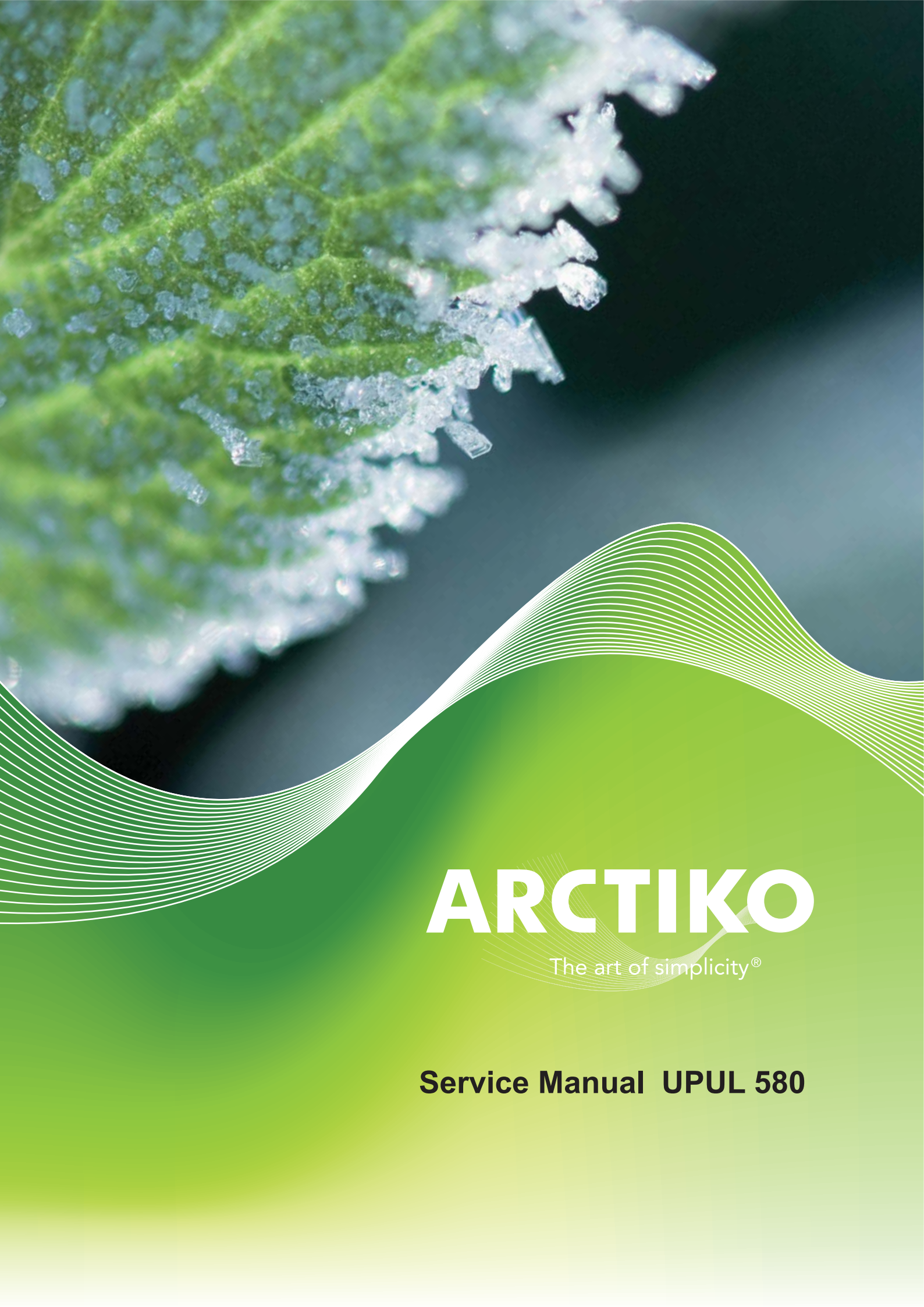




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Service Manual UPUL 580

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1. Working safety

This page provides general safety information for servicing the freezer.

The instruction manual includes additional information about security and cleaning of freezer.

1.1 General safety

To prevent personal and equipment damage, the electrical safety / legislation of your country must be observed.

- 1. Never expose the moving parts of the plant to physical overload.
- 2. When repairing plant parts, safety concerns must be respected.
- 3. When using tools, spare parts and equipment, the existing security concerns must be met.
- 4. Maintenance procedures described in this manual must only be performed by trained personnel.

1.2 Electrical safety

Maintenance procedures may imply a voltage hazard. Follow existing safety instructions, including the low voltage and current EU directives and other directives of your country.

Always disconnect the power to the unit before repair or parts replacement is initiated.

Use only electrical equipment which is designed for the freezer.

1.3 Chemical and biological safety

- Always observe the requirements for safe handling, as described below.
- Read the instruction manual before using, cleaning and servicing the freezer.
- Wear eye protection and gloves when working with refrigerants.
- Skin contact with liquid refrigerants may cause frostbite.
- Good ventilation and air extraction at the work area is required.
- Stay in environments with high concentrations of refrigerant vapors is harmful.
- Low concentrations may cause narcotic effects.
- Symptoms of this may include: headache, shortness of breath, nausea and difficulties in concentration. Possibly: Mobility / consciousness.
- Read the safety data sheet section 5d.

2. Information about the freezer

2a. General information about the freezer

UPUL 580



Label plate located on the device.



Model

Voltage

Hz

Power

AMP



Serial no.

Filling

Refrigerant

When contacting the supplier it is important to inform the model and serial number.

The label plate is located behind the front panel in the engine compartment.

For technical problems: See troubleshooting schedule (3b).

Furthermore, the device is equipped with:

Heated door frame

Heated vacuum valve

The freezer must be defrosted manually. See Section 4d.

2b. Controller G-214

The PCB controller board is located in the engine compartment behind the front panel.

The display is mounted in the front panel.

Data controller:

- 72 hour battery backup for alarms.
- Microprocessor with digital display.
- Temperature display and data acquisition during power failures.
- Visual and audible alarm.
- Adjustable high / low temperature / alarm.
- Integrated data logger.
- Automatic cycle of sensor failure.
- Measurement of the ambient air temperature.
- Direct download / upload from the USB memory stick.
- Display of battery voltage and ambient temperature.
- Integrated memory and data logger.
- RS 485/232 Interface.
- Contact for remote alarm.
- Prepared for GSM alarm.

Display G-214



PCB board

Alarm for:

- High / low temp.
- Voltage Fault
- Sensor error
- Instrument error
- Front door

Datasheet for controller G-214.
See section 5e.

2c. Model information

Model	UPUL 580
Item code	DAI 1404
Temp. range(°C)	-40/-85
Max. Ambient temp.(°C)	20
Power supply (V)	230
Frequency (Hz)	50/60
Fuse (A)	10
AMP (A)	3,2
Power consumption (KWh/24h)	11
Power(KW/Hp)	*)
Compressor	See spare parts list
No. of compressors	1
Refrigerant/filling/gram	EP88 / See label plate

*) Power consumption is monitored over time for each element. Pt. no values.

3. Troubleshooting / Repair

3a. General operating problems

Malfunction of the device, which can arise from improper handling of the device:

Moving or long periods of inactivity of the unit:

When moving or after long periods of inactivity, you must wait 1-2 hours before the freezer is started.

Loading the freezer

When loading large quantities of items into the freezer, the temperature will rise temporarily.

Repeated door openings

In case of repeated door openings, leaks or faulty gaskets, the humidity will cause rime and possibility of ice formation inside the device and around the door / interior door.

Component failure occurred during operation

Use the troubleshooting table section 3b.

3b. Troubleshooting schedule

Problem	Cause	Recommended equipment	Troubleshooting	Action
The unit does not freeze and the compressor does not start.	The socket or fuse is defect.	Universal instrument test Lamp	Check the installation.	New fuse / plug.
	Power cable is defect.		Check power cables and wiring in the engine compartment.	Repair errors. Consider using wiring diagram section 5
	The controller is defect.			Change controller
	The sensor is defect.		Test sensor.	See section 3m
	Faulty windings in compressor.		Test compressor windings.	See section 3k
	Start relay defect.		Test start relay.	See section 3l
	Fault in electrical installation.		Use wiring-diagram.	See section 5
The unit does not freeze. The compressor tries to start, but fails.	Low voltage	Voltmeter	Check voltage	Find the cause.
	Defect or faulty start relay/capacitor.	See section 3m	See section 3m	Change start relay/capacitor
	Defect compressor windings.	Ohmmeter	Check for electrical failure in the compressor.	Change the compr. See section 3f
	Defect rotor (compressor failure)			Change the compr. See section 3f
	High pressure in the cooling system.	Tapping valve Manometer Filter	Open the system and rinse the system with nitrogen.	Remove 5cm of the capillary tube. Change filter. See section 3e
	The unit has been transported horizontally.			The unit must rest a few hours before start.
	Ambient temp. low. Compr.oil too cold.	Eksternal thermometer.	Check the temp.	Find a better placement.
	May be general, if the ventilation is not sufficient.	Eksternal thermometer.	Check, that the compressor not exceeds 70°C.	Find a better placement or ventilation.
	Ambient temp. high.	Thermometer	Check ambient temp.	Find a better placement or ventilation.

3b. Troubleshooting schedule

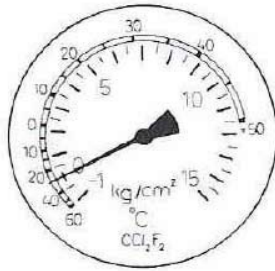
Problem	Cause	Recommended equipment	Troubleshooting	Action
The compressor runs constantly. The unit freezes normal or colder.	The sensor is in-correctly installed.			
	Sensor is defect.			
	Controller is damaged.			
	Icing on the frame.		Check the door for leaks.	See section 4a.
	The temperature is set too low.		Check the settings in the controller.	Set new values. See section 5f.
The compressor starts normally, but stops again.	Too high voltage.	Voltmeter	Measure the voltage.	Inform.
	Too high ambient temperature.	external thermometer	Check the temperature and ventilation.	Better placement or ventilation.
The unit cools too much, too little or not at all. The compressor may run continuously.	Leakage in the system.	Electronic leak-seeking, soapy water, leak seeking spray.	First check the solder points, comp, capacitor, etc.	See section 3.
	The fan is not running.	Voltmeter	Check for errors.	Replace the fan. See section 3n.
	The evaporator is blocked by ice.			
The unit cools too much or not at all. Compressor running constant.	Little or no compressor capacity.	service valve Manometer	Mount the valve and check pressure.	Change compressor. See section 3f.
Insufficient cooling.	The device has recently been filled up with a large amount of heat.			Inform the user.
	In addition, temperature of the air is too high.	external thermometer	Check temperature.	Find better ventilation or placement.
	In addition, the air temperature is too low.	external thermometer	Check temperature.	Find better ventilation or placement.

Examples of troubleshooting with a manometer connected to the process piping of the cooling system. The system is blocked:

Suction pressure is very low.

Pressure equalization takes place very slowly or not at all.

Reason: Icing or dirt in the capillary tube or filter, or blockings in the system due to other reasons.

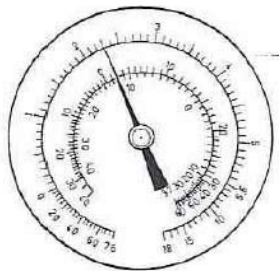


Reason: No compressor capacity

The suction pressure is too high.

The suction pressure does not change noticeably when the compressor stops.

This can be tested with a volumetric meter.



Leakage in the system

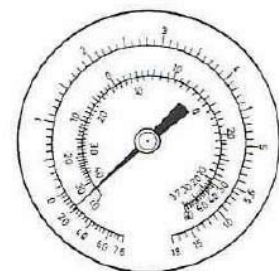
The pressure gauge indicating insufficient suction pressure.

On the pressure side the temperature increases.

Pressure equalization time is short.

Countervailing pressure is lower than expected.

Be sure that the pressure is sufficient for a pressure test.



3c. Opening of the cooling system

- To prevent moisture from penetrating under repair, the system must not be open for more than 15 minutes.
- Prepare spare parts components before the system is opened.
- The new connector is soldered to a tube with valve.



- Verify that the new filter packaging is intact and that the filter is not damaged.
- If the packaging has been broken for a longer period, the filter will be moist

3d. Evacuation of the refrigerant

- It is recommended that the compressor is running at least 25 min. before refrigerant evacuation is undertaken. This ensures that the system is hot, so that the refrigerant easier can be pulled out of the compressor oil.
- A drilling tongs with valve is placed on the process pipe.
- The refrigerant is evacuated.



- Install a valve on the pressure tube and process pipe.

Process pipe and pressure tube fitted with a valve.



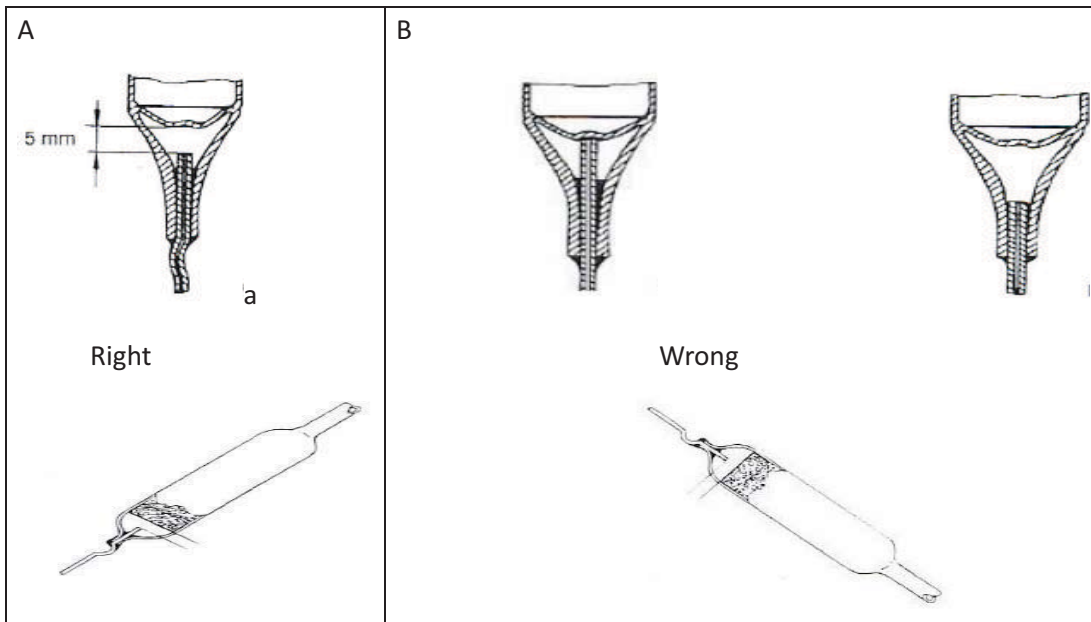
- The cooling system is evacuated with a two-stage vacuum pump for at least 30 minutes. Both from the pressure piping and process piping.
- Blow the system with nitrogen, both from the suction and the pressure side.

3e. Changing the dry filter

- The dry filter must pick up moisture in the system during operation and function as the capillary tube in front of the capillary tube, in order to avoid clogging. Clogged filter or capillary tube causes a pressure drop, by this the filter becomes colder and ice will block the system. The compressor is overloaded with a possibility of crash.
- The dry filter is placed after the condenser outlet, immediately before the capillary. Any opening of the cooling system, dry filter change to ensure the function and lifetime of the freezer.
- It is therefore recommended always to order a new filter drier, along with a new service cylinder with cooling agent.
- To prevent moisture from penetrating during the repair, the drying filter must not be open for more than 10 minutes.
- After evacuation and blowing with nitrogen, the tubes must be cleaned on both sides of the filter drier, before cutting. By doing this the pipe ends are free from impurities and metal pieces and ready for soldering.
- Cut off the pressure pipe close to the filter with a pipe cutter.



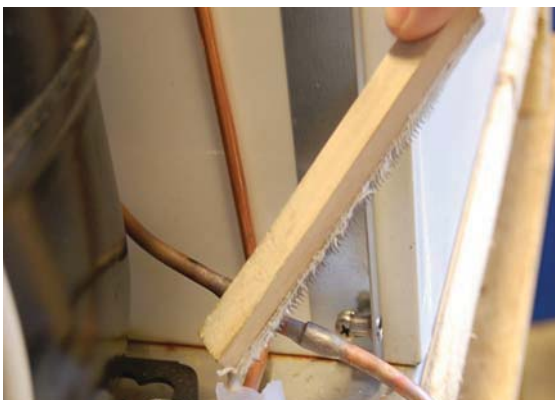
- Cut off the capillary tube with a capillary tube scissors.
- It is recommended to use a special tongs to create a wave on the capillary tube which ensures the correct positioning in the filter.



In the figure A the capillary tube is correctly installed in a dry filter. In order to ensure efficient use of the filter, it must be positioned with an inclination of at least 150 and the capillary tube must be underneath.

In the figure B the capillary tube is too close too the web of the filter. It provides great resistance and filter blocking after a short time. Or too far away, so it will be filled with flux or solder.

- Solder the new filter.
- Clean the solder points with a wire brush.



- Flush the system with nitrogen.
- If only the dry filter is to be replaced, the system must be pressure tested. See section 3g.

3f. Changing the compressor

- Evacuate the refrigerant of the system. See section 3d.
- All tubes are cut with a pipe cutter. Do NOT solder of.
- When replacing the compressor the dry filter must also be replaced. See section 3e.
- The suction and pressure pipes of the compressor must be cleaned and cut with a pipe cutter just above the soldering pipe.
- Demount the compressor.
- Install the new compressor, which is prepared as described before. (3c)



- In order to avoid decomposition of refrigerants which may remain in the system during the soldering operation, the system is blown with dry nitrogen, respectively, from the suction side respectively pressure side.
- Solder the tubes on to the compressor.
- Pressure test the system.

3g. Pressure testing and leak detection

- Pressure test the system with nitrogen. The pressure must be 10 bar during a period of 2 hours.
- Check the solder points with soapy water or leak detection spray.
- In case of any leaks, empty the system for nitrogen.
- Repair and pressure test again.
- During operation leak detection must be performed on the pressure side with the compressor running. The suction side must be tested while the compressor is stopped, and the pressures are equalized.
- The nitrogen must slowly be emptied from the system.

3h. Vacuum suction / Vacuum check

A vacuum is made on two locations on the system, one on the process tube and one on the pipe branch used for testing located on the pressure tube with an explosion-proof 2-stage vacuum pump.



- The pressure should be 2 mBar or lower for at least 12 hours.
- The system is now ready for the filling of the refrigerant.

3i. Refrigerant filling with EP88

Before filling the refrigerant, a vacuum must be sucked. See section 3h.

Note that EP88 is to be supplied from a bottle containing a specific amount of refrigerant.

Common procedures for other refrigerants can not be used.

Further it is important that the entire contents of the bottle is introduced into system to ensure optimal performance.

The contents of the bottle must be mixed before use by shaking the bottle for at least 1 minute before the filling.

In order to perform the filling operation properly, it is necessary to use a capillary tube with the valve before the filling site, instead of a conventional feeding tube. The reason is that the capillary tube ensures that the entire quantity of refrigerant is introduced to the system. If an ordinary filler hose is used, it must be as short as possible.



WARNING! EP88 is flammable!

The refrigerant cylinder is weighed before use.

The cylinder must be shaken for 1 min. before use.

During the filling procedure the cylinder must be upside down.

Cylinder with manometer



Vacuum suction of the filling hose



Loading procedure

Make vacuum. See section 3h.

The cylinder with manometer is connected to the coupler of the process piping.

Remember to first make vacuum in the filling hose to empty it.

Fill the refrigerant into the system until the pressure gauge on the pressure tube shows approx. 5 bar.

Start the compressor and let it run for 2-3 min. Open to the cylinder again to get out the remaining refrigerant.

When the pressure in the bottle shows 1 bar, the bottle is empty.

It is important that the valve is closed immediately, in order to avoid that the refrigerant runs back into the cylinder.

Now the cooling system is filled with refrigerant and only needs to be closed.

Disconnect the filling hose with pressure gauge from the process piping.

Push the process piping and pressure pipes together with a special tongs.

Cut off valve with a pipe cutter.



Closing the process tube on systems with flammable refrigerants must be performed by professionals with a Lok Ring end sleeve. It is recommended NOT to solder system.

Clean the pipe with steel wool or emery cloth. Use rotational movement in order to avoid scratching the length of the tube.

Apply LokPreb to the end of the tube.

Turn the end sleeve 360° so that the LokPreb is placed around the tube.

Squeeze the end sleeve together with the special tool as shown in the illustration.

Start the freezer and control the function of the unit.

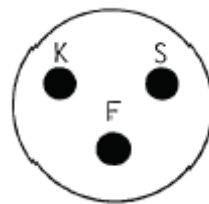
3j. Electrical troubleshooting

Before starting systematic troubleshooting, check the following:

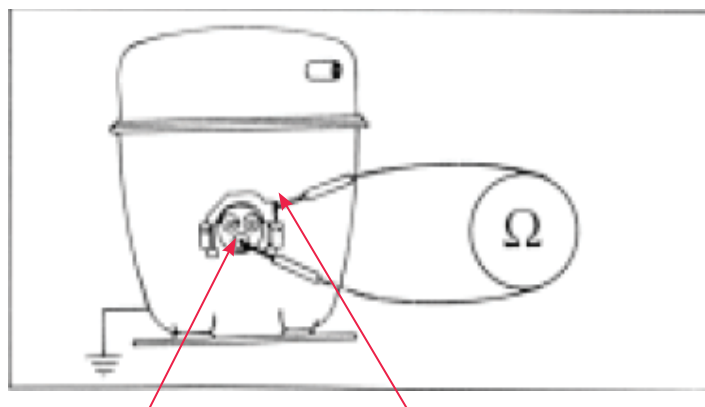
- Proper voltage is present.
- Electrical equipment used, is suitable for the compressor.
- The wires are properly installed according to wiring diagram.
- There is no transition between the live parts and ground.

Control of the transition to ground.

In order to check whether there is a transition between the conducting components and the chassis, the insulation resistance is tested by using an ohmmeter or the second high-voltage equipment. An ohmmeter can be used for a rough check. Ohmmeterets one clamp is placed on the compressor's ground terminal. The second clamp on the compressor fællesben (see sketch). Showing ohmmeter a transition, the compressor is replaced.



Plug on the compressor



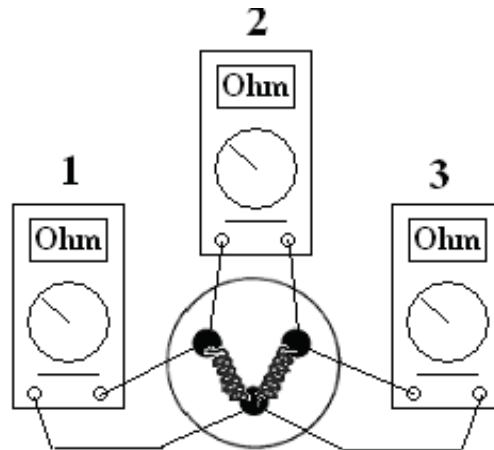
Shared leg

Ground terminal

Uses high voltage test systems with flammable refrigerants, ensure that the system is completely drained of coolant, as this can cause sparks during the test.

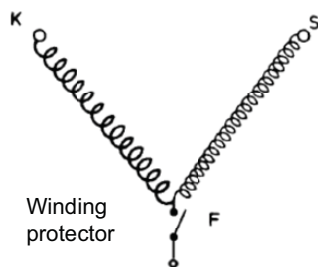
3k. Electrical fault - compressor

Remove the start relay from the compressor and use an ohmmeter to test the compressor head and start recovery. Connect ohmmeter between the common connector and start winding, then hovedviklingen to debug. See the picture below.



Dimensions of the compressor connections to determine whether driving and startvikling are intact.

This is done by measuring the resistance of these. Carry out three resistance measurements on compressor penetrations. The sum of the two smallest measurements, the intact windings will be equal to the highest. Find if the current values of the compressor data sheet.



Ohm-measurement

By measuring the compressors with built viklingsbeskytter it is extremely important to measure between K and S, as this measure will tell if this is burnt windings or an open winding protector.

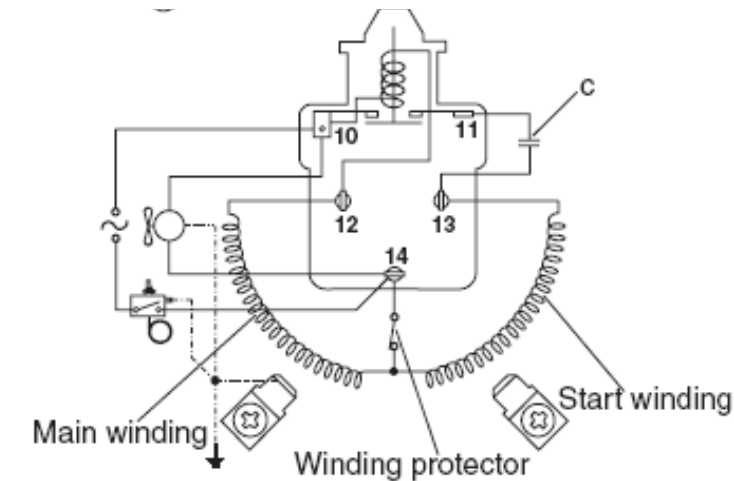
Since it is relatively small value to be measured, it would be a great advantage to use a digital ohm-meter.

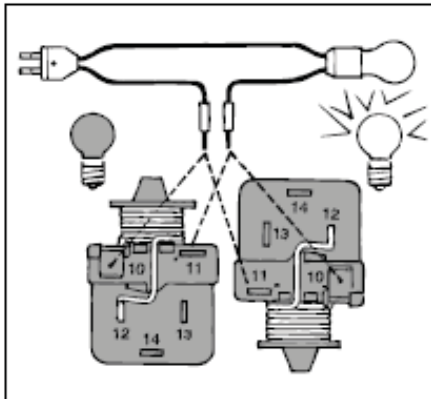
Indicates the measurement error, the compressor is replaced.

3l. HST-start relay, start capacitor

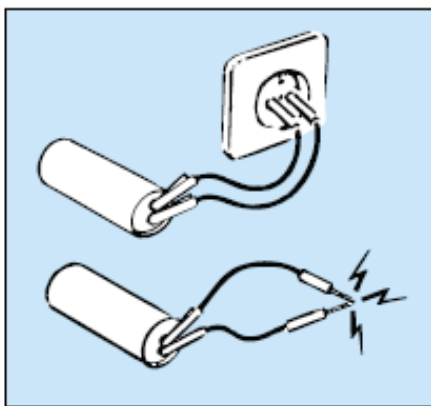
Connect a voltmeter between terminals 10 and 13 at the start of the relay. If no voltage is present, there is either a faulty cable or also start relay is defective.

Connect a voltmeter between terminals 10 and 14. If no voltage is present, the temperature sensor or its cable is defective.





A relay can be checked with an indicator light as shown in the sketch maintain end. The relay is usually ok, when in standing position is not lit, and when it is lit when the relay is upside down.



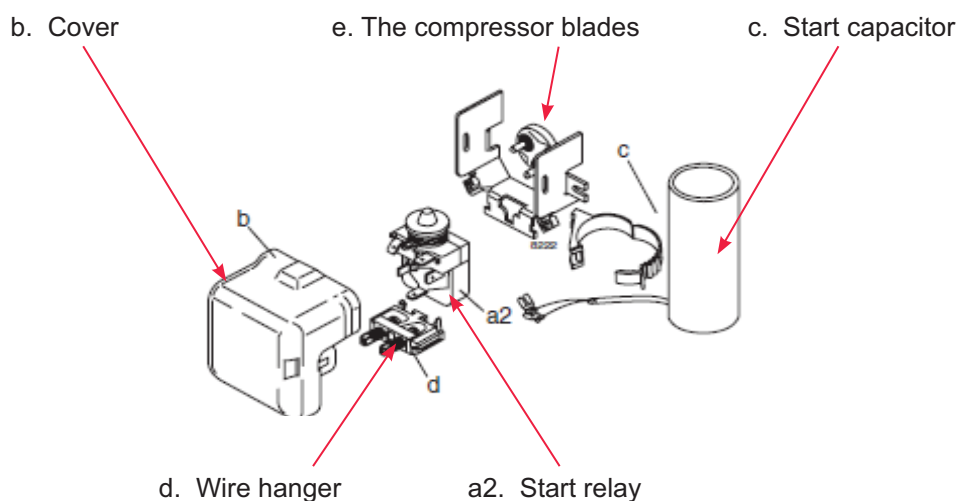
The start capacitor can be checked by injecting the normal voltage for a few seconds and than shorting it. When sparks are generated, the capacitor is in order.

When replacing the compressor should start relay and start capacitor also replaced.

Start relay is placed on the compressor's three terminalben and clamped.

The voltage connected to terminals 10 and 14

Startkondensatoren connected to terminals 11 and 13 and clamped.



3m. Sensor for the controller

PT 1000

A faulty sensor will typically prevent the compressor from starting.

If the sensor is covered with ice, the compressor will run more than usual and cool too much.

The easiest way to check the function of the sensor, is to place your hand around the sensor. If the temperature recorded on the display in the front panel does not rise, the sensor is faulty and needs to be replaced.

The sensor can also be tested with an ohmmeter.

The PT 1000 sensor is located on the right side between shelf 2 and 3 and is secured with strips.

Note that the tip of the sensor must not be in direct contact with the evaporator tubes.

This will result in an erroneous temperature measurement.

The sensor must be introduced together with the evaporator tubes in the top of the engine compartment.

The holes are sealed with putty. Electrically, the sensor is connected to the PBC board. See the wiring diagram section 5a.

Change of probe:

- Disconnect the power supply.
- Remove the engine grille.
- Remove the sealing material around the wire of the sensor on both sides of the hole.
- Remove the strips.
- Pull the sensor into the engine compartment.
- Disconnect the electrical connection of the sensor in the CBS module.
- Mount the new sensor in reverse order.

Remember! The sensor must be replaced with a sensor with the same characteristics as the original.



Mounting of the sensor in the freezer



Introduction of the sensor from the top of the engine compartment

3n. Condenser - fan

The condensor is placed in the engine compartment of the freezer behind the front panel. It is fixed with 4 bolts.

The first part is a double tube condenser with fan, followed by condenser coils.

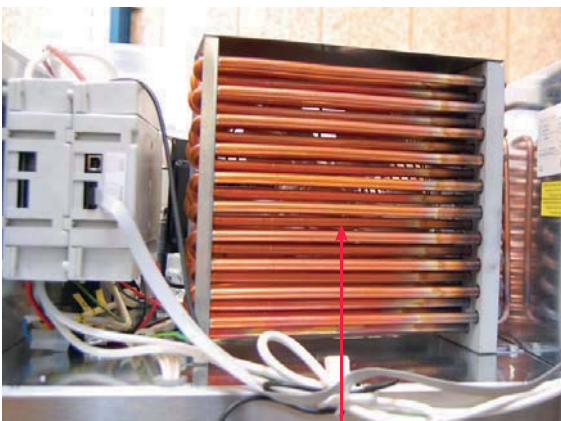
Check that the bolts are well tightened and that the rubber gaskets at the fan are not hard or defective. It is important that the cooling ribs are kept clean and the ambient temperature does not exceed 20°C.

Physically, the fan is placed on the frame of the capacitor.

Electrically, the fan is connected to terminal 10 and 14 on the start relay. See wiring diagram section 5a.

If the ventilator stops, it can cause insufficient cooling of condenser and compressors.

Higher condensing temperature means that the compressor must work more with less efficiency as a result. At worst, the compressors stops due to high temperature.



Condenser



Condenser coil

Fan

3o. Controller - demounting the display

Demount of display

- Disconnect the wire connector on the bottom of the display.
- Squeeze the mounting devices at the bottom and top together and push out the display.



Mounting device

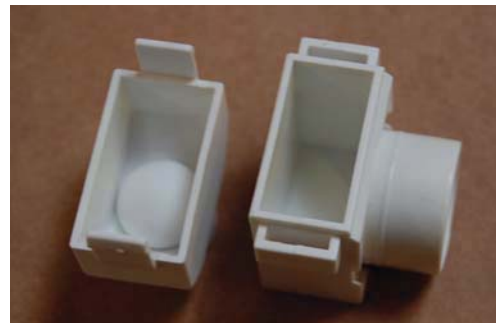
Wire connectors

Mounting device

3p. Vacuum valve

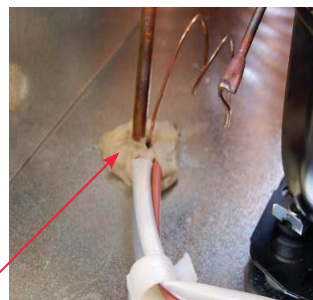
The freezer is equipped with a heated vacuum valve in order to avoid vacuum in case of repeated door openings.

The vacuum valve is placed on the back side. See the illustration. The valve can be pulled out of the freezer and disassembled into two halves. See the illustration.



Vacuum valve

The introduction of the wire is done at the back of the engine compartment together with the evaporator tubes and the wire for the probe.



Introduction of the wire for the vacuum valve

The heater is installed at the top of the cooling compartment above the evaporator tubes.



When replacing the heater:

- Disconnect the power supply.
- Disconnect the wires in the PCB board.
- Disconnect the mounting device for the heater.
- Remove the sealing on both introduction sides.
- Remove the heater.
- Install in reverse order.

3q. Heated door frame.

2 pcs. heaters are installed in the door frame.

One is connected electrically. The second is as a spare heater.

Electrically, the cable (220V) is supplied by the PCB board and assembled in the controller box. See the wiring diagram section 5a.

The cable is introduced to the door frame on the front of the engine compartment behind the front panel.

Spare cable



Introduction of cable

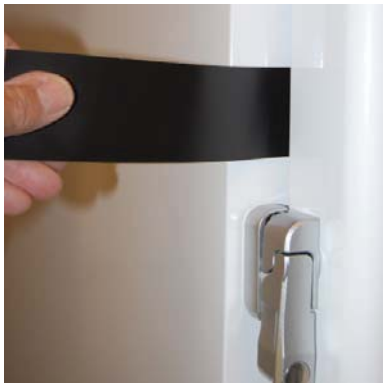
4. Maintenance

4a. Rubber gasket of the door

Rub the gasket with a suitable product, so that it stays flexible and the optimal function and tightness is secured.

Make sure the door closes tightly so that no ice forms around the door frame.

- Open the door and place a piece of paper. Close the door.
- Pull the paper.
- If the paper can not be pushed back, the adjustment is OK.
- The test is made at both the left and right side.
- In case that the gasket do not close properly, see section 4b.



4b. Locks and hinges

Make sure the hinges are not loose and the door easily can be opened and closed.

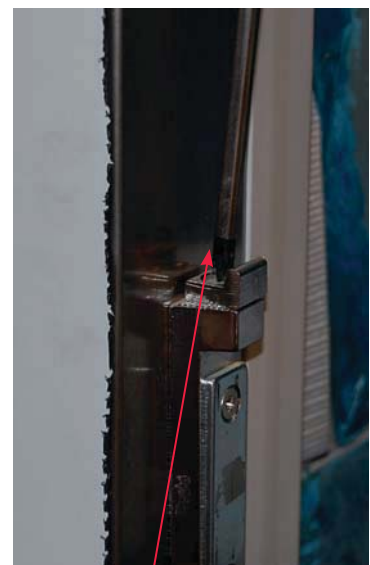
Make sure the lock works easily and safely. If necessary, use a lubricant for locks.

If there is ice around the door frame, the door must be adjusted.

- Open the door.
- Loosen the slotted screw on the latch with a crosshead screwdriver.
- Now the latch can be lifted on the gearing and the door closes tighter.
- Fasten the slotted screw again.



Door handle with lock



Door adjustment

4c. Evaporator

The evaporator tubes are integrated into each shelf.

The door frame, inner doors and the sensor must be checked for ice.

In case of large ice formation, the freezer must be defrosted.



4d. Manual defrost, cleaning and maintenance

There will be some ice formation on the sub lids of the freezer.

The ice must be removed with a scraper on a regular basis (Remember safety gloves).

Ice on the inside of the cabinet must be removed as required.

This is done by manual defrost:

- Remove the contents of the freezer.
- Unplug the unit.
- Leave the door open until the ice can be removed.
- Wipe the interior cabinet and shelves with a cloth until it is dry.

Ice formed on the inside of the door, must be removed with a wooden / plastic scraper. This ice is formed due to the low temperatures inside the cabinet, and if the ice is not removed, it will cause that the door does not close tightly.

4e. Noise

The following must be checked in case of noise:

- The compressor is not tightened well.
- The rubber feet are defect or too hard.
- The compressor process tube is too long.
- The fan blades are damaged or dirty.
- The fan is not tightened well.
- The fan bushings are worn.
- The freezer is not positioned on a flat surface.
- Long pipes can cause resonance vibrations.



Rubber feet



Process tube (too far)

4f. Battery backup

The battery (12V 7Ah) is located in the engine compartment behind the front panel.

It has a lifespan of 3 years, but should be checked every six months.

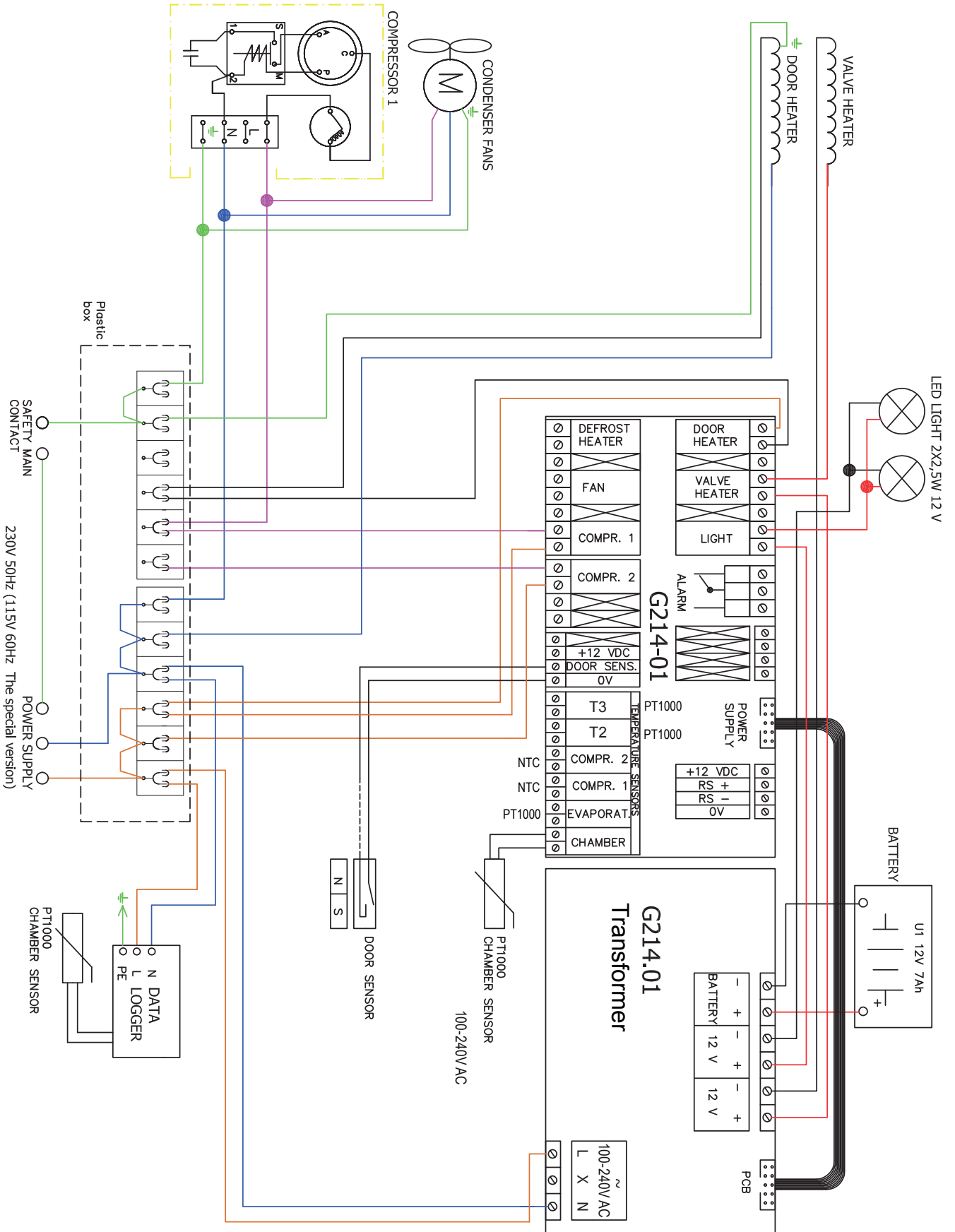
Check the voltage with a voltmeter.

The controller G-214 has built-in measurer for the battery voltage.

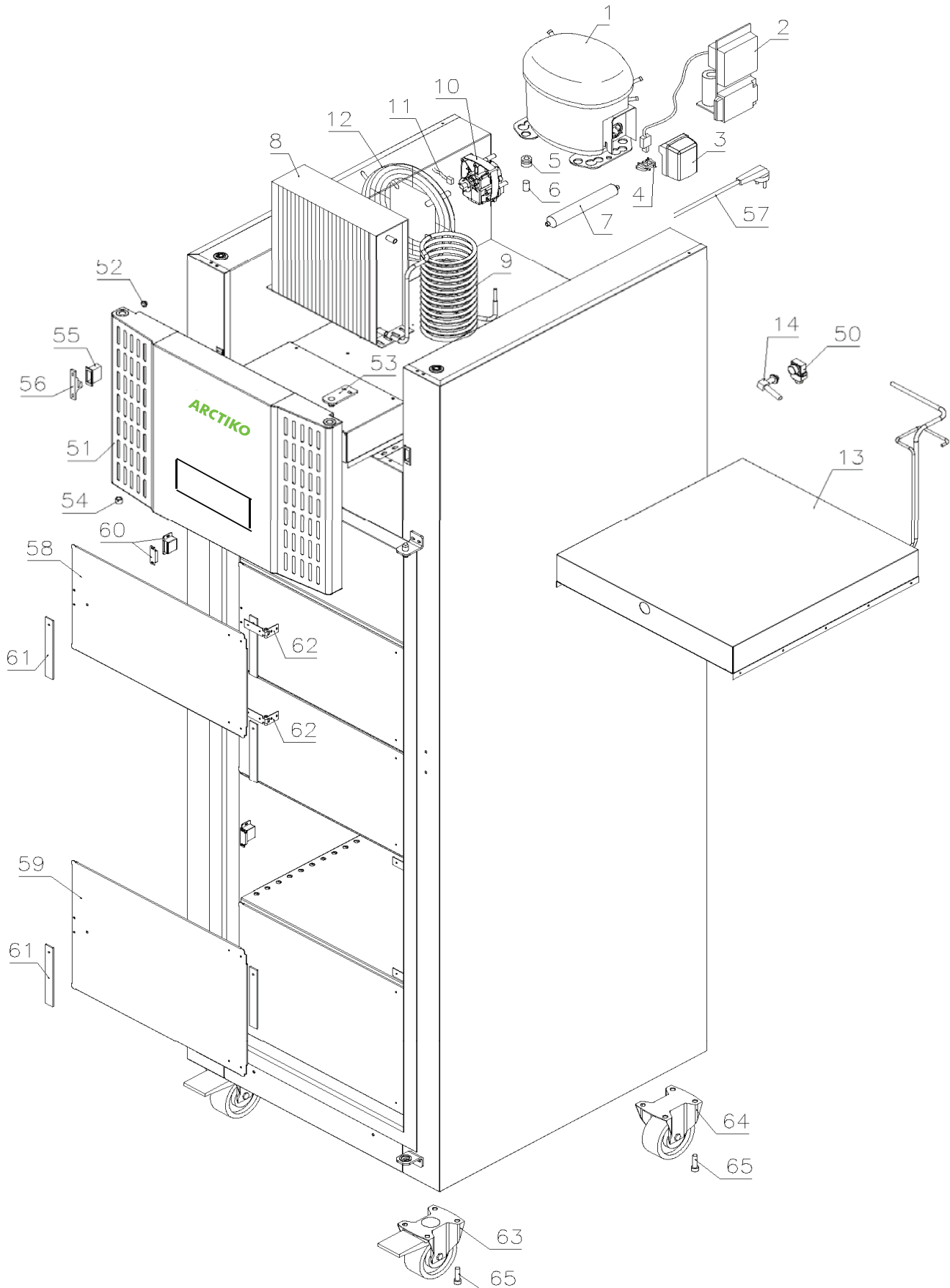


Backup battery

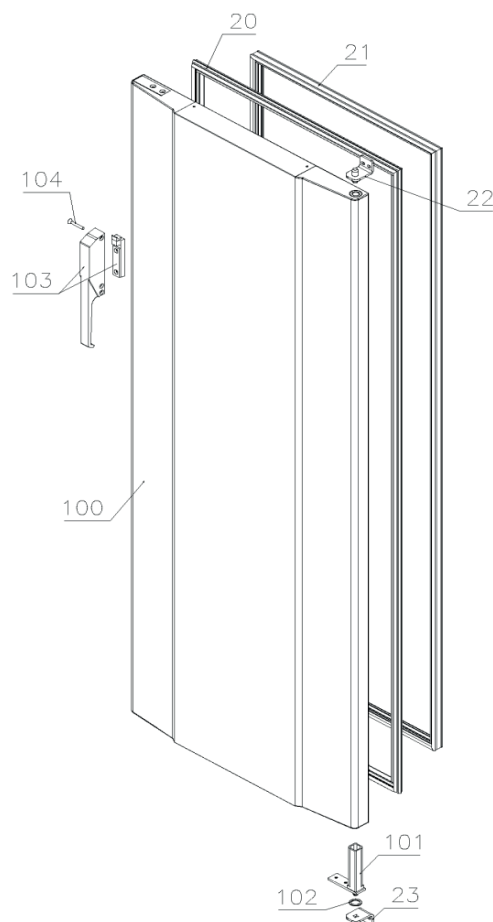
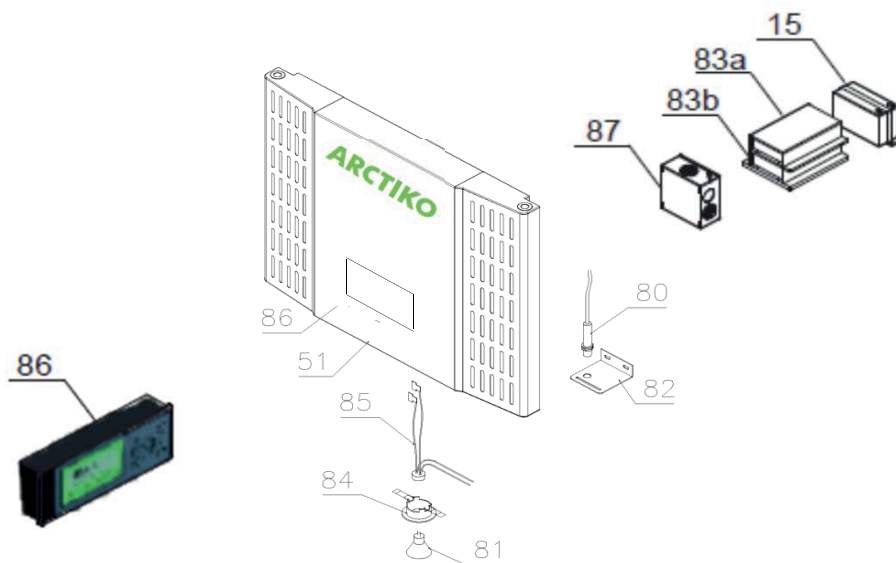
5a. Wiring-diagram



5b. Spare parts list



5b. Spare parts list



Pos. no.	Code no.	Part	Recommended
1	5070015-01	Compressor SC18CNX.2 Complete	1
2	5070016-01	Starting device for SC18CNX.2	1
3	5070017-01	Cover	
4	5070018-01	Cord relief	
5	5070019-01	Rubber feed	
6	5070020-01	Bush	
7	5079000-01	Service Filter Dryer	1
8	5071001-01	Condenser unit	
9	5074002-01	Condenser coil	
10	5010001-01	Condenser fan complete ex. fan guard	1
11	5010003-01	Wire for fan motor	
12	5010004-01	Fan guard	
13	5074004-01	Heat exchanger complete UPUL	
14	5019001-01	Heater for air valve	
15	5044001-01	Battery BP 7-12 (12V 7Ah)	1
20	5052005-01	Door gasket	1
21	5052006-01	Side gasket	1
22	5301010-01	Hinge upper right bottom left	
23	5031011-01	Hinge bottom right upper left	
50	5030015-01	Air relief valve	
51	5050007-01	Top Panel for UPUL 1404-2	
52	5050008-01	Front panel plug	
53	5031009-01	Hinge for front panel	
54	5031016-01	Hinge bush	
55	5030011-01	Front panel close latch	
56	5030012-01	Front panel close keeper	
57	5054001-01	Power cord	
58	5052010-01	Sub lid small UPUL	
59	5052011-01	Sub Lid large UPUL	
60	5031019-01	Magnet lock	
61	5052012-01	Strap handle	
62	5031018-01	Hinge for innerdoor	
63-64-65	5053005-01	Complete set of Castors 4 pcs.	
80	5049005-01	Door sensor (Magnetic) incl wire	
81	5019002-01	Halogen 10W	
82	5031002-01	Bracket for door switch and lock	
83a	5041006-01	Controller G-214 PCB board	1
83b	5041007-01	Power supply G-214	1
84	5019005-01	Mounting socket for halogen light	
85	5019006-01	Wiring for halogen light	
86	5043007-01	Display for G-214 controller	1
87	5049006-01	Box for PCB board connection.	
100	5052000-01	Door complete	
101	5031020-01	Self-close device	
102	5031021-01	Washer	
103	5051003-01	Door handle Complete	1
104	5031022-01	Screw M5x30	
-	5019003-01	Transformer 230V 50/60 Hz 12 Vac / 4 amp	1
-	5031024-01	Metalplate for controller	1
-	5042016-01	Probe NTC for compressor	
-	5042003-01	Probe for chamber (PT1000)	
-		Refrigerant EP88	1
-	5072000-01	Cylinder deposit for refrigerant	1

5c. Compressor data

SC18CNX.2 LBP Compressor R290 220-240V 50Hz

General

Code number	104H8866
Approvals	EN 60335-2-34
Compressors on pallet	80

Application

Application	LBP		
Frequency	Hz	50	60
Evaporating temperature	°C	-40 to -10	–
Voltage range	V	198 - 254	–
Max. condensing temperature continuous (short)	°C	55 (65)	–
Max. winding temperature continuous (short)	°C	125 (135)	–

Cooling requirements

Frequency	Hz	50			60		
Application		LBP	MBP	HBP	LBP	MBP	HBP
32°C		F ₂	–	–	–	–	–
38°C		F ₂	–	–	–	–	–
43°C		F ₂	–	–	–	–	–
Remarks on application:							

Motor

Motor type	CSIR		
LRA (after 4 sec. UL984), HST LST	A	24.0	–
Cut in Current, HST LST	A	24.0	–
Resistance, main start winding (25°C)	Ω	4.2	14.6

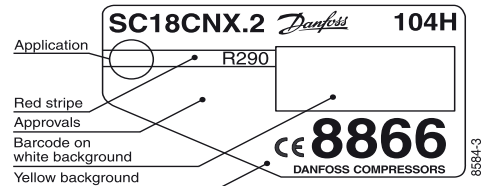
Design

Displacement	cm ³	17.69
Oil quantity (type)	cm ³	600 (polyolester)
Maximum refrigerant charge	g	150
Free gas volume in compressor	cm ³	1410
Weight without electrical equipment	kg	13.1

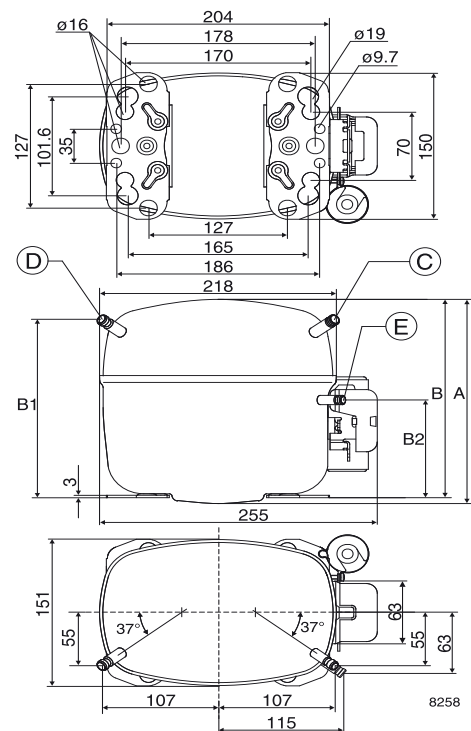
Dimensions

Height	mm	A	219
		B	213
		B1	193
		B2	110
Suction connector	location/I.D. mm angle	C	10.2 37°
	material comment	Cu-plated steel Al caps	
Process connector	location/I.D. mm angle	D	6.2 37°
	material comment	Cu-plated steel Al caps	
Discharge connector	location/I.D. mm angle	E	6.2 37°
	material comment	Cu-plated steel Al caps	
Oil cooler connector	location/I.D. mm angle	F	–
	material comment	–	
Connector tolerance	I.D. mm	±0.09	
Remarks:			

Danfoss



- S = Static cooling normally sufficient
- O = Oil cooling
- F₁ = Fan cooling 1.5 m/s
(compressor compartment temperature equal to ambient temperature)
- F₂ = Fan cooling 3.0 m/s necessary
- SG = Suction gas cooling normally sufficient
- = not applicable in this area



EN 12900 Household (CECOMAF)* $t_c = 45^\circ\text{C}$, 220V, 50Hz, fan cooling F_2

Evap. temp. in $^\circ\text{C}$	-45	-40	-35	-30	-25	-23.3	-20	-15	-10	-6.7	-5	0	5	7.2	10	15	20
Capacity in W		244	384	531	689	747	863	1057	1273								
Power cons. in W		337	417	484	541	559	591	637	682								
Current cons. in A		2.96	3.15	3.34	3.52	3.58	3.69	3.85	4.01								
COP in W/W		0.72	0.92	1.10	1.27	1.34	1.46	1.66	1.87								

ASHRAE LBP* $t_c = 45^\circ\text{C}$, 220V, 50Hz, fan cooling F_2

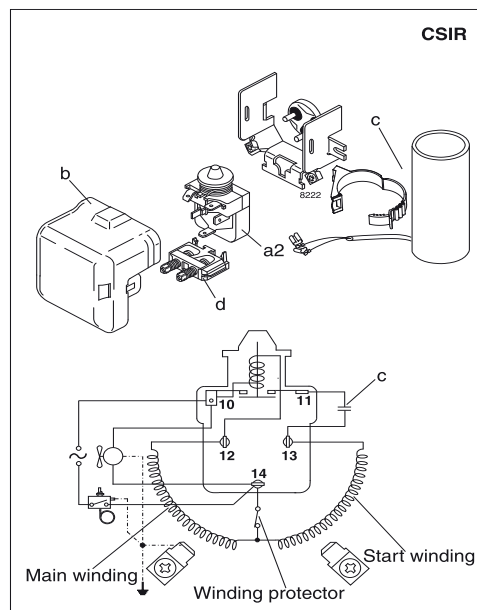
Evap. temp. in $^\circ\text{C}$	-45	-40	-35	-30	-25	-23.3	-20	-15	-10	-6.7	-5	0	5	7.2	10	15	20
Capacity in W		291	443	603	776	839	966	1176	1412								
Power cons. in W		345	420	482	535	551	581	624	667								
Current cons. in A		2.98	3.16	3.33	3.50	3.55	3.66	3.81	3.95								
COP in W/W		0.84	1.06	1.25	1.45	1.52	1.66	1.88	2.12								

EN 12900 Household (CECOMAF) $t_c = 55^\circ\text{C}$, 220V, 50Hz, fan cooling F_2

Evap. temp. in $^\circ\text{C}$	-45	-40	-35	-30	-25	-23.3	-20	-15	-10	-6.7	-5	0	5	7.2	10	15	20
Capacity in W			275	424	587	646	768	970	1197								
Power cons. in W			404	502	588	614	663	732	798								
Current cons. in A			3.30	3.57	3.82	3.91	4.07	4.31	4.55								
COP in W/W			0.68	0.84	1.00	1.05	1.16	1.32	1.50								

ASHRAE LBP $t_c = 54.4^\circ\text{C}$, 220V, 50Hz, fan cooling F_2

Evap. temp. in $^\circ\text{C}$	-45	-40	-35	-30	-25	-23.3	-20	-15	-10	-6.7	-5	0	5	7.2	10	15	20
Capacity in W			342	525	724	797	945	1193	1472								
Power cons. in W			404	500	584	610	658	726	790								
Current cons. in A			3.28	3.54	3.80	3.88	4.04	4.28	4.50								
COP in W/W			0.85	1.05	1.24	1.31	1.44	1.64	1.86								



Accessories for	SC18CNX.2	Figure	Code number
PTC starting device	6.3 mm spade connectors	—	—
	4.8 mm spade connectors	—	—
Starting relay	6.3 mm spade connectors	a2	117U7011
Cover		b	103N2009
Start. capacitor 80 μF	6.3 mm spade connectors	c	117U5017
Cord relief		d	103N1004
Protection screen for PTC		—	—

Test conditions	EN 12900/CECOMAF(*)	ASHRAE LBP(*)
Condensing temperature	55 $^\circ\text{C}$ (*45 $^\circ\text{C}$)	54.4 (*45 $^\circ\text{C}$)
Ambient temperature	32 $^\circ\text{C}$	32 $^\circ\text{C}$
Suction gas temperature	32 $^\circ\text{C}$	32 $^\circ\text{C}$
Liquid temperature	no subcooling	32 $^\circ\text{C}$

Mounting accessories	Code number
Bolt joint for one compressor	$\varnothing$: 16 mm 118-1917
Bolt joint in quantities	$\varnothing$: 16 mm 118-1918
Snap-on in quantities	$\varnothing$: 16 mm 118-1919

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5d. Safety data sheet for EP-88

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING:

1.1 Product identifier:

EP88

1.2 Relevant identified uses of the substance or mixture and uses advised against:

Cooling agent

1.3 Details of the supplier of the safety data sheet:

Arctiko A/S
Lammefjordsvej 5
DK- 6715 Esbjerg N
Phone: +45 70 20 03 28
Fax: +45 70 20 03 29
Email: info@arctiko.com

1.4 Emergency telephone number

+45 82 12 12 12 (DK)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture:

Extremely flammable gas. May cause frostbites.

EU (67/548 or 1999/45):	Fx; R12
CLP(1272/2088):	Flam. Gas 1;H220 Press. Gas

See the full text of risk- and hazard phrases in section 16.

2.2 Label elements:

EU:

Contains: -



Extremely flammable

R12	Extremely flammable
S9	Keep container in a well-ventilated place
S16	Keep away from sources of ignition -- No smoking

- S33 Take precautionary measures against static discharges
 S46 If swallowed, seek medical advice immediately and show container or label

CLP:

Contains: -



Danger

- H220 Extremely flammable gas
 P403 Store in a well-ventilated place
 P210 P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
 P243 Take precautionary measures against static discharge.
 P301+P315 IF SWALLOWED: Get immediate medical advice/attention

2.3 Other hazards

May cause frostbites in case of contact with skin and eyes.

PBT/vPvB: The mixture does not meet the criteria for PBT/vPvB in accordance with REACH Annex XII

3. COMPOSITION /INFORMATION ON INGREDIENTS:**3.1 Substances**

Not applicable.

3.2 Mixtures

Product description: Liquefied Gas

<u>Substance name</u>	<u>CAS no./Einecs no.</u>	<u>%:</u>	<u>Classification:</u>
Hexafluoroethane(R116)	76-16-4/200-939-8	20-30	EU: Not classified CLP: Not classified
Trifluoromethane (R23)	75-46-7/200-872-4	10-20	EU: Not classified CLP: Not classified
Propane (R290)	74-98-6/200-827-9	20-30	EU: Fx;R12 CLP: Flam. Gas 1; H220 Press. Gas
N-Butane (R600)	106-97-8/203-448-7	30-40	EU: Fx;R12 CLP: Flam. Gas 1; H220 Press. Gas

See the full text of risk- and hazard phrases in section 16.

4. FIRST AID MEASURES:

4.1 Description of first aid measures:

Inhalation:

Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Skin contact:

In case of contact with liquid spillage – flush with water for at least 15 minutes. Seek medical attention.

Eye contact:

In case of contact with liquid spillage – flush with water for at least 15 minutes. Hold the eye open. Remove contact lenses. Seek medical attention.

Ingestion:

Seek medical attention.

Burns:

Rinse with water until the pain disappears. Remove burned clothes during rinsing. If medical attention is necessary continue rinse until a doctor takes over.

4.2 Most important symptoms and effects, both acute and delayed:

High concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination. May cause frostbites in case of contact with skin and eyes.

4.3 Indication of any immediate medical attention and special treatment needed:

If the person is unconscious: Call immediately a doctor or an ambulance. Show this safety data sheet to the medical staff.

5. FIREFIGHTING MEASURES:

5.1 Extinguishing media:

All known extinguishing agents can be used.

5.2 Special hazards arising from the substance or mixture:

Extremely flammable. Exposure to fire may cause containers to rupture/explode. Avoid inhalation of smoke. Incomplete combustion may form carbon monoxide, carbonylfluoride or hydrogenfluoride.

5.3 Advice for fire-fighters:

In confined space use self-contained breathing apparatus.

Specific methods:

If possible, stop flow of product.

Move away from the container and cool with water from a protected position.

Do not extinguish a leaking gas flame unless absolute necessary.

Spontaneous/explosive re-ignition may occur.

Extinguish any other fire.

6. ACCIDENTAL RELEASE MEASURES:

6.1 Personal precautions, protective equipment and emergency procedures:

Use protective suit. Use self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

Evacuate the area. Ensure adequate air ventilation. Eliminate ignition sources.

6.2 Environmental precautions:

Try to stop release. Prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous.

6.3 Methods and material for containment and cleaning up:

Ventilate area.

6.4 Reference to other sections:

Not applicable.

7. H ANDLING AND STORAGE:

7.1 Precautions for safe handling:

Avoid inhalation and contact med skin and eyes. Keep away from sources of ignition, including electrostatic discharge.

Ensure equipment is adequately earthed. Suck back of water into the container must be prevented.

Purge air from system before introducing gas. Do not allow reflux into the container.

Use only properly specified equipment which is suitable for this product, its supply pressure and temperature.

7.2 Conditions for safe storage, including any incompatibilities:

Segregate from oxidant gases and other oxidants in store. Keep container below 50 °C in a well ventilated place. Keep the container secured and safe from collision.

7.3 Specific end use(s):

See use in section 1.

8. EXPO SURE CONTROLS/PERSONAL PROTECTION:

8.1 Control parameters:

Substance name	Exposure limit
Propane	1000 ppm / 1800 mg/m ³ (DK)
N-Butane	500 ppm / 1200 mg/m ³ (DK)

8.2 Exposure controls:

Appropriate engineering controls:

Ensure adequate ventilation.

Individual protection measures:

Do not smoke while handling product. Protect eyes and skin against splashes of liquid.

Respiratory protection:

In case of gas leak wear self-contained breathing apparatus

Eye protection:

Use goggles if there is risk of splashes of liquid.

Skin protection:

Use insulating gloves and protective suit if there is risk of splashes of liquid.

9. PHYSICAL AND CHEMICAL PROPERTIES:

9.1 Information on basic physical and chemical properties:

Appearance:	Colourless gas.
Odour:	Sweetish. Poor warning properties at low concentration
Odour threshold:	Not available
pH:	Not applicable
Melting point/freezing point:	Not available
Initial boiling point and boiling range:	Not available
Flash point:	Not available
Evaporation rate:	Not available
Flammability:	Not available
Upper/lower flammability or explosive limits:	Not available
Vapour pressure:	Not available
Vapour density:	Not available
Relative density:	Not available
Solubility(ies):	Not applicable
Partition coefficient (n-octanol/water):	Not available
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available
Explosive properties:	Not available
Oxidising properties:	Not available

Physical hazards (Flammable gas): Flam. Gas 1; H220

9.2 Other information:

Not relevant.

10. STABILITY AND REACTIVITY:

10.1 Reactivity:

Not available.

10.2 Chemical stability:

May decompose violently at high temperature and/or pressure or in the presence of a catalyst.

10.3 Possibility of hazardous reactions:

Can form explosive mixture with air. May react violently with oxidants.

10.4 Conditions to avoid:

Keep away from heat.

10.5 Incompatible materials:

Avoid contact with oxidizing agents.

10.6 Hazardous decomposition products:

Incomplete combustion may form carbon monoxide, carbonylfluoride and hydrogenfluoride..

11. TOXICOLOGICAL INFORMATION:

11.1 Information on toxicological effects:

Hazard class	Data	Test	Source
Acute toxicity:			
Inhalation	Not available	-	-
Dermal	Not available	-	-
Oral	Not applicable	-	-
Skin corrosion /irritation	Not available	-	-
Sensitisation	Not available	-	-
CMR	Not available	-	-

Information on likely routes of exposure:

Skin, eyes and inhalation.

Inhalation

High concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination. May cause frostbites in case of contact with skin and eyes.

Skin contact:

May cause frostbites.

Eye contact:

May cause frostbites.

Ingestion:

Ingestion is not considered a potential route of exposure.

Long term effects

No known long term effects.

12. Ecological information:

12.1 Toxicity:

Aquatic Data		Test (medium)	Source
Fish	Not available	-	-
Crustaceans	Not available	-	-
Algae	Not available	-	-

12.2 Persistence and degradability:

Not available

12.3 Bioaccumulative potential:

Not available

12.4 Mobility in soil:

Not available

12.5 Results of PBT- and vPvB assessment:

Not available

12.6 Other adverse effects:

Not available

13. DISPOSAL CONSIDERATIONS:

13.1 Waste treatment methods:

Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor.

Do not discharge into any place where its accumulation could be dangerous.

Empty bottles and bottles with residues should be returned to the supplier.

14. TRANSPORT INFORMATION:

14.1 UN number:

UN 3161

14.2 UN proper shipping name

UN 3161 Liquefied gas, flammable, n.o.s. (N-butane, propane)

14.3 Transport hazard class(es)

2 (Classification code 2F)

14.4 Packing group

Not applicable.

14.5 Environmental hazards

The mixture is not an environmental hazard

14.6 Special precautions for user

Avoid transport on vehicles where the load space is not separated from the driver's compartment.

Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product containers:

- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.
- Ensure there is adequate ventilation.
- Compliance with applicable regulations

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

15. REGULATORY INFORMATION:

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

Young people under 18 years may not work with this product. The user must be instructed before use and be familiar with the content of this Safety Data Sheet.

15.2 Chemical safety assessment:

Not available

16. OTHER INFORMATION:

Full text of hazard- and risk-phrases in section 3:

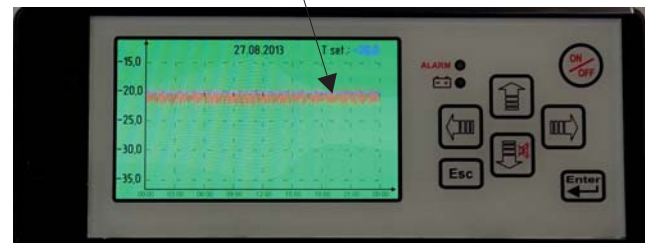
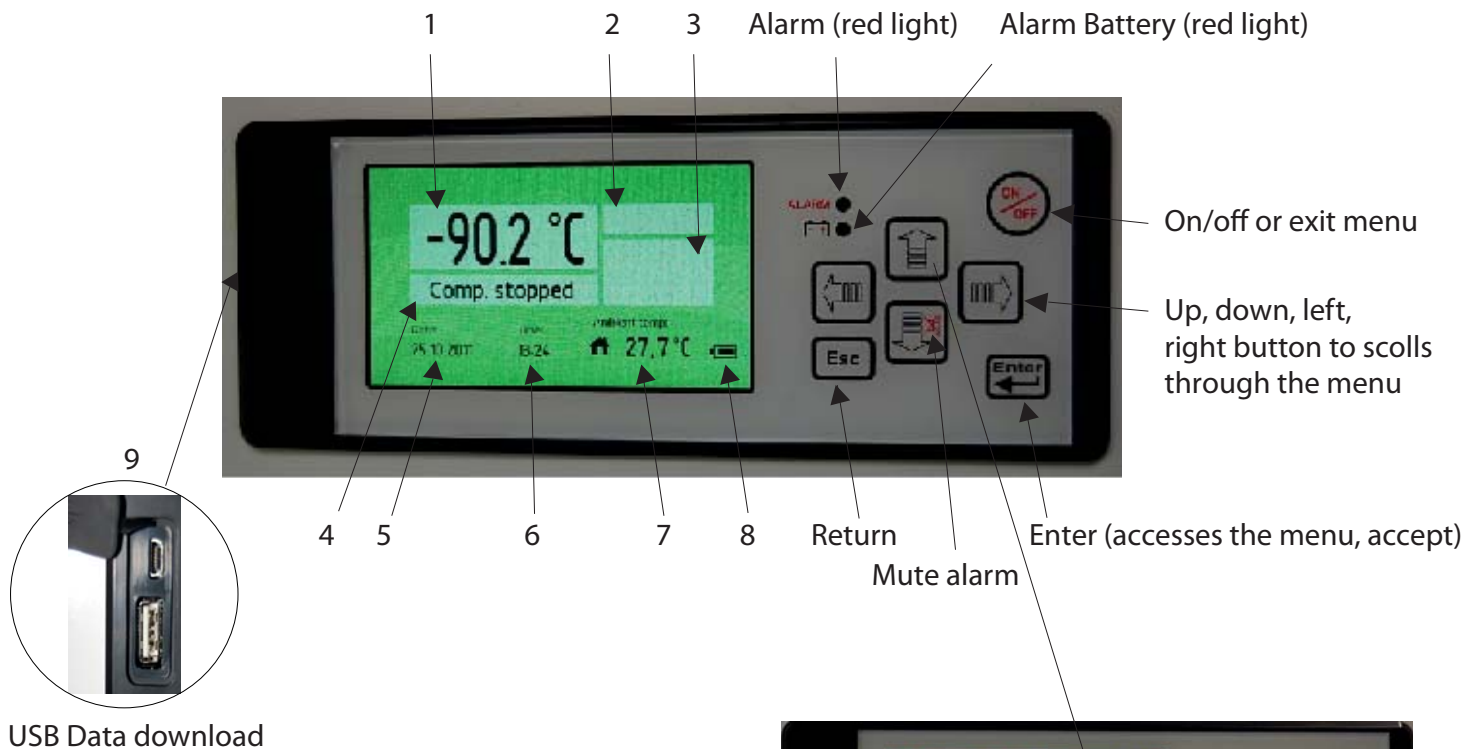
R12 Extremely flammable

H220 Extremely flammable gas

Since consumer is working outside of our knowledge and our control, be aware that it always is the consumers responsibility to make the necessary steps to comply with applicable regulations.

AM-Gruppen A/S, July 2010.

5e. Controller G-214



Control Panel Description

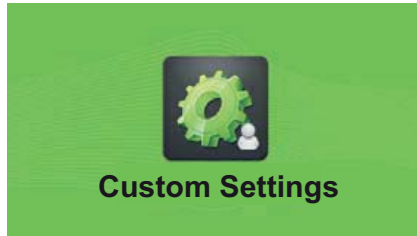
1. Temperature indicator
2. Alarm indicator
3. Alarm-icons
4. Compressor indication
5. Date indication
6. Hour indication
7. Ambient temperature indicator
8. Battery level
9. USB-Connection

Push the **UP** button in order to generate a graph.

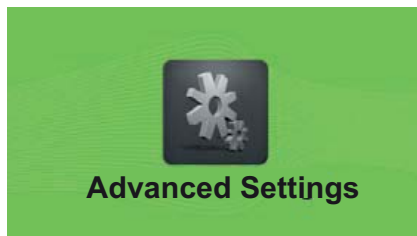
Push the **LEFT** button in order to return up to 10 days back.

Push the **Esc** button in order to exit the menu.

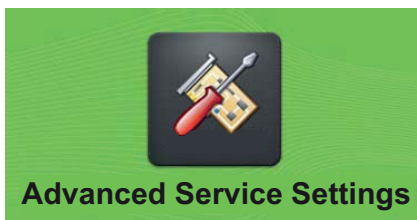
Setting icons



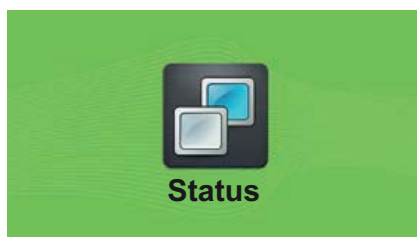
Custom Settings



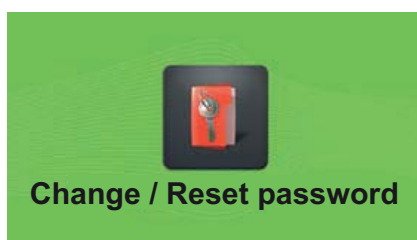
Advanced Settings



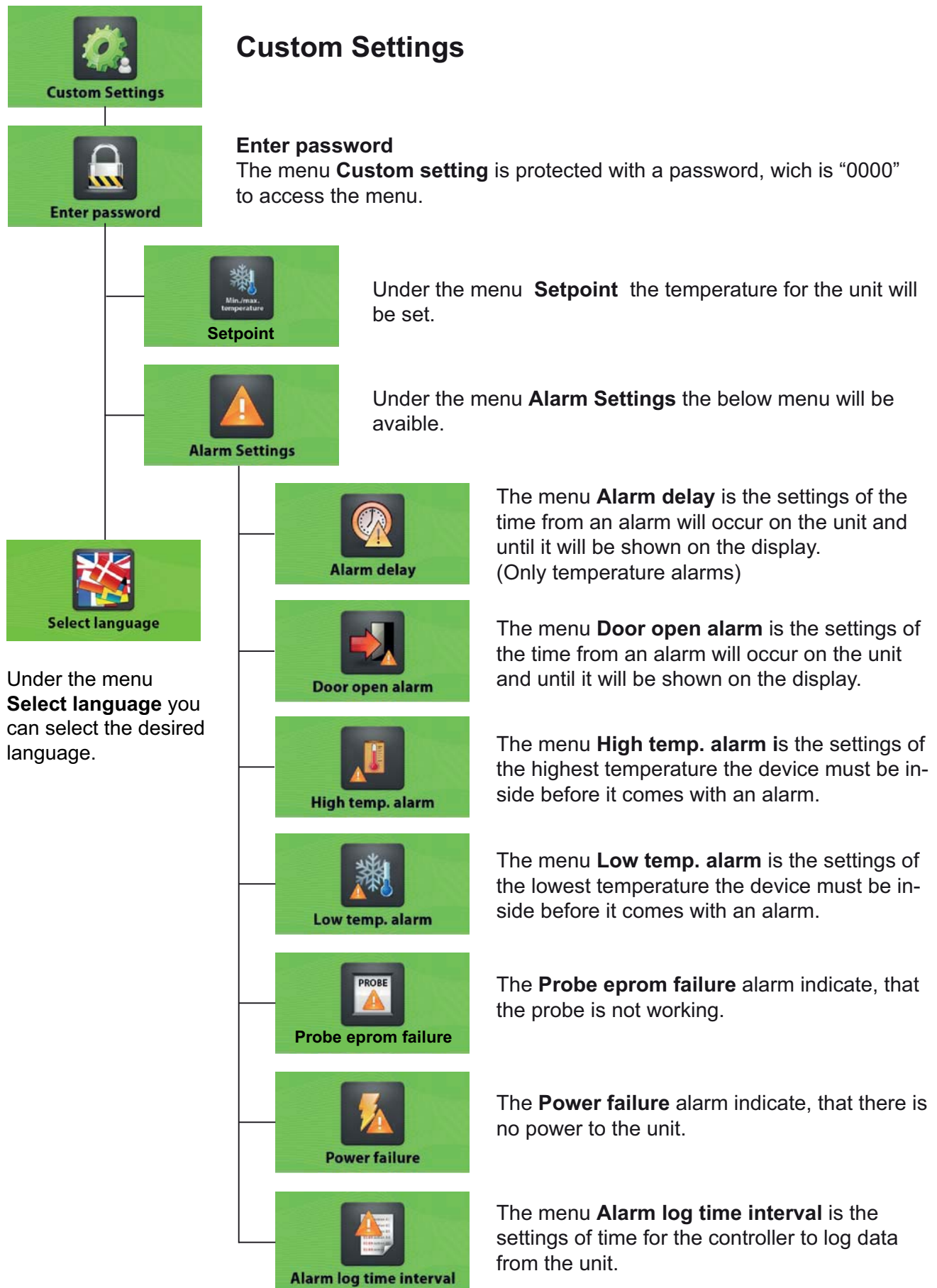
Advanced Service Settings



Status



Change / Reset password





Advanced Settings



Enter password

The menu **Advanced Settings** is protected with a password which is "0000" to access the menu.



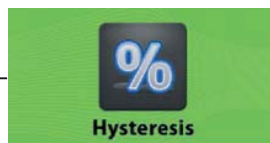
The menu **Calibration** is the settings for offset of the temperature in the display.



The menu **Automatic defrost** is the setting of the time where a defrost automatic will be performed on the unit.



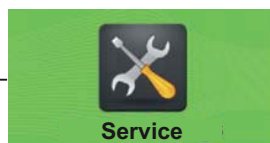
Under the menu **Manual defrost** the defrost can be started immediately.



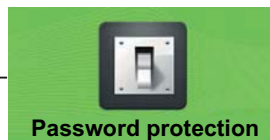
The menu **Hysteresis** is the setting of the difference from the setpoint where the compressor will start and stop.



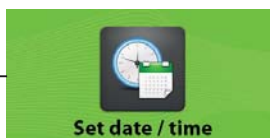
The menu **Temp. range limits** is the settings of the maximum and minimum temperature the unit can be used for.



→ Service



The menu **Password protection** is the setting of the protection for the unit not to be turned off and is protected with a password.



The menu **Set date / time** is the setting of date and time.



The menu **Ambient temp. settings** is the adjustment of the ambient temperature.



Service

Service Settings

Under the menu **Service**, there is information about the unit, which is important for service on the unit.



Compressor hours

The menu **Compressor hours** shows, how many hours the compressor has run.



Fan hours

The menu **Fan hours** shows, how many hours the fan has run.



Probe

Under the menu **Probe** the temperature for the sensor mounted in the unit is displayed.



Probe inside unit

Under the menu **Probe inside unit** the temperature of the sensor mounted inside the unit is displayed. There is mounted a sensor as standard in the unit, but it is possible to mount 3 sensors inside the device. (Controller version)



Probe Compressor

Under the item **Probe Compressor** the temperature of the sensor mounted on the compressor is displayed. (Not all models)



Probe evaporator

Under the point **Probe evaporator** the temperature of the sensor, that is located on the condenser, is displayed.



Advanced Service Settings

Advanced Service Settings

This menu is only used by the service department at the manufacturer.



Status

Status



Current alarms

The **Current alarms** shows the alarm, which have been on the unit with data and time.



Temp. last 24 hours

The **Temp. last 24 hours** shows the temperature of the unit the last 24 hours.



Change/Reset password



Change password

Under **Change password** it is possible to change the password for **Customer Settings**, **Advanced Settings** and **Advanced Service Settings**.



Reset password

Under **Reset password** it is possible to reset the password for the **Customer Settings**, **Advanced Settings** and **Advanced Service Settings**.
Contact the manufacturer to get the password for reset password.

Download Data



Place the USB pen drive in the connection on the display and press the button right for **read data** from the unit to the USB pen.



The **Read data** will be shown in the display when the data is loading to the USB pen drive.



The **Transfer complete** will be shown on the display when the loading is finished and the USB pen can be removed from the display.

Open the 2 files:
data00 and **param00**
on a computer in Excel or similar.

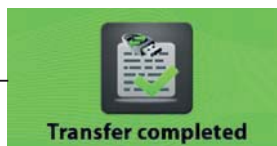
Upload Data (Only for new settings from the manufactory)



Turn-off the display before start.
Place the USB pen drive in the connection on the display and press the button left for upload parameters from the USB pen to the unit.



The **Data upload** will be shown in the display when the data is loading to the unit.



The **Transfer complete** will be shown on the display when the loading is finished and the USB pen can be removed from the display.

Alarms on display



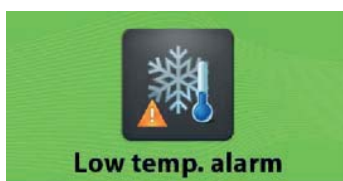
Alarm icons



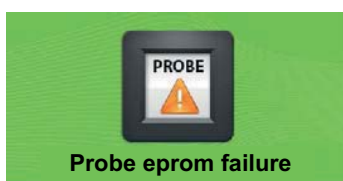
The **Door open alarm** indicate, that the door is not correct closed



The **High temperature alarm** indicate, that the temperature inside the unit is higher than permitted from setting of the unit.



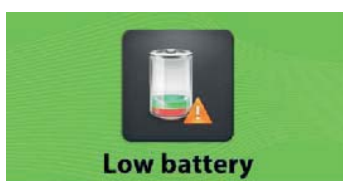
The **Low temperature alarm** indicate, that the temperature inside the unit is lower than permitted from setting of the unit.



The **Probe eprom failure** alarm indicate, that the probe is not working.



The **Power failure** alarm indicate, that there is no power to the unit.



The **Low battery** alarm indicate, that the power on the battery is to low.

5f. Default settings

Description	Arctiko default settings	Customer settings
Custom Settings (Password)	0000	
Set point		
Freezer	-80,0	
Alarm Settings:		
Alarm delay		
Freezer	15 min	
Door open alarm		
Freezer	Enable	
High temp. alarm		
Freezer	-65	
Low temp. alarm		
Freezer	-90	
Probe/eprom failure		
Freezer	Enable	
Power failure		
Freezer	Enable	
Alarm log time interval		
Freezer	1	

Description	Arctiko default settings	Customer settings
Advanced Settings (Password)	0000	
Calibration		
Freezer	0,0	
Automatic defrost		
Freezer	0	
Manual defrost		
Freezer	OK	
Hysteresis		
Freezer	2,0	
Temp. range limits		
Freezer Max.	-40,0	
Freezer Min.	-86,0	

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