



SERVICE MANUAL

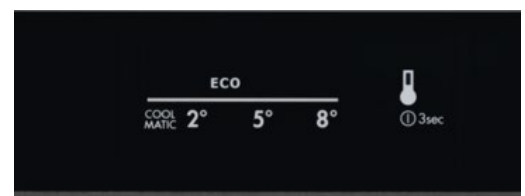
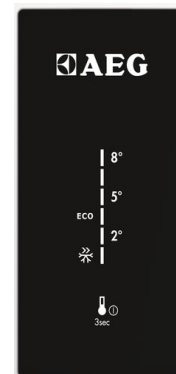
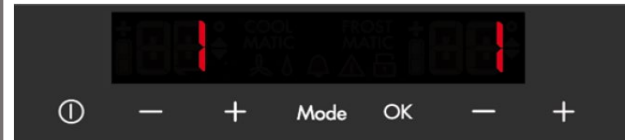
Food preservation

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Consumer Service - EMEA
Quality & Continuous Improvement - Technical Support

COLD APPLIANCES WITH ELECTRONIC
CONTROL SYSTEM

ERF2003



EN

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PURPOSE OF THIS MANUAL

The purpose of this Service Manual is to provide Service Engineers who are already familiar with repair procedures with information regarding the PCB.

The manual deals with the following topics:

- PCB general characteristics
- Disassembly

Document Revisions

Rev.	Date	Description	Author
00	06/2020	Document creation	Anna Grimlund

SAFETY

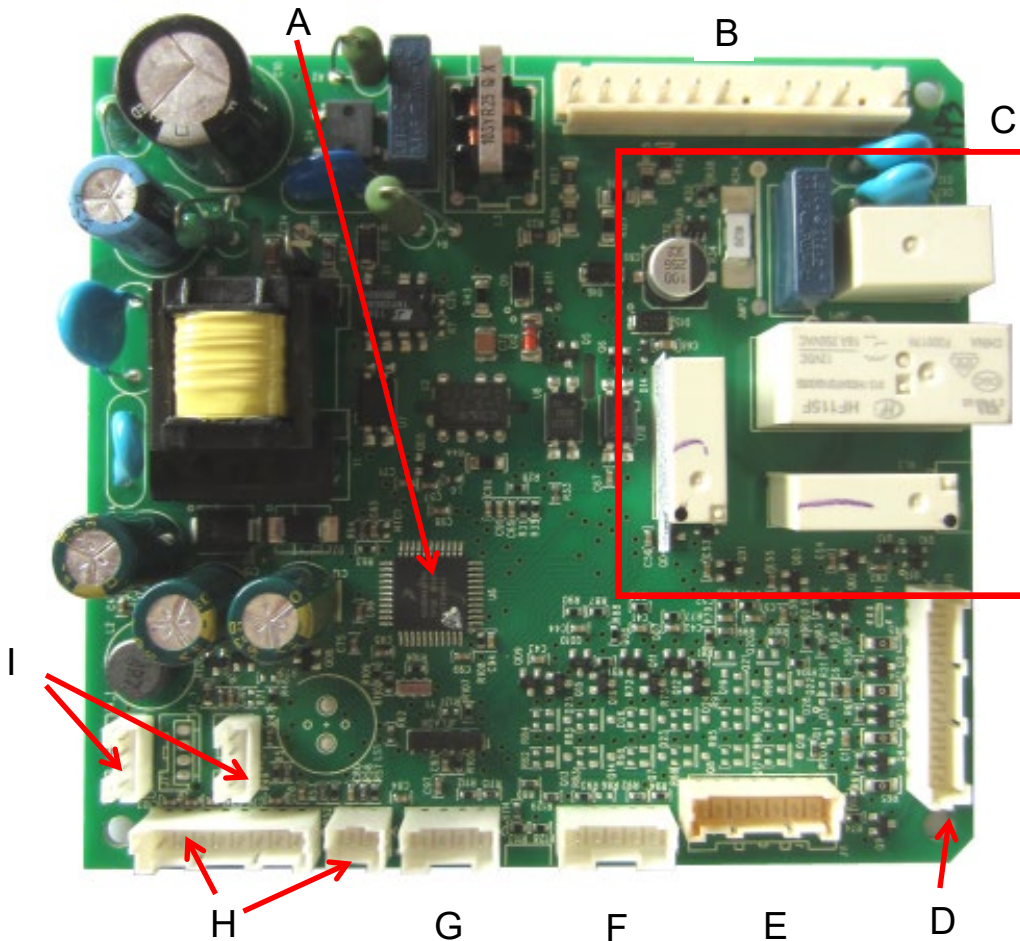


- All the work to be performed inside the appliance requires specific skills and knowledge and may only be carried out by qualified and authorised Service Engineers
- Before you access internal components, take the plug out of the socket to disconnect the power supply.
- Some of the components in the mechanical part could cause injuries, so wear suitable protection and proceed with caution.

ERF2003 GENERAL CHARACTERISTICS

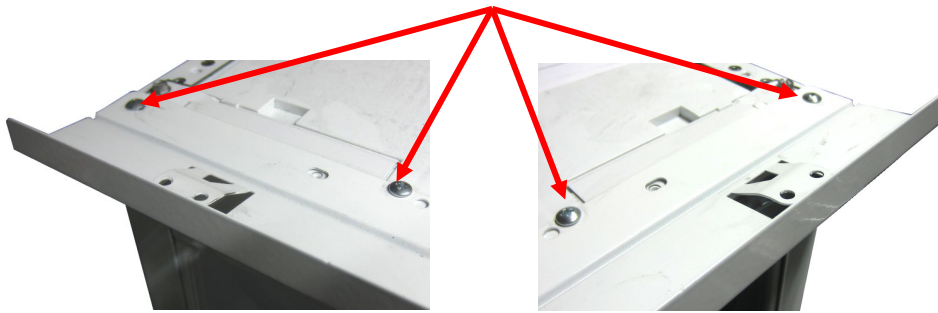
The main electronic ERF2003 can be connected to different types of user interfaces. The main electronic communicates through a serial interface when the insulation isn't needed via six wires and through a standard protocol based on MACS with insulated user interface via three wires.

Technical Specification	
Operating voltage input	100/240 Vac
Frequency range	50-60 Hz
A	Processor
B	AC: Magnetic valve, Compressor, Ventilator fridge, Defrost heater
C	Five relays
D	DC: Ventilator Freezer, Ventilator Zero degree, LED Board, Electronic driver
E	Stepper valve
F	Door
G	Sidekick
H	Five temperature sensors
I	UI



ERF2003 DISSASSEMBLY

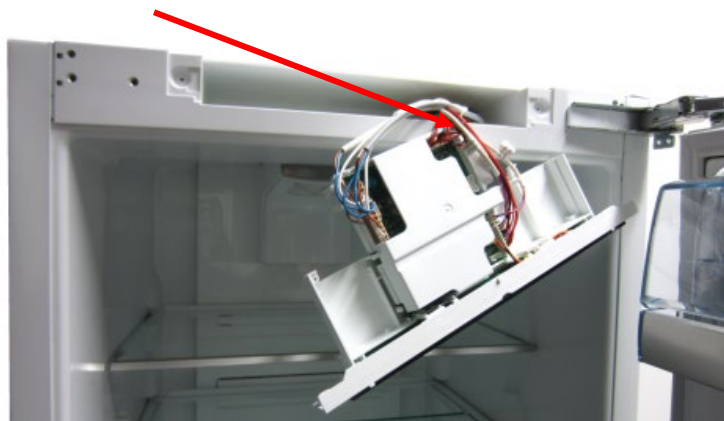
1. Unscrew the four screws and remove the panel



2. Unclip the cover on the left and right side



3. Remove two screws and pull out the electronic.

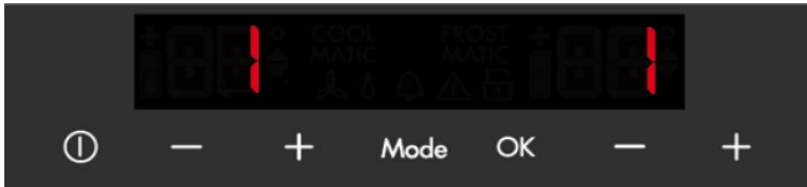


P10 USER INTERFACE

Overview

Interface with five touch keys for single appliances, freezer or fridge. In combi appliances the interface has 7 touch keys. Icons depends on the model.

7 touch keys for combi appliances:

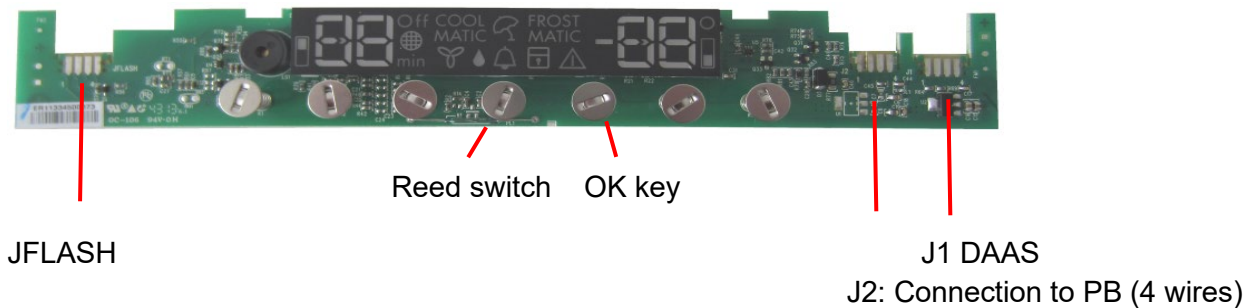


P10 on door 5 touch keys for fridge or freezer appliance:



ERF967 – P10 MACS UI


P10 on top



P10 DEMO MODE

Demo mode can only be activated when the air temperature is warmer than 10°C in the compartment or the temperature probes are disconnected. Demo Mode remains active if there is a power failure or the appliance is switched off.

Demo mode touch keys

Command	Touch key	Press	Action	Indicator
Demo mode	OK	Press key 9 times.	Enter demo mode.	Long beep and: 
Settings	Any button	Short press	Settings works as normal during demo mode.	Indicator depends on user interaction. If there is no user interaction for 20 minutes during demo mode, dE Mo graphics is displayed again.
Exit demo mode	OK	Press and hold key for 10 seconds.	Exit demo mode	Long beep.

P10 SERVICE MODE

Activation of Service mode depends on type of appliance and the UI. Service mode can be started with a cold or warm appliance. The only exception is when testing the digital input heater switch that requires a cold appliance.

Activate Service mode on built-in appliances

Command	Button	Press	Action	Indicator
Activate service mode	Mode and OK	Hold for 5 seconds.	Activate service mode	LEDs lit
Next	OK	Short press	Moves service mode to next component	Index number
Action	+	Short press	Activate and deactivate components	Lit when command is applicable
Exit service mode	Mode and OK	Hold for 5 seconds.	Exit service mode	None

Activate service mode on freestanding appliances

1. Switch on the appliance
2. Unplug the appliance
3. Wait 10 seconds
4. Plug in the appliance
5. Wait 5 seconds.
6. Press any button for 5 seconds
 - the button must be pressed within 5 to 16 seconds after power-on
7. **Next:** Use the same button as enter Service mode.
8. **Action:** Use any other button.
9. **Exit Service mode:** Use the same button as enter Service mode. Hold for 5 seconds.

(Activate service mode on freestanding appliances can also be used for built-in appliances).

SERVICE MODE DIGITAL INTERFACE

Each phase is identified by an index displayed on the UI. When the index represents hardware (AC or DC output and digital input) the visual indicator shows the hardware state. The visual indicator varies between UIs (*flower, umbrella, snowflake, ECO*). These tables shows all possible components, only physically mounted components are tested.

Task	Hardware state	Indicator
Output test	Turned off	Off
	Middle state: Affects the variable speed fan, auger motor anticlockwise rotation, water pump reverse direction activation and one of the possible positions of the stepper valve according to the specific layout of the evaporator pipes ("open fridge" or "open freezer").	Blinking
	Switched on	Lit up
	Special state: It affects a specific position of the stepper valve (open-open).	Blinking of two visual indicators
Input test	Close	Off
	Open	Lit up

AC output test

Tests AC loads connected to the appliance. When service mode starts, all loads are switched off.

Description	Index	Action key
Refrigerator compressor	0	Toggles load on/off.
Freezer compressor	1	Toggles load on/off.
Freezer evaporator heater	2	Toggles load on/off.
Refrigerator lamp	3	Toggles load on/off.
Freezer evaporator fan	4	Toggles load on/off.
Refrigerator fan	5	Toggles load on/off.
Evaporator electro valve	6	Toggles load on/off.
Zero-degree fan	7	Toggles load on/off.
Water faucet	8	Toggles load on/off.
Freezer lamp	9	Toggles load on/off.
Ice selector/solenoid cube	11	Toggles load on/off.
Condenser fan	12	Toggles load on/off.
Perfect drawer	41	Toggles load on/off.
Refrigerator balance heater	42	Toggles load on/off.
Frame heater	43	Toggles load on/off.
Condenser electro valve	46	Toggles load on/off.
Sparkling water valve	52	Toggles load on/off.
Still water valve	53	Toggles load on/off.
Ambient water valve	54	Toggles load on/off.
Ice maker 1 water valve	56	Toggles load on/off.
Bypass electro valve	65	Toggles load on/off.
Refrigerator evaporator fan	69	Toggles load on/off.
Refrigerator evaporator heater	71	Toggles load on/off.
Ice maker evaporator heater	72	Toggles load on/off.
Freezer balance heater	73	Toggles load on/off.
Zero-degree balance heater	74	Toggles load on/off.
Mullion heater	75	Toggles load on/off.
Pipe/Fill tube 1 heater	79	Toggles load on/off.
Ice maker 2 water valve	82	Toggles load on/off.
Energize ice maker	83	Toggles load on/off.

Description	Index	Action key
Pipe/Fill tube 2 heater	91	Toggles load on/off.

Auger motor test

The auger motor stops when Service Mode starts.

Description	Index	Action key
Auger motor	10	“Action” command rotates the auger motor clockwise, another action command rotates it anticlockwise. If the auger motor is not a two-direction motor, it stops.

DC output test

Tests digital outputs connected to the appliance. When service mode starts, all digital outputs are switched off.

Description	Index	Action key
Refrigerator lamp	13	Toggles output on/off.
Zero degree lamp	14	Toggles output on/off.
Freezer evaporator fan	15	Toggles output on/off.
Refrigerator fan	16	Toggles output on/off.
Zero-degree fan	17	Toggles output on/off.
Condensor fan	18	Toggles output on/off.
Glacier	19	Toggles output on/off.
Freezer lamp	20	Toggles output on/off.
Air filter Fan	21	Toggles output on/off.
Refrigerator VCC compressor	37	Toggles output on/off.
Freezer VCC compressor	38	Toggles output on/off.
Ice Chute / Dispenser Pocket Heater	47	Toggles output on/off.
UI Anti-condensation Heater	48	Toggles output on/off.
Ui dispenser valve	57	Toggles output on/off.
Nutrilight lamp	59	Toggles output on/off.
Ice maker fan	62	Toggles output on/off.
Frame/mullion heater	63	Toggles output on/off.
UI Dispenser lamp	66	Toggles output on/off.
Pipe/fill tube 1 heater	67	Toggles output on/off.
Refrigerator evaporator fan	70	Toggles output on/off.
Zero-degree damper heater	76	Toggles output on/off.
Ice Maker Water Valve	81	Toggles output on/off.
Ice cube solenoid	84	Toggles output on/off.
End caps lamp	85	Toggles output on/off.

Water pump test

The water pump stops when Service Mode starts.

Description	Index	Action key
Water pump	80	“Action” command moves the water pump forward, another action command moves it backwards. If the water pump is not a two-direction motor, it stops.

Damper test

The damper is closed when Service mode starts.

Description	Index	Action key
Refrigerator damper	22	Toggles damper open /close
Remote damper	44	Toggles damper open /close
Zero-degree damper	77	Toggles damper open /close

Flapper test

The Ice flapper is closed when Service Mode starts.

Description	Index	Action key
Ice flapper	36	"Action" command opens the ice flapper.

Ice maker twist tray test

The Ice maker twist tray is moved to home position when Service Mode starts:

Description	Index	Action key
Ice maker 1 twist tray	50	"Action" command empties the ice cubes.
Ice tray 1 bail arm	78	"Action" command empties the ice cubes.
Ice tray 2 bail arm	86	"Action" command empties the ice cubes.
Ice maker 2 twist tray	88	"Action" command empties the ice cubes.
...twist tray	96	"Action" command empties the ice cubes.
...bail arm	97	"Action" command empties the ice cubes.

Stepper valve test

The Stepper valve is moved to the initial position (open-open) when Service Mode starts.

Description	Index	Action key
Stepper valve	61	<ol style="list-style-type: none"> "Action" command moves it from initial open-open position to home position (all closed). "Action" command moves it from home position ("all closed") to first position that is identified as Pipe_B_OPEN_Pipe_C_CLOSE. <i>According to the specific connections of the evaporator pipes in the appliance, it could identify "open fridge" or "open freezer";</i> Issuing another "action" command moves from first position to the second position that is identified as Pipe_B_CLOSE_Pipe_C_OPEN. <i>According to the specific connections of the evaporator pipes in the appliance, it could identify "open fridge" or "open freezer";</i>

Digital input test

Indicator is for example *flower, umbrella, snowflake*.

- Digital input open: LED and indicator on.
- Digital input closed: LED and indicator off.

Action key is not used in this phase.

Description	Index	Indicator
Refrigerator door	23	LED and indicator on – open. Off - closed
Freezer door	24	LED and indicator on – open. Off - closed
Zero-degree door	25	LED and indicator on – open. Off - closed
Ice maker	27	LED and indicator on – open. Off - closed
Paddle switch	28	LED and indicator on – open. Off - closed
Rapid drink cooler	40	LED and indicator on – open. Off - closed
Dispenser ambient light	49	LED and indicator on – open. Off - closed
Max tank level	51	LED and indicator on – open. Off - closed
Ice bin switch	58	LED and indicator on – open. Off - closed

Heater switch

Description	Index	Indicator
Heater switch	26	LED and indicator on – open. Off - closed

How to test the Heater switch is related to the associated power board:

- ERF2002, ERF2003, ERF1600: Activate index 2 (Freezer evaporator heater) before checking the Heater switch.
- ERF2001 and ERF502L: Check Heater switch without activating index 2

Temperature/Humidity sensor test

Temperature and index are displayed if the sensor detects an acceptable value. The Action key is not used in this phase.

Description	Index	Indicator
Refrigerator air temperature	29	Temperature/humidity sensor state and indicator
Freezer air temperature	30	Temperature/humidity sensor state and indicator
Refrigerator evaporator temperature	31	Temperature/humidity sensor state and indicator
Zero-degree air temperature	32	Temperature/humidity sensor state and indicator
PB ambient temperature	33	Temperature/humidity sensor state and indicator
UI ambient temperature	34	Temperature/humidity sensor state and indicator
Freezer evaporator temperature	39	Temperature/humidity sensor state and indicator
Ice maker 1 tray temperature	45	Temperature/humidity sensor state and indicator
Zero-degree evaporator temperature	60	Temperature/humidity sensor state and indicator
UI ambient humidity	64	Temperature/humidity sensor state and indicator
Ice maker evaporator temperature	68	Temperature/humidity sensor state and indicator
Ice maker 2 tray temperature	87	Temperature/humidity sensor state and indicator

SOFTWARE AND PARAMETERS

Software and parameters are visualized at the end of service mode. Depends on the number of microprocessor, user interface and power board. All codes of software and parameters are shown on the display

Software
Software code (8 numeric characters)
PB software name (8 characters)
PB software production (8 characters)
UI software name (8 characters)
UI software production name (8 characters)

- The digits are shown letter by letter.
- The digits show each character in second steps and a short beep from the buzzer.
- Between two different codes a bar is shown on digits for one second.
- The **action**-key is not used in this phase

Life time display

The max. value can show 9999 days. Each number is shown on the display (starts from most significant).

- Press „**next**“-key- you can hear a short beep from the buzzer and the display shows the next digit
- Press the „**next**“-key again to go to the next phase

Final phase

On the display a time counter is shown in seconds the number 0 to 99 (loop).

AZZURRA USER INTERFACE

The touch key is positioned at the bottom or to the right of the display.

Electrolux brand: White LEDs

AEG brand: Red LEDs

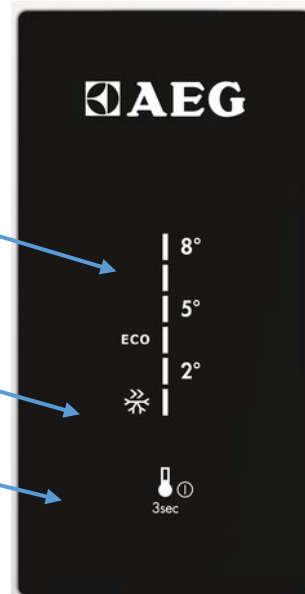
Private labels/key accounts: Red LEDs

When the UI is used in combi appliances it covers both the refrigerator and freezer, but the user can only toggle the fridge temperature. The boost applies to both fridge and freezer. The boost icon varies between brands.

AZZURRA ON DOOR

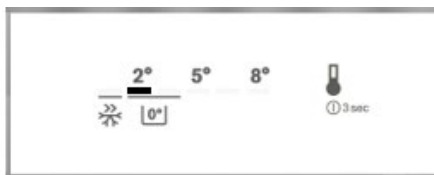
Each step in service mode is identified by LED combinations starting from the top

1. Temperature scale
2. Boost- fridge & freezer
3. Temperature adjustment and ON/OFF



AZZURRA HORIZONTAL ON TOP AND ON DOOR

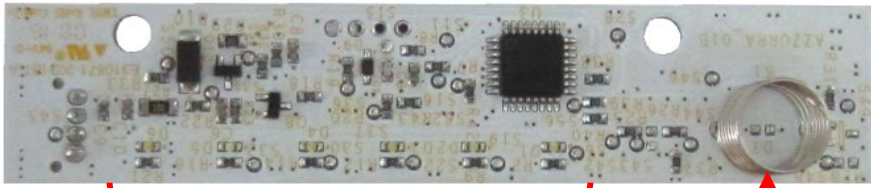
Each step in service mode is identified by LEDs starting from the 2nd LED on the left. The 1st LED (on the left) acts as hardware item state indicator.



AZZURRA ERF908

Front

Processor



Six LED's for temperature and boost

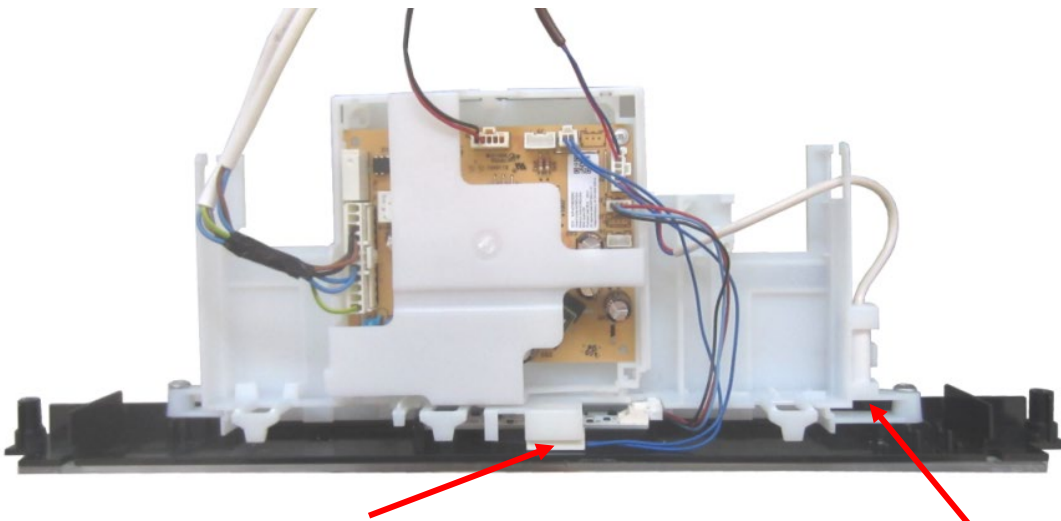
Touch key

- On / Off
- Temperature adjustment

Back



Connection electronic 5V DC



Reed-Switch, Open = Door open
Close = Door closed

Ambient- temperature sensor

AZZURRA DEMO MODE

Demo mode is not available for Azzurra UI.

SERVICE MODE AZZURRA

Activation of service mode depends on type of appliance and the UI. Service mode can be started with a cold or warm appliance. The only exception is when testing the digital input heater switch that requires a cold appliance.

Activate service mode

1. Switch on the appliance
2. Unplug the appliance
3. Wait 10 seconds
4. Plug in the appliance
5. Wait 5 seconds.
6. Press button for 5 seconds
 - the button must be pressed within 5 to 16 seconds after power-on

Command	Touch key	Press	Action	Indicator
Service mode	Singel key	Hold for 5 seconds within 6 - 16 seconds of starting the appliance.	Enter service mode	All lights on
Next	Singel key	Long press	Moves service mode to next component	None
Action	Singel key	Short press	Activate and deactivate components	Lit when command is applicable
Exit service mode	Singel key	Hold for 5 seconds.	Exit service mode	None

AZZURRA UI service mode LED indicators

Each step of service mode is identified by a unique index coded by LEDs. Each LED can assume three states, on, off or blinking.

There are different versions of LED combinations:

- Six horizontal temperature setting LEDs and a temperature set LED.
 - Service mode index starts from the 2nd LED from the left.
 - The 1st LED (on the left) acts as hardware item state indicator.
 - The temperature set LED acts as action indicator.
- Six vertical temperature setting LEDs and a temperature set LED.
 - Service mode index starts with the 1st LED from the top
 - The 6th white LED acts as hardware item state indicator.
 - The bottom temperature set LED acts as action indicator.

SERVICE MODE LED COMBINATIONS

Service mode feedback consists of light combinations.

Table note: FR: Refrigerator, FZ: Freezer, EV: Evaporator

AC output test

Tests AC loads connected to the appliance, only physically mounted components are displayed. When service mode starts, all components are switched off.

AC Load	1	2	3	4	5
FR compressor					on
FZ compressor					blinking
Heater				on	
FR lamp				on	on
AC EV fan				on	blinking
AC FR fan				blinking	
EV electro valve				blinking	on
AC Zero degree fan				blinking	blinking
Water faucet			on		
FZ lamp			on		on
Auger motor			on		blinking
Ice selector			on	on	
AC condenser fan			on	on	on
Perfect drawer			on	on	blinking
Balance heater			on	blinking	
Frame heater			on	blinking	on
FR VCC compressor		on	on	blinking	blinking
FZ VCC compressor		on	blinking		
Condenser electro valve			on	blinking	blinking

Digital output test

All digital outputs connected to electronics are automatically switched off at the start of the test.

Digital output	1	2	3	4	5
FR lamp		on	blinking		on
Zero degree lamp		on	blinking		blinking
DC EV fan		on	blinking	on	
DC FR fan		on	blinking	on	on
DC Zero-degree fan		on	blinking	on	blinking
DC Condenser fan		on	blinking	blinking	
FZ lamp		on	blinking	blinking	blinking
DC Air filter fan		on			

Damper test

DC Heater	1	2	3	4	5
Local damper		on			on
Remove damper		on			blinking

Heater test

DC Heater	1	2	3	4	5
UI anti condensation heater		on		on	
DC frame heater		on		on	on

Digital input test

- Digital input open: light on.
- Digital input closed: light off.

Action key is not used in this phase.

Digital input	1	2	3	4	5
FR door	on	on		on	
FZ door	on	on		on	on
Zero degree door	on	on		on	blinking
Heater switch	on	on		blinking	
Ice maker	on	on		blinking	on
Paddle	on	on		blinking	blinking
Rapid drink cooler	on	on	on		

Temperature probe test

Unlike the loads and digital outputs, the sensors are not activated electronically by pressing a key and their activation is signalled by a yellow light which lights up to the right.

If the circuit breaker is open the light is lit.

Digital input	1	2	3	4	5
FR air	blinking	on	on		blinking
FZ air	blinking	on	on	on	
FR EV	blinking	on	on	on	on
Zero degree air	blinking	on	on	on	blinking
PB ambient	blinking	on	on	blinking	
UI ambient	blinking	on	on	blinking	on
FZ EV	blinking	on	blinking		
UI ambient humidity	blinking	on	blinking		on

ALARMS

Temperature alarm

The alarm is activated if the temperature moves outside a set threshold:

- The maximum temperature reached is displayed.

The alarm stops when the temperature returns within the threshold.

Cancel audible alarm

Deactivate the alarm by pressing any key.

- The alarm is muted for 2 minutes in freezers and 10 minutes in refrigerators.

The display can be used as normal after the alarm is cancelled even if the alarm icon stays on until the temperature reaches an acceptable level.

Door alarm

The door alarm is activated if the door is left open for a certain period of time. The temperature key and set temperature LED starts to flash LED on for 500ms then LED off for 500ms. The door alarm stops when the door is closed.

- Fridge door: 5 minutes
- Freezer door: 80 seconds