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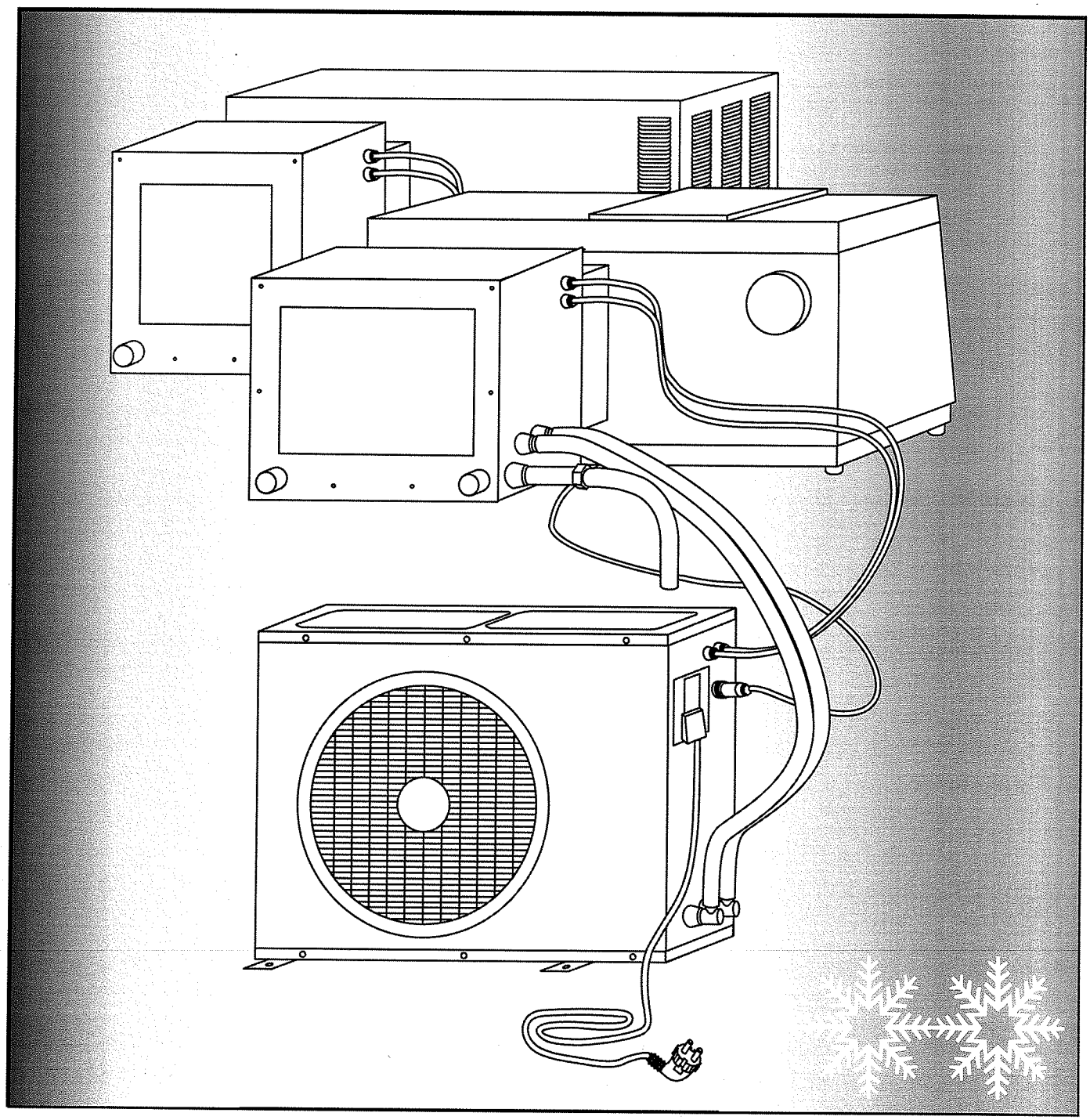
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ATLAS
MATERIAL TESTING SOLUTIONS

SunCool™
Operating Instructions



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1 Notes on Safe Operation

Dear Operator,

This device has been manufactured in accordance with the current state-of-the-art and is operationally safe. Nonetheless, this device can pose hazards, particularly if it is operated by inadequately trained personnel or if it is employed for other than its intended and designated purpose.

- For personnel responsible for working with this device, the employer shall prepare written instructions based on these operating instructions in a form that is easily understandable and in the operators' native language (FRG: Accident Prevention Code, UVV VBG 1 § 7, 2).
- Using these instructions, train the operating and cleaning personnel in the function, operation, and care of the device.
- The contents of these operating instructions are subject to change at any time, without prior notification.
- The German version of these operating instructions remains binding for translations into foreign languages.
- For safety reasons, alterations to, or modifications of, this device are prohibited.
- Should a particular problem arise which you feel is not adequately treated in these operating instructions, we urge you for your own safety to contact your supplier.

Trademarks:
SunCool™ is a registered trademark of ATLAS.

All other trademarks mentioned in these operating instructions are the sole property of the associated manufacturer.

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1 Notes on Safe Operation

Dear User,

Please note that only properly trained individuals with appropriate qualifications may work on this device:

- These Operating Instructions describe the refrigeration device:
  - SunCool 220 V, 60 Hz, and 230 V, 50 Hz

  For use in combination with the weathering devices:
  - SUNTEST CPS/CPS+ 200-240 V, 50/60 Hz;
  - SUNTEST XLS/XLS+ 200-240 V, 50/60 Hz.

- The SunCool may only be operated by authorized, qualified laboratory personnel.
- Only properly trained refrigeration/air conditioning specialists may perform maintenance and repair tasks on this device.
- Please read these operating instructions carefully prior to the first use of the SunCool in order to fully utilize the device's advantages and to avoid possible damage.
- Should a particular problem arise which you feel is not adequately treated in these operating instructions, we urge you for your own safety to contact your supplier.

Store these operating instructions securely near the device in order to be able to refer to the safety information and important operating information at any time.

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1 Notes on Safe Operation

1.1 Symbols in Operating Instructions

WARNING!

Disregarding this information can result in serious injury or death.

CAUTION!

Disregarding this information can result in slight to severe injury and property damage.

NOTE!

Provides application tips and useful information.



Warns against hazardous solvents.



Warns against electrical shock.



Warns against drowsiness hazard.



Warns against toxic materials.



Protective gloves must be worn.



Protective eyewear must be worn.



Warns against skin contact hazard.

1.2 Symbols on the Device

WARNING, HIGH VOLTAGE!

Warns against contact with components under electrical power.
Observe the safety information in the operating instructions.

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1 Notes on Safe Operation

1.3 General Safety Information

Proper use:

- The SunCool is used to supply SUNTEST weathering devices with continuously tempered refrigerated air.
- The SunCool is designed for continuous operation.
- The SunCool can be operated either in an enclosed room or at an outdoor installation.
- In order to maintain a constant room temperature when operating indoors, the installation location can be equipped with a ventilation system (technical ventilation) with a suction capacity of approx. 700 W/ 500 m^3/hr.
- The following represent the only refrigerants which may be employed:
  - Europe, R407c
  - USA, R22
- The SunCool refrigeration device can be operated from a power supply of either
  - 220 V, 60 Hz

  or
  - 230 V, 50 Hz

  It is intended to be used in combination with the following weathering devices:
  - SUNTEST CPS/CPS+ 200-240 V, 50/60 Hz
  - SUNTEST XLS/XLS+ 200-240 V, 50/60 Hz

Improper use:

- The SunCool is not intended for operation in areas in which a flame or explosion hazard exists.
- The SunCool may not be employed to air condition working or waiting areas or to refrigerate foods or temperature-sensitive substances.

The device conforms to the safety requirements set forth in:

- DIN EN 292
- DIN EN 61010
- DIN EN 50082

Disposal

- Dispose of the packaging material in accordance with locally applicable regulations. Chapter 2, Section 2.1, "Packaging Materials" contains a list of the packaging materials used.
- Used equipment contains valuable materials and should therefore not simply be taken to the nearest waste disposal site. Instead, contact your local government authorities for information regarding recycling programs in your area.

Caution- Hazardous waste!

The device employs either R22 refrigerant (220 V/ 60 Hz unit) or R407c refrigerant (230 V/ 50 Hz unit).
This refrigerants may not be disposed of by dumping them into the local sewerage/waste water system or by including containers in which they are filled in household waste.
Refrigerants must be disposed of by a specialized firm as they represent hazardous waste!

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1 Notes on Safe Operation

1.4 Safety Information: Refrigerants

Hazard information:
R407c and R22 refrigerants are classified as low toxicity chemicals. The maximum workplace concentration (MWC value) should not exceed the following limit values: Difluorochloromethane, $CHClF_2$, 1000 ppm and 3500 mg/cm^3.
Hazards when handling R407c or R22 arise in cases of:

- Direct contact with the skin;
- Prolonged exposure to refrigerant vapors;
- Reaction of the chemicals to high heat or exposed flames.

Caution - Burn hazard!



Escaping refrigerant cools rapidly. Contact with R407c/R22 can result in cold burns and frostbite.
Always wear protective clothing, gloves, respirator, and safety glasses when working on the refrigeration device.

Caution - Drowsiness!



If large quantities of R407c or R22 are released into the room's atmosphere, prolonged exposure to the resultant vapors can produce drowsiness or cardiac irregularities which will ultimately lead to death.
Immediately institute safety measures in case of extensive refrigerant leaks!

- **Immediately ventilate the room if this can be done safely.**
- **Leave the room and secure the entrances to prevent others from entering.**
- **Post notices warning against possible vapor hazards at the entrances!**
- **Call your safety department or fire department!**

Caution - Hazardous chemical reactions!



If R407c or R22 come into contact with open flames or extremely hot surfaces they will break down into toxic or irritant reaction products.
Never allow open flames to be used in the vicinity of the refrigeration device! Do not expose the refrigeration device to excessive heat!

First aid measures:
First aid measures are only intended as emergency measures or immediate measures in case of minor injury.
A physician must be contacted in all cases of excessive contact to refrigerants.

Contaminated clothing:
Immediately remove any contaminated clothing unless it is adhering to the skin. In case of such adhesion, clothing may only be removed under the supervision of a physician.

Skin contact with the refrigerant:
Allow contact areas (frostbite) to thaw by rinsing the affected area with large quantities of lukewarm water.

Eye contact with the refrigerant:
Immediately flush eyes with large amounts of saline solution. Hold eyes open for at least 10 minutes.

Inhaling refrigerant vapors:
Immediately contact an emergency physician. Keep the injured party in a well heated room. Should drowsiness or unconsciousness occur, administer CPR or oxygen, if available, accompanied by heart massage.

Refrigerant ingestion:
Immediately contact an emergency physician. Keep the individual party on their side to reduce the risk of vomiting. Never induce vomiting.
If the injured party is conscious, have them rinse their mouth thoroughly and administer approx. 200 ml - 300 ml of water.

Disposing of small amounts of R407c or R22:
Put on protective clothing and, if possible, seal the leak in the refrigerant circuit.
Escaping refrigerant vaporizes into a gas which is heavier than air and will therefore collect near the floor.
Vent the area adequately. If possible, open several doors and/or windows to create a draught.

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2 Device Delivery

2.1 Packaging

The SunCool is delivered in a sturdy shipping box. All pakkaging materials can be separated and are recyclable.

- Shipping box made of cardboard;
- Polyethylene wrapping (PE);
- Polyethylene molded parts (PE);
- Polyurethane molded parts (PU).

2.2 Standard Delivery

The SunCool is delivered for indoor installation and is fully operational at the time of delivery.
Because the device is available for different power supplies, the information regarding the required power source on the nameplate must be checked against the power supply in the intended setup area once the device has been unpakked.

The standard delivery includes:

- **Refrigeration device with preassembled connections**
  - Condenser unit;
  - Evaporator unit;
  - Hose connection, refrigerant inlet (2.5 m);
  - Hose connection, refrigerant return (2.5 m);
  - Two control wires to connect the condenser and evaporator units.
- **Set SunCool / SUNTEST interfaces**
  - Either one interface cable to operate a SunCool with a SUNTEST CPS+/XLS+ (device with program control), or;
  - One blind plug to operate a SunCool with a SUNTEST CPS/XLS (device without program control).
- **Operating instructions**

☞ **NOTE - Hose connections!**

The refrigerant circuit is a closed system. The preassembled hose connections between the condenser and evaporator units are under pressure and may not be loosened or removed.
A bend radius of at least 20 cm must be maintained when laying out the refrigerant hoses. Kinked hoses will become unusable.

2.3 Optional Equipment

- **Insulation pads for the SUNTEST CPS/CPS+ weathering devices**
  Insulation pads prevent condensation from forming on the device housing. They are glued to the surface of the device in the vicinity of the air intake opening.

- **Micropump**
  The micropump pumps the condensation water occurring at the condenser into a drain/container if the installation location makes gravity removal impossible.

- **Installation set for outdoor installation of the condenser unit**
  - Wall mounting;
  - Cables, device controls;
  - Condensation pressure regulator with assembly instructions.

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3 Installation Site Requirements

3.1 Room Environment

Climate requirements for the installation room:
The warm air generated by the compressor and evaporator units during continuous operation will result in constant changes in the room climate.
The device may therefore only be set up in adequately ventilated, dust-free areas.

- Room temperature range: 22 °C to 35 °C
- Relative humidity: 30% - 80% maximum

The installation room should be equipped with a corrosion-protected ventilation system to maintain a constant ambient environment in the room .

NOTE - Ventilation performance!

The ventilation system should be an industrial system or one of equal performance whose exhaust volume exceeds the volume flow of the refrigeration device (refer to the technical specifications).

3.2 Room Ventilation

The refrigerant is processed in various states in the refrigeration circuit. In its gaseous state, the refrigerant is heavier than air. The installation are must therefore have adequate ventilation near the floor. The doors in the installation area must be equipped with vent slots near the floor.

3.3 Heat Sources

Heat sources employing open flames or which utilize extremely hot surfaces may not be employed to heat the installation area. In case of leaks, escaping refrigerant can break down into toxic or irritating reaction products on contact with open flames or hot surfaces. The refrigeration device should not be set up in the immediate vicinity of heat sources, or be exposed to direct sunlight as the effects of both of these will increase the refrigeration system's energy consumption.

3.4 Vibrations

The compressor produces vibrations during the refrigerant liquefication process. The refrigeration device should therefore not be set up near machinery or equipment that is sensitive to vibrations.

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3 Installation Site Requirements

3.5 Space Requirements

Regardless of whether the device is set up indoors or out of doors, the following minimum spaces must be maintained around the refrigeration device's compressor unit:

- A (to the rear) 15 cm
- B (to the front) 60 cm
- C (on the left side) 15 cm
- D (on the right side) 40 cm
- E (above) 25 cm

Information concerning the weights and dimensions of the refrigeration devices:

Refrigeration device for the SUNTEST XLS/XLS+

- Weight
  Compressor unit 33 kg
  Evaporator unit (without hose) 8 kg

- Dimensions (L x W x H in mm)
  Compressor unit 700 x 600 x 350
  Evaporator unit 460 x 360 x 320

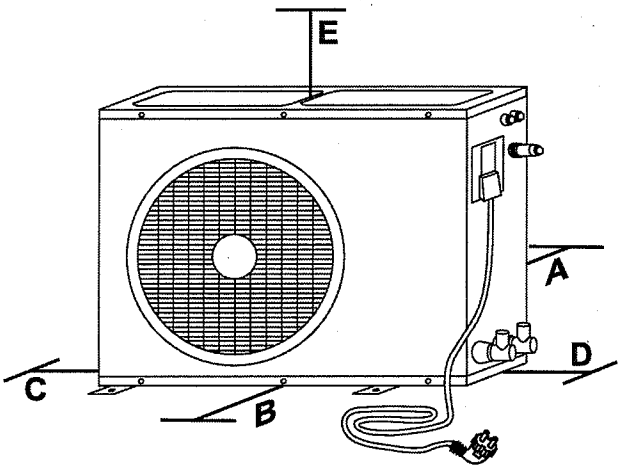
Refrigeration device for the SUNTEST CPS/CPS+

- Weight
  Compressor unit 30 kg
  Evaporator unit (without hoses) 7 kg

- Dimensions (L x W x H in mm)
  Compressor unit 700 x 600 x 350
  Evaporator unit 350 x 320 x 330

Fig. 1

Fig. 1



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4 Device Description

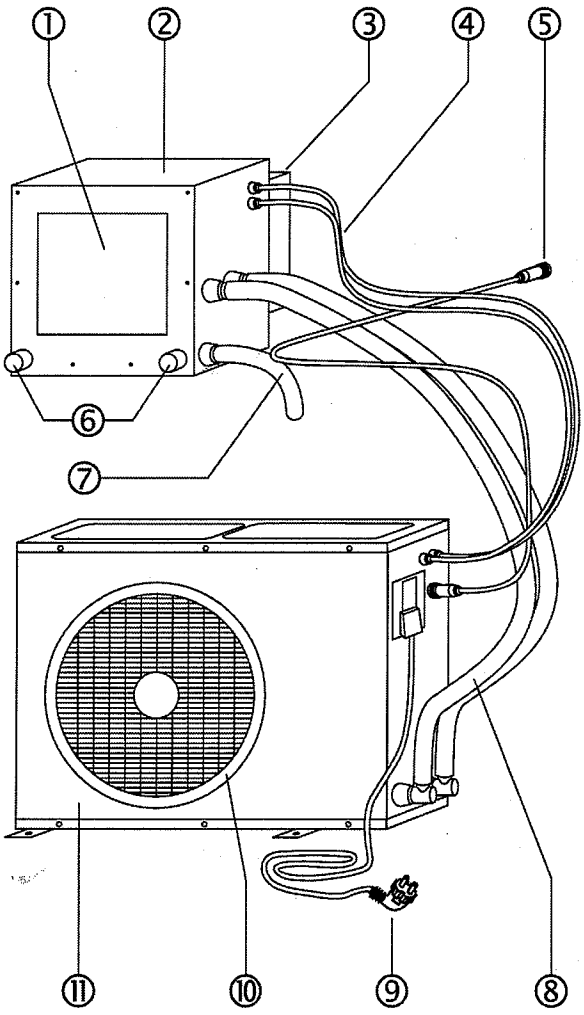
4.1 SunCool Components

The standard equipment delivery is fully preassembled for indoor setup and comprises the following components:

- **Evaporator unit** ②
  - Air intake opening with dust filter ① for the heat exchanger;
  - Air exhaust opening ③ for refrigerated air on the connection side of SUNTEST weathering devices;
  - Condensation water drain ⑦;
  - Spacer ⑥
- **Compressor unit** ⑪
  - Air intake opening ⑩ for the fan;
  - Mains power connection ⑨;
  - Refrigerant hose connections ⑧ (inlet and return);
  - Two control cables ④ 2.5 m each, to connect the compressor and evaporator units;
  - SunCool interface cable ⑤ to the SUNTEST weathering device (only for the CPS+/XLS+ versions.)

Fig. 2

Fig. 2



5 Functional Description

5.1 Function of the Refrigeration System

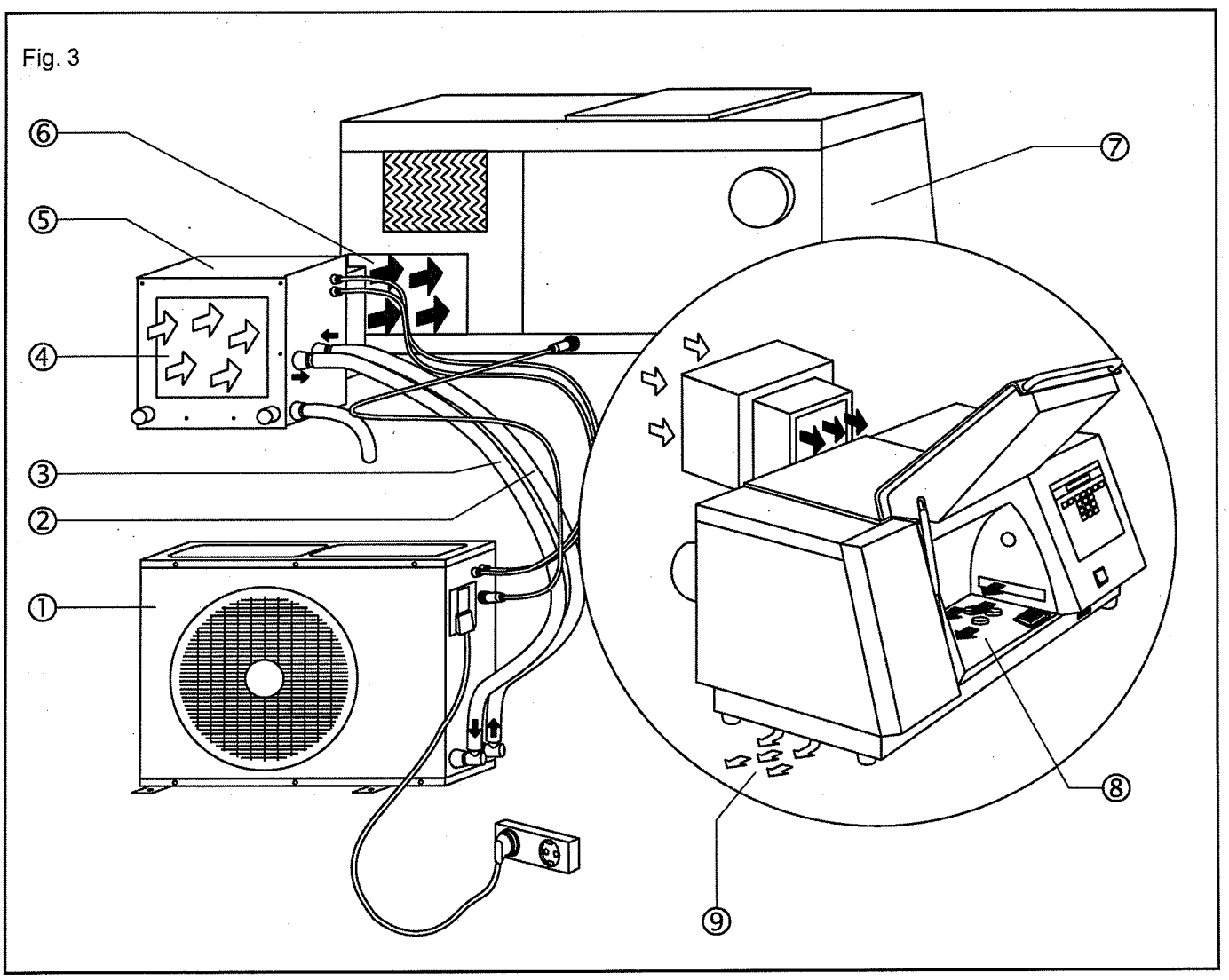
The refrigerant is introduced into the compressor unit ① in its gaseous state. In the compressor unit, the refrigerant undergoes a compression process which transforms it from its gaseous to its liquid state resulting in a reduction in the refrigerant's temperature.
In this cold, liquid state, the refrigerant passes into the evaporator unit ⑤ via the inlet line (liquid gas line) ②, where it passes through a heat exchanger. The heat exchanger panels offer a sufficiently large, metal surface area whose inherent temperature is reduced by the refrigerant as it passes through them.
The evaporator fan draws in ambient air through the air filter ④ and passes this air through the heat exchanger panels and into the air intake opening ⑥ on the weathering device ⑦. The air is refrigerated as it flows across the cold panel surfaces.

The exchange of heat with the flowing air causes the refrigerant t be warmed, returning it to its gaseous state. The refrigerant returns to the compressor unit via the return line (suction gas line) ③ where the refrigeration process is repeated.
The air refrigerated at the heat exchanger is passes through the sample chamber ⑧ where it produces a correspondingly tempered atmosphere before exiting the weathering device through the exhaust air channels ⑨ , either into the room or to the outdoors via a ventilation system.

NOTE - Icing:

To prevent the evaporator unit from icing up, the SUNTEST device should always be operated at its maximum fan speed.

Fig. 3



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5 Functional Description

5.2 Refrigeration: SUNTEST CPS+/XLS+

For the SUNTEST CPS+ and SUNTEST XLS+ the refrigeration unit is connected to the weathering device's program controller via an interface cable.

- The introduction of refrigerated air can be varied for different test cycles based on time.
- The temperature values of the introduced air depend on the ambient climatic conditions at the setup location. The table lists the anticipated values for cold and warm air (exhaust and intake) as dependent on the ambient temperature.

5.3 Refrigeration: SUNTEST CPS/XLS

Constantly refrigerated air is passed into the sample chamber of model SUNTEST CPS/XLS weathering devices.

- The temperature values of the intake air are dependent on the climatic conditions at the setup location. The table provides information concerning the anticipated values of the cold and warm air (exhaust and intake) as dependent on the ambient temperature.

5.4 Exhaust Temperatures

The following tables provide an overview and help in understanding why the exhaust temperature is not the same at different setup locations.
The energy content of the air depends on the relative humidity, the air pressure, the ambient temperature, and the air's level of contaminants.
With regard to refrigeration capability however, a refrigeration unit has only a given own capacity. Any additional regulation can only be achieved at a significant expense.

Tab. 1

Table 1
Anticipated values of the cold and warm air (exhaust and intake) as dependent on the ambient temperature and assuming that the humidity remains unchanged.

	Unit			Design				
Volume flow	m³/hr.	250,00	250,00	250,00	250,00	250,00	250,00	250,00
Intake air temp.	°C	20,00	21,00	22,00	23,00	24,00	25,00	26,00
Intake air rel. humidity	%	40,00	40,00	40,00	40,00	40,00	40,00	40,00
Exhaust air temp.	°C	6,00	7,00	7,00	8,00	8,50	9,50	10,00
Exhaust air rel. humidity	%	90,00	90,00	90,00	90,00	90,00	90,00	90,00
On-site air pressure	hPa	1.013,15	1.013,15	1.013,15	1.013,15	1.013,15	1.013,15	1.013,15
Intake air density	kg/m³	1,20	1,20	1,19	1,19	1,18	1,18	1,17
Exhaust air density	kg/m³	1,26	1,26	1,26	1,25	1,25	1,24	1,24
Dew point temp.	°C	5,99	6,88	7,77	8,66	9,55	10,45	11,34
Intake air w ater content	g/kg of air	5,80	6,17	6,56	6,97	7,41	7,87	8,36
Exhaust air w ater content	g/kg of air	5,22	5,60	5,60	6,00	6,21	6,65	6,88
Dehumidifying	g/kg of air	0,57	0,57	0,96	0,98	1,20	1,23	1,49
Exhaust air rel. humidity	%	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Intake air pressure	kJ/kg	34,79	36,75	38,76	40,83	42,96	45,16	47,42
Exhaust air pressure	kJ/kg	19,14	21,10	21,10	23,12	24,16	26,28	27,37
Air mass flow rate	kg/s	0,09	0,09	0,09	0,09	0,09	0,09	0,09
Q, air	W	-1.362,06	-1.356,25	-1.530,15	-1.527,94	-1.618,71	-1.618,15	-1.714,71
Q, sensitized	W or	1.236,98	1.232,75	1.321,62	1.317,22	1.359,37	1.354,94	1.396,99
Q, latent	W or	125,08	123,50	208,53	210,71	259,34	263,21	317,72
Condensation w ater	kg/hr.	0,18	0,18	0,30	0,30	0,37	0,38	0,46

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5 Functional Description

Tab. 2

Table 2
Anticipated values of the cold and warm air (exhaust and intake) as dependent on the relative humidity and assuming that the temperature remains unchanged.

	Unit			Design				
Volume flow	m³/hr.	250,00	250,00	250,00	250,00	250,00	250,00	250,00
Intake air temp.	°C	22,00	22,00	22,00	22,00	22,00	22,00	22,00
Intake air rel. humidity	%	30,00	35,00	40,00	45,00	50,00	55,00	60,00
Exhaust air temp.	°C	6,00	6,00	7,00	7,60	8,50	9,20	10,00
Exhaust air rel. humidity	%	90,00	90,00	90,00	90,00	90,00	90,00	90,00
On-site air pressure	hPa	1.013,15	1.013,15	1.013,15	1.013,15	1.013,15	1.013,15	1.013,15
Intake air density	kg/m³	1,19	1,19	1,19	1,19	1,19	1,19	1,19
Exhaust air density	kg/m³	1,26	1,26	1,26	1,25	1,25	1,25	1,24
Dew point temp.	°C	3,63	5,83	7,77	9,51	11,09	12,53	13,87
Intake air w ater content	g/kg of air	4,91	5,73	6,56	7,39	8,22	9,06	9,89
Exhaust air w ater content	g/kg of air	5,22	5,22	5,60	5,83	6,21	6,51	6,88
Dehumidifying	g/kg of air	-0,31	0,51	0,96	1,55	2,01	2,54	3,02
Exhaust air rel. humidity	%	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Intake air pressure	kJ/kg	34,56	36,66	38,76	40,87	42,99	45,11	47,23
Exhaust air pressure	kJ/kg	19,14	19,14	21,10	22,31	24,16	25,64	27,37
Air mass flow rate	kg/s	0,09	0,09	0,09	0,09	0,09	0,09	0,09
Q, air	W	-1.343,24	-1.524,76	-1.530,15	-1.603,46	-1.619,33	-1.668,81	-1.696,18
Q, sensitized	W or	1.411,73	1.413,48	1.321,62	1.267,58	1.186,05	1.123,45	1.052,03
Q, latent	W or	-68,49	111,28	208,53	335,89	433,28	545,36	644,15
Condensation w ater	kg/hr.	-0,10	0,16	0,30	0,48	0,62	0,78	0,93

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5 Functional Description

5.5 Setting the Test Parameters

Tab. 3

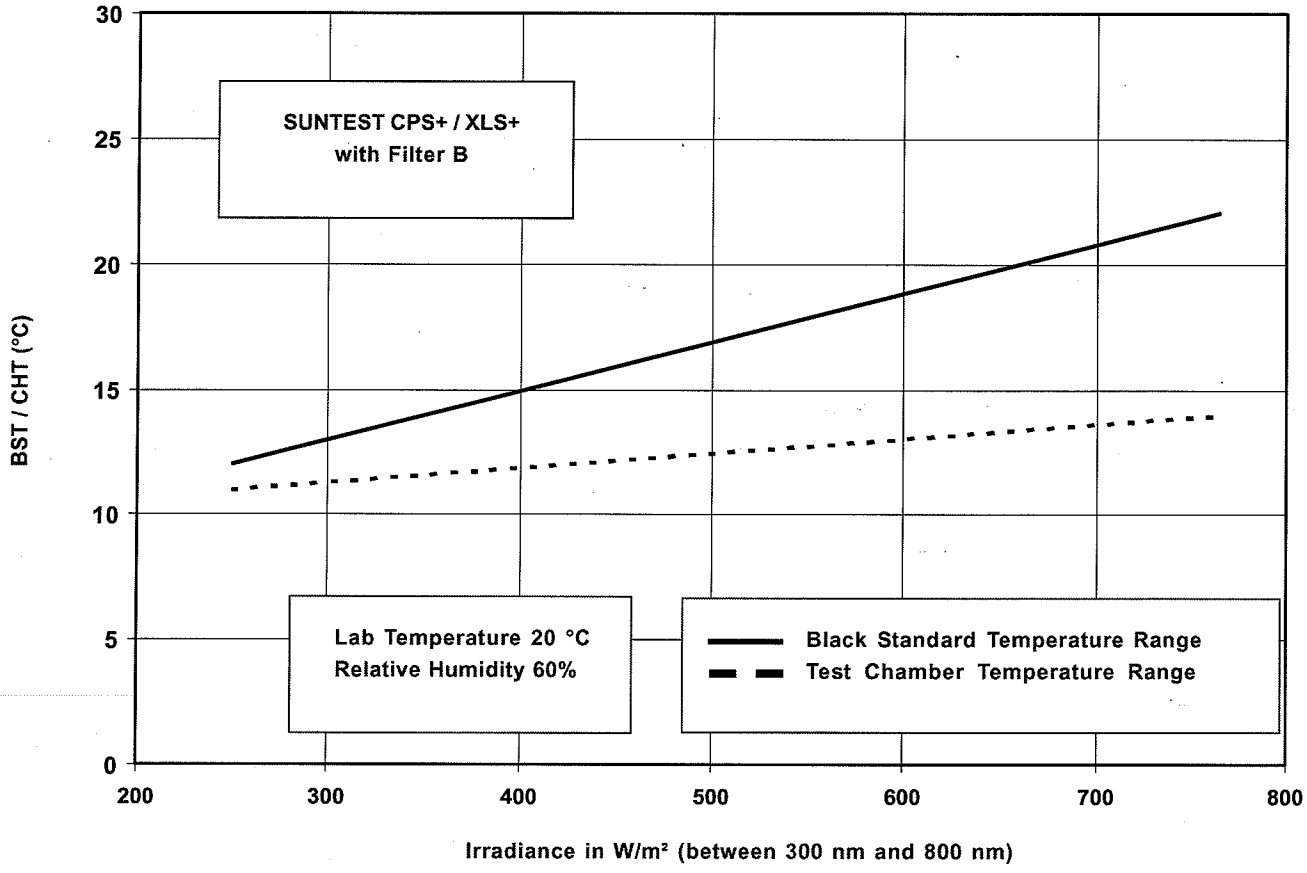
The minimum test chamber temperature (CHT) and black standard temperature (BST) in the SUNTEST device depend directly on the ambient temperature. The higher the ambient temperature, the higher the refrigeration device intake temperature and, consequently, the higher the minimum CHT and BST.
To prevent the evaporator unit from icing up, the SUNTEST device should always be operated at its maximum fan speed (BST control = 0).
The SUNTEST device can, however, also be operated at a black standard temperature (BST) that is slightly higher than the minimum BST. This precise BST point must be determined experimentally:

1. Set the SUNTEST device fan to its maximum speed (enter "0" for BST control in the program controller).
2. Register the temperature and then set the BST control slightly higher (2°C to 3°C).
3. Monitor the evaporator to see whether or not icing occurs.
4. Correct the BST setting as required.

The black standard temperature in the SUNTEST device can also be influenced by altering the distance between the evaporator unit and the air intake opening on the SUNTEST device. The relationship between distance and temperature increase under a given set of ambient climatic conditions must also be determined experimentally (refer to Sec. 7.1):

1. To slightly increase the black standard temperature, move the evaporator unit away from the air intake opening.
2. Register the temperature.
3. Monitor the evaporator to see whether or not icing occurs.
4. Adjust the distance as required.

The diagram shows the sample chamber and black standard temperatures that can be achieved by both these methods.



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6 Commissioning

6.1 Preparation

The following preparation tasks are necessary in order to operate a SunCool refrigeration device in conjunction with a SUNTEST weathering device:

1. Remove the filter mat on the SUNTEST device air intake opening.
2. Insulate the weathering device housing surface (optional).
3. Connect the drain hose to the evaporator unit. Optionally connect the micropump for the waste water to the connecting piece on the evaporator unit.
4. Set up the compressor unit.
   Optionally, set up the compressor unit at a separate location and lay the refrigerant lines, electrical power line, and the connecting lines between the compressor unit and evaporator unit accordingly.
5. Set up the SUNTEST weathering device and attach the compressor unit to it.
6. If you are using a SUNTEST CPS+/XLS+ weathering device, connect the compressor unit to the weathering device via the interface cable.
7. Connect the evaporator unit's drain hose to a waste water container of drain channel.
   Optionally, connect the micropump's drain hose to a waste water container of drain channel.
8. Connect the compressor unit to the mains power supply.
9. Connect the weathering device to the mains power supply and start the device.

Insulating the weathering device surfaces

The three-part insulation pads prevent the formation of condensation on the surface in the following areas:

- Air intake opening ② on the SUNTEST CPS/CPS+ ①,
- Air intake opening ④ on the SUNTEST XLS/XLS+ ③.

NOTE - Adhesive strength:

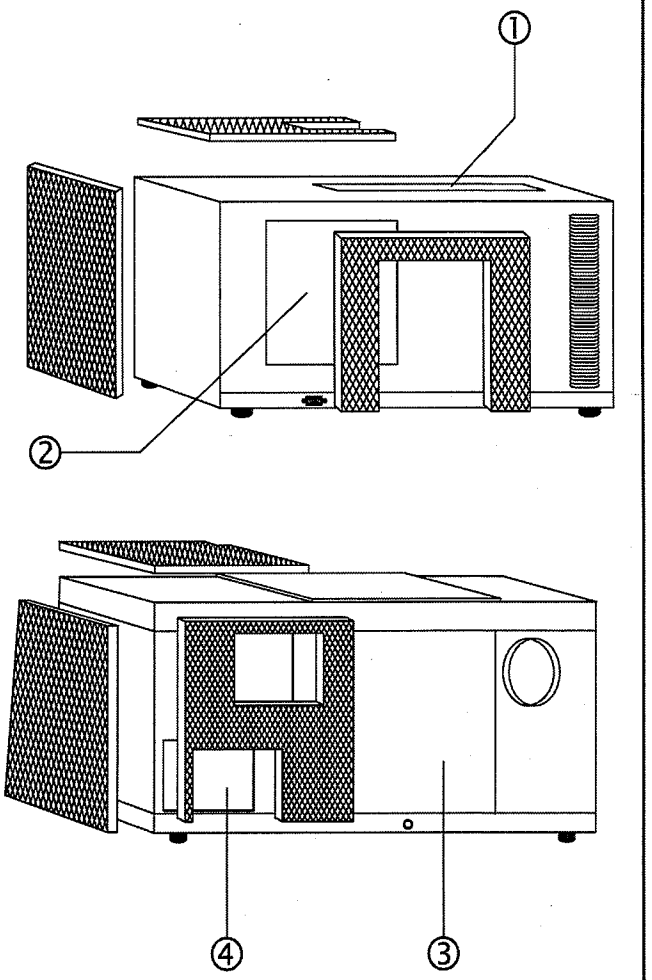
The insulation pads employ a very strong adhesive and, once stuck in place, are extremely difficult to remove. You should therefore mark the positions of the pads on the housing surface before actually gluing them in place.

Attaching the insulation pads:

1. Using a commercially available cleaner, clean the housing surface. The surface must be free of dust and grease and must be dry.
2. Mark the intended positions on the right and rear sides of the device, remove the protective paper on the pad adhesive surface, put the pads in position, and press them into place.

Fig. 4

Fig. 4



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6 Commissioning

Connecting the evaporator unit's condensation drain:

The condensation formed in the evaporator unit during heat exchange flows out of the drain connector ④.

The condensation can be collected in a container. Alternately, the condensation can be fed directly into your facility's waste water drain system. To do this, the evaporator unit must, however, be set up high enough to permit gravity drainage.

1. **Fig. 5:** Place gasket ⑤ into the spigot nut ②, attach the drain hose ③ to the connecting piece ① on the evaporator unit and tighten the spigot nut.
2. Connect the other end of the hose to the waste water container or drain. Make sure the waste water container cannot tip over.

Connecting a drain pump:

If the created condensation must be pumped away, a micropump can be connected between the evaporator unit's connecting piece and the drain hose. The micropump is equipped with an internal float valve so that it only comes on when a specific amount of condensation has collected.

1. **Fig. 6:** Place gasket ② into the spigot nut ③, attach the micropump's connecting piece ③ to the connecting piece ① on the evaporator unit and tighten the spigot nut.
2. lay the micropump's drain hose to the waste water container or drain.

WARNING - Electrical hazard:

Contact with components under power can result in life-threatening electrical shock. Inspect the micropump's power cord and plug for damage before connecting the pump to the mains power supply.
Damaged parts may not be used to connect the pump to the power supply!

3. Plug the micropump's power plug ⑥ into a properly grounded and protected wall outlet.
4. Make sure the power cord is not subject to any tension or strain.

Fig. 5/6

Fig. 5

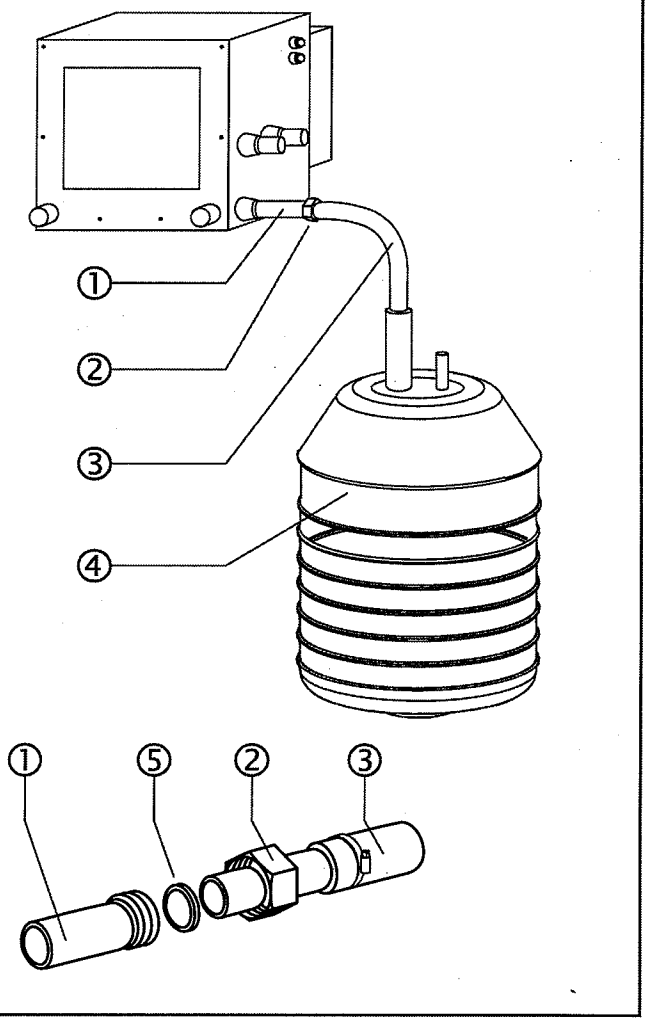
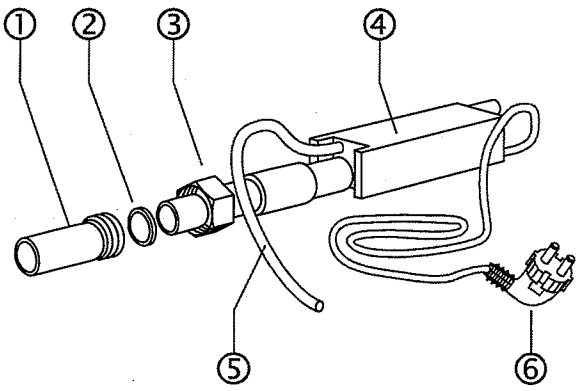


Fig. 6



6 Commissioning

6.2 Indoor Installation

In order to prevent the compressor unit's fan from drawing in heated test area air, the devices are ideally positioned with respect to one another so that the compressor unit ⑥ faces the air intake openings ② on the SUNTEST device. The compressor unit can be set up separately on the floor or, in combination with the weathering device, on a workbench or a shelf under the work area.
If the device combination is set up on a work surface, no other equipment that is sensitive to vibrations should be located on the same surface. The compressor generates oscillation waves when liquefying the refrigerant. These oscillations can damage equipment sensitive to vibrations.

NOTE - Condensation!

At low room temperatures, small amounts of condensation can form on the compressor unit when the refrigeration device is first started. When selecting the setup location, make sure that any dripping condensation will not cause any damage.
The SUNTEST unit ③ and the evaporator unit ① should always be set up on a surface that lies above the compressor unit ⑥.

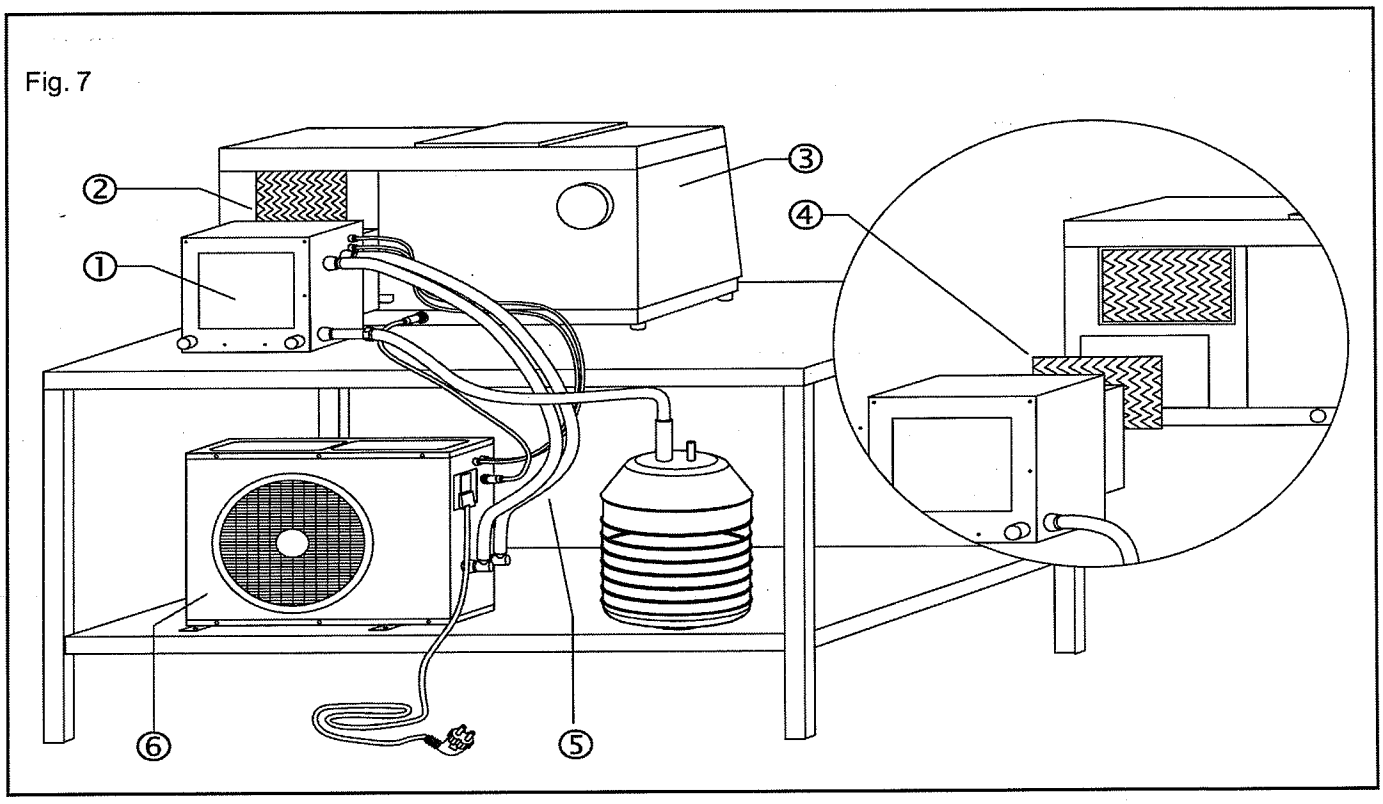
Setting up the devices:

1. Set up the SUNTEST device ③.
2. Set up the refrigeration device compressor unit. Remember that the length of the hose/cable connections ⑤ to the evaporator unit may not exceed 2.5 m. Check that the minimum distances to surrounding surfaces has been maintained. Align the compressor unit horizontally and check that the unit stands firmly and securely.
3. remove the filter mat ④ from the SUNTEST device's air intake opening. Set the refrigeration device evaporator unit ① up close to the weathering device air intake opening. No further connecting hardware is required to join the devices.
4. When laying the hose connections between the individual devices, make sure that no bend radii exceed 20 cm.
5. Make sure none of the hoses and cables are stressed or strained.

NOTE - Refrigerant settling!

If the compressor unit was tilted or flipped over during shipping or set up, you must wait at least two hours before starting the refrigeration device in order to allow the refrigerant to collect in the compressor unit.

Fig. 7



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6 Commissioning

6.3 Outdoor Installation

NOTE - Installation work!

If the compressor unit is to be installed outdoors, only authorized air conditioning and electrotechnical specialists may install the refrigerant inlet and return lines and perform the electrical and connecting cable connections.

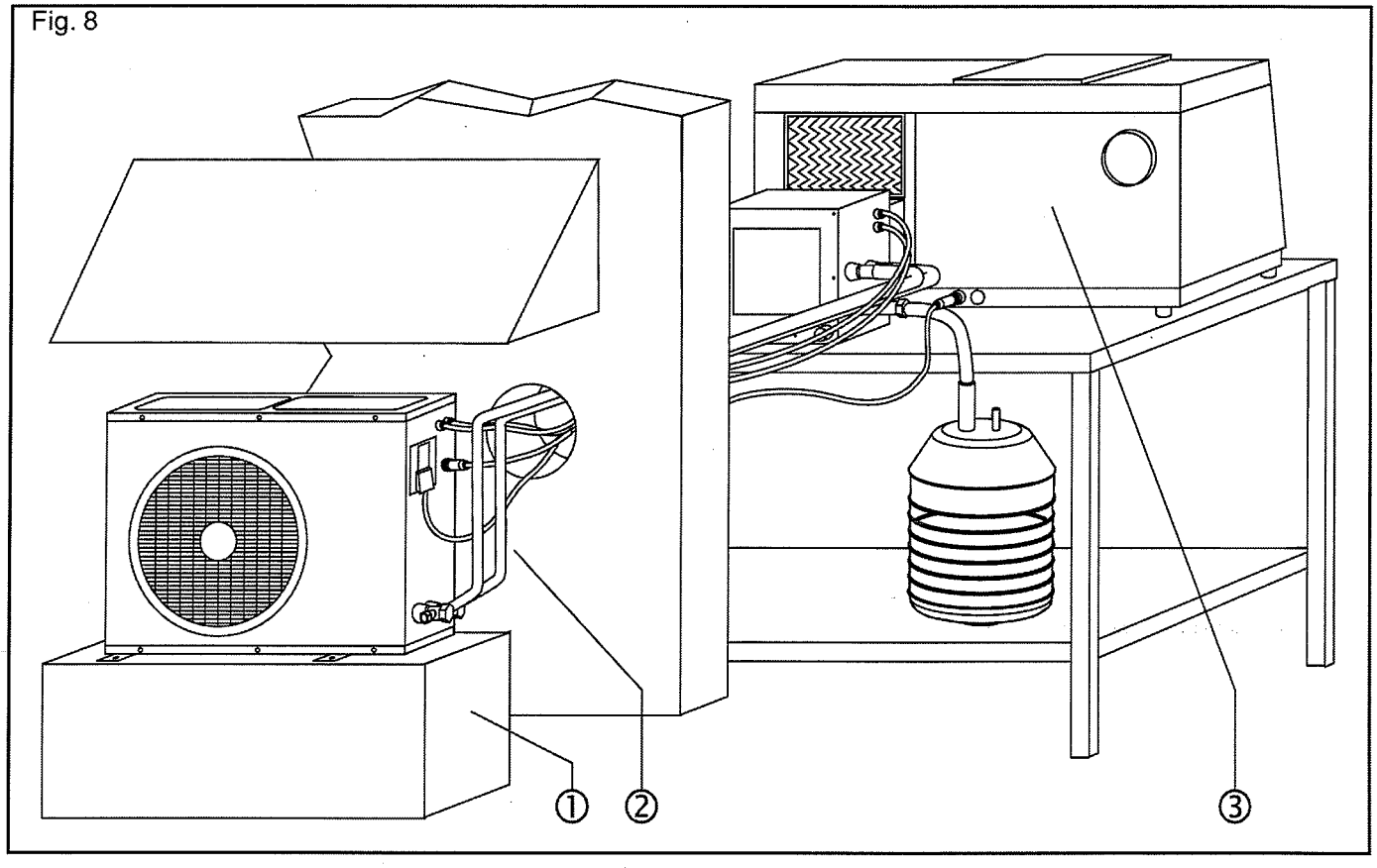
Installation site:
For outdoor installation, the compressor unit should be set up in an area protected against direct sunlight and rain. To protect the unit from water and snow collecting on the ground, the installation location ① should lie approx. 20 - 30 cm above the ground or outdoor surface, or the compressor unit should be mounted on a correspondingly tall pedestal. Proper spaces to all surrounding surfaces must be maintained (Sec. 3.5).
At low outdoor temperatures, the operation of the compressor unit causes condensation. The installation location must therefore be selected in an area where dripping condensation will not cause damage.
The difference in height between the compressor unit installation location and the setup location of the evaporator unit/SUNTEST device combination ③ may not exceed 5 m. Refer to Sec. 6.2 for the setup requirements for these units.

NOTE - Winter operation!

If, for an outdoor installation, the compressor unit operates in areas where the temperature can fall below 19 °C, the supplied condensation pressure regulator must be installed.

Tubing:
For outdoor installation, the inlet and return lines ② must be made of refrigeration grade soft copper tubing (Amaflex™). The pipe length may not exceed 25 m.
The supplied, standard hose connections may not be used for this type of installation.
The inlet and return lines must be as straight as possible. If curves are unavoidable, the interior diameter of the tubing must not be reduced by compression. The bend radius must be at least 20 cm.

Fig. 8



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6 Commissioning

Pipe connections:
Pipe connections to the compressor unit are made via the two valves ① and ②. Valve ② for the inlet line is also equipped with a maintenance connection ⑥ with a Schrader valve. For this, the pipes to be installed at the site ③ must be equipped with a spigot nut ④ and have a flared end ⑤.

NOTE - Flared end!

The flare should have a uniform wall length. Make sure no burrs, dust, or other foreign objects fall into the tube, otherwise the refrigerant circuit may become blocked at the capillary level, causing the compressor to seize up.

Refrigerant volume:
750 g of refrigerant are adequate to supply a tubing system (inlet and return lines) with an overall length of 7.5 m. If the tubing system exceeds this length, an additional 15 g of refrigerant must be added to the circuit for each additional meter of tubing.
Refrigerant is added at the maintenance connection ⑥ through the Schrader valve.

Performing a seal test:
To check the circuit for proper sealing, apply pressure to the inlet line (liquid line) and the return line (suction gas line) for approx. 30 minutes.

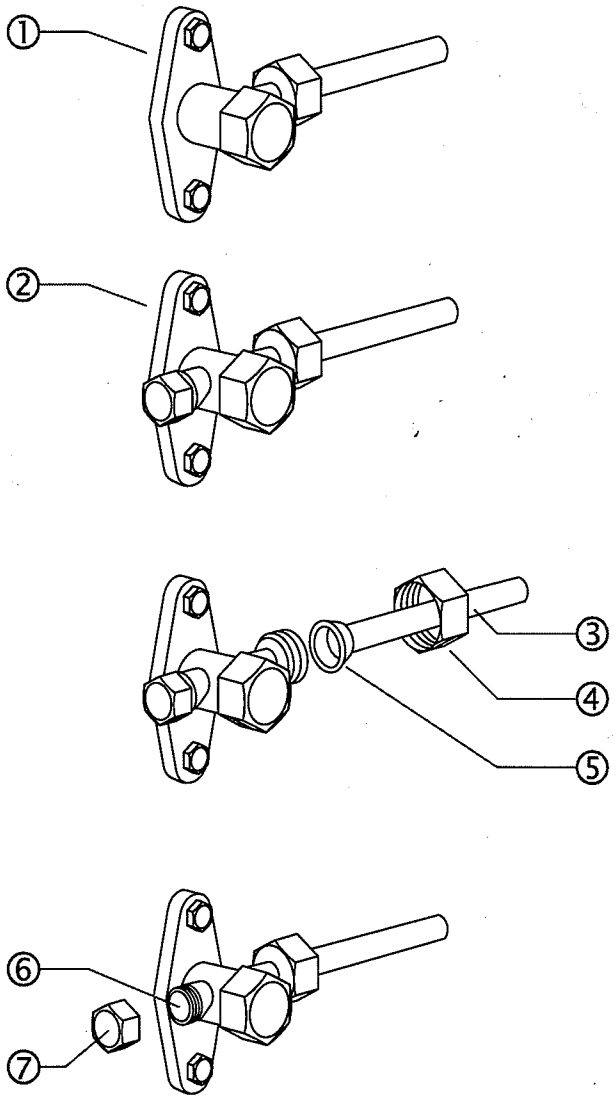
NOTE - Valve closure position!

During the seal test, the shut-offs on the compressor unit valves must not be opened.

1. Screw the tubes to the valves on the compressor unit and the connecting pieces on the evaporator unit.
2. Connect a vacuum pump to the maintenance opening ⑥ on the compressor unit return valve.
3. Pump out the tubing system until an absolute pressure of 0.1 bar is reached.
4. Switch the vacuum pump off. Measure the pressure again after 30 minutes. **The tubing system must maintain a constant pressure of 0.1 bar.**
5. Pull the vacuum pump connecting hoses off the shut-off maintenance opening and tightly seal the maintenance opening with the closure plug ⑦.

Fig. 9

Fig.9



6 Commissioning

Opening the refrigeration circuit:

1. Unscrew the closure plugs ① and ④ from the valves.
2. Using an offset socket wrench ②, completely open the shut-offs ③ and ⑤ on both valves. Slowly turn the shut-offs counterclockwise until they reach their end stops.
8. Reinstall the closure plugs ① and ④ on the valves and tighten them until their torque increases noticeably. To completely seal the plugs, turn them an additional quarter-turn.

NOTE - Leak test!

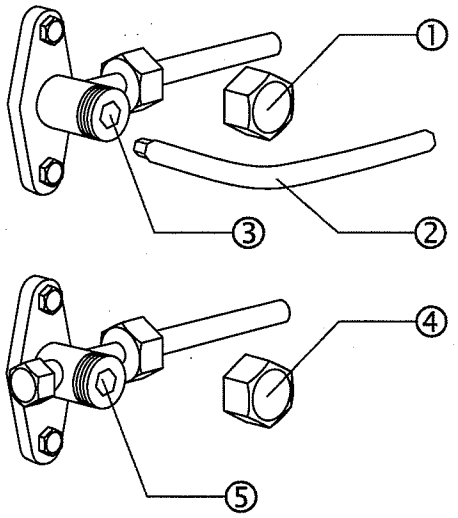
After completing the seal test and opening the refrigerant circuit, the entire system must undergo a leak test using a leak indicator.

Checking the refrigerantlevel:

A portable Freon manometer with a ¼ SAE screw-on connection can be used to perform this check. The vacuum pump is connected to the valve maintenance connection. The registered pressure must correspond to the saturation pressure at the ambient room temperature (–7 °C/approx. 2 bar).

Fig. 10

Fig.10



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6 Commissioning

6.4 Electrical Connections

Connecting the blind plug:
If the refrigeration device is used in connection with a **SUNTEST CPS/XLS** weathering device, the blind plug ⑦ must be installed in the connecting socket ③ on the compressor unit.

Connecting the interface cable:
The compressor unit is linked to the **SUNTEST CPS+/XLS+** by the interface cable ①.

1. Insert the plug-in connection with the threaded connector ⑥ into the socket ③ on the compressor unit and tighten the connection.
2. Insert the plug-in connection with the spigot nut ⑤ into the socket ① on the back of the SUNTEST CPS+ and tighten the spigot nut.
3. Make sure the interface cable is free of stress and strain.

Connecting the refrigeration device to the mains power supply:

WARNING - Electrical hazard:

Contact with components under power can result in life-threatening electrical shock.
Inspect the power cord and plug for damage before connecting it to the mains power supply.
Damaged parts may not be used to connect the pump to the power supply!

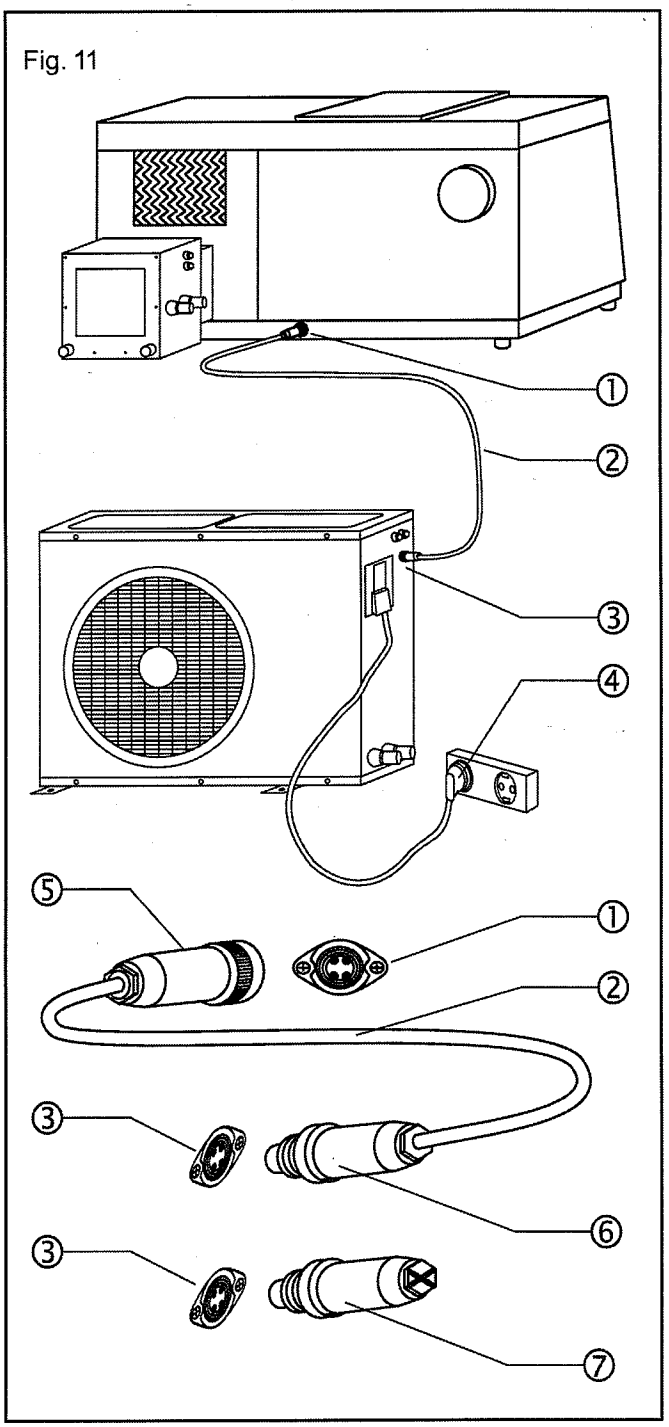
1. Before connecting the device to the mains power supply, check the power requirements on the refrigeration unit nameplate against your facility's mains power supply specifications. If the two values do not agree, the refrigeration unit may not be connected!
2. Plug the compressor unit's power plug ④ into a properly grounded and protected wall outlet.
   The refrigeration process starts.
3. Make sure the power cord is not subject to any tension or strain.

NOTE - Permanent connection!

If the compressor unit is installed outdoors, power to the refrigeration unit should be supplied via a permanent connection.

Fig. 11

Fig. 11



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7 Operation / Taking the Device Out of Service

7.1 Starting the Refrigeration Process

The refrigeration device must undergo a brief safety check prior to every start:

- Check that the refrigerant hoses have an adequate bend radius and are not kinked.
- Check whether any refrigerant is leaking from the refrigerant hoses or their connections.
- Check that condensation water produced by the compressor unit is being drained into a waste water container or drain system.

Switch the device on:

1. Plug the compressor unit's power plug into a properly grounded and protected wall outlet.
   The refrigeration process starts.
2. Switch the SUNTEST device on.

NOTE - Delayed start of cooling!

Due to physical reasons the cooling process of the SunCool will only start a few minutes after having switched on the chiller.
If this control behaviour might be critical for example for temperature sensitive specimens, you could programm an exposure test in the SUNTEST, beginning with a 5- to 10-minute dark phase.

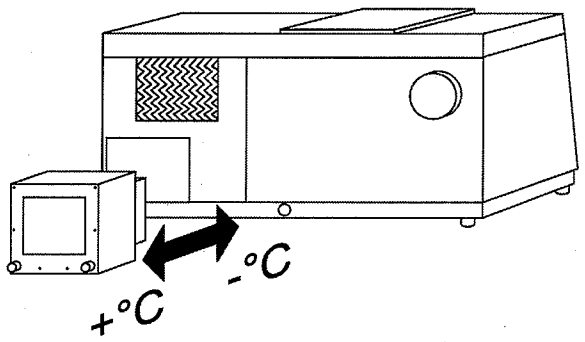
7.2 Switching the Devices Off

To take the system out of service, the devices comprising the SunCool/SUNTEST combination must be switched off separately in the following sequence:

1. Switch the **compressor unit** off, pull the plug out of the wall outlet or switch the permanent connection off.
2. Switch the **weathering device** of at its ON/OFF switch.
3. If a micropump is used to remove the condensation, the micropump must also be switched off to take the devices out of service. To do this, pull the micropump power plug out of the wall socket.
4. Allow the condensation to drain out of the hose and empty the waste water container, if required.

Fig. 12

Fig. 12



NOTE - Cold air volume!

As a rule, continuously refrigerated air is passed into the sample chamber.
The air temperature can be adjusted upward by varying the distance between the evaporator unit and the air intake opening on the weathering device.
Because the temperature value depends on the ambient conditions at the installation location, the amount the air temperature changes by varying the distance between the devices must be determined experimentally.
However, in order to obtain the full refrigeration capability, the evaporator unit must abut directly against the weathering device.

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8 Fault Correction

Tab. 4

Problem	Probable cause	Corrective action
SunCool fails to start.	Device not connected to the mains power supply.	Connect the device to the mains pow
	Interface cable not connected.	Check the connection.
	Dummy plug not installed.	Install the dummy plug.
	Main power circuit breaker/fuse faulty.	Check mains power circuit breaker/fuse.
	Device is not triggered by the Suntest.	Program triggering via supplementary function No.4.
SunCool switches itself off or exhibits reduced cooling	Air intake openings blocked.	Clear air intake openings.
	Ventilation openings or air filter clogged.	Clean ventilation openings or air filter.
	Ambient temperature below 18°C (SunCool will not start).	Bring ambient temperature up to 22°C.
	Coolant system leaking.	Inform Tech. Service.
	Hose between SUNTEST and SunCool has a kink.	Make sure any bend radius is less than 20 cm.
	Difference in the device heights is too great (outdoor installation).	Reduce height difference to max. 5 m.
	Faulty pressure regulator compressor (outdoor installation).	Inform Tech. Service.
Strong vibrations during operation	Functional fault	Inform Tech. Service.
Continuous noise during operation	Functional fault	Inform Tech. Service.

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9 Maintenance

9.1 Inspection

The device must be inspected annually.
In particular, the following must be included as part of this inspection:

- Refrigerant level check;
- Condition of the refrigerant lines;
- Function and safety of the electrical components.

NOTE - Hose condition!

If a refrigerant hose is bent or kinked, it may no longer be used to operate the refrigeration unit and must be immediately replaced.

NOTE - Warranty!

The manufacturer only warrants the safe and proper operation of the device under the condition that:

- The inspection intervals have been maintained, and;
- All inspections and any required repairs are performed by properly trained and qualified personnel or by members of the Technical Service Department of ATLAS MTT GmbH.

9.2 Repairs

Repairs may only be performed by properly trained and qualified refrigeration/air conditioning specialists or by members of the Technical Service Department of ATLAS MTT GmbH.
Only OEM replacement parts may be used.
ATLAS assumes no liability for device components or parts from third-party manufacturers.

9.3 Maintenance

- The evaporator unit air filter must be inspected weekly. If dust and dirt residue is clearly visible, the filter must be cleaned. The air filter must also be cleaned at least once every six months as part of the standard maintenance interval. (Refer to Sec. 9.4, "Cleaning".)
- Dust and dirt residue which collects at the air intake and exhaust openings on the compressor unit must be vacuumed off at least every six months.
- All other components of the SunCool system are maintenance free.

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9 Maintenance

9.4 Cleaning

WARNING - Electrical hazard:

Contact with components under power can result in life-threatening electrical shock.
- **Unplug the power cord from the wall outlet and secure it to prevent accidental reconnection.**
- **Check to make sure the device is not under power.**

Cleaning the device surfaces:

CAUTION - Plastic surfaces!

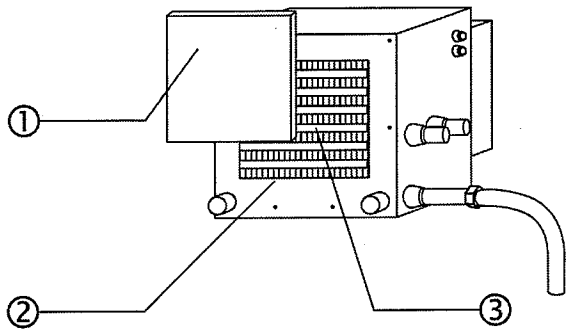
Parts of the device surface are made of plastic. Solvents can dissolve plastic, making it unusable.
Do not use solvents containing hydrocarbons to clean the device surfaces.

Wipe the device surfaces down with a soft cloth and lukewarm water containing a commercial dishwashing liquid, then use a clean, soft, lint-free cloth to thoroughly dry all surfaces.

Cleaning the air filter:
The air filter mat is simply inserted in the air intake opening on the evaporator unit.
1. Pull the filter mat ① out of the air intake opening ②.
2. Shake the filter mat or use a vacuum cleaner to remove the dust and dirt residue.
3. Vacuum the surface of the heat exchanger ③.
4. Wash the filter mat in lukewarm water containing a mild soap solution (dishwashing liquid) and allow it to dry thoroughly.
5. Replace the filter mat in the air intake opening.

Fig. 13

Fig. 13



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10 Technical Specifications

10.1 SunCool for SUNTEST CPS/CPS+

Electrical specifications

SunCool, 220 V/ 60 Hz version

• Mains voltage	220 V, 60 Hz
• Mains connection	NEMA 6-20P
• Startup current	19 A (transitory)
• Current consumption	4 A, max.
• Fuse	15 A
• Power consumption	0.8 kW, max.

SunCool, 230 V/ 50 Hz version

• Mains voltage	230 V ± 10%, 50 Hz
• Mains connection	(1, N, PE) AC or (2, PE) AC
• Startup current	19A (transitory)
• Current consumption	4 A, max.
• Fuse	16 A
• Power consumption	0.8 kW, max.

Refrigeration performance:

SunCool, 220 V/ 60 Hz version

• Volume flow (room)	260 m^3 /hr.
• Refrigeration performance	approx. 1.6 kW

SunCool, 230 V/ 50 Hz version

• Volume flow (room)	250 m^3 /hr.
• Refrigeration performance	approx. 1.6 kW

Dimensions and weights

Compressor unit

• Dimensions, in mm (width x depth x height)	700 x 600 x 350
• Weight	30 kg, w./o. connections

Evaporator unit

• Dimensions, in mm (width x depth x height)	350 x 320 x 330
• Weight	7 kg, w./o. connections

Noise generation

• Compressor unit	< 60 dB (A) at 1 m
• Evaporator unit	< 60 dB (A) at 1 m

Ambient conditions

• Room temperature range	22 °C to 35 °C
• Relative humidity	30% - 80%
• Air pressure	700 - 1060 hPa

Hose connections

• Length, in m	2.5 m
• Temperature range	-35 °C to +120 °C
• Smallest bend radius	200 mm

Refrigerant

• 220 V/ 60 Hz device	R407c
• 230 V/ 50 Hz device	R407c
• Fill volume	750 g

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10 Technical Specifications

10.2 SunCool for SUNTEST XLS/XLS+

Electrical specifications

SunCool, 220 V/ 60 Hz version

• Mains voltage	220 V, 60 Hz
• Mains connection	NEMA 6-20P
• Startup current	34 A (transitory)
• Current consumption	5 A, max.
• Fuse	15 A
• Power consumption	1.1 kW, max.

SunCool, 230 V/ 50 Hz version

• Mains voltage	230 V ± 10%, 50 Hz
• Mains connection	(1, N, PE) AC or (2, PE) AC
• Startup current	25 A (transitory)
• Current consumption	5 A
• Fuse	16 A
• Power consumption	1.1 kW, max.

Refrigeration performance

SunCool, 220 V/ 60 Hz version:

• Volume flow (room)	450 m^3 /h
• Refrigeration performance	2.6 kW

SunCool, 230 V/ 50 Hz version

• Volume flow (room)	450 m^3 /h
• Refrigeration performance	2.6 kW

Dimensions and weights

• Dimensions, in mm (width x depth x height)	700 x 600 x 350
• Weight	33 kg, w./o. connections

Evaporator unit

• Dimensions, in mm (width x depth x height)	460 x 360 x 320
• Weight	8 kg, w./o. connections

Noise generation

• Compressor unit	< 60 dB (A) at 1 m
• Evaporator unit	< 60 dB (A) in 1 m

Ambient conditions

• Room temperature range	22 °C to 35 °C
• Relative humidity	30% - 80%
• Air pressure	700 - 1060 hPa

Hose connections

• Length, in m	2.5 m
• Temperature range	-35 °C to +120 °C
• Smallest bend radius	200 mm

Refrigerant

• 220 V/ 60 Hz device	R407c
• 230 V/ 50 Hz device	R407c
• Fill volume	750 g

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11 Accessories

Insulation pads, SUNTEST XLS/XLS+	56077983
Insulation pads, SUNTEST CPS/CPS+	56077904
Micropump (= condensation pump), 50 Hz	56078463
Micropump (= condensation pump), 60 Hz	56078464
Air filter SunCool CPS	56055110
Air filter SunCool XLS	56055111
Installation kit (for outdoor installation of the compressor unit), 50 Hz	56078465
Installation kit (for outdoor installation of the compressor unit), 60 Hz	56078466

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