

User Manual

Solar Cooling Unit SelfChill Air/Liquid



Article number: 322021

Solar Cooling Unit

SelfChill Air Indoor 45/75 A-F



Article number: 322110

Solar Cooling Unit

SelfChill Liquid Indoor 45/75 A-F



Article number: 322123

Solar Cooling Unit

SelfChill Air Outdoor 45/75 A-F

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1. General Information

1.1. Solar Cooling Units

The SelfChill Air/Liquid cooling units are hermetically sealed cooling devices that work as a vapor-compression heat pump. They are filled with refrigerant and ready to be plugged to a PV system with or without batteries for different cooling applications. The Units consists of the following parts: compressor (SECOP BD35K), condenser, evaporator plate and electronic control unit (SECOP 101N042). The indoor versions use an air forced condenser (322021, 322110) while the outdoor version (322123) has a static condenser suitable for exposure to harsh environments where the use of an external fan is not desired. The indoor version is available with two different evaporator plates coating. The article 322021 with anticorrosive white paint for applications in contact with air or solid parts, and the article 322110 with a special rubber coating for applications where water or liquids are to be cooled down.

1.2. Solar Cooling Unit Application

Please read the following instructions carefully before installing and starting the device. Make sure to select the right cooling unit according to your desired application below.

Name	Article No.	Air Cooling	Water Cooling	Ice Making	Conduction Cooling
Solar Cooling Unit SelfChill Air Indoor 45/75 A-F75 Upgrade	322021	✓			✓
Solar Cooling Unit SelfChill Liquid Indoor 45/75 A-F	322110		✓	✓	
Solar Cooling Unit SelfChill Air Outdoor 45/75 A-F Di	322123	✓			✓

Please consider that only Solar Cooling Unit SelfChill Air Outdoor 45/75 A-F is designed to be operated fully outdoors. This cooling unit consists of a highly durable static condenser without any fan, suitable for outdoor applications. The other cooling units (see table below) have a forced convection condenser and a fan suitable for indoor applications protected from foreign objects.

Name	Article No.	Indoor	Outdoor
Solar Cooling Unit SelfChill Air Indoor 45/75 A-F	322021	✓	
Solar Cooling Unit SelfChill Liquid Indoor 45/75 A-F	322110	✓	
Solar Cooling Unit SelfChill Air Outdoor 45/75 A-F	322123		✓

1.3. Safety Instructions

Observe all the information pertaining to installation, safety and warning.



Attention:

Non-observance of this information may lead to material or functional damage of the appliance. This will incur loss of warranty.



Not permitted:

Non-observance will incur loss of warranty



Installation information:

Information about installation of the appliance

WARNING!

The refrigerant contained within the appliance R600a is environmentally friendly but flammable. Leaking refrigerant can ignite. To prevent possible ignition, follow the warnings below

- Do not damage the refrigeration circuit
- Any repairs and work on the appliance should only be performed by the after-sales support team.

1.4. Environment

- This appliance contains flammable gas within the refrigeration circuit. Contact the Municipality or Disposal Company in your area for information on approved recycling or disposal.
- Please recycle packaging material where facilities are available



This symbol on the product, the packaging and/or the accompanying documentation indicates that the product should not be disposed as household waste



This symbol indicates that the product complies with all European Union provisions provided for its use



The packaging which has been designed to protect the unit and its components during transport is reusable and recyclable

1.5. Safety Precautions

To ensure safe and faultless function of the appliance, please read and follow these points:

-  Any modification of the appliance (electrical or mechanical) is not permitted.
-  Electrical components (e.g. control electronics) must be protected from water and other fluids.
-  The device may not be put on the side or top (e.g., during the preparation, installation, etc.). The device may be inclined max. 45°.
-  If the appliance was not in an upright position (e.g. before installation), it must not be started the next hour, because the fluid in the compressor must flow back.

1.6. Assembly and Connections

-  The refrigerating unit may only be installed by specialized and trained personnel. Fastening is only permitted on the points provided for this purpose.
-  Please make sure that during installation sufficient air circulation for cooling the appliance is available (ventilation grid on the back of the appliance must not be blocked).
-  After successful installation, establish the electrical connection. To do so, connect the plug of the appliance with the correctly polarized coupling. The appliance works with 24V and 12V direct current (DC) for battery connection or with Panels with less than 45V Open Circuit Voltage for direct drive applications.
-  Incorrect connection may cause damage of electronic system.
-  The max. permitted length of the current conduction depends on its diameter. If this length is exceeded, considerable voltage drops will occur when the compressor starts maybe causing starting problems.

The electronic unit must always be directly connected to the battery or to the main switch in compliance with + and – polarity. A fuse is installed in the positive cable, in the case of 12Vdc systems it is 7.5A and 15A for 24Vdc systems. For cable sizing refer to the table below

Linear diameter	Maximum cable length from power source to electronic part		
	12 V	24 V	up to 45 V
2.5mm ²	2.5m	5.0m	7.5m
4.0mm ²	4.0m	8.0m	12.0m
6.0mm ²	6.0m	12.0m	18.0m
10.0mm ²	10.0m	20.0m	30.0m
16.0mm ²	16.0m	32.0m	48.0m

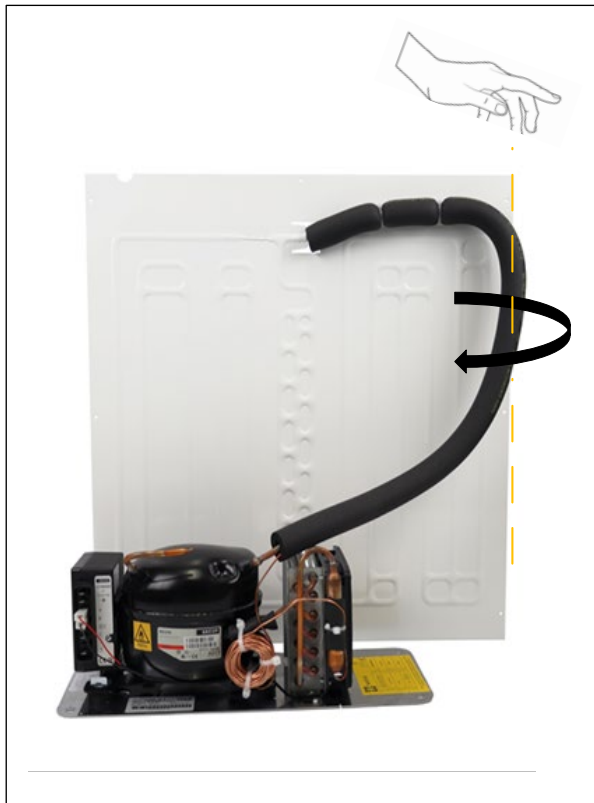
Before turning on the appliance, check to make sure that the voltage of the electrical system and /or battery complies with that which is indicated in this user manual/data sheet

Always use cables with sufficient cross sections (see recommendations in the corresponding table)

When using multiple cooling units in parallel, ensure that the system is equipped with a circuit breaker that's capable of protecting the circuit against overcurrent.

1.7. Evaporator Plate Installation

To prevent damage to the unit, the appliance should be unpacked and set up by two people.



The black insulated suction line can be turned and adjusted in a clockwise manner to straighten it. The refrigerant line is made of a flexible and durable tubing, however, turns with a radius of less than 50mm are to be avoided at any part of the suction line. The cable ties attached to the evaporator plate protect the connection to the evaporator plate. Please don't remove them.

The suction line can be moved up/down/sideways and adjusted according to the installation needs within curvatures of more than 50mm radius.



2. Features

The solar cooling unit is a vapor compression heat pump consisting of the components listed below

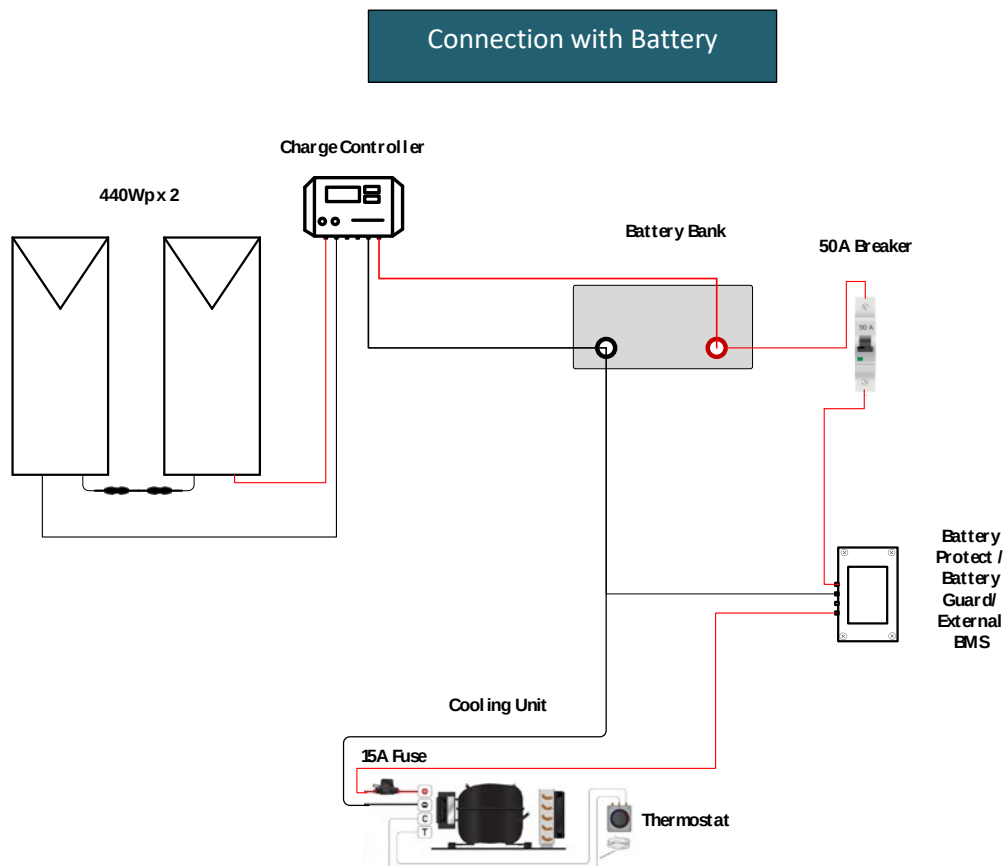
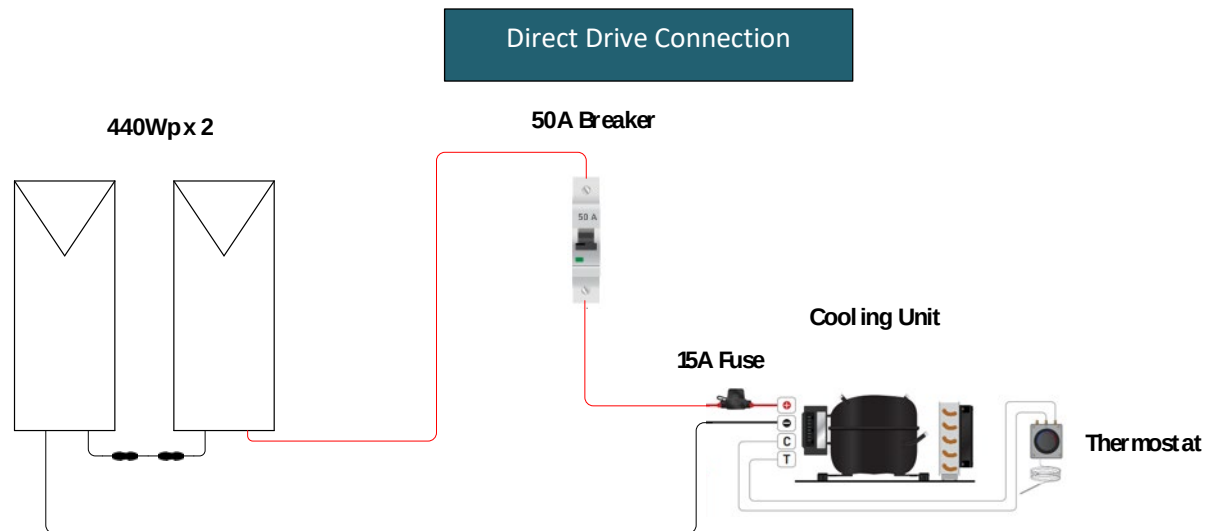
Part Number	Name
1	Compressor
2	Condenser with fan (Article No. 322021 & 322110)
2b	Static Condenser (Article No. 322123)
3	Evaporator plate
4	Capillary tube (Expansion device)
5	Suction Line
6	Electronic Unit



**Please note that the illustration provided may not precisely represent reality, could contain errors, and is subject to potential technical revisions. All information presented is without liability, and we make no claim to its completeness*

3. Connection of the cooling unit to a system

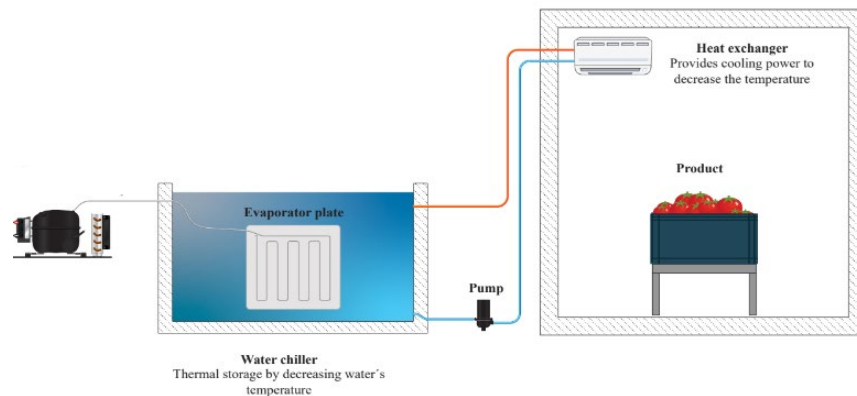
The figure below presents various integration options for the SelfChill solar cooling units into your final cooling systems. These units can be connected directly to solar panels in direct drive configuration or with batteries to extend their operation hours late into the night when the sun is no longer available.



3.1 Example Systems and Applications

The image below illustrates different ways to utilize the cooling unit. When combined with a water pump and heat exchanger, these units can be employed in cold room or ice making setups. They're also suitable for constructing solar-powered refrigerators and cooling cabinets for different needs, among other potential uses.

Cold Room Applications



Cabinet Cooling



Solar Powered Refrigerators

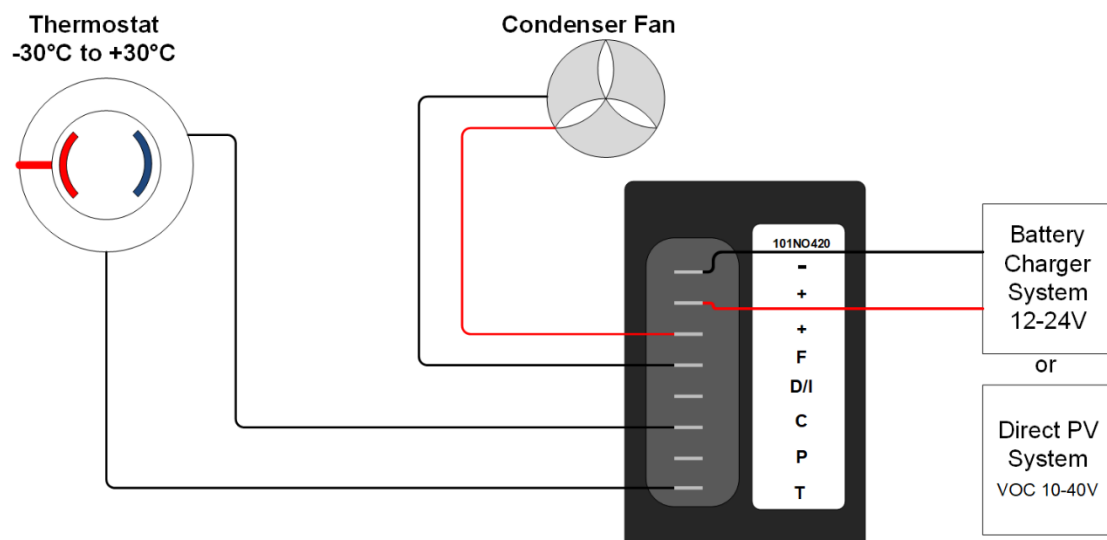


4. Thermostat Connection

4.1. Installation of the thermostat

The thermostat is not included in the cooling unit purchase, it is sold separately under the name "Installable Thermostat Phaesun SelfChill," with article number 391878. Please read carefully the operation instructions of the thermostat accompanying the thermostat package. First, connect the provided cable to the thermostat as shown in the picture, where the white cable is connected to the C (see back of the device) and the cable with the black stripe is connected to the middle connection indicated as 2.

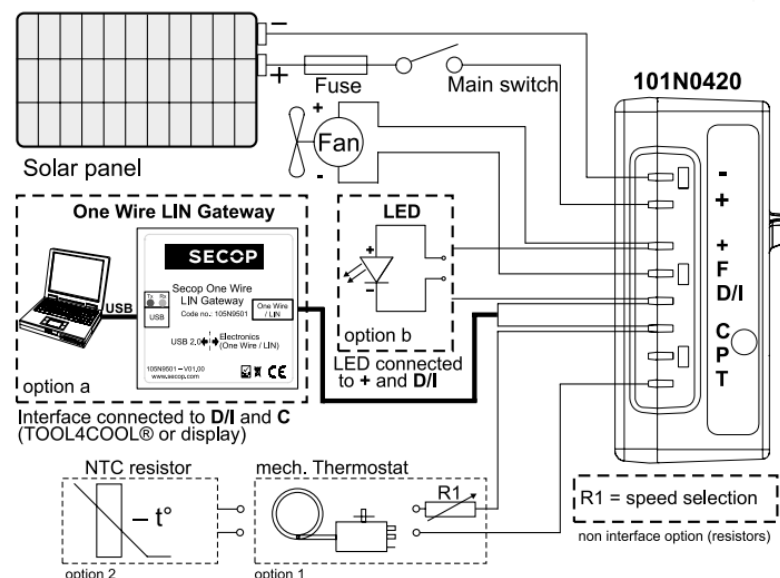
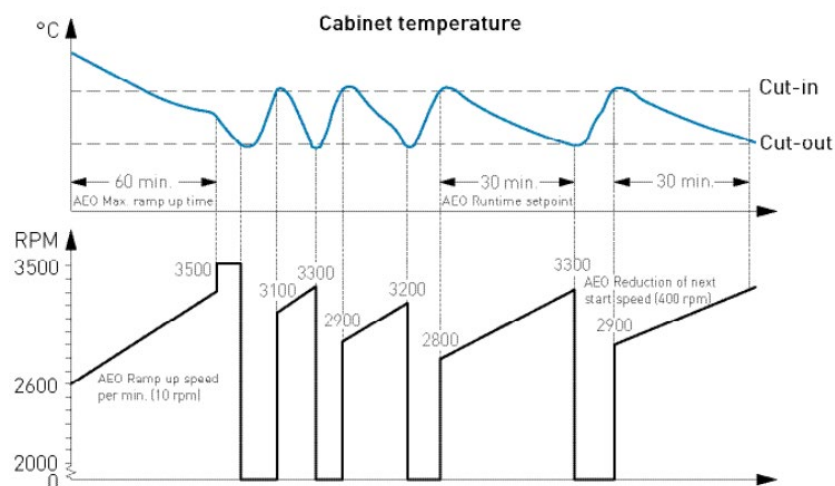
 To connect then the thermostat to the cooling unit, connect the cable with the black stripe to the lowest connection point marked as T. The other completely white cable is connected to the third connection point from the bottom up, indicated as C.



4.2. Compressor Speed

The rotary speed of the compressor can be controlled by the cooling demand, that is, according to the set temperature on the thermostat. The temperature sensor of the thermostat should be placed on the evaporator plate. By turning the rotary knob to the desired temperature, the point at which the compressor will turn off is set. Alternatively, the speed of the compressor can be regulated by connecting a resistor between the C and T terminals of the electrical unit

Electronic unit Code number	Resistor R1 (Ohm)	Compressor Speed(rpm)
101N0420	0	Variable Speed
	173	2000
	450	2500
	865	3000
	1696	3500



5. Technical Data and Specifications

Technical Data	322021 /322110	322123
Power Consumption:	45 W (at 2000 1/min) - 75 W (at 3500 1/min)	
Temperature Range:		
Evaporator:	-5°C to 15°	-5°C to 15°
Ambient:	10°C to 45°C	10°C to 45°C
Voltage Range:	10 - 45 VDC	
Refrigerant:	R-600a (Isobutane), 35g	R-600a (Isobutane), 90g
Evaporator plate dimensions (H x W):	515,8 x 502,6 mm	
Suction line between condensing unit and evaporator (diameter/length)	0,8 / 600 mm	0,8 / 1000 mm
Dimensions (packed): (Width, Length, Height)	250 x 600 x 630 mm	710x245x800 mm
Weight (packed):	10 kg	15kg

5.1. Cooling Performance Indoor Versions

322021 Solar Cooling Unit SelfChill Air Indoor 45/75 A-F

322110 Solar Cooling Unit SelfChill Liquid Indoor 45/75 A-F

COP at n = 3500 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	1.94	2.38	3.03	4.11	
	25	1.46	1.70	2.02	2.47	3.14
	35	1.17	1.32	1.51	1.76	2.09
	45	0.97	1.08	1.21	1.37	1.57

Cooling Power (W) at 3500 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	97	112	131	158	
	25	79	89	101	116	136
	35	66	73	82	92	104
	45	57	63	69	76	85

COP at n = 2000 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	2.25	2.84	3.80	5.63	
	25	1.63	1.93	2.34	2.95	3.94
	35	1.27	1.46	1.69	2.00	2.42
	45	1.05	1.17	1.32	1.51	1.75

Cooling Power (W) at 2000 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	101	128	171	253	
	25	73	87	105	133	177
	35	57	66	76	90	109
	45	47	53	59	68	79

5.2. Cooling Performance Outdoor Versions

322123 Solar Cooling Unit SelfChill Air Outdoor 45/75 A-F

COP at n = 3500 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	1.29	1.49	1.75	2.10	
	25	1.05	1.18	1.34	1.55	1.81
	35	0.88	0.98	1.09	1.23	1.39
	45	0.76	0.83	0.92	1.01	1.13

Cooling Power (W) at 3500 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	97	112	131	158	
	25	79	89	101	116	136
	35	66	73	82	92	104
	45	57	63	69	76	85

COP at n = 2000 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	1.65	1.98	2.44	3.14	
	25	1.28	1.47	1.72	2.05	2.53
	35	1.04	1.17	1.32	1.52	1.78
	45	0.88	0.97	1.08	1.21	1.37

Cooling Power (W) at 2000 1/min		Evaporator temperature (° C)				
		-5	0	5	10	15
Ambient Temperature (°C)	15	74	89	110	141	
	25	57	66	77	92	114
	35	47	53	60	69	80
	45	39	44	49	54	62

6. Troubleshooting

Failures	Possible sources of error	Error removal
Appliance does not start	- No electricity - Appliance incorrectly connected - Battery voltage too low - Cable diameter too small - Contacts oxidized - Fuse defective - Electronic system defective - Compressor defective - Thermostat defective	- Check voltage source - Check cable polarization - Change battery - Increase cable diameter - Clean contacts - Exchange fuse Please contact your sales agent directly or Phaesun GmbH
No cooling	- Ambient temperature too high - Condenser dirty - Cooling system leaking - Compressor defective - Ventilator defective	- Reduce ambient temperature- max. 45°C - Clean condenser Please contact your sales agent directly or Phaesun GmbH