

B-797 SN HC A

Refrigerator
Service Manual

1 Safety precautions

- Never use the parts on the refrigerator such as kick plate or door as a means of support or step.
- Do not damage the parts of the refrigerator where the refrigerant is circulating, with drilling or cutting tools. The refrigerant gas that might blow out when the gas channels of the evaporator, pipe extensions or surface coatings are punctured may cause skin irritations and eye injuries.
- In case of any failure or during a maintenance or repair work, disconnect your refrigerator's mains supply by either turning off the relevant fuse or unplugging your appliance.
- Be careful not to pull by the cable when pulling the plug out.
- DO NOT connect your refrigerator to the mains supply before removing all packaging materials and transport protectors.
- Keep the refrigerator in vertical position for 4 hours prior to running to ensure distribution of the compressor oil well against the possibility of being transported in horizontal position.
- Ensure that the plug is easily accessible. Do not use multiple outlets or extension cables.
- Do not allow blocking of ventilation openings on the product's casing or built-in structure.
- Prior to plugging the product into a socket, ensure that the voltage and frequency values mentioned on the product label in your appliance comply with the values of the mains supply at your house. This label is on the left side of the inner wall of the refrigerator.
- We recommend you to connect this product to an outlet which is appropriately switched and fused. The appliance should be so placed that its plug can be easily accessible.
- Caution! Your product must always be connected to a grounded socket.
- The mono-block plug at the end of your product's power cable must be cut and replaced by an appropriate plug if it is not compatible with the socket.
- Since the cutout plug with unshielded cable may cause risk of electric shock when it is connected to a socket in the house, destroy it immediately.

Important! Attaching a different plug

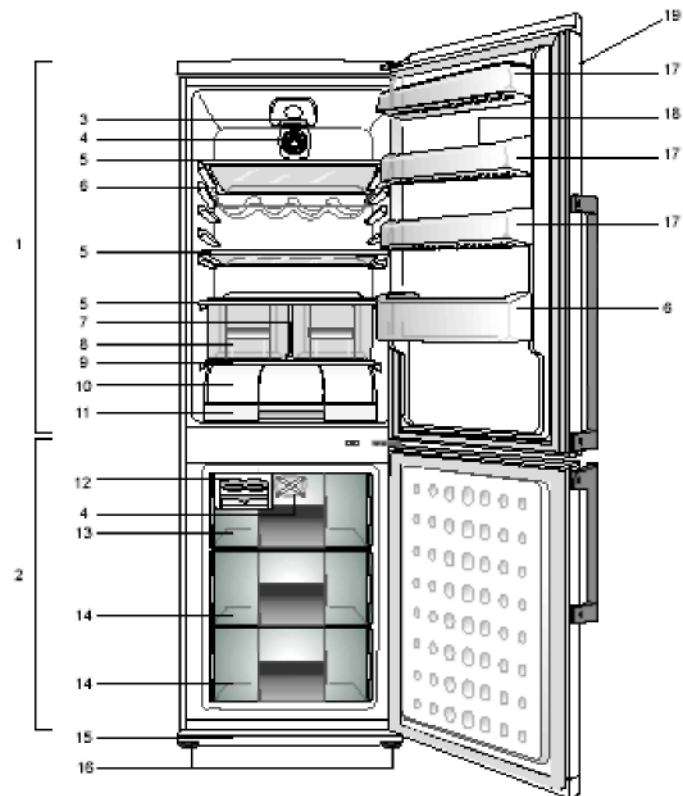
As the colors of the wires in the power cable of your appliance may not match with the color codes defining the terminals on your plug, please follow the steps given below.

1. Connect the green-yellow or solid yellow colored (Ground) wire to the terminal marked with 'E' or  symbol, or to the green or green-yellow terminal on the plug.
2. Connect the blue (neutral) colored wire to the terminal marked with 'N' or black colored terminal on the plug.
3. Connect the brown (Live) colored wire to the terminal marked with 'L' or red colored terminal on the plug. For alternative plugs, 13A fuse should be attached either to the plug or the adaptor in the mains fuse box.

2 Technical Specifications

Energy Class	A
Annual Energy Consumption [kWh/365 days]	440
Fridge Compartment Net Volume [Liters]	305
Freezer Compartment Net Volume [Liters]	86
Total Net Volume [Liters]	391
Star Class	4
Climate Class	T
Freezer Compartment Cooling System	No Frost
Temperature Rise Time [Hours]	17
Freezing Capacity [kg/24 hours]	6
Noise Level [dB A]	41
Height [cm]	191
Depth [cm]	62,5
Width [cm]	70
Weight [kg]	85
Power Supply	220-240 V / 50 Hz
Total Power [W]	130

3 Refrigerator Parts



- | | | | |
|-----|---------------------------|-----|---------------------------------|
| 1- | Fridge compartment | 11- | Chiller compartment |
| 2- | Freezer compartment | 12- | Icematic |
| 3- | Illumination lamp | 13- | Fast freeze compartment |
| 4- | Fan | 14- | Deep-freeze compartment |
| 5- | Adjustable body shelves | 15- | Lower ventilation cover |
| 6- | Bottle shelf | 16- | Adjustable legs |
| 7- | Defrost water drain hole | 17- | Fridge compartment door shelves |
| 8- | Crisper | 18- | Egg holders |
| 9- | Crisper cover | 19- | Temperature setting panel |
| 10- | Chiller compartment cover | | |

4 Transportation and Installation

4.1 Instructions for Transportation

1. This appliance should only be carried in vertical position. Packaging at the time of delivery should not be damaged during transportation.
2. If the appliance is to be carried in horizontal position, it should only be tilted towards its right side as seen from front. After bringing it to vertical position, it should be allowed to remain at least for 4 hours without running to achieve a healthy operation.
3. Failure to observe the above instructions may cause damage on the appliance. Manufacturer shall not be held responsible in case of any failure to obey these instructions.
4. The appliance should be protected against rain, humidity and other atmospheric impacts.
5. Take care not to damage your floor, piping, wall covers, etc. when placing your appliance. The appliance should never be carried away by pulling from the door or the door handle.
6. Empty any water, if any, in the defrost water drain container located on the compressor before carrying the appliance.
7. Do not sit or climb on the appliance as the appliance is not intended for such purposes.

IMPORTANT: To avoid cutting or damaging the power cable, take care not to squeeze the cable under the appliance during and after transportation of the appliance.

4.2 Instructions for Installation

1. The volume of the room where the appliance is going to be installed should not be less than 10 cubic meters.
2. Do not place the appliance in a cold room where the temperature might fall below 0°C at nights and/or especially in the winter season.

The fridge compartment of the appliance is intended to operate in ambient temperatures between 0°C and +43°C. For this reason, it is not recommended to install it in a cold place without any heating.

3. Do not install the appliance near ovens or radiators, or under direct sunlight, because they will create an adverse affect on the operation of the appliance. In case of placing the appliance near a heat source or freezer, ensure the following minimum distances.

50 mm (2") from the ovens

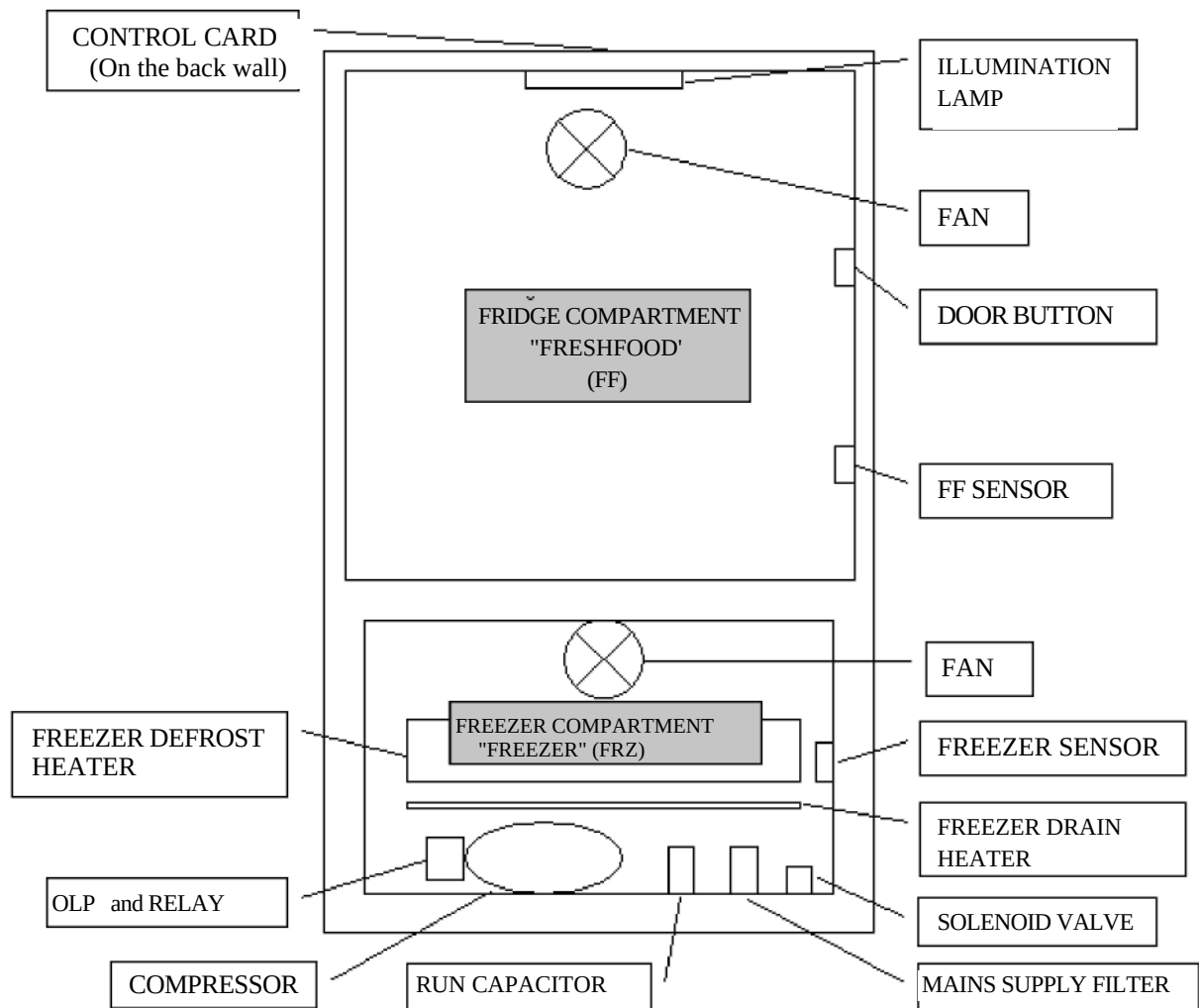
300 mm (12") from the radiators

25 mm (1") from the freezers

50 mm (2") from the wall

5. Description of the Electrical System Items

5.1 Electric Circuit Diagram



5.2. List of Components

No	Component	Piece
1	Compressor	1
2	Freezer Compartment Defrost Heater	1
3	Freezer Compartment Fan	1
4	Fridge Compartment Fan	1
5	Sensors	4
6	Thermal Fuse	1
7	PTC Relay	1
8	Overload Protector (OLP)	1
9	Door Buttons	1
10	Bulb	1
11	Mains Supply Filter	1
12	Capacitor	1
13	Electronic Control Card	1
14	Display Card	1
15	Freezer Compartment Water Drain Heater	1
16	Fridge Compartment Water Drain Heater	1
17	Solenoid Valve	1

5.3. Description of the System Items

5.3.1. Compressor

Coolant gas circulation is obtained by means of the compressor. Power supply is made over the protective thermic. The auxiliary coil which is activated for a very short time at the initial startup is deactivated by means of the PTC.

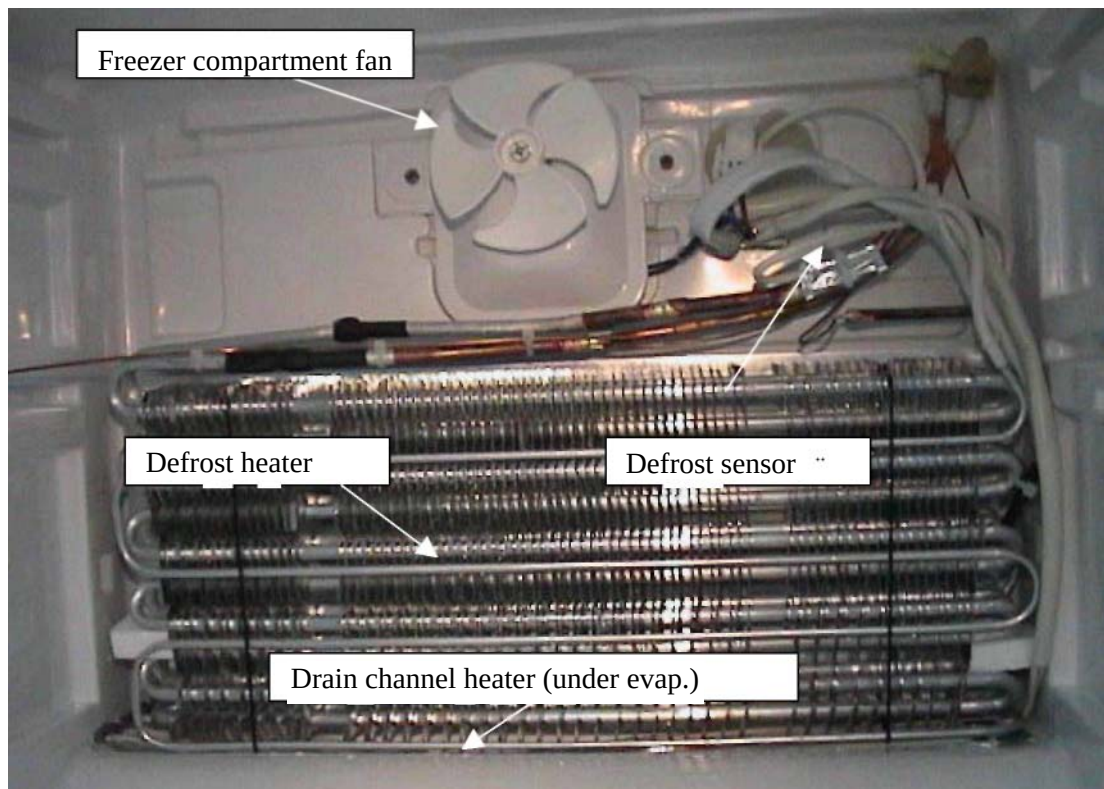
Manufacturer Firm	ACC
Production Code	HTK 95 AA
Power	101 W
Operating Voltage	220-240 V
Operating Current	0,46 A
Locked Rotor Current	8,9 A
Direction of return pipe (front view)	Right
Direction of outlet pipe (front view)	Right
Direction of service pipe (front view)	Left



5.3.2. Freezer Compartment Fan Motor

It is behind the front cover of the evaporator and mounted on the inner body of the refrigerator. It passes the air in the freezer compartment continuously over the freezer evaporator and directs it into the freezer compartment. It provides cold air circulation in the freezer compartment.

Manufacturer Firm	Sung Shin
Production Code	IS-27210ARCN-4
Voltage range	220V 50Hz
Power	4.4W
Rotating direction	Clockwise



5.3.3. Fridge Compartment Fan Motor

It is mounted on the rear wall of the fridge compartment. It draws the air inside the fridge compartment from above the uppermost shelf and directs it toward (the evaporator mounted on) the rear wall. It provides continuous air circulation in the compartment.

Manufacturer Firm	Sung Shin
Production Code	IS-2208 ARCB
Voltage range	220V 50Hz
Power	Max. 5 W
Rotating direction	Counter clockwise



5.3.4. Sensors

It has a characteristic that its resistance lowers as the temperature rises. Task of the sensors on the refrigerator is to detect the temperature in the zone they are located and send this information to the electronic control card.

5.3.4.1. Freezer Compartment Sensor

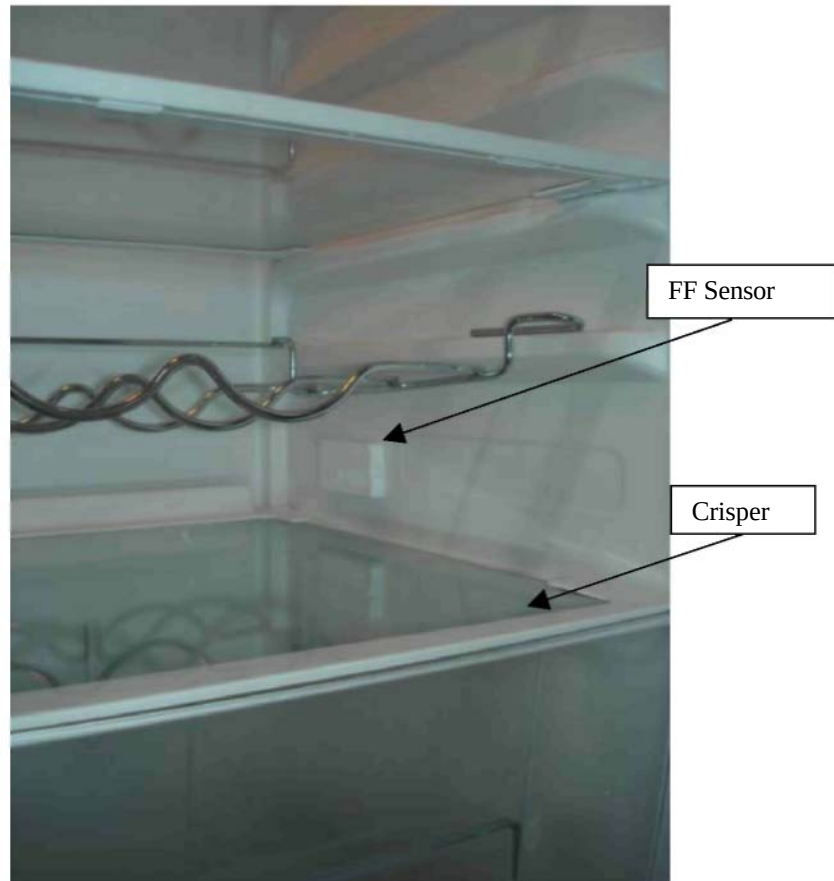
Detects the temperature in the Freezer Compartment and sends this data to the microprocessor. Values detected by this sensor are matched with the cut-in and cut-out values of the temperature set for the freezer compartment to run or to stop the compressor and the fan motor of the freezer compartment.

It is under the sensor cover and does not contain any sockets. It is on the second shelf in the freezer compartment, on the right wall.



5.3.4.2. Fridge Compartment Air Sensor

Detects the temperature in the Fridge Compartment and sends this data to the microprocessor. It provides display of the temperature value in the fridge compartment on the indicator. It has no socket. It is on the shelf above the crisper, on the right wall.



5.3.4.3. Freezer Compartment Defrost Sensor

Defrost sensor is mounted on the freezer evaporator at the back of the evaporator front cover, on the copper return pipe. It provides adjustment of defrost time. When the temperature it measures reaches the expected value, defrost process is terminated.

5.3.4.4. Fridge Compartment Evaporator Sensor

It is on the FF evaporator adhered to the back of the fridge compartment rear wall. To maintain the fridge compartment temperature at the values set, it runs the compressor and the fan at certain values. Cooling control of the fridge compartment is made by means of the sensor on the evaporator.

5.3.5. Freezer Compartment Defrost Heater

It is attached on the freezer evaporator by means of metal springs. It is activated by the electronic card during defrosting and the snow and ice that built up on the evaporator are melted during defrosting.

Power	119 W @ 220V (+/- 10%) (130W @ 230V)
Operating voltage	220 V
Resistance	407 Ohm (+/- 10%)

5.3.6. Freezer Compartment Drain Channel Heater

It is under the freezer evaporator and in the water collection and drain channel. It serves to completely melt and send from the drain channel the semi-molten snow and ice particles drained from the evaporator during and after defrosting. It is activated throughout defrost time. It is deactivated after the defrosting is over.

Power	27.45 W @ 220 V (+/- 10%) (30W @ 230V)
Operating voltage	220 V
Resistance	1763 Ohm (+/- 10%)

5.3.7. Thermal Fuse

It is located on the evaporator. In case of any electrical failure, it cuts off the power supplied to the defrost heater to deactivate the heater in order to prevent any damage the defrost heater might cause by being activated continuously on the refrigerator, environment and/or the foods inside. The thermal fuse has a socket and it is disposable. It should be changed after eliminating the failure on the refrigerator.

Manufacturer code	TV – 433 C
Operating voltage or blow up temperature	220 V / 72 °C

5.3.8. PTC Relay

It has a characteristic that its resistance increases as the temperature rises. It enables the initial startup of the compressor by activating the auxiliary coil of the compressor. Then, it deactivates the auxiliary coil by warming up with the current passing over.

Manufacturer Firm	Sensata
Manufacturer code	8 EA 19 C3
Alternate manufacturer firm	Jahwa
Alternate manufacturer code	150 MD 3

5.3.9. Overload Protector (OLP)

It cuts off the current supplied to the compressor to protect compressor coils against excessive heating when they reach a certain temperature. When the compressor temperature falls below a certain value, it reactivates the circuit to run the compressor.

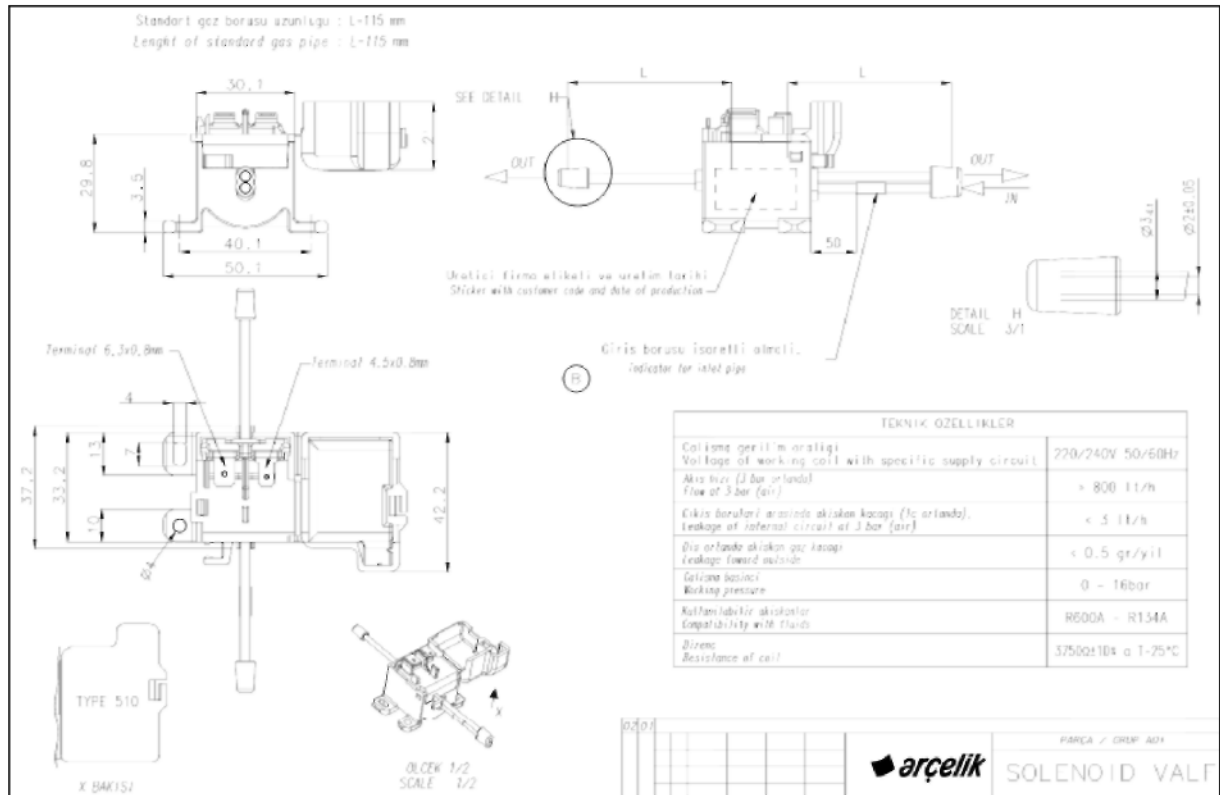
Manufacturer Firm	Texas
Manufacturer code	4TM189NFBYY

5.3.10. Solenoid Valve

It is located at the condenser outlet. It directs the refrigerant gas to the fridge compartment or to the freezer compartment. It controls the gas flow into the fridge compartment or freezer compartment according to the cooling requirement.

Solenoid valve gives a “crack” sound every time it runs. This is a normal condition.

Connection ways and technical specifications of the valve are stated in the picture below.



5.3.11. Door Buttons

Fridge compartment door button is located on the side wall of the fridge compartment. When the fridge compartment door is opened, fridge compartment fan stops and its illumination starts working. The door button of the fridge compartment has no relation with the freezer compartment fan and the compressor. If the compressor and the freezer compartment fan are running when the fridge compartment door is opened, it keeps on running.

There is not any other button on the fridge compartment door. When the fridge compartment door is opened, if the compressor and the freezer compartment fan are running, it keeps on running.

If the fridge compartment door is left open for more than 60 seconds, “door ajar warning alarm” goes off. It audibly warns the user.



5.3.12. Illumination Lamp and Bulb Holder

1 piece of E14 type 15 W (220 VAC) bulb is used to illuminate the fridge compartment. It works only when the fridge compartment door is opened.

Used to fix the E14 type 15W (230 VAC) bulb.

5.3.13. Display Card

Characteristics of the display card and the components on the card are explained below:

- Four pieces of buttons: FRZ set/, FF set/vacation, QuickFreeze and QuickFridge
- Communication via control card: Serial communication via 6 cables.
- Two-digit and “-” marked 7-segment display: FRZ set/display of actual value
- Single-digit and “-” marked 7-segment display: FF set/display of actual temperature value (Minimum 0)
- Freezer compartment bar graphs: To show the freezer compartment set value.
- Fridge compartment bar graphs: To show the fridge compartment set value.
- Alarm warning light (!): It warns the user for any failure that might occur in the system components or for “high temperature warning”.
- QuickFreeze warning icon: If QuickFreeze function is selected, it warns the user.
- QuickFridge warning icon: If QuickFridge function is selected, it warns the user.
- Vacation warning icon: It warns the user when the cooling at the fridge compartment is cancelled.
- Economy (e) icon: It warns the user when the economic usage conditions are ensured.



Display stock no: 4334050185 (OEM), 4325950185 (Blomberg) 4325960185(diffusion)



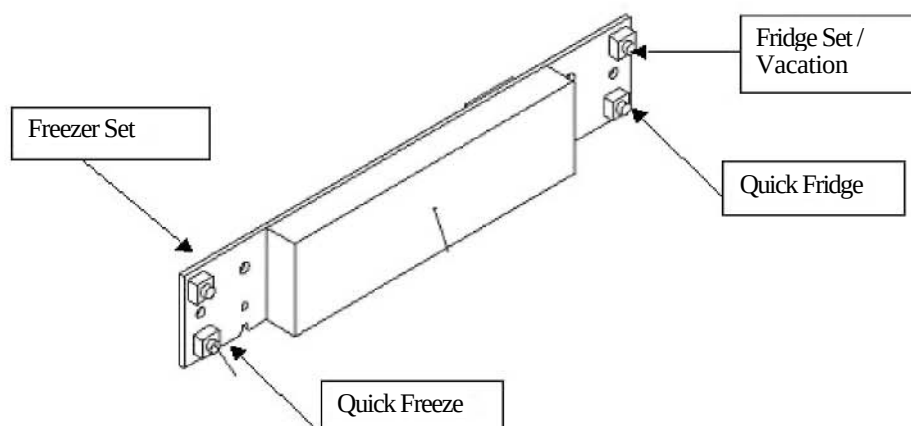
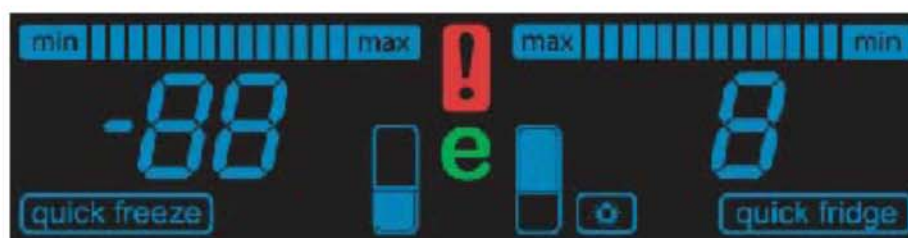
Temperature set values:

-18 -20 -22 -24 1 2 3 4 5 6 7 8



Freezer compartment (FRZ)
7-segmented display (indicator
for actual temperature)

Fridge compartment (FF)
7-segmented display (indicator
for actual temperature)



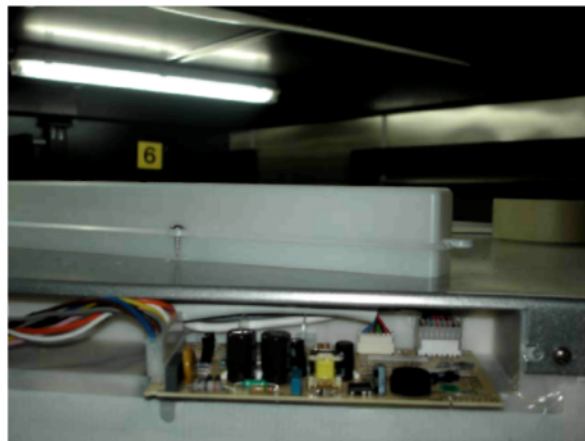
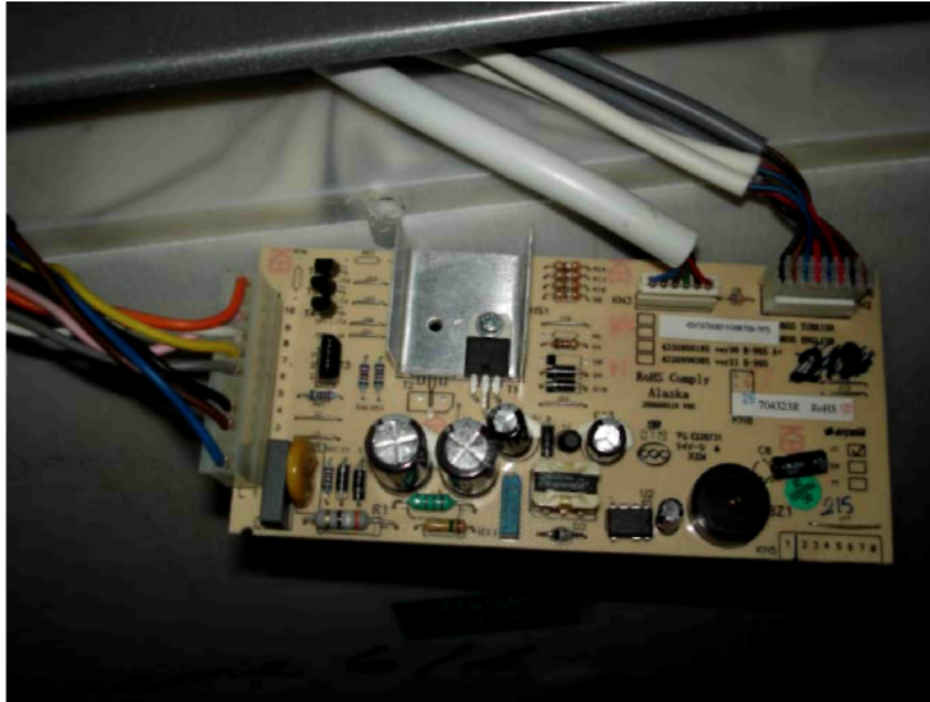
5.3.14. Electronic Control Card

Characteristics of the card and the components on the card are explained below:

- Card dimensions: 68 x 163 x 25 mm, (ALASKA)
- BUZZER is for door ajar warning.
- Display connector: It is for providing connection with the display card.
- Sensor connector: It is for providing connection with the sensors (FF, FF eva, FRZ, FRZ eva).
- Power connector: It is for connection of control items (compressor, FF door, valve, phase and neutral, FRZ Fan, FF Fan, heater).
- Driver circuit items: Triacs that control the cooling system components (compressor, valve, FF Fan, FRZ Fan, heater).
- Serial communication connector (prepared for edge-type connector on PCB edge): Transmits the variables during operation of the refrigerator to the computer to allow follow-up of the refrigerator.
- Card location: Upper rear

Stock no: 4347670185

KN1 - 1	PHASE	KN2 – 1	FF SENSOR	KN3 - 1	GND
KN1 - 2	NEUTRAL	KN2 – 2	FF SENSOR	KN3 - 2	-5 V
KN1 - 3	COMPRESSOR	KN2 – 3	FRZ SENSOR	KN3 - 3	BUTTON
KN1 - 4	EMPTY	KN2 – 4	FRZ SENSOR	KN3 - 4	ENABLE
KN1 - 5	DOOR	KN2 – 5	FRZ EVA SENSOR	KN3 - 5	SDA
KN1 - 6	HEATER	KN2 – 6	FRZ EVA SENSOR	KN3 - 6	SCL
KN1 - 7	FREEZER COMPARTMENT FAN	KN2 – 7	FF EVA SENSOR		
KN1 - 8	FRIDGE COMPARTMENT FAN	KN2 – 8	FF EVA SENSOR		
KN1 - 9	EMPTY				
KN1 - 10	SOLENOID VALVE				

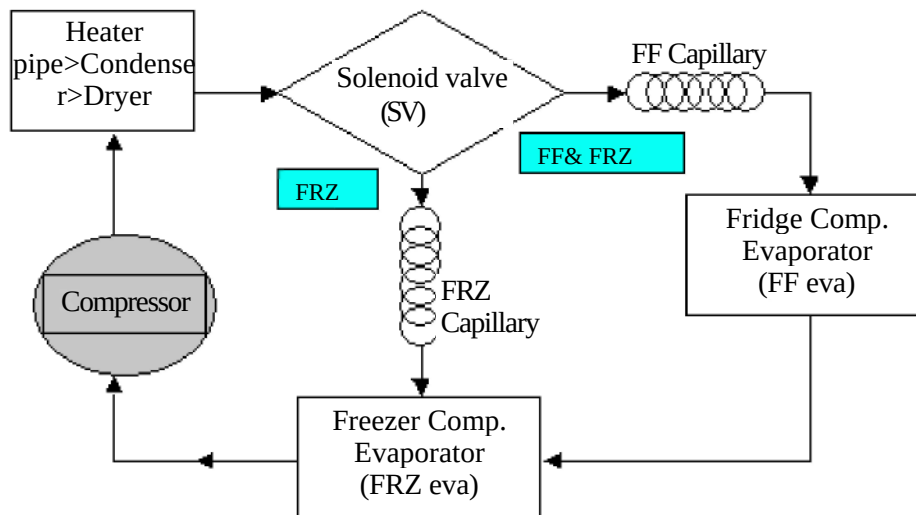


6. Operation Principals

6.1. Cooling Cycle

Cooling of both compartments is carried out by means of a single compressor, two-way valve and 2 pieces of fans. The compressor, fridge compartment fan, freezer compartment fan, solenoid valve and freezer compartment defrost heater are operated or stopped according to the temperatures detected by the sensors placed in the refrigerator.

Solenoid valve changes direction according to the value read by the sensors placed in the refrigerator. Freezer compartment (FRZ) or fridge and freezer compartment (FF & FRZ) cooling is made according to the position of the solenoid valve.



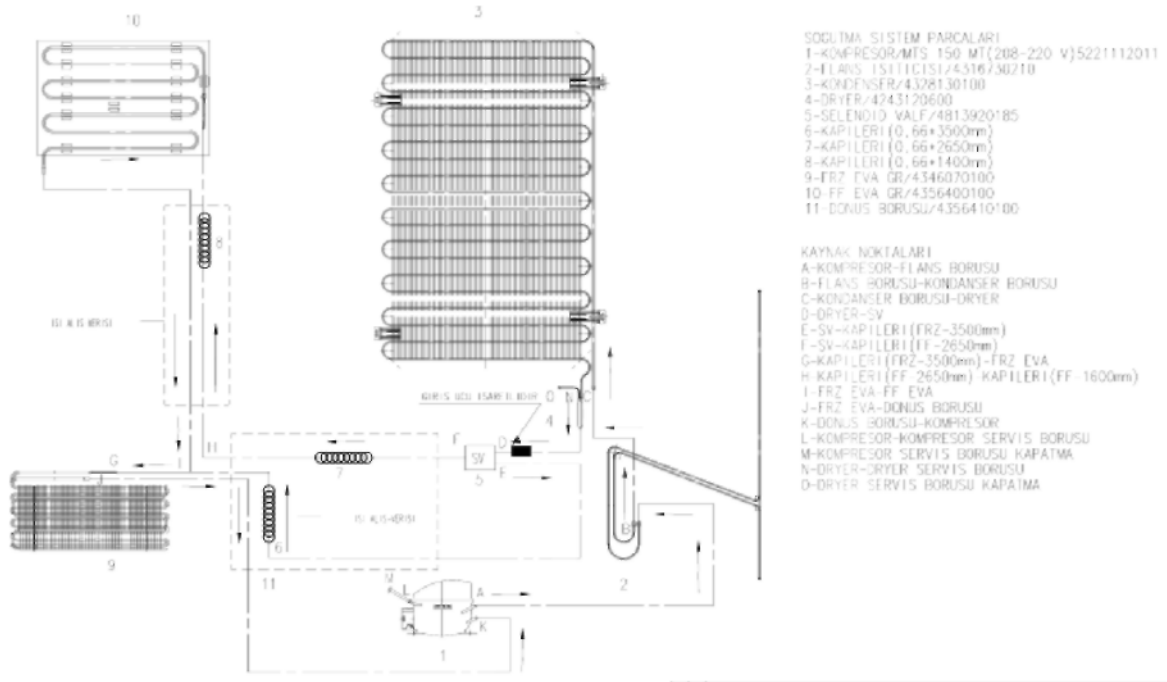
Compressor and the fridge compartment fan cool the fridge compartment by switching ON/OFF according to the fridge compartment sensor values. Compressor and the freezer compartment fan cool the freezer compartment by switching ON/OFF according to the freezer compartment sensor values. Solenoid valve directs the gas toward the freezer compartment if there is no need for cooling.

During cooling process of the fridge compartment, freezer compartment fan may also be activated together with the fridge compartment fan.

When the cooling of fridge compartment is completed, if the freezer compartment air temperature is higher than the cut-out value of the set value, freezer compartment fan shall keep on running until the cut-out value is attained.

If the fridge compartment is warmer than the thermal cut-in value, cooling of fridge compartment is carried out. If the fridge compartment is colder than the thermal cut-out value, cooling of fridge compartment is terminated.

Gas flow diagram and welding points are shown in the technical drawing on the following page.



6.2. Hot Startup / Power Failure

It is the state that the product is energized for the first time. Initial operation state is applicable after a power cutoff or plug-out and plug-in again. In such a case, all cooling components that are controlled by the control card (by triacs) according to the following algorithm called the production test, shall be operated and stopped individually.

6.2.1. Production Test

When the refrigerator arrives at the test point on the production line, current-power control is carried out to check if all the components are operating properly and the components are activated and deactivated consecutively. In case of any failure, the test apparatus warns the worker. If there is no problem, next refrigerator is tested.

6.2.2. Test Protocol:

Steps in the test procedure according to a timing sequence after the refrigerator is supplied power are as follows:

- 2 sec. all components are OFF.
- 3 sec. FF Fan ON, SV is switched to FF_FRZ position
- 2 sec. all components are OFF.
- 3 sec. Heater is ON
- 2 sec. all components are OFF.
- 3 sec. FRZ Fan is switched to ON and stopped and SV comes to FRZ
- 2 position. sec. all components are OFF.
- 6 sec. (minimum) compressor is ON.

Warm initial operation conditions available for FF compartment, compressor starts.

If warm initial operation conditions do not exist, compressor will remain in OFF position for the specified time (pause time). If there is a condition arising from cooling algorithm that necessitates operation of the compressor (e.g. Freezer compartment may have reached cut-in), compressor will not stop and keep on operating. If there is not a condition that necessitates operation of the compressor, it stops right after the production test and waits for the time it will start according to the algorithm.

If there is warm initial startup, the compressor keeps on running. So do other components keep on operating according to the algorithm.

6.2.3. Warm Initial Startup

If a long-term power cutoff took place (i.e. if the freezer compartment air sensor temperature is above a certain value), the compressor will be activated after a short time. The refrigerator shall work at $-18/+4$ set value during warm operation. All functions are forgotten.

When a warm initial startup is decided;

FF set = 4

FRZ set = -18

All functions are cancelled (Vacation, QuickFreeze, QuickFridge and Counters (Timer) are reset;

Any E4 error is forgotten, if any.)

If there is warm initial startup immediately after the production test, the compressor does not stop and keeps on running.

6.2.4. Power Failure

After a power failure, the compressor and the fans shall not be operated for a certain time to allow balancing of the interior pressures. Cooling shall carry on according to the values set before the power failure. FF and FRZ set values are recollected.

Minimum compressor stoppage time	6 minutes
Minimum FRZ and FRZ Defrost sensor values for initial startup	+10 °C
Min. time difference between the compressor and the fan if they work concurrently	20 seconds
Minimum compressor waiting period for warm initial startup	6 minutes
Maximum FF air sensor value (Thermal cut-in)	+28.6°C
Minimum FF air sensor value (Thermal cut-out) (To end cooling at FF compartment) (°C)	+1 °C
SV standby time to prevent SV instability	3 minutes
FRZ fan standby time after the compressor started	8 minutes or if FRZ defrost sensor is cooler than -15°C...
FRZ fan standby time after the compressor started after power failure	6 minutes

In case of power failure, the freezer compartment's first temperature read after the power failure and the actual freezer compartment temperature read at that moment are displayed on freezer compartment 7-segment alternately to inform the user about such power failure occurrence. This warning shall remain until any key is pressed. When the warning is finished, freezer compartment's actual temperature is displayed.

In case of warm startup (i.e. if the freezer compartment is above -9 degrees), the freezer compartment's first temperature read after the power failure and the actual freezer compartment temperature read at that moment are displayed on freezer compartment 7-segment alternately and "!" symbol flashes to inform the user about occurrence of such long-term power failure. This warning shall remain until any key is pressed.

If a high-temperature alarm condition occurs at this time (i.e. if the freezer compartment is warmer than -9°C for 30 minutes), temperature display on the freezer compartment's 7-segmented display shall disappear when any button is pressed; however, "!" symbol remains. "!" symbol disappears as soon as the high- temperature alarm is deactivated.

6.3. Fridge Compartment (FF) Temperature Adjustment

FF (fridge compartment) temperature adjustment is made by means of the “Fridge Set” button on it. The set value is shown on the bar on the indicator and the 7-segmented display in the fridge compartment.

Set values change in increments from min. to max. every time the button is pressed. If the button is pressed for one more time when it is on the maximum set value, the set value turns back to the minimum value (8,7,6,5,4,3,2,1,8,7,6,5,...). The new fridge compartment set value shall be displayed in the indicator every time the button is pressed. The set value flashes on the indicator for 5 seconds. If the set button is pressed for one more time within this time, the new set value appears. Then the indicator switches to displaying the actual value.

If the Fridge Set button is pressed during actual temperature display, present set value flashes in the fridge compartment’s display.

6.3.1. Operating after a Power Failure

After a power failure, fridge compartment’s set value is recollected.

6.3.2. Operation in Vacation Mode

- **OFF Position of the Fridge Compartment:**

If the Fridge Set button is pressed for 2 seconds, cooling control of the fridge compartment is stopped together with a long buzzer sound. If QuickFridge is selected, it is cancelled. Only “Vacation” icon lights on the indicator and all other figures and icons related to the fridge compartment go off. This function continues until QuickFridge or “Fridge Set” button is pressed again. After the vacation mode is left, previous set value is recollected.

To prevent unpleasant odors, fridge compartment temperature is maintained at +15°C.

If the freezer compartment needs to be cooled, freezer compartment fan is operated. Solenoid valve sends the gas to the freezer compartment. When the fridge compartment needs cooling, solenoid valve switches to fridge and freezer compartment position (FF&FRZ) and the fridge compartment fan runs together with the compressor.

Precooling is not made during defrosting in vacation mode.

If vacation function is selected during defrosting, vacation icon lights, however, defrost has to finish in order to have the function started.

- **Operating after a Power Failure**

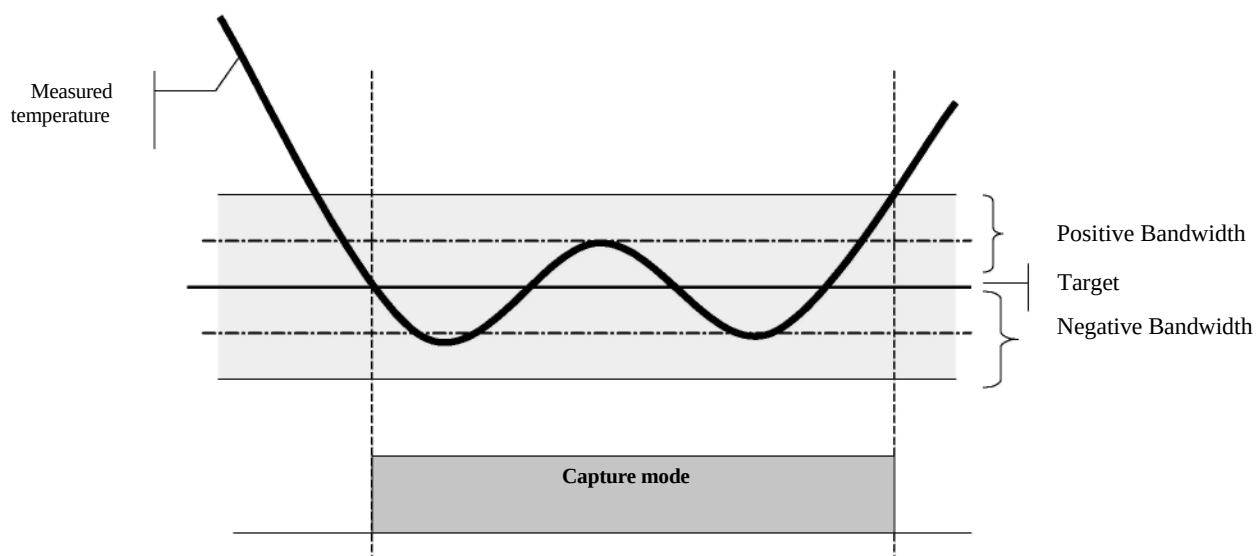
After a power failure, vacation mode is recollected.

6.3.3. List of Parameters

FF Set Value	Indicator target value	Lit bars
8°C	8°C	Min + 2 bars
7°C	7°C	Min + 4 bars
6°C	6°C	Min + 6 bars
5°C	5°C	Min + 8 bars
4°C	4°C	Min + 10 bars
3°C	3	Min + 12 bars
2°C	2	Min + 14 bars
1°C	1	Min + all bars + Max
Vacation	-	FF bars do not light
FF Set Value flashes!	5 sec.	
To start the vacation mode	“FF Set” button is pressed for 2 sec.	

6.3.4. Displaying Actual Temperatures of the Fridge Compartment (FF)

Actual temperature of the Fridge compartment (FF) is shown by 1 piece of 7-segmented display. If the temperature read by the fridge compartment sensor (FF Sensor) is towards the target, this is shown by “short update time (SUT)”. If it goes further away from the target value, it is shown by “long update time (LUT)”. After the read temperature reached the target value, the indicator remains constant within a certain limit. When limit is exceeded, the value on the indicator is replaced by the long update time range. Actual value increase/decrease occurs in 1°C increments/decrements.



- **List of Parameters**

Target value	Set value
Short update time FF	1 minute
Long update time FF	10 minutes
Minimum indicator value	0
Maximum indicator value	9

- **Operating after a Power Failure**

The current value read by the FF sensor is shown.

6.3.5. Fridge Compartment Compulsory Defrost

If the FF Fan runs continuously along a certain time period, FF cooling is paused for the time specified. It is forgotten with the power failure. FF fan shall not work during compulsory FF defrost.

FF Fan maximum continuous operation time	180 minutes
FF compulsory defrost time	40 minutes

6.4. Freezer Compartment (FRZ) Temperature Adjustment

FRZ (freezer compartment) temperature adjustment is made by means of the Freezer Set button (SW1) on the indicator. The set value is shown on the bars on the indicator and the 7-segmented display in the freezer compartment.

Set values change in increments from min. to max. every time the button is pressed. If the button is one more time pressed when it is on the maximum set value, the set value turns back to the minimum value. The new freezer compartment set value shall be displayed in the indicator every time the button is pressed. The set value flashes on the indicator for 5 seconds. If the set button is pressed for one more time within this time, the new set value appears. Then the indicator switches to displaying the actual value.

If the value read by the freezer compartment sensor exceeds certain limits, the freezer compartment compressor operates or stops.

FRZ compartment cannot be switched to OFF.

6.4.1. List of Parameters

FRZ Set Value (°C)	FRZ Cut-in Value (°C)	FRZ Cut-out Value (°C)	Indicator Target Value	Lit Bars
-18	-19,3	-20,6	-18	Min + 6 bars
-20	-21,3	-22,6	-20	Min + 10 bars
-22	-23,1	-24,6	-22	Min + 12 bars
-24	-25,3	-26,9	-24	Min + All Bars + Max

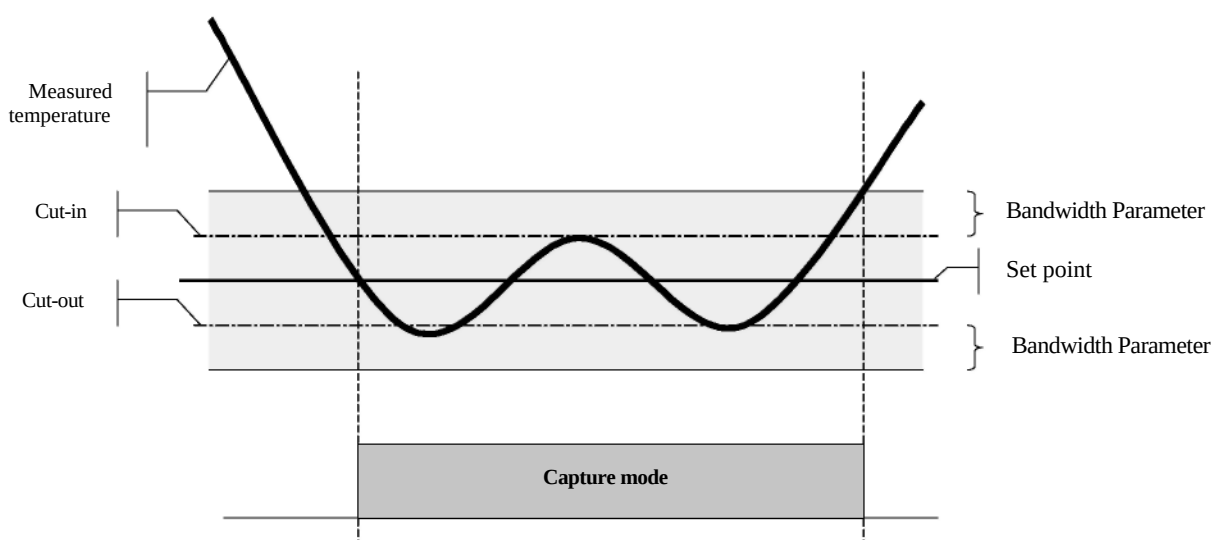
6.4.2. Operating after a Power Failure

After a power failure, the set value for the FRZ is recollected.

6.4.3. Indication of the Actual Temperatures of FRZ

Actual temperature of the Freezer compartment (FF) is shown by 2 pieces of 7-segmented display. If the temperature read by the freezer compartment sensor is going toward the target, this is shown by “short update time (SUT)”. If it goes further away from the target value, it is shown by “long update time (LUT)”. After the read temperature reached the target value, the indicator remains constant within a certain limit. When limit is exceeded, the value on the indicator is replaced by the long update time range. Actual value increase/decrease occurs in 1°C increments/decrements.

When the freezer compartment sensor value is within the broadband, the freezer compartment temperature display goes toward the target in SUT. When the freezer compartment sensor value is outside the broadband, the freezer compartment temperature display is replaced by LUT.



- **List of Parameters**

Target value (°C)	Set value
Short update time FRZ (min)	1
Long update time FRZ (min)	10
Minimum indicator value	-29
Maximum indicator value	29

- **Operating after a Power Failure**

The current value read by the FRZ sensor is shown.

6.5. Solenoid Valve

Solenoid valve has an electromagnetic characteristic with single-inlet and double-outlet. By means of one magnet placed in it, the outlet channels are either opened or closed. The applied voltage thus directs the magnet to decide about the outlet channels.

Solenoid valve has an outlet called SV_FF+FRZ (freezer and fridge compartments' cooling) and another outlet called SV_FRZ (freezer compartment cooling). Positive wave impacts or negative wave impacts should be applied on the pins of the valve for these outlets. The applied voltage is active for 100ms. In order to activate the SV_FF+FRZ or SV_FRZ, application of continuous voltage is not required.

To prevent inertia of the plunger channel in the solenoid valve as a result of oxidation, position is changed two times in 15 minute intervals during plunger cooling. That is, 15 minutes in SV_FRZ position. If any remained, SV_FF+FRZ position is switched and after 3 seconds, it is returned back to the original SV_FRZ position. This state is repeated when the compressor is in ON or OFF position.

Solenoid valve is in SV_FRZ position by default. If the fridge compartment needs to be cooled, solenoid valve is switched to FF_FRZ position. When the cooling requirement of the fridge compartment ceased, it is directed towards the freezer compartment.

6.5.1. Operating after a Power Failure

It is switched back to previous SV_FRZ position.

6.5.2. List of Parameters

To switch to SV FF_FRZ position	Should reach FF cut-in value FRZ
SV default position (if no cooling is needed)	
Time to change SV position	15 minutes
Minimum time to remain in the same position during normal cooling	3 minutes
Time to remain in any position when SV is changing direction	3 seconds

6.6. Freezer Compartment (FRZ) Defrost Algorithm

Defrost; accumulated snows and ices on the freezer compartment evaporator are melted by means of a heater to prevent drop of cooling performance of the refrigerator. Melting process is made at certain intervals. Defrost cannot surpass a certain time limit in order to protect the foods and refrigerator from damage during such defrost.

To prevent the freezer compartment overheat during defrost before the defrost heater is activated, pre-cooling is carried out for 30 minutes or up to a certain temperature value.

Solenoid valve works in (SV = FF-FRZ) mode during pre-cool. Fans of the fridge compartment and the freezer compartment are in ON position throughout pre-cool. If the fridge compartment evaporator reaches cut-out or if the specified time elapses, pre-cool is terminated. In the vacation mode and when there is fridge compartment evaporator error, pre-cool cannot be made during defrost.

The heater is activated after pre-cool and runs until the freezer compartment evaporator sensor reaches 10°C or for a period of maximum 60 minutes.

Wait for a certain time (6 min) to allow the water drops formed on the evaporator fall (water draining). Then the compressor is started. 8 minutes after that, the freezer compartment fan is activated (fan delay). If the fridge compartment needs to be cooled, fridge compartment fan is activated together with the compressor.

If 15 hours elapsed since the previous defrost or if the freezer compartment fan has worked 100% for 30 hours, defrost shall be carried out.

During the defrost and until 90 minutes passed after the end of the defrost, actual temperature displays of the FF and FRZ are not changed.

6.6.1. Operating after a Power Failure

If power failure occurs during a defrost process, the defrost process will be restarted by the control after the power failure with activation of the heater. Freezer compartment fan operating time is recollected.

6.6.2. List of Parameters

Pre-cooling conditions before defrost	Cut-out of FF Set value or for maximum 30 minutes
Delay time for the compressor operation after defrost (water drain)	6 minutes (Cannot be smaller than the Compressor pause time)
Fan delay time after defrost	8 minutes
Frz fan run time for defrost	15 Hours
If QuickFreeze button is pressed during defrost	QuickFreeze led lights, but Quick Freeze is carried out after defrost is finished
Maximum defrost time	60 minutes
Defrost end temperature	10 °C
Displaying of actual values on freezer compartment bar on the indicator after defrost is finished	90 minutes
Maximum 100% run time of freezer compartment fan for compulsory defrost	30 Hours

6.7. Quick Freeze Function

When warm food is put in the freezer compartment and/or quick freezing is required, it is used in order to prevent spoiling of the other foods (excessive rise in compartment temperature) and accelerate freezing. When the QuickFreeze button on the indicator is pressed, a short buzzer sound is heard to confirm the process. Then the function starts operating and QuickFreeze icon lights.

Actual value displayed for FRZ becomes the temperature of “Quick Freeze”.

If quick freeze function is selected while there is a high-temperature alarm, QuickFreeze icon lights, but the Quick Freeze time does not start.

Quick Freeze cannot be selected when there is EO error.

Display target value in the Quick Freeze mode is shown on the basis of band values specified for the freezer compartment. When the freezer compartment sensor value is within the bandwidth, target is entered by SUT, and when it goes out the bandwidth, LUT is used to go far away from the target.

If QuickFreeze button is pressed during Quick Fridge, Quick Fridge function is terminated. Quick Freeze starts.

If the freezer compartment set value is changed during Quick Freeze, Quick Freeze is terminated.

When Quick Freeze cooling is cooling the freezer compartment, it aims to keep the fridge compartment at a certain temperature range. Therefore, a cycle process is realized.

For example:

Fridge compartment warms up from the coldest temperature towards the hottest temperature. That the Quick Freeze process is being carried out can be understood. (Compressor runs and directs the gas for SV freezer.) When the hottest compartment temperature is reached at the end of this process, cooling of the fridge compartment starts. Meanwhile, the compressor and the fridge compartment fan run and direct the gas for SV FF. Fridge compartment starts cooling down to its coldest value.

When the fridge compartment becomes cold enough (i.e. when it reaches the minimum fridge compartment temperature), cooling process of the freezer compartment restarts. Thus, the cooling cycle continues.

The compressor runs continuously until the Quick Freezer function is cancelled and the valve directs the refrigerant gas to either FF or FRZ according to the cooling requirement.

6.7.1. Displaying Actual Temperature

With the Quick Freeze function, the freezer compartment is tried to be cooled down to -27°C. For this reason, freezer compartment set value changes as -27.

6.7.2. Operating after a Power Failure

This function is forgotten after the power failure.

6.7.3. List of Parameters

Quick Freeze time	24 Hours
Number to flash in the freezer compartment display for 5 seconds when the QuickFreeze button is pressed	-27
Target temperature value to display the freezer compartment's actual value	-27 °C
Number of bars to light in the freezer compartment display when the QuickFreeze button is pressed	All, including Max.
Confirmation tone time for the pressed button	0.2 seconds

6.8. Quick Fridge Function:

When warm food is put into the fridge compartment, this function enables cooling of them in a short time.

QuickFridge icon lights when this function is selected. QuickFridge target temperature flashes for a couple of seconds.

When this key is pressed one more time, function is cancelled and the relevant icon turns off.

Temperature target value in the QuickFridge function is shown on the basis of band values specified for the fridge compartment. When the fridge compartment sensor value is within the bandwidth, target is entered by SUT, and when it goes out the bandwidth, LUT is used to go far away from the target.

If QuickFridge button is pressed when in vacation mode, vacation mode is terminated and the previous set value is recollected. When vacation mode is activated, QuickFridge function cannot be activated. To select the QuickFridge function, press the button again.

If QuickFreeze button is pressed during QuickFridge, QuickFridge function is terminated. QuickFreeze function is started.

If the freezer compartment set value is changed during QuickFridge, QuickFridge is terminated.

QuickFridge function is for cooling the fridge compartment and it operates in cycles.

For example:

During QuickFridge, the fridge compartment is cooled from QuickFridge cut-in temperature towards QuickFridge cut-out temperature. Compressor runs; the valve directs the gas to the fridge compartment.

When the QuickFridge cut-out value is reached, if the freezer compartment needs to be cooled, the freezer compartment starts to be cooled. Cooling is made according to the set temperature value of the freezer compartment. Meanwhile, the fridge compartment starts to be warmed up from QuickFridge cut-out value towards QuickFridge cut-in value. When QuickFridge reaches cut-in value, QuickFridge cooling restarts.

Freezer compartment defrost cannot be made during QuickFridge. If QuickFridge is selected during defrost, defrost has to come to an end.

6.8.1. Displaying Actual Temperature

Freezer compartment may warm up a little during QuickFridge. For this reason, freezer compartment temperature display is frozen. During QuickFridge, the set value is displayed as the actual temperature.

6.8.2. Operating after a Power Failure

This function is forgotten after the power failure.

6.8.3. List of Parameters:

QuickFridge period (hours)	3
Target temperature value (°C) to display the actual FF value	1
Number of bars to light in the FF display when the QuickFridge button is pressed	All, including Max.
Confirmation tone time for the pressed button (sec.)	0.2
Target temperature value (°C)	+1

6.9. Economy Function

It is the function that ensures the least power consumption. When the freezer compartment set value is set to the hottest, the economy icon “e” on the indicator lights. If set values are changed, “e” icon turns off and economy function is terminated.

If QuickFreeze function is selected, economy function is cancelled and “e” icon turns off.

6.9.1. List of Parameters:

FRZ set value (hottest)	-18
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6.9.2. Operating after a Power Failure

This function is recollected after a power failure.

6.10. FF Door opening

When the user opens the FF door for any reason, the ON/OFF switch on the lamp assembly changes position and sends “door open” data to the control card.

FF lamp is turned on by the door button and after a while audible “door open” alarm goes off. This alarm is to warn the user that the door is kept open more than necessary. When the door is closed or if any button is pressed, warning ceases. To reactivate the warning, door has to be closed and opened again. Otherwise, the audible warning continues. Pressing any button once when the alarm is activated cuts off the alarm only; it does not activate the function connected to the pressed button.

When the door is open, the FF Fan will stop.

6.10.1. List of Parameters

Time to start audible alarm after the door is opened	60 seconds
Alarm “buzzer” time for an open door	500 milliseconds
Alarm “buzzer” off time for an open door	500 milliseconds
Pause time to activate the fan after the door is closed	10 seconds

6.10.2. Operating after a Power Failure

The door starts operating after a power failure just as it is newly opened.

6.11. High Temperature Alarm

If the freezer compartment is warmer than a specified value for a certain period, the red led on the indicator lights continuously. Alarm warning is deleted when the temperature drops down to the desired value. It is not given for the first 12 hours after power is supplied.

6.11.1. List of Parameters:

FRZ sensor temperature (cut-in) for high temperature alarm	-9°C
FRZ sensor temperature (cut-out) for high temperature alarm	-13°C
Time to elapse for high temperature alarm after defrost	60 minutes
Time needed for the red icon to start flashing after the alarm is activated <i>If FRZ-9 is not shown during this time period, it should be waited</i>	30 minutes
Minimum time between two high temperature alarms	60 minutes

6.11.2. Operating after a Power Failure

The high temperature alarm led does not light after a power failure even if it was lighting before and it is not active for a certain time.

7. Circuit Components

ITEM	Component	Piece	I/O
1	Compressor	1	Outlet1
2	Fridge Compartment Fan	1	Outlet4
3	Freezer Compartment Fan	1	Outlet3
4	Freezer Compartment Defrost Heater	1	Outlet2
5	Freezer Compartment Water Drain Heater	1	-----
6	Fridge compartment door	1	Inlet
7	Run capacitor	1	
8	Sensor	4	Inlet
9	PTC relay	1	
10	Thermic	1	
11	Electronic control card	1	
12	Main display card	1	Inlet
13	Condenser Fan	1	-----
14	Solenoid Valve	1	
15	Fridge Compartment Water Drain Heater	1	-----

8. Service Test

If any button is pressed within 30 seconds after the electronic card is supplied power for the first time and then the “QuickFreeze” and “QuickFridge” buttons are pressed simultaneously, the self-test starts. In the self-test:

All icons flash together with the back-light as ON for 0.5 sec and OFF for 0.5 sec.

Buzzer is turned ON for 2 seconds and then it goes silent.

When the first button is pressed, the version number is shown on the freezer compartment (FRZ) display. Minor revision number is shown on the FR 7-segment display.

If any button is pressed one more time, in the FRZ 7-segment display;

- While FRZ 7-segment display is showing freezer compartment sensor value, FF 7-segment display shows “r”,
- While FRZ 7-segment display is showing fridge compartment sensor value, FF 7-segment display shows “F”,
- While FRZ 7-segment display is showing fridge compartment evaporator sensor value, FF 7-segment display shows “E”,
- While FRZ 7-segment display is showing freezer compartment evaporator sensor value, FF 7-segment display shows “d”,

in 1 sec. intervals. The process continues in this cycle.

Then,

If QuickFreeze button is pressed;

Bars nr. 2 and 3 LED#2 on FRZ bar indicators (near “Min.” label) light and the compressor starts. “CO” appears in the freezer 7-segment display.

If the solenoid valve is in FF_FRZ position, “1” appears in FF 7-segment display; if it is in FRZ position, “2” is shown in the FF 7-segment display.

If QFRZ button is pressed one more time;

Bars nr. 2 and 3 on the freezer bar indicators go off. Compressor stops. “SV” appears in the FRZ 7-segment display.

If the solenoid valve is in FF_FRZ position, “1” appears in FF 7-segment display; if it is in FRZ position, “2” is shown in the FF 7-segment display.

If FRZ Set button is pressed;

Bars nr. 6 and 7 LED#4 on FRZ bar indicators (count from “Min.” label) light and the freezer fan starts. “RF” appears in the FRZ 7-segment display.

If the solenoid valve is in FF_FRZ position, “1” appears in FF 7-segment display; if it is in FRZ position, “2” is shown in the FF 7-segment display.

If FRZ Set button is pressed one more time;

Bars nr. 2, 3, 6 and 7 LED#3#4 on FRZ bar indicators go off and the FRZ fan stops. “SV” appears in the FRZ 7-segment display.

If the solenoid valve is in FF_FRZ position, “1” appears in FF 7-segment display; if it is in FRZ position, “2” is shown in the FF 7-segment display.

If FF Set button is pressed;

Bars nr. 8 and 9 LED#5 on FRZ bar indicators (count from “Min.” label) light and the FF fan starts. “FF” appears in the FRZ 7-segment display.

The solenoid valve is taken to FF_FRZ position, “1” appears in FF 7-segment display.

If FF Set button is pressed one more time;

Bars nr. 8 and 9 LED#5 on FRZ bar indicators (count from “Min.” label) go off and the FF fan stops. “SV” appears in the FRZ 7-segment display.

The solenoid valve is taken to FRZ position, “2” appears in FF 7-segment display.

If QuickFridge button is pressed;

Bars nr. 4 and 5 LED#3 on FRZ bar indicators (count from “Min.” label) light and the heaters start. “HE” appears in the freezer 7-segment display.

If the solenoid valve is in FF_FRZ position, “1” appears in FF 7-segment display; if it is in FRZ position, “2” is shown in the FF 7-segment display.

If QFRG button is pressed one more time;

Bars nr. 4 and 5 LED#3 on FRZ bar indicators (count from “Min.” label) go off and the heaters do not operate. “SV” appears in the freezer 7-segment display.

If the solenoid valve is in FF_FRZ position, “1” appears in FF 7-segment display; if it is in FRZ position, “2” is shown in the FF 7-segment display.

Exiting the test:

At the end of 30 minutes, during power failure or if QuickFridge and QuickFreezer buttons are pressed concurrently, service test is terminated.

9. Service/Production Test and Error Messages

Error messages that may be seen on the FRZ display are below:

- E0 = FRZ sensor
- E3 = FF Sensor
- E1 = FRZ eva sensor
- E4 = Defrost heater
- E8 = FF eva sensor
- At Zero Cross error, the compressor runs according to the FF sensor.

If more than one error occurs, they are shown respectively in 1 sec intervals together with FRZ actual value.

The “!” icon flashes together with any error warning as “ON for 0.5 sec and OFF” for 0.5 sec.

9.1. Run-time Test

Errors that occur during operation of the refrigerator are shown on the FRZ display. When a failure occurs, cooling will continue as specified according to the failure type. The “red LED” together with the error code flashes. All errors are deleted after a power failure and they are displayed when the same error occurs again.

When the cause of the failure is eliminated, the error message is cleared.

9.2. Sensor Failure (E0, E1, E3 and E8, ZC)

When any sensor failure occurs, the exclamation “!” icon on the display lights and related error codes are shown on the FRZ display.

When the sensor is open circuit or closed circuit, an error alarm goes off. Cooling is carried on as explained below in case of a failure:

9.2.1. FRZ sensor (E0) failure:

Only “E0” error flashes alternately on the FRZ 7-segment display together with the actual temperature value. Compressor and FRZ fan run continuously. SV changes direction in every 10 minutes. If SV is in FF_FRZ position, the FF Fan runs; if not, the FF Fan stops. QuickFreeze function cannot be selected. FRZ Set value may be changed, but it will have no effect.

9.2.2. FRZ eva sensor failure (E1)

Only “E1” error flashes alternately on the FRZ 7-segment display together with the actual temperature value. The heater is activated for 20 minutes during FRZ Defrost.

9.2.3. FF sensor failure (E3):

In the FRZ 7-segment display, “-” character is shown. The “E3” error flashes alternately on the FRZ 7-segment display together with the FRZ actual temperature value. QuickFreeze and Vacation functions may be selected, but they do not work with this error. Compressor and FRZ fan run continuously. SV changes direction in every 10 minutes. If SV is in FF_FRZ position, the FF Fan runs; if not, the FF Fan stops.

9.2.4. Defrost heater error (E4):

The “E4” error flashes alternately on the FRZ 7-segment display together with the actual temperature value. If the defrost time is 60 min for 4 consecutive times, “E4” error is given. When defrost time arrives, it activates the defrost heater again. The cooling continues normally. When defrost is made for a time shorter than 60 minutes, error is deleted. After a power failure, the error is recollected.

9.2.5. FF eva sensor failure (E8)

The “E8” error flashes alternately on the FRZ 7-segment display together with the actual temperature value. Pre-cool cannot be made during defrost. Compressor and FRZ fan run continuously. SV changes direction in every 10 minutes. If SV is in FF_FRZ position, the FF Fan runs; if not, the FF Fan stops.

9.2.6. ZC error:

If there is an error in the zero Cross circuit, "ZC" flashes on the FRZ display.

9.3. Operating after a Power Failure

All error messages are forgotten.

9.3.1. List of Parameters

FF set value [°C]	4
FRZ set value [°C]	-18
Brightness adjustment	Normal

9.3.2. ELPROM Data to be Stored

- FRZ set value
- FF set value
- Vacation function
- Fan run-time
- Heater error