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Safety Precautions

The Blood Bank unit is designed for storage of whole blood and related products at constant temperature in clinical, pharmaceutical, research, and other laboratory applications. Please carefully read this manual, and follow the instructions to properly operate the unit.

This manual covers all aspects of installing and operating the unit. It also provides information that can prevent a user from being injured. «Caution» and «Warning» suggest two levels of safety implications. Please follow them carefully.



WARNING

This action may cause fatal injury or servere damage.



CAUTION

This action may cause fatal injury or servere damage.

Example of labels:



This symbol suggests precaution be followed



This symbol means that an action is strictly prohibited.



This symbol designates procedures to be followed. Please keep this manual for convenient reference.



This symbol means "OFF" for part of the equipment.

Environmental Conditions

This unit is designed for applications in the following environmental conditions. It is safe to operate the unit at these or more favorable conditions:

1. Indoor usage.
2. Elevation of less than 2.000 meters.
3. Ambient temperature between 5° C to 32° C.
4. Voltage variation within ± 10 percent of nominal voltage supply.
5. Factory-approved abnormal voltage range.
6. Instantaneous over-voltage complies with second grade for installation of equipment. For the main voltage supply, the minimum and normal supply is second level.
7. Environment complying with IEC664 standard, Grade 2 Contamination.
8. The unit complies with EC directives : 2004/108/ECC
2006/95/ECC
93/42/ECC

SAFETY PRECAUTIONS



Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain.



Only qualified engineers or service personnel should install the unit.

The installation by unqualified personnel may cause electric shock or fire.



Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.



Never install the unit in a humid place or a place where it is likely to be splashed by water.

Deterioration of the insulation may result which could cause current leakage or electric shock.



Never install the unit in a flammable or volatile location. This may cause explosion or fire.



Never install the unit where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.



Always ground (earth) the unit to prevent electric shock. If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod.



Such grounding may cause electric shock in the case of an incomplete circuit.



Connect the unit to a power source as indicated on the rating label attached to the unit.

Use of any other voltage or frequency other than that on the rating label may cause fire or electric

Never store volatile or flammable substances in this unit if the container cannot be sealed.



These may cause explosion or fire.



Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit. This may cause electric shock or injury by accidental contact with moving parts.

SAFETY PRECAUTIONS



-  Use this unit in safe area when treating the poison, harmful or radiate articles.
 Improper use may cause bad effect on your health or environment.
-  Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.
-  Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand. This may cause electric shock
-  Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.
-  Never splash water directly onto the unit as this may cause electric shock or short circuit.
-  Never put containers with liquid on the unit as this may cause electric shock or short circuit when the liquid is spilled.
-  Never bind, process, or step on the power supply cord, or never damage or break the power supply plug. A broken supply cord or plug may cause fire or electric shock.
-  Do not use the supply cord if its plug is loose. Such supply cord may cause fire or electric shock.
-  **Never disassemble, repair, or modify the unit yourself.** Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.
-  Disconnect the power supply plug if there is something wrong with the unit.
Continued abnormal operation may cause electric shock or fire.
-  When removing the plug from the power supply outlet, grip the power supply plug, not the cord. Pulling the cord may result in electric shock or fire by short circuit.
-  Disconnect the power supply plug before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.
-  Disconnect the power plug when the unit is not used for long periods. Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.

SAFETY PRECAUTIONS



-  If the unit is to be stored unused in an unsupervised area for an extended period, ensure that children do not have access and that doors cannot be closed completely.
-  The disposal of the unit should be accomplished by appropriate personnel.
Remove doors to prevent accidents such as suffocation.
-  Do not put the packing plastic bag within reach of children as suffocation may result.
-  Use a dedicated power source (a dedicated circuit with a breaker) as indicated on the rating label attached to the unit. A branched circuit may cause fire resulting from abnormal heating.
-  Connect the power supply plug to the power source firmly after removing the dust on the plug. A dusty plug or improper insertion may cause a heat or ignition.
-  Never store corrosive substances such as acid or alkali in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.
-  Check the setting when starting up of operation after power failure or turning off of power switch. The stored items may be damaged due to the change of setting.
-  Be careful not to tip over the unit during movement to prevent damage or injury.
-  Prepare a safety check sheet when you request any repair or maintenance for the safety of service personnel.
-  Always keep the keys in separate place and out of reach of children.
-  Before servicing or cleaning the appliance, unplug it from the mains or disconnect the electrical power supply.
-  The power supply cable may only be replaced by an authorised person.
-  The packing material is entirely recyclable, for more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Installing the appliance

1. Always allow an authorised electrician to install the appliance.
2. The appliance should be located in a cool, dry place out of direct sunlight. The appliance gives off a great deal of heat when in operation. If the ambient temperature is too high there is a risk that the appliance will not operate correctly. It is recommended that the room be ventilated so that the room temperature does not exceed ambient temperature.
3. Place the appliance on a solid and flat substrate. This will eliminate any vibration and irritating noise. The appliance should be placed with at least 10cm free to the sides, at least 16cm free at the back.

Electrical Connection

Only use the appliance for its specific purpose

The appliance should be given extra protection in accordance with Electricity Supply Regulations in order to protect the user against dangerous electric shocks in the event of faults.

If the switch is for three-pin plug, a three-pin plug should be used and the conductor with yellow/green insulation connected to the Earth terminal.

Data regarding voltage and absorbed power/current is given on the rating plate. (see page 16) Electrical connection must be made in accordance with the local regulations.

Information

This appliance contains a mixture of various refrigerants. For more information please see the plate affixed to the refrigerator. (see page 16)

2. Information about the unit

2a. General information about the unit

BBR 300 / 500 / 700



BBR 1400



BBR 100

Descriptions of Refrigerator Parts and their Functions

1.1 Control Panel (G-214 Controller)

The control panel on the blood bank shows the actual storage temperature inside the refrigerator. You can use the push buttons on the panel to adjust the temperature set point and test the alarm functions.

1.2 Secondary Alarm (Dixell XR30CX Controller)

The secondary temperature alarm on the blood bank shows the temperature of stored goods.

2.1 Battery Back-up for Main Controller

2.2 Battery Back-up for Secondary Controller

Before you start up the refrigerator, you have to connect the Battery Back-up (see page 41)

3. Door Lock with key

You can use this feature to lock the refrigerator.

4. Door Handle

For easy of opening and closing door.

5. Castors

The 4 castors underneath the unit provide the convenience of moving the unit around.

6. Automatic Temperature Recorder

The refrigerator is equipped with an automatic temperature recorder. Its paper chart runs for a full turn in 7 days, so the storage temperature can be permanently recorded. The chart paper must be changed once every 7 days.

7. Blood Storage Drawers with adjustable Devices

The drawers are designed to conveniently store and unload the blood samples.

8. Interior Light

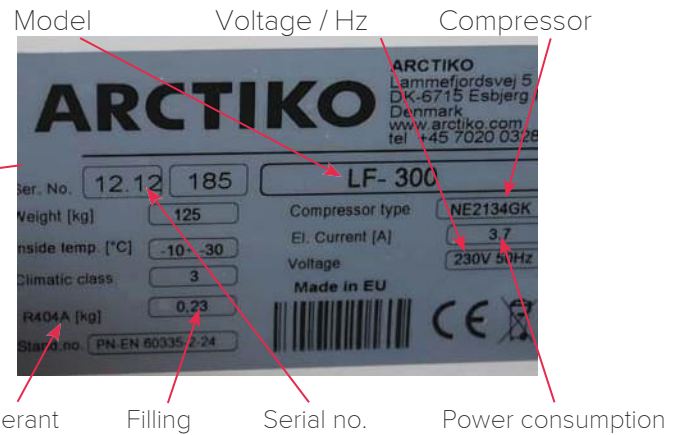
LED-Light.

9. Door Alarm

When the door is open for 15 minutes, the door alarm will sound. You should reduce the open door time to stabilize the refrigerator temperature.

10. Rating plate (See page 16)

Label plate located on the device



When contacting the supplier it is important to inform the model and serial no. 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.

The unit must be defrosted manually / automatically. See section 4h.

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.

Alarm for:

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

Display G-214



EI-box

PCB Board

Data sheet for controller G-214.
See section 5d.

2c. Model information

Model	BBR 100	BBR 300	BBR 500	BBR 700	BBR 1400
Item code	DAI 0770	DAI 0775	DAI 0735	DAI 0740	DAI 0745
Temp. range (°C)	+4	+4	+4	+4	+4
Max. ambient temp. (°C)	32	32	32	32	32
Power supply (V)	230/110*	230/110*	230/110*	230/110*	230/110*
Frequency (Hz)	50/60*	50/60*	50/60*	50/60*	50/60*
Fuse (A)	10	10	10	10	10
AMP (A)	1.2	1.3	1.3	1.8	3.2
Power consumption (KWh/24h)	2.9	3.1	3.53	5.7	8.13
No. Of compressors	1	1	1	1	1
Refrigerant / Filling	R134a /See label plate	R134a /See label plate	R134a /See label plate	R134a /See label plate	R404a /See label plate

* Special produced units (not standard).

Compressor:

The compressor type can be found on the rating plate in the engine compartment.

The units may be provided with compressors of different brands, but with the same specific properties.

2d. Proper usage of the Refrigerator

During the initial startup and continuous usage of the refrigerator, the following procedures should be followed.

1. Power the refrigerator in a dedicated power socket. The voltage requirement is 230 VAC and 50 Hz. When started, do not place any products in the refrigerator before the refrigerator has run for the first 24 hours.
2. When the unit initially starts up, the buzzer alarm may sound. This is normal. You can push the buzzer alarm button to cancel the sound. The buzzer alarm continues to work until the upper bottle temperature reaches the range of 2° C to 6° C.
3. Make sure that both sensor bottles have glycerin solution of 10% concentration. Please refer to item 4 in the Operation section for details.
4. This refrigerator has been factory preset to operate at a $\pm 2^{\circ}\text{C}$. It is not necessary a range of 4° C to adjust the temperature set point.
5. It usually takes several hours for the unit to reach the preset temperature. Once the unit's temperature is stable, check the sensor bottle temperature to see if it matches the set point.
6. Turn on the light for the interior. Inspect the light to make sure it functions properly.
7. Once a thorough inspection of the unit is completed, products can be loaded into the refrigerator. Beware to not load too many warm products into the unit at one time.

2e. Remote alarm contact

The terminals for the remote alarm contact are located on the back of the unit cover panel. The contacts are designed for 30 VDC and 2A load. The remote alarm contacts work in synchronization with the buzzer alarm on the refrigerator. Therefore, the remote alarm can be terminated by pushing the buzzer alarm button. However, in case of a power outage, the remote alarm contacts cannot be controlled by the buzzer alarm.

Remote alarm condition: Open for Normal, Close for Abnormal

2f. Maintenance



WARNING

Before any inspection or maintenance work is performed, the refrigerator's power plug should be disconnected from the power supply socket. This is to prevent any potential electrical shock or injury. During the maintenance work, do not breathe the dust and aerosols near the unit; they might be harmful to your health.

Cleaning the refrigerator

1. The refrigerator should be cleaned once a month. Regular cleaning can keep the unit looking new.
2. Use a dry, soft cloth to clean the dust off the interior and exterior. If necessary, use a soft cloth with a solution of water and mild detergent to wipe the unit.
3. After the cleaning, use a dry cloth to wipe off any solution residue off the surfaces.
4. Do not pour water directly into the refrigerator. By doing so, the water can damage the insulation materials and cause problems.
5. Parts in the refrigeration system for this refrigerator are completely sealed. They do not require any lubrication.

2g. Specifications

Description	Blood Bank Refrigerator For Medical Application				
Model Number	BBR100	BBR300	BBR500	BBR700	BBR1400
External Dimension	W 610 x D 645 x H 810 mm	W 520 x D 700 x H 1997 mm	W 620 x D 860 x H 1997 mm	W 720 x D 860 x H 1997 mm	W 1440 x D 860 x H 1997 mm
Internal Dimension	W 490 x D 470 x H 434 mm	W 400 x D 575 x H 1505 mm	W 500 x D 695 x H 1505 mm	W 600 x D 695 x H 1505 mm	W 1320 x D 695 x H 1505 mm
Effective Storage Volume	100 L	345 L	525 L	630 L	1255 L
External Wall Surface	Varnished steel				
Internal Wall Surface	Stainless Steel				
Door	Electric heater heated glass door				
Insulation	Hard Polyurethane foam (No Fluoride)				
Drawer / Shelves	2 stain- less steel	5 stain- less steel	5 stain- less steel	5 stain- less steel	10 stain- less steel
Refrigeration system	Forced air cooling				
Compressor	Hermetically sealed				
Condenser	Finned coil condenser				
Evaporator	Finned coil evaporator				
Refrigerant	R-134a				
Defrost system	Automatically Forced defrost system				
Temperature controller	Electronic Controller				

2g. Specifications

High Temperature Alarm	Flashing Alarm Indicator, alarm buzzer, remote alarm contact				
Low Temperature Alarm	Flashing Alarm Indicator, buzzer alarm without time delay, remote alarm contact				
Door Ajar Alarm	Alarm for door opening after 15 minutes delay				
Memory Device	Non-Volatile memory storage				
Florescent Light	8 W				
Chart Recorder	Standard including one box of recorder chart paper, and 1 piece of 9 V battery				
Accessory Items	One set of key, one certificate of warranty, one copy of operation manual, one plastic bag				
Weight	70 kg	105 kg	105 kg	112 kg	178 kg
Rechargeable battery	DM8-6 (8V6AH)				

Operating Parameters

Model	BBR100	BBR300	BBR500	BBR700	BBR1400
Sensor Bottle Temperature	+4° C +/- 2° C				
Design Ambient Temperature	+5° C To 35° C				
Sustainable Alarm Time	72 Hours With Fully chargeable battery				

Note: the design parameters of this refrigerator may change without notice.

2h. Rating Plate

The Rating Plate is placed inside the machinery room on the right side.



The rating plate is a permanent aluminium foil sticker with black print.

1. Logo
2. Address and tlf.no.
3. Modelname
4. Compressor type
5. El. current (A)
6. Voltage
7. Symbol for Rosh.
8. CE sign for Declaration and Conformity
9. Made in EU
10. Temperature Class
11. Refrigerant and quantity
12. Climatic class
13. Inside temp. (°C)
14. Weight (kg)
15. Serial no.: 15 = week; 14 = year, 1026516 = consecutive number
16. Operating instructions
17. Caution

2i. After-Sale Support

Dear Customer,

If you have any problems or questions, and you have studied the manual, don't hesitate to contact us, and we will revert to you, as soon as possible. In case of contact to the service department, please have the model name and serial number written down. This will help us and you very much.

Spare Parts

When ordering spare parts, that you can easily fit yourself, please give unit type number and the function of the part(s) concerned.

If any spare parts are required, we will try to have a day to day delivery service for spare parts, but special parts can take longer be course of special production time. We also guarantee that all parts for our products will be available for a period of at last 10 years from purchase date.

Guarantee

ARCTIKO provides a 100% guarantee on parts for a period of 12 months, excluding shipping costs and labor.

There is no guarantee for the contents of the unit.

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 unit is started.

Loading the unit

When loading large quantities of items into the unit, 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 schedule (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 4l.
	Faulty windings in compressor		Test compressor windings.	See section 3k.
	Start relay defect.		Test start relay.	See section 3l.
	Fault in el-installation.		Use wire-diagram.	See section 5.
The unit does not freeze. The compressor tries to start, but fails.		Voltmeter	Check voltage.	Find the cause.
	Low voltage.			
	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 compr. See section 3f.
	Defect rotor (compressor failure).			Change compr. See section 3f.
	High pressure in the cooling system.	Tapping valve Manometer Filter	Open the system and rinse the system with nitrogen.	Remove 5 cm 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 temperature.	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 normally or colder.	The sensor is incorrectly 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 5e.
The compressor starts normally, but stops again.	Too high voltage.	Voltmeter	Measure the voltage.	Inform.
	Too high ambient temperature.	Eksternal 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.	Elektronic leak-seeking, soapy water, leak seeking spray.	First check the solder points, compr., capacitor etc.	See section 3.
	The fan is not running.	Voltmeter	Check for errors.	Replace the fan. See section 4c.
	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.	Eksternal thermometer	Check temperature.	Find better ventilation or placement.
	In addition, temperature of the air is too low.	Eksternal thermometer	Check temperature.	Find better ventilation or placement.

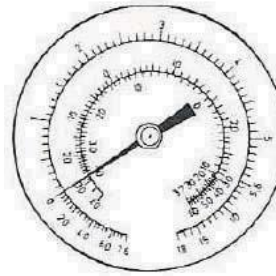
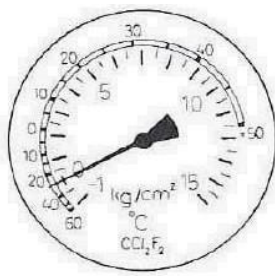
Examples of troubleshooting with a manometer connected to the process piping of the cooling system.

The system is blocked:

Suction pressure is very low.

Pressure equalization takes place slowly or not at all.

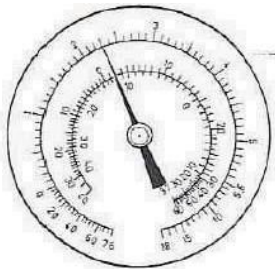
Reason: Icing or dirt in the capillary tube or filter, or blockings in the system due to other reasons.



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.

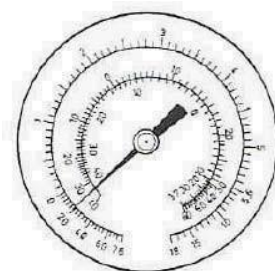


Leakage in the system.

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

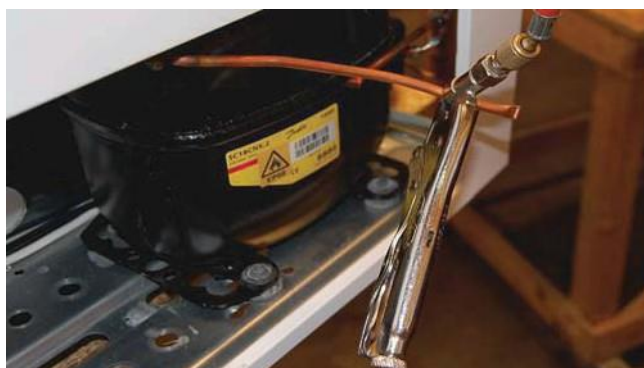
- To prevent moisture from penetrating under repair, the system must not be open for more than 15 minutes.
- Prepare spare parts components before the system is opened.
- The new connector is soldered to a tube with valve.



- 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.



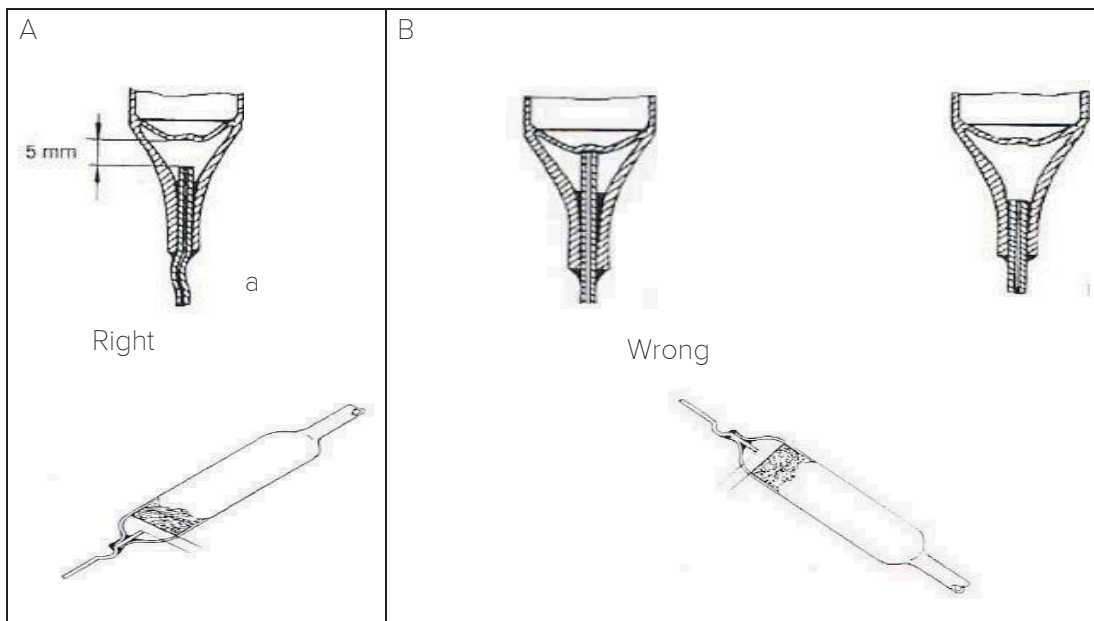
- The cooling system is evacuated with a two-stage vacuum pump for at least 30 minutes. Both from the pressure piping and process piping.
- Blow the system with nitrogen, both from the suction and the pressure side.

3e. Changing the dryfilter

- The dryfilter 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 dryfilter is placed after the condenser outlet, immediately before the capillary. Any opening of the cooling system, dryfilter change to ensure the function and lifetime of the unit.
- 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 min.
- 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.



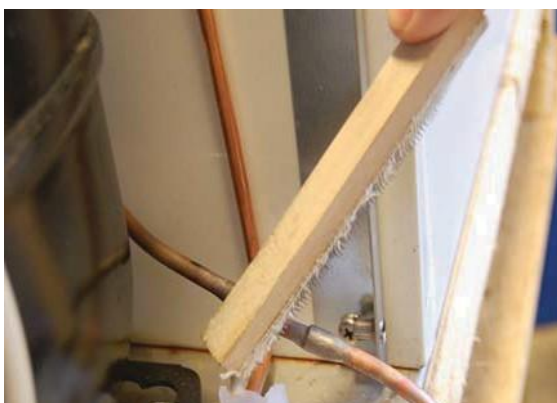
- Cut off the capillary tube with a capillary tube scissors.
- It is recommended to use a special tongs to create a wave on the capillary tube which ensures the correct positioning in the filter.



In the figure A the capillary tube is correctly installed in a dryfilter. 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 dryfilter 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 R134a / R404a

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

Note that R134a / R404a 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 min. 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 is used, it must be as short as possible.

The refrigerant cylinder is weighed before use.



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 first to 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 LokRing 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 unit and control the function of the device.

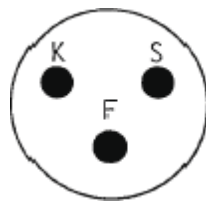
3j. Electrical troubleshooting

Before starting systematic troubleshooting, check the following:

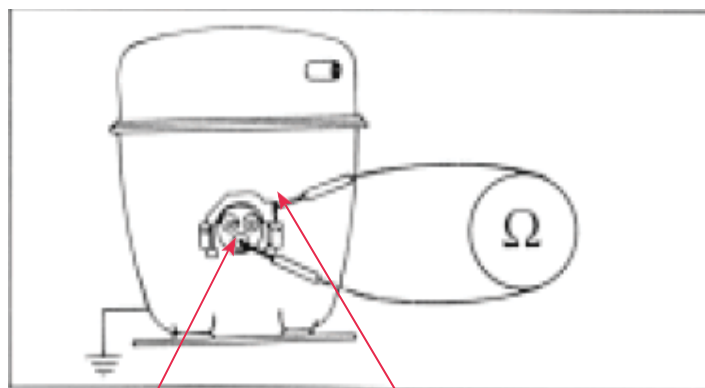
- Proper voltage is present.
- Electrical equipment used, is suitable for the compressor.
- The wires are properly installed according to wiring diagram.
- There is no transition between the live parts and ground.

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. The Ohmmeter's one clamp is placed on the compressor's ground terminal. The second clamp on the compressor's shared leg (see sketch). If the Ohmmeter shows a transition, the compressor is replaced.



Plug on the compressor



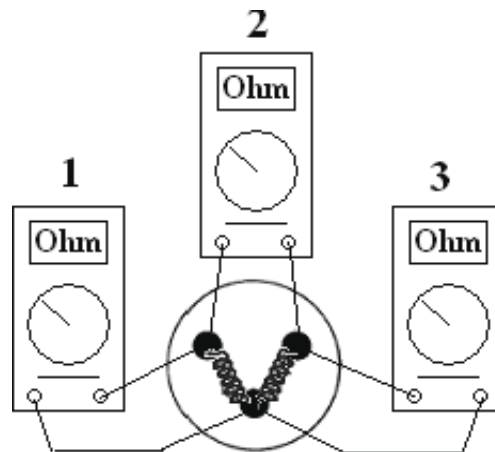
Shared leg

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.

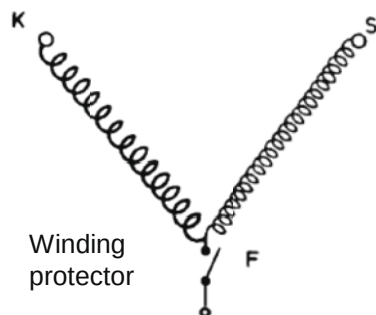
3k. Electrical fault - compressor

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



Dimensions of the compressor connections to determine whether driving and start winding are in- tact.

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 winding protection 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.

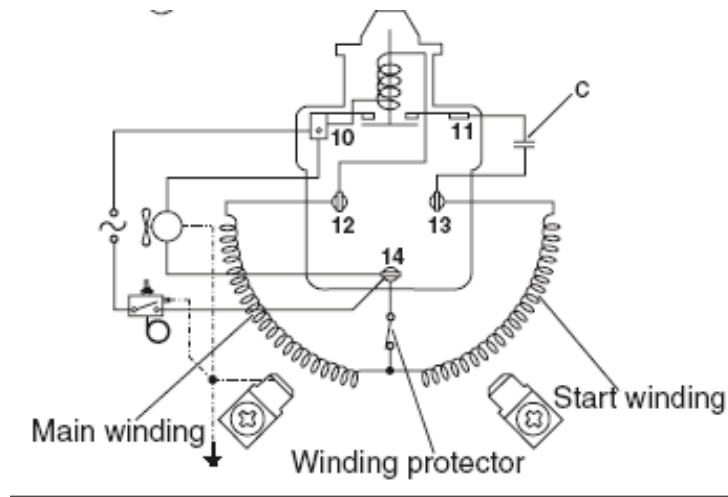
Since it is relatively small value to be measured, it would be a great advantage to use a digital Ohm-meter.

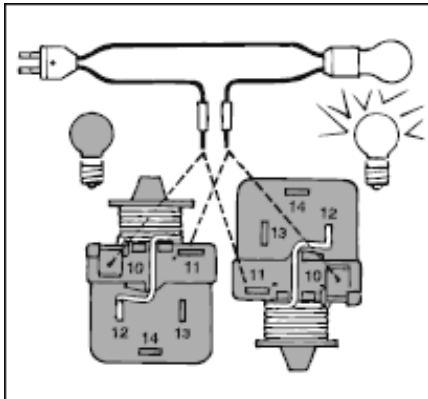
If the measurement indicates error, the compressor is replaced.

3I. HST-start relay, start capacitor

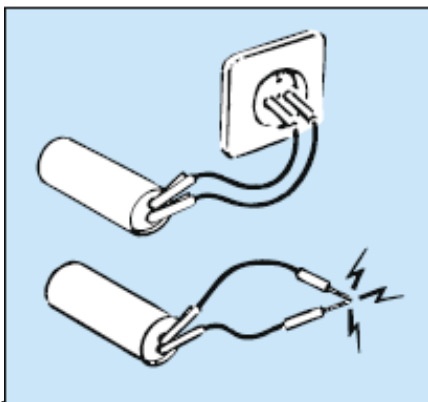
Connect a voltmeter between terminals 10 and 13 at the start of the relay. If no voltage is present, there is either a faulty cable or also the start relay is defect.

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





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.

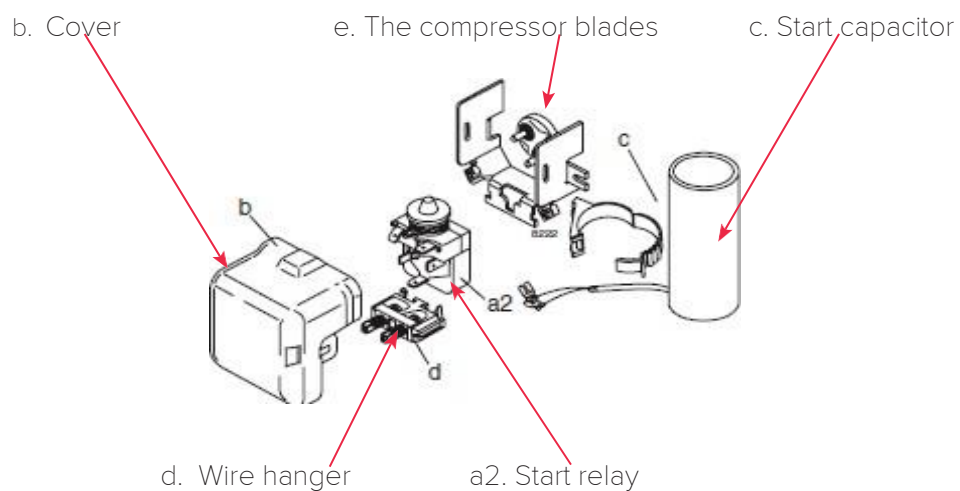


The start capacitor can be checked by injecting the normal voltage for a few seconds and then shorting it. When sparks are generated, the capacitor is in order.

When replacing the compressor the start relay and the start capacitor should also be replaced. The start relay is placed and clamped on the three terminal pins on the compressor.

The voltage is connected to terminals 10 and 14.

The start capacitor is connected and clamped to terminals 11 and 13.



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 the right side.
- In case that the gasket do not close properly, see section 4b.



The door can be adjusted in the slots in the top hinge of the door in the motor compartment.



Adjusting

4b. Heated door frame

The heaters are installed in the door frame .

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.



4c. Evaporator, Fan, Heat.element for aut. defrost and heating spiral in the defrost water drain

The evaporator is placed at the top of the cold storage.

The fan runs continuously when the unit is connected and ensure good air distribution in the cold storage.

The fan stops when the door is opened and during the automatic defrost.

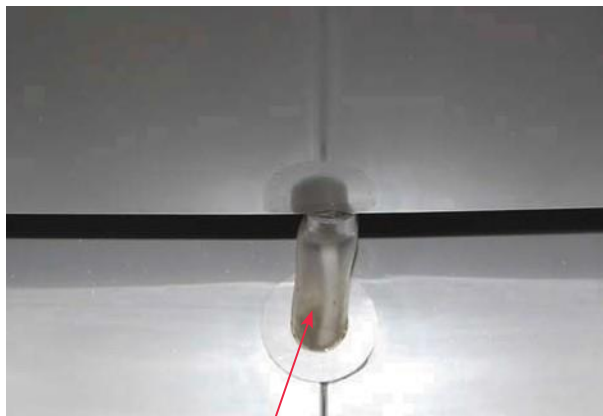
To avoid ice formation in the defrost water tray, a heater is mounted in the drain pipe to the drain tray.



Fan BBR 500 - 700 - 1400 (2 pcs.)



Fan BBR 300

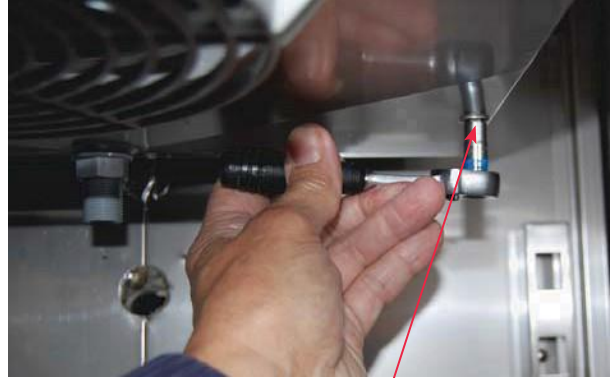


Heater in the drain pipe

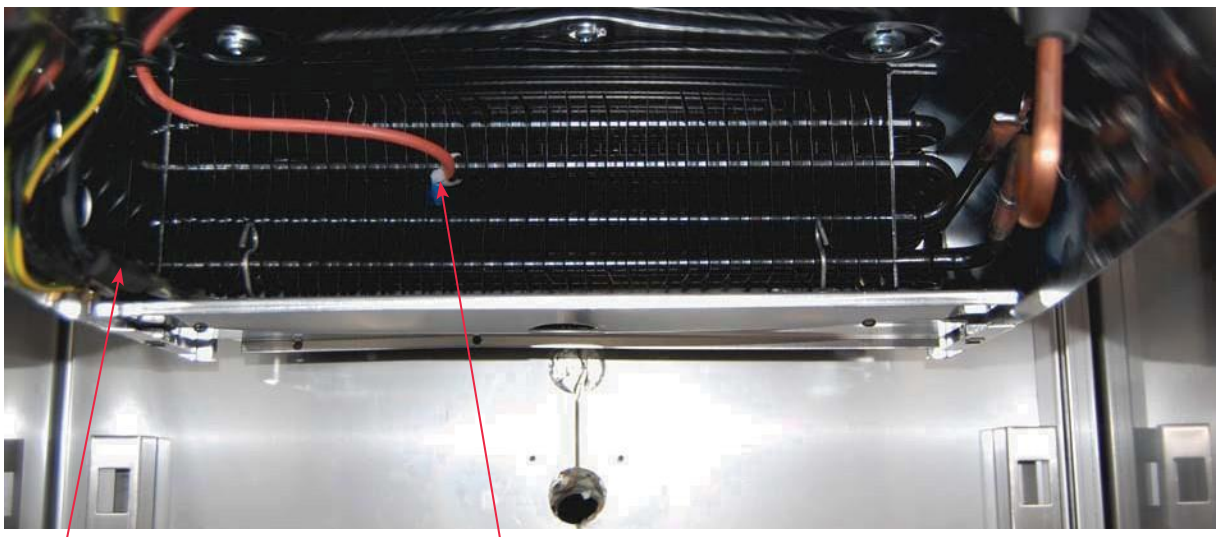
To get into the evaporator, the sensor for evaporator temperature and the heating element the drain is removed. Then remove the drain tray (4 screws).



Remove the drain pipe



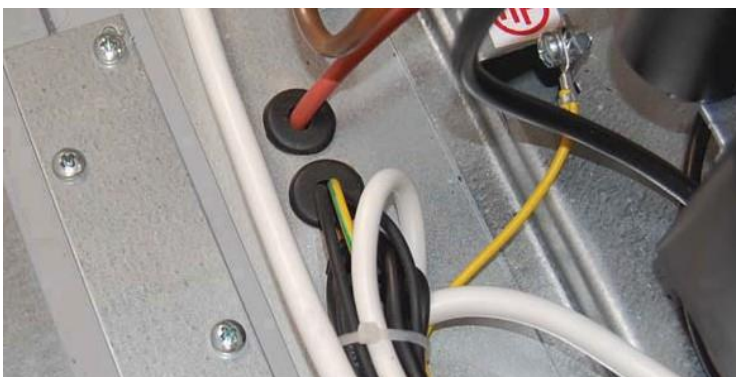
Remove the drain tray



Heating element

The sensor for evaporator

Sensor lead, wire for ventilation and heater as seen from the top of the motor compartment.



4d. Condenser - Fan

The condenser is placed in the engine department of the unit behind the front panel.

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 25°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.

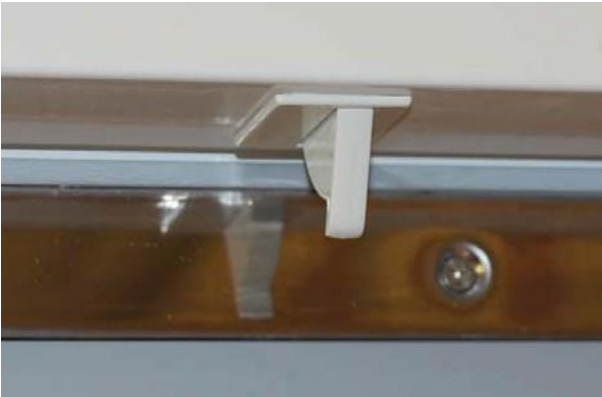


Fan

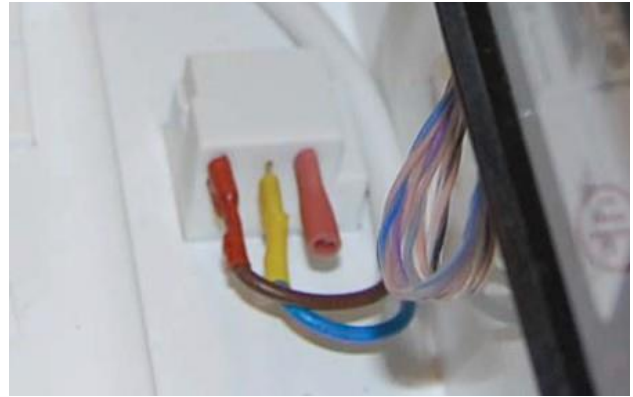


Cooling ribs

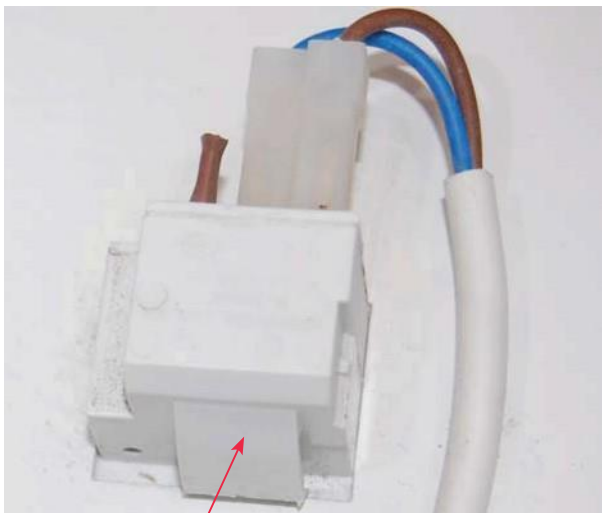
4e. Door switch



Door switch under the top panel



Door switch in the motor compartment



Push here when remounting

The door switch function controls:

Start/stop of the evaporator fan.

On/off light.

Alarm for open door.

The door switch is clipped under the door panel.

When replacing remove wire.

The flaps are pushed together and the switch is pressed out. A new switch is mounted in reverse order.

4f. Sensor for cold storage temperature

Sensor for evaporator tube temperature:

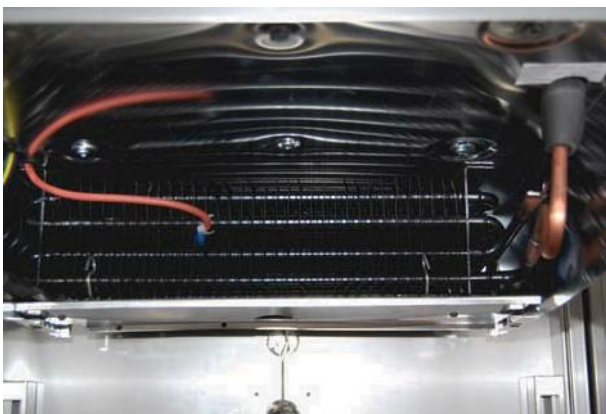
The sensor is the type of PT 1000.

The sensor must be introduced from the top of the motor compartment as the sensor for the room temperature.

The sensor is placed at the top of the evaporator in the cold storage covered by the drain cover. To remove the sensor, remove the cover. (See section 4c)

The sensor is fastened with strips.

The sensor is connected to the PCB board input. (See wire-diagram section 5a)



Evaporator



Sensor wire

Sensor for cold storage temperature:

The PT 1000 sensor for cold storage temperature is placed on the right side fastened with strips.

The sensor must be introduced from the top of the motor compartment.

The holes are sealed with putty.

Electrically, the sensor is connected to the PCB board input (Temp. sensors - Chamber).

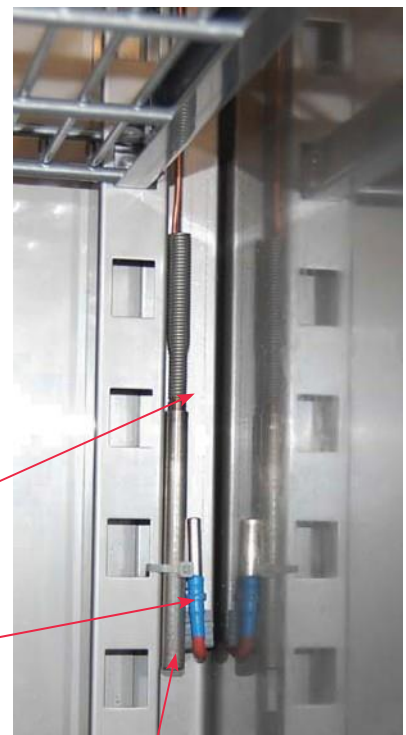
See wire-diagram section 5a.

Change of probe:

- Disconnect the power supply.
- Disconnect the electrical connection of the sensor in the CBS modul.
- Remove the strips.
- Remove the sensor track.
- Pull the sensor into the motor compartment.
- Mount the new sensor in reverse order.

Sensor track

PT 1000 sensor



Sensor for possible Chart-recorder

4g. 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

4h. Automatical / manual defrost, cleaning and maintenance

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

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 unit.
- 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.

Automatic defrost cycles in G 214 controller.

As default the controller will run automatic defrost every 6 hours.

1. The automatic defrost cycles start.
2. The compressor stop.
3. The evaporator-fan stop.
4. The evaporator-heat element starts heating up the evaporator.
5. The evaporator-sensor is measuring the temperature in the evaporator.
6. When the temperature in the evaporator reach -5°C., the heat element stop. parameter d9
7. The ice which was build up in the evaporator, will get into liquid form, and start floating out of the chamber, into the water tray on the back of the unit.
8. The parameter c3 is the time for the water can drip of the evaporator when the heat element has switch off.
9. After the C3 dripping time, the compressor start running again.
10. The parameter C13 will determine when the evaporator fan is starting, if the temperature d8 has been reached.
11. When the temperature in the evaporator reach -5°C., the evaporator-fan start running again.
12. The automatic defrost cycles end.

C7 is the paramet which block the display to measure the temperature in the chamber. Examble: If the display show -28° before the defrost starts, the display will show -28°C during the defrost cycles and 5 minutes (c7) after the defrost is finished. After the 5 minutes the display will show the actually temperature again.

The parameter c14 is start blocking time defrost cycles.

The parameter c15 is the end time of blocking defrost cycles.

Examble : If the customer do not want the unit to be defrosted in normally working hour, 8 o'clock until 16 o'clock.

c14 : 8 and c15 :16, now the unit will not do any defrost cycles in between these hours.

During the automatic defrost cycles, the displayed temperature will show the temperature in the air. This is not the actually temperature which are in the samples of medicine or similar product.

The temperature will be dropping approx. 2°C in the samples, during the automatic defrost.

4i. 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



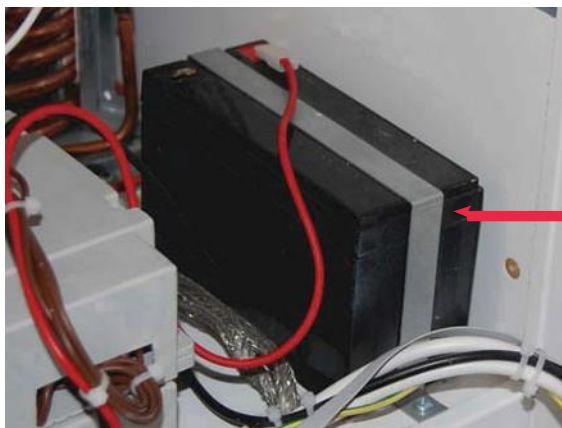
Process tube (too far)

4j. 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.

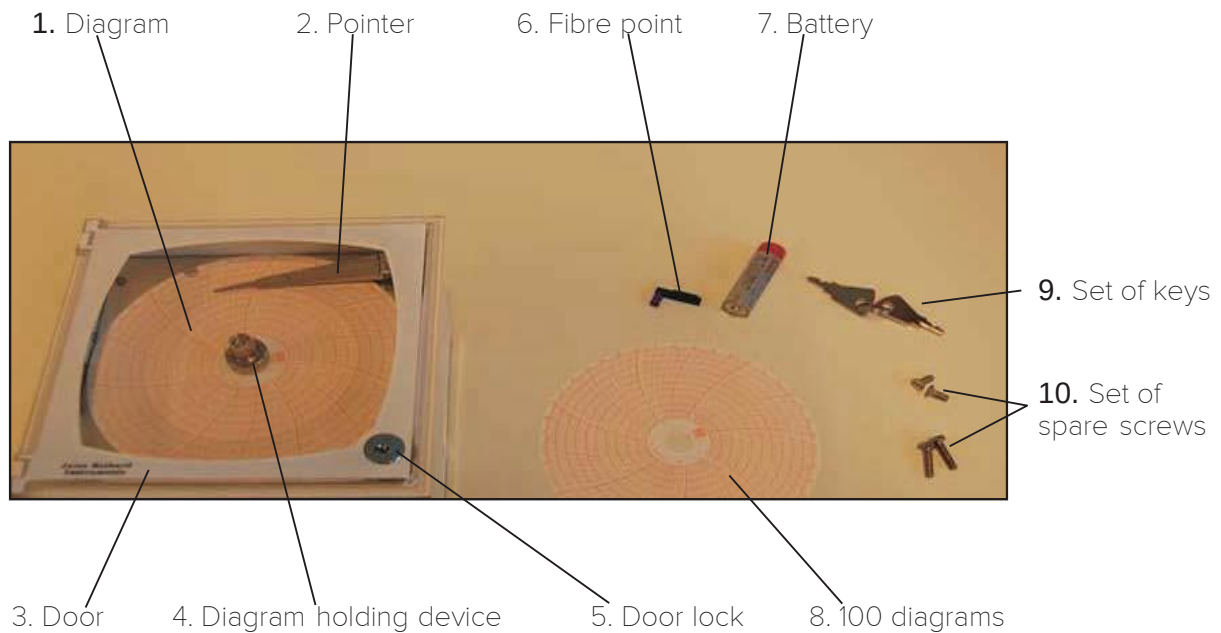
Check the voltage with a voltmeter.

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



Backup-battery

4k. Chart Recorder



The Chart Recorder is device intended to monitor the temperature and/or the pressure. It is made up of a neutral gas thermometer and write on a circular diagram with a fibre point pen. The case is made up of a closed body and a perforated rear hood made of white ABS plastic, and includes:

A clockwork movement, a diagram the measurement's drive element and the mechanical amplification device as well the interchangeable fibre point pen inscription.

The case front panel is a key locked transparent polycarbonate door. The diagram drive is ensured by:

- A standard quartz two-speed clockwork mechanism (1x24h and 7x24h) powered by a standard commercial battery.

The recording corresponding to the rated time length is done on a complete diagram rotation.

1. Implementation and use

A) Installing the battery



The standard LR6 AA leak proof alkaline battery should be replaced every year.

CAUTION: Never remove the central screw of the knurled nut.

To achieve the operation:

- Open the recorder door (3).
- Lift the pointer (2) so as to release the diagram (1).
- Unscrew the knurled nut (4) and remove the diagram (1).
- Firmly hold the case in one hand and, with the other, pull the mechanism axis toward the outside by alternatively swinging up and down to release it from its base.
- Change the battery located behind the mechanism, replace the mechanism in its case up to the stop.

For two-speed versions, the mechanism thus taken out allows access to the speed-changing lever.

- Tighten the nut, the knurled part toward the outside, up to the stop.

To set the time, turn the milled axis clockwise by using the end of the fibre point pen as a mark. This direction is imperative to eliminate the looseness in the clockwork mechanism.

B) Putting the fibre point pen in place

- Lift the plate's pointer (2).
- Insert the end of the pointer into the fibre point pen's slide rail up to the stop (6).
- Remove the cap by pulling and turning it at the same time.
- Do not place the point of the fibre point pen in contact with the fingers.
- Gently place the pointer on the diagram again.

C) Installing the diagram

- Release the pointer from the diagram (2).
- Unscrew the knurled nut (4).
- Place the diagram on the drive's axis (1).
- Insert the diagram under tabs foreseen to hold it.
- Tighten the nut, the knurled part toward the outside, up to the stop.
- Gently bring the pointer on the diagram.

D) Use of the clockwork mechanism

Winding the clockwork spring

Turn the knurled button (4) clockwise up to the stop without forcing it.

When the spring is completely unwound, the winding takes from 8½ to 9 rounds. (one round per 24 hours of operation).

Replacing the diagram and setting the time

To lessen the uncertainty of time setting, the operation shall be carried out on an even hour.

- After rewinding, lift the pointer (2).
- Unscrew the winding knob and the diagram's locking knob (4).
- Take a blank diagram (8), note the date and identify the recording in the boxes foreseen so that effect.
- Install the diagram on the axis and slip the edge of the disk under the 2 holding tabs.
- Screw back knob, clockwise, up to the stop and then come slightly backwards so as to be able to make the diagram turn.
- Gently place the pointer back on the diagram.
- Position the diagram facing the fibre point, on the date and 4 hours in advance. The locking of knob entails a slight slip (in the hour direction), for this reason one must anticipate this displacement so as to obtain an accurate time setting.
- Tighten locking screw, without touching the diagram, up to positioning the diagram on the exact time. The taking up of the angular play shall be carried out at the same time.
- Tighten the winding knob again.

2. Technical properties

Description	Self contained temperature probe - recorder 1
Number of measurements channels	0-100°C and -10+40°C
Measuring range	Capillary tube length: standard 3 m
Connection	+2% of measuring range at 23°C
Accuracy	45 mm
Full stroke	Diagram disk ø125 mm 1R /
Viewing	7 days, 1R / 24 hours
Length of recording (period) Power	Battery - LR 6 - 1.5V, 1 year (AA)
supply, self contained Appointed	-15°C +60°C
operating conditions Storage	-35°C +65°C
conditions	144 x 144 x 119 mm
Size	IP 20
Degree of protection	
Humidity	Max. 60%
Accessories:	
Diagrams Fibre	100 pcs.
point pen	violet About
Fibre point pen's capacity	90 m

3. Maintenance

Clean the housing with soapy water and a soft rag.

Change the battery once a year. Do not leave the battery inside the appliance during prolonged stops. Purchasing chart paper for the Chart Recorder:

The chart recorder papers are imprinted chart papers designed for the recorder. The papers that are supplied with the unit usually last about half a year. When you are running short of the chart paper, please contact Arctiko to purchase more. The lead time to deliver the charts is 1-3 working days after receiving the order. Please call Arctiko for details.

To change the accessories, see the following paragraphs:

- Putting the battery in place.
- Putting the fibre point pen in place.
- Putting in place the diagram for battery mechanism.
- Using the mechanical movement.

Annual check of the metrological features.

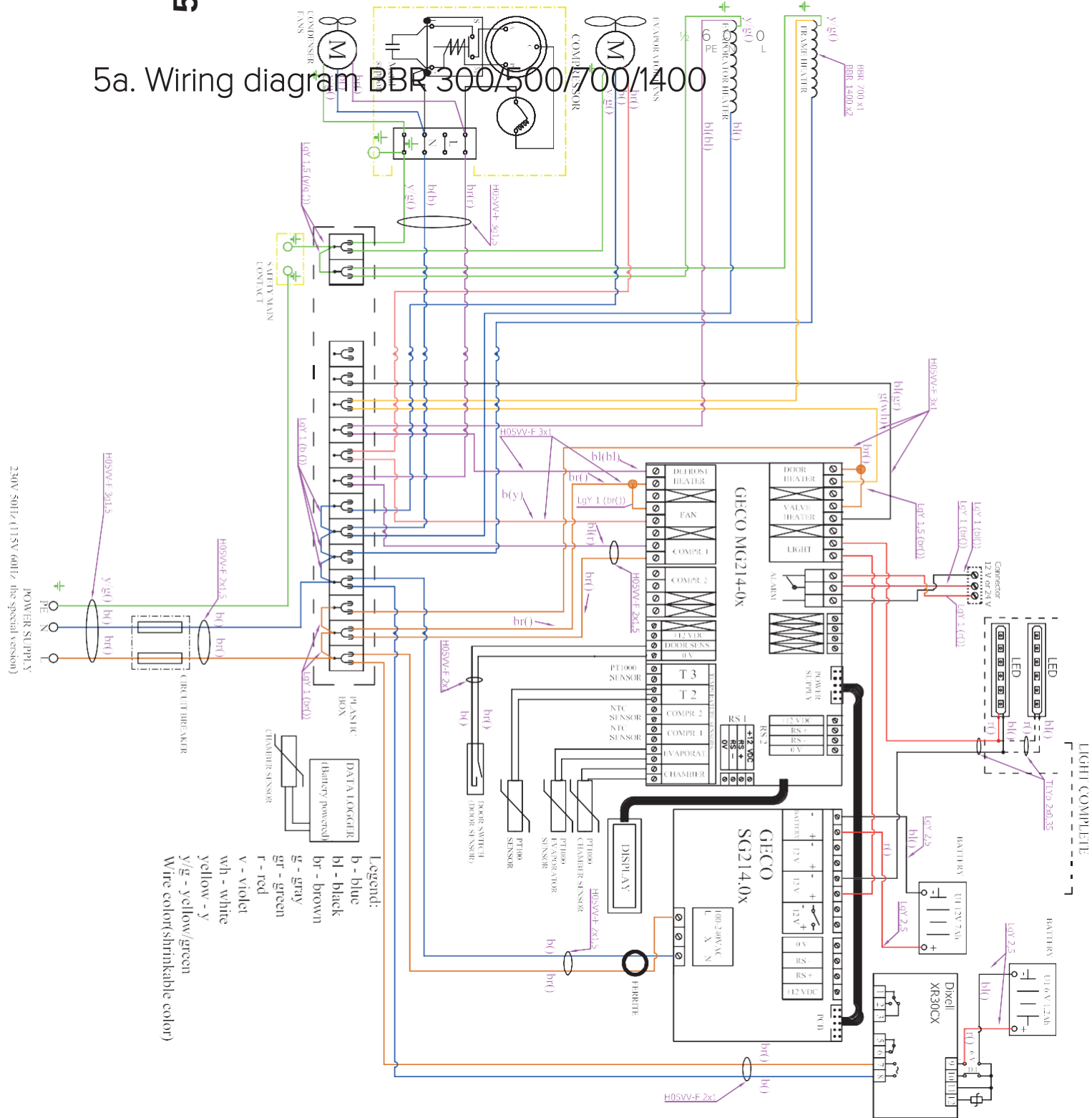
Wiring diaram BBR 100

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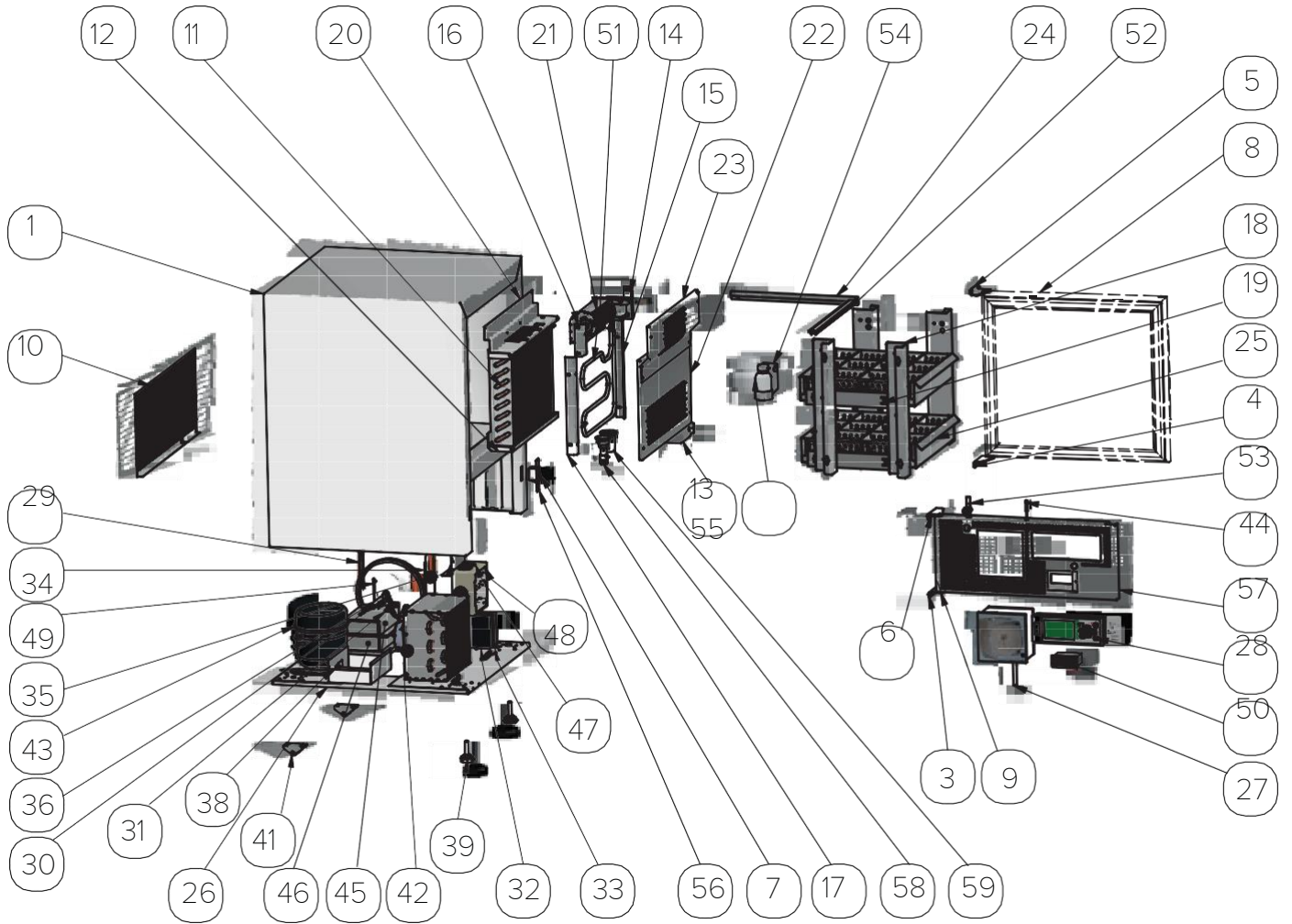
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5a.

5a. Wiring diagram BBR 300/500/700/1400

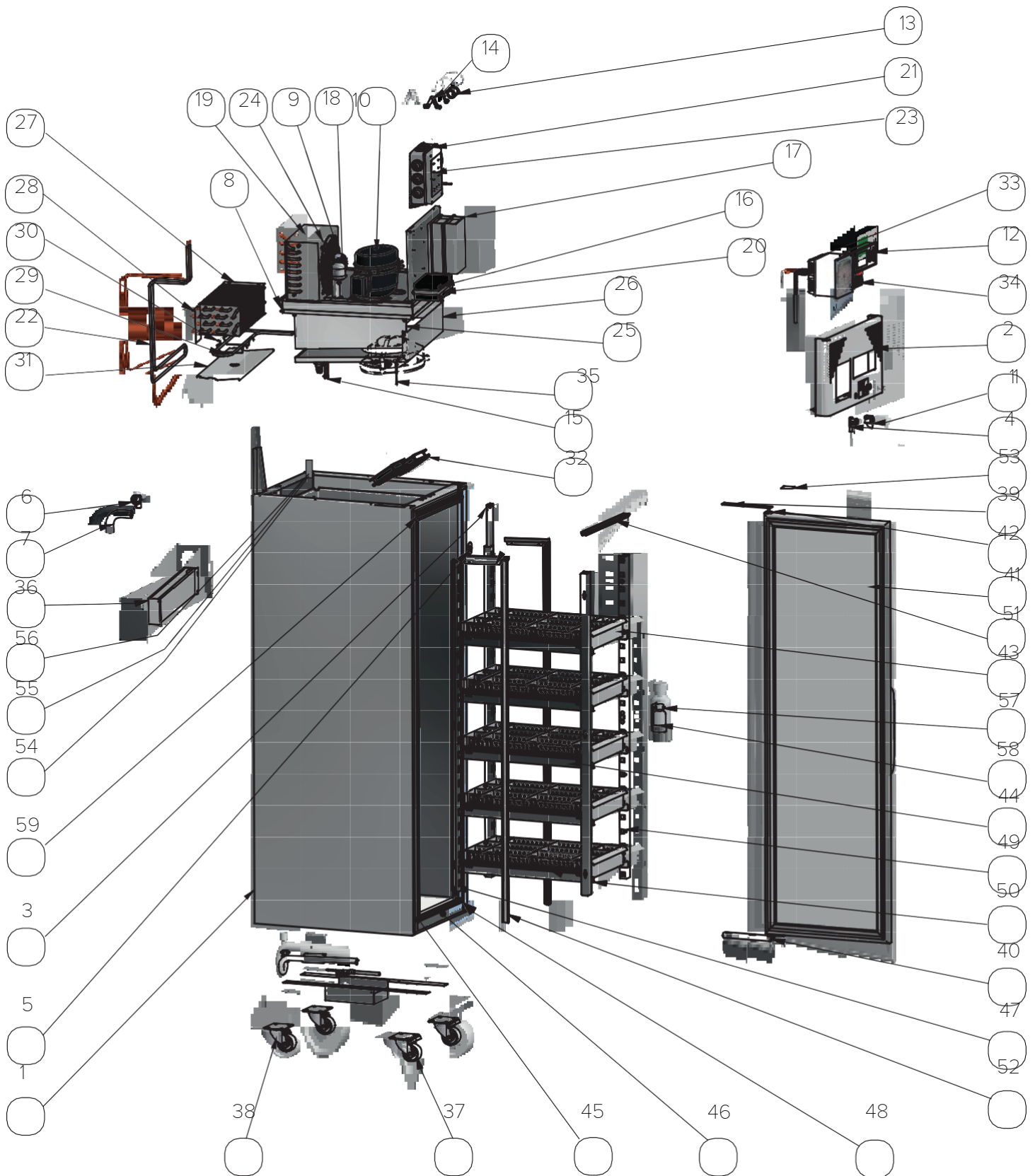


5b. Spare parts list BBR 100



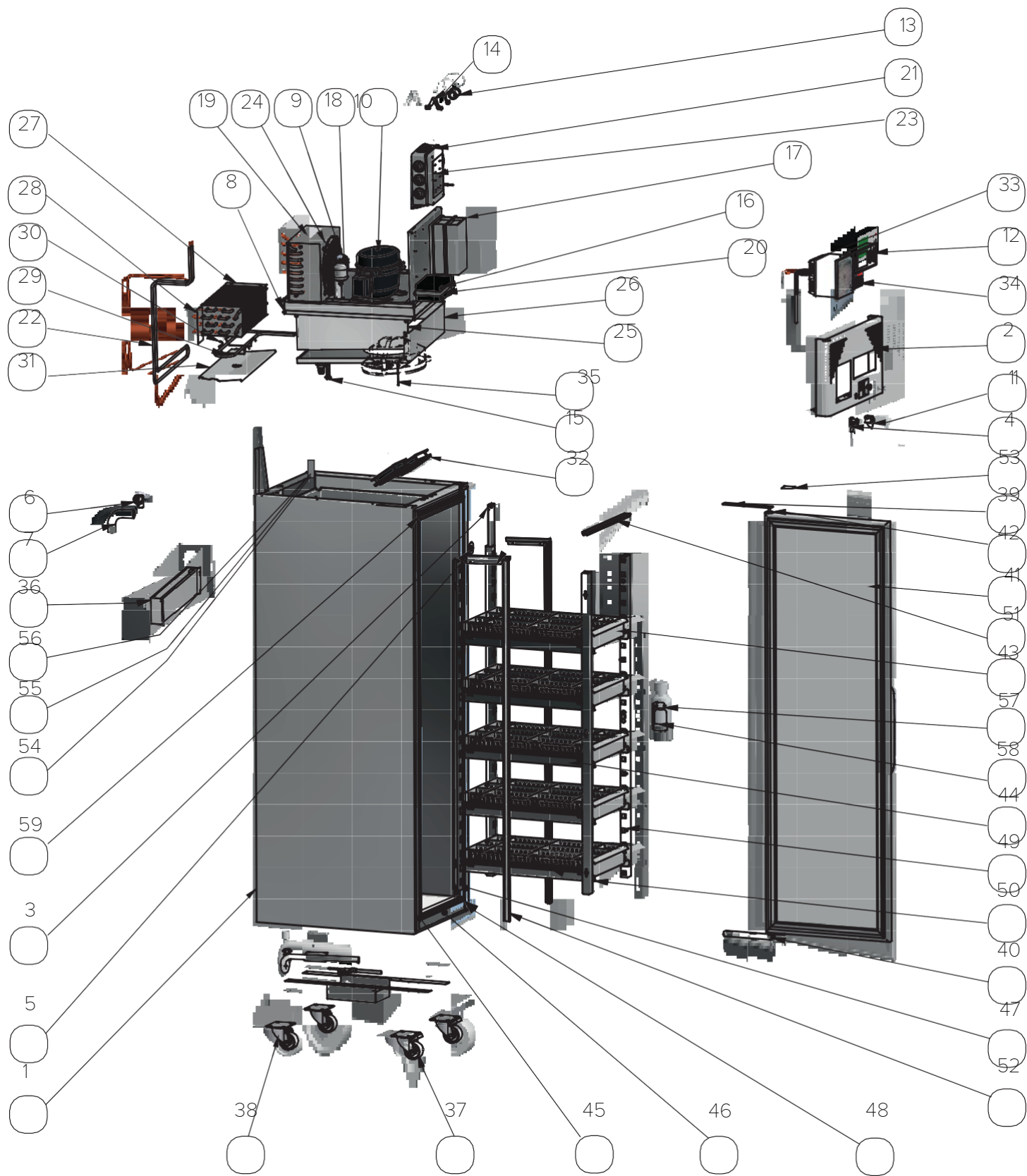
Pos. no.	Code no.	Part	Recommended
1		Cabinet	
3	5031142-01	Front panel lower support	
4	5031012-01	Door lowersupport	
5	5031043-01	Door uppersupport	
6	5031143-01	Front panel upper support	
7	5051059-01	Latch part1	
8	5052048-01	Glass door	
9	5031144-01	Loer sleeve - Frontpanel	
10	5050073-01	Back cover	
11	5073031-01	Evaporator	1
12	5031193-01	Skillet pan	
13	5031194-01	Cable cover	
14	5031195-01	Fan cover right bracket	
15	5031148-01	Evaporator coverbracket	
16	5031149-01	Fan coverbracket	
17	5031196-01	Fan cover left bracket	
18	5062024-01	Drawer slide support	
19	5062018-01	Slide for drawer	
20	5031145-01	Fane frame	
21	5010036-01	Radial fan	
22	5031146-01	Evaporator cover	
23	5031147-01	Fan cover	
24	5031166-01	Probe metal cover	
25	5061038-01	Drawer	
26	5031191-01	Condenser and compressor support	
27	DAI0933	Chart recorder	
28	5043007-01	Controller G-214	1
29	5042003-01	Probe (PT1000)	1
30	5019128-01	Flat cable G-214 PCB-PSU	
31	5019017-01	Flat cable G-214 Display	
32	5044001-01	Battery	
33	5031192-01	Battery support	
34	5031167-01	Filter support	
35	5079024-01	Filter drier	
36	5030081-01	Electrical water tank heater	
38	5031036-01	Water tank	
39	5053016-01	Regulated feet	
41	5053011-01	Wheel	
42	5071039-01	Condenser	
43	5070084-01	Compressor TL4G	1
44	5019113-01	Door switch witch magnet	
45	5041006-01	PCB-Board G-214controller	
46	5041007-01	Power supply G-214	
47	5049013-01	Electrical box with support	
48			
49	5042005-01	Probe forXR30CX	1
50	5040007-01	Controller Dixell XR30CX AC-version	1
51	5019140-01	Evaporator heater	
52	5019139-01	LED-light	
53	5051015-01	Lock with key, set of 2 pcs.	
54	5051035-01	Bracket for glycerine bottle	
55	5030013-01	Glycerine bottle	1
56	5051058-01	Latch part2	
57	5050091-01	Top panel complete	
58	5030081-01	Drain	
59	5030089-01	Short funnel drain	
	5072000-01	Cylinder deposit for refrigerant	
	Finans no.	Refrigerant	1

5b. Spare parts list BBR 300 / 500 / 700



Pos. no.	Code no.	Part	Recommended
1		Cabinet	
2	5050092-01	Top panel complete	
3	5031166-01	Probe metal cover	
4	5051015-01	Lock with key set of 2 pcs.	
5	5030081-01	Drain	
6	5030089-01	Short funnel drain	
7	5030090-01	Spout KPM-ML Ø25	
8	5031138-01	Condenser and compressor support	
9	5031167-01	Filter support	
10	5070036-01	Compressor Danfoss TL5G	
11	5019022-01	Door switch	
12	5043007-01	Controller G-214	1
13	5019017-01	Flat cable G-214 Display	
14	5019128-01	Flat cable G-214 PCB - PSU	
15	5042003-01	Probe (PT1000)	1
16	5041006-01	PCB-Board G-214	1
17	5044001-01	Battery	
18	5079027-01	Filter Honeywell FF032 6mm	
19	5071015-01	Condenser TK1000	
20	5041007-01	Power supply G-214	
21	5049014-01	Installation box IP44	
22	5019132-01	Evaporating water tank heater	
23	5049006-01	Box for PCB-Board connection G-214	
24	5010007-01	Condenser fan incl. Wing	
25	5031187-01	Top cover of evaporator	
26	5031188-01	Bottom cover of evaporator	
27	5010010-01	Evaporator	
28	5031178-01	Fairing of evaporator	
29	5019137-01	Heater	
30	5031170-01	Heater holder	
31	5031189-01	Plate under evaporator	
32	5010042-01	Evaporator fan RS1060	
33	DAI0933	Chart recorder	
34	5040007-01	Controller Dixell XR30CX AC-version	1
35	5042005-01	Probe for XR30CX	
36	5031036-01	Defrost water tank	
37	5053007-01	Castor with bracket	
38	5053006-01	Castor	
39	5031041-01	Door upper support	
40	5031034-01	Door lower support	
41	5052103-01	Glassdoor	
42	5031033-01	Door sleeve	
43	5061036-01	Drawer	
44	5062004-01	Slide for drawer	
45	5031172-01	Vertical magnetic steel	
46	5031190-01	Horizontal magnetic steel	
47	5031174-01	Vertical steel list	
48	5062006-01	Drawer back support	
49	5062006-01	Drawer front support	
50	5062028-01	Drawer slide	
51	5019138-01	Top LED light	
52	5019131-01	Vertical long LED	
53	5031175-01	Front panel hinge hole cover	
54	5031179-01	Pipe for sensor	
55	5031176-01	Black sleeve	
56	5031177-01	Cover for sleeve	
57	5051035-01	Bracket for glycerine bottle	
58	5030013-01	Glycerine bottle	
59	5019129-01	Body frame heater	
	Finansno.	Refrigerant	
	5072000-01	Cylinder deposit for refrigerant	

5b. Spare parts list BBR 1400



Pos. no.	Code no.	Part	Recommended
1		Cabinet	
2	5050095-01	Top panel complete	
3	5031166-01	Probe metal cover	
4	5051015-01	Lock with key set of 2 pcs.	
5	5030081-01	Drain	
6	5030089-01	Short funnel drain	
7	5030090-01	Spout KPM-ML Ø25	
8	5031138-01	Condenser and compressor support	
9	5031167-01	Filter support	
10	5070055-01	Compressor SC10CLX	
11	5019022-01	Door switch	
12	5043007-01	Controller G-214	1
13	5019017-01	Flat cable G-214 Display	
14	5019128-01	Flat cable G-214 PCB - PSU	
15	5042003-01	Probe (PT1000)	1
16	5041006-01	PCB-Board G-214	1
17	5044001-01	Battery	
18	5079027-01	Filter Honeywell FF032 6mm	
19	5071016-01	Condenser TK1270	
20	5041007-01	Power supply G-214	
21	5049014-01	Installation box IP44	
22	5019132-01	Evaporating water tank heater	
23	5049006-01	Box for PCB-Board connection G-214	
24	5010007-01	Condenser fan incl. Wing	
25	5031180-01	Top cover of evaporator	
26	5031181-01	Bottom cover of evaporator	
27	5073013-01	Evaporator RS2100BRivacold	
28	5031178-01	Fairing of evaporator	
29	5019134-01	Heater	
30	5031170-01	Heater holder	
31	5031183-01	Plate under evaporator	
32	5010042-01	Evaporator fan RS1060	
33	DAI 0933	Chart recorder	
34	5040007-01	Controller Dixell XR30CX AC-version	1
35	5042005-01	Probe for XR30CX	
36	5031036-01	Defrost water tank	
37	5053007-01	Castor with bracket	
38	5053006-01	Castor	
39	5031041-01	Door upper support	
40	5031034-01	Door lower support	
41	5052031-01	Glass door	
42	5031033-01	Door sleeve	
43	5061037-01	Drawer	
44	5062004-01	Slide for drawer	
45	5031172-01	Vertical magnetic steel	
46	5031173-01	Horizontal magnetic steel	
47	5031174-01	Vertical steel list	
48	5062006-01	Drawer back support	
49	5062006-01	Drawer front support	
50	5062027-01	Drawer slide	
51	5019130-01	Top LED light	
52	5019131-01	Vertical long LED	
53	5031175-01	Front panel hinge hole cover	
54	5031179-01	Pipe for sensor	
55	5031176-01	Black sleeve	
56	5031177-01	Cover for sleeve	
57	5051035-01	Bracket for glycerine bottle	
58	5030013-01	Glycerine bottle	
59	5019129-01	Body frame heater	
	Finansno.	Refrigerant	
	5072000-01	Cylinder deposit for refrigerant	

5c. Safety data sheet for R-134A

Material Safety Data Sheet

R-134A

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: R-134A
DISTRIBUTOR: National Refrigerants, Inc.
661 Kenyon Avenue
Bridgeton, New Jersey
08302

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-262-0012

IN CASE OF EMERGENCY CALL:
CHEMTREC: 1-800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
1,1,1,2-Tetrafluoroethane	811-97-2	100

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-134A is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None Known

R-134A

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section			

4. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite, water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

INHALATION: Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention immediately. DO NOT give epinephrine (adrenaline).

INGESTION: Ingestion is unlikely because of the physical properties and is not expected to be hazardous. DO NOT induce vomiting unless instructed to do so by a physician.

ADVICE TO PHYSICIAN: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Gas, not applicable per DOT regulations
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	>750°C
UPPER FLAME LIMIT (volume % in air):	None*
LOWER FLAME LIMIT (volume % in air):	None*
	*Based on ASHRAE Standard 34 with match ignition
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:

Use any standard agent – choose the one most appropriate for type of surrounding fire (material itself is not flammable)

UNUSUAL FIRE AND EXPLOSION HAZARDS:

R-134A is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources. Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

R-134A

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE:

(Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return until air has been tested and determined safe, including low-lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING:

(Always wear recommended personal protective equipment.)

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

R-134A should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

STORAGE RECOMMENDATIONS:

Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:

Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

PERSONAL PROTECTIVE EQUIPMENT SKIN

PROTECTION:

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

EYE PROTECTION:

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

R-134A

RESPIRATORY PROTECTION:

None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH approved gas mask with organic vapor canister.

ADDITIONAL RECOMMENDATIONS:

Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
1,1,1,2-Tetrafluoroethane	None	None	*1000 ppm TWA (8hr)

* = Workplace Environmental Exposure Level (AIHA)

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

Hydrogen Fluoride: ACGIH TLV: 2 ppm ceiling, 0.5 ppm TLV-TWA

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless liquid and vapor	
PHYSICAL STATE:	Gas at ambient temperatures	
MOLECULAR WEIGHT:	102	
CHEMICAL FORMULA:	F ₃ CCH ₂ F	
ODOR:	Faint ethereal odor	
SPECIFIC GRAVITY (water = 1.0):	<1.22	
SOLUBILITY IN WATER (weight %):	0.15 wt%	
pH:	Neutral	
BOILING POINT:	-26.2°C (-15.1°F)	
FREEZING POINT:	-92.5°C (-141.9°F)	
VAPOR PRESSURE:	85.8 psia @ 70°F 213.4 psia @ 130°F	
VAPOR DENSITY (air = 1.0):	3.5	
EVAPORATION RATE:	>1	COMPARED TO: CCl ₄ = 1
% VOLATILES:	100	
FLASH POINT:	Not applicable	

(Flash point method and additional flammability data are found in Section 5.)

R-134A

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

The product is stable.

Do not mix with oxygen or air above atmospheric pressure. Any source of high temperatures, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:

(Under specific conditions: e.g. very high temperatures and/or appropriate pressures) – Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically reactive metals: potassium, calcium, powdered aluminum, magnesium, and zinc.

HAZARDOUS DECOMPOSITION PRODUCTS:

Halogens, halogen acids and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

LC₅₀ : 4 hr. (rat) - > 500,000 ppm / Cardiac Sensitization threshold (dog) 80,000 ppm. NOEL – 50,000 ppm

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Not mutagenic in four tests

Teratogenic NOEL (rat and rabbit) – 40,000

ppm Subchronic inhalation (rat) NOEL – 50,000

ppm Chronic NOEL – 10,000 ppm

OTHER DATA:

Metabolism <0.5% as CO₂ in tests at 50,000 ppm, late developing benign tumors were found.

12. ECOLOGICAL INFORMATION

Degradability (BOD):

R-134A is a gas at room temperature; therefore, it is unlikely to remain in water.

Octanol Water Partition Coefficient: Log P_{ow} = 1.06

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded?
If yes, the RCRA ID number is:

Not a hazardous waste
Not applicable

R-134A

OTHER DISPOSAL CONSIDERATIONS:

Disposal must comply with federal, state, and local disposal or discharge laws. R-134A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT PROPER SHIPPING NAME: 1,1,1,2-Tetrafluoroethane
US DOT HAZARD CLASS: 2.2
US DOT PACKING GROUP: Not applicable
US DOT ID NUMBER: UN3159

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on the TSCA inventory
OTHER TSCA ISSUES: None

SARA TITLE III / CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA / CERCLA RQ (lb.)	SARA EHS TPQ (lb.)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE
PRESSURE

SARA 313 TOXIC CHEMICALS:

The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
No ingredients listed in this section	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

R-134A

ADDITIONAL REGULATORY INFORMATION:

R-134A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82.

WARNING: DO NOT vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered. **Contains 1,1,1,2-Tetrafluoroethane (HFC-134a)**, a greenhouse gas which may contribute to global warming.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

Canada – Listed on DSL
EU - EINECS # 223770

16. OTHER INFORMATION

CURRENT ISSUE DATE: December, 2008
PREVIOUS ISSUE DATE: August, 2007

OTHER INFORMATION: HMIS Classification: Health – 1, Flammability – 1, Reactivity – 0
NFPA Classification: Health – 2, Flammability – 1, Reactivity – 0
ANSI/ASHRAE 34 Safety Group – A1
UL Classified

Regulatory Standards:

1. OSHA regulations for compressed gases: 29 CFR 1910.101
2. DOT classification per 49 CFR 172.101

Toxicity information per PAFT Testing

17. DISCLAIMER

National Refrigerants, Inc. believes that the information and recommendations contained herein (including data and statements are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other methods of use of the product and of the information referred to herein are beyond the control of National Refrigerants. National Refrigerants expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

5c. Safety data sheet for R-404A

Material Safety Data Sheet

R-404A

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: R-404A
DISTRIBUTOR: National Refrigerants, Inc.
661 Kenyon Avenue
Bridgeton, New Jersey
08302

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-262-0012

IN CASE OF EMERGENCY CALL:
CHEMTREC: 1-800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Pentafluoroethane (HFC-125)	354-33-6	44
1,1,1-Trifluoroethane (HFC-143a)	420-46-2	52
1,1,1,2-Tetrafluoroethane (HFC-134a)	811-97-2	4

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: R-404A is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section			

4. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

INHALATION: Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

INGESTION: Ingestion is unlikely because of the physical properties and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a physician.

ADVICE TO PHYSICIAN: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Gas, not applicable per DOT regulations
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	<750°C
UPPER FLAME LIMIT (volume % in air):	None*
LOWER FLAME LIMIT (volume % in air):	None*
	*Based on ASHRAE Standard 34 with match ignition
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:

Use any standard agent – choose the one most appropriate for type of surrounding fire (material itself is not flammable)

UNUSUAL FIRE AND EXPLOSION HAZARDS:

R-404A is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources.

Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE:

(Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return until air has been tested and determined safe, including low-lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING:

(Always wear recommended personal protective equipment.)

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

R-404A should not be mixed with air above atmospheric pressure for leak testing or any other purpose.

STORAGE RECOMMENDATIONS:

Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

8. EXPOSURE CONTROLS /PERSONAL PROTECTION

ENGINEERING CONTROLS:

Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

PERSONAL PROTECTIVE EQUIPMENT SKIN

PROTECTION:

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse.

EYE PROTECTION:

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

RESPIRATORY PROTECTION:

None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH- approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH-approved gas mask with organic vapor canister.

ADDITIONAL RECOMMENDATIONS:

Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations, 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Pentafluoroethane	None	None	*1000 ppm TWA (8hr)
1,1,1-Trifluoroethane	None	None	*1000 ppm TWA (8hr)
1,1,1,2-Tetrafluoroethane	None	None	*1000 ppm TWA (8hr)

* = Workplace Environmental Exposure Level (AIHA)

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

Hydrogen Fluoride: ACGIH TLV: 3 ppm ceiling

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless liquid and vapor
PHYSICAL STATE:	Gas at ambient temperatures
MOLECULAR WEIGHT:	120
CHEMICAL FORMULA:	CHF ₂ CF ₃ , CH ₃ CF ₃ , CH ₂ FCF ₃
ODOR:	Faint ethereal odor
SPECIFIC GRAVITY (water = 1.0):	1.08 @ 21.1°C (70°F)
SOLUBILITY IN WATER (weight %):	Unknown
pH:	Neutral
BOILING POINT:	-47.8°C (-54.0°F)
FREEZING POINT:	Not Determined
VAPOR PRESSURE:	182.9 psia @ 70°F 370.9 psia @ 130°F
VAPOR DENSITY (air = 1.0):	3.43
EVAPORATION RATE:	>1
% VOLATILES:	100
FLASH POINT:	Not applicable

COMPARED TO: CCl₄ = 1

(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

The product is stable.

Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:

(Under specific conditions: e.g. very high temperatures and/or appropriate pressures) – Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically active metals: potassium, calcium, powdered aluminum, magnesium and zinc.

HAZARDOUS DECOMPOSITION PRODUCTS:

Halogens, halogen acids and possibly carbonyl halides.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

HFC-125: LC₅₀ : 4 hr. (rat) - > 800,000 ppm / Cardiac Sensitization threshold (dog) 75,000 ppm
HFC-143a: LC₅₀ : 4hr. (rat) - > 540,000 ppm / Cardiac Sensitization threshold (dog) > 250,000 ppm
HFC-134a: LC₅₀ : 4hr. (rat) - > 500,000 ppm / Cardiac Sensitization threshold (dog) > 80,000 ppm

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

HFC-125: Teratogenic NOEL (rat and rabbit) – 50,000 ppm
Subchronic inhalation (rat) NOEL - $\geq$ 50,000 ppm / Chronic NOEL – 10,000 ppm
HFC-143a: Teratogenic NOEL (rat and rabbit) – 50,000 ppm
Subchronic inhalation (rat) NOEL - $\geq$ 50,000 ppm
HFC-134a: Teratogenic NOEL (rat and rabbit) – 40,000 ppm
Subchronic inhalation (rat) NOEL – 50,000 ppm / Chronic NOEL – 10,000 ppm

OTHER DATA:

HFC-125, HFC-134a: Not active in four genetic studies
HFC-143a: Not active in two genetic studies

12. ECOLOGICAL INFORMATION

Degradability (BOD):

R-404A is a gas at room temperature; therefore, it is unlikely to remain in water.

Octanol Water Partition Coefficient: Unknown for mixture

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded?
If yes, the RCRA ID number is:

Not a hazardous waste.
Not applicable.

OTHER DISPOSAL CONSIDERATIONS:

Disposal must comply with federal, state, and local disposal or discharge laws. R-404A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT PROPER SHIPPING NAME: Refrigerant gas R 404A
US DOT HAZARD CLASS: 2.2
US DOT PACKING GROUP: Not applicable
US DOT ID NUMBER: UN3337

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Components listed on the TSCA inventory

OTHER TSCA ISSUES: None

SARA TITLE III / CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<u>INGREDIENT NAME</u>	<u>SARA / CERCLA RQ (lb.)</u>	<u>SARA EHS TPQ (lb.)</u>
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE PRESSURE

SARA 313 TOXIC CHEMICALS:

The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

<u>INGREDIENT NAME</u>	<u>COMMENT</u>
No ingredients listed in this section	

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:

R-404A is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82.

WARNING: Contains Pentafluoroethane (HFC-125), 1,1,1-trifluoroethane, tetrafluoroethane, greenhouse gases which may contribute to global warming. **Do not vent** to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

EU – EINECS # 2065578 – HFC-125
2069965 – HFC-143a
223770 – HFC-134a

16. OTHER INFORMATION

CURRENT ISSUE DATE: December, 2008
PREVIOUS ISSUE DATE: August, 2007

OTHER INFORMATION: HMIS Classification: Health – 1, Flammability – 1, Reactivity – 0
NFPA Classification: Health – 2, Flammability – 1, Reactivity – 0 ANSI
/ ASHRAE 34 Safety Group – A1

Regulatory Standards:

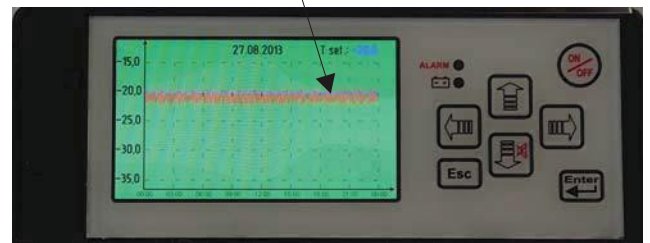
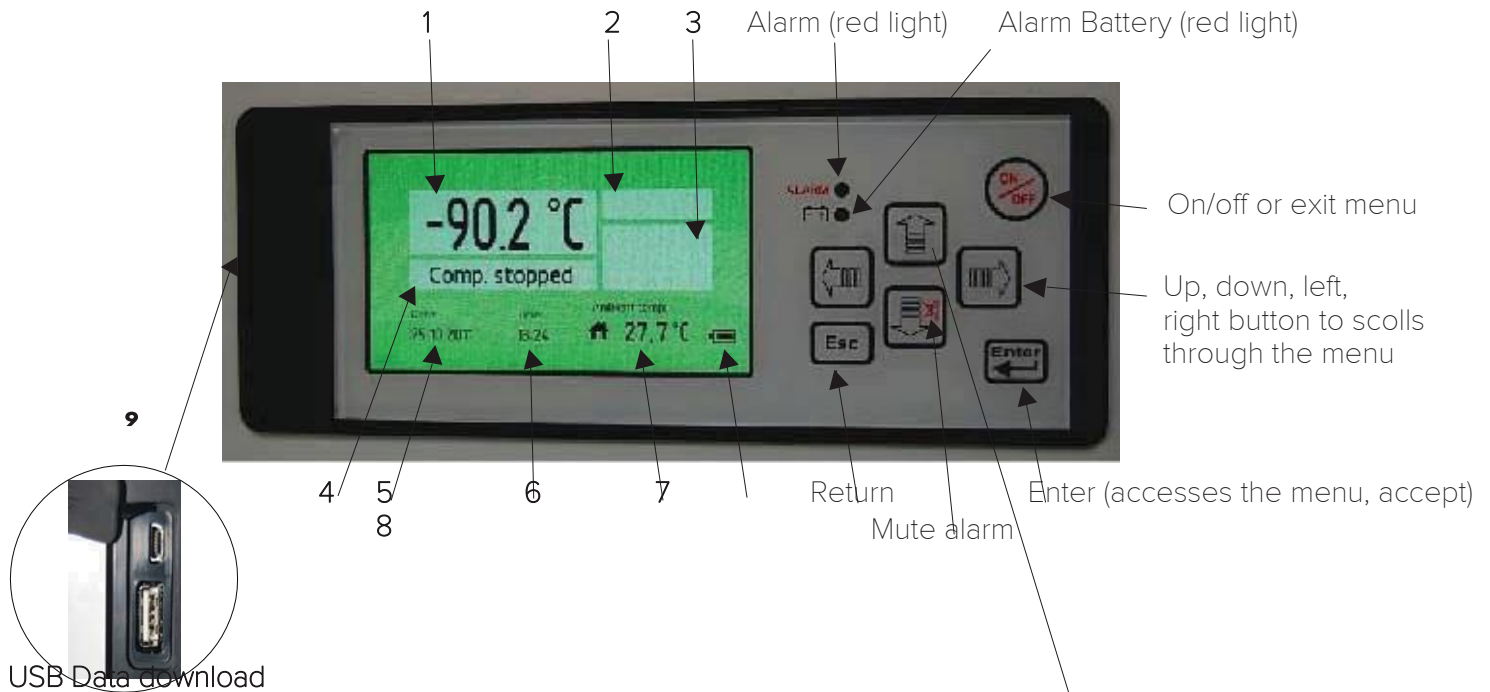
1. OSHA regulations for compressed gases: 29 CFR 1910.101
2. DOT classification per 49 CFR 172.101

Toxicity information per PAFT Testing

17. DISCLAIMER

National Refrigerants, Inc. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other methods or use of the product and of the information referred to herein are beyond the control of National Refrigerants. National Refrigerants expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.

5d. Controller G-214



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

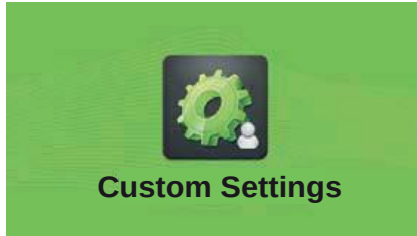
Push the **LEFT** button in order to return up to 10 days back.

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

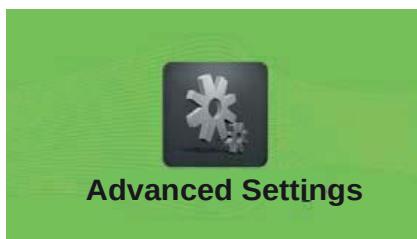
Control Panel Description

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

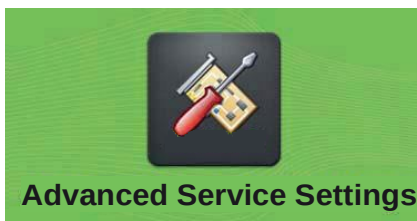
Setting icons



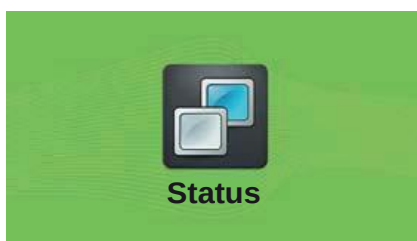
Custom Settings



Advanced Settings



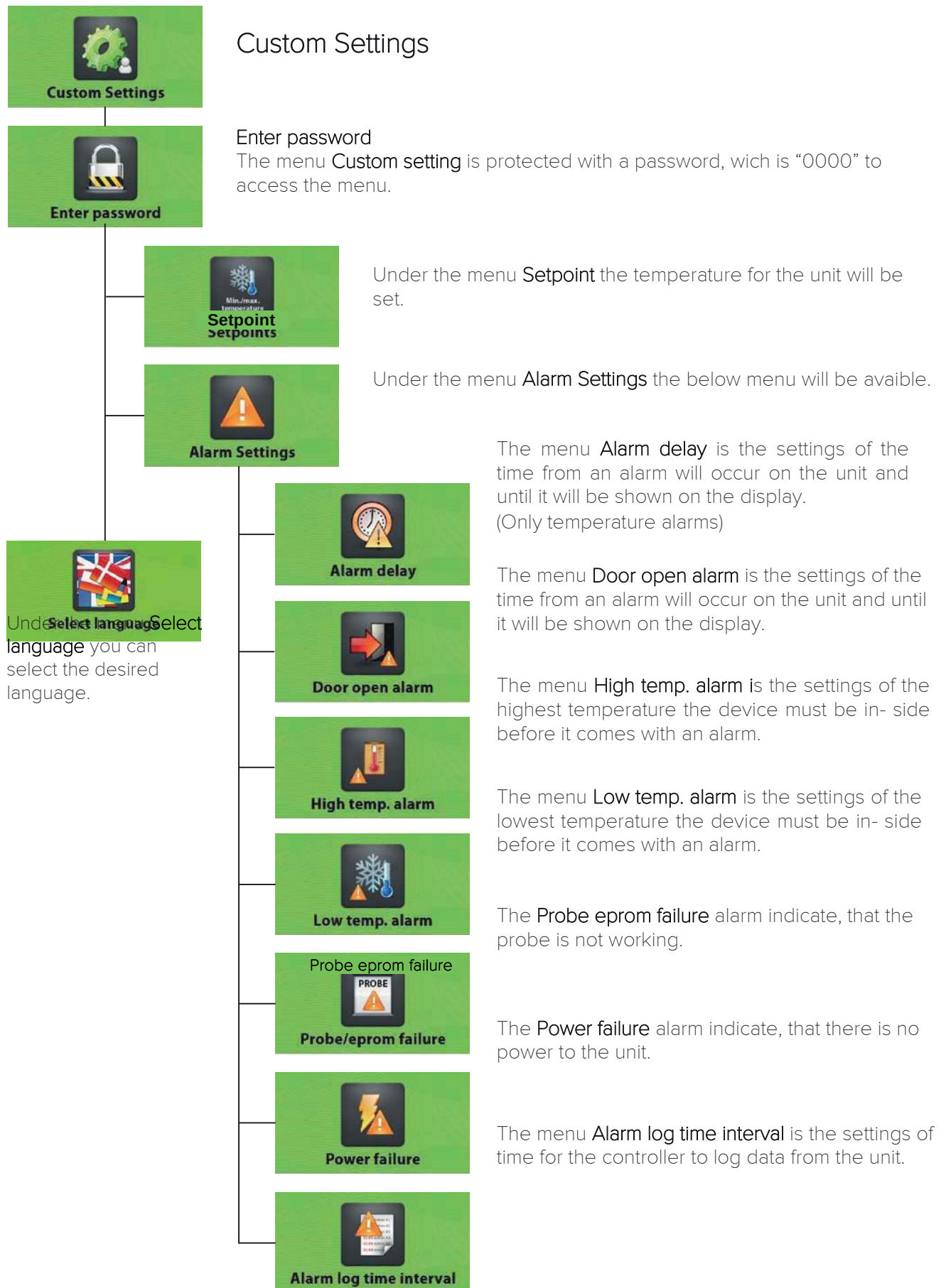
Advanced Service Settings



Status



Change / Reset password



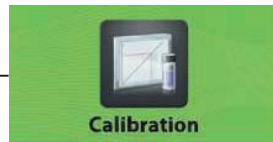


Advanced Settings



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.



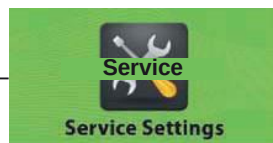
Under the menu **Manual defrost** the defrost can be started immediately.



The menu **Hysteresis** is the setting of the different 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



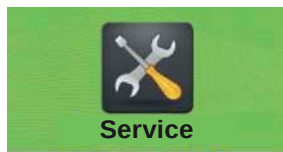
The menu **Password protection** is the setting of the protection for the unit not to be turned off and is protected with a password.



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 Settings

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



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



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



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



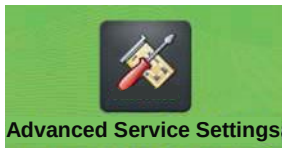
Under the menu **Probe inside unit** the temperature of the sensor mounted inside the unit is displayed. There is mounted a sensor as standard in the unit, but it is possible to mount 3 sensors inside the device. (Controller version)



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



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



Advanced Service Settings

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



Status



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



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



Change / Reset password



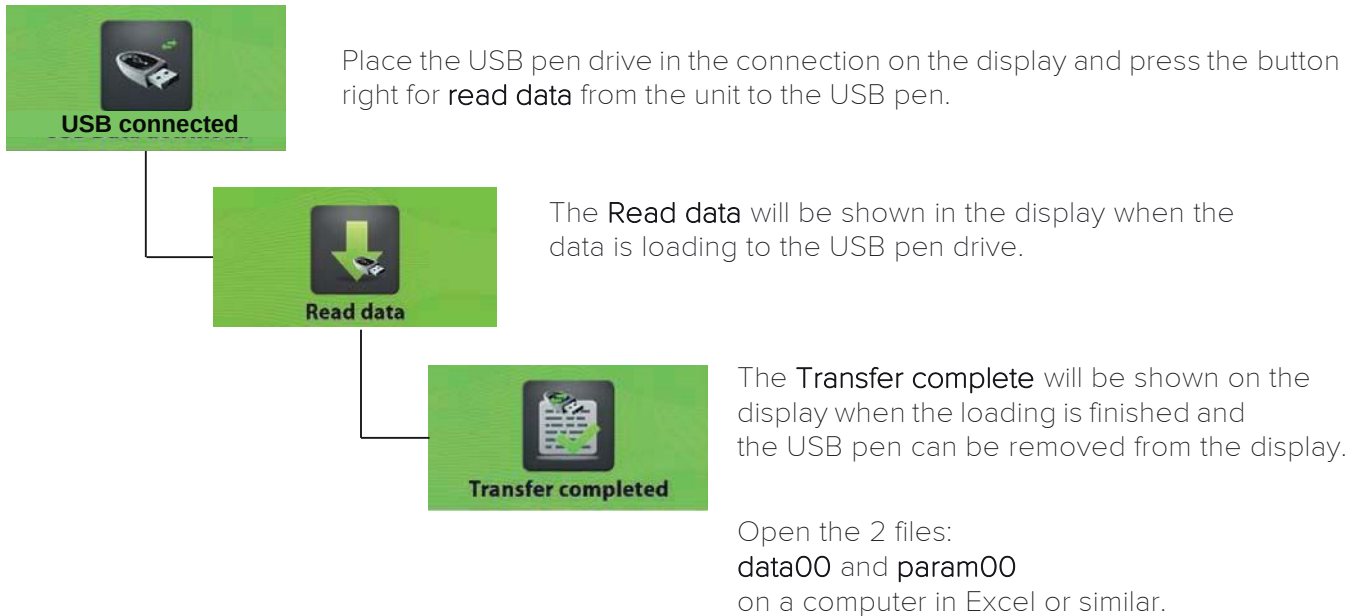
Under **Change password** it is possible to change the password for **Customer Settings**, **Advanced Settings** and **Advanced Service Settings**.



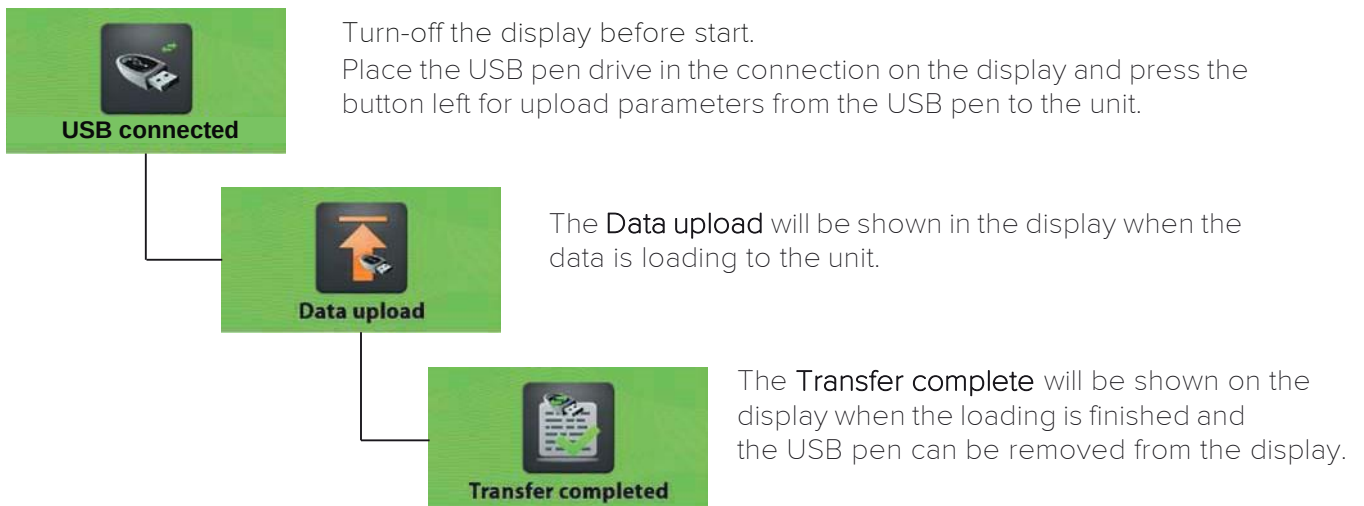
Under **Reset password** it is possible to reset the password for the **Customer Settings**, **Advanced Settings** and **Advanced Service Settings**.

Contact the manufacturer to get the password for reset password.

Download Data



Upload Data (Only for new settings from the manufactory)



Alarms on display



Alarm icons



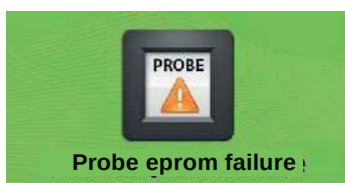
The Door open alarm indicate, that the door is not correct closed



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.

5e. Default settings

Parameter	Description	Arctiko default settings	Control
C0	Defrosting frequency (h)	6	
C1	Maximum defrosting time (min)	30	
C2	Minimum compressor stopping time (min)	1	
C3	Evaporator thawing time (min)	2	
C4	Temperature delay alarms (min)	0	
C5	Maximum compressor operation time (min)	40	
C6	Compressor stopping time (min)	1	
C7	Time for which the temp. measured directly prior to the defrosting compartment (min)	5	
C8	Compressor operation time if controlling sensor has been damaged (min)	3	
C9	Compressor stopping time if controlling sensor has been damaged (min)	3	
C10	Fan start after start compressor (min)	0	
C11	Fan stop after stop compressor (min)	0	
C12	Period write data to controller (min)	1	
C13	Evaporator freezing time (min)	5	
C14	Hour start blockade defrosting process (hh)	0	
C15	Hour end blockade defrosting process (hh)	0	
C16	High hysteresis value blockade display temperature (°C)	0,0	
C17	Low hysteresis value blockade display temperature (°C)	0,0	
C18	Time delay alarm open the door (min)	3	
C19	Time delay start two compressors (s)	0	
C20	Time delay between compressor start and the moment when compressor outlet temperature is measured. (s)	0	
C21	Time interval during compressor operation when the compressor outlet temp. can't fall more than d11 parameter. (s)	0	
C22	Time delay for closing the door lock	5	
C23	The period of reading data from the controller to a USB flash drive 0 - read all data from memory 1 - reading data from the last 24 hours 2 - reading data from last week 3 - reading data from last month 4 - reading data from the last 3 months 5 - reading data from the last 6 months	0	

Parameter	Description	Arctiko default settings	Control
D0	User set minimum temperature (°C)	2,0	
D1	User set maximal temperature (°C)	6,0	
D3	Hysteresis (°C)	1,0	
D4	Chamber sensor rescaling with relation to measured temperature (°C)	0	
D5	Ambient sensor rescaling with relation to measured temperature (°C)	-16,0	
D6	Chamber temperature higher up, will be Alarm (°C)	6	
D7	Chamber temperature below this, will be Alarm (°C)	2	
D8	Evaporator temperature at which fans will start their operation after the defrosting process completion (°C)	4	
D9	Evaporator temperature at which the defrosting terminates (°C)	4	
D10	Minimum increase of compressor outlet temperature in time C20 (°C)	4,0	
D11	Maximum decrease of compressor outlet temp. during time interval C21 (°C)	20,0	
D12	Rescaling temperature sensor T2	0,0	
D13	Rescaling temperature sensor T3	0,0	
D14	Temperature at which the evaporator fan will be shut down.	40	

Parameter	Description	Arctiko default settings	Control
R0	0 - Data writes to controller – disable 1 - Data writes to controller – enable	1	
R1	0 - Power failure – disable 1 - Power failure – enable	1	
R2	0 - Door open – disable 1 - Door open – enable	1	
R3	0 - Probe Failure – disable 1 - Probe Failure – enable	1	
R4	Evaporator fans operation method, the parameter set as follows: 0 – fan operates according to GECO algorithm 1- fans operate all time 2- fan stopping	0	
R5	Evaporator defrosting method, the parameter set as follows: 0 – defrosting through the compressor stop 1 – heater assisted defrosting	1	
R6	Door opening sensor option. 0 – no door opening sensor present 1 – door opening sensor available, connected when door is open 2 – door opening sensor available, disconnected when door is open	2	
R7	Evaporator fans operation method, the parameter set as follows: 0 – fans operate only together with the compressor 1 – fans operate permanently after activating the power supply NOTE!!! This parameter does not affect the cycle and method of evaporator defrosting	1	
R8	Option for alarm relay: 0 - relay normally open 1 - relay normally connect	1	

R9	Address of controller to 485	2	
R10	Type device 0- unit with one compressor 1-unit with two compressors, working together 2-unit with two compressors, only one compressor working	0	
R11	Blockade, turning of alarm relay (transmitter) with "mute" button on control panel. 0-blockade off 1-blockade on	1	
R12	Number of cycles changes work compressor, for type refrigerator no 2.	0	
R13	The display of temperature 0-the total value of temperature display 1-temperature displayed with a comma	1	
R14	Relay operation Relay lights attached all time Relay lights attached with the door open 2- Relay lights attached with the door closed	1	
R15	Communication between modules" full communication with the power supply. This is set if we have single PCB module connected to single power supply Only the power failure detection. we have 2 PCB modules connected to single power supply. ave modules. PCB module <u>does not communicate</u> with power supply If we have 2 PCB modules connected to single power supply. aster modules. PCB module communicates with power supply.	0	
R16	Door lock options: lack of door lock lock on the front door 2 - lock on the front door - reverse polarity	0	
R17	The choice of sensor on the main screen - T1 - T2 3 – T3	1	

5f. CONTROL PANEL (Dixell XR30CX)

SET To display target set point; in programming mode it selects a parameter or confirm an operation.

(DEF)  To start a manual defrost

(UP)  To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value.

(DOWN)  To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

 To switch the instrument off, if onF = oFF.

 NOT USED



Figure 1

KEY COMBINATIONS:

-  +  To lock & unlock the keyboard.
- SET +  To enter in programming mode.
- SET +  To return to the room temperature display.

MAIN FUNCTIONS

HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:



1. Enter the Programming mode by pressing the Set and DOWN key for 3s (the "°C" or "°F" LED starts blinking).
2. Select the required parameter.
3. Press the "SET" key to display its value.
4. Use "UP" or "DOWN" to change its value.
5. Press "SET" to store the new value and move to the following parameter. To exit: Press SET + UP or wait 15s without pressing a key.

NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

HOW TO ENTER THE HIDDEN MENU



1. Enter the Programming mode by pressing the Set +  for 3s (the "°C" or "°F" LED starts blinking).
2. Released the keys, then push again the Set+  keys for more than 7s. The Pr2 label will be displayed immediately followed from the HY parameter. NOW YOU ARE IN THE HIDDEN MENU.
3. Select the required parameter.
4. Press the "SET" key to display its value.
5. Use  or  to change its value.
6. Press "SET" to store the new value and move to the following parameter. To exit:
7. Press SET +  or wait 15s without pressing a key.

NOTE1: if none parameter is present in Pr1, after 3s the "noP" message is displayed. Keep the keys pushed till the Pr2 message is displayed.

NOTE2: the set value is stored even when the procedure is exited by waiting the time-out to expire.

Default settings Dixell XR30CX Controller

Label	Name	Range	Set point	Pr 1/2
ALc	Temperature alarms configuration	rE=related to set; Ab=absolute	Ab	Pr2
ALU	Maximum temperature alarm	Set÷110.0°C; Set÷230°F	6	Pr1
ALL	Minimum temperature alarm	-50.0°C÷Set/-58°F Set	2	Pr1
AFH	Differential for temperature alarm recovery	(0.1°C÷25.5°C)(1°F÷45°F)	1	Pr2
ALd	Temperature alarm delay	0÷255min	0	Pr2
dAo	Delay of temperature alarm at start up	0÷23h e 50'	23	Pr2
tbA	Alarm relay disabling	n=no; y=yes	y	Pr2
Aro	Alarm relay activation with power failure	n(0) – y(1)	y	Pr2
ALF	Alarm relay activation for all the alarms	n(0) – y(1)	y	Pr2
bon	Time of buzzer restart after muting, in case of alarm duration	0 ÷ 30 (min)	30	Pr2
AoP	Alarm relay polarity (0Al=ALr)	oP; cL	cL	Pr2
i1P	Digital input polarity	oP=opening; cL=closing	cL	Pr1
i1F	Digital input configuration	EAL, bAL,PAL, dor; dEF; Htr, AUS	AUS	Pr1
Adr	Serial address	0÷247	1	Pr2
PbC	Kind of probe	Ptc; ntc	Pt1	Pr2
onF	On/off key enabling	Nu, oFF; ES	oFF	Pr2

ALARMS

ALC Temperature alarms configurations: (Ab; rE)

Ab= absolute temperature: alarm temperature is given by the ALL or ALU values. rE = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the "SET+ALU" or "SET-ALL" values.

ALU MAXIMUM temperature alarm: (SET÷150°C; SET÷302°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.

ALL Minimum temperature alarm: (-100.0 ÷ SET°C; -148÷302°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.

AFH Differential for temperature alarm recovery: (0,1÷25,5°C; 1÷45°F) Intervention differential for recovery of temperature alarm.

ALd Temperature alarm delay: (0÷255 min) time interval between the detection of an alarm condition and alarm signalling.

dAo Exclusion of temperature alarm at startup: (from 0.0 min to 23.5h) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

ALARM RELAY MANAGEMENT DIGITAL INPUT

tbA Alarm relay silencing (with oA1=ALr): (n= silencing disabled: alarm relay stays on till alarm condition lasts, y =silencing enabled: alarm relay is switched OFF by pressing a key during an alarm).

Aro Alarm relay activation with power failure:

y = the alarm relay is activated if a temperature alarm happens during a power failure

n = the alarm relay is never activated during a power failure

ALF Alarm relay activation for all the alarms:

y = the alarm relay is activated for all the alarms

n = the alarm relay is activated only in case temperature alarms and regulation probe failure.

bon Time of buzzer restart after muting, in case of alarm duration: (0÷30min; with 0 the buzzer is always off after muting)

AoP Alarm relay polarity: it set if the alarm relay is open or closed when an alarm happens.

CL= terminals 1-2 closed during an alarm; oP = terminals 1-2 open during an alarm

DIGITAL INPUT

i1P Digital input polarity: oP: the digital input is activated by opening the contact; CL: the digital input is activated by closing the contact.

i1F EAL = external alarm: “EA” message is displayed; bAL = serious alarm

“CA” message is displayed. PAL = pressure switch alarm, “CA” message is displayed; dor = door switch function; dEF = activation of a defrost cycle; AUS =to switch on the second relay if oA1 = AUS;

Htr = kind of action inversion (cooling – heating); FAn = not set it; ES = Energy saving.

OTHER

Adr Serial address (1÷244): Identifies the instrument address when connected to a ModBUS compatible monitoring system.

PbC Type of probe: it allows to set the kind of probe used by the instrument: PtC = PTC probe, Pt1 = Pt1000 probe.

onF on/off key enable: nu = disabled; oFF = enabled; ES = not set it.

ALARM SIGNALS

Message	Cause	Outputs
“P1”	Room probe failure	Compressor output acc. to par. “Con” and “COF”
“HA”	Maximum temperature alarm	Outputs unchanged.
“LA”	Minimum temperature alarm	Outputs unchanged.
“dA”	Door open	Compressor according to rrd
“EA”	External alarm	Output unchanged.
“CA”	Serious external alarm (i1F=bAL)	All outputs OFF.
“CA”	Pressure switch alarm (i1F=PAL)	All outputs OFF

ALARM RECOVERY

Probe alarm “P1” starts some seconds after the fault in the related probe; it automatically stops some seconds after the probe restarts normal operation. Check connections before replacing the probe. Temperature alarms “HA” and “LA” automatically stop as soon as the thermostat temperature returns to normal values.

Alarms “EA” and “CA” (with i1F=bAL) recover as soon as the digital input is disabled.

Alarm “CA” (with i1F=PAL) recovers only by switching OFF and ON the instrumen

