Service manual
COMPACT 600

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Gram Scientific ApS. (CVR No. 43122193)
Aage Grams Vej 1
6500 Vojens

Content

Scope of this service manual

This service manual is made in order to aid service technicians when servicing and troubleshooting on the Gram Compact 600 product range, and in particular related to the electrical controller.

The service manual is **not intended to be handed over to end-users**, since unintended changes of settings potentially can cause situations where the temperature inside the cabinet cannot be kept as intended, (high foodstuff temperatures can occur if wrong adjustments are made).

Another side effect of making unintended changes of the controller settings, is potentially causing damage to the refrigeration system.

Changing service level parameter settings from the factory default, will void the warranty!

This service manual does explain how to access the different additional controller levels related to service. These levels are:

- Entering / adjusting factory default parameter settings (adjustable if necessary)
- Entering and using the I/O test area
- How to boot the correct software on a spare part controller
- How to replace the controller and what to take care of while doing so

Furthermore, this manual does explain:

- The layout of the controller and the different connections including the specifications of these.
- EC declaration of conformity
- Wiring diagrams for:
    - R – Models (Refrigerators with solid door)
    - GR – Models (Refrigerators with glass door)
    - C – Models (Extended refrigerator with dry cooling function)
    - F – Models (Freezers with solid door)

Introduction to this manual

- This manual will advise you how to service the product.

- Changes in installation and other use of the product than described under intended use, might affect the operation and durability of the product.

- The manual is written according to our current technical knowledge. We constantly work on updating this information, and we reserve the right to make technical changes.

User manual

Intended use

Applies to all 600 products:

The product is intended for the storage of foodstuffs in non-household environments but not for the display to or access by customers.

The product is designed for storage at a constant temperature and is not to be used for chilling or freezing hot/fresh foodstuff.

The product is only to be used for the purpose for which it has been expressly designed. Any other use could cause that the foodstuff stored in the product is not kept at the correct temperature or even cause damage to the product.

The product is not suited for storing blood plasma, laboratory samples, pharmaceuticals or similar substances.

The manufacturer will not be held liable or responsible for any damage caused by improper, incorrect or unreasonable use of the product.

Safety information

Important

Description of symbols used in this manual.

Warning Lacking observation to these instructions might result in accidents with personal injury.

Important If these instructions are not observed, the product might be damaged or destroyed.

Be aware that Gram Commercial has taken precautions to ensure that the safety of the product is in order.

Please carefully read the following information regarding safety.

It is important, that everyone who are to use or install the product, have access to the user manual.

This appliance is not intended for use by persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

The appliance might contain parts with sharp edges e.g. in the compressor compartment or inside compartment.

The appliance is not to be transported on a sack trolley, due to danger of losing balance, causing personnel danger.

Do not pull the power cord to disconnect the appliance or when moving the appliance.

Location

When receiving the product, check the packaging for damage.

If packaging material is damaged, it should be considered if the product might have been damaged too. If the damage is substantial, please contact your dealer.

How to remove the transport pallet:

COMPACT 600:
The cabinet is tilted slightly backward, and the front part of the pallet can be removed.
Then the cabinet is tilted slightly forward, and the rear part can be removed. (see Fig.1)

⚠ This task requires at least 2 persons. The heaviest part of the cabinet is at the top. Be aware of this, when removing the transport pallet.

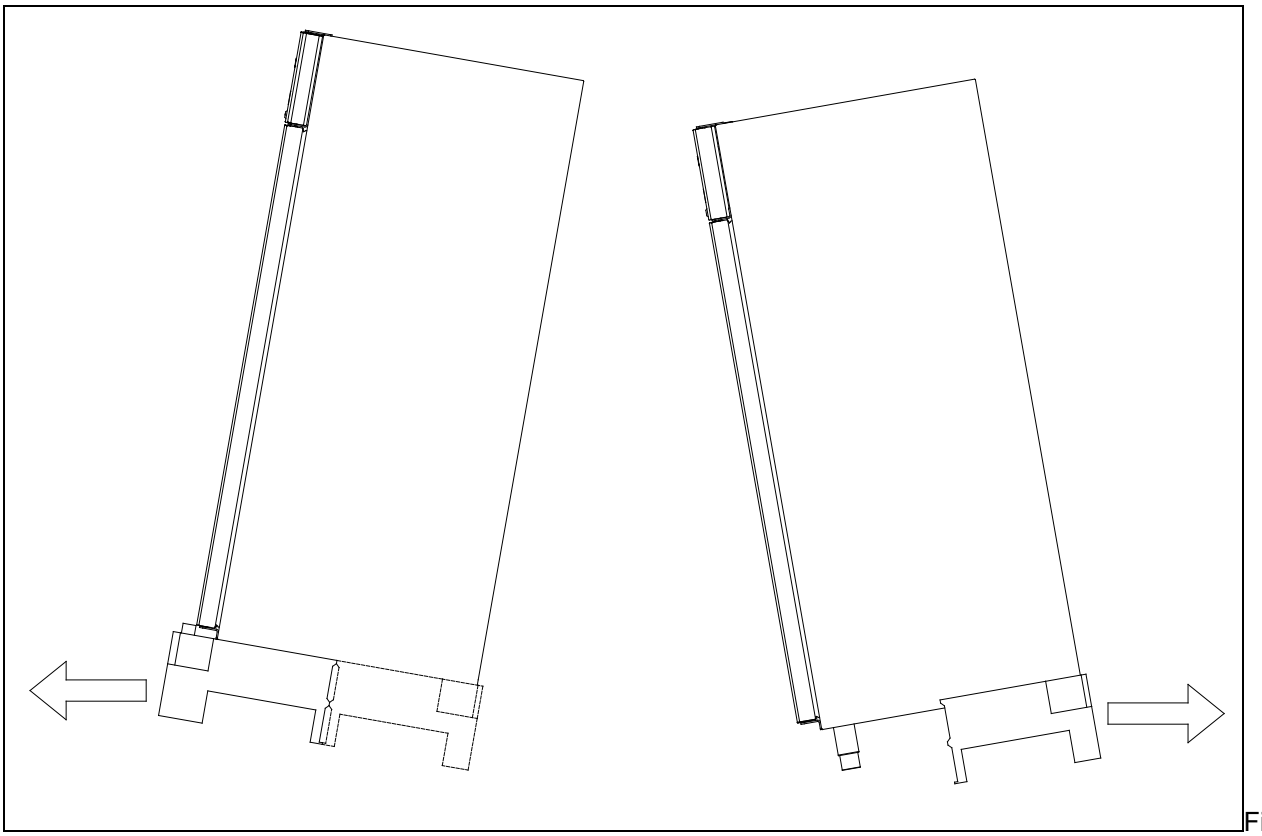


Fig.1

If the cabinet has been transported in horizontal position it must stand upright for at least 2 hours before it is turned on to allow the oil from the compressor to run back.

Because of the heavy weight of the product, the floor might be damaged or scratched when moving the product.

Correct set up gives the most effective operation.
The product should be located in a dry and adequately ventilated room.

To ensure efficient operation, it may not be placed in direct sunlight or against heat-emitting surfaces. The product is designed to operate in an ambient temperature between +16°C and +40°C.

Do not place the product in a chlorine/acid-containing environment (swimming bath etc.) due to risk of corrosion.

Parts of the product is equipped with a protecting film, which should be removed before use.

Clean the product with a mild soap solution before use.

The set-up area must be level and horizontal.

For versions with legs, use the adjustable legs to make sure that the product is level see Fig.2.

For versions with castors, the locking devices of the two front castors must be activated, when the product is in place, see Fig.2. The base must be level, and the product may not be placed on frames or the like.

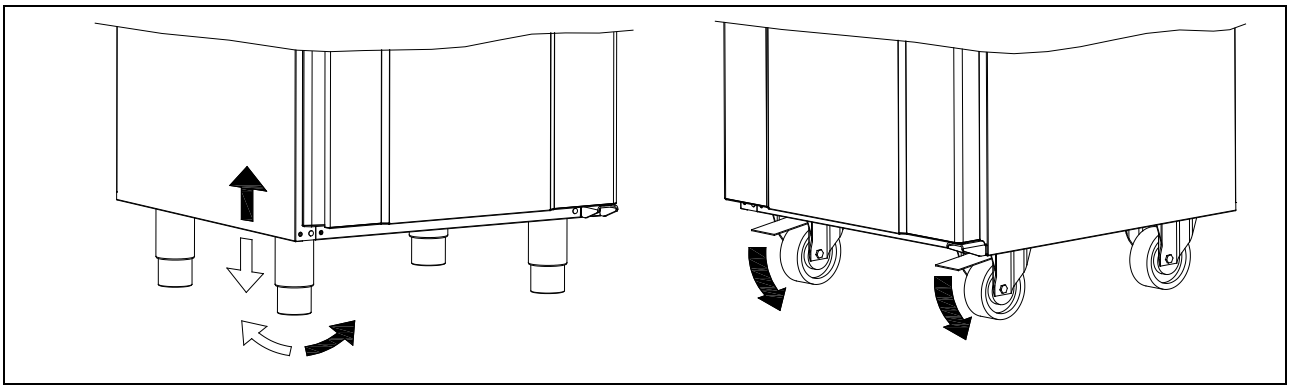


Fig. 2

It is ideal to install the product as close as possible up against the wall and max. 75 mm from the wall.

There must be sufficient ventilation and free air circulation around the cabinet, as illustrated on Fig.3. There must be a minimum clearance of 250 mm above the cabinet, and 20 mm at the sides.

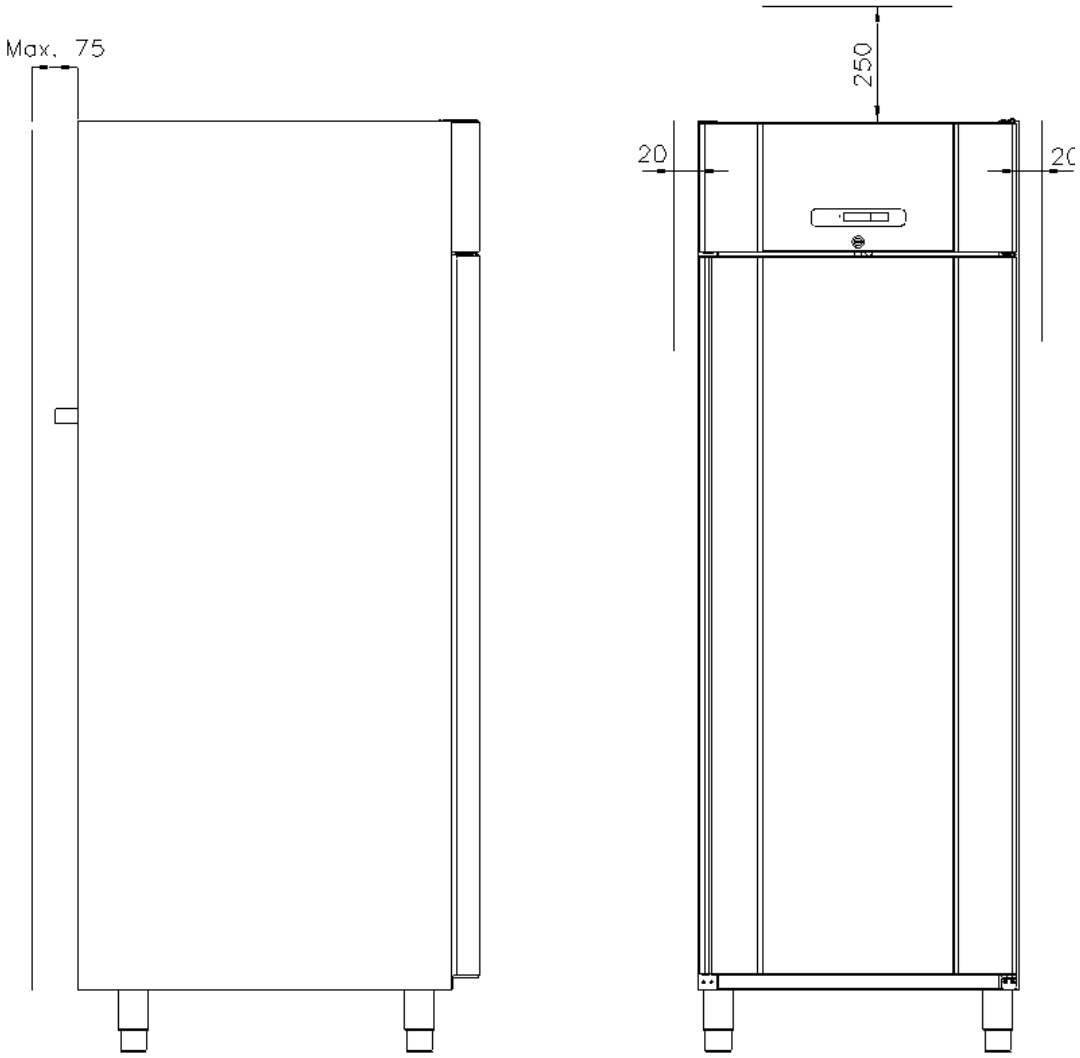


Fig. 3

Cabinets equipped with a glass door, must be fastened to a stable surface to ensure the cabinet does not tilt when the door is open. Brackets for fastening are supplied with the cabinet (fasteners not supplied, use fasteners according to wall material/type).

See how to mount brackets in Fig.4

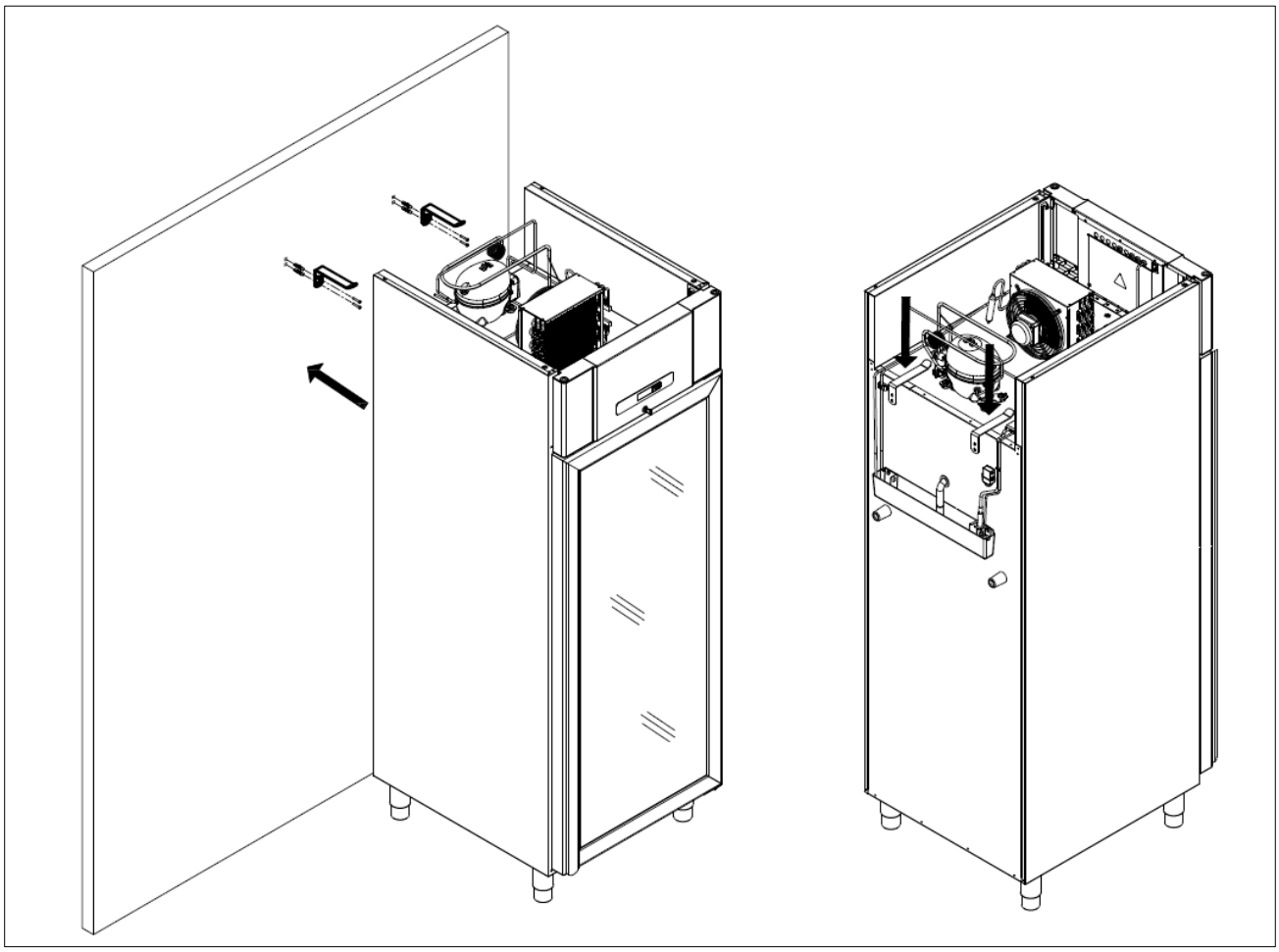


Fig. 4

To ensure that users, surroundings and stored items are not injured/damaged if the cabinet does tilt, these brackets must be mounted.

Optimizing the energy consumption

- Correct set up gives the most efficient operation.
- The product should be located in a dry and adequately ventilated room.
- To ensure efficient operation, it may not be placed in direct sunlight or against heat-emitting surfaces. The product is designed to operate in an ambient temperature between +16°C and +40°C.
- Do not keep the door open for too long.
- Do not set the temperature setpoint too low.
- The product should be placed as close as possible up against the wall.

General description

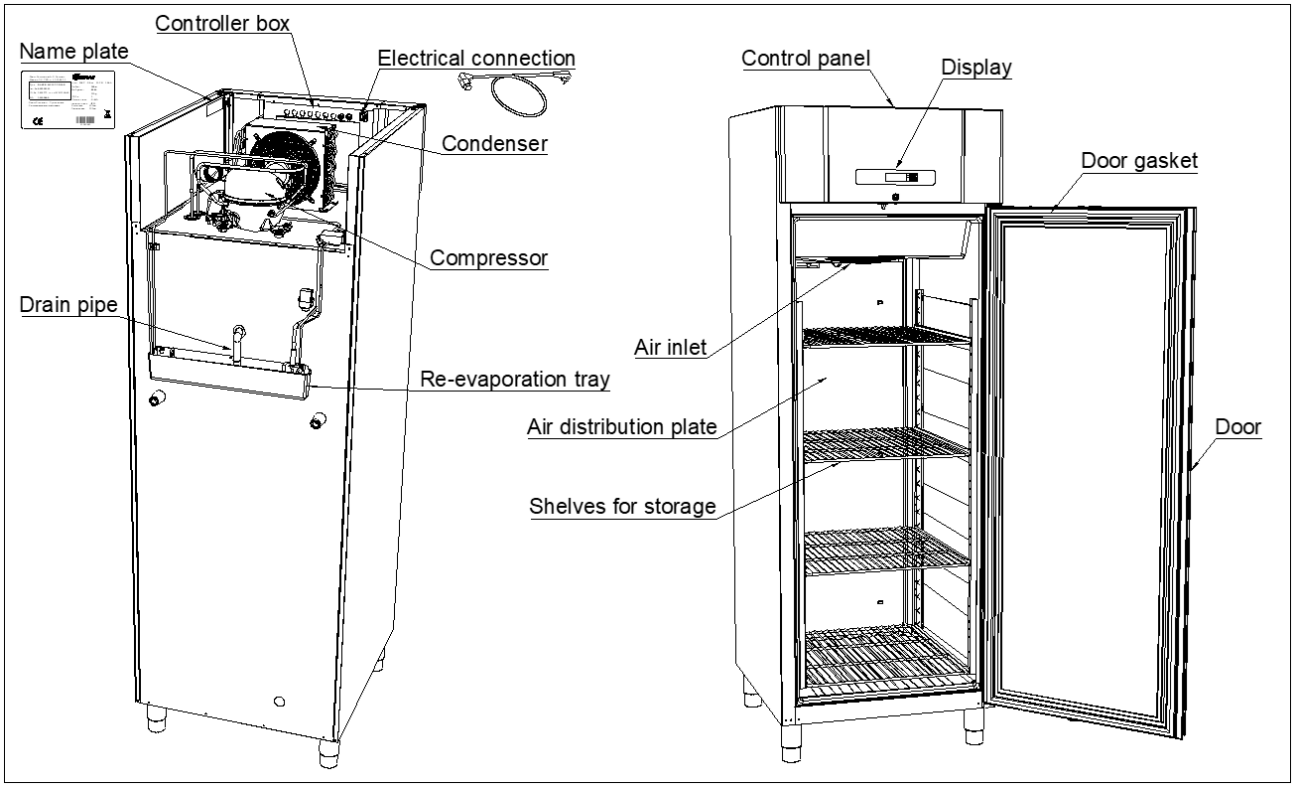


Fig.5

Refrigerant / GWP

Refrigerators	Refrigerant	Charge kg	GWP	CO_2 equivalent t
COMPACT R 600	R600a	0,058	3	0,000174
COMPACT GR 600	R600a	0,058	3	0,000174
COMPACT C 600	R600a	0,062	3	0,000186
Freezer				
COMPACT F 600	R290	0,043	3	0,000129

Climate / temperature class

Products are tested according to the following climate and temperature classes. Information about the climate and temperature class of the exact Compact 600 product, can be found on the name plate of the product (see fig. 5)

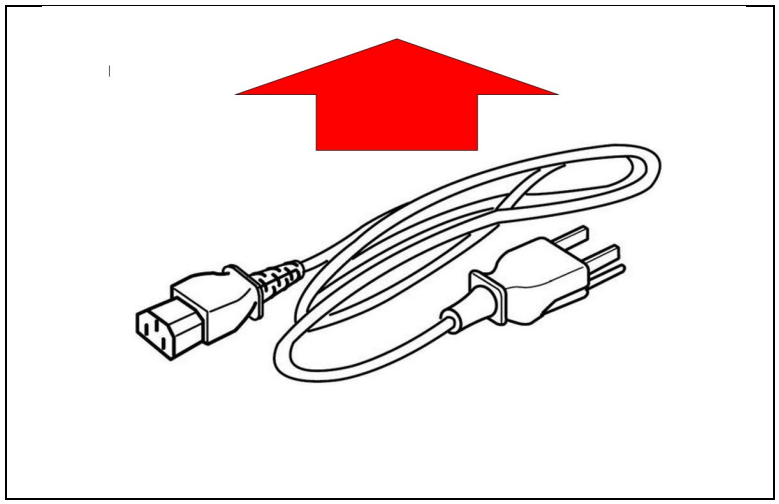
Climate class	
4	30°C / 55 % RH
5	40°C / 40 % RH

Temperature class	
L1	-18°C
M1	+5°C

Electrical connection

Read the text below thoroughly before electrical connection.
Connect the detachable power cord to the main supply inlet, on the back of the controller box (see fig. 5) where it is named “Electrical connection”. Only the supplied cord is to be used.

The power cord is found in the back of the top compartment, behind the label illustrated below:



Picture for illustration purpose only
The power cord supplied will vary depending on the country to which the cabinet is delivered

The product is intended for connection to alternating current. The connection voltage (V) and frequency (Hz) are shown on the name plate positioned in the compressor compartment (see Fig.5).

Never use an extension cord for this appliance!
If a wall socket is not within reach of the supplied power cord, contact an electrician to establish a wall socket.

If the product is defective within the warranty period, it must be examined by a properly skilled technician with proper knowledge of the product as advised by your dealer. Outside the warranty period, it is still advisable to use the service advised by your dealer.

Always disconnect the power if interruptions in power supply occur, whenever electrical parts are removed/fitted, and before cleaning and maintenance of the product.

Repairing of electrical/technical parts may only be performed by properly skilled technicians with proper knowledge of the product.

Do not use the product before all coverings are installed, so that live or rotating machine parts cannot be touched.

The product is not to be used outdoor.

All earthing requirements stipulated by the local electricity authorities must be observed. The plug and wall socket should then give correct earthing. If necessary, contact an electrician.

Make sure the product is switched off at the socket before service is performed on electrical parts. It is not enough to switch off the product by the START/STOP key as there will still be voltage to some electrical parts of the product.

General use

Do not damage the refrigeration system parts.

During normal operation, some parts of the refrigeration system in the compressor compartment might reach high temperatures and could therefore cause burns if touching these components.

Do not use electrical devices inside the product.

To ensure correct and efficient air flow in the product, the shaded areas (above the top load line, below the lowest shelve positioning), must be kept free of items. (see Fig. 6)

All items to be stored, that are not wrapped or packed, must be covered in order to avoid unnecessary corrosion of the inner parts of the cabinet.

If any controller parameters are changed from default, this could cause that the product is not functioning normally, and harmful temperatures could damage items that are kept inside the product.

If the product is turned off, wait minimum 3 minutes before turning it on again. This is to protect the compressor from damage

Maximum loading of wire shelf: 40 kg

Do not store explosive substances such as aerosol cans with flammable propellant in this appliance.

Be aware, if bottles are stored near the air outlet, they may freeze up and break, causing a risk of injury (R, C and GR products).

Do not overpack the product. Allow some space to ensure good airflow.

Moist or fresh foods and those with a strong smell should be wrapped in a plastic film or packed in a container. Otherwise the food may dry out or give their smell to other foods.

Foods containing acetic acid or yeast should be wrapped in plastic film. Otherwise they may accelerate corrosion of the evaporator and metal parts, resulting in failure.

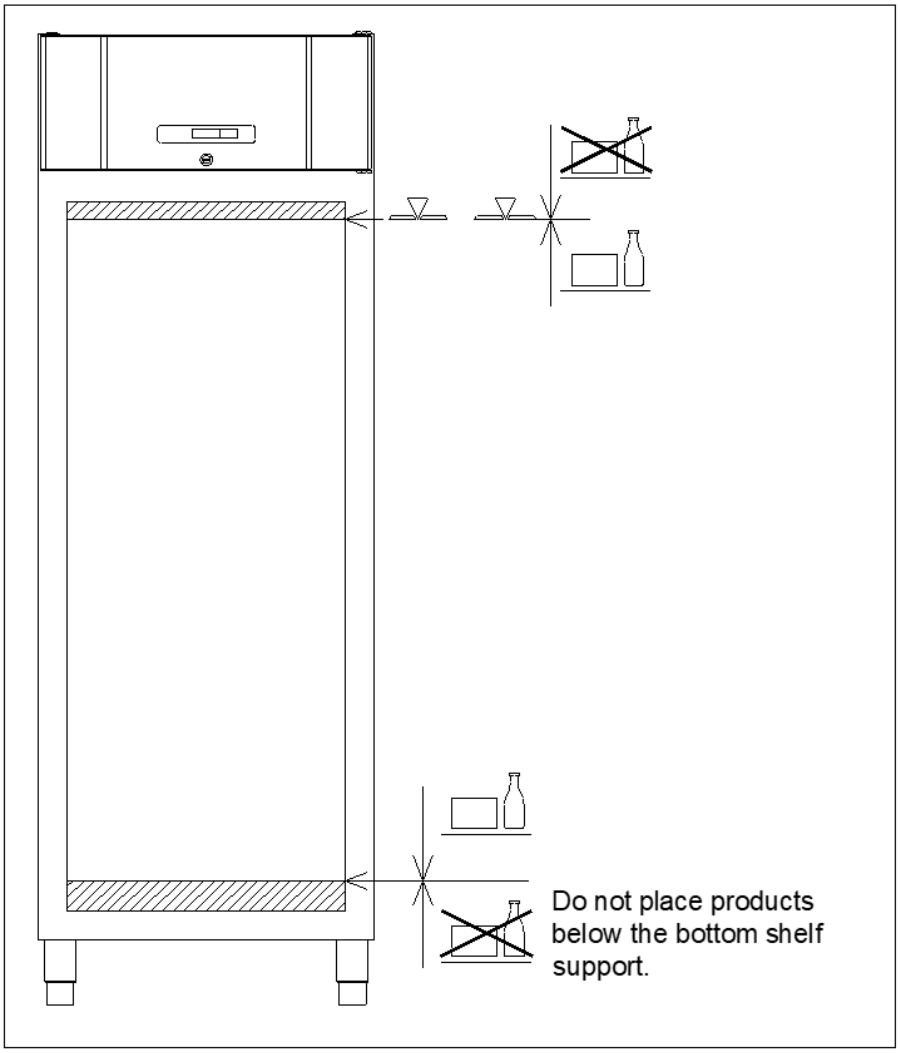
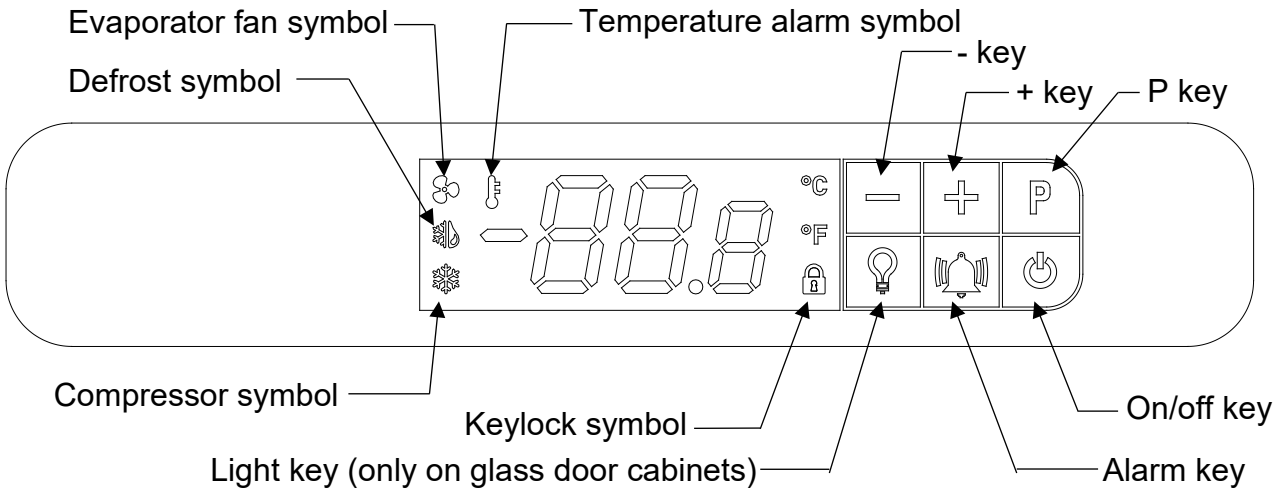


Fig. 6

Operating the product

Display overview



If the cabinet is not turned on when connecting it to the main power source, the following must be done:

To turn the cabinet on, push and hold the ⏻ key for 5 seconds.

During a short boot sequence, all light segments in the display are lit. After that the controller will start up in normal operation mode.

This does mean that the refrigeration system will work to reach and maintain the factory adjusted default set temperature:

For refrigerators (R and GR) the set temperature is 5°C (adjustable from 2 to 12°C)

For refrigerators with extended temperature range (C) the set temperature is 5°C (adjustable from -5 to 12°C)

For freezers (F) the set temperature is -18°C (adjustable from -10 to -22°C)

The cabinet is turned off by pushing and holding the ⏻ key for 5 seconds.

Control lights

The following control lights are located on the display:

- ❄ Compressor symbol. This LED is on while the compressor is running. Flashes during temperature setting.
- Defrost symbol. This LED is lit constantly during the defrosting cycle.
- Evaporator fan symbol. This LED is turned on while the evaporator fan is running.
- Temperature alarm symbol. This LED is turned on if a temperature alarm occurs. See chapter on temperature alarms.

Keylock

A condition for any adjustments to the controller settings, is making sure that the controller keys are not locked. When powering up the controller the keys will automatically be locked after two minutes.

This is done to prevent unintended changes of settings due to cleaning and daily use. Furthermore, it is done in order to minimize the risk of unauthorized tampering with the controller.

When the display keys are locked the keylock symbol is lit.

To unlock the keys:

Push and hold any key for 5 seconds to unlock the controller keys. During this period of unlocking, the keylock symbol flashes simultaniously with the display flashing **UnL**. When the controller has been successfully unlocked, the keylock symbol turns off, and the display reverts to normal operation.

To lock the keys:

Leaving the controller without touching any key for two minutes, will result in the keylock being activated automatically. The change from being unlocked to being locked is shown by flashing the keylock symbol simultaneously with the display flashing **Loc** for the last 5 seconds. After that the keylock symbol is lit and the keys are locked. The display will automatically revert to normal operation.

Adjusting the cabinet temperature

To change the set temperature, push P once, ❄ flashes, and the current set point is shown in the display, with one decimal place after the comma.

Push + or − to change the temperature set point. The new set point temperature is confirmed/saved by pushing P once. The display returns to normal operation.

To exit without change push ⏻ once, or do not touch any keys for 60 seconds

After a power failure the controller returns to stored settings.

Dry cooling

(This function is only available on C – cabinets).

When the cabinet is supplied, dry cooling (DC) is not activated. In order to activate (DC), which will lower the rH% inside the cabinet, the following must be done:

Push and hold − for 5 sec. When the 5 sec. have elapsed, a small “d” is lit in the decimal segment - indicating (DC) being activated. When (DC) is activated it is therefore not possible to show temperatures with one decimal in the display.

De-activation of (DC) is done in the same way (the small “d” will be turned off).

Setting temperature alarm parameters

Adapting the below parameters to suit the real conditions of use is important to ensure that the settings do not make the alarm system either too sensitive or too insensible.
Adjusting the difference between temperature set point and **hAL** / **LAL** alarm settings to narrow, will result in unintended alarms. A narrow gab combined with a too short **dAh** could result in an **AH** alarm, just by opening the door.
dAh should never be adjusted to less than 30 minutes.

To access the temperature alarm parameters, push and hold  and P simultaneously for 5 seconds.
The display will flash the first temperature alarm parameter **hAL**.

To access the individual parameters push P.

To move between and adjust the parameters use  and .

Push P to store the new setting. The controller automatically jumps to the next parameter.
Adjustable parameters are the below mentioned.
Factory default:

hAL	**H**igh **A**larm **L**imit	+ 25° C
LAL	**L**ow **A**larm **L**imit	- 29° C
dAh	Time **d**elay **A**larm **h**igh	120 minutes
dAL	Time **d**elay **A**larm **L**ow	20 minutes
Atd	**A**larm **t**emperature **d**ifferential	2K

The above parameter settings will result in the following:
To trigger a high temperature alarm **(Ah)** the cabinet temperature must be above **hAL** = 25°C for more than **dAh** = 120 minutes. This will result in  being lit and the display alternating between **Ah** and the present cabinet temperature.
Once the temperature goes below 23°C **(hAL – Atd)** the alarm changes from present to being logged. The display will show current temperature and  will remain lit indicating there has been a temperature alarm.
To trigger a Low temperature alarm **(AL)** the cabinet temperature must be below **LAL** = -29°C for more than **dAL** = 20 minutes. This will result in  being lit and the display alternating between **AL** and the present cabinet temperature.
Once the temperature goes above -27°C **(LAL + Atd)** the alarm changes from present to being logged.
The display will show current temperature and  will remain lit indicating there has been a temperature alarm.

Temperature alarms

The following temperature alarms can be displayed:

Ah **A**larm **h**igh temperature

AL **A**larm **L**ow temperature

If an alarm occur, **Ah** or **AL** will be shown alternating with the current temperature.

If the temperature gets back within the accepted limits, the current temperature will be shown in the display and will remain lit until the alarm has been reset. After 3 days will be turned off, but the alarm will still be kept in the alarm log.

Displaying alarms:

The temperature alarm log stores information related to the latest 10 temperature alarms (named A 1 to A10). If a new alarm occurs the oldest alarm (A10) will be erased.

Push once to open the log.

- If there is no present or logged temperature alarm the display will show "**no**" flashing for 4 seconds. After that the controller will revert to normal operation.
- If there are present or logged temperature alarms the display will show the most recent temperature alarm being:

A 0	Present / ongoing temperature alarm.
A 1.. A10	Not present temperature alarms logged

Once the cabinet temperature, related to a present temperature alarm (A 0), is no longer outside the alarm ranges, this A 0 alarm becomes the new A 1. Etc.

Use and to navigate between the different alarms.

Push to open a temperature alarm in order to show:

Example 1 – alarm A 0: (Present temperature alarm)

Ah	Indicating it is a high temperature alarm (AL indicating a low temperature alarm)
8.0	the maximum temperature in °C during the alarm (If AL the minimum temperature)
dur	alarm duration until now
01h	the alarm has been ongoing for 1 hour
15'	…. and 15 minutes

Example 2 – alarm A1 to A10: (alarms in the log – not present)

Ah	Indicating it is a high temperature alarm (AL indicating a low temperature alarm)
9.0	the maximum temperature in °C during the alarm (If AL the minimum temperature)
dur	alarm duration
01h	the alarm lasted for 1 hour
15'	…. and 15 minutes
tSE	time since the end of the alarm
08h	the alarm ended 8 hours ago (maximum 99 hours)

Each value is displayed alternately for approx. 1 second.

It is not possible to reset or delete a present temperature alarm A 0

Resetting alarm symbol

Look through all non-present alarms, after each alarm Push P to verify having seen the alarm. To exit an alarm without verifying, push ⏻. Once all alarms have been verified, will turn off, unless there is a present alarm.

Push ⏻, to leave the alarm log.

Deleting alarms:

Push 🔔 once to open the log.

Display shows A 1. Delete all non-present temperature alarms by holding 🔔 for 5 seconds. Once the alarm log is deleted the display flashes " - - - " for 3 seconds.

Messages and alarms shown in the display

OP — **OP** shown constantly, indicates door open. If alternating with temperature, door has been open for more than 2 minutes. Close the door and **OP** will disappear.

If not – check if the door switch is broken or is not operated properly by the door. It is always recommendable to try operating the door switch by hand, when the door is open, in order to make sure that the door switch does switch properly when opened/closed.

d — a small "d" is lit in the decimal segment, after the temperature e.g. 5d - indicating Dry cooling being activated (only possible on C - Cabinets). For explanation see under Dry Cooling

E1 — **E1** indicates a defective room sensor. Monitor the temperature until the room sensor has been replaced.
Request service assistance immediately. In case of an **E1** error occurring, the room sensor monitoring the cabinet inside temperature is either disconnected or defective. The controller will try to maintain the temperature based on pre-set compressor run and off times in the controller. This kind of running will maintain some kind of cooling, but the cabinet temperature may vary a lot as this is affected by ambient conditions and door openings.

E2 — Alternating between **E2** and temperature indicates a defective evaporator sensor. Defrosting will be time-based. (freezer) **Request service assistance**. If an **E2** error occur the evaporator/defrost sensor will either be disconnected or defective. This does result in the defrost cycle being performed for the maximum time set in the controller, which in some cases might be much longer than needed. This might have impact on the temperature inside the cabinet during the defrosting period.

Ah — **A**larm **h**igh temperature – See explanation under temperature alarms

AL — **A**larm **L**ow temperature – See explanation under temperature alarms

Defrosting

COMPACT R / C and GR:

Defrosting is automatically performed 4 times every 24 hours. is lit. The defrost of the R and the GR cabinet is done by means of the evaporator fan. The defrost of the C - cabinet is either done by means of the evaporator fan or an electrical defrost heater, depending on the temperature set-point or if the dry cool function is activated.

COMPACT F:

Defrosting is automatically performed 4 times every 24 hours. is lit. The defrost of the freezer is done by means of an electrical defrost heater.

Manual defrosting:

If operating with frequent door opening and replenishment, manual defrosting can be necessary. Manual defrosting is started by pressing and holding for 5 seconds.

Do not use sharp or pointed objects to accelerate the defrosting process.

Defrost water

The cabinet produces water during defrosting, which is led into the re-evaporation tray on the backside of the cabinet (see Fig.5). A re-evaporation hot gas pipe from the refrigeration system, placed in the tray, re-evaporates the water. As a precaution in order to try avoiding tray overflow during excessive load / many door openings, an electrical re-evaporation heater, controlled by a float switch, is installed in this tray on R/GR and C products.

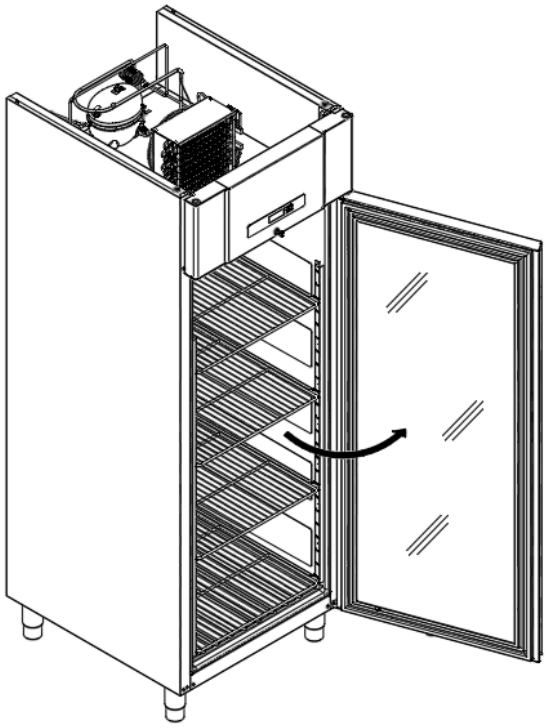
It is recommended to clean the re-evaporation tray and water trap when necessary - at least once a year. Remember to disconnect the cabinet before cleaning.
Be careful not to damage the re-evaporation pipe (and the electrical re-evaporating system) during cleaning.

Reversing a solid door

Always disconnect the power supply prior to reversing of the door.

The door can be changed from right-hand hinged to left-hand hinged, or vice versa.

To do so, proceed as follows:



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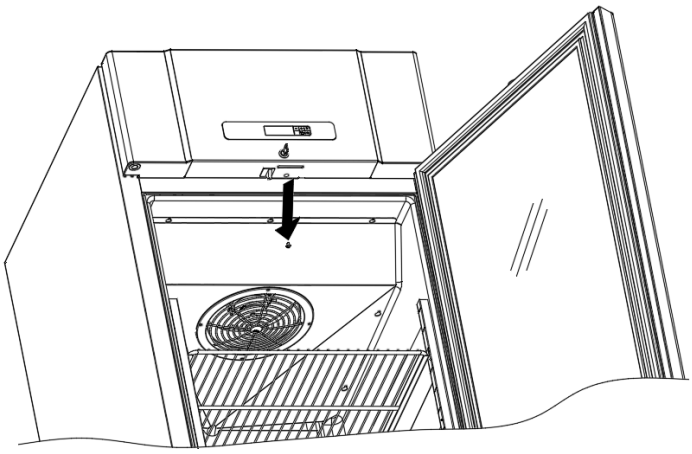

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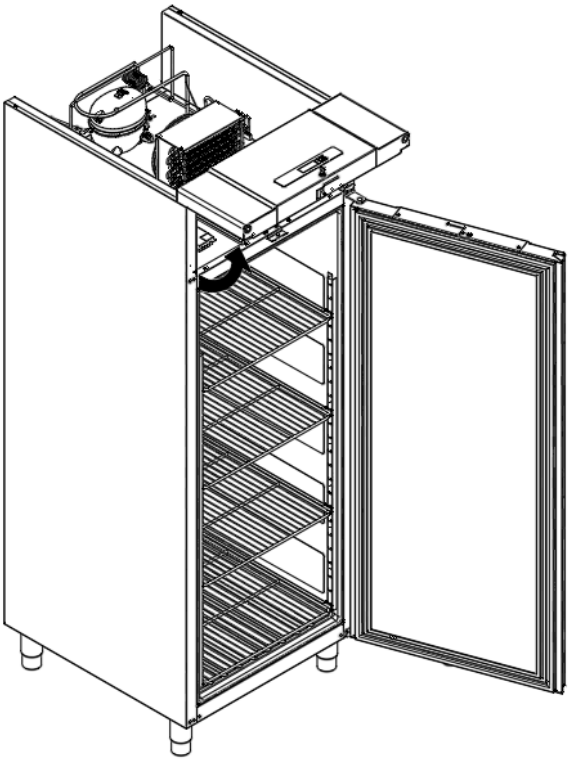

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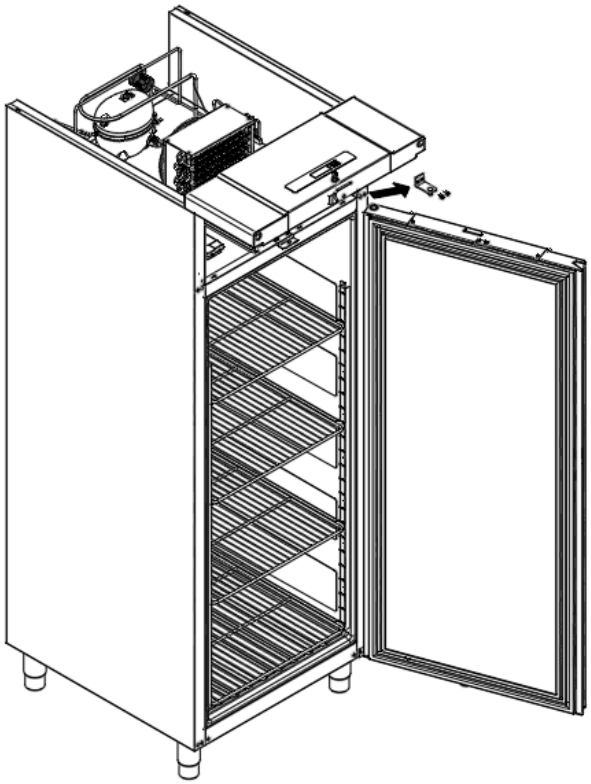

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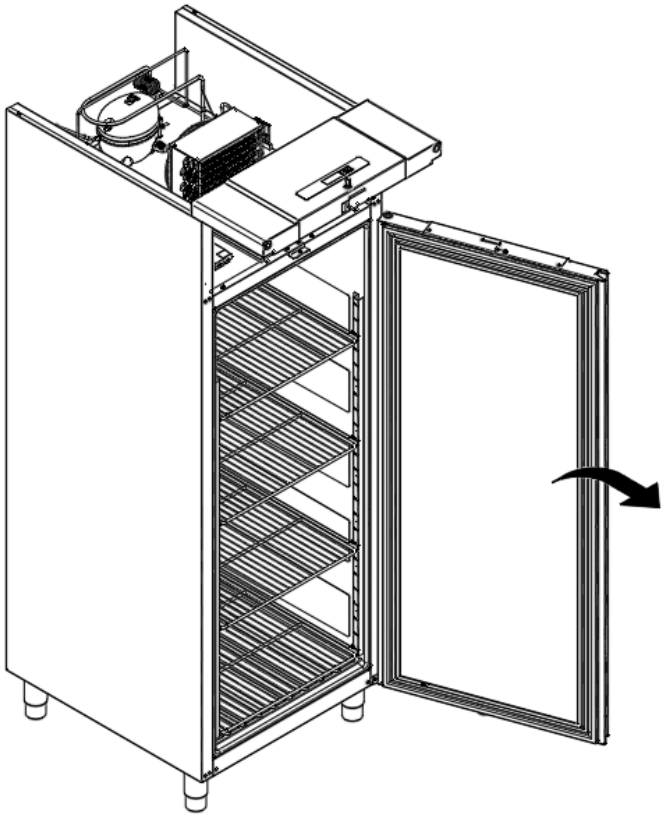

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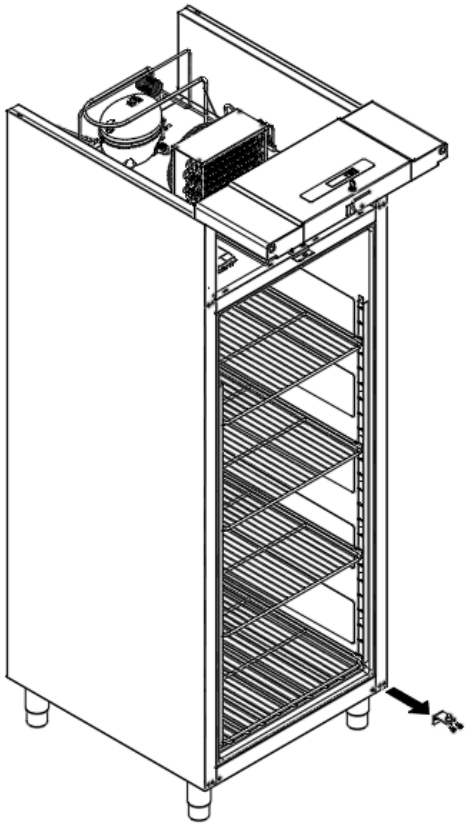

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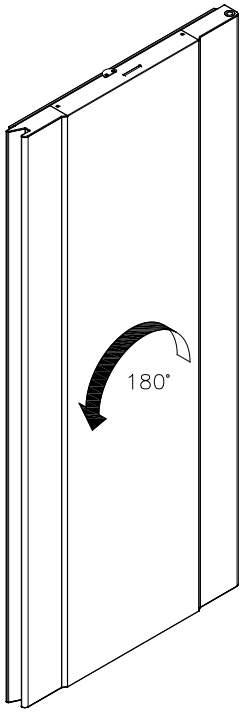

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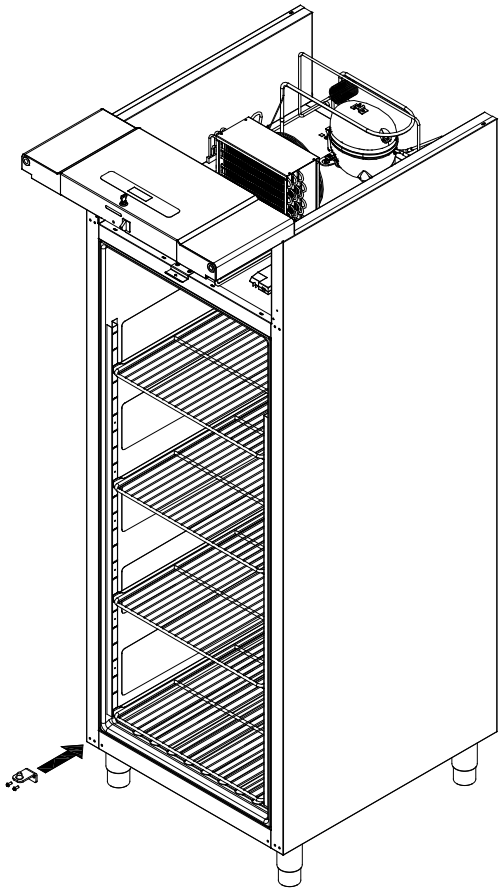

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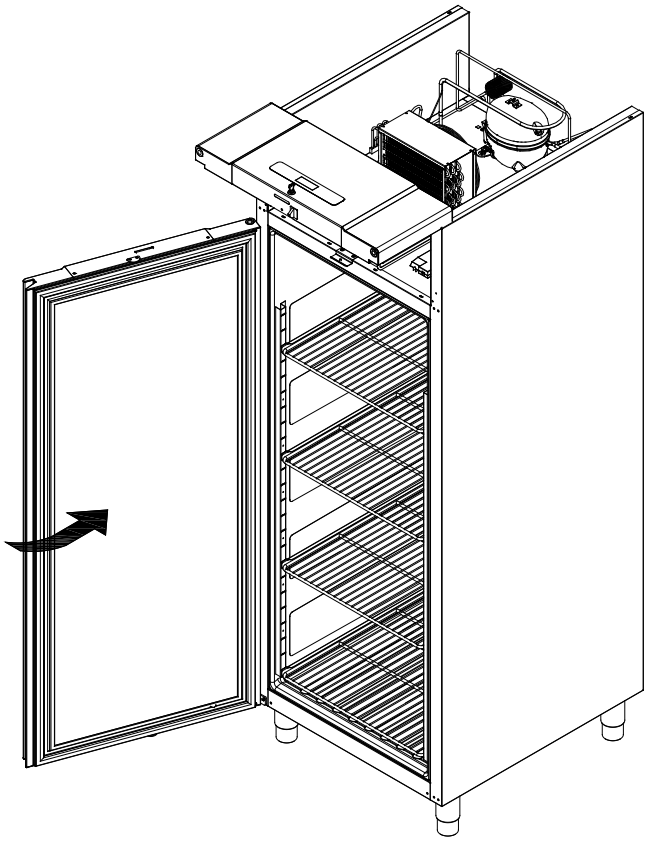

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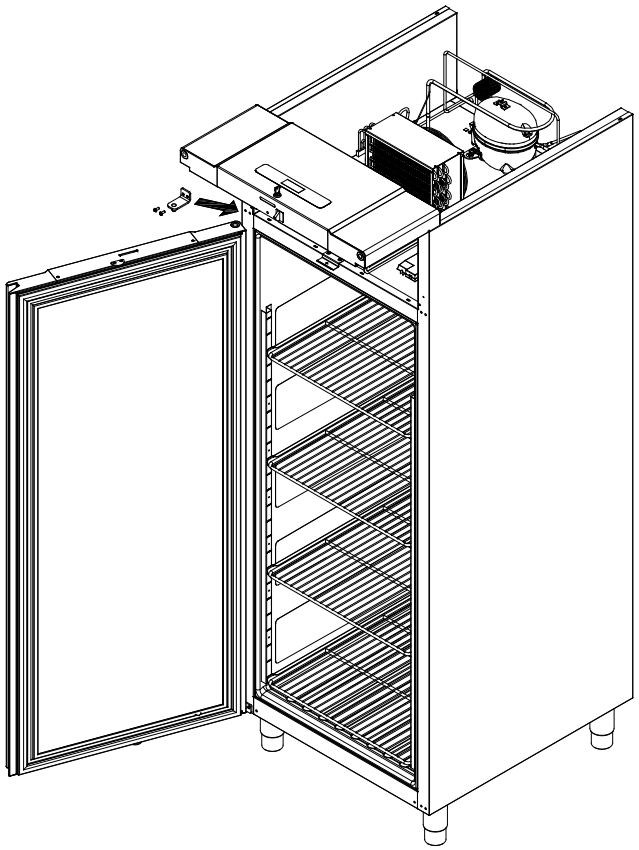

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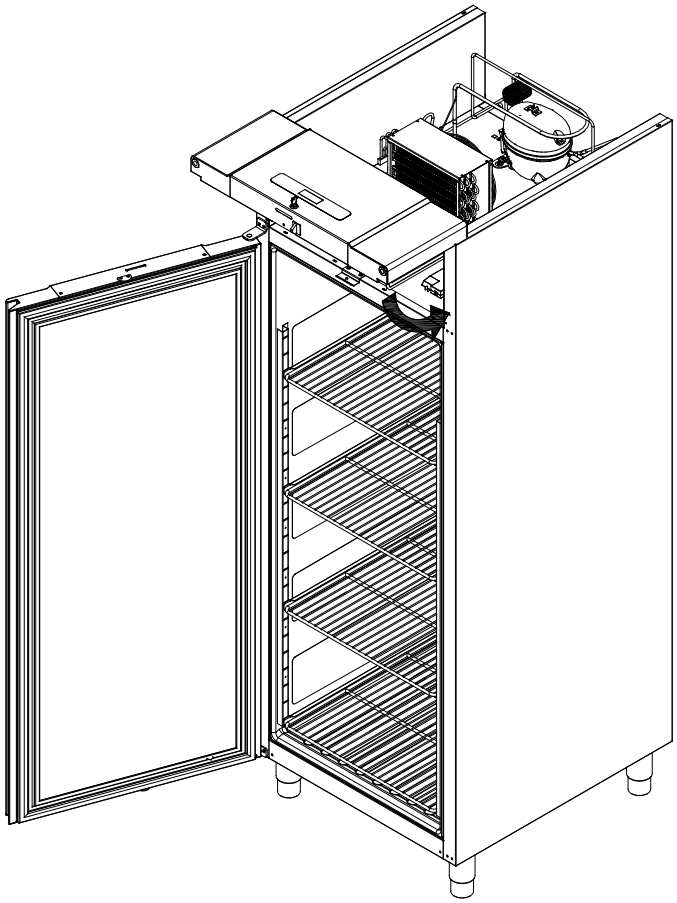

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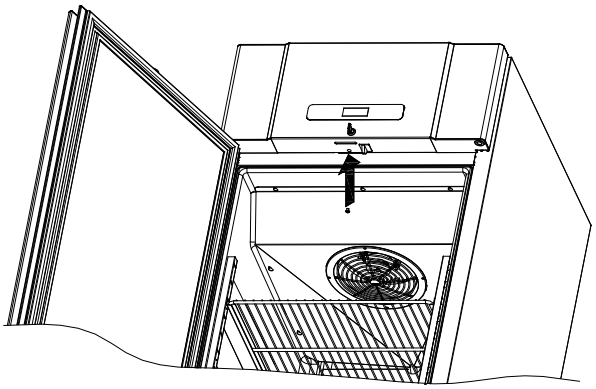

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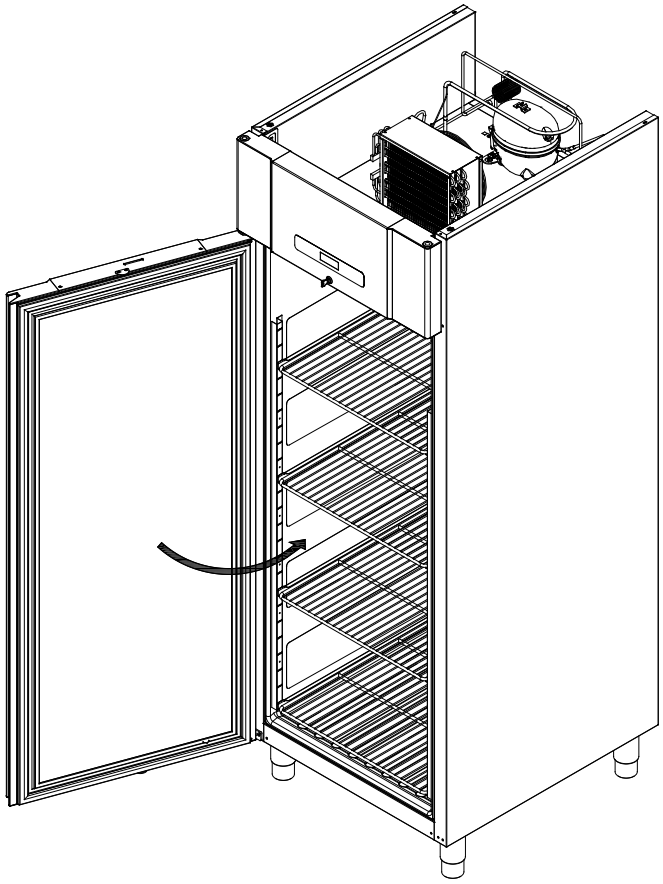
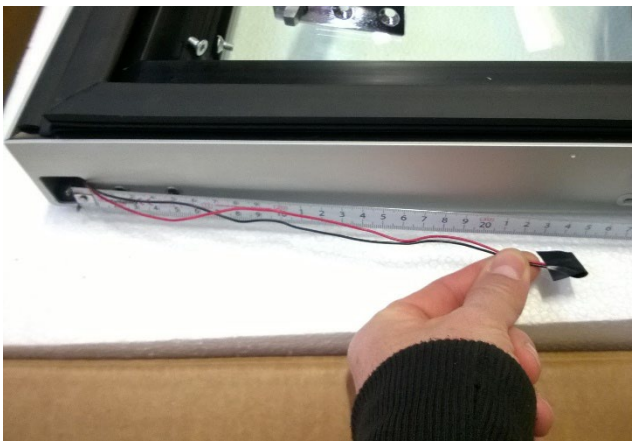


13

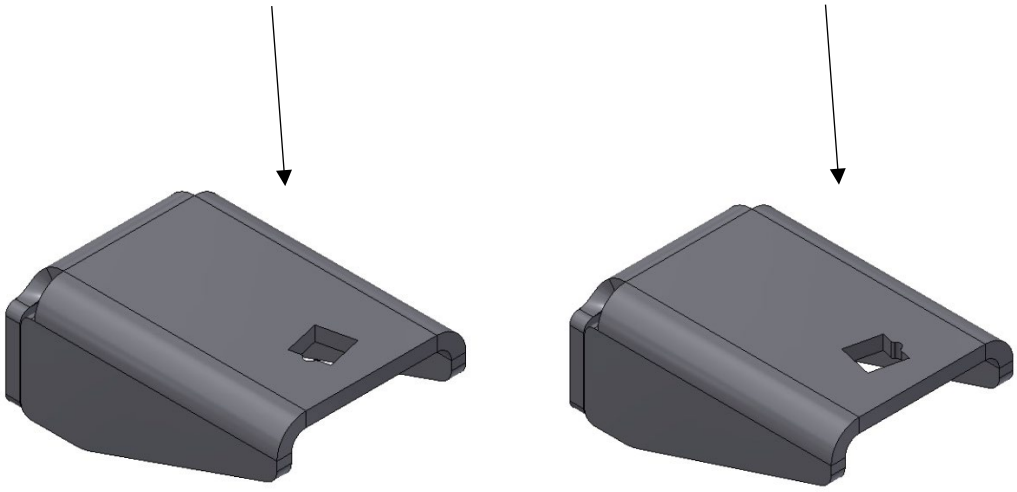
Reversing a glass door (need of new lower hinge)

When changing the glass door from a right-hand hinged version to a left-hand hinged version or vice versa, the self-closing device and the bronze bushing hinge must change position.
Inside the door frame, behind the self-closing device, an additional pair of LED light connection wires are positioned. These must be pulled out and now go through the bronze bushing moved to this position. The wiring in the opposite end of the door must be pushed back into the door in order to make the mounting of the self-closing device possible.

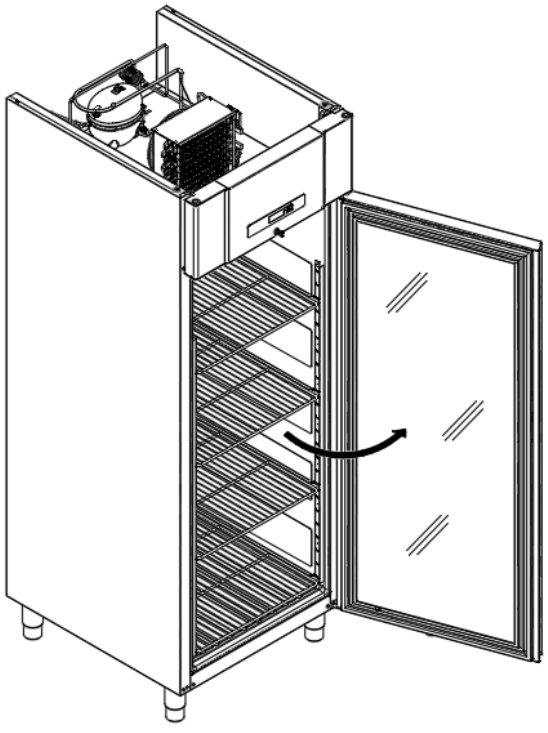


When switching the door positioning from **left to right or vice versa**, the lower hinge must be replaced, in order to ensure proper spring tension of the self-closing device.

Lower Left hinge – Item number	Lower Right hinge – Item number
762222827	762222824



Below is shown how to change right hinged to left hinged. From left to right, follow the same steps.



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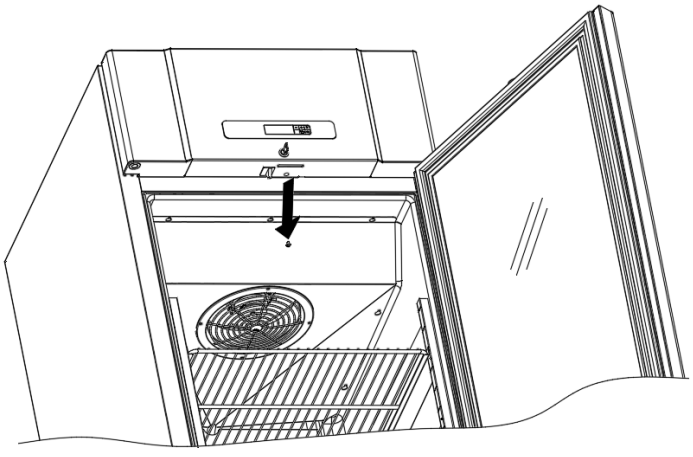

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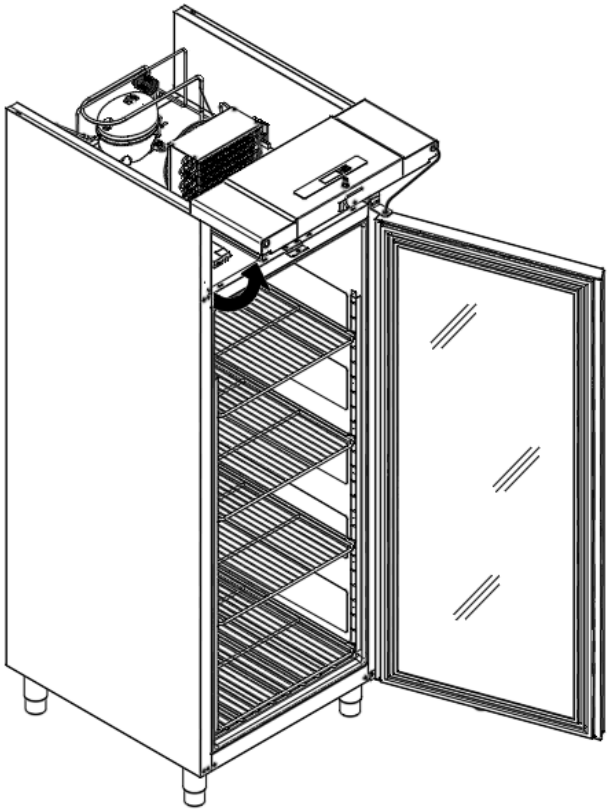

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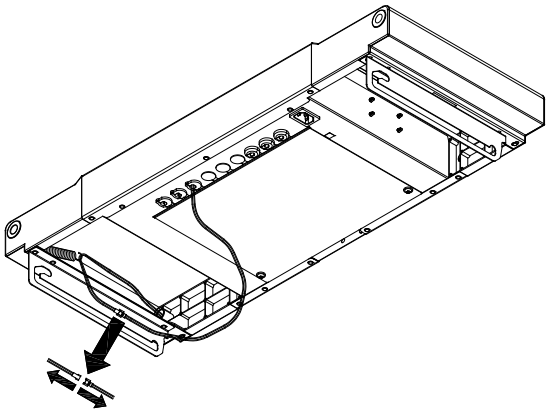

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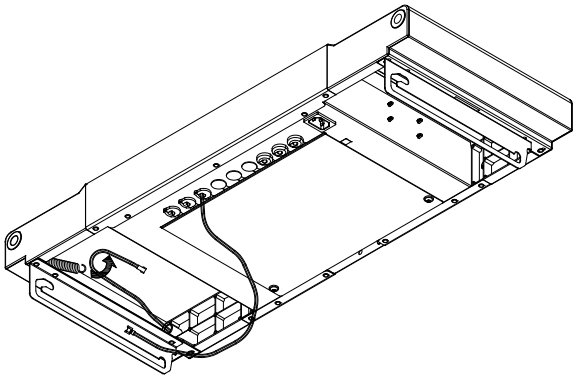

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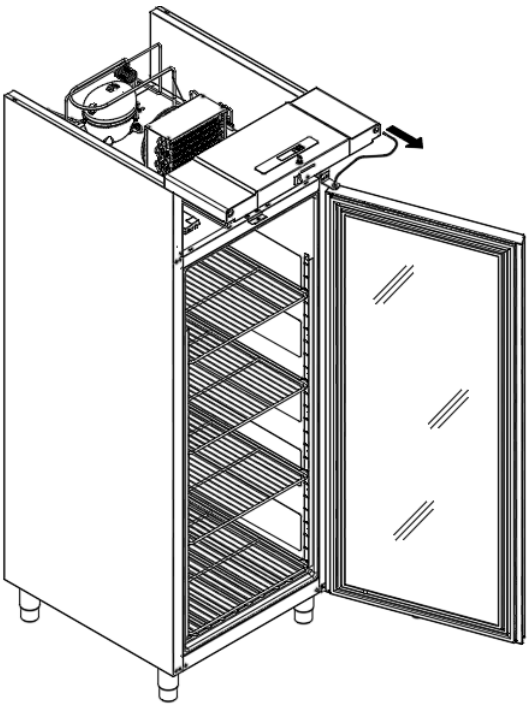

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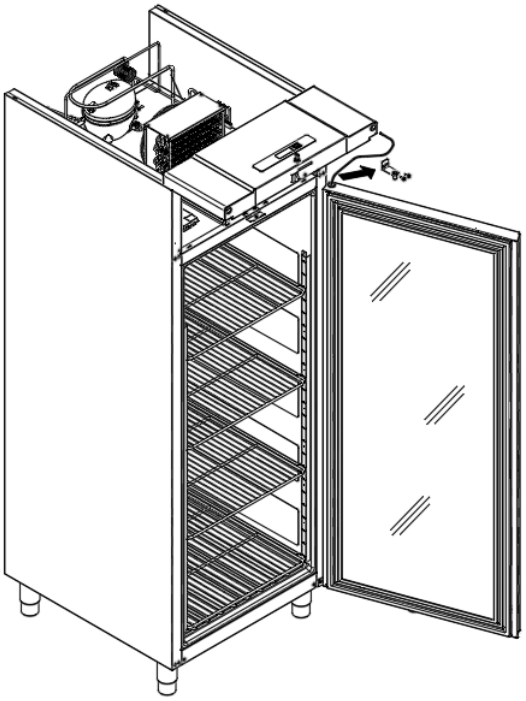

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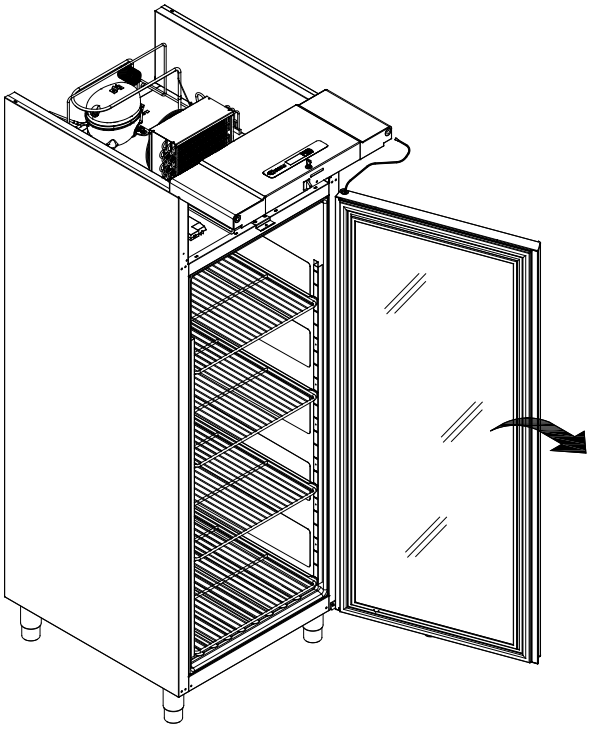

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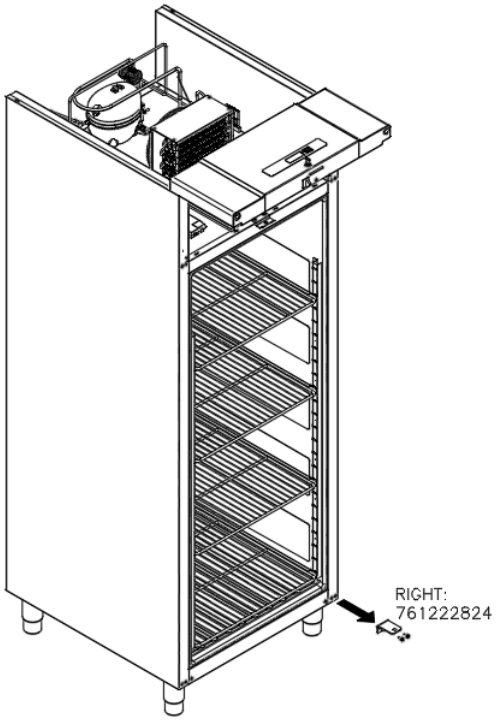

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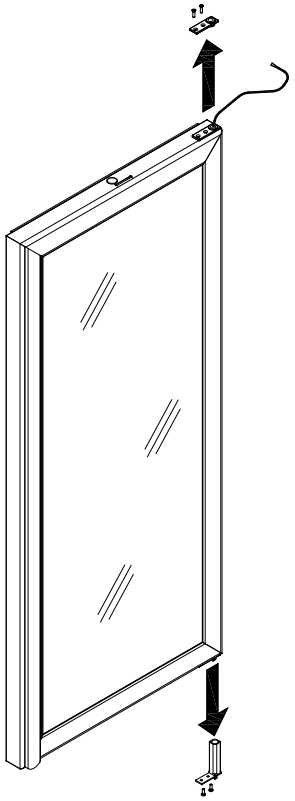

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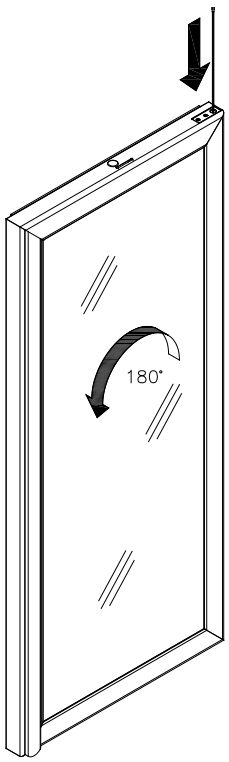

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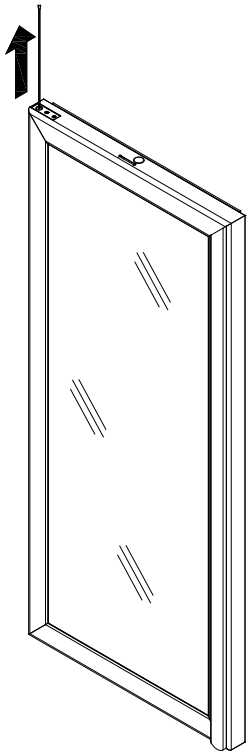

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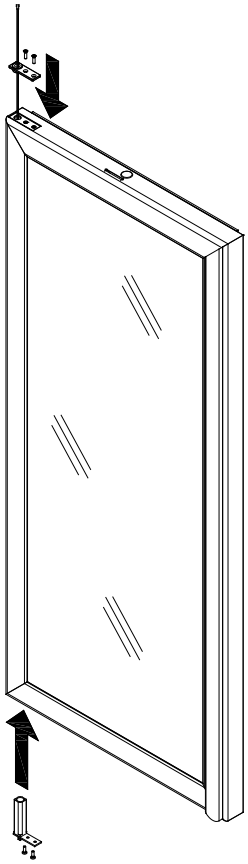

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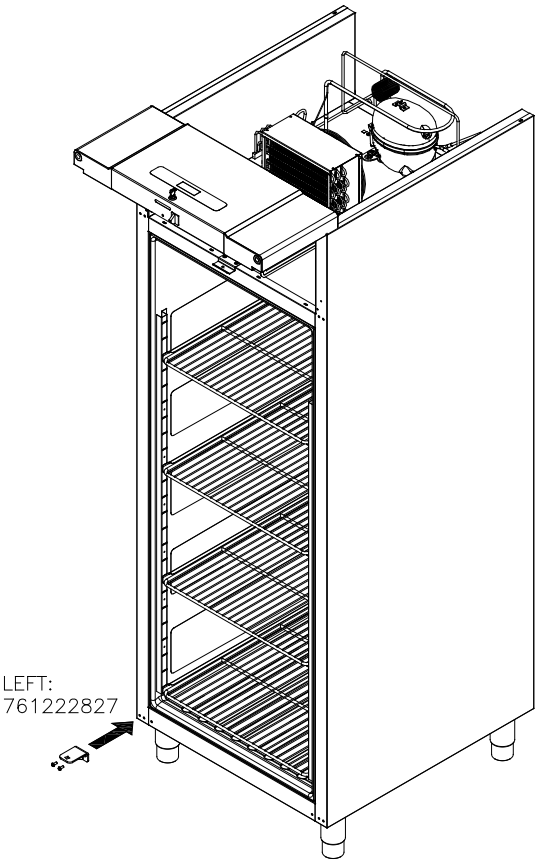

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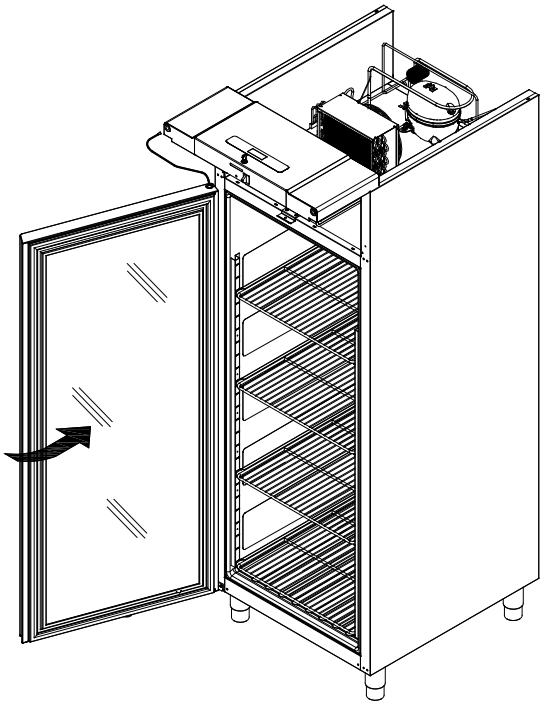

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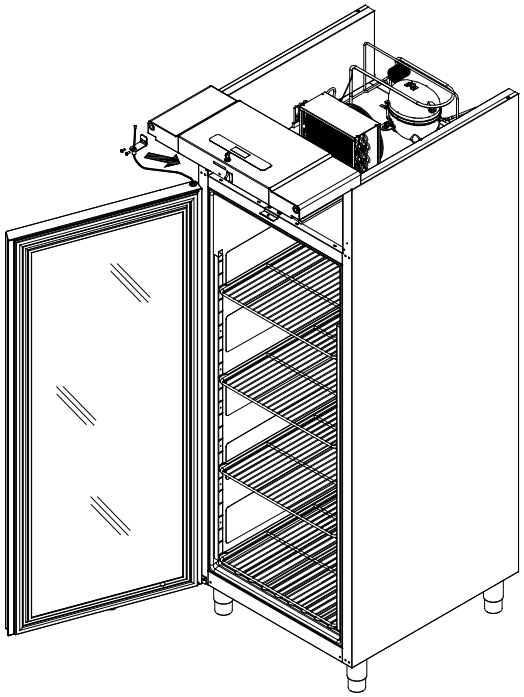

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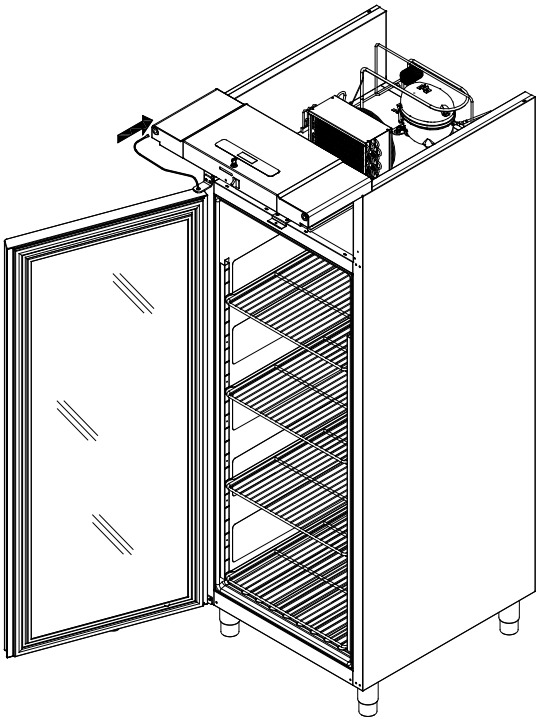

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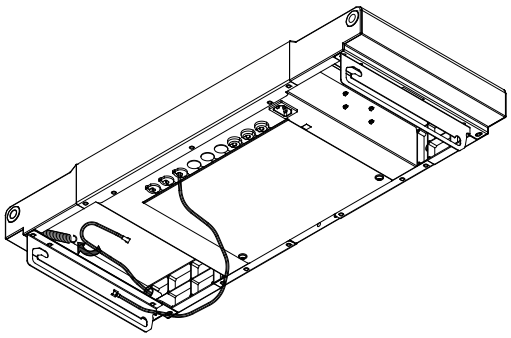

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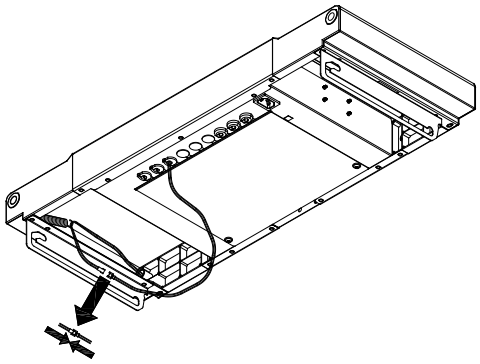

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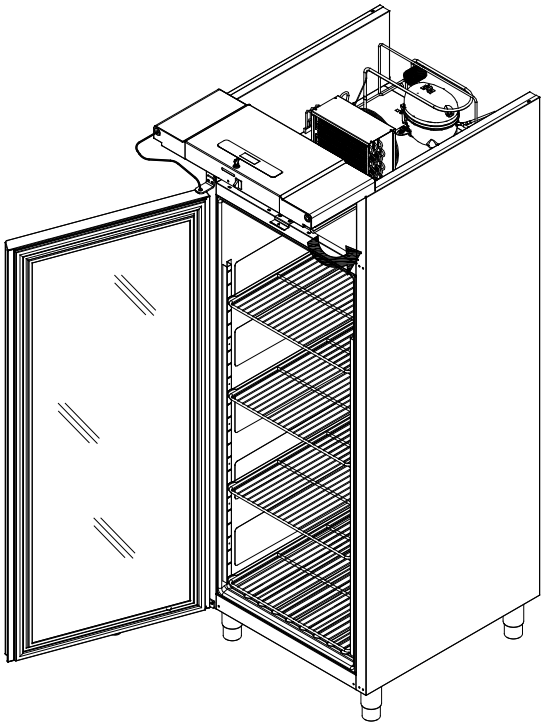

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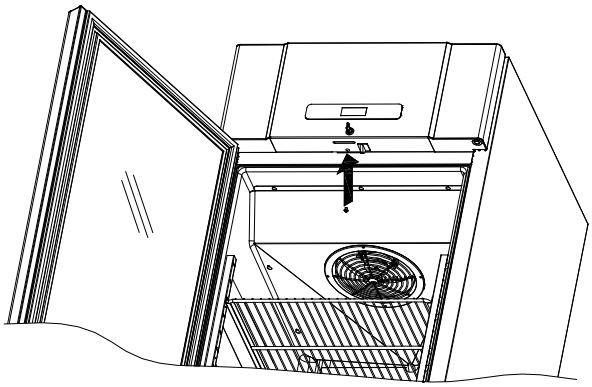

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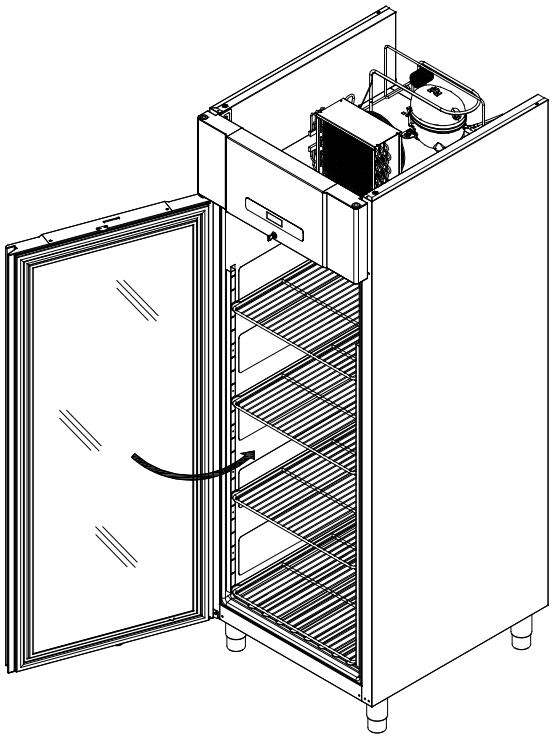


22

Light – glass door

The light in the glass door, can be switched to work in two different ways.
Light constantly on (Lco) or light off when door closed (Ldo).

Push and hold for 5 seconds to change between Lco and Ldo.

Cleaning

Insufficient cleaning will cause the product to not work at optimum performance, or eventually become defective.

Before cleaning, the product should always be disconnected.

Do not flush the product with water, do not use water jet or steam hose as this may cause short-circuits in the electrical system.

Cleansing agents containing chlorine or compounds of chlorine as well as other corrosive substances, **are not to be used**, as they might cause corrosion to the cabinet and the evaporator.

The compressor compartment and in particular the condenser must be kept free from dust and dirt. This is best done with a vacuum cleaner and a brush.

For the external maintenance and cleaning – Use a hot soapy damp cloth. After cleaning rinse off with a moist cloth only containing water. Finalize the cleaning by wiping the cabinet dry, using a dry cloth. Cabinets with stainless steel exterior, should be treated with stainless steel polish at the end.

The product should be cleaned internally with a mild soap solution at suitable intervals and checked thoroughly before it is put into operation again.

Door gaskets

This chapter deals with the importance of a well-functioning door gasket.

Gaskets are an important part of a refrigerator/freezer. Gaskets with reduced functionality, reduces the cabinets ability to seal properly. This might cause increased humidity, internal icing, an iced-up evaporator (leading to reduced refrigeration capacity), and in worst case reduced lifecycle of the cabinet.

Therefore, it is important to be aware of the condition of the gasket. Regular inspection is recommended.

The gasket should be cleaned regularly with a mild soap solution.

If a gasket needs replacement, contact your supplier.

Long term storage

If the product is taken out of operation and need to be prepared for long-term storage, clean the inside compartment, the door and door gasket thoroughly with a hot soapy damp cloth. Eventual remnants of food do create mold.

It is advisable to leave the cabinet door open during long term storage, in order to minimize the risk of bad smell and the building of mold inside the cabinet.

Service

The refrigerating system and the hermetically sealed compressor require no maintenance - they merely must be kept clean.

If refrigeration fails, first investigate whether the unit has been unintentionally disconnected or switched off at the socket, or whether a fuse has blown.

If it is not possible to find the cause of the refrigeration failure, please contact your dealer.

When reporting a malfunction please state the type and the 8-digit serial number (S/N) of the cabinet. This information is found on the name plate, see Fig. 5.

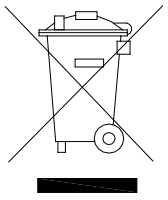
Disposal

Electrical and electronic equipment (EEE) contains materials, components and substances that can be dangerous and harmful to human health and the environment if the waste (WEEE) is not disposed of properly.

Products that are labelled with a “crossed-out wheelie bin” is considered electric and electronic equipment. The crossed-out wheelie bin symbolizes that waste of this type cannot be disposed of with unsorted municipal waste but must be collected separately.

Contact your local dealer when the product needs to be disposed of.

Please be aware of not damaging the refrigeration system and piping when a product is taken out of use. This will prevent the uncontrolled escape of the refrigerant from the refrigeration system.



Service manual

Entering/adjusting factory default parameter settings

This part of the manual **should not** be handed to anyone outside the Gram/Hoshizaki organisation, unless it is necessary.

Prior to entering the controller for whatever reason, it is important to make sure that the controller keys are not locked. When powering up the controller the keys will automatically be locked after two minutes.

This is done to prevent unintended changes of settings due to cleaning and daily use. Furthermore, it is done in order to minimize the risk of unauthorized tampering with the controller.

When the display keys are locked the keylock symbol is lit.

To unlock the keys:

Push and hold any key for 5 seconds to unlock the controller keys. During this period of unlocking, the keylock symbol flashes simultaniously with the display flashing **UnL**. When the controller has been successfully unlocked, the keylock symbol turns off, and the display reverts to normal operation.

The below list of parameters is divided into different groups, each representing a dedicated area of the operation cycle. These groups are:

S = System configurations
C = Compressor control related parameters
D = Defrost related parameters
F = Evaporator fan related parameters
A = Alarm related parameters
IO= inputs and outputs related parameters

Under each section there are numerous sub-parameters which can be adjusted.

In order to access the list of parameters and settings, the following must be done:

- Press and hold P and ⏻ simultaneously for 10 sec.
- The first setting group “S” will be shown in the display.
- Use − and + to navigate between the different setting groups.
- Press P to access the chosen setting group.
- Use − and + to navigate between the different setting names.
- Press P to access the chosen setting name.
- Use − and + to change the settings.
- Press P to save the new setting and the display will revert to the setting name.
- Press ⏻ to move back one level.

Parameters and default settings

Relation	**Setting Group**	Setting name	Parameter name	Unit	Range	Adjustment resolution	Default R	Default GR	Default C	Default F
SYSTEM	**S**									
SYSTEM		S1	Default setpoint	°	S2 to S3	0,1	5	5	5	-18
SYSTEM		S2	Minimum limit for SP setting	°	-30 to S3	1	2	2	-5	-22
SYSTEM		S3	Maximum limit for SP setting	°	S2 to 20	1	12	12	12	-10
SYSTEM		S4	Celsius grade decimal shown on display 0= No, 1=yes	NUMERIC	0 or 1	N/A	0	0	0	0
SYSTEM		S5	Evaporator probe 0= absent, 1= present	NUMERIC	0 or 1	N/A	1	1	1	1
SYSTEM		S6	display update delay (Temperature)	SEC	0 to 300	10	10	10	10	10
SYSTEM		S7	Temperature fluctuation filter [1]	K	0 to 3	0,5	3	3	3	3
SYSTEM		S8	Offset room sensor	K	-5 to +5	0,1	0,0	0,0	0,0	0,0
SYSTEM		S9	Slow down		0 to 100		0	0	0	0
SYSTEM		S10	Dry cooling on 0= No, 1=yes				NO	NO	NO	NO
SYSTEM		S11	Buzzer options **NON**E=0, **AL**A**R**M related =1, When touching a Button **BUT** = 2				ALR	ALR	ALR	ALR
SYSTEM		S12	Threshold for turning frame and drain heater on	°	-15 to 0		-5	-5	-5	-5
SYSTEM		S13	Hysteresis for turning frame and drain heater off	K	0,0 to 5,0		2,0	2,0	2,0	2,0
COMP	**C**									
COMP		C1	Comp. Cut-in above SP	K	1 to 5	0,1	1,0	1,0	1,0	1,0
COMP		C2	Comp Cut-out below SP	K	1 to 5	0,1	-2,0	-2,0	-2,0	-3,0
COMP		C3	Comp. On delay at power up	Min	0 to 10	1	2	2	2	2
COMP		C4	Minimum comp. Off time	Min	0 to 30	1	5	5	5	5
COMP		C5	Minimum comp. On time	Min	0 to 30	1	3	3	3	3
COMP		C6	On comp. with defective P1 (room sensor)	Min	0 to 30	1	5	5	5	10
COMP		C7	Off comp. with defective P1 (room sensor)	Min	0 to 30	1	15	10	15	10
COMP		C8	Compressor off delay when Id1 activated	Min	0 to 10	1	1	1	1	1

[1] This means if the temp. detected by the room sensor is within SP ± S7, the display will show SP. When the temperature detected by the room sensor does go above/below SP ± S7. The actual temperature will be displayed. When the temperature does return to being within SP ± S7, the displayed temperature will be actual until SP is reached. When SP is reached the temperature fluctuation filter will be re-activated.

Relation	**Setting Group**	Setting name	Parameter name	Unit	Range	Adjustment resolution	Default R	Default GR	Default C	Default F
DEF	**d**									
DEF		d1	Defrosting interval	Hours	4, 6, 8 or 12	-	6	6	6	6
DEF		d2	Defrost type 0= FAN, 1=ELEC, 2=Automatic (see d11) 3= HOTGAS	NUMERIC	0, 1, 2 or 3	N/A	0	0	2	1
DEF		d3	Defrost reference 0= time, 1=combined time and room sensor, 2= combined time and evap. temperature., 3= combined time and Id1 activation, 4 = evap. Temp	NUMERIC	1 or 2	N/A	2	2	2	2
DEF		d4	Dripping duration	Min	0 to 5	1	0	0	0	4
DEF		d5	Defrost end temp. (P2 sensor)	°	0 to 12	1	7	7	7	4
DEF		d6	Defrost duration time max.	Min	0 to 60	1	30	30	30	30
DEF		d7	Defrost cancelation period	Hours	0 to 18	1	2,0	2,0	2,0	2,0
DEF		d8	Defrost cancelation temperature threshold	°	0 to 10		2,0	2,0	2,0	2,0
DEF		d9	Defrost cancelation duration	%	0 to 100		20	20	20	20
DEF		d10	Defrost end temp differential above SP, measured on Room sensor (P1) if F0 = 0 and S5 = 0 Actual P1 temperature ≥ SP + d10 = defrost end (only if d2 =1 and d3 = 1)	K	0 to 5	1	2,0	2,0	2,0	2,0
DEF		d11	Setpoint threshold to determine defrosting method	°	1 to 12		3,0	3,0	2,0	3,0
DEF		d12	Display reed out during defrosting 0 = Actual room temperature 1 = - d - 2 = dEF 3 = If room temperature is below SP + C1 at time of defrost start, SP is displayed. If room temperature is above SP + C1 at time of defrost start, actual temp at defrost start is displayed.	NUMERIC	0, 1, 2 or 3	N/A	3	3	3	3

Relation	**Setting Group**	Setting name	Parameter name	Unit	Range	Adjustment resolution	Default R	Default GR	Default C	Default F
DEF		d13	Delay in display temp update after end defrost if d12 = 3	Min	0 to 60	5	30	30	30	30
DEF		d14	Time < d14 since Id1 activation to skip defrosting cycle (only if d2 = 1 and d3 = 3)	Min	0 to 180	10	30	30	30	30
DEF		d15	Maximum number of consecutive skipped defrosts	NUMERIC	0 to 5	1	2	2	2	2
FAN	**F**									
FAN		F0	Fan activity during normal operation (compressor on) 0 = Switched on 1 = Switched on with compressor on, related to F2, F3, F4, F5, F6	NUMERIC	0 to 1	N/A	1	1	1	1
FAN		F1	Fan on-delay after defrosting	Min	0 to 10	1	10	10	10	10
FAN		F2	Evap. temperature before fan start	°	-10 to 0	1	-1	-1	-1	-1
FAN		F3	Fan pause time during compressor off	SEC	0 to 600	5	300	300	300	300
FAN		F4	Fan pulse time during compressor off	SEC	15 to 300	5	60	60	60	60
FAN		F5	Fan off delay time after compressor off	SEC	15 to 300	5	60	60	60	60
FAN		F6	Fan on time after door closing with compressor off 0 = Running F4 setting More than 0 = settings in sec.	SEC	0 to 300	5	0	0	15	0
FAN		F7	Fan activity during defrost and drip time 0 = Fan on 1 = Fan off (restart after defrosting see F2)	NUMERIC	0 to 1	1	0	0	1	1
FAN		F8	Fan cut-in monitoring before compressor cut-in	K	-2 to 0		0,0	0,0	0,0	0,0
FAN		F9	Fan minimum off time	SEC	0 to 600		0	0	0	0
FAN		F10	Fan minimum on time	SEC	0 to 600		0	0	0	0

Relation	**Setting Group**	Setting name	Parameter name	Unit	Range	Adjustment resolution	Default R	Default GR	Default C	Default F
ALARM	**A**									
ALARM		HAL	High Alarm Limit	°	+25 to -35	1	25	25	25	25
ALARM		LAL	Low Alarm Limit	°	-35 to 25	1	-29	-29	-29	-29
ALARM		dAH	Time delay Alarm High	Min	5 to 240	1	120	120	120	120
ALARM		dAL	Time delay Alarm Low	Min	5 to 240	1	20	20	20	20
ALARM		Atd	Alarm temperature differential	K	0 to 10	1	2	2	2	2
ALARM		OP	Open door alarm delay	Min	1 to 10	1	5	5	5	5
I/O										
I/O		P1	Room sensor type n5 = NTC5K, n10 = NTC10K	N/A	N/A	N/A	n5	n5	n5	n5
I/O		P2	Evaporator sensor type n5 = NTC5K, n10 = NTC10K	N/A	N/A	N/A	n5	n5	n5	n5
I/O		Id1	Digital input active on 0 = CLS, 1 = OPN	N/A	N/A	N/A	OPN	OPN	OPN	OPN
I/O		LGT	Light control 0=ON, 1=DOOR	N/A	N/A	N/A	DOOR	ON	DOOR	DOOR
I/O		rE2	RL2 output 0=NONE, 1=DEF, 2=C fan, 3= E fan, 4= Light	N/A	N/A	N/A	NONE	LGt	DEF	DEF
I/O		SSR	SSR Output 0=NONE, 1=Light, 2=E fan, 3= GAS	N/A	N/A	N/A	FAN	FAN	FAN	FAN
I/O		DCO	12V DC Out 0=NONE, 1=E fan, 2=Light, 3=C fan, 4=100%, 5=HTR Frame and drain line heaters (controlled by S12 & S13)	N/A	N/A	N/A	NONE	NONE	NONE	HTR
EXTEND	**E**	E01	Compressor output off when probe P1 is faulty	Min	0 to 30		10	10	10	10
EXTEND		E02	Dripping duration	Min	0 to 5	1	4	4	4	4
EXTEND		E03	Defrost end temperature	°	0 to +12	-	4,0	4,0	4,0	4,0
EXTEND		E04	Fan re-start temperature on P2 after defrosting	°	-10 to 0	N/A	-5,0	-5,0	-5,0	-5,0
EXTEND		E05	Fan stop delay after compressor stop	Sec	10 to 300	N/A	10	10	10	10
EXTEND		E06	Fan cut-in monitoring before comp cut-in	K	-2 to 0	1	0,0	0,0	0,0	0,0
EXTEND		E07	Timed fan run when compressor is stopped	Sec	0 to 30		15	15	15	15
EXTEND		E08	Fan always controlled by E04 when DC is activated 0=NO, 1=YES				YES	YES	YES	YES
EXTEND		E09	Hysteresis for turning fan OFF when E08 is set to yes	K	-5 to +5		1,0	1,0	1,0	1,0

Relation	**Setting Group**	Setting name	Parameter name	Unit	Range	Adjustment resolution	Default R	Default GR	Default C	Default F
General										
		SoF	Software chosen for the product 1=rE, 2=rEG, 3=ErE, 4=Fr		0 to 1	N/A	rE	rEG	ErE	Fr

Test of inputs / outputs

In order to ease the trouble shooting for the field engineer, the different inputs and outputs can be forced on and off manually. Doing so makes it possible to force an output on, in order to measure if the different components are powered. The reason could e.g. be if the compressor is not running.

NB: Make sure not to keep the different outputs powered too long, especially when it comes to the compressor and the defrost output. There is no automatic function limiting the on-time of these functions, as they are only to be used by people with the right skill level.

Entering the test of inputs and outputs:

- In order to access the test program (Setting group "**tEs**") press and hold — and + simultaneously for 5 sec.
- **tEs** will be shown in the display and all outputs will be turned off.
- Press P to access the list of "Setting names".
- Use — or + to choose between the different setting names.
- Press P in order to test the chosen input or output. Read out will be shown and if the setting name is related to an output, this output will be powered on.
- Press ⏻ to turn off the I/O being tested and revert to setting name.
- Press ⏻ twice to exit the test program.

Relation	Setting Group	Setting names	Parameter name	Display read out	Output status
	tEs				
		P1	Room sensor	Actual temp on P1*	N/A
		P2	Evap. sensor	Actual temp on P2* (only on freezers)	N/A
		Id1	Digital input (DOOR)	State of digital input shown in display 0 = open contact, I = closed contact **	N/A
		rE1	Relay 1 (COMPRESSOR)	On	ON
		rE2	Relay 2 (Output defined under I/O rE2)	On	ON
		SSr	SSR output Defined under I/O SSr (FAN)	On	ON
		dCO	12V dc (add. heaters on Fr)	On	ON

(*) The temperature displayed during the read out of the sensor, is the exact temperature related to the probe resistance. No programmed temperature differentials or filters will be taken into consideration.

(**) Operating the door switch when the setting name Id1 is activated.

- When the door is open the read out will be I
- When the door is closed the read out will be 0

This makes it easy to determine if the door switch is functioning as it should or not, just by opening the door, which should result in a change of read out from 0 to I. When the door is closed again the read out should change accordingly.

By testing rE1 (the compressor output) and at the same time measuring at the compressor connections using a voltmeter, it can easily be determined if there is 230 Volt on the compressor inlet.

By testing rE2 (the second output relay) and at the same time measuring at the connected component using a voltmeter or a clamp meter, it can easily be determined if there is 230 Volt / a current draw over the output. This output can either be used connecting the cabinet light on a GR cabinet or for powering the defrost heater in C and F cabinets. The use is defined under parameter rE2 in the above parameter table.

The 12V DC out is only used on the F600 (Freezer model). On this product the 12V DC out does operate a relay on an additional PCB, which again does control the powering of the frame heater and the drain line heater. The room temperature at which these heaters are turned on is defined by the parameters referred to as S12 and S13 in the above table.

Know that the defrost heater is equipped with a temperature limiter with a cut off temperature of 60°C and a reset temperature of 40°C, in series with the defrosting output. If the defrosting output has been tested for a long time this limiter can be triggered, which can be the reason for no heat being generated by the defrost element (Thermal cut-off), even though the output is ON.

When it comes to the light, the 230V controller output to the LED driver and the 24V DC driver output are not accessible, without accessing the controller box.

How to change the controller

Since the controller and the display foil are attached to each other, by means of double adhesive tape, it cannot be guaranteed, being possible to replace the controller front label without replacing the controller and vice versa.

In order to make the front of the controller “watertight” (IP 65 from the front), the controller label is mounted using a very strong double adhesive layer between the top panel and the controller label. This does at the same time mean that the label is glued to the capacitive touch of the display part.
If the controller front label becomes defective due to physical impact of some kind, the controller is no longer protected against water and dust, in the same way as if the label is intact.

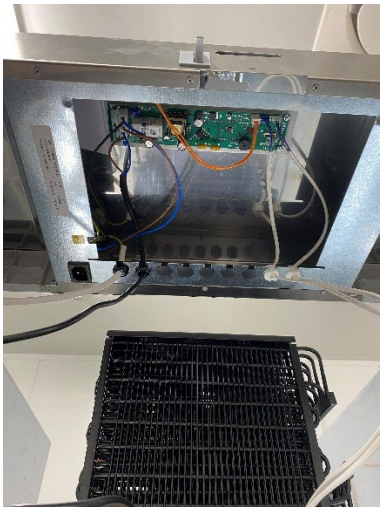
There is an imminent risk of breaking the capacitive touch, of the controller, when trying to remove the label. For that reason, the replacement controller and the controller front label should always be changed/and bought as a set.

How to physically access the controller

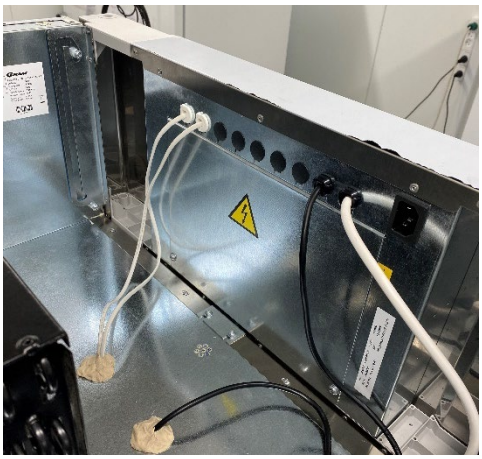
If it for some reason becomes necessary to physically access the controller PCB positioned on the back of the top panel, or the related connections (door switch, LED driver on GR cabinets or other connections of components wired into the controller e.g. evaporator fan, defrost heater, drain line heater, frame heater or compressor), this is possible. Before proceeding it is however important to disconnect the kettle plug from the cabinet in order to avoid the risk of electrical shock. Once the cabinet has been disconnected, the controller box can be accessed by removing the M5 screw positioned in the middle of the underside of the top panel (between door and top panel). See the below pictures.

Once this screw has been removed the top panel can be pulled away from the cabinet and slide upwards until the panel is situated on the top of the cabinet. When the top panel is pushed all the way back, it is secured in its position above the cabinet. See the below pictures.

On the back of the top panel there is a rather large lid, which can be dismantled by removing the two torx 25 screws holding it. Once the lid has been removed there is direct access to the above-mentioned parts and connections.



Once whatever work required have been performed, the controller box lid is re-fitted using the two torx 25 screws and the top panel is re-positioned and fixed by use of the M5 screw. Once the top panel is positioned and fixed correctly, the top panel will be placed like shown on the below picture (seen from the compressor compartment)



How to boot the correct software on a 600 spare part controller

When making sure that the controller does have a fault, which can be clearly identified if e.g. the controller is not able to switch the compressor on/off when using the test of inputs and outputs, and all connections are correct, it can be necessary to replace the controller.

In order to ease the replacement of a defective controller, and to minimize the number of different controllers to have in stock, it has been decided that the controller used for spares is the one with the highest spec. (meaning the fully populated hardware of the F controller) this controller, article number 453580607, holds all software versions which do relate to the compact 600 range.

This makes it possible to choose between the different software versions shown below, by booting this software into the controller.

In order to start this booting sequence, the following must be done:

- Make sure the controller is turned on (not in oFF) and the display is not locked.
- Press the P key and the ⏻ key simultaneously for approx. 10 seconds (until the display show S in the most left display place).
- Press — until the display show io.
- Press the P key. The display will then show P 1.
- Press — until the display show SoF – which is short for software.
- Press the P key to see the currently chosen software
- To navigate between the four different software shown below, use the — key and the + key.
- When the abbreviation for the needed software is displayed, this software is booted to operate the controller by pushing the P key.

rE - Refrigerator solid door (R – cabinet)
rEG - Refrigerator glass door (GR – cabinet)
ErE - Extended refrigerator (C – cabinet)
Fr - Freezer solid door (F – cabinet)

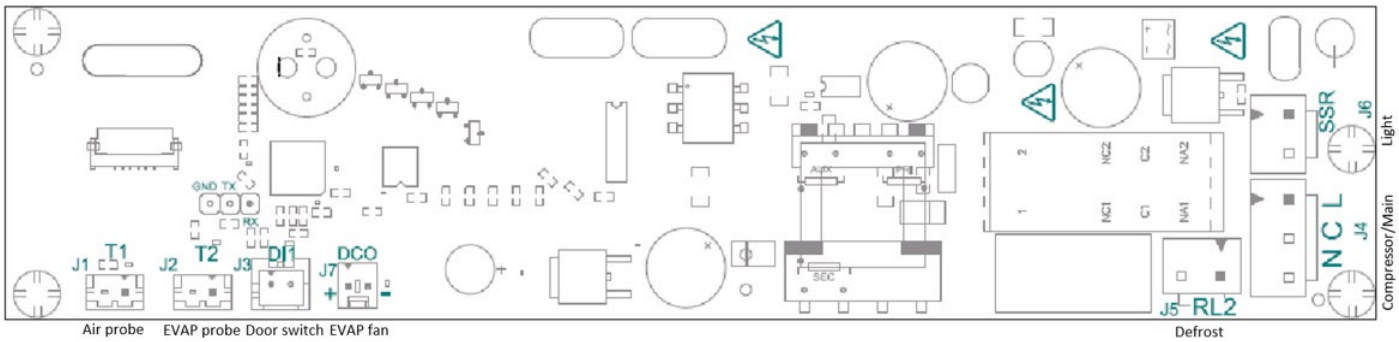
When the needed/desired software has been booted, the controller will revert to displaying P 1.

In order to leave the booting sequence, the ⏻ key is pushed several times. The controller will be powered down, and the display will read oFF.

Press and hold the ⏻ key in order to turn the controller back on.

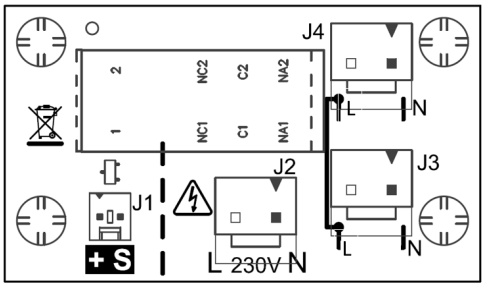
Controller layout and description

Main controller PCB



Connectors				Inputs				
Reference	On board connectors	Cable connectors	Make	Description	Features			
J1/T1	B2B-EH-TS	EHR-2	JST	Air/room probe NTC5K	Range -40 ... 15°C accuracy ±0.1°C			
J2/T2	B2B-EH-TS-E	EHR-2-E	JST	Evaporator probe NTC5K	Range +16 ... +100°C ±0.5°C			
J3/DI1	B02P-XASK-1-A	XAP-02V-1	JST	Door switch	Digital input: 5V; 100 ohm max.			
Connectors				Outputs				
Reference	On board connectors	Cable connectors	Make	Description	Model	Load	Rating@230Vac	Cycles
J4/RL1	B03P-NV	NVR-03	JST	Neutral/compressor/live	G2RL	Inductive	4FLA; 24LRA	100K
J5/RL2	B02P-NV-BL	NVR-02-E	JST	Defrost/light	G5Q	Resistive	4A (N.O:)	100K
J6/SSR	B02P-NV	NVR-02	JST	Evaporator fan	SSR	---	0,5A	---
J7/DCO	2227-2021	2201-2021	MOLEX	On signal additional PCB	Open collector	SELV	12Vdc, 350mA	---
Power supply				Operating conditions				
100 ... 240 Vac ±10% 50-60 Hz				Temperature between -10 and +50°C, Relative humidity between 15 and 80%				

Additional PCB for Freezers to operate drain line heater and frame heater



Connectors				Inputs
Reference	On board connectors	Cable connectors	Make	Description
J1	2227-2021	2201-2021	MOLEX	"+ S" supplied by 12V DCO from main PCB
J2	B02P-NV	NVR-02	JST	Main 230 Vac supply L & N
Reference	On board connectors	Cable connectors	Make	Outputs
J3	B02P-NV	NVR-02	JST	230Vac output from relay. J3 and J4 connectors in parallel, to power drain line heater and frame heater — G2RL-14-E-HA 12Vdc coil 16A/250Vac contactor — Make: OMRON
J4	B02P-NV	NVR-02	JST	

EC-Declaration of conformity

Producer	Name:	Gram Scientific ApS. (CVR No. 43122193)
	Adress:	Aage Grams Vej 1, 6500 Vojens
	Tel.:	0045 73 20 12 00
Product	Model:	Compact 600
	Refrigerant:	R290, R600a
	Year:	2023

Directives

The product is in compliance with all the essential health- and safety requirements and provisons in:

Directive for Machinery 2006/42/EF

The product is where relevant in compliance with the following other directives:

Electromagnetic Compatibility Directive – 2014/30/EU

Design of energy related products 2009/125/EF

Regulation 2015/1095

Energy labelling directive 2010/30/EU

FCM regulation 10/2011

Regulation 1935/2004

RoHS 2 - 2011/65/EU

ROHS 3 - (EU) 2015/863

Standards

The following standards are used to the extent necessary to comply with the relevant directives:

DS/EN 12100:2011 - Safety of machinery -- General principles for design -- Risk assessment and risk reduction

DS/EN 60335-1:2012 – Household and similar electrical appliances. Safety. General requirements

DS/EN 60335-2-89:2010 – Household and similar electrical appliances. Safety. Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant condensing unit or compressor

Person responsible for technical dossier	Company:	Gram Scientific ApS. (CVR No. 43122193)
	Adress:	Aage Grams Vej 1
	Name:	John Lund

Signature Vojens 05/12-2023 R&D Manager

UKCA-Declaration of conformity

Producer	Name:	Gram Scientific ApS. (CVR No. 43122193)
	Address:	Aage Grams Vej 1, 6500 Vojens
	Tel.:	0045 73 20 12 00
Product	Model:	Compact 600
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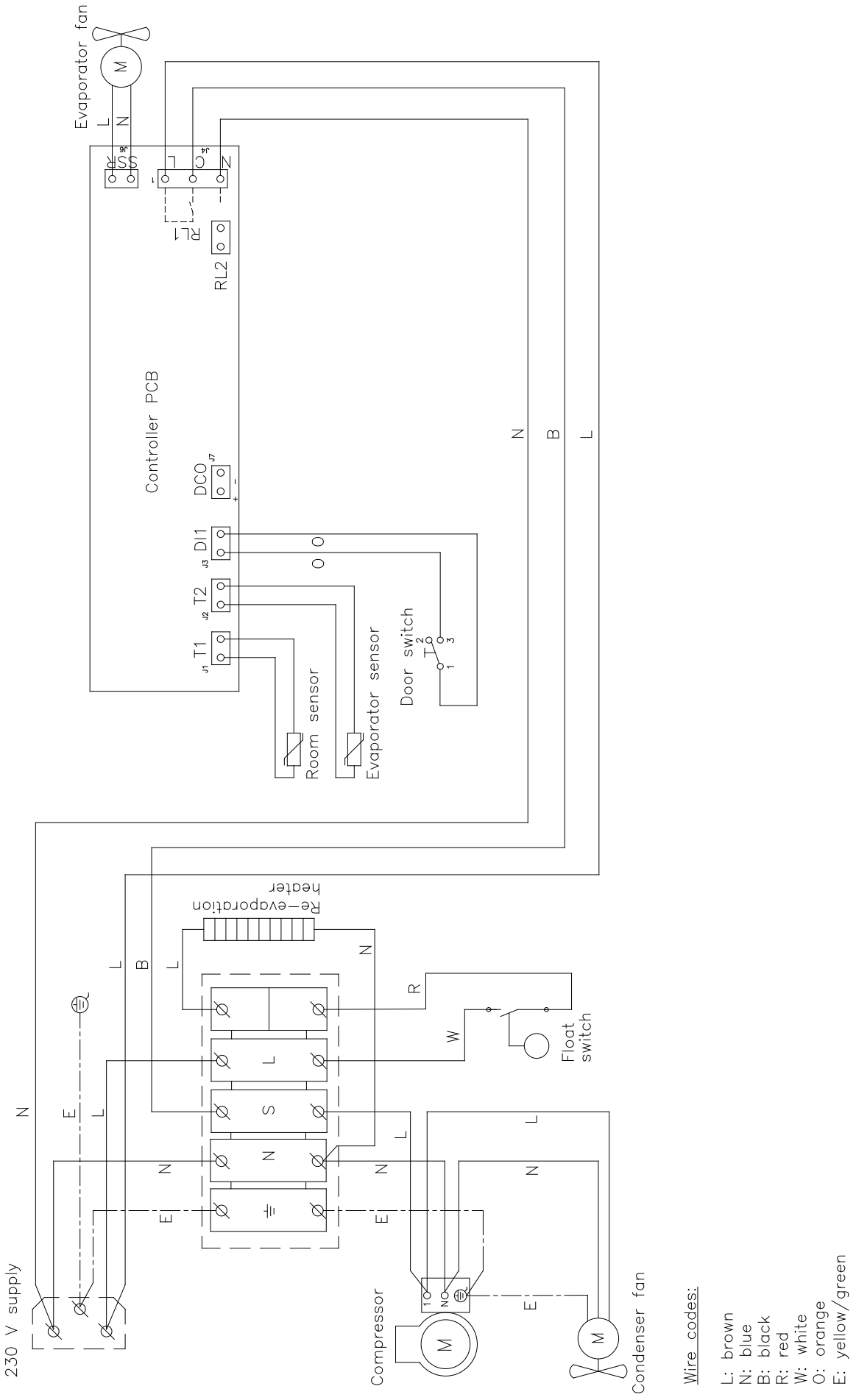
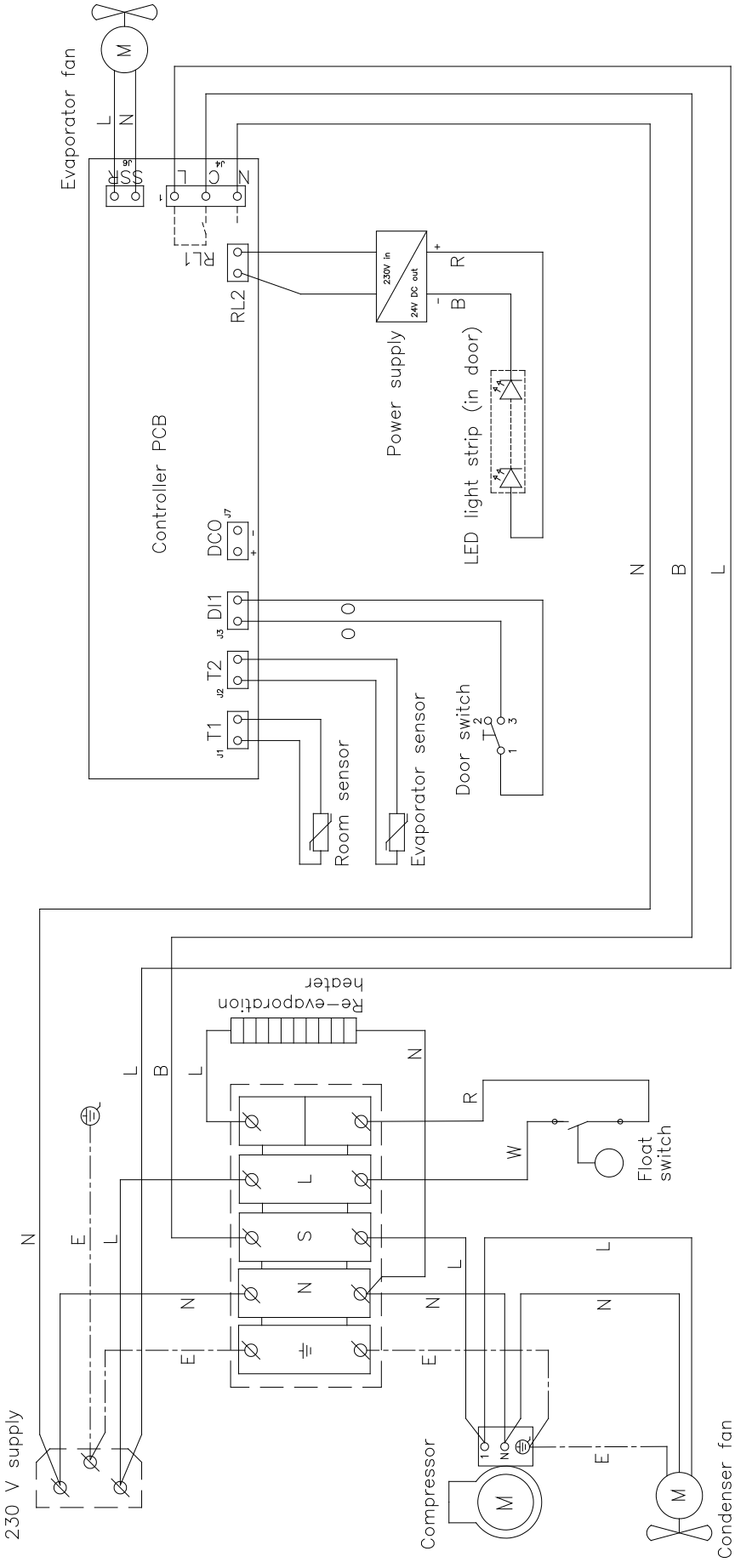
Responsible Technical File	Company:	Gram Scientific ApS. (CVR No. 43122193)
	Name:	R&D Manager John Lund
Signature	Vojens	05/12-2023

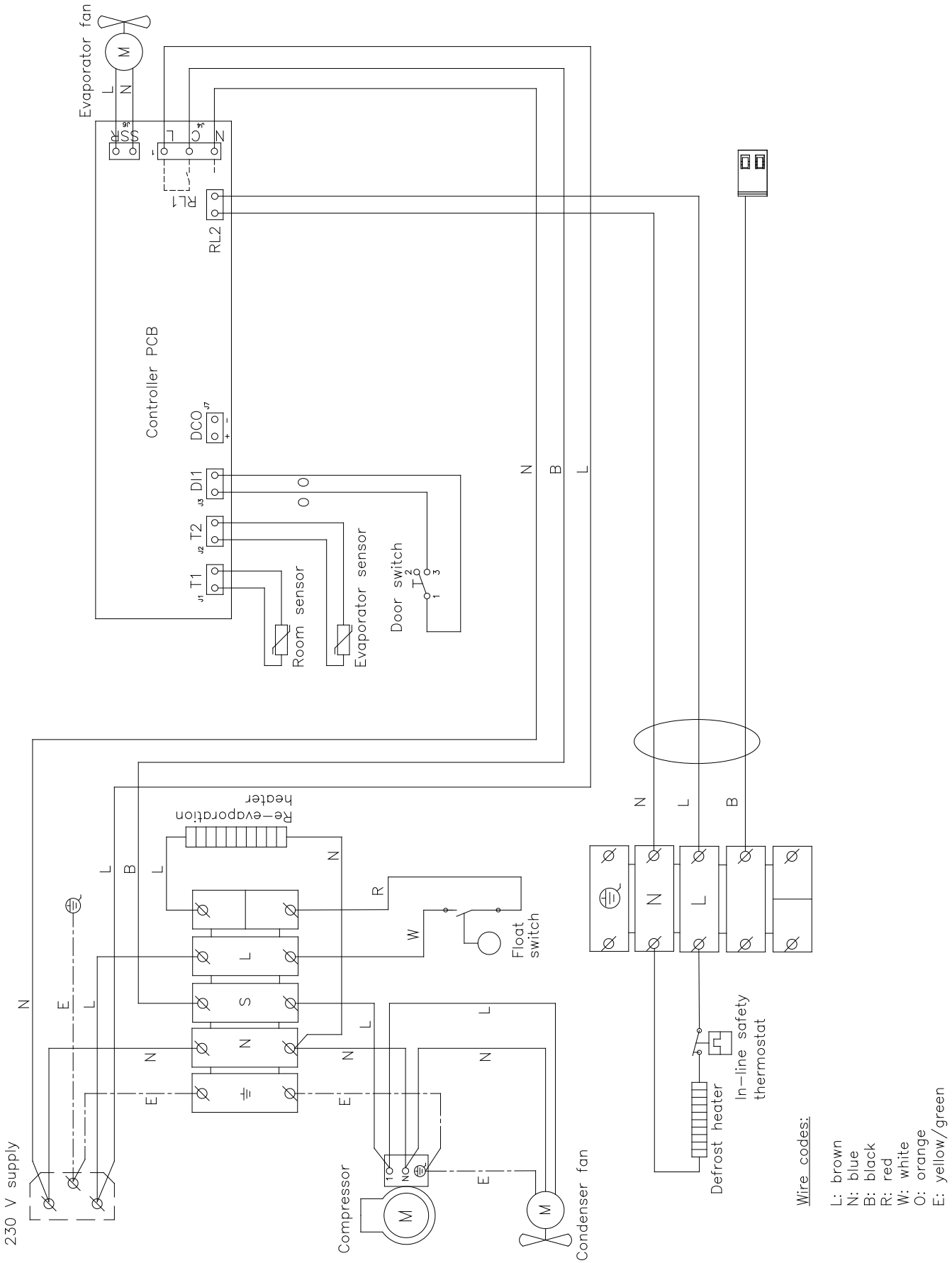
Wiring diagram – R 600



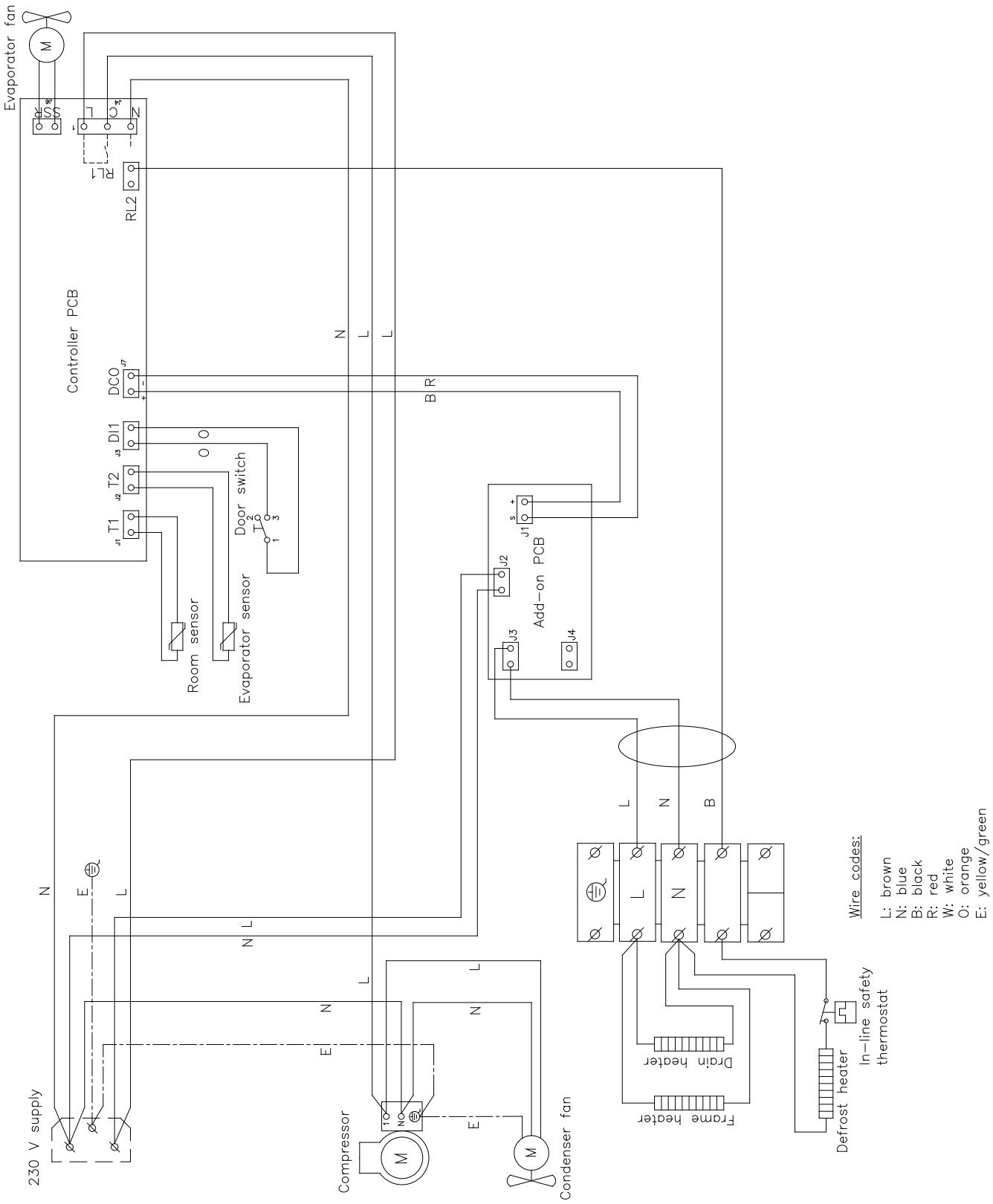
Wiring diagram – GR 600



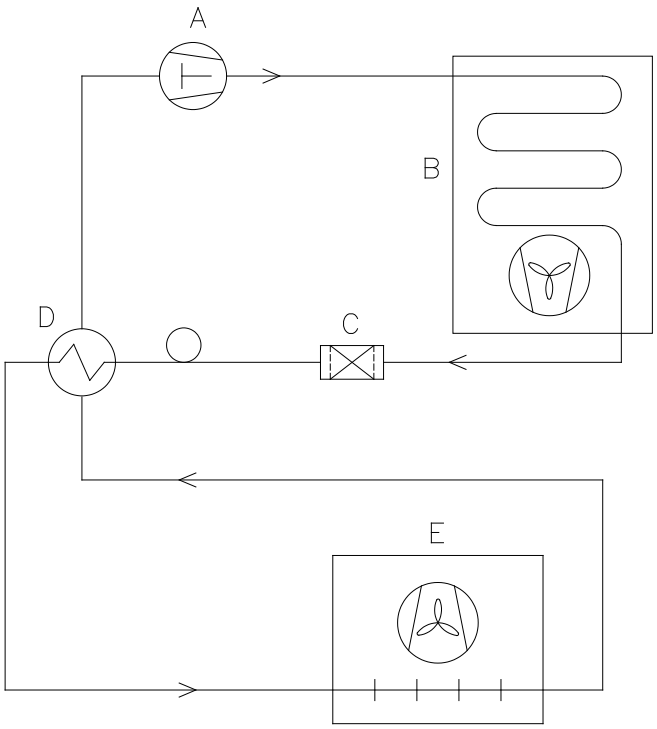
Wiring diagram – C 600



Wiring diagram – F 600



Piping diagram



	DK	GB	D
A	Kompressor	Compressor	Kompressor
B	Kondensator	Condenser	Verflüssiger
C	Tørrefilter	Filter drier	Trockenfilter
D	Varmeudveksler	Heat exchanger	Wärmeaustauscher
E	Fordamper	Evaporator	Verdampfer