



Service Manual

LFE 110 / 360

LRE 120 / 440

PRE 120 / 440

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1. Working safety

This page provides general safety information for servicing the unit.

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

1.1 General safety

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

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

1.2 Electrical safety

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

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

Use only electrical equipment which is designed for the unit.

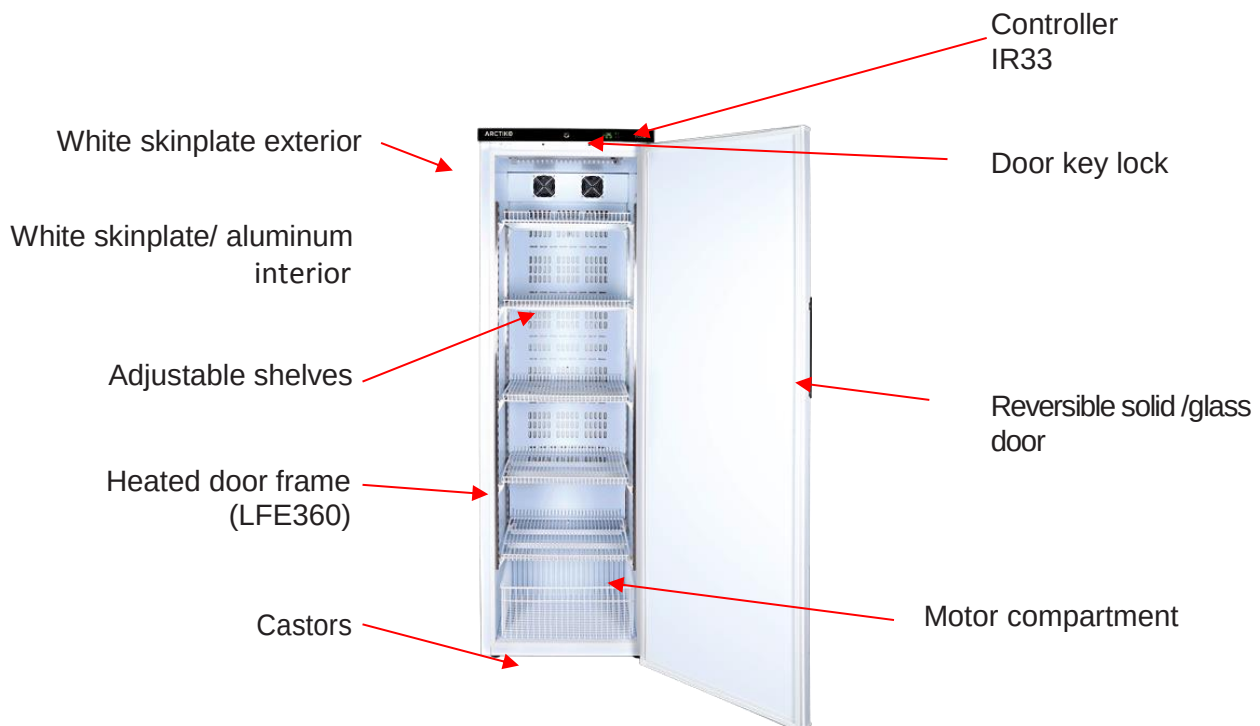
1.3 Chemical and biological safety

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

2. Information about the unit

2a. General information about the unit

LRE440 / LFE 360



LFE110 / LRE 120



PRE 440 / PRE 120



Label plate located on the device



- 1- Company logo
- 2- CE marking
- 3- Model
- 4- Serial number
- 5- Volume capacity gross/net
- 6- Expanding agent
- 7- Climatic class
- 8- Tension
- 9- Power/Frequency/Amp
- 10- led light info
- 11- Gas type and charge
- 12- Arctiko contacts

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

The label plate is located in right top inside of the cabinet.

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

Furthermore, in case of LFE 360 the device is equipped with heated door frame

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

2b. Controller IR33 IXOLCOHH205

The display controller is mounted in the top panel

Controller:

- Digital display
- Visual and audible alarm.
- Adjustable high / low temperature / alarm.
- Open door alarm
- Contact for remote alarm.

Alarm for:

- High / low temp.
- Open door

Display IR33



2c. Model information

Model	LFE 110	LRE120/ PRE 120	LRE440/ PRE440	LFE 360
Item code				
Temp. range (°C)	-15 / -25	+2 / +8	+2 / +8	-15 / -25
Max. Ambient temp. (°C)	32	32	32	32
Power supply (V)	230	230	230	230
Frequency (Hz)	50/60	50/60	50/60	50/60
Fuse (A)	3	4	6	15
AMP (A)	0,65	0,77	1	4.8
Power consump.(KWh/24h)	1,5	1,8/ 1,8	3,16/3,62	15.1
Compressor	HXK80AT	HXK 80 AT	HXK12AT	NLY12NGa
No. of Compressors	1	1	1	1
Refrigerant / Filling (gram)	R600a / see label plate	R600a / see label plate	R600a / see label plate	R290 / see label plate

Cabinet interior material on LFE-models: White Aluminum

Compressor:

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

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.	Low voltage.	Voltmeter	Check voltage.	Find the cause.
	Defect or faulty start relay/capacitor.	See section 3m.	See section 3m.	Change start relay/ capacitor.
	Defect compressor windings.	Ohmmeter	Check for electrical failure in the compressor.	Change 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.	External thermometer	Check the temperature.	Find a better placement.
	May be general, if the Ventilation is not sufficient.	External 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 sensor is incorrectly installed.			
The unit freezes normally or colder.	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.	External thermometer	Check the temperature and ventilation.	Better placement or ventilation.
The unit cools too much, too little or not at all. The compressor may run continuously	Leakage in the system.	Electronic leak-seeking, soapy water, leak seeking spray.	First check the solder points, 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.	External thermometer	Check temperature	Find better ventilation or placement.
	In addition, temperature of the air is too low.	External thermometer	Check temperature	Find better ventilation or placement.

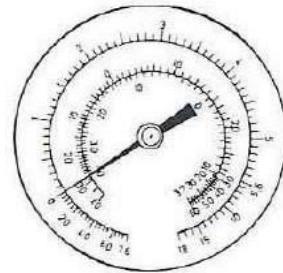
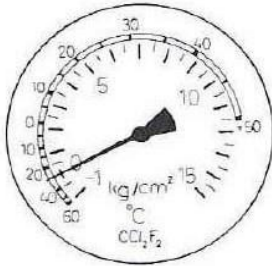
Examples of troubleshooting with a manometer connected to the process piping of the cooling system.

The system is blocked:

Suction pressure is very low.

Pressure equalization takes place slowly or not at all.

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

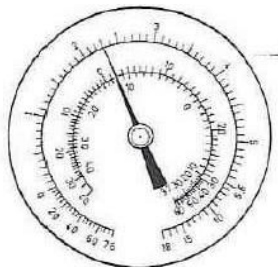


Reason: No compressor capacity.

The suction pressure is too high.

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

This can be tested with a volumetric meter.



Leakage in the system.

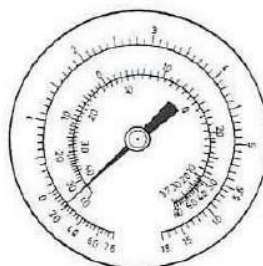
The pressure gauge indicating insufficient suction pressure.

On the pressure side the temperature increases.

Pressure equalization time is short.

countervailing pressure is lower than expected.

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



3c. Opening of the cooling system

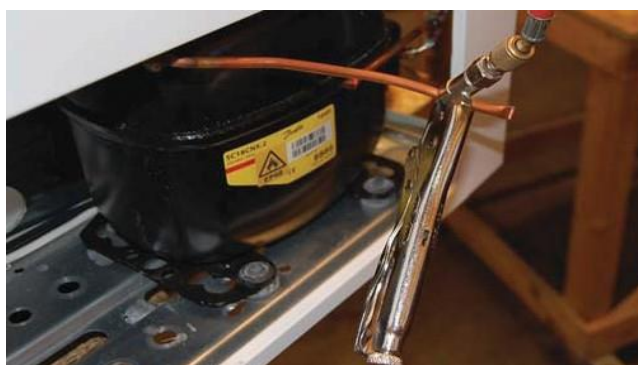
- To prevent moisture from penetrating under repair, the system must not be open for more than 15 minutes.
- Prepare spare parts components before the system is opened.
- The new connector is soldered to a tube with valve.



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

3d. Evacuation of the refrigerant

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



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

Process pipe and pressure tube fitted with a valve.



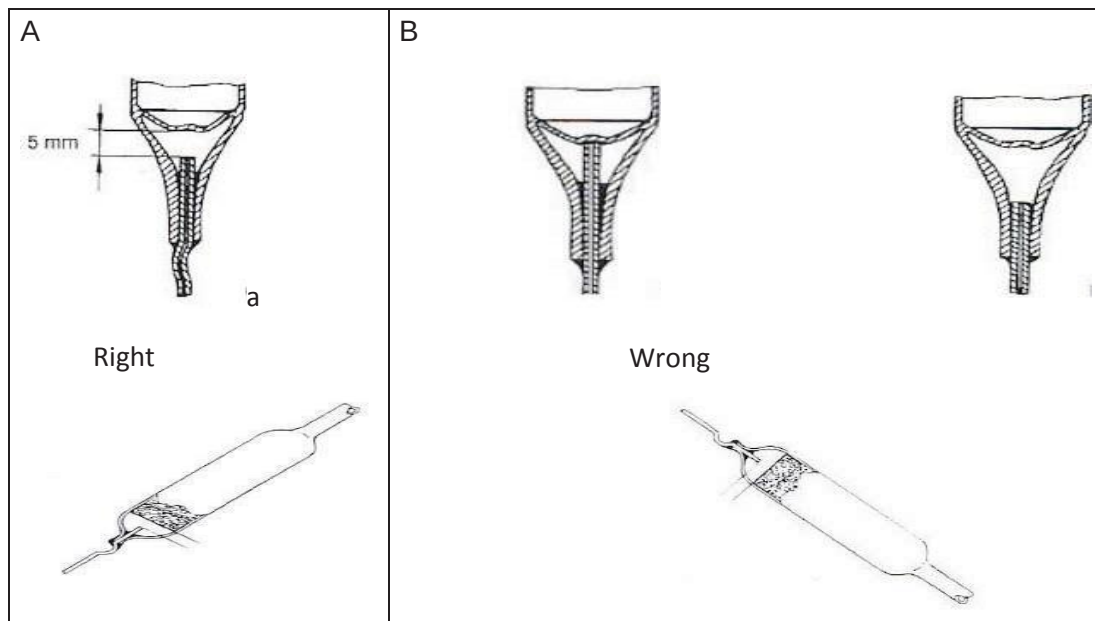
- The cooling system is evacuated with a two-stage vacuum pump for at least 30 minutes. Both from the pressure piping and process piping.
- Blow the system with nitrogen, both from the suction and the pressure side.

3e. Changing the dry filter

- The dry filter must pick up moisture in the system during operation and function as the capillary tube in front of the capillary tube, in order to avoid clogging. Clogged filter or capillary tube causes a pressure drop, by this the filter becomes colder and ice will block the system. The compressor is overloaded with a possibility of crash.
- The dry filter is placed after the condenser outlet, immediately before the capillary. Any opening of the cooling system, dry filter change to ensure the function and lifetime of the 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.



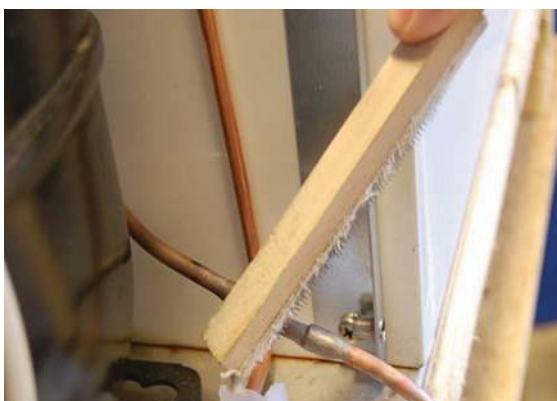
- Cut off the capillary tube with a capillary tube scissors.
- It is recommended to use a special tongs to create a wave on the capillary tube which ensures the correct positioning in the filter.



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

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

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



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

3f. Changing the compressor

- Evacuate the refrigerant of the system. See section 3d.
- All tubes are cut with a pipe cutter. Do NOT solder of.
- When replacing the compressor the dry filter must also be replaced. See section 3e.
- The suction and pressure pipes of the compressor must be cleaned and cut with a pipe cutter just above the soldering pipe.
- Demount the compressor.



- Install the new compressor, which is prepared as described before. (3c)
- In order to avoid decomposition of refrigerants which may remain in the system during the soldering operation, the system is blown with dry nitrogen, respectively, from the suction side respectively pressure side.
- Solder the tubes on to the compressor.
- Pressure test the system.

3g. Pressure testing and leak detection

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

3h. Vacuum suction / Vacuum check

A vacuum is made on one locations on the system, through the load valve or load pipe, 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 R-600a or R-290

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

Note that R-600a or R-290 is to be supplied from a bottle containing a specific amount of refrigerant. Common procedures for other refrigerants can't 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.

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

During the filling procedure the cylinder must be upside down

Cylinder with manometer



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 end sleeve. It is recommended NOT to solder system.

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

Apply LokPreb to the end of the tube.

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

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

Start the unit and control the function of the device.

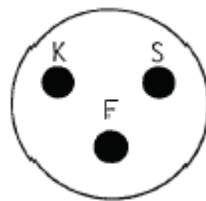
3j. Electrical troubleshooting

Before starting systematic troubleshooting, check the following:

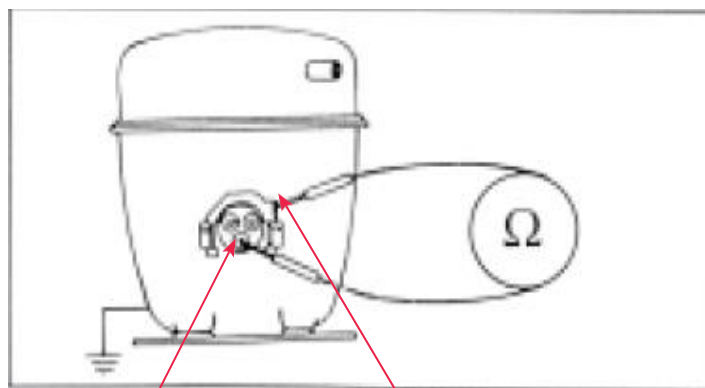
- Proper voltage is present.
- Electrical equipment used, is suitable for the compressor.
- The wires are properly installed according to wiring diagram.
- There is no transition between the live parts and ground.

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 Ohmmeters one clamp is placed on the compressors ground terminal. The second clamp on the compressor shared leg (see sketch). Is the Ohmmeter showing a transition, the compressor is replaced.



Plug on the compressor



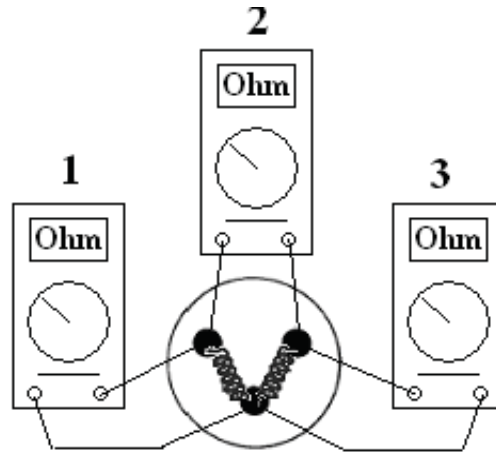
Shared leg

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.

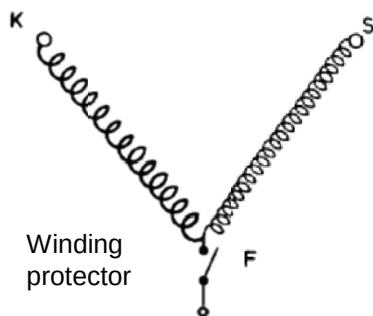
3k. Electrical fault - compressor

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 intact.

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



Ohm-measurement

By measuring the compressors with built 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.

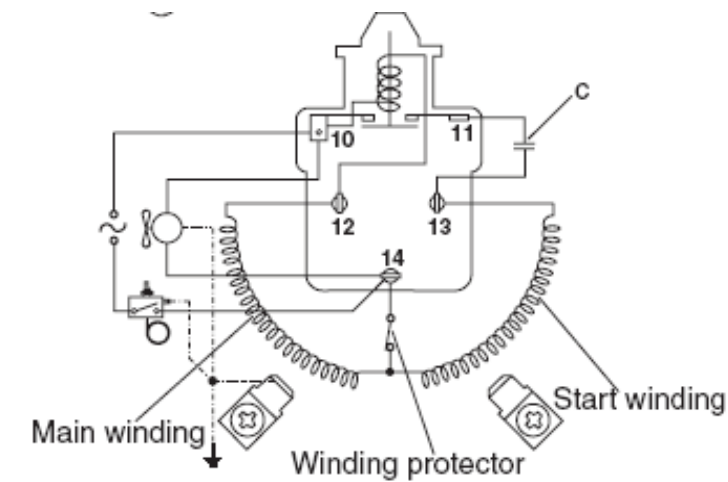
Since it is relatively small value to be measured, it would be a great advantage to use a digital Ohm-meter.

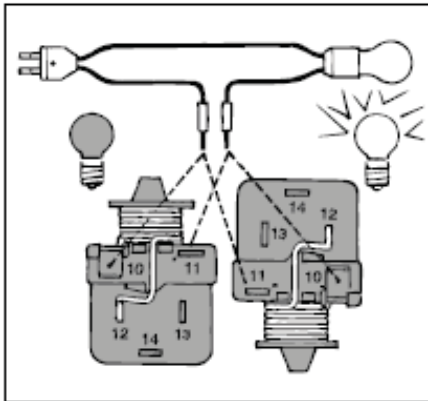
If the measurement indicates error, the compressor is replaced.

3l. HST-start relay, start capacitor

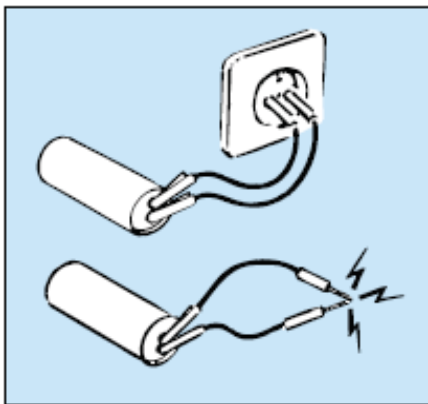
Connect a voltmeter between terminals 10 and 13 at the start of the relay. If no voltage is present, there is either a faulty cable or also the start relay is defect.

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.



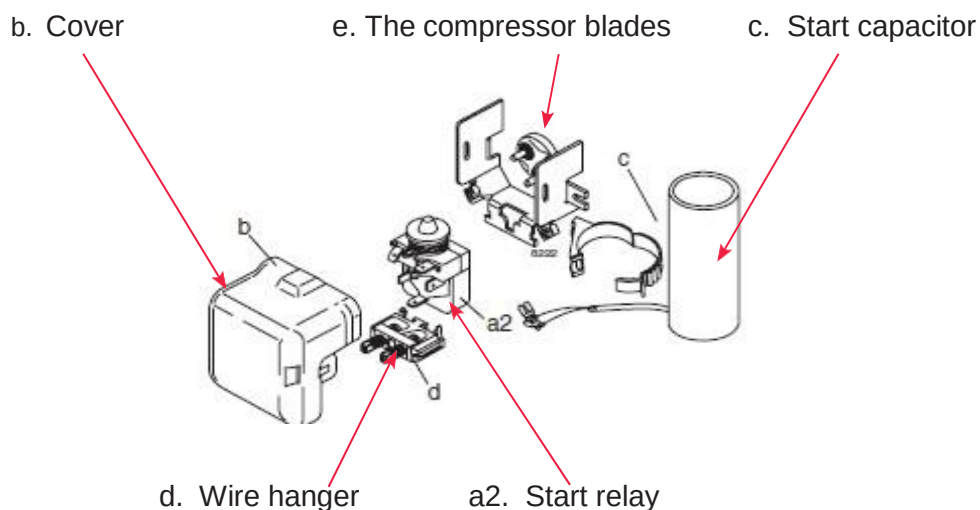
The start capacitor can be checked by injecting the normal voltage for a few seconds and then shorting it. When sparks are generated, the capacitor is in order.

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

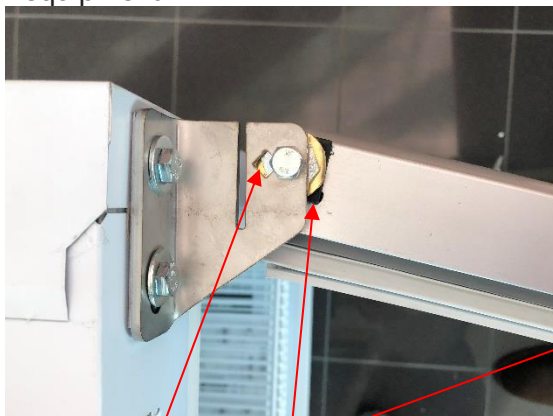
Rub the gasket with a suitable product, so that it stays flexible and the optimal function and tightness is secured.

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't 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 top and bottom of the equipment



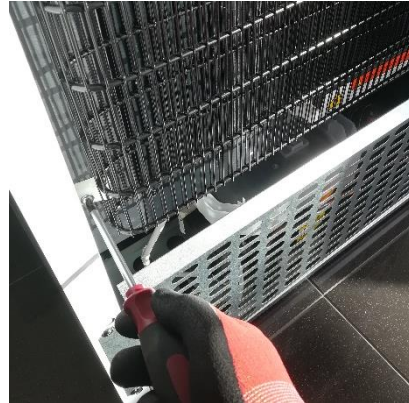
Adjusting

4b. Accessing all wires and controller

In case of needed to change any cables or the controller, the top panel needs to be removed in order to access this parts.



1- Remove screws on back of top panel



2- Remove screws that hold the condenser in the left side



4- open the top panel



5- remove black metal protection to access hole for cables inside unit

4c. Heated door frame (model LFE 360)

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 top the panel

To change the heater:



1-Open the frame



2- Remove the frame



3- Disconnect and remove the heater



4- Disconnect, remove the heater and change for new one

4d. Fan, Evaporator, Light, probe

Fan is located on the interior in the top to ensure good air distribution
The fan stops when the door is opened and during the automatic defrost.



Fan LRE/PRE 120 (1 pcs.)



Fan LRE/PRE 440 (2 pcs.)

To change the fan:



1- Remove plastic cover from screws



2-Remove screws



3-Remove fan protection, unplug fan and plug new one

The evaporator is placed at the interior of the equipment behind the evaporator protection. To get into the evaporator, and the evaporator probe temperature:



1-Remove cover and screws of evaporator protection



2-Find the probe on the back of evaporator

To change the Led stripe:



1-Remove cover and scr



2-Pull out led protection



3-Remove led Protection and take led stripe



4-Unplug led strip and change for new one

4e. Condenser – Fan (model LFE 360)

The condenser is placed in the back of the unit.

It is important that the ambient temperature does not exceed 25°C.

Physically, the fan is placed on back bottom of unit, inside motor zone.

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

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.

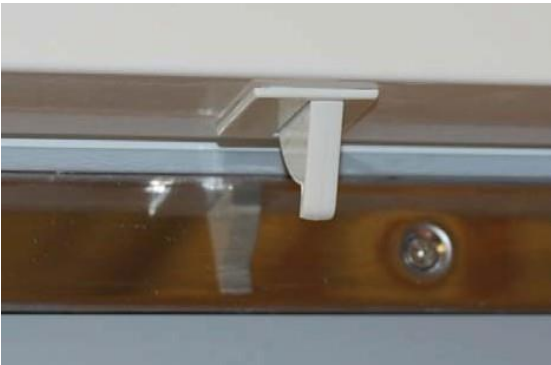


1- Remove motor zone protection



2- Find fan below the condenser

4f. Door switch



Door switch under top panel



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 top panel.

When replacing remove wire.

The switch is connected to the controller

The flaps are pushed together and the switch is pressed out.

A new switch is mounted in reverse order.

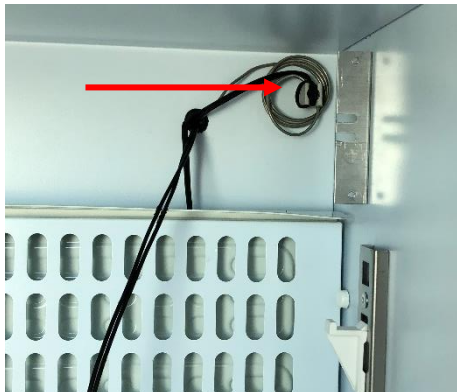
4g. Sensor for cold storage temperature

Sensor for cold storage temperature:

The sensor is the type of PT 100.

The sensor must be introduced from the top panel. The sensor is placed at the top interior behind the fan protection. To remove the sensor, remove the fan protection first.

The sensor is connected to the controller.



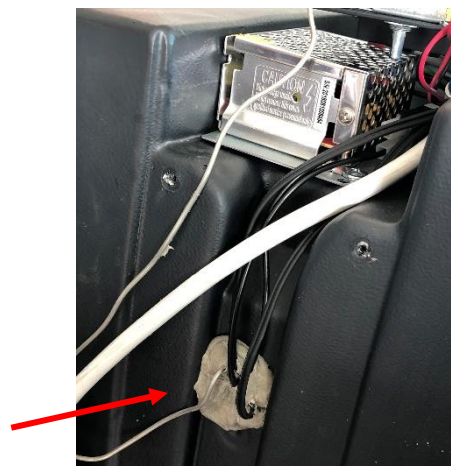
1-Probe located behind the fan protection



2- remove top panel



3- Probe is connected in the controller



4-Hole to pass the probe covered with putty

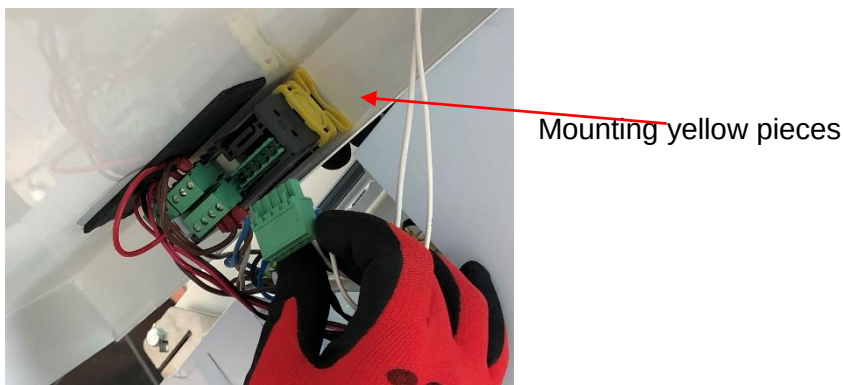
Change of probe:

- Disconnect the power supply.
- Remove the top panel
- Disconnect the electrical connection of the sensor in the controller
- Remove the sensor track.
- Pull the sensor into the top panel.
- Mount the new sensor in reverse order.

4h. Controller - demounting the controller display

Demount of controller

- Remove top panel
- Disconnect the fast connectors on the back of the controller.
- Press the yellow mounting devices at the back of display together and push out the display.



1- Disconnect fast connectors and press yellow pieces

4i. 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 IR33 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 6.5°C., the heat element stop. parameter "Dt1"
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 "dd" is the time for the water can drip of the evaporator when the heat element has switch off.
9. After the "dd" dripping time, the compressor start running again.
10. The parameter "F1" will determine when the evaporator fan is starting, the temperature it's 10°C.
11. When the temperature in the evaporator exceed 10°C., the evaporator-fan stop running.
12. The automatic defrost cycles end.

"d6" During defrost, the temperature shown it's the last one before starting the defrost cycle.

Temperature displayed returns normal when temperature reaches the set point or, in any case, after the time set as exclusion alarms after defrost "d8"

The parameter "dl" it's Interval between two defrosts.

The parameter "dP1" it's maximum evaporator defrost duration.

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

