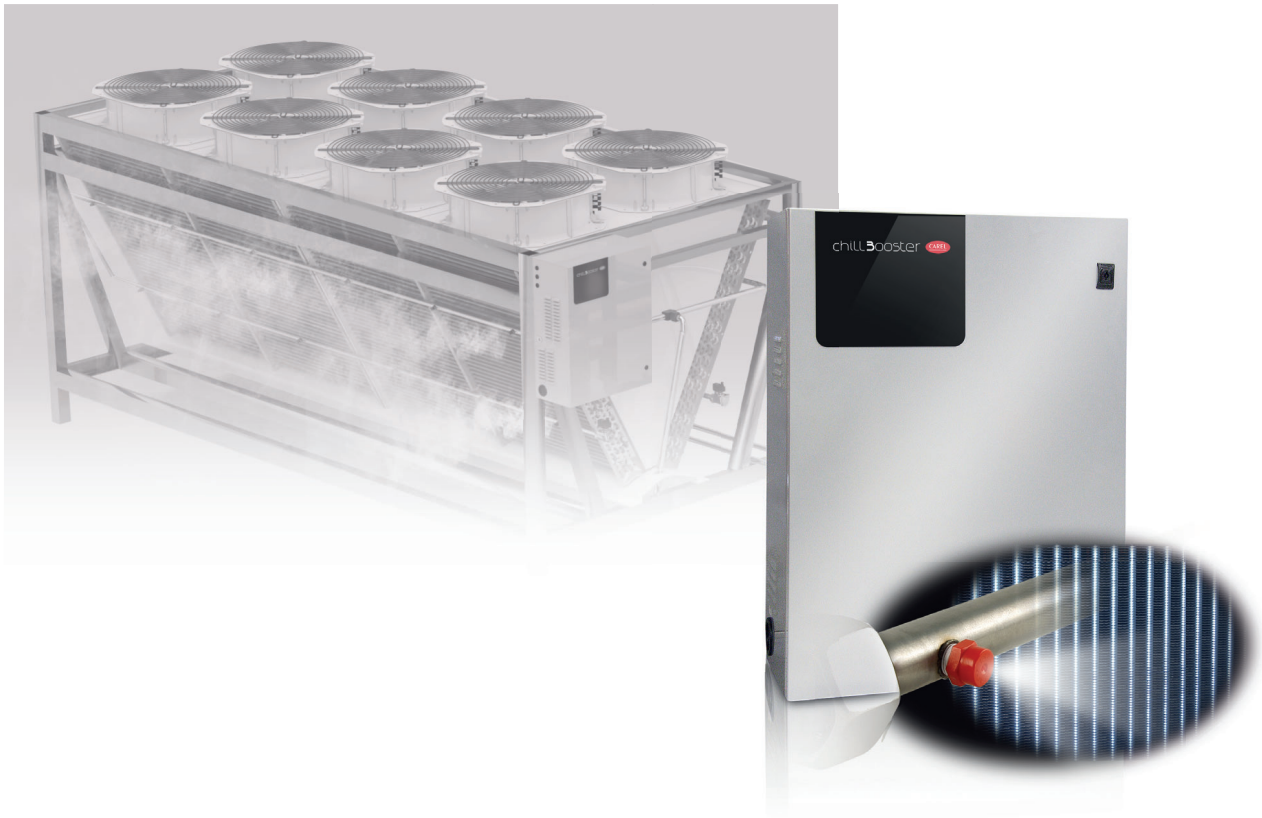
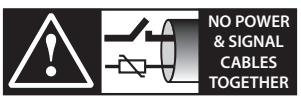
chillBooster

adiabatic cooling for finned heat exchangers



USER MANUAL

READ AND SAVE THESE INSTRUCTIONS



READ CAREFULLY IN THE TEXT!

Index

1. PURPOSE OF THE MANUAL

This manual contains instructions for the installation, use and maintenance of the models of chillBooster unit referred to in paragraph 4.4. The manufacturer of the unit is:

CAREL INDUSTRIES
Via dell'Industria, 11, 35020
Brugine - Padova (Italy)
Tel. (+39) 049.9716611 - Fax (+39) 049.9716600
e-mail: carel@carel.com - www.carel.com

2. HOW TO READ THE MANUAL

The manual is divided into chapters and paragraphs. Each paragraph is a sub-level of the corresponding chapter. References to headings or paragraphs are indicated by the abbreviation "Chap." or "Par." followed by the number.
Example: "Chap. 2" or "Par. 2.1".
The figures in this manual are numbered consecutively according to the corresponding chapter, for example Figure 1.c is the third figure in chapter one. References to the figures are indicated by the abbreviation "fig." followed by the number. Example: "Fig. 1.c".
The components shown in the figures are marked with numbers. A reference to component 1 in figure 2, chapter 3 will be indicated as follows: "See 1 - Fig. 3.b" or simply "(1 - Fig. 3.b)".

IMPORTANT
The figures shown in this manual are purely indicative. The actual components may vary from those illustrated. If in doubt, contact an authorised service centre.

In addition to the instructions for installation, use and maintenance, this manual contains safety information that requires special attention. This information is denoted by the symbols described below:

DANGER
Failure to comply with this warning will lead to an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Failure to comply with this warning will lead to potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Failure to comply with this warning will lead to a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT
Failure to comply with this warning will lead to a potentially hazardous situation which, if not avoided, could cause minor damage to the unit.

Notice: provides supplementary information to the above safety instructions.

3. GENERAL SAFETY INFORMATION AND INSTRUCTIONS

3.1 Intended use

The humidifier is designed and built exclusively to humidify rooms through distribution systems (ducts). Any other use may be a source of danger that is not contemplated in this manual and is therefore considered improper and therefore is prohibited by the manufacturer, which declines all liability in such cases.

3.2 General safety instructions

The customer (manufacturer, designer or installer) accepts all liability and risk relating to the configuration of the unit in order to reach the expected results in relation to the specific final installation and/or equipment. The manufacturer may, based on specific agreements, act as a consultant for the installation/commissioning/use of the unit, however in no case does it accept liability for the correct operation of the unit and/or the final installation if the warnings or suggestions provided in this manual or in other unit technical documents are not heeded. In particular, as well as observing the above warnings and suggestions, the following warnings must be observed for correct use of the product:

- The unit automatically and constantly fills/drains certain quantities of water. Malfunctions in the connections or in the unit may cause leaks.
- The installation of the product must include an earth connection, using the yellow-green terminal provided on the unit.
- Environmental and power supply conditions must conform to the values specified on the unit's labels.
- Only qualified personnel who are aware of the necessary precautions and able to perform the required operations correctly may install, operate or carry out technical service.
- Only water with the characteristics indicated in this manual must be used to produce the spray (see par. 6.2.4).

Important: Only use potable water.

- All operations on the product must be carried out according to the instructions provided in this manual and on the labels applied to the product. All uses or modifications not authorised by the manufacturer are considered improper and therefore prohibited by the manufacturer, which declines all liability is such cases.
- Do not attempt to open the unit in any way other than described in the manual.
- For anything not specified in this manual, comply with the regulations in force in the country where the unit is installed.
- Do not install and use the product near objects that may be damaged when in contact with water (or condensate). The manufacturer declines all liability for direct or indirect damage following water leaks from the unit.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the inside and outside parts of the unit, unless specifically indicated in the user manual.
- Do not drop, hit or shake the unit, as the inside parts and the linings may be irreparably damaged.

Important: The manufacturer adopts a policy of continual development and consequently reserves the right to make changes and improvements to any product described in this document. The technical specifications shown in the manual may be changed without prior warning.

Note: the liability of the manufacturer in relation to its products is specified in the general contract conditions, published on the website www.carel.com and/or by specific agreements with customers; specifically, to the extent where allowed by applicable legislation, in no case will the manufacturer, its employees or subsidiaries/affiliates be liable for any lost earnings or sales, losses of data and information, costs of replacement goods or services, damage to things or people, downtime or any direct, indirect, incidental, actual, punitive, exemplary, special or consequential damage of any kind whatsoever, whether contractual, extra-contractual or due to negligence, or any other liabilities deriving from the installation or use of the product.

3.3 Personal protective equipment

DANGER Strictly follow the instructions provided in the manual.

Personal protective equipment (PPE) means any equipment intended to be worn and kept by workers in order to protect themselves against one or more risks likely to threaten their health or safety during work, as well as any device or accessory intended for this purpose.
All PPE described in this manual are intended to protect personnel from health and safety risks.

Below is a list of personal protective equipment to be used and the procedures to be adopted to protect workers from the residual risks that exist during the various phases of the humidifier's life cycle.

GLOVES TO PROTECT AGAINST PHYSICAL ELEMENTS:
these must protect the person's hands against cuts, abrasion and heat.

NON-SLIP SAFETY FOOTWEAR: these must prevent falls on slippery surfaces and protect the person's feet from impact, crushing and puncture wounds.

SAFETY HARD HAT: this must protect the person's head against bumps or material accidentally falling from above.

SAFETY GLASSES: these must protect the person's eyes from all risks due to contact with hazardous substances or materials.

PROTECTIVE MASK: this protects the wearer's respiratory tract against all risks associated with the inhalation of dangerous substances.

PROTECTIVE CLOTHING: this guarantees the body adequate protection against thermal and chemical agents.

EARMUFFS: these must attenuate noises that would otherwise be harmful to the person's hearing.

INSTRUCTION MANUAL: this must be referred to whenever necessary, in order to avoid adopting unsafe procedures.

4. UNIT OVERVIEW

4.1 Description of the unit

The unit comprises a pumping station and a distribution system to spray finely atomised water. The minute droplets of water evaporate spontaneously at the expense of the energy of the air, which is consequently cooled and reaches the finned coil at below-ambient temperature.
In this way, the heat exchanger can more easily dissipate the required amount of heat even in when the temperature is warmer than expected.o.

4.1.1 Components

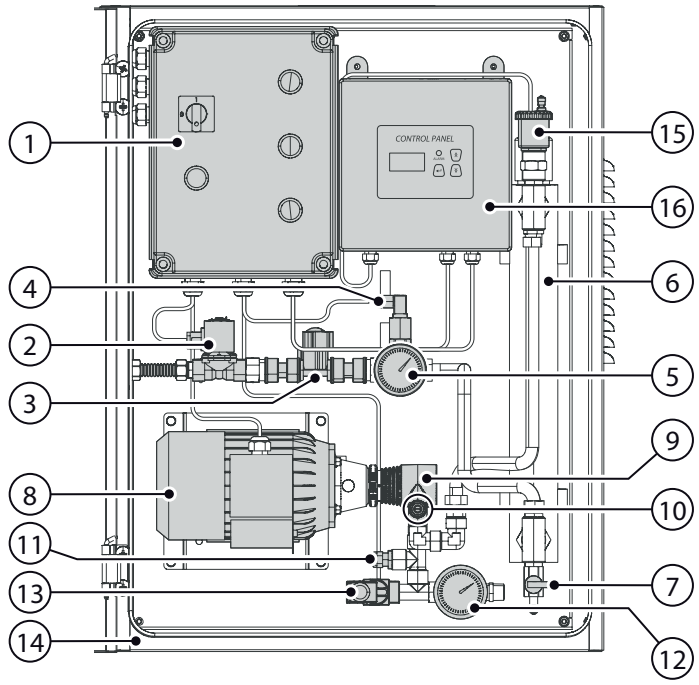


Fig. 4.a

Key

1	Electrical panel
2	NC fill solenoid valve
3	Pressure reducer
4	Pressure switch
5	Water inlet pressure gauge
6	UV lamp (optional)
7	UV lamp drain valve (optional)
8	Motor
9	Pump
10	Pressure adjustment screw
11	Temperature-controlled valve
12	Water outlet pressure gauge
13	NO drain solenoid valve
14	Structure
15	Relief valve
16	UV lamp electrical panel (optional)

4.2 Dimensions and weight

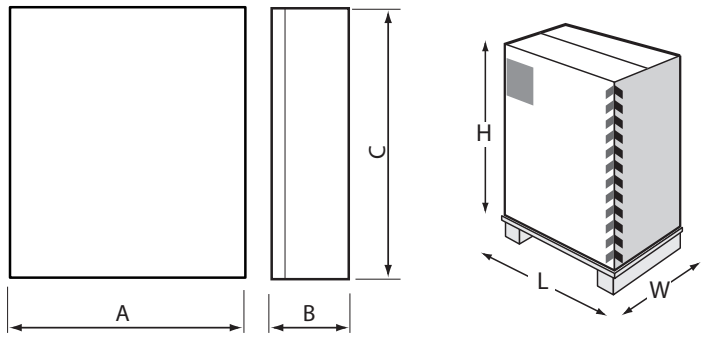


Fig. 4.b

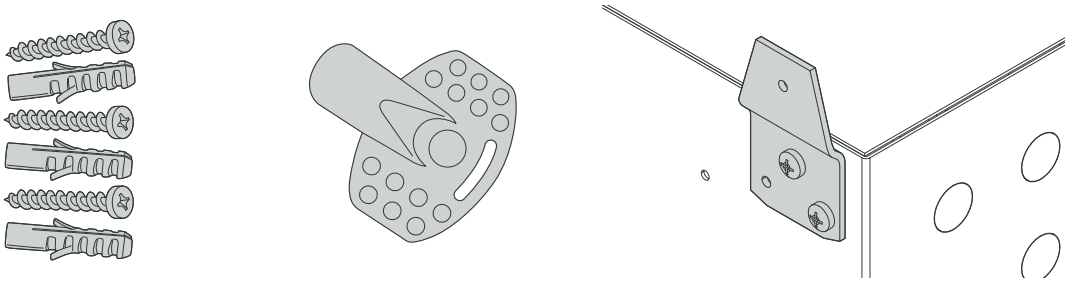
Mod.	AxBxC (mm)	Weight (kg)	LxWxH (mm)	Weight (kg)
AC*****0**	630x300x800	49	720x410x1020	52
AC*****01*	630x300x800	53	720x410x1020	56

Tab. 4.a

4.3 Packaging contents

When opening the packaging, make sure that the components illustrated in Fig. 4.a. and the accessories in Fig. 4.b are present and intact:

- kit of screws with anchors for wall mounting (inside the cabinet) (a - Fig. 4.c);
- tool to open the cabinet (b - Fig. 4.c);
- 4 rear brackets (c - Fig. 4.c);
- user manual.



a b c

Fig. 4.c

Notice: if anything is missing when opening the package, contact the manufacturer immediately to agree on the appropriate procedures to be adopted.

4.4 Unit specifications

The unit is available in various models, which differ in terms of:

Mod.	Size (maximum capacity)
AC012*****	100 l/h
AC052*****	500 l/h
AC102*****	1000 l/h

Mod.	Power supply voltage
AC***D0***	monofase 230 Vac 50 Hz
AC***D1***	monofase 230 Vac 60 Hz
Mod.	Optional
AC******1*	Versione con lampada UV

Tab. 4.b

4.4.1 Physical specifications

- wall-mounting;
- electrical panel and electrical components IP55;
- cabinet operating conditions:
  - for installation inside an equipment room: 5-45 °C <80 % RH non-condensing;
  - for outside installation sheltered from sunlight: 5-45 °C <80 % RH non-condensing;
  - for outside installation with exposure to sunlight: 5-35 °C <80 % RH non-condensing;
- shutdown conditions (winter): provided that the water circuit is completely emptied, temperatures below 0 °C are allowed (for further information, see chapter 8 "Maintenance");
- storage conditions: 5-50 °C <80 % RH non-condensing.

4.4.2 Electrical specifications

AC***D0*** (230 V 50 Hz) [1]
AC***D1*** (230 V 60 Hz) [1]

	voltage (Vac)	No. of phases	frequency (Hz)	power (kW)	current (A)
AC012D0***	230	1	50	0,2	1.03
AC052D0***	230	1	50	0,4	1.80
AC102D0***	230	1	50	0,6	2.60
AC012D1***	230	1	60	0,2	1.05
AC052D1***	230	1	60	0,4	2.15
AC102D1***	230	1	60	0,6	2.80
AC012D0*1*	230	1	50	0,23	1.23
AC052D0*1*	230	1	50	0,43	1.90
AC102D0*1*	230	1	50	0,6	2.70
AC012D1*1*	230	1	60	0,23	1.25
AC052D1*1*	230	1	60	0,43	2.25
AC102D1*1*	230	1	60	0,6	2.90

Tab. 4.c

[1] Product compliant with EN60204, EN61000, EN60335.
Insulation grade III

4.5 Description of the controls

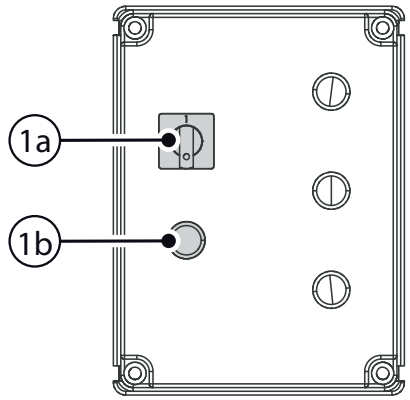


Fig. 4.d

Key

Ref.	Component	Function
1a	ON/OFF switch	Used to switch the unit ON (position I) and OFF (position O).
2b	Black button	Simulates the remote ON command (closure of contacts 1-2). Used during commissioning if the ON command from the external controller is not available. The button enables operation of the pump to calibrate and verify the water circuit.

4.6 Layout diagram

Per garantire i corretti spazi di manovra necessari all'esecuzione delle operazioni di installazione e manutenzione della macchina, si raccomanda di predisporre il luogo di installazione in maniera tale da avere a disposizione le distanze (quote in mm) indicate in fig. 4.e.

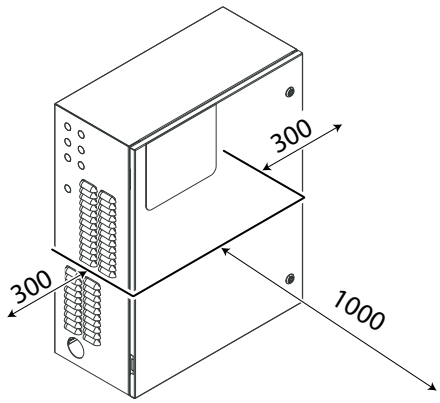


Fig. 4.e

5. TRANSPORT AND HANDLING

DANGER: Always place the unit on surfaces that are suitable to support its weight.

Warnings:

- Transport operations must be carried out by trained personnel using certified equipment in good condition. Transport equipment and tools must be suitable for the weight and characteristics of the unit.
- Make sure that there are no unauthorised persons or things that could obstruct the lifting and transport operations in the area where these are performed.
- Any other method of handling or transport not described in this manual is considered unsuitable, dangerous and therefore not approved by the manufacturer..

5.1 Transport

The unit is shipped already assembled, packed and secured to pallets suitable for the weight of the unit by special straps. The places where the forklift forks can be inserted are marked by special tags. To guarantee correct handling, loading and anchoring of the packages, the manufacturer checks all of the phases in the preparation of the packages and all of the materials needed for transport before the unit is loaded on the vehicle, and provides a delivery note (DDT) where the carrier can express any reservations about the stability or suitability of the load for the vehicle in question.

Nonetheless, the recipient must scrupulously check the packages before they are unloaded from the delivery vehicle. Notify the carrier immediately, in writing, of any damage that may be due to improper or negligent transport.
Move the unit to the site of installation before removing it from the packaging, grasping the neck from underneath using suitable lifting equipment.
Open the cardboard box, remove the protective material and remove the unit, keeping it vertical at all times.

Notice: the packaging material must not be dispersed in the environment; consequently, the different types of material must be separated and disposed of by local waste disposal services, in accordance with the regulations in force in the country where the unit is installed.

5.2 Handling

Handling operations must be carried out by qualified personnel, with an assistant required for signalling. The lifting and transport equipment must be of suitable capacity and chosen based on the dimensions, weight and shape of the unit. The capacity of the lifting equipment and lifting accessories must be greater (with a margin of safety) than the weight of the loads being moved. Lifting movements must be continuous, without jerking or sudden movements. During handling, nobody is allowed in the manoeuvring area; the entire surrounding area is considered a danger zone. The handling operator is responsible for verifying the stability of the unit before lifting and handling it.

5.3 Table of residual risks and PPE for handling operators

PPE required:

- Protective gloves
- Non-slip safety footwear
- Safety hard hat
- Instruction manual

Residual risk	Procedure to be adopted
Risk of cutting or abrasion due to sharp edges or surfaces.	Wear gloves to protect against physical agents and a hard hat before entering the work area.
Risk of slipping, tripping or falling due to slippery surfaces in the installation area.	Wear non-slip shoes.
Risk of tripping and falling due to insufficient lighting.	The unit must be installed in an environment with medium intensity lighting, in compliance with the regulations in force in the country where the unit is installed.
Crushing risk due to suspended loads.	Display the pictogram prohibiting parking and transit in areas where there are suspended loads.
Crushing risk due to loss of stability during handling.	Strictly follow the instructions described in this manual and on the labels affixed to the unit.

Tab. 5.a

DANGER: If manually handling the unit in spaces that do not allow the use of suitable handling equipment, the manufacturer recommends the operations be carried out by at least two people, plus an assistant for signalling, so as to guarantee the stability of the unit and avoid the consequent danger of crushing due to a possible loss of stability, as well as the ergonomic hazards (excessive effort, uncomfortable positions) resulting from the weight of the unit.

Warnings: The safety manager is responsible for assessing the need to equip handling operators with additional personal protective equipment in accordance with the environmental conditions where the operations are performed.

6. INSTALLATION

6.1 Positioning

The unit must be positioned so as to allow the following operations:
- opening the front panel;
- accessibility to the internal parts for checks and maintenance;
- connection of the feedwater lines;
- connection of the water distribution lines;
- power and control electrical connections.

Recommended: clearances for routine maintenance:
- at the front 1 m;
- on the right and left side about 0.3 m.

Secure the unit to a sufficiently solid support surface using the screws and bracket supplied. Make sure that there is sufficient space for the water line inlet and outlet connections.

6.1.1 Wall mounting holes

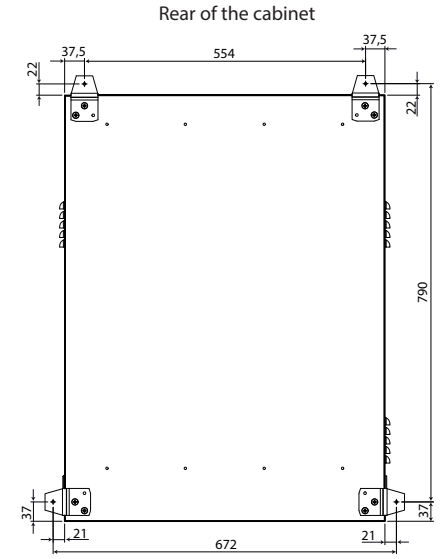


Fig. 6.a

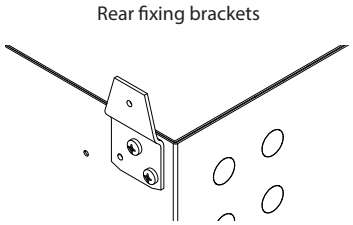


Fig. 6.b

6.2 Water connections

6.2.1 Fittings provided for water connections

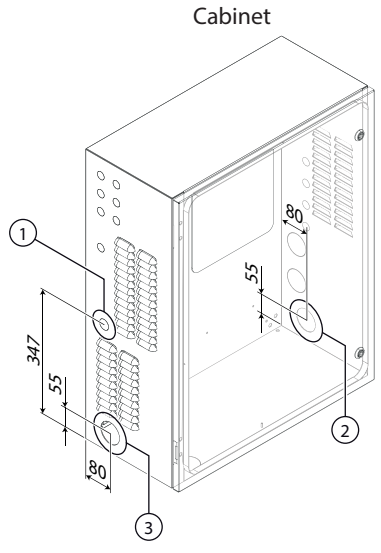


Fig. 6.c

Key:

1	Water inlet (G1/2" female)
2	Pressurised water outlet (G1/2" female)
3	Drain water outlet (G1/2" female)

6.2.2 Water connection layout

Refer to the following installation layout for the water connections:

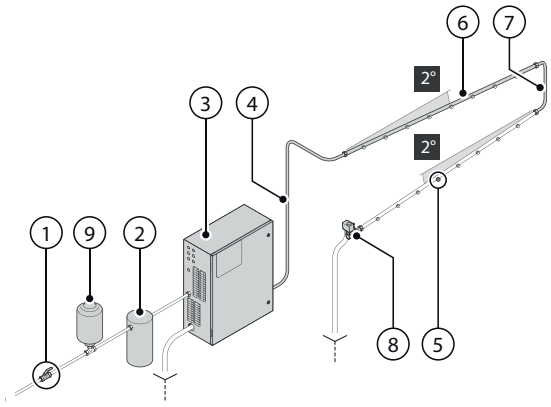


Fig. 6.d

Key:

1	manual valve upstream of the system to shut off the water line (not supplied by the manufacturer)
2	10 µm water filter (P/N ACKF000000) to remove particles from the feedwater
3	ChillBooster cabinet
4	Hoses complete with adapters (see par. 6.3.5)
5	Nozzles (see par. 6.3.1)
6	Racks (see par. 6.3.3)
7	Rack connection hoses (see par. 6.3.5)
8	NO drain water solenoid valve (see par. 6.3.6)
9	Expansion vessel

DANGER: Before making the water connections to the unit, make sure that the unit is not connected to the mains power supply.

Important:

- For direct connection to the water mains, use pipes and fittings compliant with IEC 61770.
- The system pipes and racks must be installed with an incline of at least 2° (see Fig. 6.d) to ensure that the residual water can easily flow to the drain, thus avoiding stagnation when the unit is off.

Notice: to meet Watermark requirements, where applicable, a Watermark approved double check valve must be installed on the unit's feedwater line when connected to the potable water supply network. If, on the other hand, the unit is supplied with water from a reverse osmosis system connected to the potable water supply network, the double check valve must be installed on the inlet to the reverse osmosis system.

6.2.3 Unit water circuit characteristics

Models	AC012*****	AC052*****	AC102*****
Flow-rate (l/h)	100	500	1000
Min.-max. inlet pressure (bars/MPa)*	2-8 / 0,2-0,8		
Temperature (C°)	5 - 40		
Inlet connections	G1/2" female		
Outlet connection	G1/2" female		
Drain connection	G1/2" female		
Temperature-operated valve drain connection (mm)**	Pipe OD 10 ID 5		

Tab. 6.a

* if during the transient at start of production the feedwater pressure drops below 2 bars for a short time, it is recommended to choke the outlet of the drain solenoid valves on the cabinet and on the distribution rack, for example using a G1/2" M - G1/4" F adapter.
** the solenoid valve drain pipe must run through the hole on the left side (3 - Fig. 6.c)

6.2.4 Type of feedwater

The unit can work with drinking water, lightly softened water or demineralised water. The water atomised by the nozzles may not evaporate completely before reaching the finned coil as a result of variable ambient air conditions; consequently, the heat exchanger fins will be wetted, thus increasing overall system efficiency. Following evaporation, the minerals dissolved in the feedwater are partly carried in the air stream in the form of very fine dust, and partly deposit on the surface of the heat exchanger fins. The frequency of routine maintenance depends on the type and quantity of minerals contained in the feedwater, which cause fouling and, in extreme cases, corrosion of the materials.

The problem can be minimised by using demineralised water from a reverse osmosis system, with the following characteristics:

- conductivity <100 µS/cm;
- total hardness <5 °fH (50 ppm $CaCO_3$);
- 6.5<pH< 8.5;
- chloride content <20 mg/l;
- silica content <5 mg/l.

Feedwater requirements for optimum operation

Feedwater requirements:

Type / properties	Requirement
Demineralised water	ok
Tap water	ok *
Softened water	ok **
Temperature °C (°F)	5 to 40 (41 to 104)
Pressure (MPa/bars)	0.2 to 0.8 (2 to 8)
pH	6.5 to 8.5
Total hardness mg/l CaCO3 (°F)	< 160 (16 °F)
Conductivity (µS/cm) at 20°C	< 400

Tab. 6.b

* The use of tap water with a total hardness and conductivity exceeding the specified limits is permitted and does not affect the operation of the pumping station; however, maintenance will need to be performed more frequently to clean the atomising nozzles and remove build-up of minerals from the heat exchanger fins.
** Water treatment with polyphosphates or water softeners is allowed, guaranteeing at least 60% of the initial hardness value and no less than 5°f.

Important:

- To reduce fouling on the surface of the coils when using untreated water, it is recommended to operate the unit only when necessary, and in any case typically for no more than 200 hours a year.
- On the water line, upstream of the cabinet, install an expansion vessel (not supplied by the manufacturer) with a capacity of at least 5 litres, so as to avoid water hammer that may damage the unit.
- The water line is tested and adjusted to an outlet pressure of 10 bars downstream of the cabinet. This value must be checked and adjusted during commissioning.

6.3 General characteristics of the distribution system

Notice:

- in order to optimise the surface area covered by the spray from the nozzles, the manufacturer suggests installing the distribution system 30 cm from the finned coil, with the spray aimed against the air flow entering the coil.
- in order to stabilise the distribution system during operation, the manufacturer suggests fixing it to the finned coil using collars, such as those shown in Fig. 6.e. The collars are not supplied by the manufacturer.

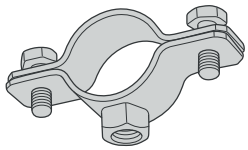


Fig. 6.e

Important:

- Be careful to not damage the finned coil when installing the fixing collars.
- Use Teflon tape on all of the components with threads but without gaskets to ensure tightness.

6.3.1 Nozzles

The atomizing nozzles are made from plastic and are available in three different flow-rates, all with the same dimensions and weights. Each nozzle has a different colour to denote its flow-rate and the angle of the atomised water spray.
Each kit includes 10 nozzles.

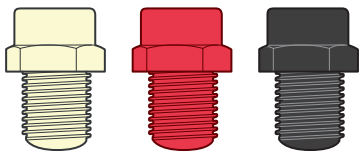


Fig. 6.f

Part number	Colour	Angle	Flow-rate at 10 bars
ACKNR00000	red	115°	5,0
ACKNC00000	cream	105°	7,5
ACKNB00000	black	120°	15,0

Tab. 6.c

Important: Max. tightening torque 0.8 Nm.

6.3.2 Plugs

If the 1/8" NPT holes on the racks need to be closed, stainless steel plugs are available.

P/N: ACKCAP0000

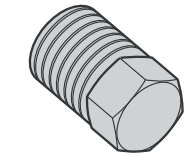


Fig. 6.g

Important:

- Max. tightening torque 10 Nm.
- Place a suitable layer of Teflon tape around the thread.

6.3.3 Racks

Stainless steel nozzle racks, outside diameter 20 mm, with NPT 1/8" F threaded fittings.
The racks are available in three standard lengths: approximately 1, 2, 3 m, so as to adapt to different installation needs. The racks can be joined together and/or adapted by cutting to them to the desired length.

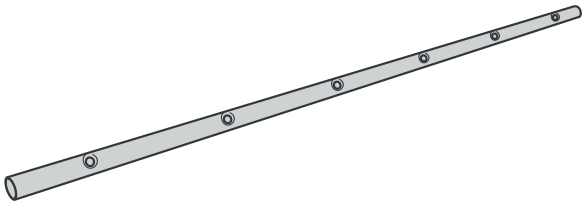


Fig. 6.h

Part number	length mm	no. of holes
ACKT007000	1052	7
ACKT013000	1964	13
ACKT019000	2876	19

Tab. 6.d

6.3.4 Rack fittings

Special fittings are available for the connections between the racks, pipes, hoses and solenoid valves. In systems where the water is not excessively demineralised (conductivity > 30 µS/cm), nickel-plated brass push-lock couplings are available. In systems supplied with highly demineralised water (conductivity < 30 µS/cm), stainless steel compression fittings are available..

Brass distribution system couplings

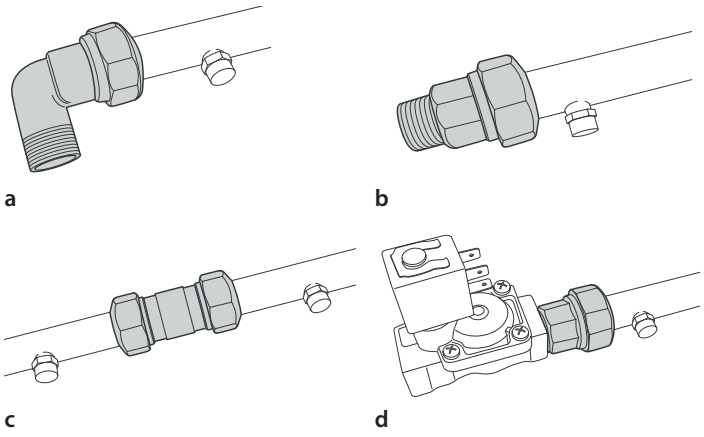


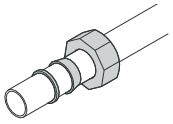
Fig. 6.i

Part number	Description	material	Ref. figure
ACKRFL0000	"L" push-lock coupling male - G1/2" F 20 mm dia. pipe	nickel-plated brass	a - 6.i
ACKRDF0000	straight push-lock coupling G1/2" F 20 mm dia. pipe	nickel-plated brass	b - 6.i
ACKRDI0000	intermediate straight push-lock coupling 20 mm dia. pipe	nickel-plated brass	c - 6.i
ACKRDM0000	straight push-lock coupling 1/2" M 20 mm dia. pipe	nickel-plated brass	d - 6.i

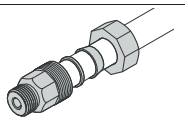
Tab. 6.e

Attaching the 20 mm dia. nickel-plated brass push-lock couplings

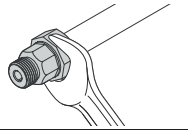
1. The pipes must be deburred. Insert the ring nut, the plastic ring and the rubber gasket into the pipe.



2. Insert the pipe into the coupling, as far as it will go.



3. Tighten to a torque of 15 Nm.



Stainless steel distribution system fittings

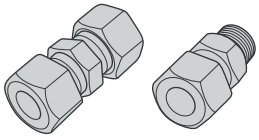


Fig. 6.j

assembly examples

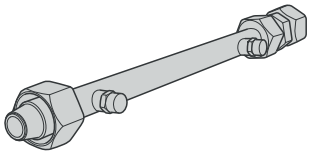


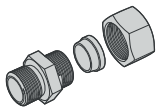
Fig. 6.k

Part number	Description	Material	Ref. fig.
ACKRDM0001	straight fitting 1/2" M 20 mm dia. pipe	AISI 304 stainless steel	6.j
ACKRDI0001	intermediate straight fitting 20 mm dia. pipe	AISI 304 stainless steel	6.k

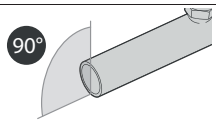
Tab. 6.f

Assembling 20 mm dia. stainless steel compression fittings.

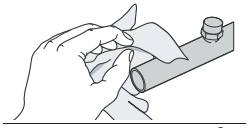
1. Carefully clean the tightening nut, gasket and body of the fitting.



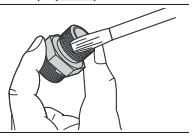
2. Check that the pipe is cut 90° and deburred both on the inside and outside.



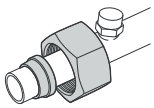
3. Clean the racks and remove any impurities or dust by blowing with compressed air.



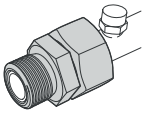
4. Carefully lubricate all contact surfaces.



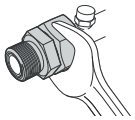
5. Correctly insert the nut and the gasket onto the pipe.



6. Insert the pipe, complete with nut and gasket, into the body of the fitting, as far as it will go.



7. Tighten the nut using a suitable spanner until meeting considerable resistance (about 1.5 turns): then tighten another ¼ of a turn.



6.3.5 Corrugated AISI 304 stainless steel hose

Stainless steel hoses are available in different lengths and sizes for connection between the pumping station and the distribution system and between racks.
The hoses are supplied with G½" F and G3/4" F threaded couplings. Special fittings are available in different shapes for connection between the various components, designed to house gaskets to ensure tightness.

Hose

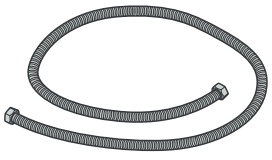


Fig. 6.l

Part number	Hose	Length m
ACKT1F0500	1/2" hose complete with two G1/2"F couplings	0,5
ACKT1F1000	1/2" hose complete with two G1/2"F couplings	1
ACKT1F2000	1/2" hose complete with two G1/2"F couplings	2
ACKT2F1000	3/4" hose complete with two G3/4"F couplings	1
ACKT2F2000	3/4" hose complete with two G3/4"F couplings	2
ACKT1FA100	1/2" hose complete with two G1/2"F couplings	10

Tab. 6.g

Fittings and gaskets for hoses

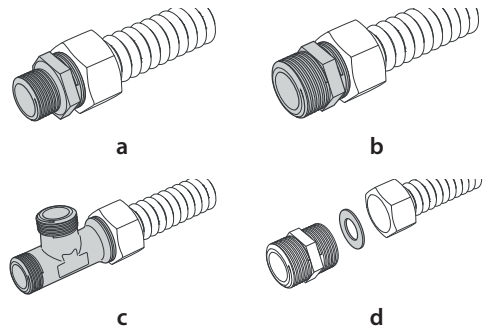


Fig. 6.m

Part number	Fittings	Ref. figure
ACKRR01200	G1/2" - G3/4" M-M adapter	a - 6.m
ACKRN01000	G1/2" M-M straight adapter	b - 6.m
ACKRN02000	G3/4" M-M straight adapter	b - 6.m
ACKRTF1110	G1/2" M - G1/2" M - G1/2" M 'T' fitting	c - 6.m
ACKRTF1120	G1/2" M - G1/2" M - G3/4" M 'T' fitting	c - 6.m
ACKG100000	G1/2" gasket kit (10 pcs.)	d - 6.m
ACKG200000	G3/4" gasket kit (10 pcs.)	d - 6.m

Tab. 6.h

6.3.6 Drain solenoid valve for distribution systems

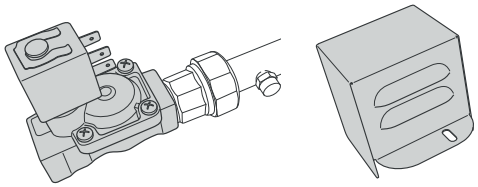


Fig. 6.n

Part number	Description	Material	Ref. fig.
ACKV1D0010	NO solenoid valve kit 230 V, 50/60 Hz, G1/4" female fitting, NW IP65	brass	a - 6.h
ACKV1D0011	NO solenoid valve kit 230 V, 50/60 Hz, G1/4" female fitting, AW IP65	stainless steel	a - 6.h
ACKVCVR000	Outside cover for solenoid valve	painted galvanised sheet metal and nickel-plated brass	b - 6.h

Tab. 6.i

6.4 Electrical connections

6.4.1 Electrical connection inputs

AC***D0*** ; AC***D1***

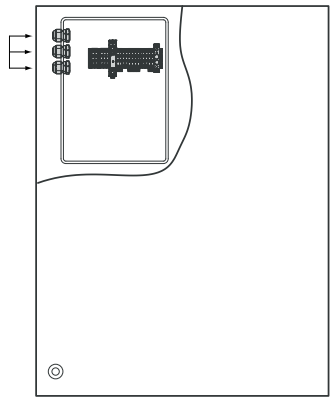


Fig. 6.o

6.4.2 Wiring requirements

Important: Make sure the cable glands are fitted.

6.4.3 Power supply

Depending on the models:
- AC***D0*** voltage 230V 1~ 50Hz;
- AC***D1*** voltage 230V 1~ 60Hz;

Important: Use sheathed power cables with two wires plus earth, minimum cross-section 0.75 mm² and minimum outside diameter of 7 mm. Cables must comply with local regulations. Install a power switch outside of the cabinet to isolate it fully from the power supply.

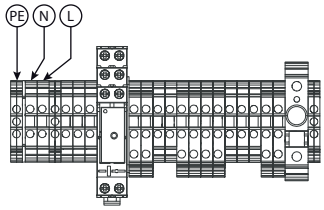


Fig. 6.p

Connections

Cabinet AC	Power cable
L	L/F (phase)
N	N/W (neutral)
PE	GR/PE (earth)

6.4.4 Remote ON/OFF command

Use an AWG20/22 sheathed two-wire cable with a minimum outside diameter of 7 mm. The terminals indicated enable the unit to be started via a remote signal.

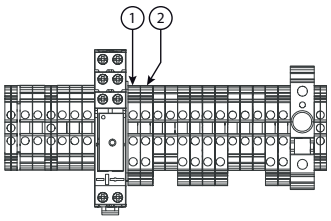


Fig. 6.q

Connections

Cabinet AC	Remote ON/OFF
1	NC/NO
2	C

6.4.5 NO drain solenoid valve connection at end of water line

Use a sheathed cable with two wires plus earth and a minimum cross-section of 0.75 mm² with a minimum outside diameter of than 7 mm.

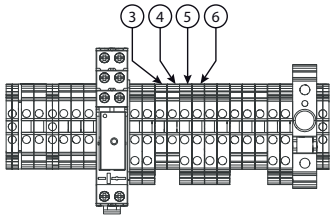


Fig. 6.r

Connections

Cabinet AC	solenoid valves
3	terminal 1 (solenoid valve 1)
4	terminal 1 (solenoid valve 2)
5	terminal 2 (solenoid valve 1)
6	terminal 2 (solenoid valve 2)

6.4.6 Alarm relay

This is activated when, with the remote signal to enable production activated (see par. 6.4.4), a fault has been detected involving the pressure switch, motor protector or UV lamp.

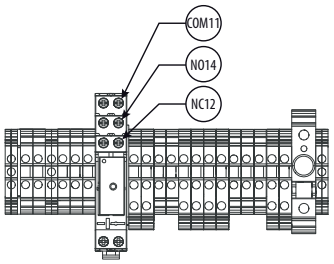


Fig. 6.s

Causes of the alarms

Alarm	Cause
Pressure switch	Absence of pressure (if < 0.5 bars).
Motor protection	Motor current overloaded.
UV lamp	Check the UV lamp control panel (see par. 9.3.4).

Connections

Cabinet AC	contact
COM11	common C
NO14	NC contact
NC12	NO contact

6.4.7 Unit status/pump operation

Voltage connections (0-230 V). The terminals are powered when the pump starts and change status when it stops.

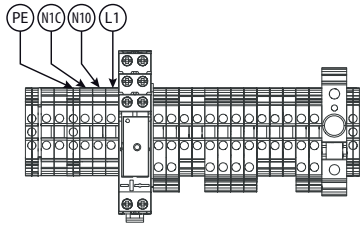


Fig. 6.t

Pump ON

Terminal	Voltage
Terminal N1C	230V
Terminal N1O	0V
Terminal L1	0V

Pump OFF

Terminal	Voltage
Terminal N1C	0V
Terminal N1O	230V
Terminal L1	0V

6.4.8 Operation or stop production on UV lamp alarm - UV lamp version only

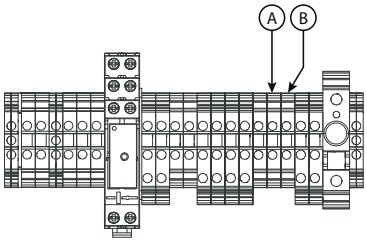


Fig. 6.u

The jumper between terminals A and B (Fig. 6.v) allows the unit to switch off in the event of a lamp alarm:

- When the jumper between A and B is closed and there is an active alarm, the unit signals the alarm by switching on the red light and energising the alarm relay; it does not switch off and production continues (default option).
- When the jumper is disconnected, and therefore terminals A and B are open, the unit signals the fault by switching on the red light and energising the alarm relay, and stops production.

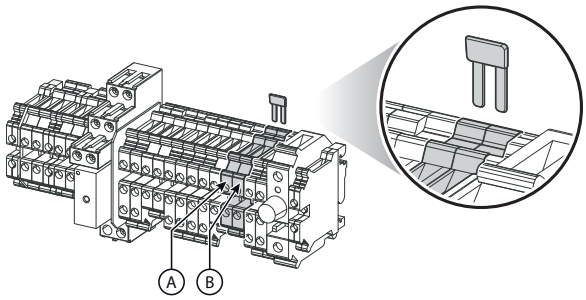


Fig. 6.v

6.4.9 Fuse F1

Panel protection fuse: for replacement use kit P/N ACKFUSE000SP, which contains one 10.3X38 F 1 A fuse.

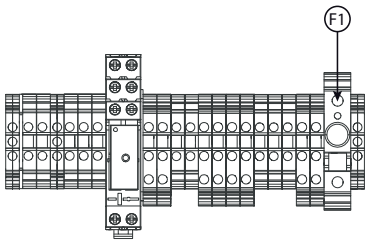


Fig. 6.w

6.4.10 Electrical panel indicator lights

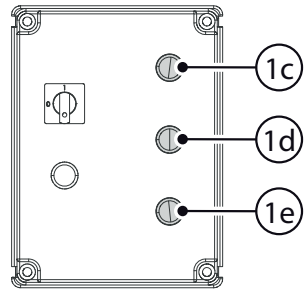


Fig. 6.x

Ref.	On	Signal
1c	White light	Indicates that power is connected to the panel. The white light is on when the ON/OFF switch (1a - Fig. 4.c) is in position I.
1d	Green light	Indicates correct operation of the unit, i.e. that the unit is producing humidity and the pump is running (pump ON).
1e	Red light	Indicates unit shutdown (pump OFF), and may be due to an alarm or simply that there is no humidity request.

Notice: on the UV lamp version only, the red and green indicator lights may be on at the same time. This indicates that the unit is producing humidity, however there is an alarm relating to the UV lamp and the jumper (Fig. 6.v) between terminals A and B has been closed, meaning the unit signals an alarm without stopping production (see par. 6.4.8).

DANGER: In accordance with the regulations in force in the country where the unit is installed, the manufacturer recommends using a suitable circuit breaker to protect against overload and overcurrent upstream of the unit's power line. The installer is responsible for selecting and installing this device (not supplied by the manufacturer).

6.4.11 Operation of the timer relays

Two timer relays are installed inside the unit's electrical panel.

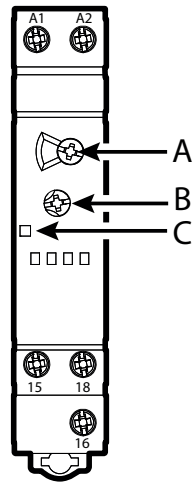


Fig. 6.y

- Relay RT1:
  Factory setting
  Full scale 16 s (reference A)
  Activation time 8 (reference B)

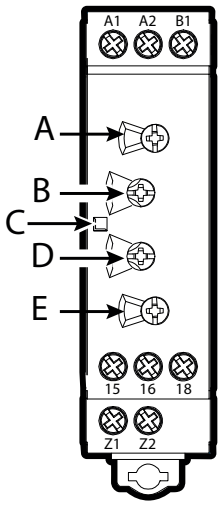


Fig. 6.z

- Relay RT2 (type A or type B):

  Factory setting, type A relay
  Full scale T1 1 h (reference A)
  Activation time T1 2.5 s (reference B)
  Full scale T2 10 (reference E)
  Activation time T2 5 (reference D)

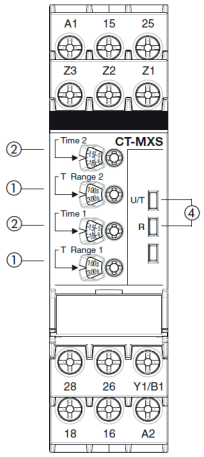


Fig. 6.aa

Factory setting, type B relay
T1 full scale 10 sec (reference 1)
T1 activation time15 (reference 2-bottom)
T2 full scale 30 min (reference 1-top)
T2 activation time 15 (reference 1-top)

Assuming there is on/off signal to operate the system. Relay RT2 is powered when the LP contact (see the wiring diagram) is in position 2 (this means that the pressure is below the 0.5 bar activation value), i.e. there is a low pressure problem. When relay RT2 is energised, the timer starts: timer T2 if it is a type A relay or timer T1 if it is a type B relay (5 seconds, factory setting).
When the LP contact moves from position 3 to position 2, the relay RT1 timer starts (8 seconds, factory setting), as it is no longer powered.

- If during timer RT2 (5 seconds, factory setting) the pressure causes the LP contact to switch (meaning there is adequate pressure for operation), timers RT1 and RT2 are reset and the system continues operating.
- If during the 5 seconds the LP contact remains in position 2 due to low pressure, relay RT2 changes status and a second timer starts: timer T1 if it is a type A relay or timer T2 if it is a type B relay (15 minutes, factory setting). .
  Meanwhile timer RT1 reaches 8 seconds and closes the fill valve, switches off the motor and the pump.
  After 15 minutes, the second timer for relay RT2 ends and the procedure starts again from the beginning to verify if the pressure is sufficient to start atomising.

Notice: the ChillBooster unit may be fitted with type A or type B relay RT2, check the model for the settings

Important: provide an external power switch to the humidifier for the omnipolar disconnection of the mains, type TT grounding system, protection against fault current to ground value 30 mA.

6.5 Table of residual risks and PPE for installers

PPE required:

- Protective gloves
- Non-slip safety footwear
- Safety hard hat
- Instruction manual

Residual risk	Procedure to be adopted
Risk of cutting or abrasion due to sharp edges or surfaces.	Wear gloves to protect against physical agents and a hard hat before entering the work area.
Risk of slipping, tripping or falling due to slippery surfaces.	Wear non-slip shoes.
Risk of tripping and falling due to insufficient lighting.	The unit must be installed in an environment with medium intensity lighting, in compliance with the regulations in force in the country where the unit is installed.
Crushing risk due to suspended loads.	Display the pictogram prohibiting parking and transit in areas where there are suspended loads.
Crushing risk due to loss of stability.	Strictly follow the instructions described in this manual regarding stability conditions during installation.
Shearing risk due to the mass of the components being installed.	Wear gloves to protect against physical agents and a hard hat before entering the work area. Ensure the stability conditions during the installation procedures described in this document.

Tab. 6.j

Important: The safety manager is responsible for assessing the need to equip installers with additional personal protective equipment in accordance with the environmental conditions where the operations are performed.

7. COMMISSIONING

7.1 Preliminary checks

Before starting the unit, check the following:

7.1.1 Cabinet

- Cabinet (3 - Fig. 7.a) installed on a level surface
- Cabinet (3 - Fig. 7.b) protected against direct sunlight.
- Make sure that the cap on the automatic air vent valve (15 - Fig. 7.b) is NOT tightened.
- Run the outlet of the drain solenoid valve (13 - Fig. 7.b) installed inside the cabinet to an outside drain.

7.1.2 Electrical connections

- Power supply voltage 230V 1~ 50(60) Hz and an adequate protection circuit.
- ON/OFF control signal correctly connected to terminals 1+2
- End-of-line drain solenoid valves correctly connected (solenoid valve 1: terminals 3-5, solenoid valve 2: terminals 4-6).
- Unit status relay correctly connected (terminals COM11, NO14, NC12).
- Pump status relay correctly connected (terminals N1C, N1O, L1, PE).
- UV lamp alarm relay correctly connected (terminals A and B).
- Default overload settings:
  - AC01% - 100l/h cabinet = for units up to rev. 2,000: 2.5A / for units from rev. 3,000: 1.5A
  - AC05% - 500l/h cabinet = for units up to rev. 2,000: 3.0A / for units from rev. 3,000: 2.2A
  - AC10% - 1000l/h cabinet = for units up to rev. 2,000: 4.0A / for units from rev. 3,000: 3.0A

7.1.3 Water line

- Mains water inlet pressure 2-8 bars.
- Feedwater characteristics compatible with the data described in paragraph 6.2.4.
- Manual valve (1 - Fig. 7.a) installed upstream of the system to disconnect the water line.
- Watermark-approved double check valve installed upstream of the system (only where Watermark requirements apply).
- 10 µm filter (2 - Fig. 7.a) installed on the water line upstream of the cabinet.
- Expansion vessel (9 - Fig. 7.a) installed on the water line (internal air pre-charge pressure 1.3 bars or in any case lower than the mains pressure).
- Water line correctly connected to the drains and water without debris.

7.1.4 Distribution system

- Correct number of nozzles (5 - Fig. 7.a) installed, as per the design, evenly distributed on the racks.

Important: Max. tightening torque 0.8 Nm.

- Plugs fitted on all unused holes.

Important: Max. tightening torque 10 Nm.

- Racks (6 - Fig. 7.a) suitably arranged so as to maximise the surface covered by the spray from the nozzles.
- Racks (6 - Fig. 7.a) suitably secured so as to remain straight, especially at the joints.
- Pipes and racks inclined at least 2° to assist the flow of water to the drain solenoid valves.
- For vertical installation, distance between the racks (6 - Fig. 7.a) and the floor ≥ 500 mm.
- Outside covers supplied fitted on both drain solenoid valves (8 - Fig. 7.a).
- Partial choking of the drain solenoid valve outlets (e.g. by using 1/2" to 1/4" adapters or alternative couplings) (8 - Fig. 7.a)..

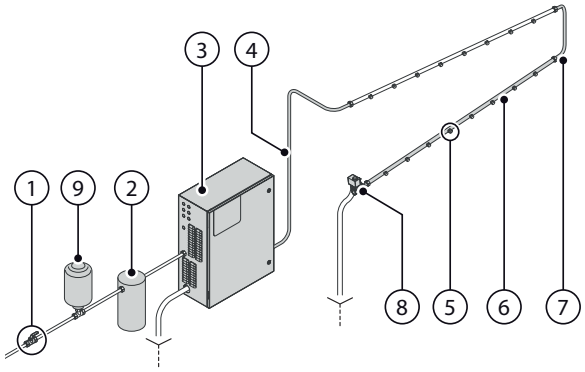


Fig. 7.a

7.2 Start-up procedure

1. Open the manual valve (1 - Fig. 7.a) on the feedwater line and power on the unit.
2. Switch the unit on by moving the disconnect switch (1a - Fig. 7.b) to position I.
3. Start the system by closing contacts 1-2 (automatic via external control, manual via black button, 1b - Fig. 7.b)
4. The fill solenoid valve (2 - Fig. 7.b) will open, while the drain valve (13 - Fig. 7.b) will close. The outside drain solenoid valves (8 - Fig. 7.a) stay open.
5. The pressure inside the unit increases and the LP switch is activated (0.5 bars) (4 - Fig. 7.b). Check the pressure on the pressure gauge (5 - Fig. 7.b).
6. When the pressure exceeds 0.5 bars and the LP switch is closed, the motor starts and the drain solenoid valves (8 - Fig. 7.a) downstream of the unit close. Check that the pressure measured on the pressure gauge (5 - Fig. 7.b) is higher than 0.5 bars.
7. Check for any water leaks in the cabinet or in the distribution system due to loose fittings or nozzles that are tightened too hard.

Important: Small water leaks will make it hard for the unit to reach the design pressure.

8. Adjust the pump bypass by turning the screw (10 - Fig. 7.b), checking the outlet pressure gauge (12 - Fig. 7.b) until reaching a pressure of 10 bars.
9. Make sure the solenoid valves downstream of the distribution system are activated correctly.

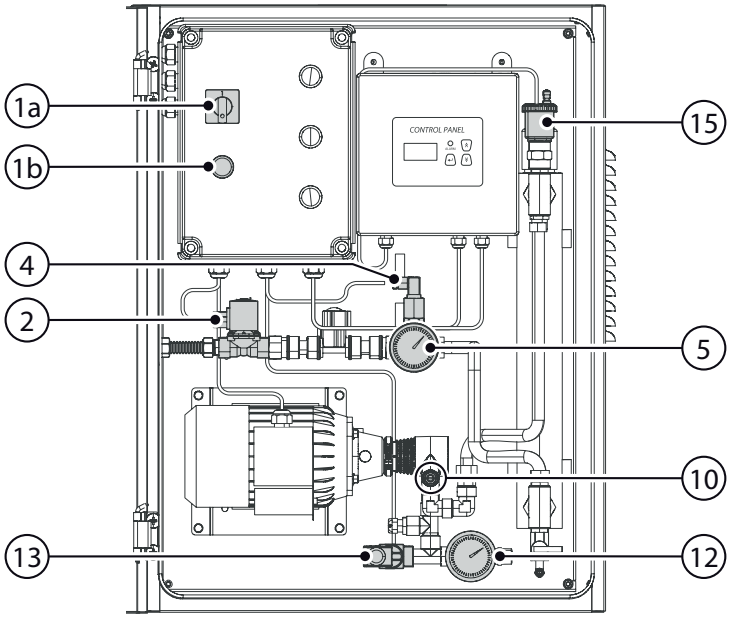


Fig. 7.b

8. UNIT OPERATION

8.1 Normal operation

The unit normally operates automatically based on the request from the system it is installed in.
Once the disconnect switch (1a - fig .4.3) has been set to position I (ON) and the circuit breaker has been reset, the unit and its electrical panel will be powered by the power line and, in the versions where featured (AC******1*), the UV lamp electrical panel will also be powered.
Once operation has been enabled by the external control signal (closing the contact between terminals 1-2), the unit starts and, having verified the minimum inlet pressure, atomised water production begins until the control request is no longer present or an alarm is activated (par. 6.4.6).

Notice: if the minimum required water line inlet pressure is not guaranteed, the unit will periodically attempts to start, closing and opening the solenoid valves.

8.2 Operation in test mode

During start-up and maintenance, the unit can be operated manually. Pressing the black button (1b - Fig. 4.c) simulates the external control signal by closing contact terminals 1-2, thus temporarily enabling the production of atomised water.

Notice: manually closing the contact between terminals 1-2 does not on its own start the production of atomised water. As in the case of normal operation, the minimum required water line inlet pressure must also be guaranteed.

9. UV LAMP

On models where featured, a UV lamp for disinfecting the water is installed on the unit, powered and managed by its own electrical panel (Fig. 9.a):

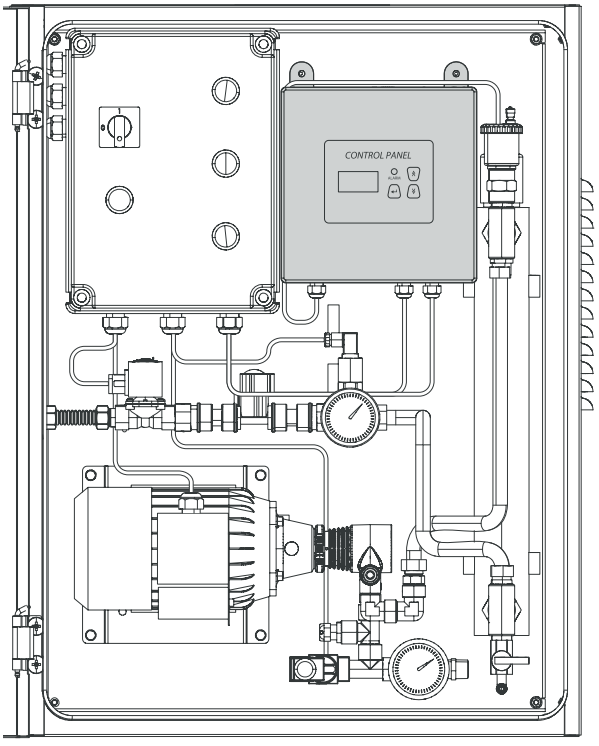


Fig. 9.a

9.1 Switching the lamp on and off

The lamp electrical panel (Fig. 9.a) cannot switch on or off independently with respect to the unit, as it does not have its own power button; nonetheless, the lamp can be switched off in one of the ways shown below:

- pressing the OK button (2 - Fig. 9.b) on the control panel (Fig. 9.b) for 5 seconds;
- closing the remote ON/OFF contact (see Annex A: Wiring and connection diagrams);
- setting the on/off timer (see par. 9.3.2).

9.2 Control panel

The control panel (Fig. 9.b) is located on the lamp electrical panel (Fig. 9.a) and is used to:

- view information relating to the operation of the lamp;
- change the lamp operation settings (see par. 9.3.2);
- reset the lamp on replacement (see par. 9.3.3);
- view the lamp alarms (see par. 9.3.4).

9.2.1 Control panel components

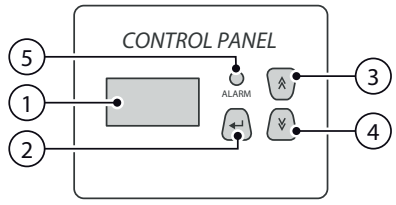


Fig. 9.b

Key

1	Display
2	OK button ↵
3	Up button ⩓
4	Down button ⩔
5	Alarm Led

9.3 Navigation and functions on the display

When the electrical panel is powered, the control panel display (1 - Fig. 9.b) comes on and shows the main screen, indicating the remaining lamp operating hours (Fig. 9.c).

Fig. 9.c

Important: If the electrical panel is powered but the display is off, check the power connection and make sure the fuse has not blown.

9.3.1 Main menu

From the main screen (Fig. 9.c), press one of the buttons (↵, ⩓ or ⩔) to access the main menu, listing the general functions of the control panel. Use the arrow buttons ⩓ and ⩔ to scroll between the items, and access the selected item by pressing OK ↵.

The main menu includes the following items:

Info menu
Used to view information on system operation.

Settings menu
View the available settings.

Sensor Calibration
Used to calibrate the sensor.

Reset Hr Lamp
Used to reset the lamp operating life counter.

Password Menu
Password-protected menu (required for default settings).

Exit
Return to the main screen.

Notice: after 3 seconds without pressing any button, the main screen is displayed again.

9.3.2 Settings menu

Use the arrow buttons ⩓ and ⩔ to scroll between the screens in the settings menu.

The following items have settings that can be changed:

ON delay 5 s

ON delay
Press OK ↵ to set the switch-on delay. The value is expressed in seconds. This allows the lamp to switch on and become fully operational without activating any alarms. Use the arrow buttons ⩓ and ⩔ to increase or decrease the values.
Default value: 5 sec.

OFF delay 60 s

OFF delay
Press OK ↵ to set the remote switch-off delay. The value is expressed in seconds. If the remote ON/OFF contact is connected to a flowmeter, the lamp will not stop due to a brief temporary interruption to the flow.
Default value: 60 sec.

Remote NC

Remote
Press OK ↵ to select the remote ON/OFF contact as either NO or NC (NO = Normally Open, NC = Normally Closed).
Default value: NC.

Notice: switching the lamp ON/OFF too frequently reduces its working life. Max. 3 ON/OFF cycles are allowed per day. Use the arrow buttons ⩓ and ⩔ to increase or decrease the values.

Buzzer Mode OFF

Buzzer
Press OK ↵ to set the 230 V (115 V) output and the voltage-free contact in "buzzer mode". If a buzzer is controlled by one of these contacts, in the event of an alarm, the buzzer will sound intermittently (ON for 5 sec, OFF for 5 minutes).
Default value: MODE OFF.

Stop For 0 H

Stop For
Press OK ↵ to set the time interval that the system must remain off for. Use the arrow buttons ⩓ and ⩔ to increase or decrease the values. Setting this value to 0 disabled the timer.
Default value: 0 h

Stop In 0 H

Stop In
Press OK ↵ to set the first timer off delay. After the first switch-off, the system will stop every day at the same time. Use the arrow buttons ⩓ and ⩔ to increase or decrease the values. Setting this value to 0 disabled the timer.
Default value: 0 h

EXIT Settings

Exit
Press OK ↵ to return to the main screen

Notice: after 3 seconds without pressing any button, the main screen is displayed again.

9.3.3 Reset Hr Lamp

This operation is used to reset the lamp hour counter (countdown) and must be completed when first starting and whenever replacing the lamp.

New Lamps OK

New Lamps OK
Press OK ↵ to reset the lamp operating hour counter.

9.3.4 Alarms

Important: If an alarm is activated, the LED (5 - Fig. 9.b) on the control panel flashes.

If the LED flashes on the display (1 - Fig.9.2), one of the following messages will be shown:

Lamp Off

Lamp Off
Indicates that the lamp is broken. If the system has more than one lamp, the faulty lamp is identified on the display. Check that:
- the lamp is connected correctly;
- the lamp has not burned out;
- the unit ON/OFF switch (1a - Fig. 4.c) is not faulty.

Change Lamps

Change Lamps
Indicates that the remaining lamp operating hour meter has reached zero. Replace the lamp and reset the hour counter (see par. 9.3.3). If the system has more than one lamp, replace the lamps and reset the meter.

Notice: to replace the UV lamp, see par. 10.6.

10. MAINTENANCE

DANGER:
- always wear protective gloves during maintenance operations.
- poor maintenance, removal or modification of safety devices and/or the use of non-original spare parts can cause serious or fatal injuries to operators or third parties and unit malfunctions.

Carry out systematic preventive maintenance annually or at the start of each season. The higher the content of salts or impurities in the feedwater, the more frequently maintenance needs to be performed.

10.1 Maintenance table

Component	Frequency	Actions	Spare parts kit
Nozzles	Pre-season	Visual inspection	ACKNR00000 ACKNC00000 ACKNB00000
	3 months	Visual inspection/replace if necessary	
Filter cartridge	Pre-season	Visual inspection/replace	ACKF100000SP
UV lamp (if present)	9000 h	Replace lamp and reset hour counter	ACKUV10000SP
Gaskets	Pre-season	Visual inspection for leaks	ACKG100000
Check pressure/calibrate to 10 bars	Pre-season	Visual inspection	
	3 months	Visual inspection and adjust bypass/replace pump	see ref. 9 - Annex C: Accessories and spare parts kits
Expansion vessel (if featured)	Pre-season	Check pre-charge pressure (<1.3 bars)	

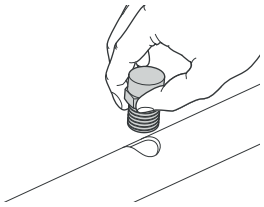
Tab. 10.a

10.2 Cleaning and replacing the nozzles

Important: Make sure that the unit is not in operation and the disconnect switch (1a - Fig. 4.c) is in position O.

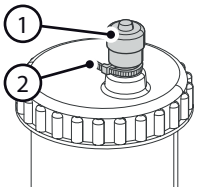
Once a year, check the nozzles. If the nozzle does not atomise properly, to restore correct operation:

1. Remove the nozzles from their housing on the rack and replace them if necessary.
2. Carefully clean the nozzles.
3. Wrap the threads of the nozzles with a suitable layer of Teflon tape and reposition them.



10.3 Checking the vent valve

1. Make sure that the cap (1) on the automatic air vent valve (15 - Fig. 4.a) is not tightened.
2. Also make sure that the tie (2) used to keep the valve open is correctly fitted.



10.4 Checking the water line

When starting the unit each season, check tightness of the water circuit:
- check and clean the water filter upstream of the cabinet;
- check the seal of the gaskets on the corrugated stainless steel hose couplings inside the cabinet and on the distribution lines; if there are water leaks, replace the gaskets (P/N ACKG100000, ACKG200000).

10.5 Checking the UV lamp

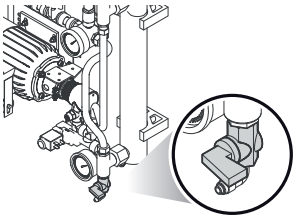
Check the status of the UV lamp every month on the lamp control panel (Fig. 9.b). Specifically, check:
- the remaining lamp operating hours (see par. 9.3) shown on the display;
- that the alarm LED is not on (see par. 9.3.4).

10.6 Replacing the UV lamp

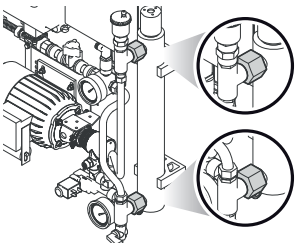
DANGER: Make sure that the unit is not powered and the disconnect switch (1a - Fig. 4.c) is in position O.

Every 9000 hours or if there is a lamp alarm (par. 9.3.4), replace the UV lamp. To replace the lamp, proceed as follows:

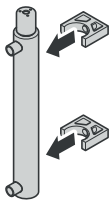
1. Disconnect the water supply (valve 1 - Fig. 6.d).
2. Drain the water in the lamp body through the valve provided.



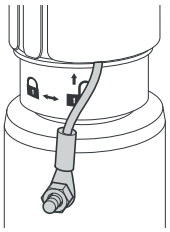
3. Disconnect the water connections via the couplings.



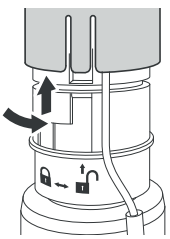
4. Remove the lamp body from the clamps that hold it in place.



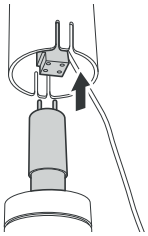
5. Remove the earth connector fixed to the steriliser by unscrewing the nut.



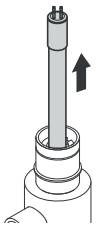
6. Lift the cover cap by turning it slightly.



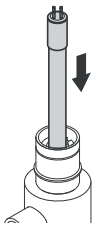
7. Unplug the four-pin electrical connector from the UV lamp.



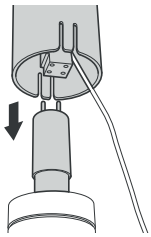
8. Take the UV lamp out of the sheath.



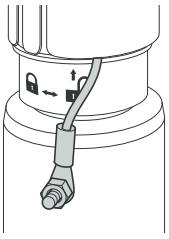
9. Remove the new lamp from the packaging, handling it with care at the ends. Then place it in the steriliser sheath.



10. Plug in the four-pin connector and reposition the contact cover cap.



11. Reconnect the earth connector and tighten the fixing nut. Then reassemble the lamp body following the same procedure in reverse. Power on the unit by moving the disconnect switch (1a - Fig. 4.c) to I. Once the unit has started, reset the lamp counter (see par. 9.3.3).



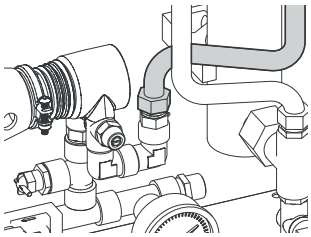
Important: remember to close the lamp drain valve again.

10.7 Replacing the pump

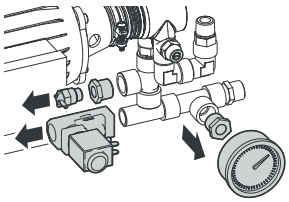
DANGER: Make sure that the unit is not powered and the disconnect switch (1a - Fig. 4.c) is in position O.

Every 3 months, visually inspect the pump (9 -Fig. 4.a) and replace it if necessary, proceeding as illustrated below:

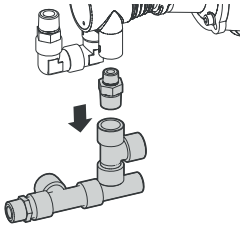
1. Disconnect the water supply (valve 1 - Fig. 6.d).
2. Removethecorrugated hoses from the pump inlet, unscrewing the nut and making sure not to lose the gasket.



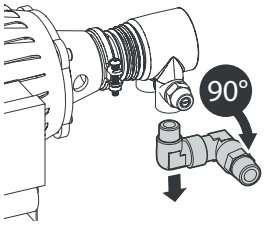
3. Remove the pressure gauge, the solenoid valve and the temperature-operated valve.



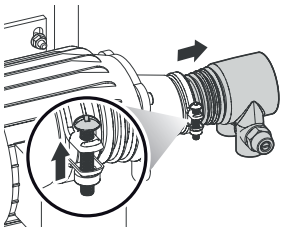
4. Remove the high pressure outlet fittings.



5. Rotate the pump inlet fitting 90° and then remove it.



6. Using a Phillips-head screwdriver, remove the fixing collar screw and slide the pump out of the motor coupling.



7. Once the existing pump has been removed, install the new pump by following the same instructions in reverse order.
8. Then check the correct calibration of the pump and adjust it using the bypass if necessary. The operating pressure must be 10 bars.

10.8 Table of residual risks and PPE for maintenance operators

PPE required:

- Protective gloves
- Non-slip safety footwear
- Safety hard hat
- Safety glasses
- Protective clothing
- Earmuffs
- Instruction manual

Residual risk	Procedure to be adopted
Risk of cutting or abrasion due to sharp edges or surfaces.	Wear gloves to protect against physical agents and a hard hat before entering the work area.
Risk of slipping, tripping or falling due to slippery surfaces.	Wear non-slip shoes.
Noise hazard during normal system operation.	Wear the earmuffs when the system is operating.
Risk of tripping and falling due to insufficient lighting.	The unit must be installed in an environment with medium intensity lighting, in compliance with the regulations in force in the country where the unit is installed.
Electrocution hazard due to direct or indirect contact.	Wear insulated gloves before entering the work area.

Tab. 10.b

Warnings: the safety manager is responsible for assessing the need to equip maintenance operators with additional personal protective equipment in accordance with the environmental conditions where the operations are performed.

11. TROUBLESHOOTING

Problem	Cause		Verification	Solution
The motor does not start when the unit is switched on (the LP switch did not close within the required time, controlled by relay RT2)	Power supply	Faulty fill solenoid valve	Check the pressure gauge inside the cabinet when operating	Replace the faulty solenoid valve
		Incorrect LP switch calibration	Check that the switch is activated at 05 bars during filling	Replace the LP switch
	Water supply	No mains water pressure	Check with a pressure gauge	Open all closed valves upstream of the unit
		Mains water pressure ≤ 2 bars	Check with a pressure gauge	Install an auxiliary pump or increase the mains pressure
		Blocked filter	Visually inspect the filter for any debris	Clean the filter or replace it with a new one if necessary
		Fill solenoid valve inlet	Check for debris that may be blocking the valve / check that the correct voltage is applied	Clean the valve or replace it if necessary
	Distribution system	Drain solenoid valve outlet not choked enough	Visually check the size of the drain valve outlet	Reduce the valve outlet to at least 1/4"
		Water leaks in system components (eg nozzles or threaded connections)	Visually check the individual components	Tighten or replace components if necessary, apply a layer of Teflon tape to ensure tightness where required
The moto starts but then shudders due to low pressure during operation	Water supply	Mains water pressure ≤ 2 bars	Check with a pressure gauge	Install an auxiliary pump or increase the mains pressure
		Drops in mains water pressure ≤ 2 bars	Check with a pressure gauge	Install an expansion vessel
		Blocked filter	Visually inspect the filter for any debris	Clean the filter or replace it with a new one if necessary
		Fill solenoid valve inlet	Check for debris that may be blocking the valve / check that the correct voltage is applied	Clean the valve or replace it if necessary
	Distribution system	Drain solenoid valve outlet not choked enough	Visually check the size of the drain valve outlet	Reduce the valve outlet to at least 1/4"
		Water leaks in system components (eg nozzles or threaded connections)	Visually check the individual components	Tighten or replace components if necessary, apply a layer of Teflon tape to ensure tightness where required
The unit does not reach a pressure of 10 bars during operation	Distribution system	Water leaks in system components (eg nozzles or threaded connections)	Visually check the individual components	Tighten or replace components if necessary, apply a layer of Teflon tape to ensure tightness where required
		The drain solenoid valve does not close	Visually check the solenoid valve closure	Check the electrical connections or replace the solenoid valve if necessary
		Cabinet undersized compared to the distribution system	Check the rating plate and confirm with the system designer that the data are compatible	Reduce the number of nozzles installed or install a suitable cabinet
		Too many nozzles installed	Check with the system designer	Install the correct number of nozzles
Unit overload during operation	Other	High ambient temperature	Check that the cabinet is protected against direct sunlight	
	Power supply	Incorrect overload settings	Visually check the settings	Set the correct values for the circuit breaker
		Faulty motor/capacitor	Check the windings and the capacitor	Replace the components if necessary
White light off when the switch is in position I	Other	Blown fuse	Check the fuse / check the electrical connections	Replace the fuse if necessary
UV lamp alarm (red light on)	Other	See par 934	See par 934	Place a jumper between terminals A and B (see par 648) / replace the UV lamp (see par 106)

Tab. 11.a

ANNEX

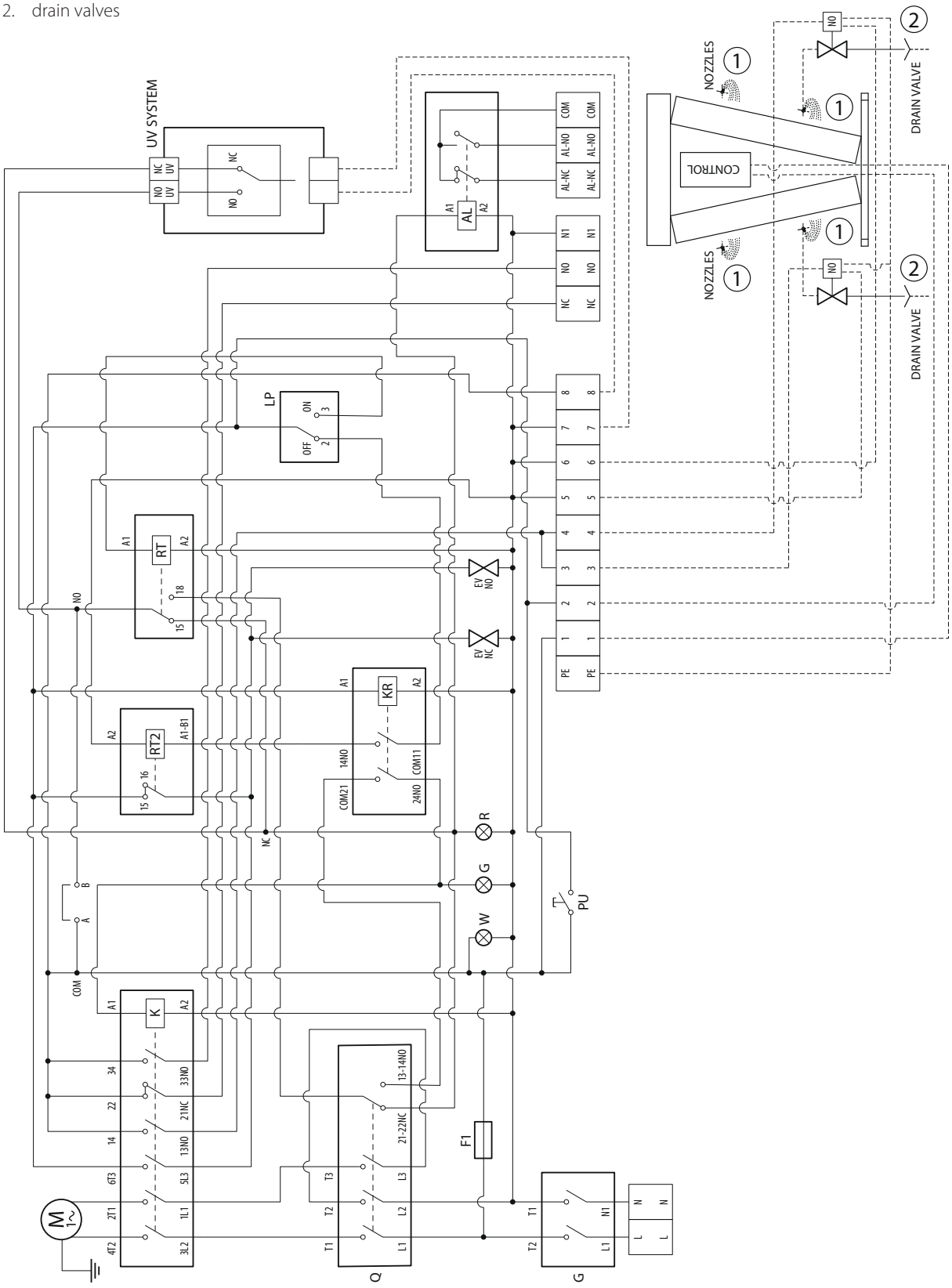
Annex A: Wiring and connection diagrams

Version with UV lamp

AC**2D**1* (Rev 2.000)

Key:

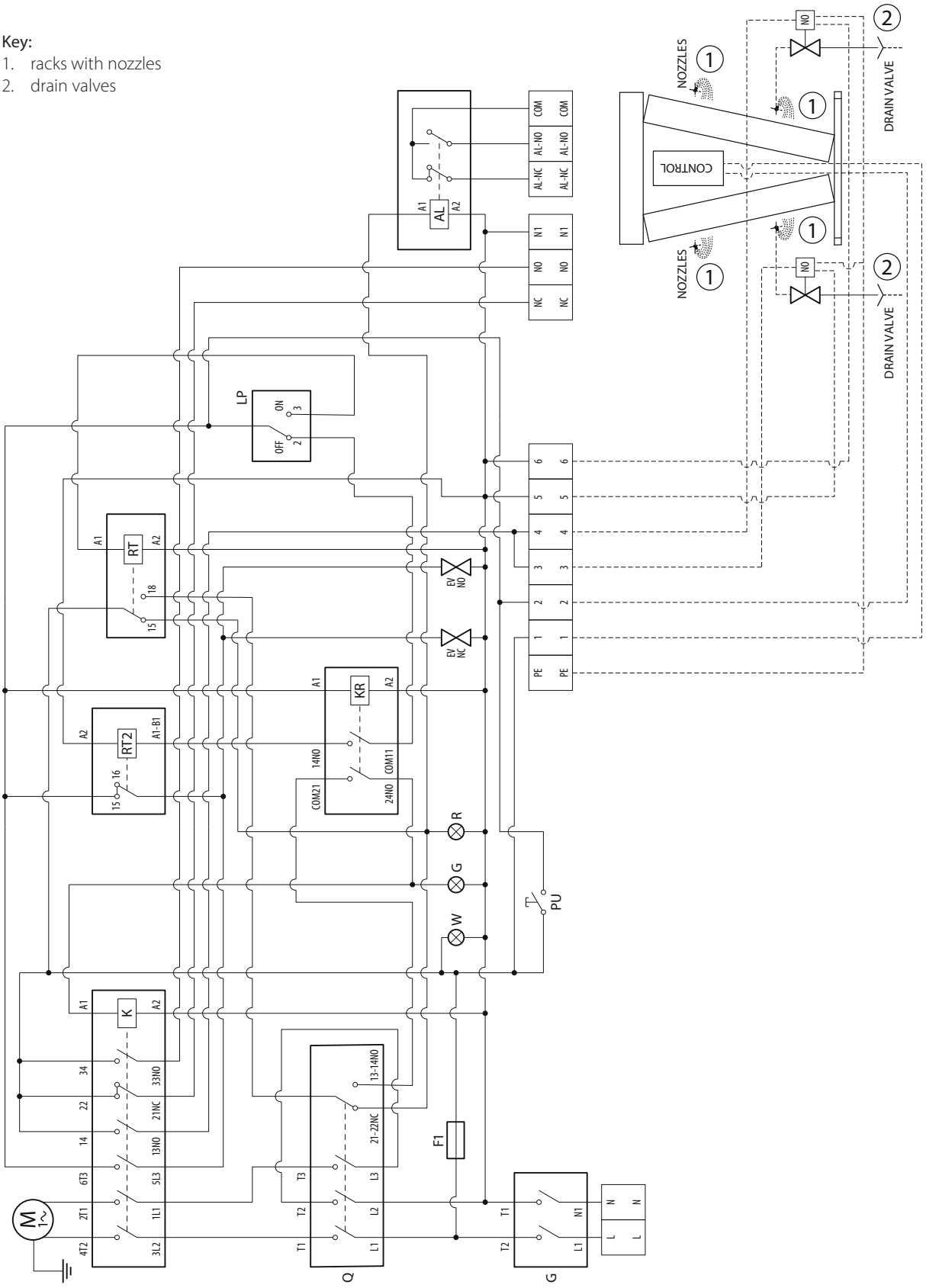
1. racks with nozzles
2. drain valves



Version without UV lamp

AC**2D**0* (Rev2.00)

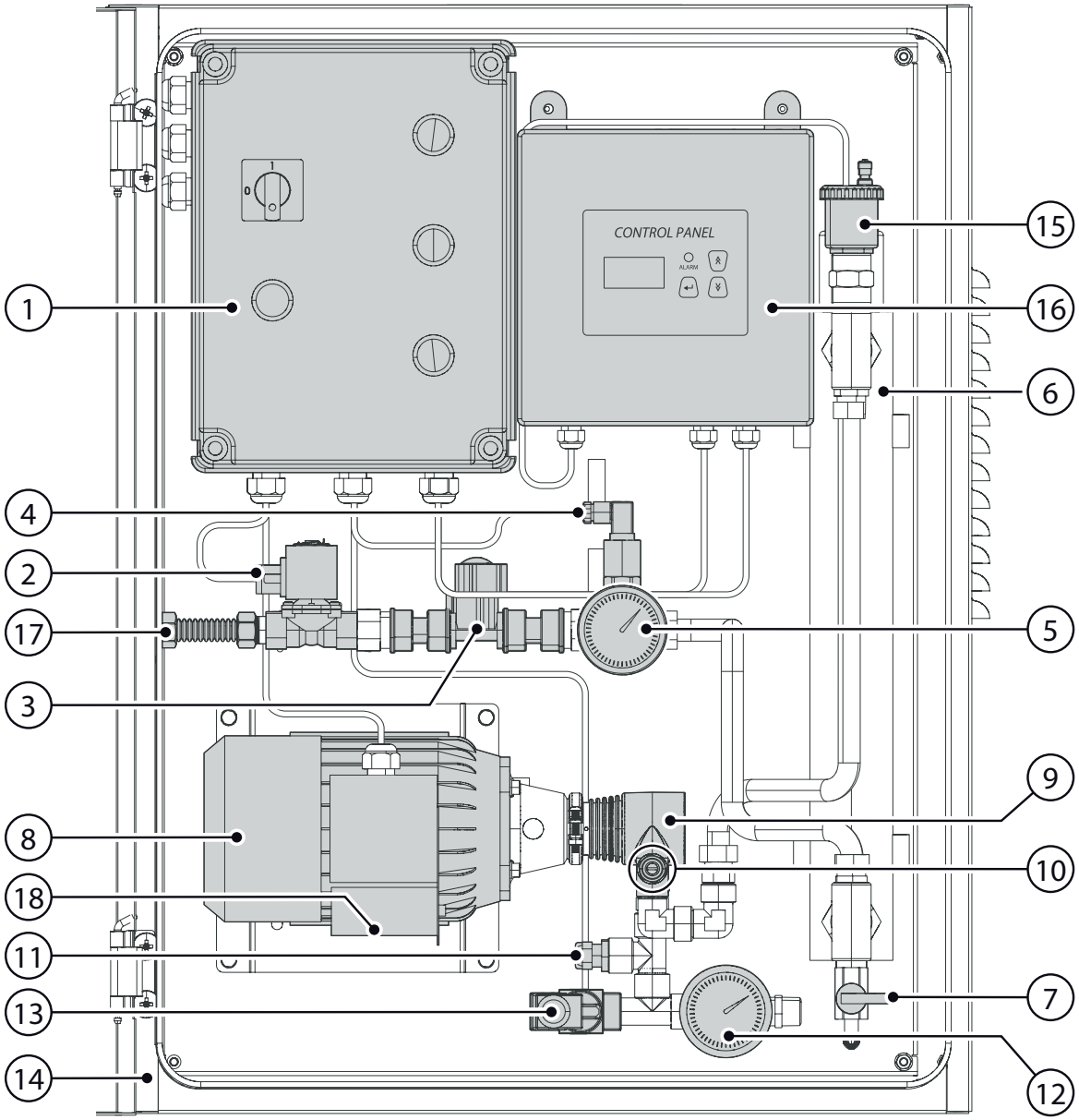
Key:
1. racks with nozzles
2. drain valves



Annex B: Checklist prior to startingo

Checklist prior to starting			
1. Cabinet		**Si**	**No**
1.a	Installed level.		
1.b	Protected against direct sunlight.		
1.c	Automatic air vent valve cap not tightened (15 - Fig. 4.a).		
1.d	Drain solenoid valve outlet runs to an outside drain (8 - Fig. 7.a).		
2. Electrical connections		**Si**	**No**
2.a	Power supply voltage 230V 1~ 50(60) Hz (par. 6.4.3).		
2.b	Adequate protection circuit installed.		
2.c	ON/OFF control signal correctly connected to terminals 1+2 (par. 6.4.4).		
2.d	End-of-line drain solenoid valves correctly connected (solenoid valve 1: terminals 3-5, solenoid valve 2: terminals 4-6) (par. 6.4.5).		
2.e	Unit status relay correctly connected (terminals COM11, NO14, NC12) (par. 6.4.6).		
2.f	Pump status relay correctly connected (terminals N1C, N1O, L1, PE) (par. 6.4.7).		
2.g	UV lamp alarm relay correctly connected (terminals A and B) (par. 6.4.8).		
2.h	Default overload settings: - AC01% - 100l/h cabinet = 2.5 A - AC05% - 500l/h cabinet = 3.15 A - AC10% - 1000l/h cabinet = 3.9 A		
3. Water line		**Si**	**No**
3.a	Mains water inlet pressure 2-8 bars.		
3.b	Feedwater characteristics compatible with the data described in paragraph 6.2.4.		
3.c	Manual valve (1 - Fig. 7.a) installed upstream of the system to disconnect the water line. (Where Watermark requirements apply: Watermark-approved double check valve installed upstream of the system).		
3.d	10 µm filter (2 - Fig. 7.a) installed on the water line upstream of the cabinet.		
3.e	Expansion vessel (9 - Fig. 7.a) installed on the water line (internal air pre-charge pressure 1.3 bars or in any case lower than the mains pressure).		
3.f	Water line correctly connected to the drains and water without debris.		
4. Distribution system		**Si**	**No**
4.a	Correct number of nozzles (5 - Fig. 7.a) installed, as per the design, evenly distributed on the racks.		
4.b	Plugs fitted on all unused holes.		
4.c	Racks (6 - Fig. 7.a) suitably arranged so as to maximise the surface covered by the spray from the nozzles.		
4.d	Racks (6 - Fig. 7.a) suitably secured so as to remain straight, especially at the joints.		
4.e	Pipes and racks inclined at least 2° to assist the flow of water to the drain solenoid valves.		
4.f	For vertical installation, distance between the racks (6 - Fig. 7.a) and the floor ≥ 500 mm.		
4.g	Outside covers supplied fitted on both drain solenoid valves (8 - Fig. 7.a).		
4.h	Partial choking of the drain solenoid valve outlets (e.g. by using 1/2" to 1/4" adapters or alternative couplings) (8 - Fig. 7.a).		

Annex C: Accessories and spare parts kits



Part number	Description	Ref. figure	Ref. unit label
ACKV1D0010	NO water drain solenoid valve kit IP67	13	DV
ACKV1F0000	NC water fill solenoid valve kit IP65	2	FV
ACKVENT000	automatic air vent valve kit	15	
1309851AXX	0 to 10 bar glycerine-filled pressure gauge	5	
1309852AXX	0 to 25 bar glycerine-filled pressure gauge	12	
MCKMNFD000	rack	17	
ACKPS00000	pressure switch	4	LP
ACKR100000	water pressure reducer kit - brass 1000 l/h - AC102	3	RP
UAKRID0000	water pressure reducer kit - AC012 - AC052	3	RP
ACKP001000	100 l/h pump kit	9	
ACKP005000	500 l/h pump kit	9	
ACKP010000	1000 l/h pump kit	9	
ACKM25F500	0.25 kW 230 V 50 Hz motor kit for AC012D0... for units up to rev. 2,000	8	MT
ACKM37F500	0.37 kW 230 V 50 Hz motor kit for AC052D0... for units up to rev. 2,000	8	MT
ACKM55F500	0.55 kW 230 V 50 Hz motor kit for AC102D0... for units up to rev. 2,000	8	MT
ACKM25F600	0.25 kW 230 V 60 Hz motor kit for AC012D1... for units up to rev. 2,000	8	MT
ACKM37F600	0.37 kW 230 V 60 Hz motor kit for AC052D1... for units up to rev. 2,000	8	MT
ACKM55F600	0.55 kW 230 V 60 Hz motor kit for AC102D1... for units up to rev. 2,000	8	MT
ACKM25F530SP	motor kit 0,25KW 230V 50HZ IE3 for AC012D0... for units from rev. 3,000	8	MT
ACKM37F530SP	motor kit 0,37KW 230V 50HZ IE3 for AC052D0... for units from rev. 3,000	8	MT
ACKM55F530SP	motor kit 0,55KW 230V 50HZ IE3 for AC102D0... for units from rev. 3,000	8	MT
ACKM25F630SP	motor kit 0,25KW 230V 60HZ IE3 for AC012D1... for units from rev. 3,000	8	MT
ACKM37F630SP	motor kit 0,37KW 230V 60HZ IE3 for AC052D1... for units from rev. 3,000	8	MT
ACKM55F630SP	motor kit 0,55KW 230V 60HZ IE3 for AC102D0... for units from rev. 3,000	8	MT
ACKMC25F50	capacitor kit for 0.25 kW 230 V 50 Hz motor for AC012D0... for units up to rev. 2,000	18	MT
ACKMC37F50	capacitor kit for 0.37 kW 230 V 50 Hz motor for AC052D0... for units up to rev. 2,000	18	MT
ACKMC55F50	capacitor kit for 0.55 kW 230 V 50 Hz motor for AC102D0... for units up to rev. 2,000	18	MT
ACKMC25F60	capacitor kit for 0.25 kW 230 V 60 Hz motor for AC012D1... for units up to rev. 2,000	18	MT
ACKMC37F60	capacitor kit for 0.37 kW 230 V 60 Hz motor for AC052D1... for units up to rev. 2,000	18	MT
ACKMC55F60	capacitor kit for 0.55 kW 230 V 60 Hz motor for AC102D1... for units up to rev. 2,000	18	MT
ACKMC25F53SP	capacitor kit for 0,25KW 230V 50HZ IE3 for units from rev. 3,000	18	MT
ACKMC37F53SP	capacitor kit for 0,37KW 230V 50HZ IE3 for units from rev. 3,000	18	MT
ACKMC55F53SP	capacitor kit for 0,55KW 230V 50HZ IE3 for units from rev. 3,000	18	MT
ACKMC25F63SP	capacitor kit for 0,25KW 230V 60HZ IE3 for units from rev. 3,000	18	MT
ACKMC37F63SP	capacitor kit for 0,37KW 230V 60HZ IE3 for units from rev. 3,000	18	MT
ACKMC55F63SP	capacitor kit for 0,55KW 230V 60HZ IE3 for units from rev. 3,000	18	MT
ACKASPM000	1000 l/h pump motor assembly kit	9	
ACKASPM500	500 l/h pump motor assembly kit	9	
ACKASPM100	100 l/h pump motor assembly kit	9	
ACKTEMP000	timer kit	1	RT
ACKTEMP020	2-stage timer kit RT2	1	RT2
ACKMAG0010	motor protector switch kit 1.6-2.5A 400V for AC012 for units up to rev. 2,000	1	
ACKMAG0050	motor protector switch kit 2.5-4.0A 400V for AC052 for units up to rev. 2,000	1	
ACKMAG0100	motor protector switch kit 4.0-6.3A 400V for AC102 for units up to rev. 2,000	1	
ACKMAGA010SP	motor protector switch kit 1.5 for AC012 with motor IE3 for units from rev. 3,000	1	
ACKMAGA050SP	motor protector switch kit 2,2A for AC052 with motor IE3 for units from rev. 3,000	1	
ACKMAGA100SP	motor protector switch kit 3,0A for AC102 with motor IE3 for units from rev. 3,000	1	
ACKUV10000SP	UV lamp with chillBooster relay 230 V 50-60 Hz CE	6	
ACKSUV1201SP	UV lamp system with chillBooster relay 230V 50-60 Hz CE	-	
ACKF000000	G3/4" F 5 µm water filter kit	-	
ACKF100000SP	10 µm filter cartridge	-	
ACKKEY0000	structure tool kit	-	
ACKFUSE000SP	fuse 10.3 x 38 1 A F	-	

CAREL