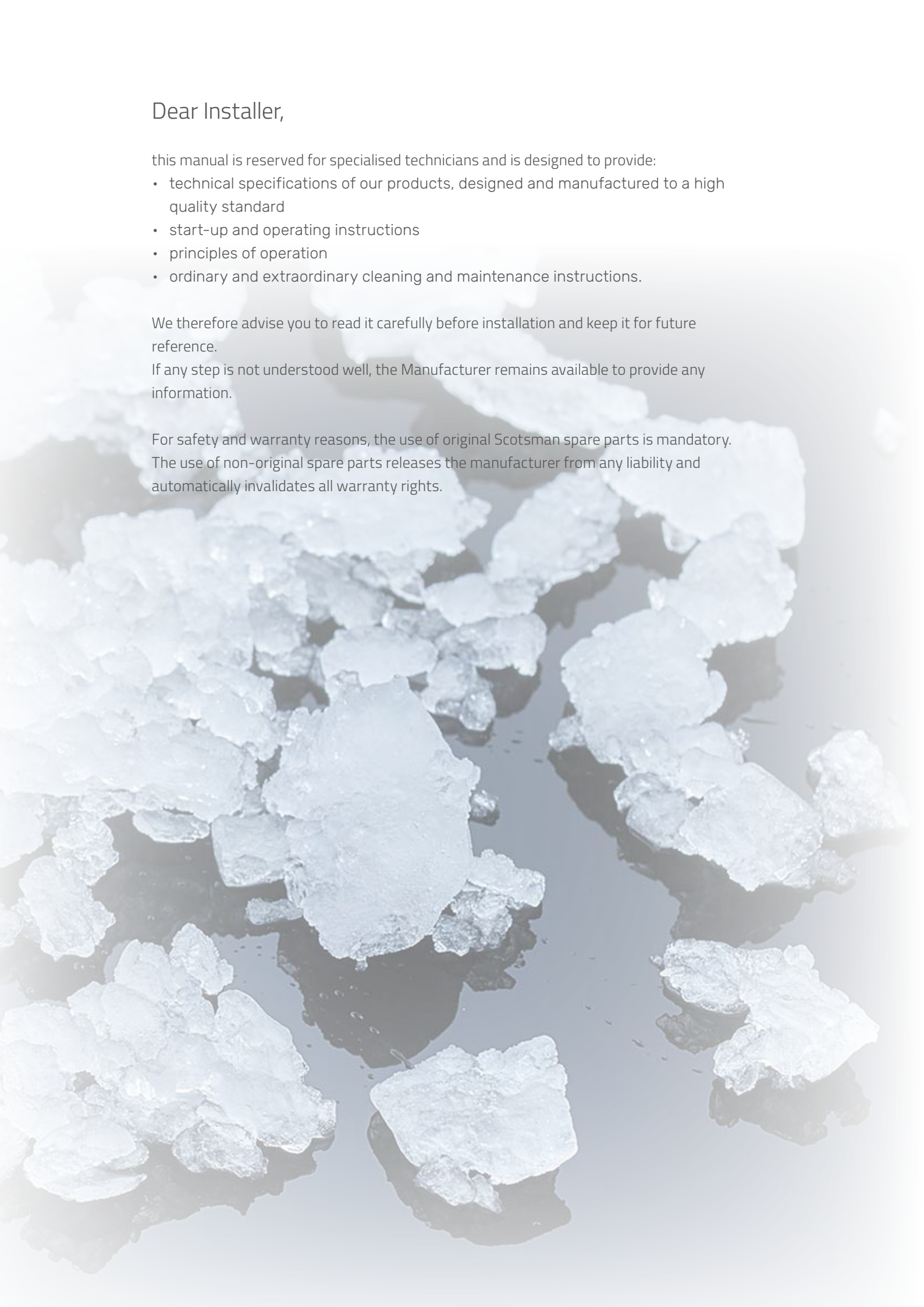


Scotsman[®]

SERVICE MANUAL

FLAKE | NUGGET & CUBELET ICE



The background of the entire page is a photograph of numerous ice cubes scattered on a dark, reflective surface. The lighting is soft, creating gentle shadows and highlights on the jagged edges of the ice. The overall tone is cool and clean, with a gradient from light blue/white at the top to a darker blue at the bottom.

Dear Installer,

this manual is reserved for specialised technicians and is designed to provide:

- technical specifications of our products, designed and manufactured to a high quality standard
- start-up and operating instructions
- principles of operation
- ordinary and extraordinary cleaning and maintenance instructions.

We therefore advise you to read it carefully before installation and keep it for future reference.

If any step is not understood well, the Manufacturer remains available to provide any information.

For safety and warranty reasons, the use of original Scotsman spare parts is mandatory. The use of non-original spare parts releases the manufacturer from any liability and automatically invalidates all warranty rights.

SERVICE MANUAL

SAFETY	page 4
TECHNICAL DATA	page 8
INSTALLATION	page 14
NOTES	page 42
OPERATING PHASES	page 55
DIAGNOSTICS	page 63
MAINTENANCE	page 65

Scotsman Ice Srl - Via Lainate 31
20005 Pogliano Milanese - Milano - Italy
Phone: +39 02 93960 208
Fax: +39 02 93960201
sales@scotsman.it

For any information, always state:

- product model
- serial number
- data in the purchase invoice

SAFETY

Pictogram explanation

In order to make reading clearer and more pleasant, symbols have been used within this manual to convey to the reader the meaning or importance of the information provided by the statements alongside them.



Indicates that caution is required when performing an operation described in a paragraph that bears this symbol. The symbol also indicates that maximum operator awareness is required in order to avoid unwanted or dangerous consequences.



Indicates important information to be read and complied with.



Indicates requirements relating to actions that must be avoided.



This symbol placed on the appliance or used in the manual identifies the areas with an electrical hazard.



Indicates grounding



Identifies the terminals which, when connected together, bring the various parts of an appliance or system to the same potential (not necessarily the earth potential)



Indicates that the paragraph marked with this symbol must be read carefully before the installation, use and maintenance of the product



Who is this manual for?

These instructions are primarily intended for the installer and maintenance personnel, who should read them carefully before working on the appliance. If you do not understand all the contents of the manual contact your local Scotsman distributor before working on the appliance.

Intended use and classification

● This appliance is an ice maker and must only be used for making ice (not as a container for bottles, cans, etc.)



The appliance is designed to be used in domestic and similar applications such as:

- the kitchen area for staff in shops, offices and other work environments;
- farms and by customers in hotels, motels and other residential-type environments;
- bed and breakfasts;
- catering services and similar applications, not for retail.

General warnings



Partial or total failure to observe these instructions and the following prescriptions, an installation, use, ordinary or extraordinary maintenance other than those indicated in the manual, improper use, tampering with or modification of the appliance or some of its parts (unless expressly authorised), use of non-original spare parts or spare parts not specific to the model, may:

- cause damage, injury or fatal accidents;
 - void the warranty
 - reduce or compromise the quality and safety characteristics of the appliance;
- release the Manufacturer from any liability.

Given the continuous progress in the design sector, the Manufacturer reserves the right to make changes to the production and instructions, without this entailing the obligation to update the production and previous instructions. If necessary, further copies or updates of these instructions must be requested from the Manufacturer.

- Installation must be performed by authorized and specialized personnel, complying with the instructions in this manual.

Personnel must be adequately trained and instructed on how to assemble the machine and how to operate on electrical and refrigeration systems.

Under no circumstances may the customer perform the operations described in this manual.

- Before installation:
 - check the compliance of the systems with the regulations in force in the country of use and with what is stated on the serial plate;
- check that you are familiar with all the safety and fire prevention regulations in force in the country of use;
- check that a high sensitivity (30 mA) differential magnetothermic switch to which the machine must be connected and a power socket with ground connection of the type used in the country of use have already been prepared in the vicinity of the appliance.

⊘ Do not transport, install or carry out maintenance work on the appliance without using the personal protective equipment prescribed in this manual.

⚠ Keep all ventilation openings in the casing of the appliance free of obstructions.

⚠ Do not place objects that cause poor ventilation on and around the appliance.

- Ensure that the installation location offers adequate clearance around the machine, so that the required periodical maintenance work may be carried out in full safety.

- If the machine is being repaired, display appropriate signals in visible locations indicating that the machine **MUST NOT** be used.

- Before working on the machine, make sure that any hot parts have returned to room temperature.

- Disconnect the appliance from the power supply before carrying out any installation or maintenance work, ordinary or extraordinary.

⊘ During the installation of the appliance, persons not involved in the installation activities are not permitted to pass or remain in the vicinity of the work area.

⊘ The appliance is **NOT** designed to be installed:

- in explosive atmospheres;
- outdoors, in places exposed to salt-laden sea air or direct sunlight and weather elements (rain, humidity, etc.).

- The appliance must be easily moved for any extraordinary maintenance: pay attention that any masonry work subsequent to installation (e.g. construction of walls, replacement of doors with narrower ones, renovations, etc.) do not hinder movement.

- The appliance must be transported by means suitable for its weight and size and wearing appropriate personal protective equipment. When moved, even for very small distances, the appliance should always be lifted, **NEVER** pushed or pulled across the floor.

- If the appliance is on wheels, make sure to be gentle when moving it around, to prevent it from tipping over and being damaged. Also pay attention to any roughness of the sliding surface. The appliance equipped with wheels cannot be levelled, so make sure that the support surface is perfectly horizontal, flat and free from roughness.

⊘ Do not overturn or lay the appliance on its side for maintenance.

Unauthorised interventions, tampering or modifications not in accordance with this manual will invalidate the warranty.

● The rating plate provides important technical information that is vital in case of a request for maintenance or repair of the appliance: please do not remove, damage or modify it.

⊘ It is absolutely forbidden to tamper with or remove the adopted safety devices (protective grids, danger stickers, etc.). The Manufacturer declines all responsibility if the above instructions are not complied with.

● Packaging material is potentially dangerous and must be kept out of the reach of children or animals, and properly disposed of according to local regulations.

● The appliance must be periodically checked by an authorised service centre. In order to ensure the best conditions of use and safety, such checks should be carried out in accordance with current national regulations or, preferably, every year.

● The stationary state of the appliance, detected by visual inspection, does not guarantee with certainty that it is switched off. In order to protect his own safety, the operator must check that the machine is not powered, that is, that its plug is disconnected or that the switch of the panel to which it is connected is in the "OFF" position.

● When installing the machine ALWAYS replace any pre-existing water supply pipes with the new ones supplied with it.

⚠ WARNING: If the power cable is damaged, have it replaced ONLY by QUALIFIED PERSONNEL in order to prevent any risks.

We recommend the installation of a water softener filter on the water line upstream the machine.

Refrigerant gas safety warnings

⚠ The appliance contains fluorinated greenhouse gases governed by the Kyoto protocol, in the quantities indicated on the serial plate.

⚠ The GWP (Global Warming Potential) of the gases is as follows: HFC R404A = 3750; HFC R452A = 2140; HFC R134a = 1430; R290 = 3.

⚠ Propane is a highly flammable gas. It is heavier than air, which means that in the event of a refrigerant leak it migrates to the ground.

Propane used in refrigeration systems is odourless. The system is hermetically sealed.

Safety instructions for UV lamps (only for XSafe models)

 This machine contains an apparatus that emits UV and generates O₃ dissolved in the air. In some circumstances and if not properly managed, O₃ can generate risks to human health. The XSafe appliance is designed to produce O₃ below the legal limits when properly installed, used and maintained.

 Improper use of the appliance or damage to the container can lead to the release of dangerous UV radiation. UV radiation can, even in small doses, cause damage to the eyes and skin. Appliances which are obviously damaged must not be used.

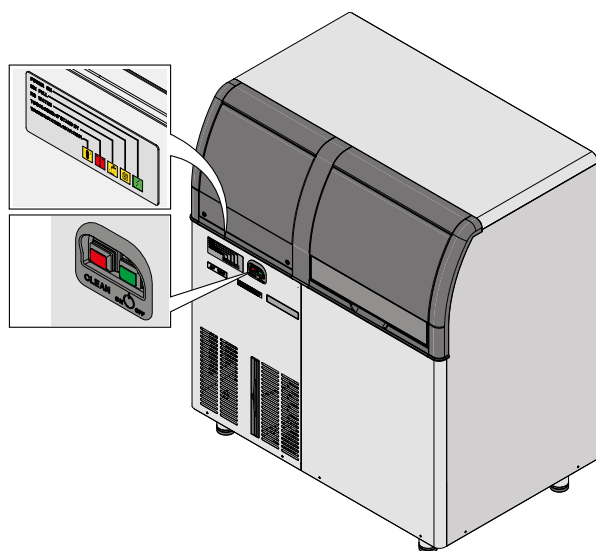
 The replacement of the UV lamp CANNOT be carried out by the user, contact a specialized technician.

 Please contact your local Scotsman dealer for the annual maintenance plan.

TECHNICAL DATA

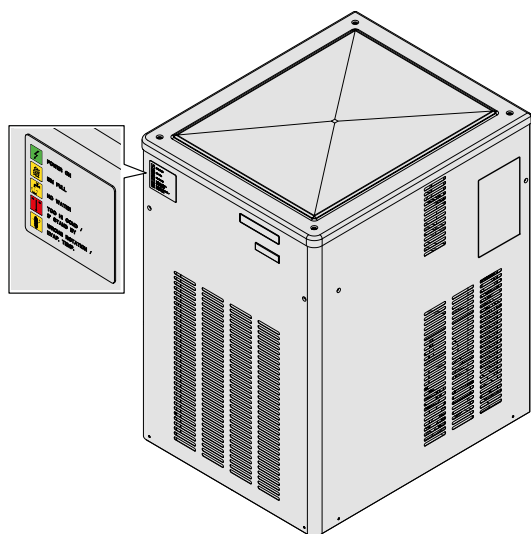
Operating limits (for all models)

Parameters	Minimum	Maximum
Ambient temperature	10°C	43°C
Water temperature	5°C	38°C
Water pressure	0.1 MPa (1 bar)	0.5 MPa (5 bar)
Water hardness	7 °f (French degrees) 4°dH (German degrees)	18 °f (French degrees) 10°dH (German degrees)
Voltage tolerance with respect to the data indicated on the plate	-10%	+10%
Sound level produced by the operation of the appliance	<70 dB(A)	



AF | EF | AFC | EFC series

Granular ice maker with built-in ice container



MF | MFN series

Granular ice maker without built-in ice container

For more technical information regarding the appliance, scan the QR code



SINGLE-PHASE 230V/50 Hz - 400V/50 Hz - TEMPERATURE 32 °C

AIR COOLING								
MODEL	MF26	MF36	MF46	MF56	MF56	MF66	MF86	MF86
VOLTAGE	230/50/1	230/50/1	230/50/1	230/50/1	400/50/3N	400/50/3N	230/50/3	400/50/3N
Charge R404A (g)	N/a	480	750	700	980	2400	4000	4000
Charge R452A (g)	N/a	N/a	950	1150	1000	2500	4500	4500
Charge R134A (g)	390	430	N/a	N/a	N/a	N/a	N/a	N/a
SUCTION PRESSURE (bar)	0.56	0.4	2.4	2.4	2	2.2	N/a	1.8
DISCHARGE PRESSURE (bar)	10.5	12	23.5	22	22	21.5	N/a	20

WATER COOLING							
MODEL	MF26	MF36	MF46	MF56	MF56	MF66	MF86
VOLTAGE	230/50/1	230/50/1	230/50/1	230/50/1	400/50/3N	400/50/3N	400/50/3N
Charge R404A (g)	N/a	480	600	980	700	1200	2400
Charge R452A (g)	N/a	N/a	650	750	670	1950	2000
Charge R134A (g)	360	400	N/a	N/a	N/a	N/a	N/a
SUCTION PRESSURE (bar)		0.4	2	2.4	2	2.1	
DISCHARGE PRESSURE (bar)		10	19.3	17.5	17.4	19.5	

AIR COOLING			
MODEL	MF 37	MF47	MF57
VOLTAGE	230/50/1	230/50/1	230/50/1
Charge R290 (g) 	115	150	150
SUCTION PRESSURE (bar)	1,9	1.8	2.12
DISCHARGE PRESSURE (bar)	14,5	16.6	18.5

WATER COOLING	
MODEL	MF37
VOLTAGE	230/50/1
Charge R290 (g) 	140
SUCTION PRESSURE (bar)	14,5
DISCHARGE PRESSURE (bar)	1,9

AIR COOLING					
MODEL	AF/EF 80	AF/EF 103	AF/EF 124	AF/EF 156	AF/EF 206
VOLTAGE	230/50/1	230/50/1	230/50/1	230/50/1	230/50/1
Charge R404A (g)	N/a	320	400	490	480
Charge R452A (g)	N/a	410	420	N/a	N/a
Charge R134A (g)	270	410	360	490	540
SUCTION PRESSURE (bar)	0.4	0.6	0.6	0.65	0.45
DISCHARGE PRESSURE (bar)	9.5	11	11.5	12.5	14

WATER COOLING					
MODEL	AF/EF 80	AF/EF 103	AF/EF 124	AF/EF 156	AF/EF 206
VOLTAGE	230/50/1	230/50/1	230/50/1	230/50/1	230/50/1
Charge R404A (g)	N/a	N/a	300	300	480
Charge R452A (g)	N/a	N/a	N/a	N/a	N/a
Charge R134A (g)	250	280	350	250	470
SUCTION PRESSURE (bar)	0.4	0.6	0.6	0.62	0.4
DISCHARGE PRESSURE (bar)	10	10	9.8	9.9	10

AIR COOLING			
MODEL	AF87	AF107	AF127
VOLTAGE	230/50/1	230/50/1	230/50/1
Charge R290 (g) 	100	105	105
SUCTION PRESSURE (bar)	1.9	2.15	2.2
DISCHARGE PRESSURE (bar)	13.6	14.2	15.2

AIR COOLING				
MODEL	MFN46	MFN56	MFN56	MFN86
VOLTAGE	230/50/1	230/50/1	400/50/3N	400/50/3N
Charge R404A (g)	750	980	980	4000
Charge R452A (g)	900	1080	1000	4500
Charge R134A (g)	N/a	N/a	N/a	N/a
SUCTION PRESSURE (bar)	2.7	2.3	2.3	1.8
DISCHARGE PRESSURE (bar)	23	21	23.8	19.5

WATER COOLING				
MODEL	MFN46	MFN56	MFN56	MFN86
VOLTAGE	230/50/1	230/50/1	400/50/3N	400/50/3N
Charge R404A (g)	600	700	700	2400
Charge R452A (g)	570	810	680	2000
Charge R134A (g)	N/a	N/a	N/a	N/a
SUCTION PRESSURE (bar)	2.1	2.45	2.15	1.8/1.9
DISCHARGE PRESSURE (bar)	17.5	17.5	17.4	22.2

AIR COOLING		
MODEL	MFN47	MFN57
VOLTAGE	230/50/1	230/50/1
Charge R290 (g) 	150	150
SUCTION PRESSURE (bar)	1.8	1.7
DISCHARGE PRESSURE (bar)	16.6	18.2

AIR COOLING		
MODEL	AFC80	AFC/EFC 134
VOLTAGE	230/50/1	230/50/1
Charge R404A (g)	430	380
Charge R452A (g)	370	380
Charge R134A (g)	300	380
SUCTION PRESSURE (bar)	0.18	0.7
DISCHARGE PRESSURE (bar)	12	13

WATER COOLING		
MODEL	AFC80	AFC/EFC 134
VOLTAGE	230/50/1	230/50/1
Charge R404A (g)	420	300
Charge R452A (g)	370	300
Charge R134A (g)	320	210
SUCTION PRESSURE (bar)	0.2	0.6
DISCHARGE PRESSURE (bar)	9.8	9.9

SINGLE-PHASE 230V/60 Hz - 380V/60 Hz - TEMPERATURE 32 °C

AIR COOLING						
MODEL	MF26	MF36	MF46	MF56	MF66	MF66
VOLTAGE	230/60/1	230/60/1	230/60/1	230/60/1	230/60/3N	380/60/3N
Charge R404A (g)	N/a	480	750	980	N/a	N/a
Charge R452A (g)	N/a	N/a	650	1060	2200	2350
Charge R134A (g)	390	580	N/a	N/a	N/a	N/a
SUCTION PRESSURE (bar)	N/a	0.5	N/a	2.5	1.7	1.7
DISCHARGE PRESSURE (bar)	N/a	12.5	N/a	22.5	19.9	20.3

AIR COOLING				
MODEL	MF26	MF36	MF46	MF56
VOLTAGE	230/60/1	230/60/1	230/60/1	230/60/1
Charge R404A (g)	N/a	480	600	700
Charge R452A (g)	N/a	N/a	600	800
Charge R134A (g)	420	260	N/a	N/a
SUCTION PRESSURE (bar)	0.47	0.48	N/a	2.3
DISCHARGE PRESSURE (bar)	9.5	10	N/a	18.4

AIR COOLING					
MODEL	AF/EF 80	AF/EF 103	AF/EF 124	AF/EF 156	AF/EF 206
VOLTAGE	230/60/1	230/60/1	230/60/1	230/60/1	230/60/3N
Charge R404A (g)	N/a	270	400	490	480
Charge R452A (g)	N/a	N/a	N/a	N/a	N/a
Charge R134A (g)	230	350	330	490	490
SUCTION PRESSURE (bar)	N/a	0.5	N/a	0.8	0.6
DISCHARGE PRESSURE (bar)	N/a	10.5	N/a	11.8	12.5

WATER COOLING	
MODEL	AF/EF 80
VOLTAGE	230/60/1
Charge R404A (g)	N/a
Charge R452A (g)	N/a
Charge R134A (g)	260
SUCTION PRESSURE (bar)	0.3
DISCHARGE PRESSURE (bar)	10.3

AIR COOLING		
MODEL	MFN46	MFN56
VOLTAGE	230/60/1	230/60/1
Charge R404A (g)	750	1040
Charge R452A (g)	850	1060
Charge R134A (g)	N/a	N/a
SUCTION PRESSURE (bar)	2	2.6
DISCHARGE PRESSURE (bar)	19.7	22

WATER COOLING		
MODEL	MFN46	MFN56
VOLTAGE	230/60/1	230/60/1
Charge R404A (g)	N/a	700
Charge R452A (g)	460	700
Charge R134A (g)	N/a	N/a
SUCTION PRESSURE (bar)	2	N/a
DELIVERY PRESSURE (bar)	18.1	N/a

AIR COOLING		
MODEL	AFC80	AFC/EFC 134
VOLTAGE	230/60/1	230/60/1
Charge R404A (g)	410	380
Charge R452A (g)	N/a	N/a
Charge R134A (g)	300	425
SUCTION PRESSURE (bar)	2.3	0.8
DELIVERY PRESSURE (bar)	21	13.6

INSTALLATION

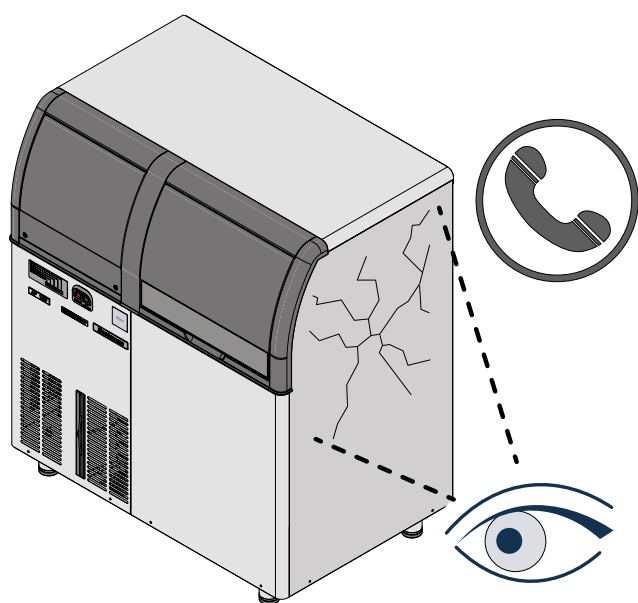
INSTALLATION INDEX

PRELIMINARY CHECKS	14
TRANSPORT	15
POSITIONING.....	17
Installation Warnings	17
Preliminary Operations	17
<i>CHECK OF THE SUPPLIED COMPONENTS.....</i>	<i>17</i>
<i>REMOVAL OF THE PROTECTIVE FILMS.....</i>	<i>17</i>
<i>MOUNTING FEET</i>	<i>17</i>
Positioning in the installation room	18
<i>ROOM CHARACTERISTICS.....</i>	<i>18</i>
<i>MINIMUM DISTANCES TO BE RESPECTED.....</i>	<i>19</i>
<i>POSITIONING.....</i>	<i>19</i>
CONNECTIONS	20
Connection warnings	20
Consult the rating plate	20
Water connection	21
<i>CONNECTION TO THE WATER MAINS.....</i>	<i>21</i>
<i>CHARACTERISTICS OF INLET WATER.....</i>	<i>21</i>
<i>DRAIN CONNECTION.....</i>	<i>21</i>
Electrical connection.....	24
Refrigeration connections	35
RUNNING TEST.....	39

PRELIMINARY CHECKS

F01 After unpacking and before taking the appliance to the installation site:

- ① remove the front and rear panels (if present) and visually check that it has not been damaged during transport; if damage or anomalies are noted, do not proceed with the installation but inform the carrier or the manufacturer accordingly without delay;
- ② remove all internal supports used for shipping and protective adhesive tapes.
- ③ check that:
 - the refrigerant circuit pipes do not touch other pipes or surfaces;
 - that the fan turns freely;
 - that the compressor is free to swing on its mounting brackets;
- ④ also check that all components and accessories required for the model to be installed are present. The feet, if provided, are supplied disassembled and are stored inside the cell. If any components are missing or damaged, contact the manufacturer;
- ⑤ clean all internal and external surfaces of the appliance with a clean cloth dampened with water.



Scotsman Ice Srl - Via Lainate 31
 20005 Pogliano Milanese - Milano - Italy
 Phone: +39 02 93960 208
 Fax: +39 02 93960201
sales@scotsman.it

Before proceeding with the installation, dispose of the packaging in accordance with the regulations in force in the country of installation. This prevents it from being in the way when the appliance is being moved to the installation site, or children or animals from playing with it, with the risk of suffocation.

Materials used for packaging:

Pallet: wood

Corners: polystyrene

Outer box: cardboard

Straps, films, bags: plastic

Clips: metal

Note: depending on the packaging, all or only some of the materials indicated may have been used.

TRANSPORT

The manufacturer is not liable for any inconvenience caused by transport under conditions other than those specified in this chapter.

Transport and lifting of the appliance must take place:

- in **full compliance with the accident prevention regulations** and current laws, and with the utmost caution;

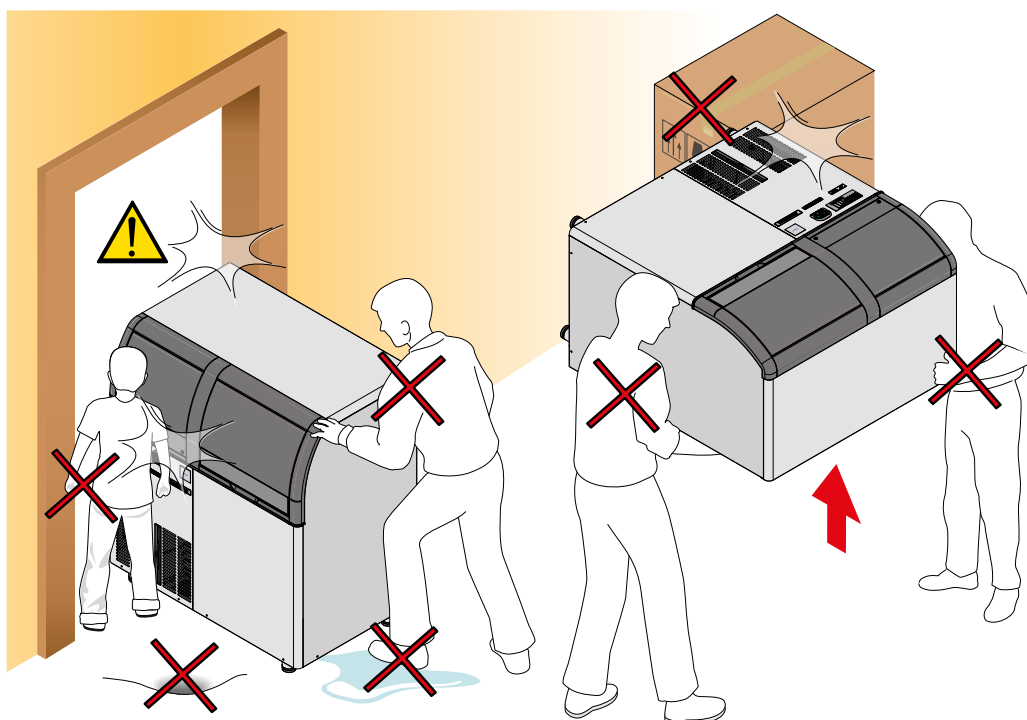
- by professionally qualified personnel, authorised and trained for the performance of these tasks and in **full possession of their physical and mental capacities**;
- **wearing all the appropriate PPE - Personal protective equipment**;
- **keeping the appliance in the vertical position**. If this is not possible, wait **24 hours** before putting it into operation;
- after ensuring that **no persons or objects** that may prevent the activities from being carried out in full safety are present in the working area;
- after ensuring that the **floor is smooth**, perfectly level, free of bumps and obstacles, and not slippery.

F02 Appliances must NOT be moved:

- manually;
- with straps;
- pulling or pushing them.



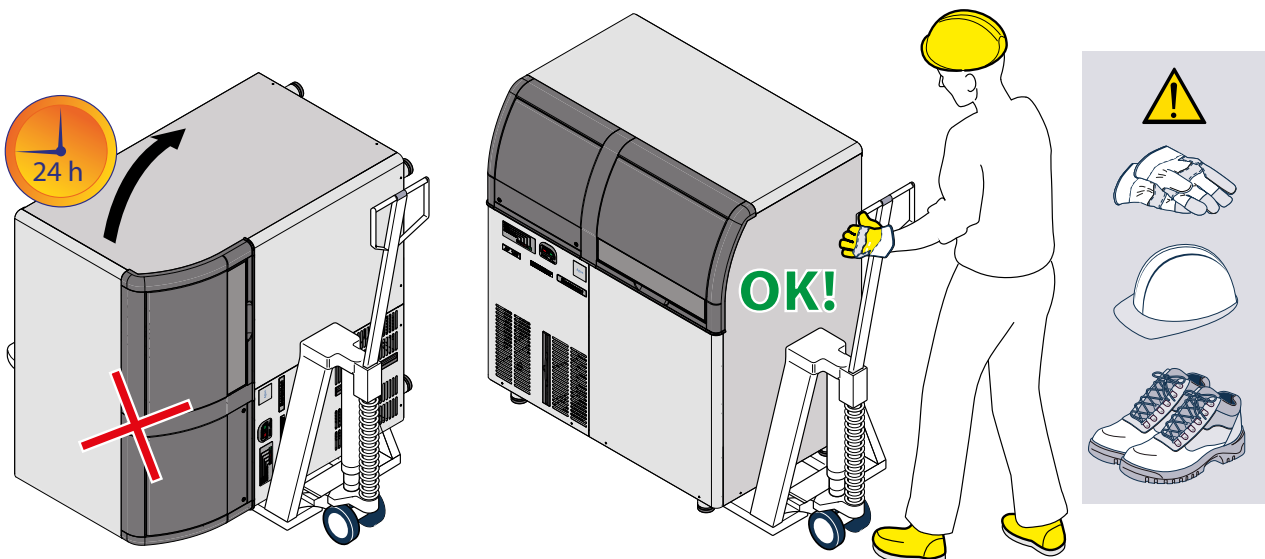
To find out the weight of the appliance being transported, please refer to the model data sheet, which can be downloaded using the QR code.



Correct transport of the appliance

F03 Insert the forks of a **pallet truck** suitable for the weight of the appliance under the **sides** of the same, taking care not to damage the bottom. Raise the appliance high enough so that it can be moved easily and take special care to balance the weight, as the centre of gravity does not coincide with the geometric centre of the appliance. Pay attention to the inclination when moving; **always keep the appliance in the vertical position**. If this is not possible, wait **24 hours** before putting it into operation. When handling the appliance using a **pallet truck or forklift truck**, insert the forks on the inside of the feet (if present). In case of mistake, do not try to counteract the load but drop it.

- Lifting equipment (pallet trucks, forklift trucks, etc.) must be suitable for the masses, dimensions and movements to be carried out.
- When lifting each part, make sure to use lifting equipment with a lifting capacity that is at least 20% greater than the weight of the part.
- ⊘ It is forbidden to make modifications on one's own initiative or to use makeshift means to secure and lift machine parts.
- ⊘ The use of lifting equipment other than that specified in these instructions is prohibited.
- ⊘ No person should be in the vicinity of the machine during transport, except the person transporting it.



POSITIONING

Installation Warnings

The installation of the machine must **ONLY** be carried out by authorised and qualified personnel.

This manual discusses the assembly instructions for various appliances, although only some of the currently available models are indicated.

Unless expressly otherwise specified, **the instructions are valid for all models.**

Appropriate personal protective equipment must be worn during the installation operations.

The installation location must meet the minimum installation requirements indicated by the manufacturer.

The machine must be installed following the methods and meeting the requirements described in these instructions, as well as allowing for the required free surrounding spaces.

The installer must assess the installation position of the machine and equipment in such a way as to ensure that the assembly and disassembly of its various components is simple and convenient, and guarantee the necessary clearance and access to the machine for maintenance purposes.

Preliminary Operations

CHECK OF THE SUPPLIED COMPONENTS

Check that all the components required for the installation have been received and are in good condition.

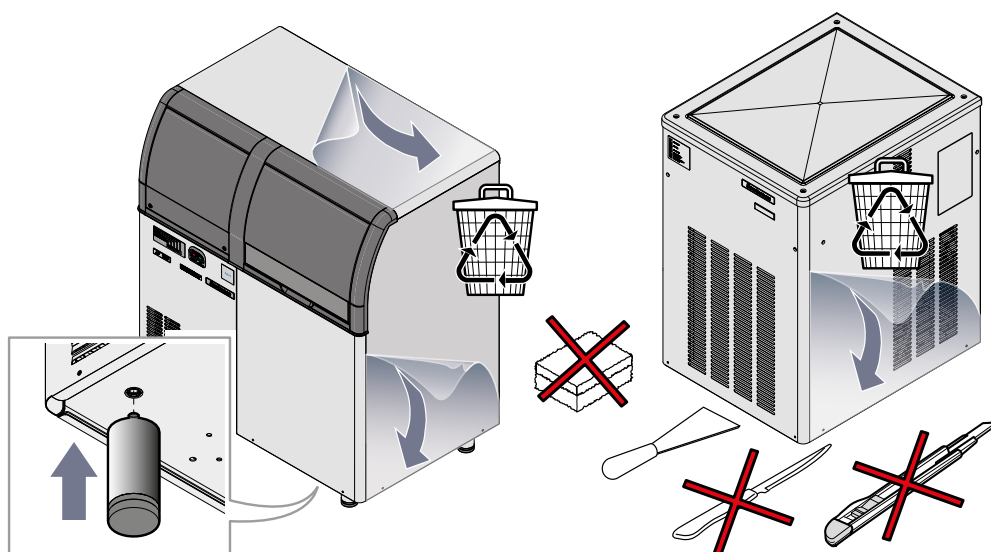
If any are missing, do not proceed with the installation but promptly inform the manufacturer or dealer.

REMOVAL OF THE PROTECTIVE FILMS

F04 Slowly peel off the protective films from the appliance. Clean any glue residues with a suitable solvent without using tools or abrasive or acid detergents, which could damage the surfaces. Once removed, protective films must be kept out of the reach of children or animals, as they are potentially dangerous, and properly disposed of according to local regulations.

MOUNTING FEET

F04 Models are normally supplied with feet (except MF | MFN): these must be fitted at the time of installation by screwing them tightly onto the fittings at the base.



MINIMUM DISTANCES TO BE RESPECTED

F06 Install the appliance:

- so that the electricity and water connection points are at easy reach;
- leaving the spaces indicated in the figure from any walls or other neutral appliances;
- at a distance of about **15 cm** from hot appliances (e.g. fryers, ovens, hotplates, etc.).

Always ensure that the position chosen for the installation allows for the convenient and easy removal of ice cubes and that there is sufficient space for daily cleaning and extraordinary maintenance (e.g. repairs).

Also check that there are NO curtains or obstacles in the vicinity of the appliance that could obstruct or prevent proper air circulation through the ventilation slots.

POSITIONING

AF | EF | AFC | EFC series appliances

Appliances must **only be placed on the floor**.

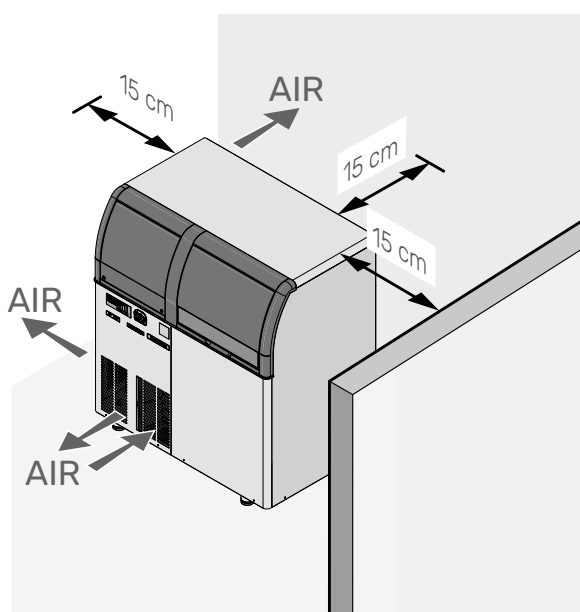
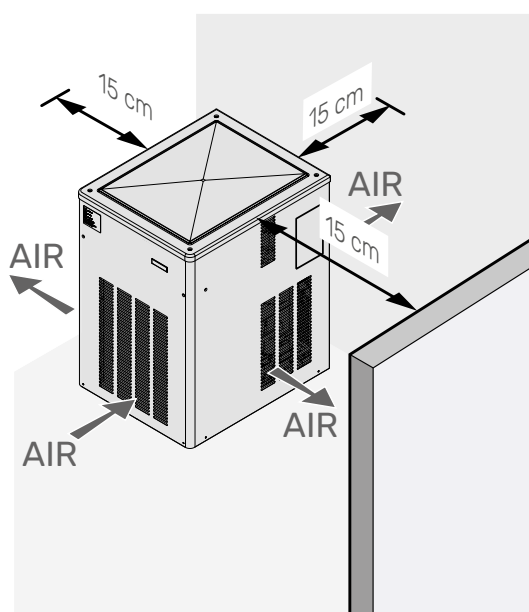
The floor on which the machines (AC | EC series) rest must be flat, smooth, fireproof and have the technical and structural characteristics to support the weight of the appliance and the ice cubes produced.

Slight unevenness of the floor can be compensated for by adjusting the feet of the appliance, rotating them until perfect levelling is achieved.

If, due to severe unevenness or slopes in the floor, the appliance cannot be set perfectly level, operation and drainage may be impaired!



Caution! Do not install the machine on containers with an area lower than the base of the machine.



CONNECTIONS

Connection warnings

The appliance requires the following connections to the systems inside the room:

- **water connection** (1 or 2 water ports depending on the machine install);
- **electricity connection.**

● All connections must be completed by qualified personnel, wearing personal protective equipment (e.g. gloves, safety shoes, etc.), in accordance with the regulations in force in the country of use and in compliance with the regulations on installations and safety at work.

Consult the rating plate

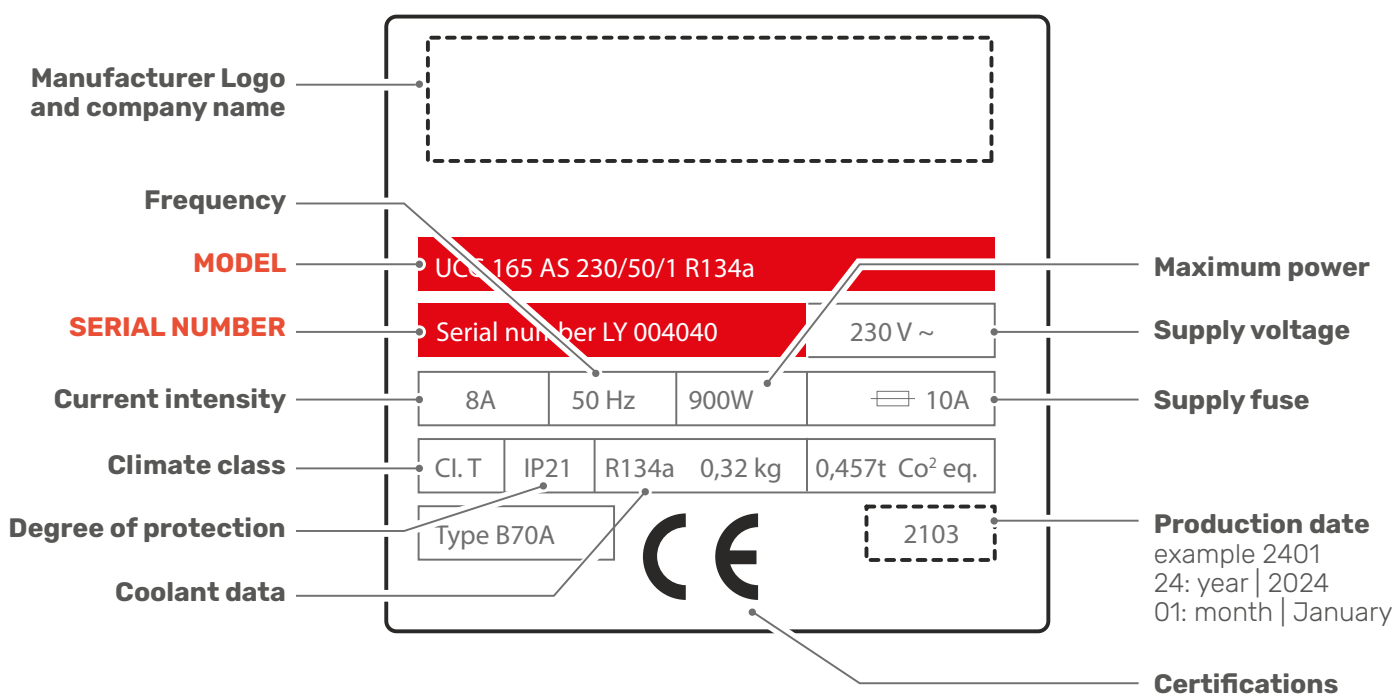
F07

Before completing the connections, it is necessary to **check the details** of the appliance to ensure that they match those of the system; all data can be found on the rating plate **located on the back of the equipment.**

The rating plate provides important technical information, which are also indispensable in the event of a request for maintenance or repair of the appliance. It is therefore recommended not to remove, damage or modify it.

Machine: Ice Maker Series AC | EC | MXG
Manufacturer:

Scotsman Ice Srl - Via Lainate 31
20005 Pogliano Milanese - Milano - Italy
Phone: +39 02 93960 208
Fax: +39 02 93960201
sales@scotsman.it



Water connection

Before connecting the appliance to the water mains, it is mandatory to carefully read the safety instructions on page **4** of this manual.

The following are supplied with the appliance:

Air models

- 1 reinforced plastic hose with 3/4" female fitting
- 1 X 20 mm diameter water outlet pipe, not threaded

Water models

- 2 or 3 reinforced plastic hoses with 3/4" female fitting;
- 1 or 2 20 mm diameter water outlet pipe, not threaded;
- 1 "Y" fitting (if present).

CONNECTION TO THE WATER MAINS

The position of the inlet ports is different depending on the model. Refer to the data sheet of the appliance to be installed.

Air-cooled models

The appliance requires the following water connections:

- 1 3/4" connection to the water mains in order to fill the machine with the drinking water required for making ice cubes.

Water-cooled models

The appliance requires the following water connections:

- 1 3/4" connection to the water mains in order to fill the machine with the drinking water required for making ice cubes;
- 1 3/4" connection to the water mains to load the water (not necessarily of drinking quality) required for the water condenser.

In both cases, install a shut-off tap (not supplied) at the water ports, so that the appliance can be isolated when necessary.

CHARACTERISTICS OF INLET WATER

Water is the only ingredient for making ice; therefore, the characteristics of the incoming water must not be neglected. For example, a supply water pressure of less than 1 bar can cause malfunctions in the appliance.

The use of excessively mineralised water could result in the production of opaque ice cubes and considerable fouling of the internal parts of the water circuit.

The incoming water must have the following characteristics:

- be **potable** (only the water used to create the ice cubes);
- have a **temperature** between 5°C and 38°C;
- have a **maximum conductivity** of 100µ S/cm
- have a **maximum hardness** of 17.8 °f (French degrees) | 10°dH (German degrees) and a minimum hardness of 7.12 °f (French degrees) | 4°dH (German degrees); if the water hardness is higher, use a water softener (not supplied). The choice of the type of softener is the responsibility of the installer.
Damage to components due to limescale deposits is not covered by the warranty;
- have a **pressure** value between 1 Bar and 5 Bar.
If the inlet pressure is lower than the indicated value, use a pump with a suitable flow rate (minimum flow rate 300 l/h); if it is higher, use a pressure reducer.

DRAIN CONNECTION

The position of the drains differs depending on the model. Refer to the data sheet of the appliance to be installed.

F08 Connect to the **ø 20mm "A" fitting "T" drain pipe** made of rigid plastic and with a 18 mm internal diameter as extension (not supplied).

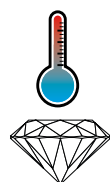
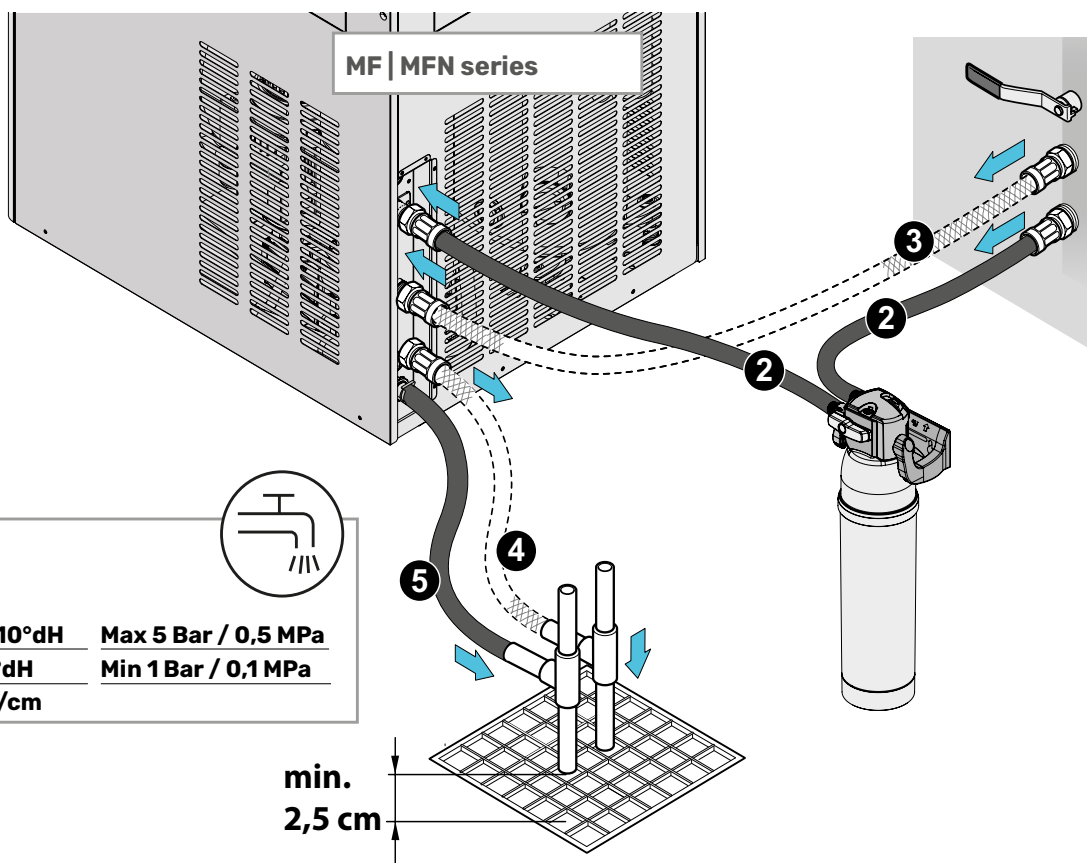
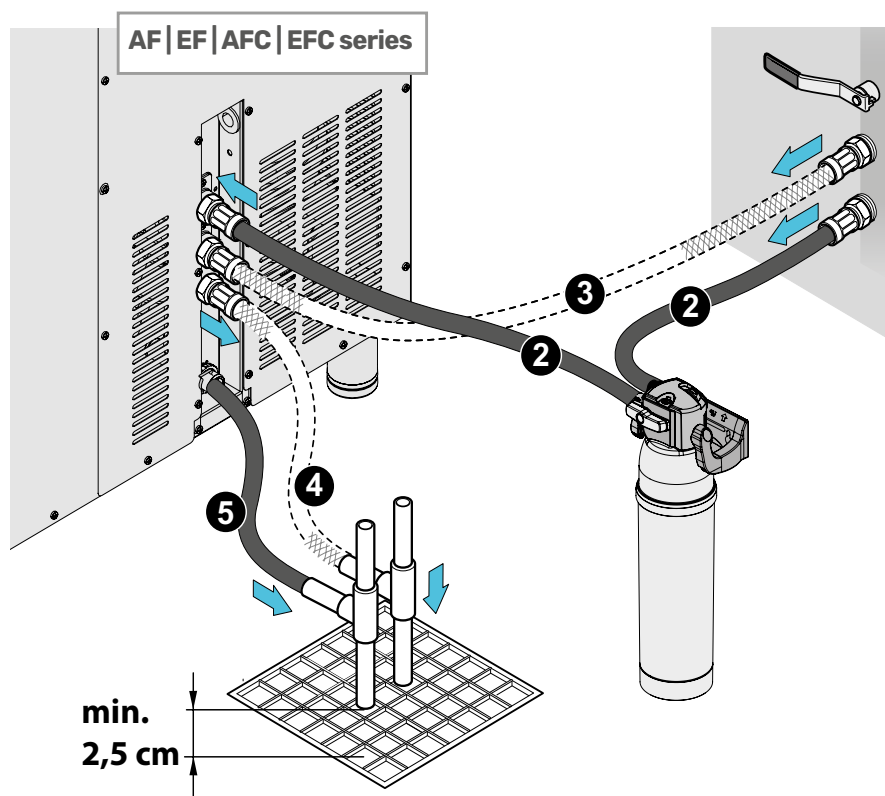
The discharge of excess water takes place by gravity; to ensure a regular outflow, it is essential that the drain has an air vent and goes into an open siphon. The choice of the type and the fixing method is the responsibility of the installer; it is advisable to have a length and slope such to allow the proper drainage of condensate and to install a siphon.

An air gap of 2.5 cm must be maintained between the exhaust pipe and the evacuation area (grating or other receiving pipe). This ensures that potentially dangerous bacteria are NOT able to travel up the drain and contaminate the appliance.



Water-cooled appliances only

Water-cooled appliances require a separate water drain line to be connected to the 3/4" fitting marked "Water drain - water-cooled only".

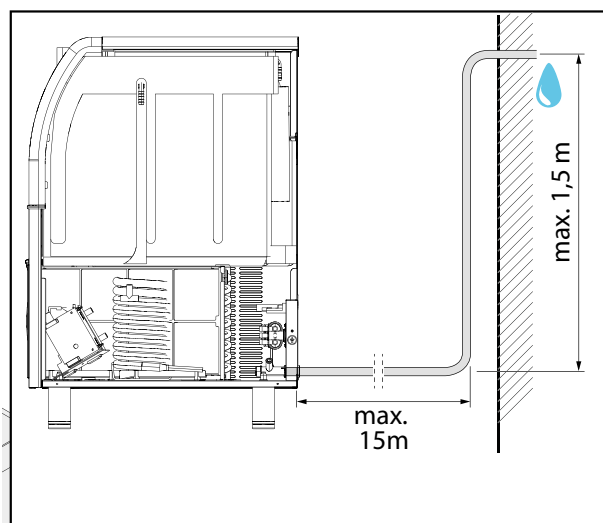
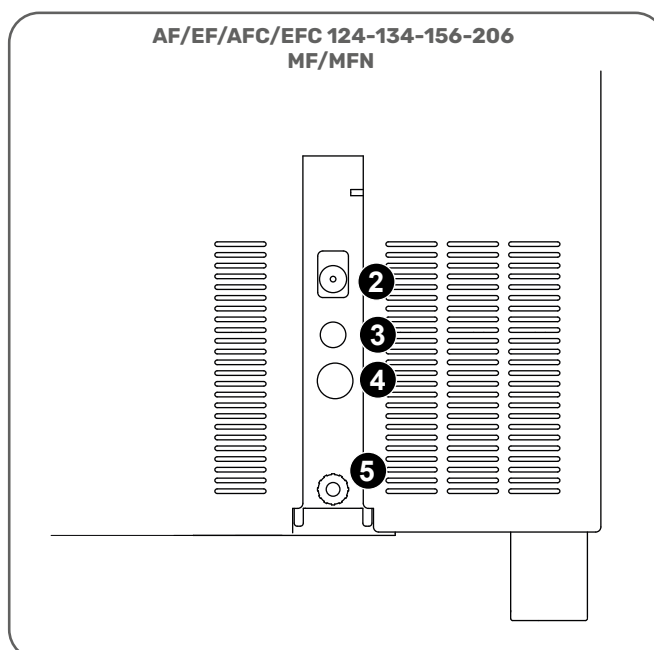
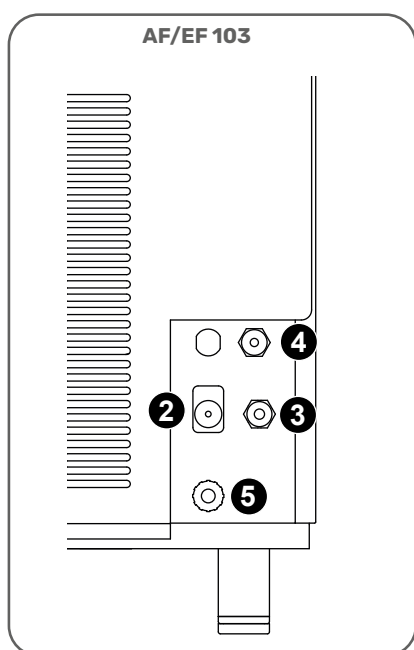
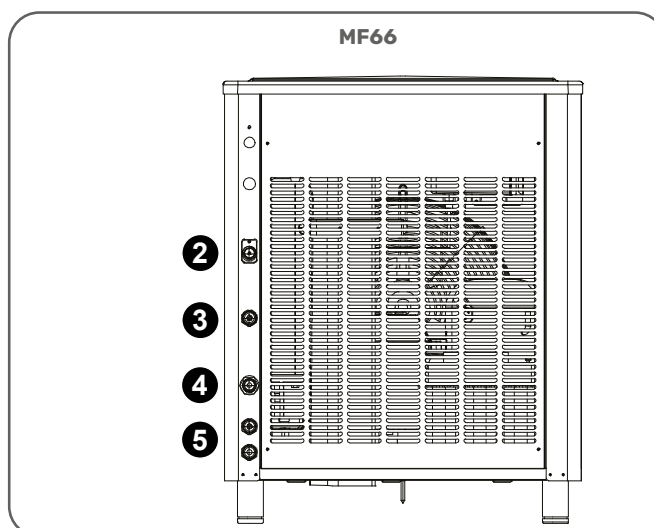
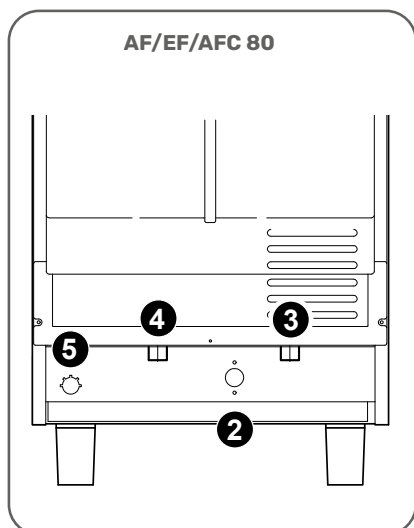


Max 38°C
Min 5°C

Max 18 °f | 10°dH
Min 7 °f | 4°dH
Min 100µ S/cm

Max 5 Bar / 0,5 MPa
Min 1 Bar / 0,1 MPa





For EF | EFC series appliance only

EF | EFC appliances have a pump to drain the water built into the machine; this is useful if there is no drain available near the machine.

The maximum distance between the pump and the ice maker is **15 metres** and approx **1.5 metres** in height.

Electrical connection

SAFETY WARNINGS

Before making any electrical connections, it is mandatory to carefully read the safety instructions on page **4** of this manual and always compare the system data with the data on the rating plate.

● The connection to the power supply network must comply with the regulations in force in the country where the appliance is installed and must be carried out by **qualified personnel authorised by the manufacturer**. Failure to comply with these requirements may result in damage and injury, invalidates the warranty and releases the Manufacturer from all liability.

For the connection **do not use adapters or multiple sockets. It is not possible to lengthen or join** the power cable in any way. **Do not roll up** the cable on itself if it is too long, and take care that it is not pinched, crushed or in the way of people passing by.

The connection system must:

- have a **maximum voltage variation** of +/-10% from what indicated on the rating plate (low voltage can cause abnormal operation and can result in serious damage to protections and electrical windings);
- have suitable **earth connection**  using a single seamless cable, not even interrupted by the circuit breaker. The yellow/green earth conductor must be at least 10 mm longer than the other conductors;
- have a **thermal-magnetic ON/OFF switch** easily accessible, with appropriate fuses (see rating plate) and with a contact opening distance such as to ensure complete disconnection in case of category III overvoltage conditions. Disconnection devices must be incorporated into the power supply in compliance with the installation rules. This switch is necessary to cut off the power supply to the machine if it is directly connected to an electrical panel or if its plug is positioned in a place that is difficult to access.

Each appliance must also be part of an efficient **equipotential system**  which complies with the regulations in force in the country of installation.

● Replacement of the power cable, if necessary, should only be carried out by a qualified and authorised technician. The cable may only be replaced with one of similar characteristics.

CONNECTION TO THE POWER GRID

The appliance can be supplied:

- with power cable and plug or
- with power cable without plug.

APPLIANCES WITH POWER CABLE AND SHÜKO PLUG ALREADY FITTED

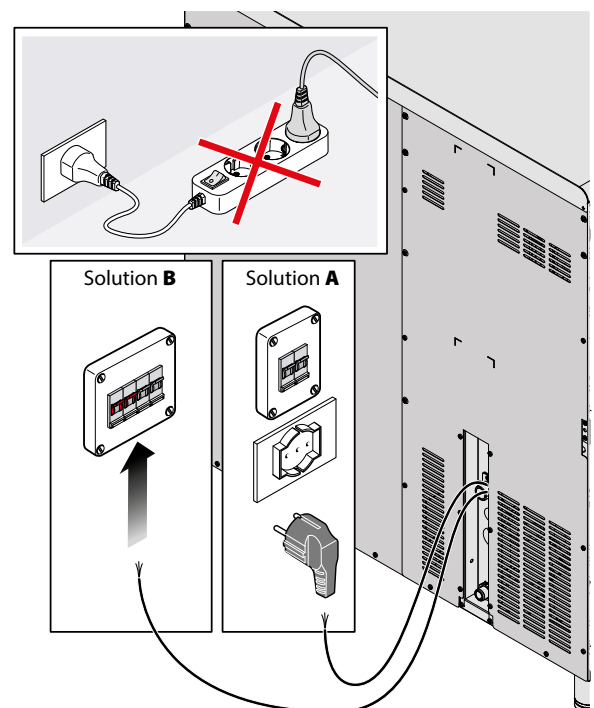
F10 To connect the appliance **with power cable e shüko plug already fitted**, simply insert their plug into a socket with a capacity appropriate for the electrical characteristics of the machine, which can be found on the rating plate.

APPLIANCE WITHOUT A PLUG FITTED

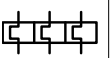
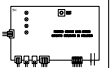
The connection must be carried out by qualified personnel in one of two ways:

- by fitting a **plug** appropriate for the electrical characteristics of the machine;
- by connecting to an **electrical panel** that complies with the regulations in force in the country where the appliance is installed.

All electrical data can be found in the data sheet of the appliance to be installed.



WIRING DIAGRAMS | **LEGEND**

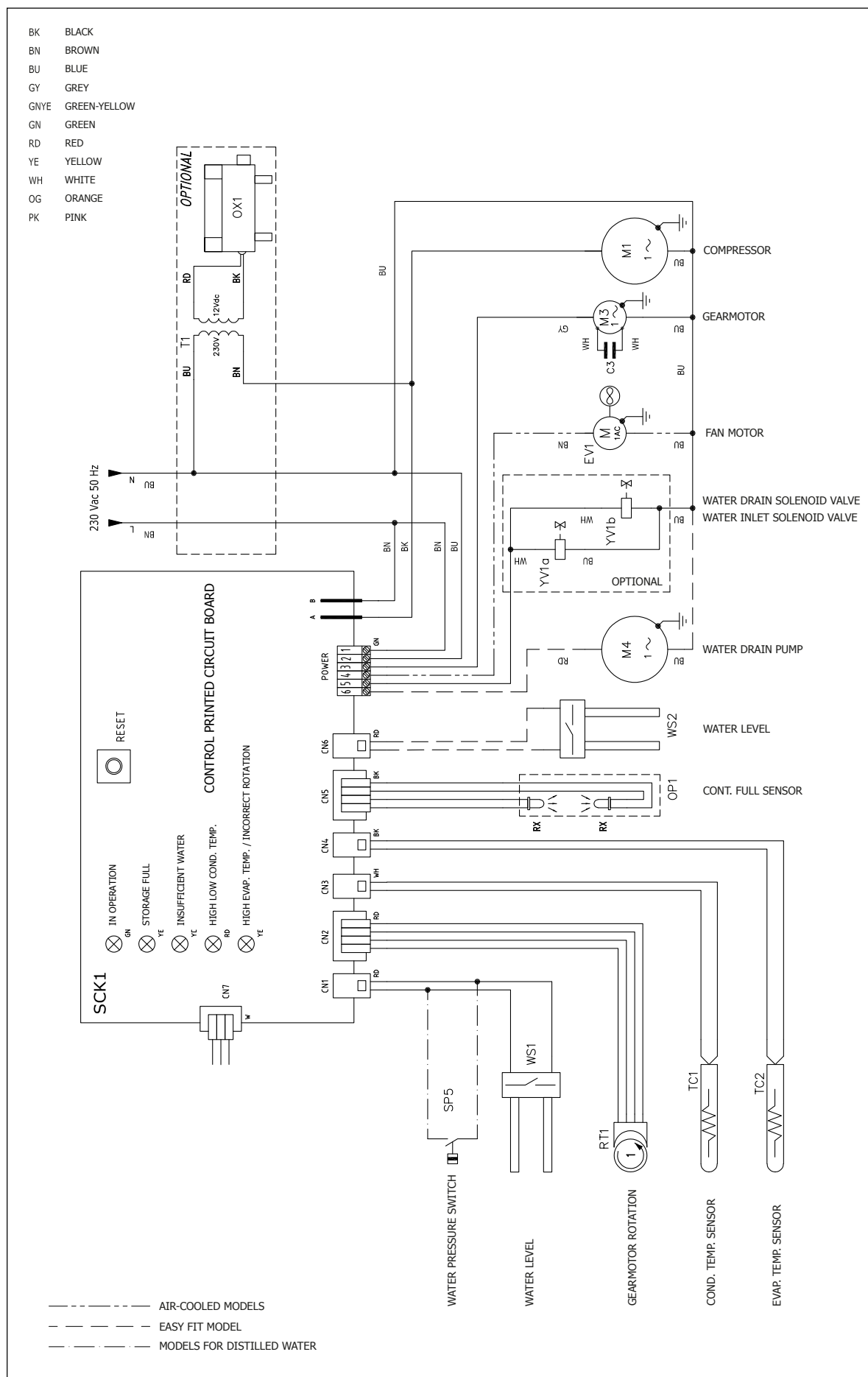
	C1	Fan operation condenser
	EV1	Fan
	FN1	Fan speed controller
	HL2	High pressure alarm
	KA1	Liquid solenoid valve relay
	KM1	Compressor contactor
	M1	Compressor
	M2 M2a M2b	Water pump
	M3	Water drain pump
	NF	Noise filter
	OP1	Container full sensor
	OX1	XSafe device
	QM1	Compressor thermal protector
	R1	Compressor heater
	SA1	Main switch
	SB1	Reset button
	SCK1	Control printed circuit board
	SK1	PWC control board
	SP1	Water pressure switch
	SP2	Fan pressure switch
	SP3	High-pressure safety pressure switch
	ST1	High-temperature control thermostat
	ST2	Storage thermostat
	ST3	Evaporator thermostat
	T1	230V/12Vdc transformer
	TC1	Condenser temperature sensor
	TC2	Evaporator temperature sensor
	TM1	Electronic timer
	WS1	Water level sensor
	YV1	Condenser water solenoid valve
	YV2 YV2a YV2b	Water inlet solenoid valve
	YV3 YV3a YV3b	Hot gas solenoid valve
	YV4 YV4a YV4b	Water drain solenoid valve
	YV5	Condenser valve
	X1	Connector

BN	brown
BK	black
BU	Blue
GY	grey
GNYE	yellow-green
GN	green

YE	yellow
OG	orange
PK	pink
RD	red
WH	white

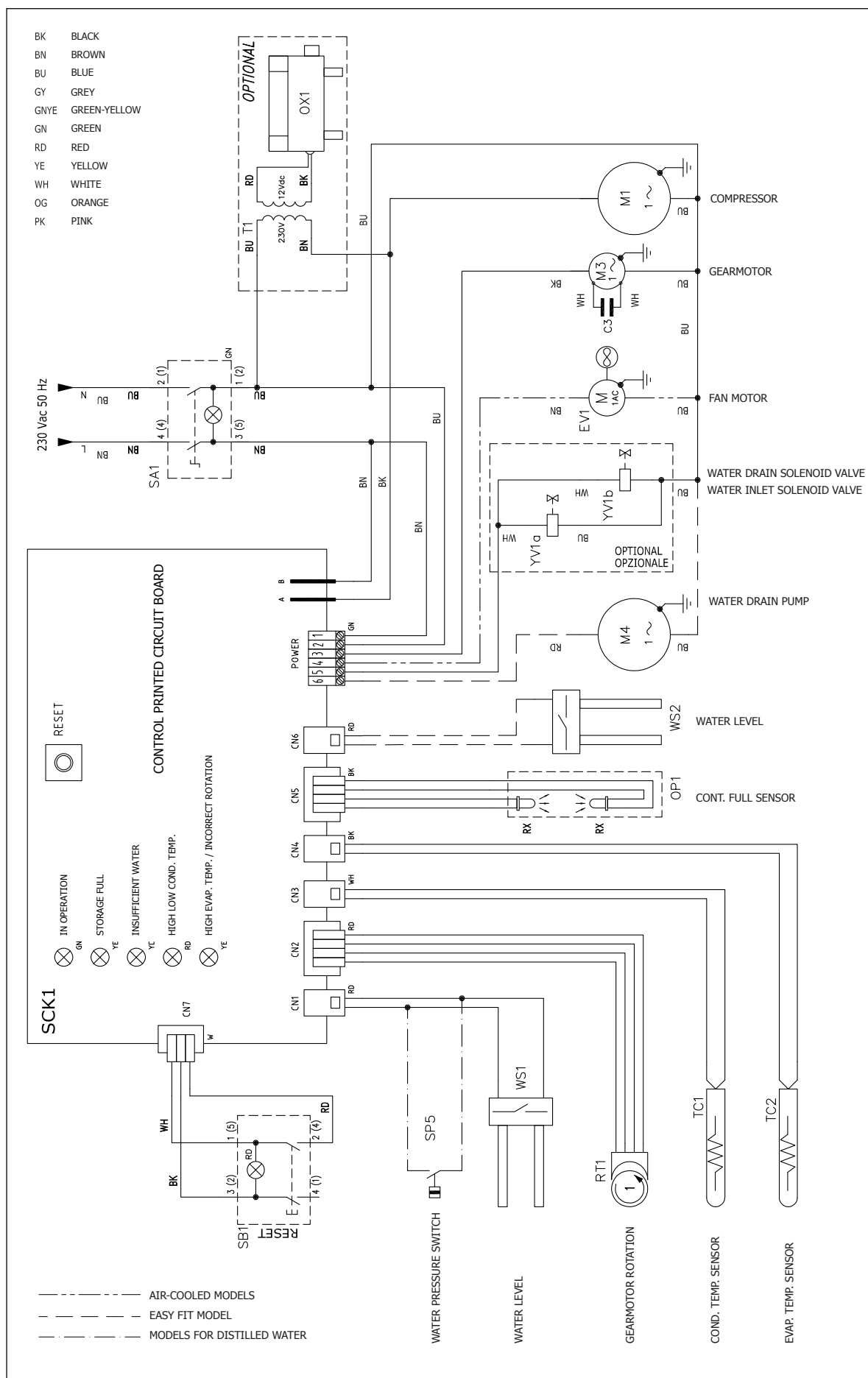
WIRING DIAGRAM **AF EF 80/ 87 / 103 / 107 / 127 /137 /157/207 - MF-26 / 36/ 37**

AIR AND WATER COOLING - 230/50-60/1

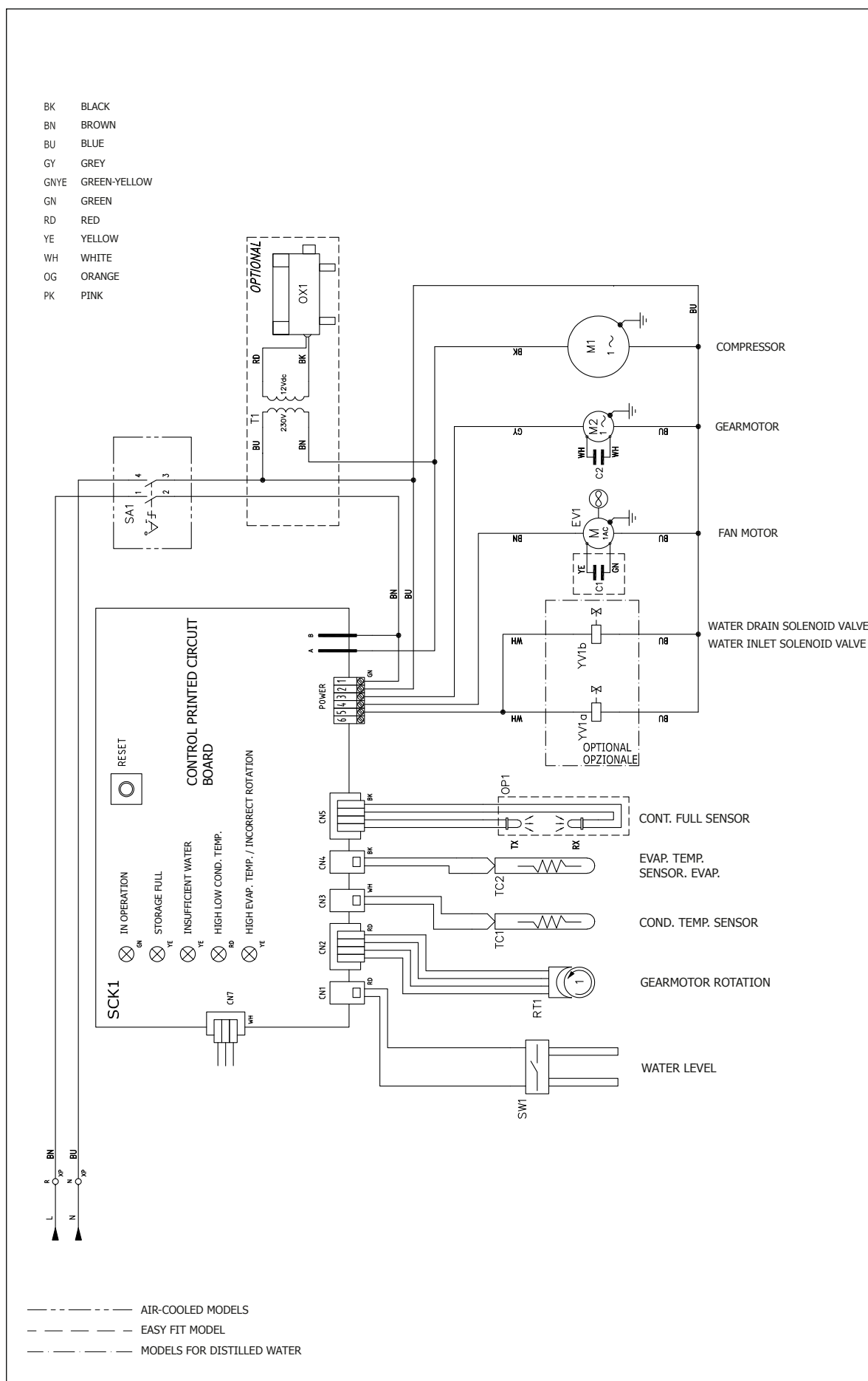


WIRING DIAGRAM **AF 124/AFC 134- AF 206**

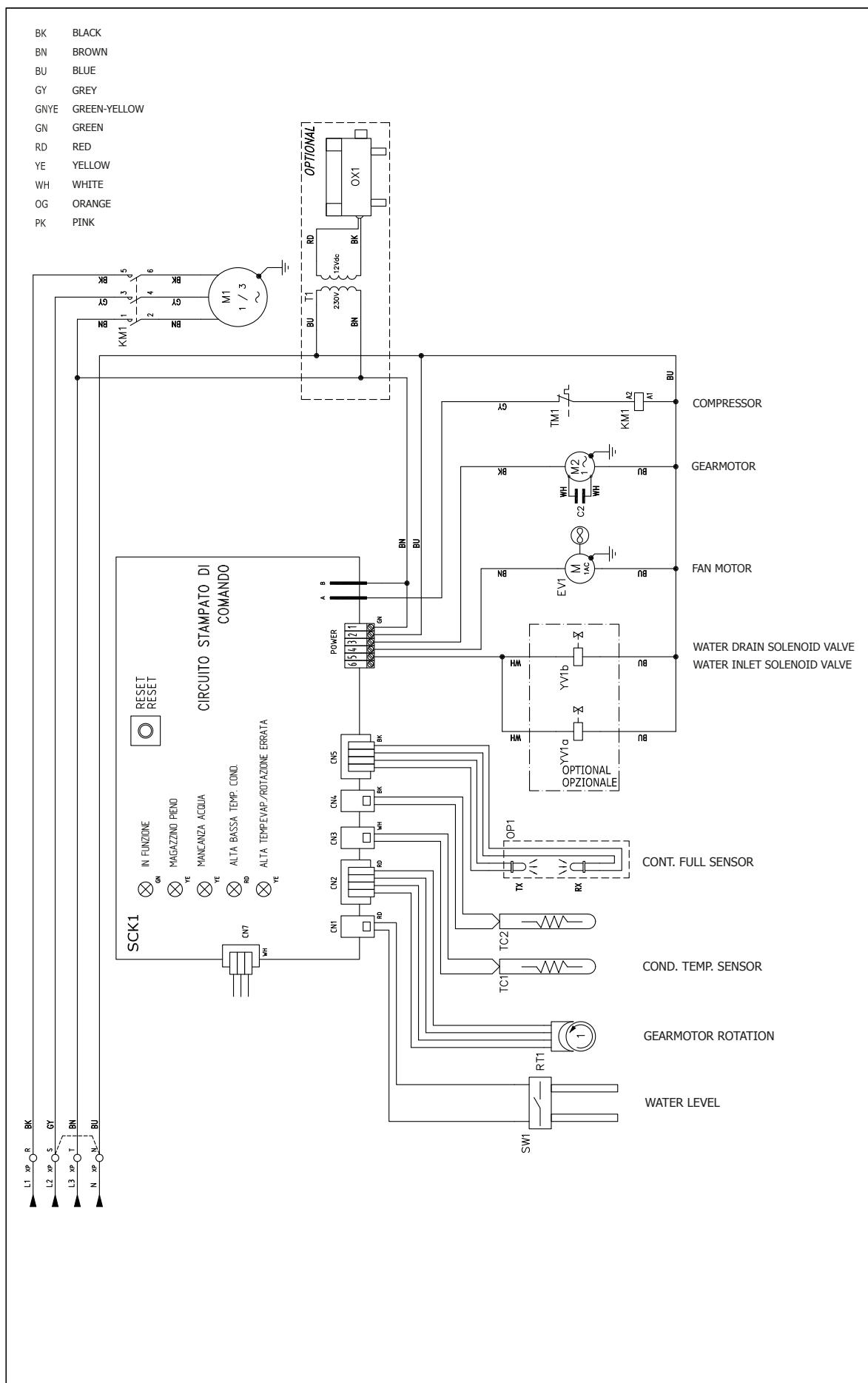
AIR AND WATER COOLING - 230/50-60/1



WIRING DIAGRAM **MF 46/56/47** AIR AND WATER COOLING - 230/50/1

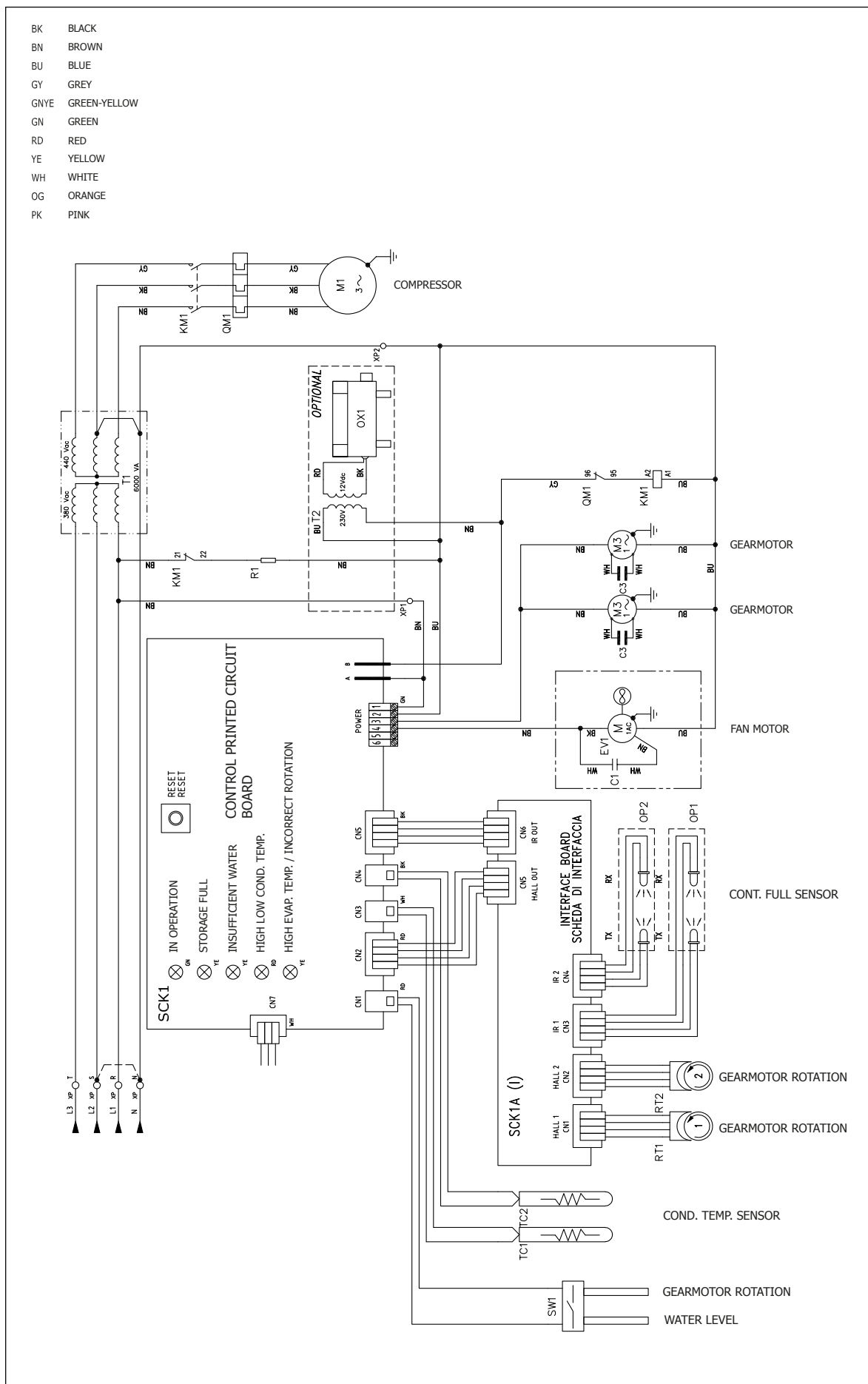


WIRING DIAGRAM MF **MF 46 - MF 56**
AIR AND WATER COOLING - 400/50/1



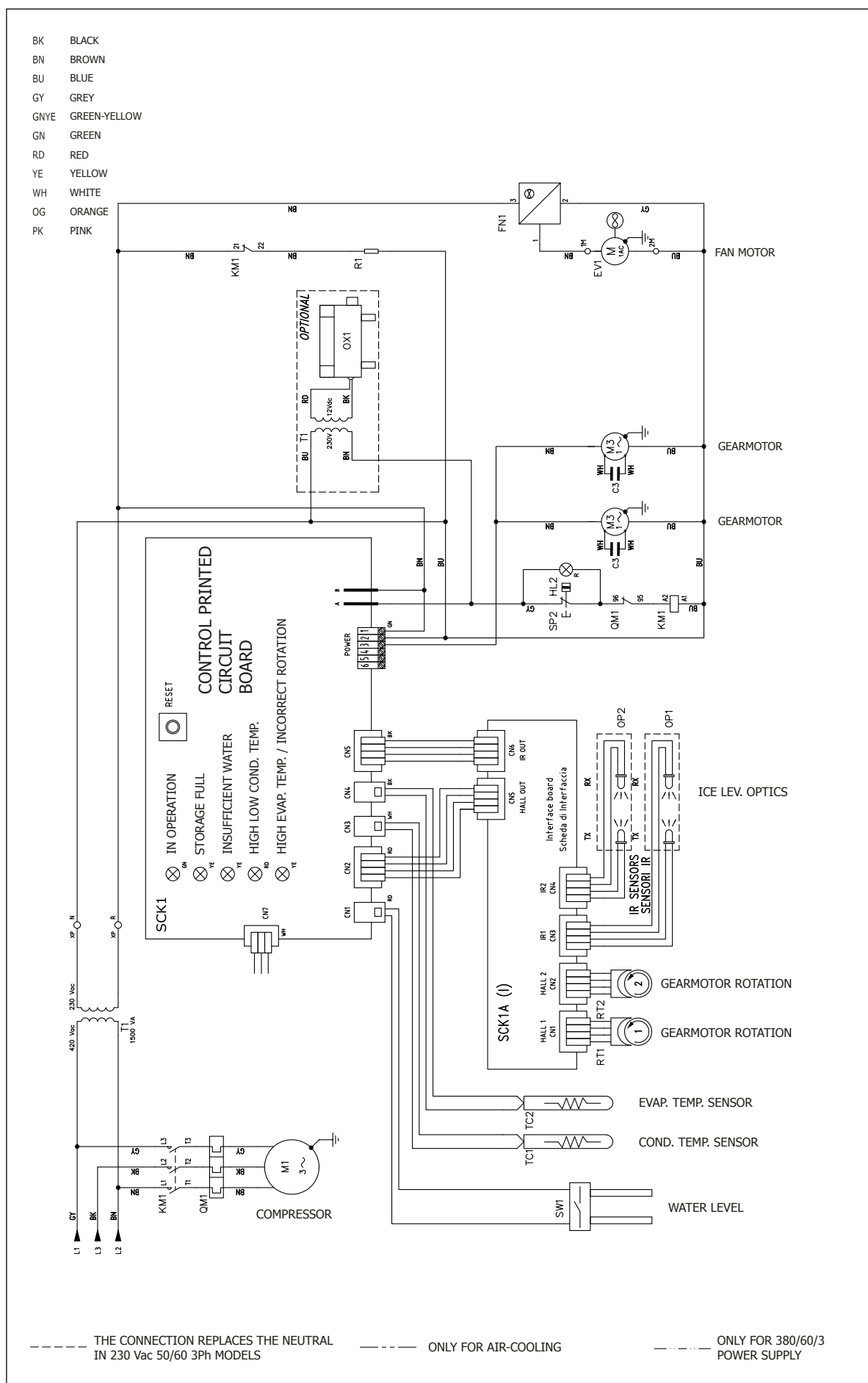
WIRING DIAGRAM **MF 66**

AIR AND WATER COOLING - 400/50/1



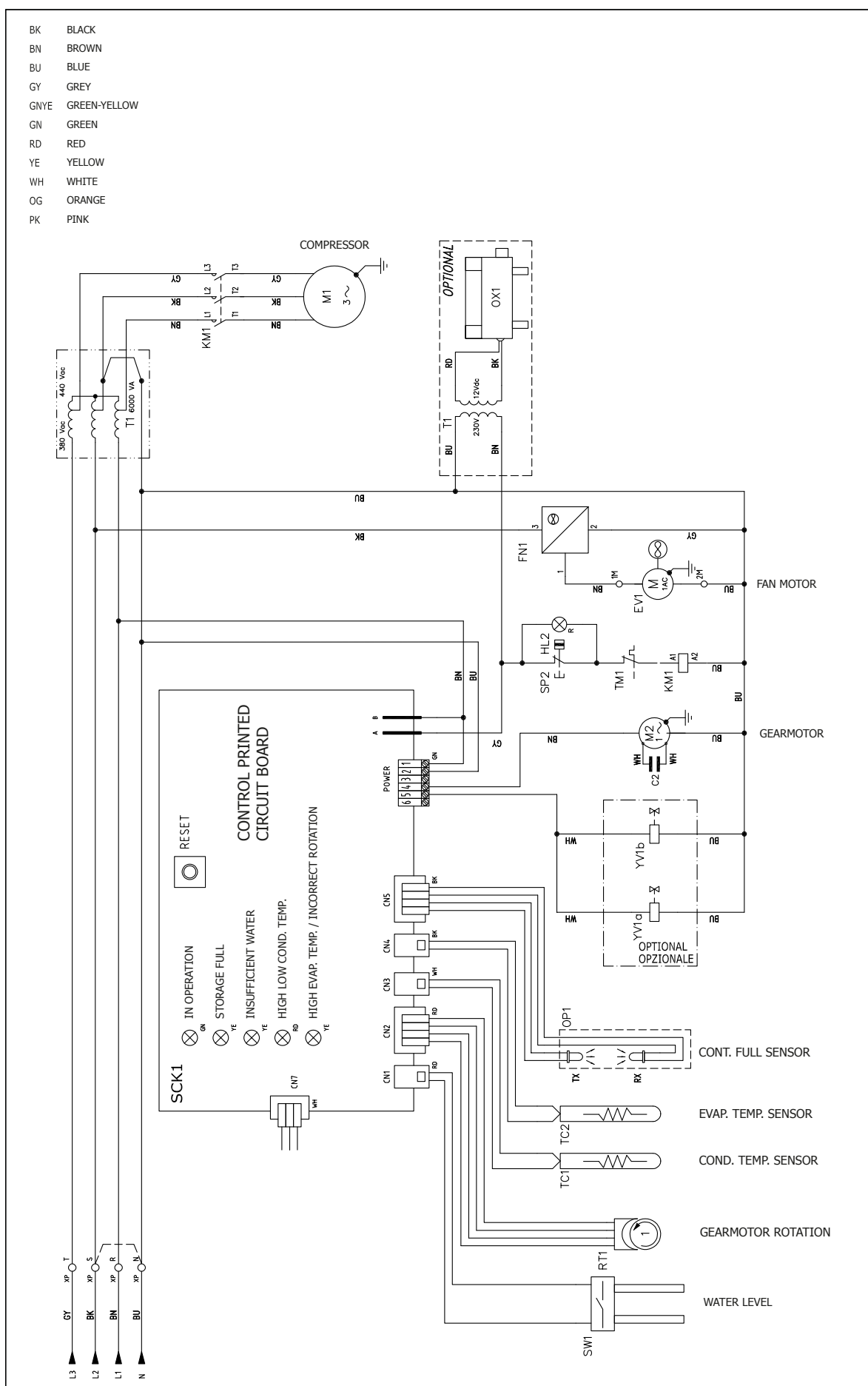
WIRING DIAGRAM **MF 66 RC**

AIR AND WATER COOLING - 400/50-60/1



WIRING DIAGRAM **MF 56 RC**

AIR AND WATER COOLING - 400/50/1



Refrigeration connections (MF models only)

Appliances with integrated air or water cooling units do not require any connection.

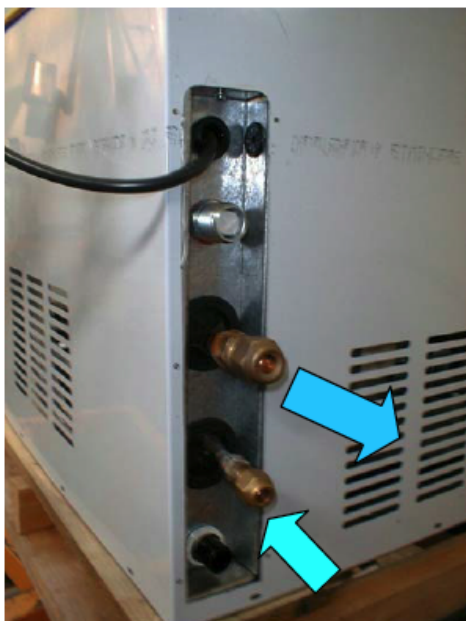
If, on the other hand, the cooling unit is separate, the connections with the machine must be completed by a technician authorised and qualified to do so.

The remote cooling unit can be placed on the floor, in the **horizontal** position (recommended), or on a wall, in the **vertical** position. Based on their experience and the wall or floor material, the installer will assess the correct installation method and choose the most suitable fixing screws (fixing screws not supplied).

ATTENTION - MF 58-68 models may NOT be connected to sub-cooled liquid units.

The refrigeration system of the new Granular MF 58-68 Split version consists of:

- Refrigerant inlet male threaded fitting (3/8")
- Refrigerant outlet male threaded fitting (1/2" MF 58 and 5/8" MF 68)



- Liquid solenoid valve



- Thermostatic expansion valve
(Flica TMVX Ø 2.0 mm - 2 pieces in MF 68)

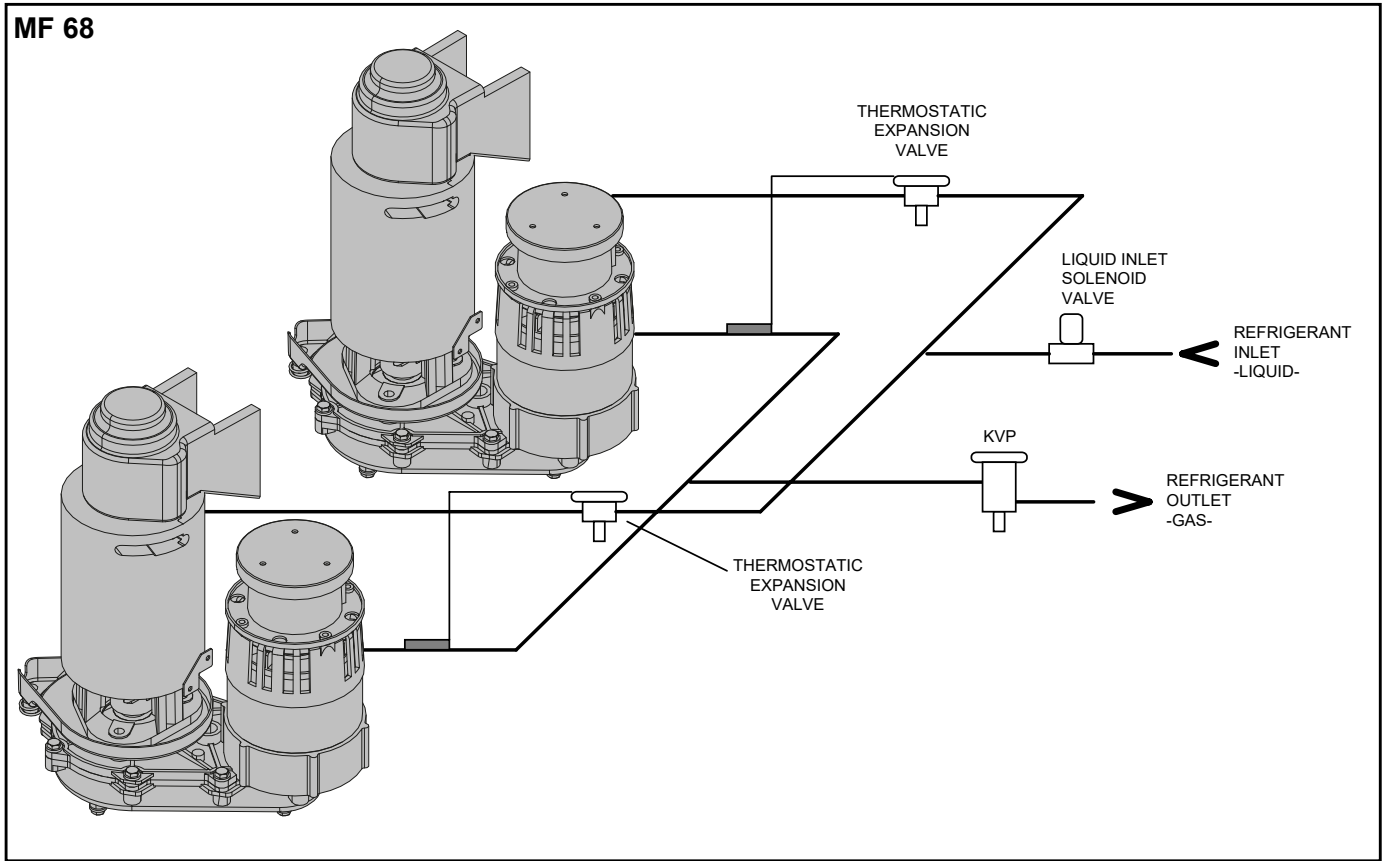
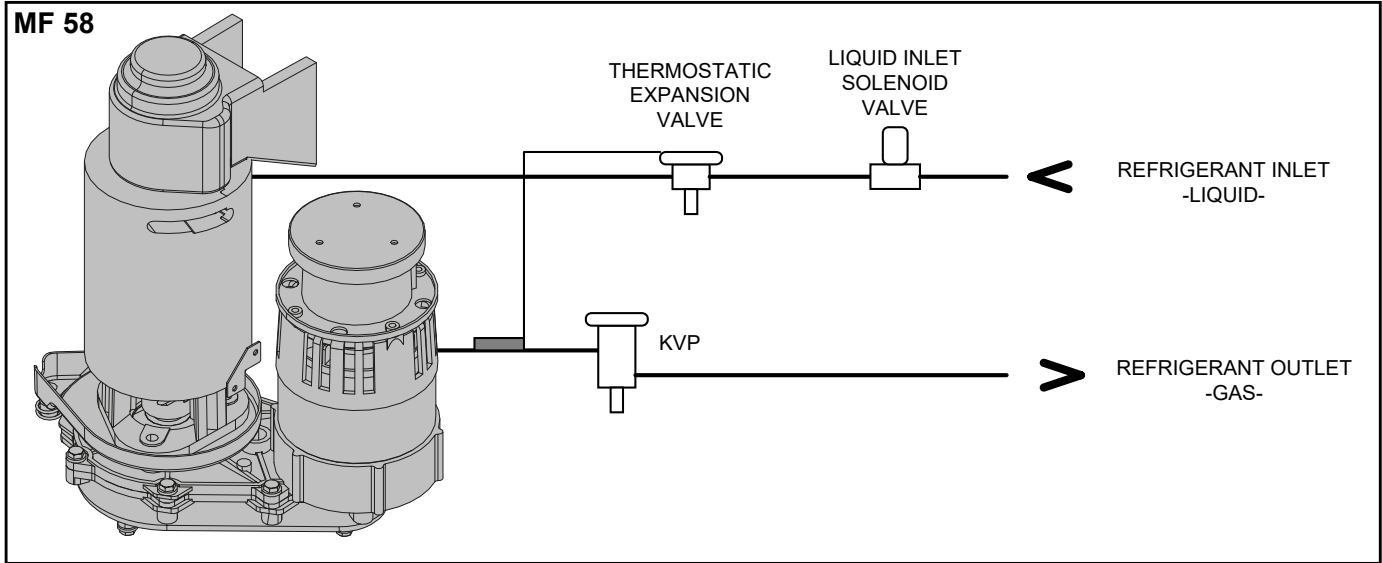


- Constant evaporation pressure control valve
(Danfoss KVP 12 in MF 58 and Danfoss KVP 22 in MF 68)

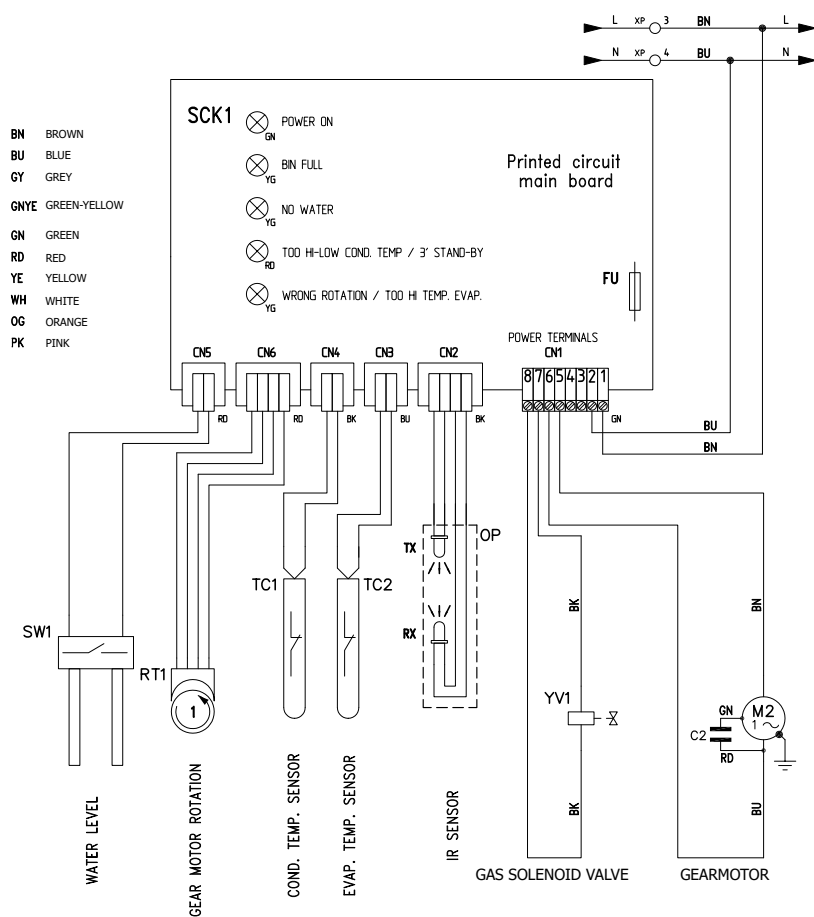


The refrigeration system is supplied completely sealed by means of two sealed copper plugs, and pre-charged with a limited amount of nitrogen.

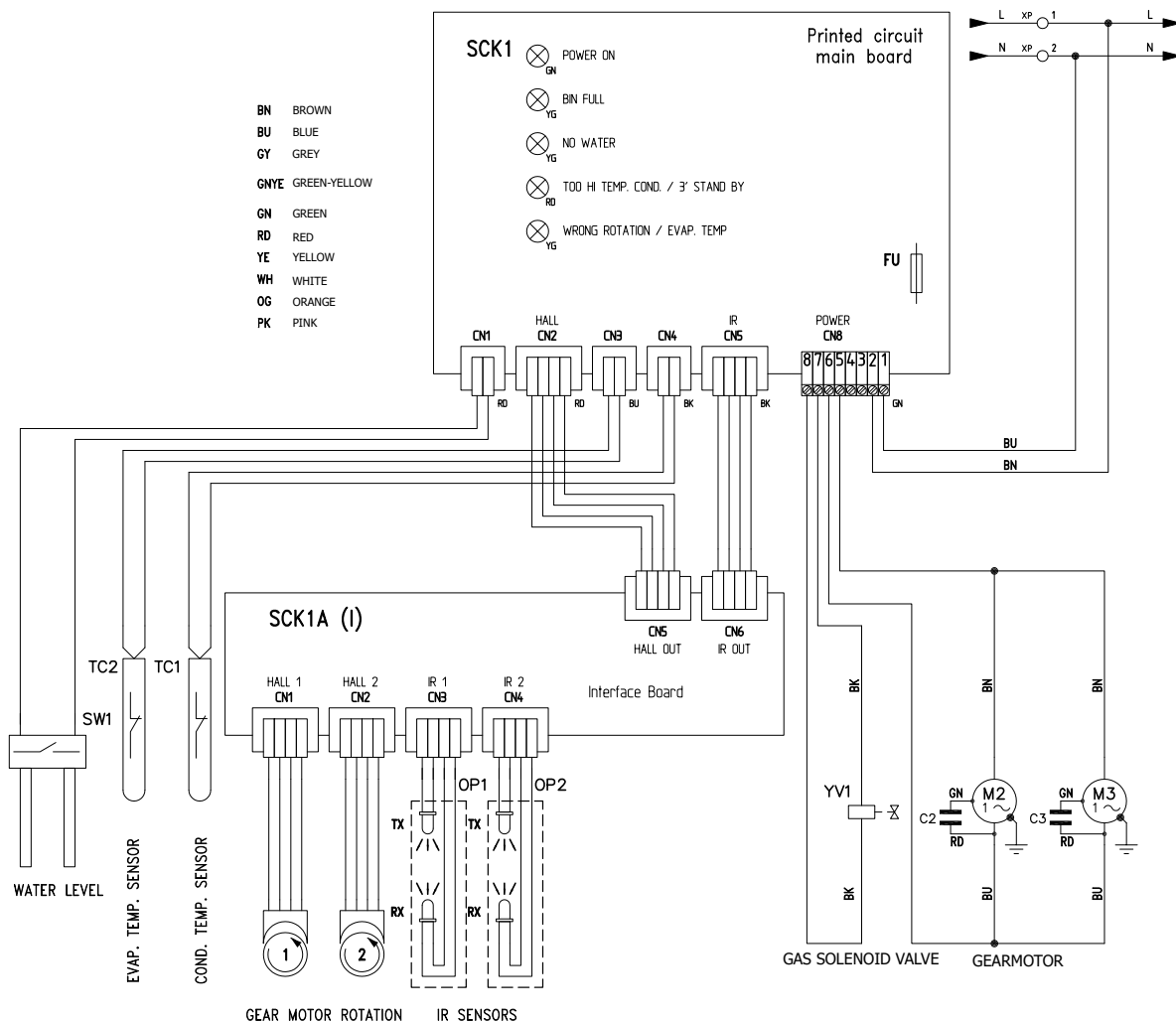
REFRIGERANT SYSTEM DIAGRAM



WIRING DIAGRAM MF58



WIRING DIAGRAM MF68



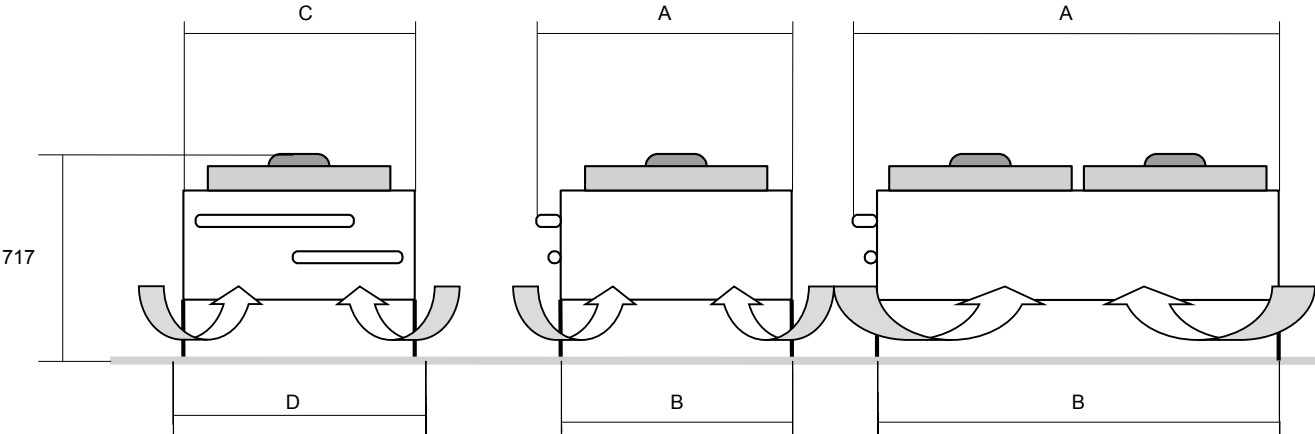
Refrigeration connections

Appliances with integrated air or water cooling units do not require any connection.

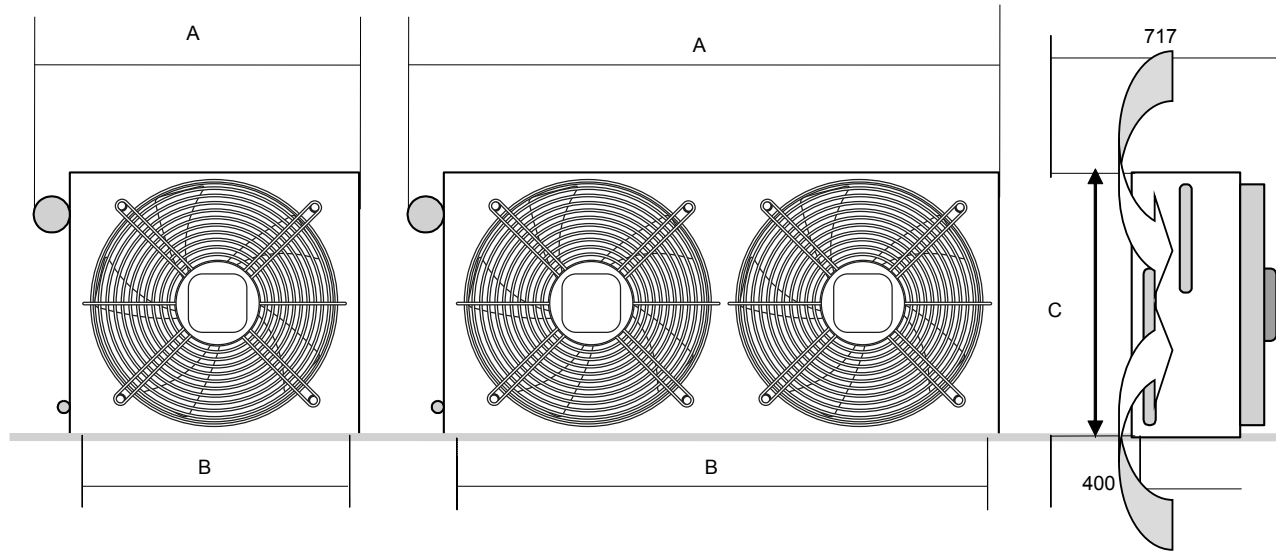
If, on the other hand, the cooling unit is separate, the connections with the machine must be completed by a technician authorised and qualified to do so.

The remote cooling unit can be placed on the floor, in the **horizontal** position (recommended), or on a wall, in the **vertical** position. Based on their experience and the wall or floor material, the installer will assess the correct installation method and choose the most suitable fixing screws (fixing screws not supplied).

HORIZONTAL INSTALLATION (RECOMMENDED)



VERTICAL INSTALLATION (RECOMMENDED)



	1 fan TKE351A2R.0370 RMTCND164656J	1 fan TKE351A4.0370 RMTCNDMF6100J	2 fans TKE352A4.0370 RMTCNDASK0000	1 fan LU-VE SHVN 5/8	1 fan LU-VE SHVN 6/3
A mm	600	754	1304	540	748
B mm	440	590	1140	445	556
C mm	415	614	614	463	578
D mm	445	594	594	N/A	N/A

MF 56	MF 66	MF 86
1080	2200	3500

REFRIGERANT CHARGE R404A (grams)

AIR-COOLED WATERPROOF REMOTE CONDENSER

Cube and granular ice makers with remote condenser are similar to the standard versions, with the sole difference of being equipped with the remote condenser and, in MF Series models, the electronic fan speed controller used to power the fan(s).

TECHNICAL SPECIFICATIONS

The air-cooled remote condenser must be mounted on the appropriate supports and installed horizontally or vertically

Cooling capacity with ΔT 15 K: 4.5 KW = MF 56, MV 456; 10.5 KW = MF 66; 20.5 KW = MF 86

Fan(s) 220-240/50-60 /1. 180 Watt - 0.8 Amp. IP 44 protection degree and airflow of 2150 m³/hour.

The remote condenser of the MF 66 and MF 86 models has two fans.

Ice makers are equipped with an **electronic fan speed controller** set at 16 Bar.

10 metre long pre-loaded coolant connection hoses are also supplied, fitted with AEROQUIP quick fittings at each end.

A **safety pressure switch** with manual reset set at 34 Bar (replacing the condenser sensor function) is used.

A warning light indicates the tripping of the safety pressure switch.

POSITIONING

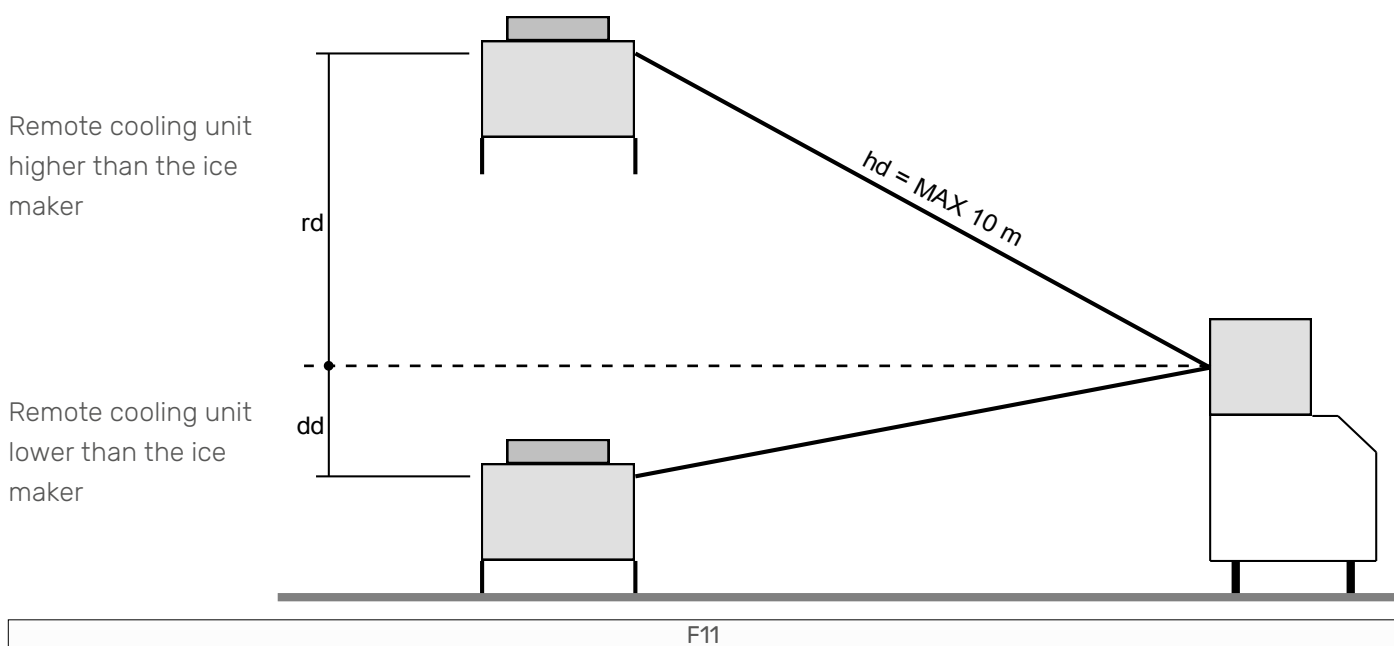
The remote refrigeration unit must be installed in an **indoor or outdoor location**, protected from dirt, dust and weather elements (e.g. rain, snow, etc.). Choose the best available location that is protected from dust/dirt.

Since the remote condenser is waterproofed, it can be installed outdoors as well as inside buildings, and can also operate in adverse weather conditions (rain, wind, snow, etc.).

Carefully follow the instructions below and use the calculation formula to define the correct positioning/distance between the remote condenser and the ice maker.

The positioning of the remote condenser **MUST** be within the following limits:

- Maximum vertical drop (dd) between ice maker and remote condenser = 1 Metre
- Maximum vertical rise (rd) between ice maker and remote condenser = 3 metres
- Maximum permissible length of the refrigerant connection pipes between the ice maker and the remote condenser = 10 metres

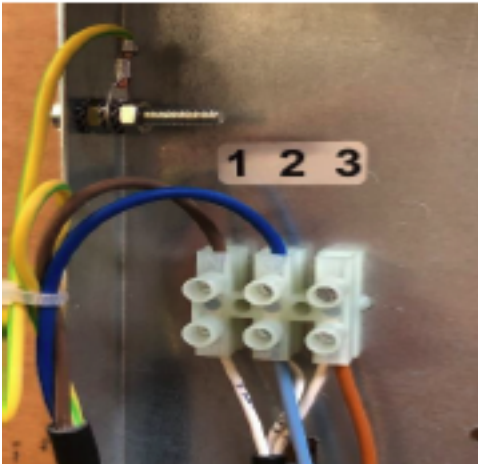


Keep the pipe route as straight as possible; allow for a maximum of one pipe rise and fall.

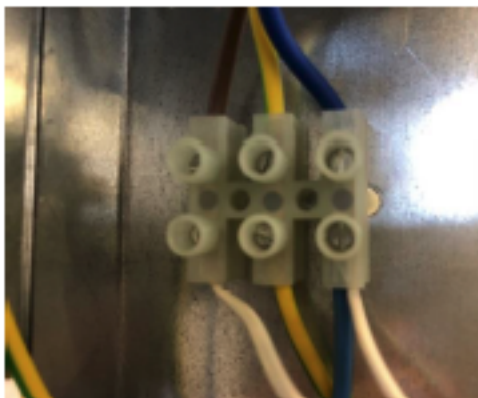
The maximum distance (CD) must be calculated using the following formula and must be within the limit of 18 metres.

$A = \text{fall} = dd \times 6.6$ $B = \text{rise} = rd \times 1.7$ $C = \text{horizontal path} = hd \times 1$ $CD = A+B+C$

ELECTRICAL CONNECTION



- Connect the BLUE wire of the remote condenser to the BLUE and WHITE wires (position 2) of the machine terminal board
- Connect the BROWN wire of the remote condenser to the WHITE wire (position 1) of the machine terminal board
- Connect the YELLOW/GREEN wire of the remote condenser to the earth screw of the machine frame
- Do not connect the terminal board to position 3



- Connect the BLUE wire of the remote condenser to the BLUE and WHITE wires of the machine terminal board
- Connect the BROWN wire of the remote condenser to the WHITE wire of the machine terminal board
- Connect the YELLOW/GREEN wire of the remote condenser to the wire of the same colour of the machine terminal board

NOTE: The connection cable between the unit and the remote condenser is 230 Volt. It is IMPERATIVE to properly insulate the cable in a metal or plastic sheath in accordance with local electrical regulations.

PRE-CHARGED REFRIGERANT CONNECTION PIPES

The refrigerant pre-charged pipe set consists of a gas line and a liquid line, both with hermetically sealed 1- 20" UNEF AEROQUIP quick connect fittings. Below are the measurements of the pipe diameters according to the models:

MODEL	LIQUID LINE	GAS LINE
MF 56	1/4"	10 mm - 3/8"
MF 58	12 mm - 1/2"	12 mm - 1/2"
MF86	12 mm - 1/2"	16 mm - 5/8"

Whenever the length of the pre-charged pipes is longer than the distance between the ice maker and the remote condenser, place the excess pipes inside the building, arranged into a vertical spiral to avoid refrigerant deposits.

WARNING. Each quick-connect fitting of the refrigerant pre-filled pipes is hermetically sealed and must be tightened ¼ turn beyond the normal tightening point.

ALWAYS USE TWO SPANNERS TO TIGHTEN THESE FITTINGS, IN ORDER TO PREVENT THE PIPES FROM TWISTING OR THE LINES FROM BREAKING/BENDING.

Connect the gas line fitting of the remote condenser marked with the GAS sticker with the corresponding connection on the back of the ice maker. Connect the liquid line fitting of the remote condenser marked with the LIQUID sticker with the corresponding connection on the back of the ice maker.

WARNING. In the remote condenser, the refrigerant inlet pipe (gas) MUST always be positioned above the refrigerant outlet pipe (liquid), for both types of installation (vertical and horizontal)

Operating Instructions

Cube and granular ice makers with remote condenser operate in the same way as standard ice makers.

The only difference is in the operation of the fan, which in the MF Series cannot be controlled by the condenser sensor, as is the case in standard versions, where it cycles the fan in ON-OFF mode. In place of the condenser sensor, there are an electronic fan speed controller (set at 16 Bar via an adjustment screw) and a manually reset high pressure switch. The electronic speed controller transmits a variable voltage to the fan in order to modulate the fan speed and keep the delivery pressure constant. The high pressure switch is only used as a safety device to stop machine operation in the event of fan failure.

RUNNING TEST

After positioning and connecting the appliance, check that:

	it is level and that all specified clearances are as required	page 17
	room temperatures never fall below 10°C, even during the winter months	page 17
	all required electrical and plumbing connections have been completed	page 20-20
	the water shut-off valve(s) is/are in the ON position (open)	page 21
	the inlet pressure of the water circuit is at least 1 Bar	page 21
	the refrigerant circuit and water circuit piping do not emit vibrations	page 21
	the voltage of the power supply line is the same as that specified on the rating plate	page 16
	the inside walls of the ice container have been cleaned and disinfected	user manual supplied with the appliance
	the compressor anchor bolts allow the compressor to swing on the supports	
	all the documentation relating to the appliance and the details of the authorised service centre have been handed over to the user	



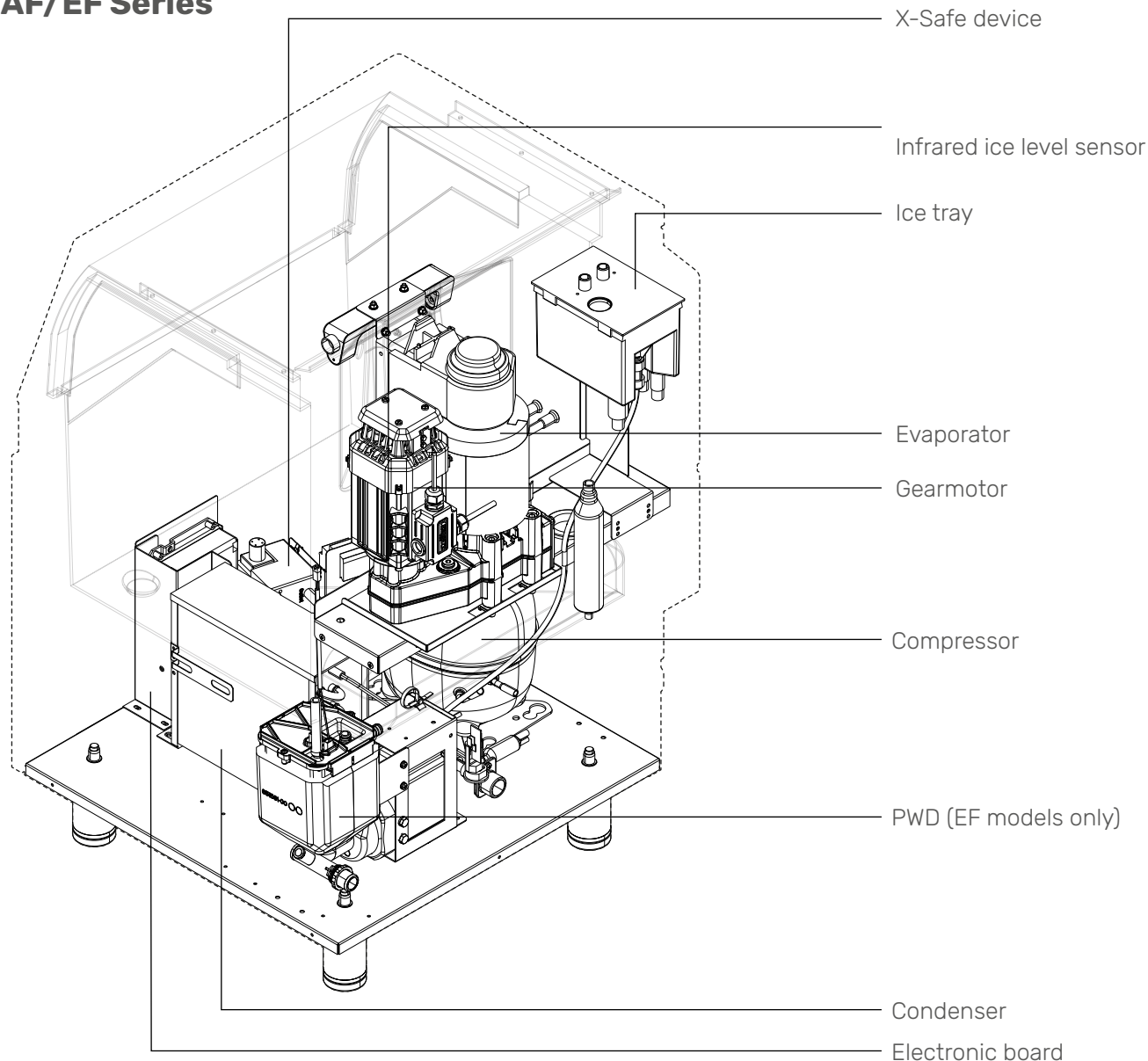
NOTES

DESCRIPTION OF THE COMPONENTS27

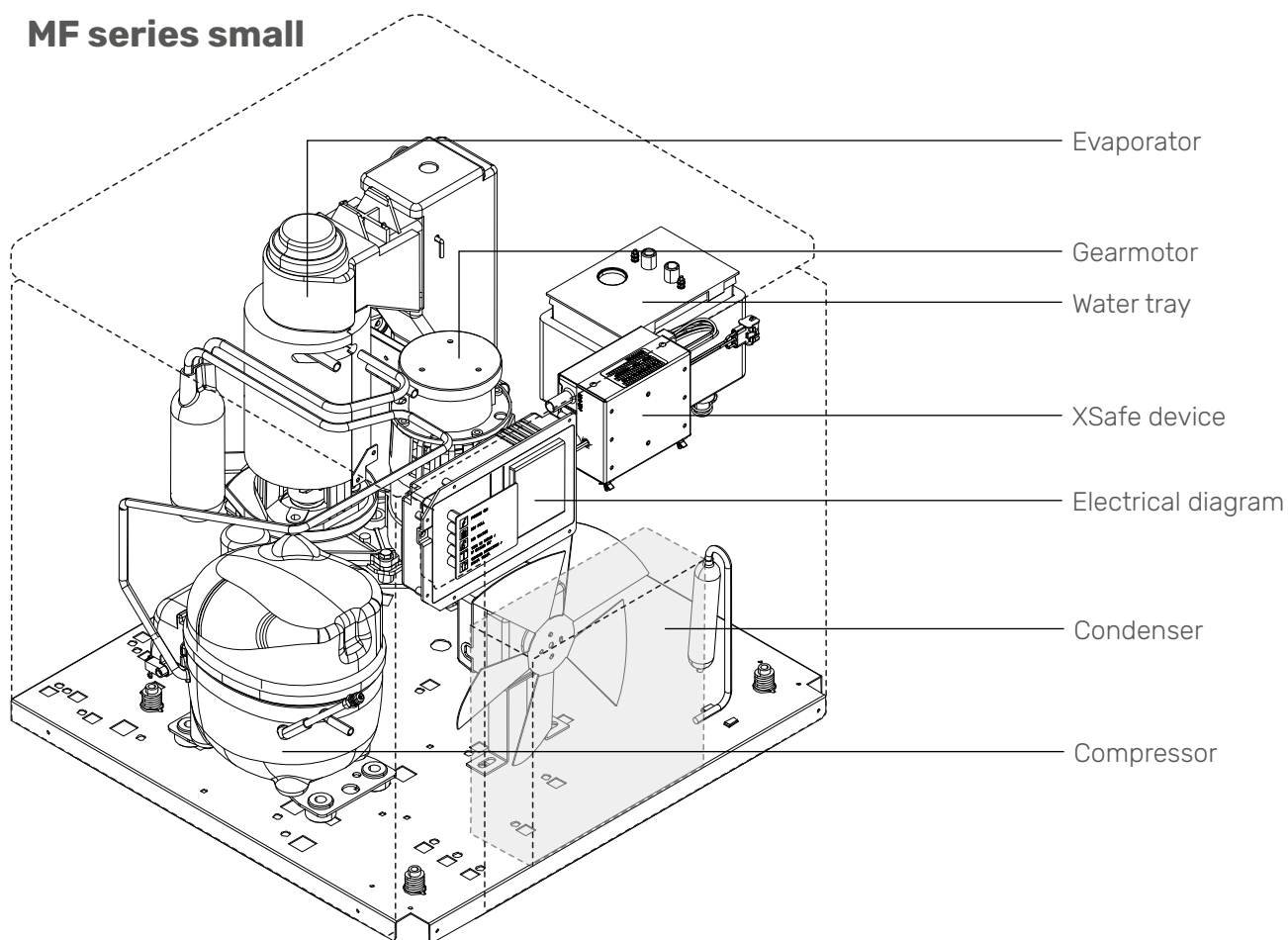
Evaporator temperature probe	27
UV lamp and ozone (only for XSafe models)	27
Condenser temperature probe	27
Thermal probe	28
Optical ice level control reader.....	28
Electronic board (microprocessor).....	28
Reset button.....	28
LEDs (monitoring panel).....	30
Electronic board dip switch.....	31
Condenser air filter	32

Electric pump	32
Water inlet solenoid valve	32
Hot gas solenoid valve	33
Pressostatic valve	33
Water drain solenoid valve.....	33
Motor fan	33
Compressor	33

AF/EF Series

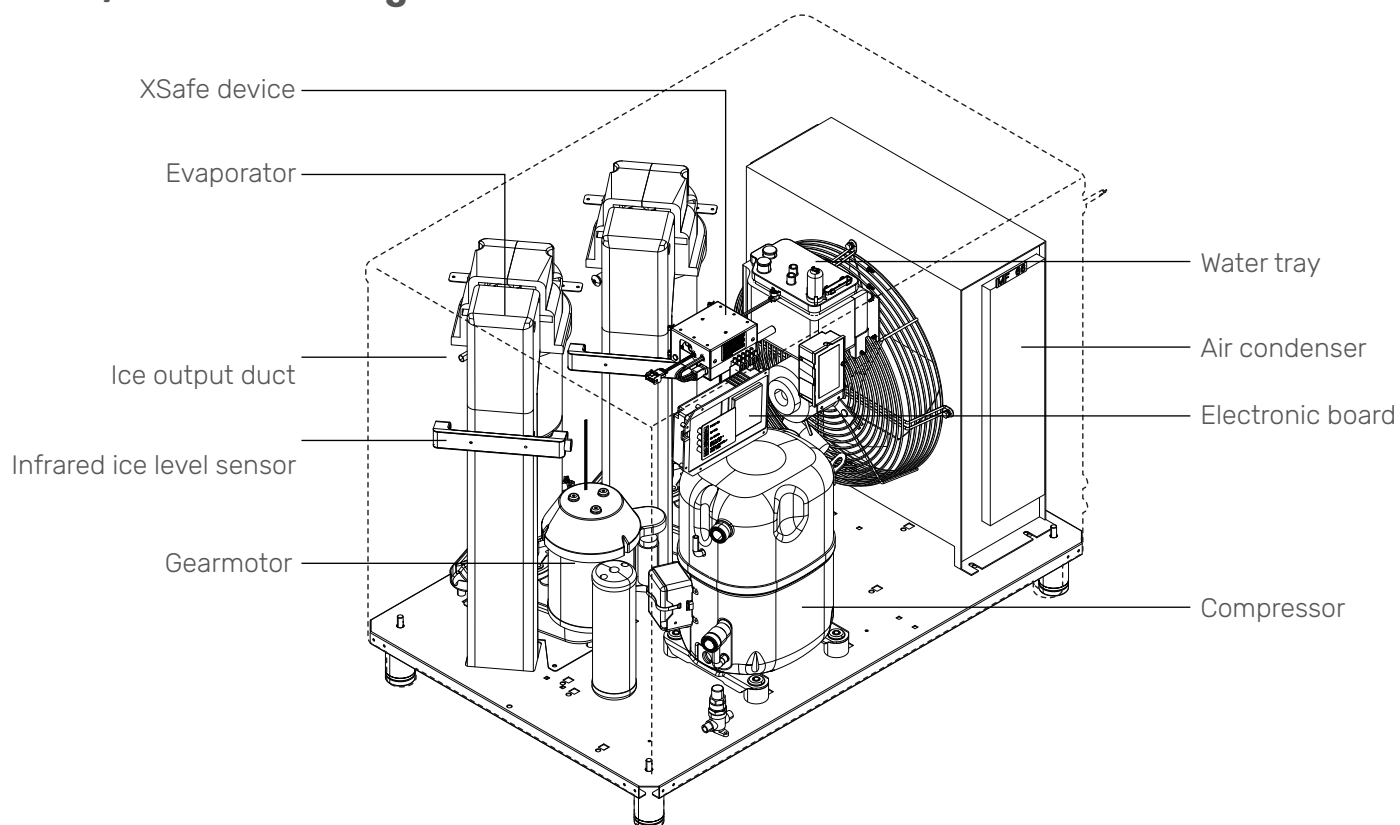


MF series small



F13

MF/MFN series large



F14

DESCRIPTION OF THE COMPONENTS

UV lamp and ozone (XSafe model only)

This natural disinfection system relying on the **UV lamp** is integrated inside the machine and guarantees absolute purity and hygiene.

The XSafe system requires quarterly or annual maintenance

Caution! When handling the UV lamp, avoid touching the glass element with bare hands as oil and skin residues can adversely affect the performance of the lamp. Once removed, clean it with a very soft cloth freshly soaked in a specific detergent compatible with quartz glass (e.g. denatured alcohol). Wait until the lamp is perfectly dry and replace it in its position.

ANNUAL MAINTENANCE | UV LAMP REPLACEMENT

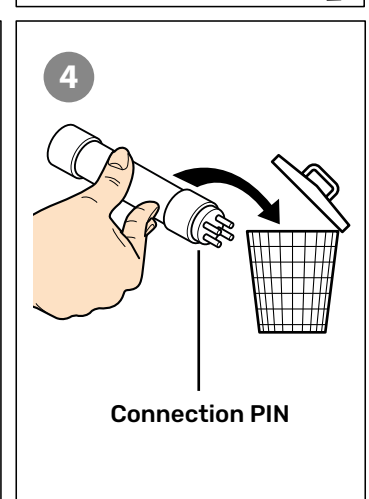
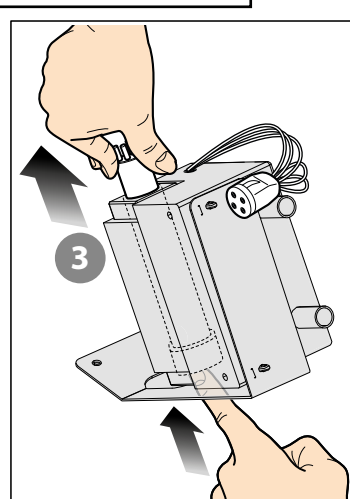
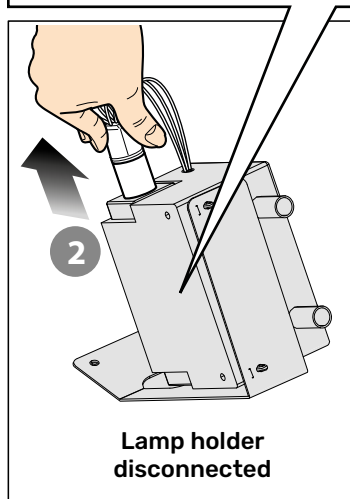
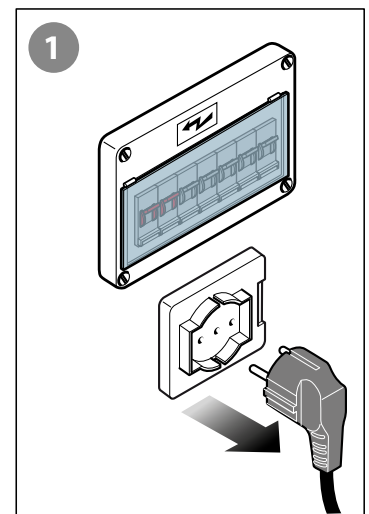
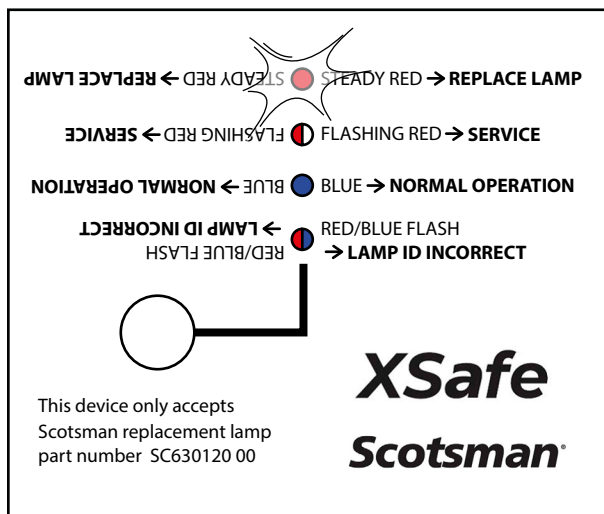
The **switching on of the RED LED** indicates that the UV lamp needs to be replaced. However, regardless of the LED light, the lamp must always be changed every twelve months to ensure maximum functionality and efficiency.

F15 HOW TO REMOVE THE UV LAMP

- 1. **Disconnect the power supply from the ice machine**, remove its covers and access panels to access the XSafe device (see figures **F12** and **F13** on the previous pages for its position inside the machine).

Meaning of the LEDs:

-  The UV lamp needs replacing
-  Operating fault
-  Normal operation
-  Incorrect Lamp ID



- **2. Make sure that the entire XSafe device is cold. Wear protective gloves.**

- Gently pull the lamp holder to disconnect it from the lamp. Important: Do not detach the lamp holder by pulling on the connecting wires, this will damage it and may result in electrocution when reconnecting it. The 4 connection pins of the UV lamp will be exposed.
- **3.** Push the UV lamp from behind until it comes out by about 2 cm: this will facilitate its removal.
- **4.** Dispose of the old UV lamp in accordance with hazardous waste disposal regulations (these UV lamps contain small traces of mercury).
- **5.** Insert the new UV lamp, making sure that its 4 connection pins are exposed so that the lamp holder can be reconnected. Only use SCOTSMAN SC630102 00 UV lamps. The use of different types of lamps invalidates the warranty. **Caution!** When handling the new UV lamp, avoid touching the glass element with bare hands as oil and skin residues can adversely affect the performance of the lamp.
- **6.** Replace all the covers and panels removed from the ice machine and reconnect it to the power supply.

FREQUENTLY ASKED QUESTIONS

What is Scotsman XSafe?

XSafe is a natural sanitising system that relies on a UV lamp. It is integrated inside the appliance and guarantees absolute purity and hygiene:

- treats the air with ozone technology in the food area of the ice maker;
- keeps the ice maker and the container clean, reduces mould, viruses and other microorganisms;
- it is fully automated and chemical free.

How does it work?

The XSafe process replicates the positive effects of UV sunlight. The UV lamp generates a mixture of free oxygen atoms (O), hydroxyl radicals (HO), ozone (O₃) and super oxide ions (O₂⁻); this mixture is highly active against mould, viruses and other microorganisms.

Is XSafe dangerous to humans?

The XSafe appliance is designed to produce O₃ below the legal limits when properly installed, used and maintained.

Does the XSafe system contaminate or change the taste of ice?

No. The XSafe system works without the use of chemicals and the reactive oxygen mixture does not transfer any taste or odour to the ice.

Can XSafe be installed on any Scotsman machine?

Yes, the XSafe XR-30 kit can also be installed externally on all SCOTSMAN ice machines.

Why is XSafe better than devices that add ozone to water?

Because all the internal parts of the machine not in direct contact with water would not be sanitised and because the taste and appearance of ice could change.

Is any intervention required on the part of the operator?

The XSafe system requires no operator intervention. It works automatically 24 hours a day, regardless of whether the machine is producing ice or is on stand-by.

Is XSafe effective against Covid-19?

XSafe was tested with the influenza A virus (bird flu virus), which is a type of virus similar to Covid-19 (they belong to the same family). The result was 99.99% inactivation efficiency.

Does XSafe also sanitise the ice scoop?

Yes, if the scoop is kept inside the ice tray.

Does XSafe sanitise incoming water?

XSafe was developed for the treatment of the internal areas of the ice machine (ice compartment). It will certainly have a slight disinfectant effect on the incoming water, but if the water is not drinking quality, it must be purified and filtered by other suitable means before use.

Will the ice machine still need a water filter?

To ensure that the ice machine produces clear and pure ice, it is always recommended to install a suitable filter system. The XSafe system has no beneficial effect on the formation of fouling; if hard water is used, a water filter is definitively necessary.

Does XSafe also reduce the descaling frequency?

No, XSafe only has an effect on organic microorganisms, not on inorganic materials such as limestone, salts, sand, etc.

Is XSafe noisy?

No, XSafe does not produce noise.

With XSafe fitted, is it still necessary to empty and clean the ice machine?

Yes. The ice machine must still be switched off and emptied periodically to remove physical contaminants and dirt that may have entered the machine.

How can one make sure that XSafe is working properly?

On XSafe there are LEDs that indicate the status of the machine, the blue LED light indicates normal operation.

How often should the internal UV bulb be replaced?

The UV lamp must be replaced every year by Technical Support with an original SCOTSMAN lamp. This guarantees the perfect effectiveness of the system. If the lamp is not replaced every year, in addition to the loss of efficiency, the manufacturer warranty is also invalidated.

Can the UV bulb be replaced by the end user?

The replacement of the UV lamp CANNOT be carried out by the user, contact a specialized technician.

Personal notes

[illegible]

Green main switch (where present)

Found on the front panel of the machine, it is used to switch the machine on and off by pressing the green button inside. When on, the green light is also on.

Red alarm / reset switch (where present)

Found on the front panel of the machine (next to the green main switch), it works in conjunction with the electronic board and is activated in the following cases:

- Condensation temperature higher than 70 °C (air-cooled version) - ON STEADY with the ice maker OFF
- Condensation temperature higher than 60 °C (water-cooled version) - ON STEADY with the ice maker OFF
- Condenser sensor out of service - FLASHES TWICE AND REPEATS with the ice maker OFF
- Condenser air filter dirty - ON STEADY with ice maker ON
- Water circuit dirty - FLASHES SLOWLY with the ice maker ON. In the first two cases, it is possible to reset the machine operation by pressing and holding the Red Alarm/Reset button for 5" until the Red light turns off.



NOTE: The Green and Red switches are not used in AF-AFC 80 and AF-EF 103 models

Evaporator temperature sensor

The evaporator temperature sensor is found inside a metal tube welded to the evaporator suction line. It reads the temperature from the evaporator and sends it with a low voltage signal to the electronic board. Depending on the temperature read, the board gives consent to the ice maker to continue to operate (evaporation temperature below 0°C after 10 minutes from start-up) or, in the event of partial or total lack of refrigerant in the system, stops its operation by turning on the 5th YELLOW alarm LED - flashing - (evaporation temperature above 0°C after 10 minutes from start-up).



NOTE: The ice maker will stay off for about an hour, after which it will resume normal operation. If the problem reoccurs three times in three hours, the ice maker will stop permanently and the monitoring LEDs will show an alarm. Once the cause of the fault has been eliminated, the appliance must be electrically disconnected and reconnected in order to restart.

Minimum float tray water level sensor

The minimum float tray water level sensor consists of two stainless steel pins (sensors) fixed to the cover and electrically connected to the low-voltage circuit of the electronic board. Their lower end is immersed in the water contained in the tray and, due to current flowing through the mineral salts contained in the water, is able to indicate to the electronic board if water is in the tank.



NOTE: insufficient water, or water lacking in mineral salts (electrical conductivity less than 30 mS), causes the interruption or decrease of the electric current transmitted to the electronic board, with the consequent stop of the ice maker (the compressor will stop immediately and the gearmotor after 3'), indicated by the YELLOW LED coming on.

Condenser temperature sensor

The condenser temperature sensor (inserted between the fins of the air condenser, or in contact with the condenser coil in case of water condenser) detects the condensation temperature and transmits its variations by sending a signal to the electronic board. If the condenser probe temperature falls below +3°C (ambient temperature too low), the electronic board immediately stops and does not give consent to start the appliance until the probe temperature has risen to a higher value (5°C). In air-cooled models, the condenser probe also controls the operation of the motor fan via the MICROPROCESSOR on the electronic board. By means of a TRIAC, this gives consent to the motor fan to operate, thus removing heat from the condenser and therefore lowering its temperature. Should the condenser temperature exceed 70°C or 60°C, the MICROPROCESSOR will immediately stop the appliance.



NOTE: ice maker will stay off for about an hour, after which it will resume normal operation. If the problem reoccurs three times in three hours, the ice maker will stop permanently and the monitoring LED panel will show an alarm. Once the cause of the fault has been eliminated, the appliance must be electrically disconnected and reconnected in order to restart.

Gearmotor speed and direction sensor

The speed and rotation direction sensor of the gearbox motor, installed inside a special enclosure at the top of the motor, detects the speed and rotation direction of the motor by means of a magnetic signal (Hall effect). When the speed falls below 1300 rpm, the signal transmitted to the MICROPROCESSOR of the electronic board causes the appliance to stop immediately and the YELLOW alarm LED to come on. The same happens when the motor rotates in the wrong direction (anti-clockwise), preventing the ice inside the freezer from compacting and blocking the auger, which would cause mechanical damage.



NOTE: ice maker will stay off for about an hour, after which it will resume normal operation. If the problem reoccurs three times in three hours, the ice maker will stop permanently and the monitoring LED panel will show an alarm. Once the cause of the fault has been eliminated, the appliance must be electrically disconnected and reconnected in order to restart.

Optical ice level control system

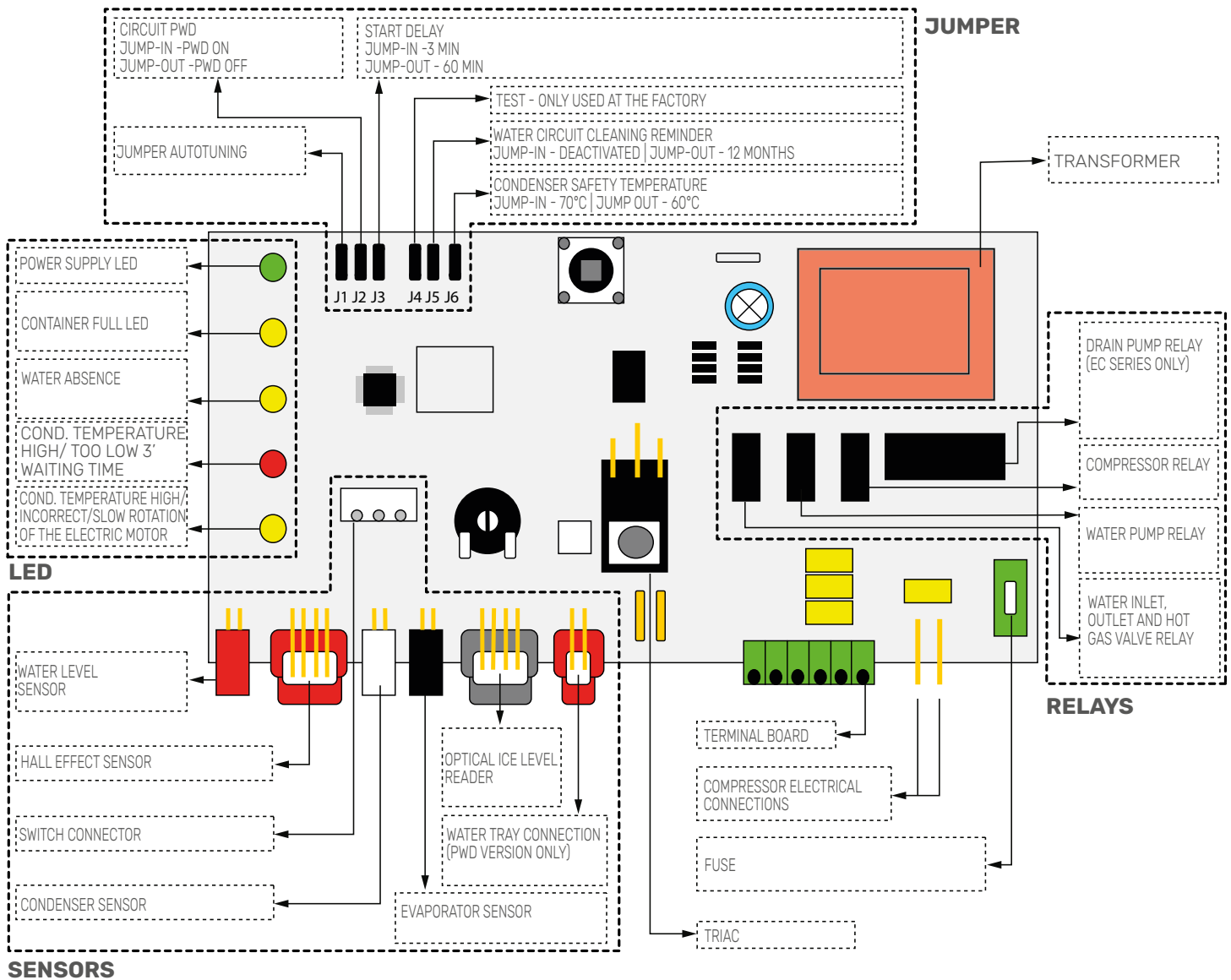
The optical ice level control system, located inside the ice drain duct, stops the operation of the appliance when the ice level interrupts the (infrared) light beam transmitted between the two optical readers. When the light beam is interrupted, the container full YELLOW LED starts flashing slowly. The continuous interruption of the light beam for more than 10 seconds causes the compressor to stop immediately, and the gearmotor 3" later, at the same time indicating the reason for the stop with the coming on of the second YELLOW LED. The 10-second shutdown delay prevents the ice maker from shutting down due to accidental and unwanted interruption of the light beam (ice grains falling into the drain). As soon as the ice is removed and the light beam between the optical readers is restored, the electronic board gives consent to restart and, after 10 seconds of the Container Full YELLOW LED flashing quickly, operation of the appliance is restored, whilst at the same time the LED turns off.

Electronic board (microprocessor)

The electronic board, found on the front of the appliance, consists of a high-voltage circuit and a low-voltage circuit, separated according to regulatory requirements and both protected by fuses, with five LEDs indicating operation and alarms, and of low-voltage connections to the sensors and power connectors to the various electrical components of the machine. The electronic board is the actual brain of the system; it receives the incoming signals from the sensors, and after processing them through its MICROPROCESSOR, it controls the electrical components accordingly (gearmotor, compressor, etc.), therefore managing the operation of the entire appliance. The electronic board software allows the gearmotor to be kept running for a period of 3 minutes after the machine has stopped, in order to expel any ice from inside the evaporator cylinder. This delay occurs when the machine stops its operation for:

- Insufficient water
- High evaporation temperature
- High condensation temperature
- Container full

Only when the machine stops due to a Rotation alarm (Wrong/Slow/Missing) will the gearmotor stop immediately.



F17

J1 - AUTO TUNING: Optical ice level reader auto calibration

- Closed contact - Active
- Contact open - Manual

J2 - PWD ON: Water drain pump

- Contact closed - MF/AF-AFC series - Pump not present (OFF)
- Contact open - EF series - Pump present (ON)

J3 - 3'/60': Start delay

- Contact closed - 3 min.
- Contact open - 60 min.

J4 - TEST: Factory use only

J5 - 0/12 M.: Water system cleaning reminder

- Contact closed - not active
- Contact open - 12 months

J6 - 60°/70°C: Maximum condensation temperature threshold

- Contact closed - 70°C
- Contact open - 60°C

LEDS (MONITORING PANEL)

The five LEDs protruding from the front of the electronic board indicate:

	GREEN LED Appliance powered/in operation
	YELLOW LED • Flashing slowly: Rx/Tx beam interrupted • On steady: ice container full • Flashing quickly: Rx/Tx beam restored
	YELLOW LED Insufficient water in the float tray
	RED LED • On steady: unit in alarm due to condensation temperature too high, unit in alarm due to ambient temperature $< +3^{\circ}\text{C}$ • Flashing: 3 minutes start delay.
	YELLOW LED • On steady: unit in alarm due to rotation opposite to the gearmotor or too low, or seizing of the gearmotor • Flashing: unit in alarm due to evaporation temperature $> 0^{\circ}\text{C}$ after 10 minutes of operation.

LED	STATUS	MEANING – SIGNIFICATO – SIGNIFICATION – BEDEUTUNG
   	ON STEADY FISSO FIXE STÄNDIG AN	UNIT UNDER POWER IN TENSIONE SOUS TENSION GERÄT BESTROMT
    	ON STEADY FISSO FIXE STÄNDIG AN	UNIT OFF AT BIN FULL CONTENITORE PIENO CABINE PLAINE MASCHINE AUS, SPEICHER VOLL
    	BLINKING SLOW LAMPEGGIO LENTO CLIGNOTANT LENT BLINKT LANGSAM	I/R BEAM CUTTED RAGGIO INFRAROSSO INTERROTTO FAISCEAU INFRA ROUGE CELLULE NIVEAU GLACE INTERROMPU LICHTSCHRANKE UNTERBROCHEN
    	BLINKING FAST LAMPEGGIANTE VELOCE CLIGNOTANT RAPIDE BLINKT SCHNELL	I/R ON AFTER TRIP OFF AT BIN FULL RAGGIO INFRAROSSO RIPRISTINATO INTERROTTO FAISCEAU INFRA ROUGE CELLULE NIVEAU GLACE ETABLI SPEICHER ENTLEERT, MASCHINE STARTET GLEICH
    	ON STEADY FISSO FIXE STÄNDIG AN	NO WATER MANCANZA ACQUA MANQUE D'EAU KEIN WASSER
    	ON STEADY FISSO FIXE STÄNDIG AN	TOO HIGH DISCHARGE PRESSURE/TEMPERATURE FERMATA ALTA TEMPERATURA CONDENSAZIONE COUPURE HP ZU HOHER KONDENSATIONSDRUCK
    	BLINKING LAMPEGGIANTE CLIGNOTANT BLINKT	DELAY AT START UP (3' OR 60' ACCORDING TO THE JUMPER SETTINGS) RITARDO PARTENZA (3' O 60' IN FUNZIONE DELLA REGOLAZIONE DEL PONTICELLO) TEMPORISATION AU DEMARRAGE (3' OU 60' SELON LE REGLAGE DU CHAVALIER) 3' ODER 60' STARTVERZÖGERUNG JE NACH JUMPER KONFIGURATION
    	BLINKING 3 TIMES & REPEAT LAMPEGGIANTE 3 VOLTE CLIGNOTANT 3 FOIS ET NOVEAU BLINKT 3 MAL & WIEDERHOLEN	TOO LOW ROOM TEMPERATURE (<+3°C) FERMATA TEMPERATURA AMBIENTE BASSA (<+3°C) COUPURE TRES BASSE TEMP. AMBIANTE (<+3°C) ZU NIEDRIG RAUMTEMPERATUR (<+3°C)
    	ON STEADY FISSO FIXE STÄNDIG AN	NO, SLOW OR WRONG ROTATION OF DRIVE MOTOR MOTORE RIDUTTORE GIRA AL CONTRARIO, NON GIRA O GIRA LENTAMENTE MOTOREDUCTEUR TOURNE A L'ENVERS, NE TOURNE PAS, OU TROP LENTEMENT KEINE, ZU LANGSAME ODER SCHWERE GETRIEBROTATION
    	BLINKING LAMPEGGIANTE CLIGNOTANT BLINKT	TOO HIGH EVAP. TEMP. (>0°C) AFTER 10' FROM START UP OR TOO LOW EVAP. TEMP. (<-30°C) TEMP. EVAP. >0°C DOPO 10' DA INIZIO FUNZIONAMENTO O INFERIORE A -30°C TEMP. EVAP. >0°C APRES 10' DE FONCTIONNEMENT OU TEMP. EVAP. <-30°C ZU HOHE VERD. TEMP. >0°C 10' NACH DEM START ODER VERD. TEMP. <-30°C

LED	STATUS	MEANING – SIGNIFICATO – SIGNIFICATION – BEDEUTUNG
   	ON STEADY FISso FIXE STÄNDIG AN	CONDENSER SENSOR OUT OF ORDER SONDA CONDENSATORE MALFUNZIONANTE SONDE CONDENSEUR HS KONDENSATORFÜHLER DEFEKT
   	BLINKING LAMPEGGIANTE CLIGNOTANT BLINKT	EVAPORATOR SENSOR OUT OF ORDER SONDA EVAPORATORE MALFUNZIONANTE SONDE EVAPORATEUR HS VERDAMPFERFÜHLER DEFEKT
   	BLINKING ALTERNATIVELY LAMPEGGIANTE ALTERNATO CLIGNOTANT ALTERNÉ BLINKT IM WECHSEL	OPTICAL ICE LEVEL CONTROL OUT OF ORDER SONDA ALL'INFRAROSSO LIVELLO GHIACCIO MALFUNZIONANTE CELLULE INFRAROUGE NIVEAU GLACE HS LICHTSCHRANKE DEFEKT
   	BLINKING LAMPEGGIANTE CLIGNOTANT BLINKT	6 OR 12 MONTHS WATER SYSTEM CLEANING REMIND (ACCORDING TO JUMPER SETTING) RICHIAMO PULIZIA CIRCUITO IDRICO DOPO 6 O 12 MESI (IN BASE A REGOLAZIONE PONTICELLO) RAPPEL NETTOYAGE SYSTÈME HYDRAULIQUE APRÈS 6 OU 12 MOIS (SELON REGLAGE CHAVALIER) 6 ODER 12 MONATE REINIGUNGSHINWEIS FÜR WASSERSYSTEM JE NACH JUMPER KONFIGURATION
   	BLINKING LAMPEGGIANTE CLIGNOTANT BLINKT	XSAFE ALARM ALLARME XSAFE ALARME XSAFE XSAFE-ALARM
     	BLINKING LAMPEGGIANTE CLIGNOTANT BLINKT	UNIT OFF DUE TO THE JUMPER ON TEST CONTACTS MACCHINA FERMA – CONTATTI TEST CHIUSI MACHINE A L'ARRÊT – CONTACTS TEST FERMÉES JUMPER KONFIGURATION IM TESTMODUS
    	BLINKING ALTERNATIVELY LAMPEGGIANTE ALTERNATO CLIGNOTANT ALTERNÉ BLINKT IM WECHSEL	TIME OUT PWD ALARM ALLARME MALFUNZIONAMENTO PWD ALARMÉ PWD DYSFONCTIONNEMENT PWD- FEHLFUNKTIONSLARM

PUSH AND HOLD THE RED LIGHTED SWITCH OR THE PC BOARD BUTTON FOR MORE OF 5 SECONDS WITH MACHINE IN OPERATION TILL THE SWITCHING OFF OF THE TWO YELLOW LEDS TO RESTART THE CLEANING REMIND COUNTDOWN.

PREMERE IL PULSANTE ROSSO O IL PULSANTE DELLA SCHEDA PER PIÙ DI 5 SECONDI CON LA MACCHINA IN FUNZIONE FINO ALLO SPEGNIMENTO DEI DUE LED GIALLI PER FAR RIPARTIRE IL CONTEGGIO PER LA PROSSIMA DISINCROSTAZIONE.

APPUYER SUR LE BOUTON ROUGE OU SUR LE BOUTON DE LA CARTE POUR 5 SECONDS AVEC LA MACHINE EN FONCTIONNEMENT JUSQU'A L'ETEINTE DE LES DEUX LEDS JAUNE POUR REINITIALISER L'ALARME JUSQU'AU PROCHAIN DETARTRAGE.

DRÜCKEN UND HALTEN SIE DEN ROTEN SCHALTER ODER DEN PUSH BUTTON AUF DER ELEKTRONIK, FÜR MEHR ALS 5 SEKUNDEN WENN DIE MASCHINE IN BETRIEB IST, BIS DIE 2 GELBEN LED'S AUS DER ELEKTRONIK NICHT MEHR LEUCHTEN. DER ERINNERUNGSZYKLUS FÜR DIE REINIGUNG IST SOMIT ZURÜCKGESETZT UND STARTET NEU.

Connectors

The electronic board has a set of six connectors (Jumpers) with the following functions:

- J1** = AUTOTUNING: Used to activate the auto calibration function of the optical ice level sensor (if activated, the board performs an auto calibration of the sensor every time the appliance is powered; if disabled, it is still possible to manually calibrate the sensor when necessary)
- Jumper CLOSED = Auto calibration activated
 - Jumper OPEN = Auto calibration deactivated
- J2** = PWD: Used to drain water with the aid of a Drain Pump, supplied as an additional KIT
- Jumper CLOSED = Drain pump NOT installed/operating (MF AF and AFC models)
 - Jumper OPEN = Drain pump installed/operating (EF and EFC models)
- J3** = 3'/60' Controls the start delay of each restart
- Jumper CLOSED = Delay 3'
 - Jumper OPEN = Delay 60'
- J4** = TEST only carried out at the factory during the running test in order to check the electrical components

If the installer/technician needs to by-pass the 3/60' delay, this can be done by closing the two contacts of the TEST jumper while keeping the electronic board live

J5 = 6/12 MONTHS

J5 = 0/12 MONTHS

Used for the water circuit cleaning reminder (the red light switch flashes when the machine is running)

- Jumper CLOSED = reminder disabled
- Jumper OPEN = washing reminder set to 12 months

- J6** = 60/70 °C Used to set the high condensation alarm temperature detected by the condenser probe
- Jumper CLOSED = 70°C
 - Jumper OPEN = 60°C

Float tray

The tray assembly consists of a plastic bowl, at the top of which is a float with an adjusting screw that maintains a constant water level inside the bowl, and for the communicating vessels inside the evaporator cylinder. Vertically attached to the cover are the two minimum water level control sensors, which indicate the presence or absence of water in the tray to the electronic board.



NOTE: It is very important to ensure the correct positioning of the lid on the tray, so that the sensors are submerged and can transmit the electric signal confirming the presence of water to the electronic board, therefore preventing the ice maker from stopping.

Evaporator freezer

Consisting of a vertical stainless steel cylinder, on the outside of which the evaporation chamber of the refrigerant is welded, and on the inside of which (on the same axis as the cylinder) the auger or worm screw rotates. The freezer assembly transforms the water in contact with the inner wall into ice, which is then pushed upwards by the action of worm screw, where it is extruded into granules by the ice breaker and then sent to the outlet at the top. The ice formed due to the contact of the water with the inner walls of the refrigerated cylinder is moved up by the action of the auger that rotates inside the cylinder, held in place by the upper (inserted inside the ice breaker ring) and lower bearings. At the bottom, just above the bearing, is the rotating shaft seal ring, which hermetically seals the freezer/auger assembly, so that all the water reaching the cylinder can be retained and turned into ice.

Ice breaker ring

Positioned at the top of the freezer, the ice breaker counteracts the ice rising along the walls of the cylinder, compressing it and removing some of its water, and breaking it into granules, which are then channelled into the container. Inside the ice breaker is the upper bearing, consisting of two rows of stainless steel rollers that support both the radial and axial loads exerted by the auger. This bearing is lubricated with food-grade and water-repellent grease.



NOTE: It is recommended to check the condition of the lubricant as well as the upper bearing every six months.

Gearmotor

Consisting of a single-phase asynchronous motor with a permanent condenser coupled to a gear and pinion gearbox, the gearmotor assembly drives, via a transmission joint, the ice lifting worm screw or auger located inside the evaporator or vertical freezer.

The motor rotor, supported by two permanently lubricated ball bearings, transmits motion to a fibre gear (to reduce noise) and from this, with cascading pairs of gears and pinions supported on roller bearings housed in the upper and lower enclosures, to the output shaft.

The entire sealed gearbox is lubricated with special grease (MOBILPLEX IP 44) by two oil seals inserted in the rotor and output shaft bores. The whole thing can be disassembled and inspected by simply unscrewing and opening the two aluminium half guards. The output shaft of the gearmotor is coupled to the evaporator auger by means of half toothed joints, which only transmit motion when turning in the correct direction (anti-clockwise).

Motor fan

(Air-cooled models)

The **motor fan**, electrically connected to the TRIAC of the electronic board, operates during the freezing cycle, circulating air through the condenser fins. During the freezing cycle, the fan can run intermittently to keep the temperature and thus the condensing pressure within two preset values.

Pressostatic valve

(Air-cooled models)

The pressostatic valve maintains the condensing pressure (delivery/high pressure) in the refrigerant circuit at a constant value by varying the condenser cooling water flow. As the pressure rises, the pressostatic valve opens further to increase the flow of cooling water to the condenser.

Compressor

The **hermetic compressor** is the heart of the system and circulates the refrigerant through the entire system. It draws in the refrigerant in the form of low pressure and low temperature vapour and then compresses it, causing its pressure and temperature to rise accordingly, transforming it into high pressure and high temperature vapour as it passes through the drain valve into the circuit, from where it is then sent to the condenser.

Expansion valve (split only)

Normally, the appliances use the capillary tube as the laminating organ for the change of state of the refrigerant from sub-cooled liquid to vapour.

The liquid refrigerant passes through the capillary tube welded to the evaporator inlet. Here, the change of section causes a sudden expansion of the refrigerant with the vaporisation of the liquid. This change of state results in the removal of heat, which lowers the temperature on the surfaces of the evaporator, allowing ice to form. The expansion valve (only found on Split models) is a lamination organ that works like the capillary tube but is able to regulate itself as the pressure of the liquid and the temperature at the evaporator outlet change, allowing constant overheating (temperature difference between the temperature at the evaporator outlet and the evaporation temperature).

KTV (split only)

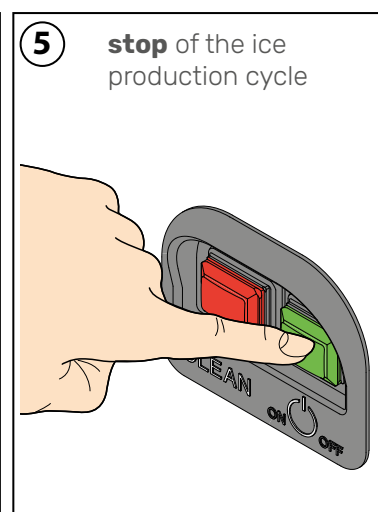
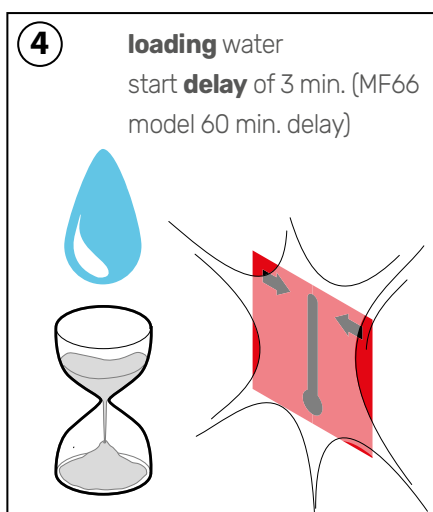
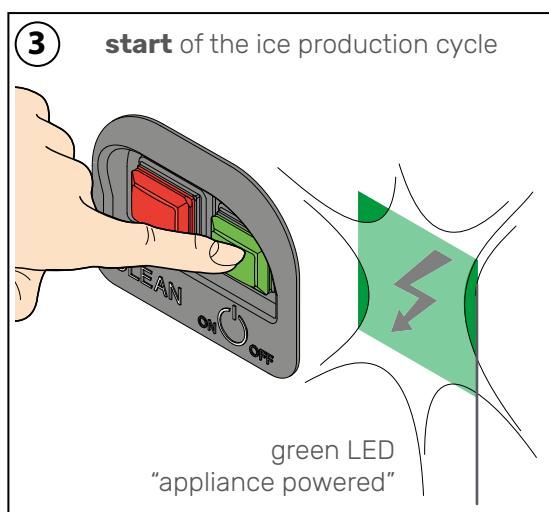
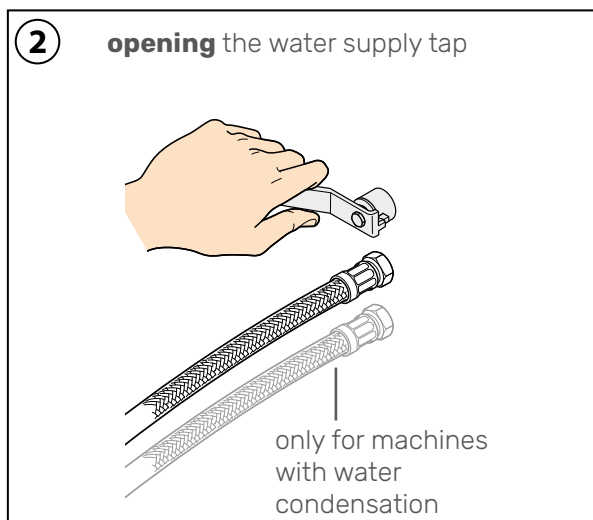
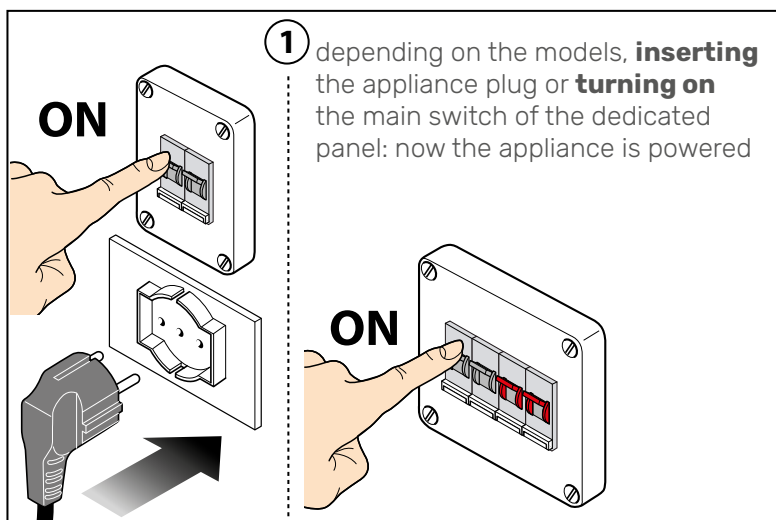
The KVP valve, fitted (on split models only) at the end of the suction line of the appliance, allows the suction/evaporation pressure to be regulated and maintained at that value. It is very useful when the split ice maker is connected to large refrigeration plants, where the flow rates involved are high and pressure imbalances can be generated on the low side.

Start-up and loading	34
Production phase	36
The process.....	36
First freezing phase	38
<i>Suction pressure control</i>	<i>38</i>
<i>Delivery pressure control</i>	<i>38</i>
<i>Condensation temperature control.....</i>	<i>38</i>
Operating pressures	40
Defrosting cycle	41
Residual water discharge	44
Components	44
Operation	44

START-UP | LOADING

After the appliance has been correctly installed and connected to the electricity and water supply, follow the procedure below to start it:

- 1 **Power the machine** by inserting its plug into a socket of suitable capacity or turn on (ON) **the main switch of the dedicated switchboard** (if present): the machine is now powered.
- 2 Open the **water supply tap** so that the machine can be loaded.
- 3 **Press the green ON/OFF button** (if present): the green "machine ON" light comes on.





NOTE: Whenever power is supplied to the appliance after a period of standstill (electrically disconnected) the RED LED flashes for a period of 3 minutes or 60 minutes depending on the setting of Jumper J3, after which the appliance starts to operate with the gearmotor starting up, followed after 5 seconds by the compressor.

④ At the end of the waiting phase (3 minutes), the appliance activates the following components in sequence:

- GEARMOTOR
- COMPRESSOR
- FAN MOTOR (in case of air-cooled appliances), controlled by the condenser temperature sensor located between the condenser fins

After 2-3 minutes, from the moment the compressor starts, the appliance begins to send the first ice granules into the container.



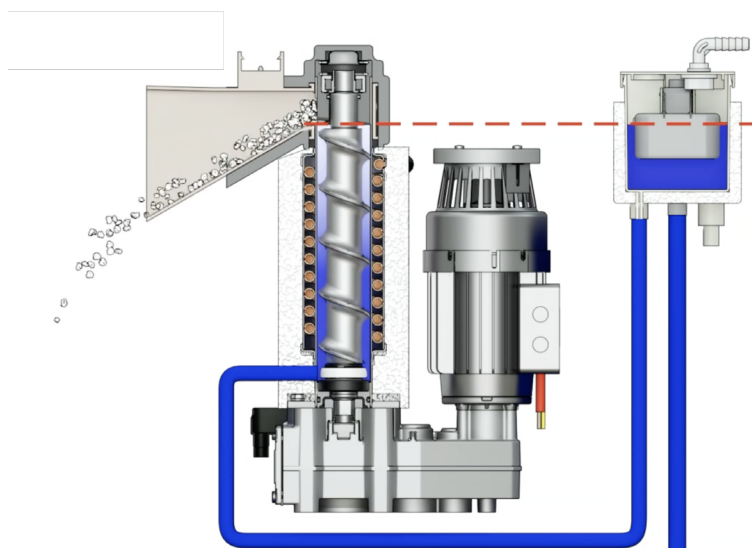
NOTE: The first ice granules produced are of low consistency because the evaporation temperature has yet to reach the steady-state level. It is therefore necessary to wait about ten minutes for the evaporation temperature to drop down to steady-state levels in order to have ice of the right consistency.



NOTE: In air-cooled models, the condensing pressure is kept constant by means of the fan, which is operated intermittently by the probe/sensor located between the condenser fins. If the condenser temperature should reach 70°C, due to an obstructed condenser and/or the fan not working, in air-cooled versions, and 60°C for water-cooled versions, the condenser temperature probe will immediately stop the compressor and after 3 minutes also the gearmotor, while simultaneously switching on the RED warning LED (Figure 3). The ice maker will stay off for about an hour, after which it will resume normal operation. If the problem reoccurs three times in three hours, the ice maker will stop permanently and the monitoring LED panel will show an alarm. Once the cause of the fault has been eliminated, the appliance must be electrically disconnected and reconnected in order to restart. The RED start-up delay LED will flash for 3 minutes, after which the ice maker will resume operation.



NOTE: If, after 10 minutes from the start of the appliance, the temperature of the evaporator, detected by a special probe, has not dropped to a value below -1°C (lack or low level of refrigerant in the system, etc.), the ice maker will immediately stop the compressor and after 3 minutes the gearmotor will also stop. The 5th YELLOW alarm LED will flash and the ice maker will stay off for about an hour, after which it will resume normal operation. If the problem reoccurs three times in three hours, the ice maker will stop permanently and the monitoring LED panel will show an alarm. Once the cause of the fault has been eliminated, the appliance must be electrically disconnected and reconnected in order to restart. The RED start-up delay LED will flash for 3 minutes, after which the ice maker will resume operation.



CHECKS TO BE CARRIED OUT AFTER START-UP

If necessary, install, after removing the front panel, the service pressure gauges on both Schröder valves – high and low – in order to check the condensation and suction pressures.

- Check the correct operation of the float tray minimum water level probe by closing the water shut-off tap on the appliance. After a few moments, when the water level in the tray has dropped below the level of the sensors, the appliance will immediately stop the compressor, followed after 3 minutes by the gearmotor, while the YELLOW insufficient water LED will come on.



NOTE: The water level control probe detects the presence of water in the tray by means of a low-voltage current flowing through the water in the float tray.

WARNING. The use of particularly soft water (with little or no mineral salts) having an electrical conductivity of less than 30 mS prevents the passage of low-voltage current, which causes the appliance to stop or fail to operate, with the YELLOW insufficient water LED coming on, even if there is sufficient water.

- After the water supply to the appliance has been restored, the YELLOW LED turns off instantly, with the RED LED flashing at the same time. After 3 minutes, the appliance starts again, first the gearmotor and after 5" the compressor.
- Verify the correct operation of the optical ice level control system, which monitors the ice sent to the container, by placing ice between the two optical sensors: the light beam between the two infrared sensors will be interrupted, while at the same time the YELLOW container full LED on the front of the electronic board will flash slowly. The appliance will automatically stop the compressor after about 10 seconds and the gearmotor after 3 minutes, while the YELLOW container full LED will go from flashing to ON STEADY.
- The machine will restart automatically 10" after the light beam between the two sensors has been restored, during which time the YELLOW Container Full LED will flash quickly. After 10', the YELLOW LED will go out and the machine will restart following the start procedure with the 3' delay.



NOTE: The operation of the optical ice level control system is independent of temperature but can be affected by external light sources, as well as by any limescale deposits that may accumulate on its optical readers (infrared sensors). For proper functioning of the appliance, it is therefore advisable to install it away from direct light sources, keep the container door closed and strictly follow the instructions in the maintenance section regarding the periodic cleaning of optical readers.

In EF/EFC series models, as soon as the water reaches its maximum level inside the water collection tray, the two metal pins immediately close the contact using the water itself as a conductor, therefore transmitting a low-voltage current to the electronic board.

The Electronic Board will power the Water Drain Pump for 8 seconds, to pump out most of the water contained in the tank.

If installed, remove the service gauges and replace the previously removed front panel.

Train the owner on the operation, cleaning and sanitisation of the ice maker.

PRINCIPLE OF OPERATION

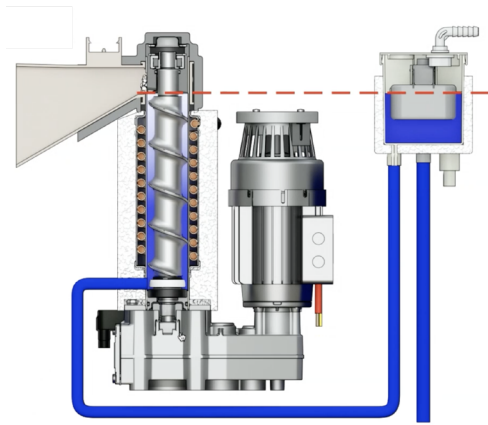
WATER CIRCUIT

The water enters the appliance through the inlet port, which has a small mesh filter at the rear, and from there it reaches the water tray through a nozzle with the flow regulated by a float.



NOTE: The presence of water inside the tray is detected by a two-sensor system that operates in conjunction with the electronic board, exploiting the conductivity of the water itself to send a low-voltage current signal to the board; insufficient water or particularly pure water (demineralised water, with an electrical conductivity of less than 30 mS), causes the interruption of the current flow to the electronic board and therefore the shutdown of the appliance, with the simultaneous coming on of the YELLOW "insufficient water" LED.

The water tray is positioned at the side of the cylinder of the evaporator or freezer, at a height that allows, thanks to the principle of communicating vessels, a correct and constant water level to be maintained inside the freezer. Through a connecting pipe, the water from the tray reaches the inside of the freezer, where it is frozen and turned into ice; the process is constantly kept in motion by a worm screw or auger that rotates inside the freezer.



The auger, immersed in the water inside the cylinder, is kept rotating counter-clockwise by a gearmotor, so as to push upwards the layer of ice that gradually forms along the refrigerated inner walls of the freezer. As it is pushed upwards by the auger, the ice becomes thicker and thicker, and when it comes into contact with the ice breaking ring is compressed and shattered into small granules, which then reach a special conveyor (outlet), from which opening they fall into the ice collection container. Switching on the appliance starts the continuous and constant ice making process, which will continue until the container in which the ice is deposited is filled to the level determined by the optical probes at the sides of the ice discharge outlet. When the ice interrupts the infrared light beam between the two optical readers, the appliance stops and the YELLOW container full LED comes on at the same time.



NOTE: The interruption of the light beam between the two optical readers is signalled by the flashing of the YELLOW container full LED. After approximately 10" of continuous beam interruption, the appliance stops (with the exception of the gearmotor, which will stop after the 3' stop delay time has elapsed) and the YELLOW LED goes from flashing to ON STEADY. The 10-second delay is to avoid unwanted stops of the ice maker, which could be caused by the ice granules, which may temporarily interrupt the light beam between the optical readers while falling through the outlet opening and into the ice container.

As soon as ice is taken from the container, the light beam between the optical readers is restored, causing the YELLOW container full LED to flash quickly. After about 10", the appliance starts working again and the YELLOW container-full LED turns off, activating the 3' delay timer.

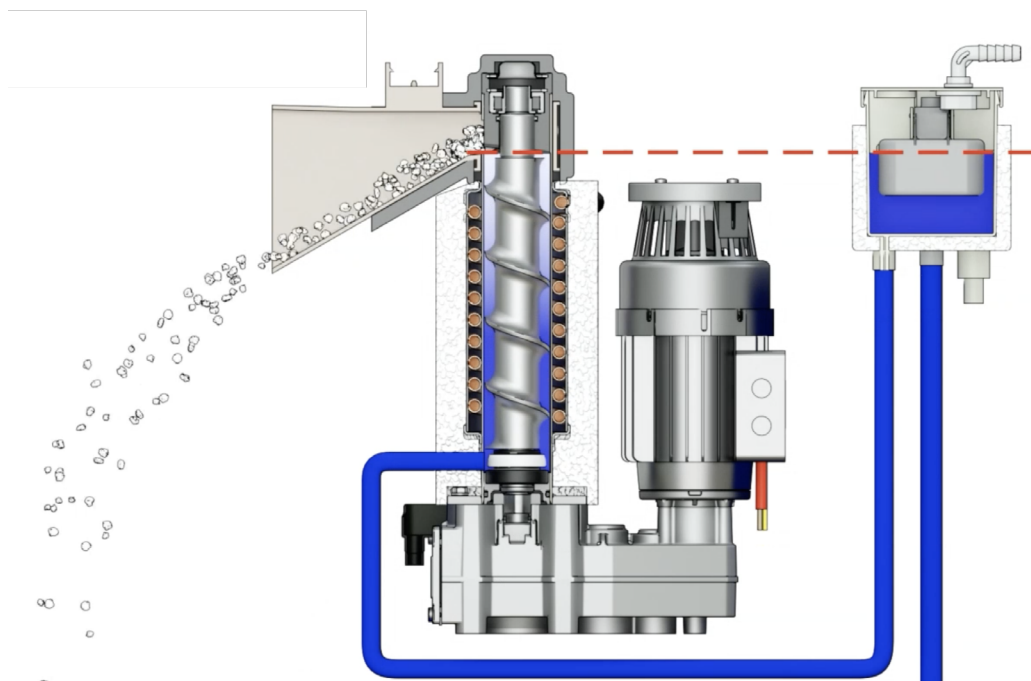
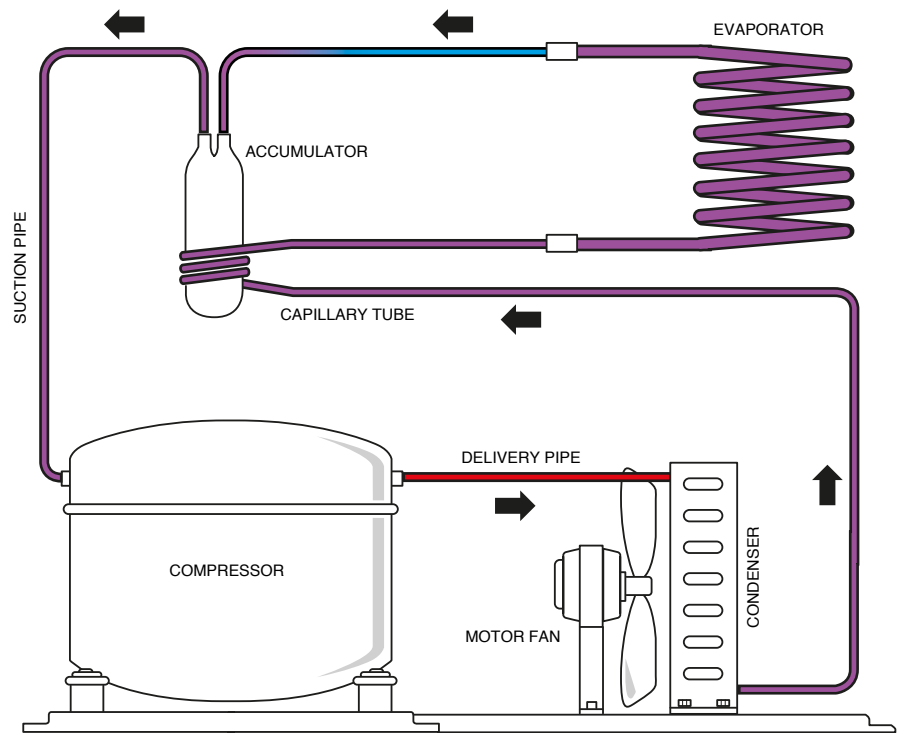
REFRIGERANT CIRCUIT

Refrigerant in its gaseous state and at high temperature is pumped by the compressor and passes through the condenser, where it is turned into liquid refrigerant. The liquid line takes the refrigerant from the condenser to the capillary tube, through the dehumidifier filter. As it passes through the capillary tube, the refrigerant in its liquid state gradually loses some of its pressure and, therefore, some of its temperature. It then reaches and enters the evaporator coil or freezer cylinder. Due to the contact with the refrigerated wall of the evaporator, the water releases heat to the refrigerant circulating inside the coil, causing its evaporation and its physical change of status, from liquid to vapour. After going through the accumulator, the gaseous refrigerant is sucked back into the compressor via the suction line. The delivery pressure of the refrigerant system (high pressure) is maintained

between two preset values by means of the condenser temperature sensor (in air-cooled models), which is positioned between the condenser fins. In water-cooled condensers, the pressure is managed by means of the pressure relief valve, while the probe positioned in contact with the liquid line of the refrigerant only acts as high condensation pressure safety device.

On air-cooled appliances, as soon as the temperature of the condenser exceeds a certain value, the sensor changes its electric potential, transmitting low-voltage current to the MICROPROCESSOR of the electronic board, which processes the signal received and electrically powers (intermittently ON - OFF) THE FAN

MOTOR via a TRIAC located at the output of the electronic board. On water models, the high pressure is controlled by the pressostatic valve which, connected by a capillary tube to the liquid line of the refrigerant circuit, automatically regulates the flow of water to the condenser, so as to maintain a constant refrigerant delivery pressure.



NOTE: If the condenser temperature sensor detects a value higher than 70°C for the air-cooled version or 60°C for the water-cooled version due to one of the following abnormal causes: CONDENSER DIRTY (Air cooling), INSUFFICIENT CONDENSING WATER (Water cooling) BURNED OR SEIZED MOTOR FAN (Air cooling), HIGH AMBIENT TEMPERATURE (HIGHER THAN 43°C), the compressor stops immediately, followed after 3' by the gearmotor, to avoid prolonged operation in abnormal conditions, while at the same time the RED alarm LED comes on. The ice maker will stay off for about an hour, after which it will resume normal operation. If the problem reoccurs three times in three hours, the ice maker will stop permanently and the monitoring LED panel will show an alarm. Once the cause of the fault has been eliminated, the appliance must be electrically disconnected and reconnected in order to restart. The RED start-up delay LED will flash for 3 minutes, after which operation will be resumed. The condenser sensor also functions as a safety device in the event of an ambient temperature below 3°C, when it stops the ice maker and triggers an alarm (RED LED on steady). When the room temperature returns to the minimum acceptable value (>5°C), the appliance resumes operation, automatically activating the 3-minute start-up delay timer.

Under normal ambient conditions (21°C), the suction pressure or low pressure stabilises after a few minutes of operation of the ice maker.

This value may vary by 1 or 2 tenths of a bar, more or less, depending on the temperature of the water reaching the evaporator.



NOTE: If, after 10 minutes from the start of the ice maker, the refrigerant temperature detected at the evaporator outlet by the special probe does not fall below 0°C, the appliance stops (first the compressor and after 3' the gearmotor) and the 5th YELLOW alarm LED flashes. The ice maker will stay off for about an hour, after which it will resume normal operation. If the problem reoccurs three times in three hours, the ice maker will stop permanently and the monitoring LED panel will show an alarm. Once the cause of the fault has been eliminated, the appliance must be electrically disconnected and reconnected in order to restart. The RED start-up delay LED will flash for 3 minutes, after which operation will be resumed.

Residual water drain (PWD only EC models)

Components

- Hermetic water tray
- Hermetic water pump
- Non-return valve

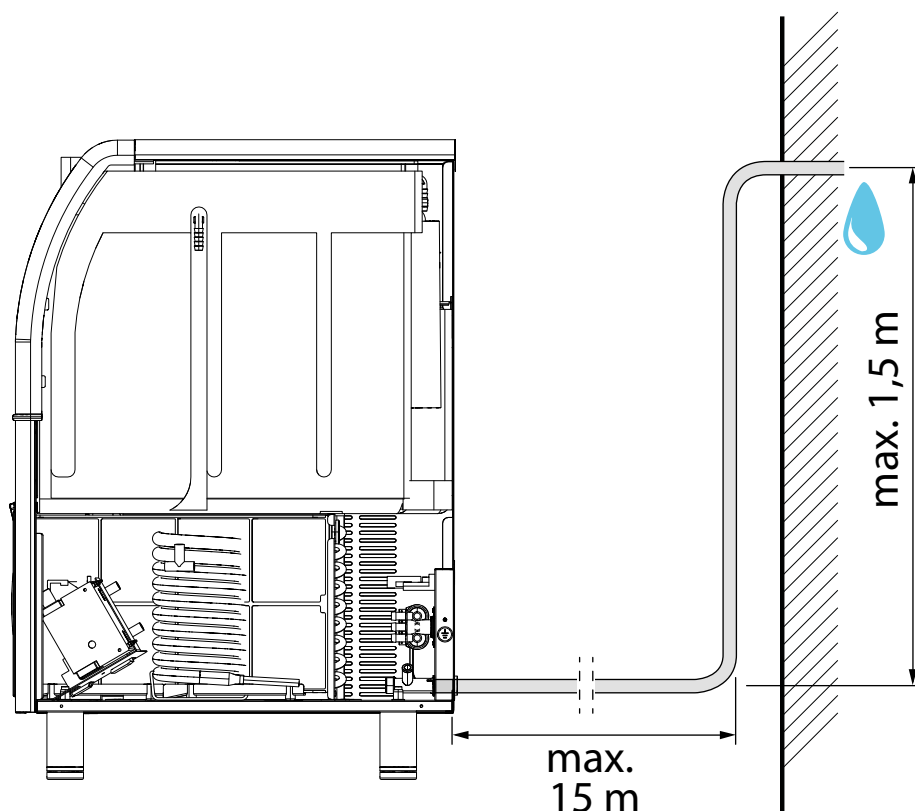
Operation

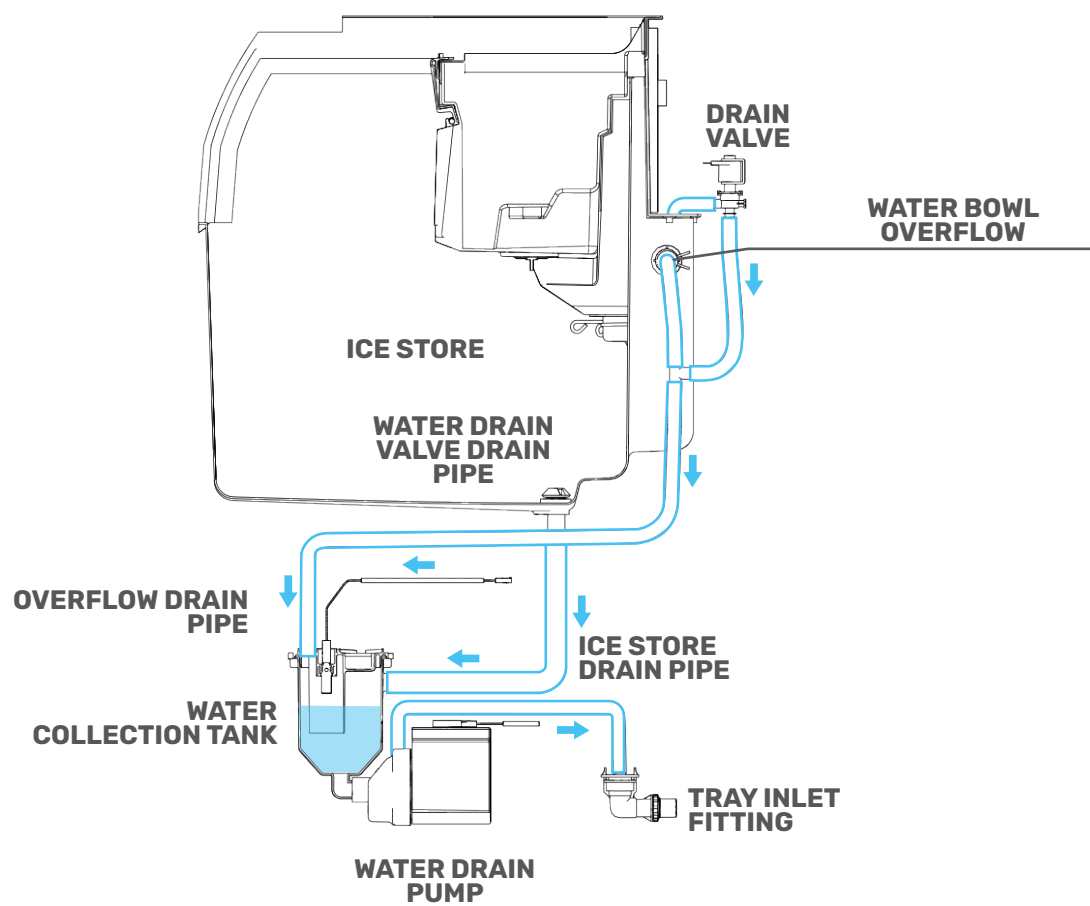
The water coming from the **overflow** fitting, the drain valve and from the melting of the ice in the cell/ container is collected inside the **hermetic tray**.

If the water level reaches the two metal sensors corresponding to the maximum level in the hermetically sealed tray, a low-voltage current is generated towards the electronic board. The same board powers the drain pump for 8 seconds (the time required to remove water from the tray).

F20 The water discharged under pressure can be sent up to 1.5 metres high or 15 metres horizontally.

A non-return water valve is installed on the drain line of the system.





F22

DIAGNOSTICS

SYMPTOMS	POSSIBLE CAUSE	SUGGESTED REMEDIES
The unit does not operate (No LEDs on)	- Electronic board fuse blown, main switch off - Electronic board not working - Electric cables disconnected	- Replace the fuse and search for the cause of the blown fuse - Set the switch to on - Replace the electronic board - Check the wiring
Yellow container full LED on (but no ice in the container or container not full)	Infrared ice level probe dirty or not working	- Clean or replace the dirty or faulty probe - Remember to complete the calibration
Yellow insufficient water LED on	- Insufficient water in the float tray - Water too soft - Sensors clogged by limescale	- Install the mineral salt dispenser - Sensors clogged by limescale - Remove limescale with descaler
Red LED on	- Excessive condensation temperature - Room temperature too cold	- Condenser dirty. Clean - Motor fan burned. Replace. - Move the appliance to a more suitable location (room temperature > 5°C)
Red LED flashes	3' delay/ 60' delay for MF66	None. Allow the 3-minute or 60-minute delay to expire
Yellow reverse rotation LED flashes	- High evaporator temperature - Partial or total lack of refrigerant	Check the refrigerant charge
Yellow reverse rotation LED on	- Gearmotor rotating in the reverse direction - Rotational speed too low	- Check stator and capacitance - Check the rotor and auger bearings as well as the inner surfaces of the freezer
Yellow (water) and red LEDs on steady	Faulty condenser sensor	Replace
Yellow (water) and red LEDs flashing	Faulty evaporator sensor	Replace
The compressor cycles intermittently	- Low voltage - Contactors with oxidised contacts - Non-condensing gases in the system - Compressor cables partially disconnected	- Check the circuit for overload - Check the power supply voltage - Download, empty and reload - Check the various terminals

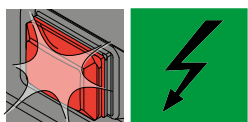
SYMPTOMS	POSSIBLE CAUSE	SUGGESTED REMEDIES
Poor ice production	• Capillary tube partially clogged • Moisture in the system • Insufficient water in the evaporator • Partial lack of refrigerant • Refrigerant overload • Float tray level too low • Rough/worn auger/evaporator	• Check the operating pressures • Drain and replace the dehumidifier filter • Empty and reload • Check for leaks and reload • Adjust the water tray • Replace the auger/evaporator
Ice too wet	• High ambient temperature • Too little or too much refrigerant • Float tray level too high • Inefficient compressor • Worn auger profile	• Place the appliance in a cooler environment • Check the operating pressures • Lower the water level in the tray • Replace • Replace
The appliance works but does not produce ice	• No water is reaching the freezer • Reduction gear worn • Moisture in the system	• Air bubble in the freezer water supply pipe. Unclog the freezer water supply pipe. Clean the water system • Replace the gear • Download, empty and reload
Water leak	• Water ring not holding • Freezer supply pipe not holding • Float not closing • Outlet gasket leak	• Replace • Check the straps • Adjust the float screw • Replace outlet gasket
Excessive noise or screeching	• Deposits of limescale or minerals on the interior surfaces of the freezer/auger • Suction pressure too low • Freezer water supply pipe partially obstructed • Float tray level too low • Worn freezer bearings	• Remove and clean the auger. Use emery cloth to clean the inside walls of the freezer, swiping it vertically. • Check the pressures and add refrigerant to the system if necessary • Check and clean. Remove any air bubbles • Raise the water level in the tray • Check and replace
Gearmotor noise	• Worn rotor bearings • Gearbox not lubricated • Gearbox bearing or gears in poor condition	• Check and replace • Check for lubricant leaks • Replace the oil seal and replenish the lubricant with grease
Insufficient water	• Water inlet filter clogged • Float tray nozzle clogged • Freezer water supply pipe partially obstructed	• Clean the filter • Clean the nozzle after removing float • Check and clean. Remove any air bubbles

FOREWORD.....52

Cleaning/replacement of condenser air filter.....	52
Cleaning the ice maker	52
Instructions for cleaning the water circuit	53
<i>Flushing the water circuit</i>	54
Sanitisation	55

Cleaning-replacement of the condenser air filter

Some models have a condenser air filter and a function on the electronic board that reminds the end user of the need to clean the air filter and the water circuit (red button flashing slowly and green light on)



- **F22** Pull air filter "C" through the opening in the front panel.
- Blow compressed air in the opposite direction of the condenser air flow to remove accumulated dust.
- If compressed air is not available, use clean water from the water mains, always running it in the opposite direction to the direction of the air flow. Once cleaned, shake the filter to remove any accumulated water and then dry it using a hair dryer. If damaged, the air filter must be replaced with a new one. Refit the air filter by pushing it through the front panel opening.

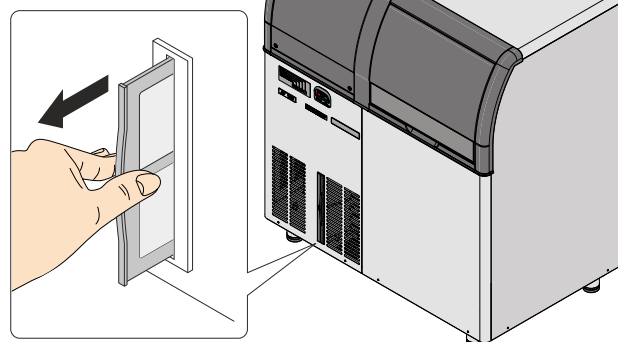
FOREWORD

The details of the maintenance and cleaning periods and procedures are supplied as a guide and should not be regarded as absolute and imperative.

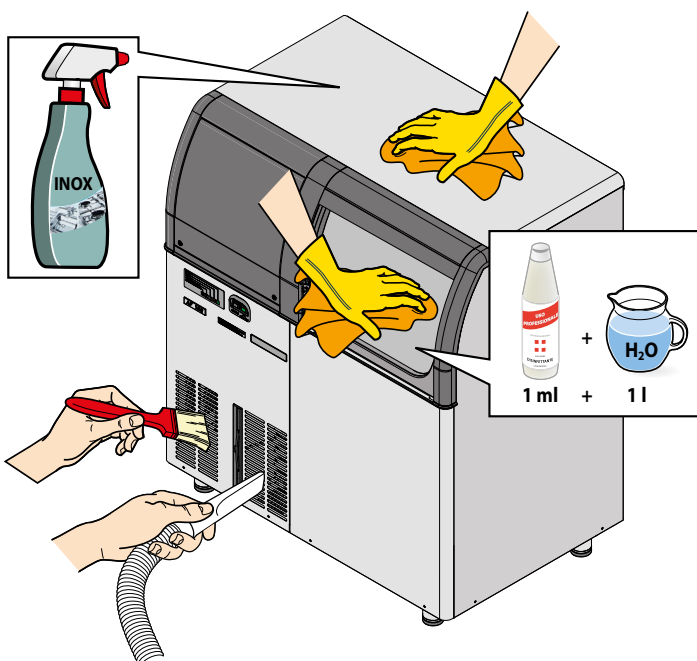
Cleanliness, in particular, is closely linked to the condition of the environment and the water used, and the amount of ice produced.

Each appliance must have its own individual maintenance plan, in accordance with its specific location.

Filter "C" is present only in air-cooled machines



F23

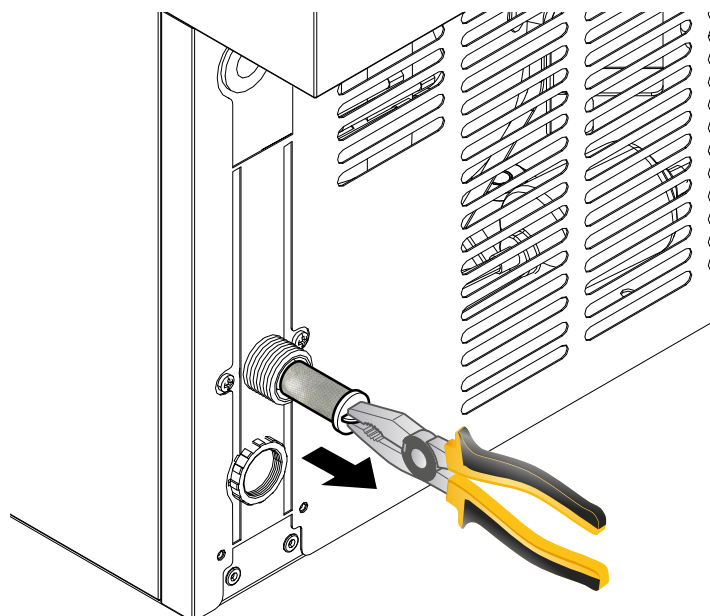


F24

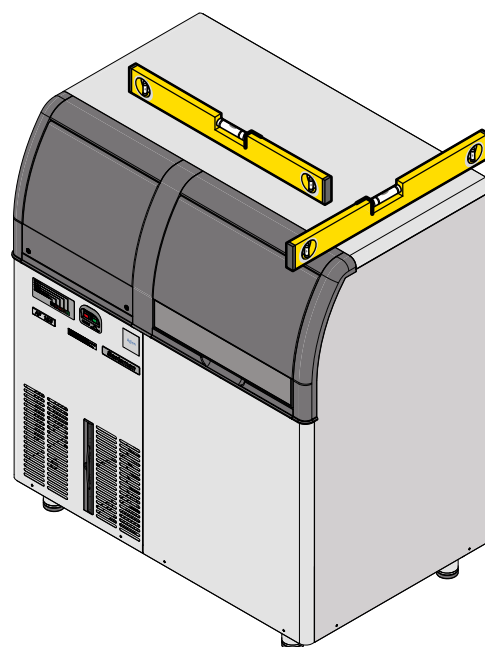
Cleaning the ice maker

The following maintenance operations must be carried out at least twice a year:

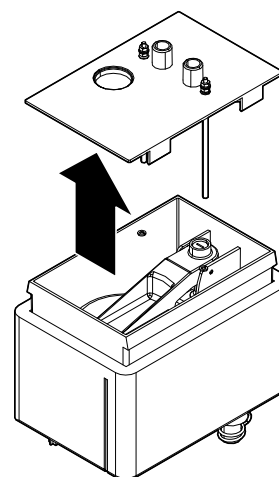
- **F24** Check and clean **the filter screen** inside the water inlet valve.
- **1 F25** Check that the appliance **is level** in both directions. If not, level it by adjusting the feet.
- **2 F26** Remove the **cover of the float tray**, taking care not to damage the water level sensors, and while pressing down on the float check that the water fills the tray to a good level.
- **3** Make sure that the water level in the tray is lower than the overflow level but always high enough to ensure proper operation.
-  **NOTE:** The float should stop the flow of water when its fulcrum, containing the adjustment screw with rubber seal, is perpendicular to the nozzle.
- **4** Clean the **tray and the inside of the freezer** using SCOTSMAN CLEANER descaling fluid. Please refer to the water circuit cleaning instructions in chapter "INSTRUCTIONS FOR CLEANING THE WATER CIRCUIT"; after cleaning, it is possible to estimate the frequency and the procedure to be followed in the future depending on where the appliance is installed.
-  **NOTE:** The cleaning requirements vary depending on the type of water and local working conditions.
- **5** Use some of the concentrated SCOTSMAN CLEANER descaling agent to remove all traces of limescale around the **water level sensors in the tank**.
- **6** With the ice maker switched off, in air-cooled models clean the condenser using a Hoover or a non-metallic brush, taking care not to damage the ambient and condenser temperature sensors.
- **7** Check the water circuit for leaks. Pour water into the ice container to ensure that the drain pipe is clear.
- **8** Check the operation of the optical ice level control system by placing ice between the optical readers to interrupt the infrared light beam. The interruption of the light beam between the two optical readers is signalled by the flashing of the YELLOW container full LED. After approx. 10' of continuous beam interruption, the appliance stops (the compressor stops immediately, followed after 3' by the gearmotor) and the YELLOW LED comes on steady. The 10-second delay is to avoid unwanted



F25



F26



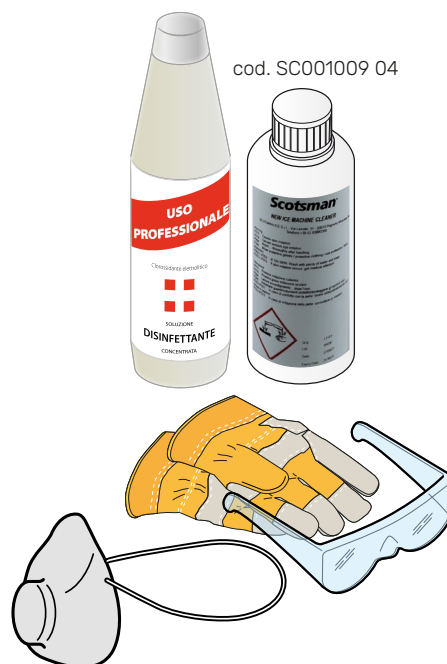
F27

stops of the ice maker, which could be caused by the ice granules, which may temporarily interrupt the light beam between the optical readers while falling through the outlet opening and into the ice container. A few moments after the removal of the ice between the optical readers, the appliance automatically starts again.

-  *NOTE: The infrared ice level control consists of two LEDs, the transmitter and the receiver, between which runs a light beam; in order for the appliance to function properly, it is imperative to clean the two sensor lenses at least once a month with a non-abrasive cleaning cloth.*
- **10** Check for refrigerant leaks and that the suction line is frosted up to about 10 cm from the compressor. If in doubt about the refrigerant charge, connect the pressure gauges to the Schröder fittings and check that the operating pressures are the same as those indicated in the manual.
- **11** Check that the fan turns freely.
- **12** After removing the polystyrene shells of the ice discharge outlet and the seeger ring that holds the ice breaker cover in place, or the plastic cap depending on the model, check the condition of the upper bearing, clean off all grease and apply a coat of water-repellent food-grade grease, cod. SC060294 06.
-  *NOTE: For the upper freezer bearing only use food-grade and water-repellent grease.*
- **13** Check the quality of the ice. As soon as it is formed, the ice may be wet, but it should quickly reach normal consistency inside the cell.
-  *NOTE: It is quite normal that, together with the ice, some water also comes out.*

Cleaning the water circuit

EQUIPMENT REQUIRED



- **1** Close the water tap on the supply line.
- **2** Switch the appliance off using the green luminous button.
- **3** Remove all the ice stored in the container so that it does not become contaminated with descaling solution.
- **4** Remove the top panel to access the float tray.
- **5** Remove the cover of the float tray and connect a piece of electric cable (use alligator clips) to the two pins of the low-voltage water level sensor.
-  *NOTE: Avoid resting one or both of the pins of the water level sensor on the body of the appliance, as this will transmit voltage from the condenser sensor to the electronic board, causing the appliance to stop due to high temperature.*
- **6** Disconnect the lower end of the pipe connecting the float tray to the freezer and collect the water coming out of both the freezer and the tray in a container, then replace the pipe.

- **7** In a clean bucket, prepare the descaling solution by diluting 0.2–0.3 litres of SCOTSMAN CLEANER in 2–3 litres of hot drinking water (45–50°C).

SANITISING THE WATER CIRCUIT (SCOTSMAN SANITISER)

It is recommended to sanitise the water system at least once a month.

- **Make sure to wear appropriate PPE (gloves, goggles)** and prepare the sanitising solution in a clean plastic container following the dilution instructions provided by the manufacturer and using lukewarm water (40–50°C). Caution, **never mix** CLANER descaling solution with SANITIZER sanitising solution.
- Follow the indicated descaling procedure, shortening the pump's operation time to just 10 minutes.
-  *NOTE: SCOTSMAN CLEANER descaling agent for ice makers contains a solution of phosphoric and hydroxyacetic acid. This solution is corrosive and can cause intestinal disorders if ingested. In case of ingestion, do not induce vomiting. Drink copious amounts of water or milk and immediately call the doctor. In case external contact, simply wash the area with water. KEEP IT OUT OF THE REACH OF CHILDREN.*
- **8** Slowly pour the descaling solution into the float tray and operate the appliance using the external switch.
- **9** Wait for the appliance to start running before continuing to slowly pour descaling solution into the tray, trying to keep the level below the overflow pipe.

-  *NOTE: The ice produced with the descaling solution is yellowish and mushy. At this stage, loud squeaking may be heard coming from the freezer due to friction between the rising ice and the walls of the evaporator. If this is the case, it is advisable to stop the operation of the appliance for a few minutes to allow the descaling solution to dissolve the limescale deposits inside the freezer*
- **10** Once the descaling solution has been used up, open the tap and let the appliance run until the ice produced is once again compact and clean.
- **11** Stop the appliance again and proceed to melt the newly produced ice by pouring a few jugs of hot water into the container, and then use a sponge soaked in a bactericidal substance to clean the inside walls of the container.
-  *WARNING. Do not use the ice produced with the cleaning solution. Make sure there is none left in the container.*
- **12** In the water tray, place 1 cc (about 20 drops) of SCOTSMAN sanitiser (anti-algae, cod. 264000.02) and then start the machine.
- **13** Leave the appliance running for about 10 minutes, then remove the electrical wire used to connect the two water level sensors and replace the water tray cover, making sure that it is in the correct position.
-  *NOTE: DO NOT USE the ice produce using the sanitising solution.*
- **14** Using a sponge soaked in a sanitising solution to clean the inside walls of the container.
-  *NOTE: Remember that to prevent the accumulation of unwanted bacteria it is necessary to clean and sanitise the inside walls of the container every week with a solution of water mixed with a bactericidal substance.*

Any unauthorized reproduction, even partial, of the content of these instructions is expressly prohibited.

These instructions and all accompanying documentation have been checked prior to sale. If errors or inaccuracies are found, please inform the Manufacturer.

The manufacturer reserves the right to make improvements to the appliance or accessories at any time, without notice. Measurements are purely indicative and not binding. In the event of disputes, the original language of the manual is Italian. The Manufacturer is not responsible for any translation/interpretation errors.

The background of the entire page is a close-up photograph of numerous ice cubes. The cubes are of various sizes and shapes, some showing a crystalline structure. They are set against a dark, reflective surface that creates clear reflections of the ice. The lighting is soft, highlighting the edges and facets of the ice cubes.

SCOTSMAN Srl
Scotsman Ice Srl - Via Lainate 31
20005 Pogliano Milanese - Milano - Italy
Phone: +39 02 93960 208
Fax: +39 02 93960201
sales@scotsman.it