

# compactSteam

Steam humidifier for residential rooms

*Umidificatore a vapore per ambienti residenziali*

# CAREL



**(ENG)** User manual

**(ITA)** Manuale d'uso

**LEGGI E CONSERVA  
QUESTE ISTRUZIONI**

**READ AND SAVE  
THESE INSTRUCTIONS**

**NO POWER  
& SIGNAL  
CABLES  
TOGETHER**

**READ CAREFULLY IN THE TEXT!**

H i g h E f f i c i e n c y S o l u t i o n s



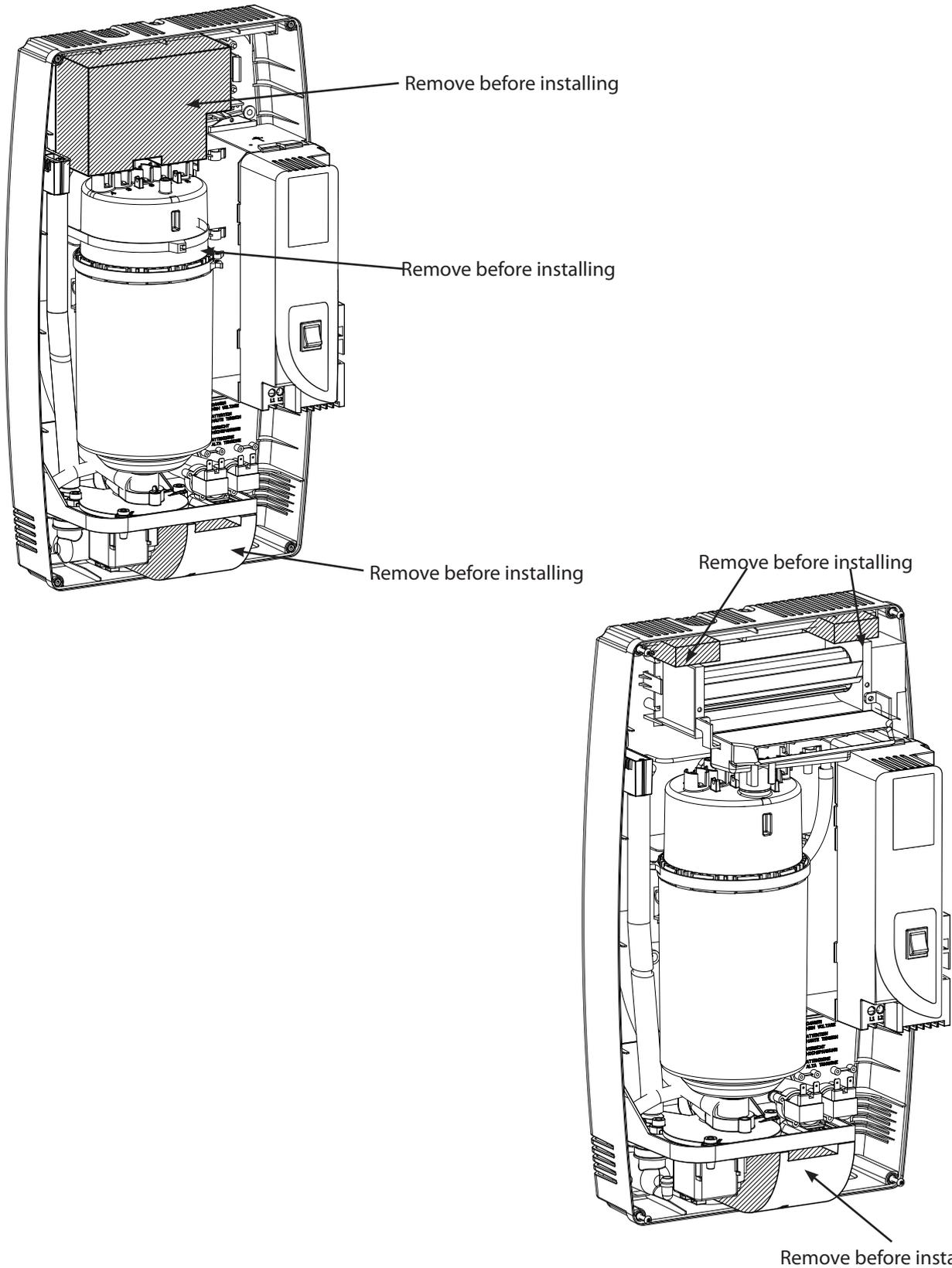
# User manual



# Warning

If present, remove the following items:

Close the cylinder clamp



**WARNINGS**

The CAREL Industries humidifiers are advanced products, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website [www.carel.com](http://www.carel.com). Each CAREL Industries product, in relation to its advanced level of technology, requires setup/configuration/programming/commissioning to be able to operate in the best possible way for the specific application. The failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL Industries accepts no liability in such cases.

The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment. CAREL Industries 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 humidifier and the final installation if the warnings or suggestions provided in this manual or in other product technical documents are not heeded. In addition to observing the above warnings and suggestions, the following warnings must be followed for the correct use of the product:

- **DANGER OF ELECTRIC SHOCK**

The humidifier contains live electrical components. Disconnect the power supply before accessing inside parts or during maintenance and installation.

- **DANGER OF WATER LEAKS**

The humidifier automatically and constantly fills/drains certain quantities of water. Malfunctions in the connections or in the humidifier may cause leaks.

- **DANGER OF BURNS**

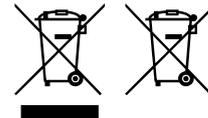
The humidifier contains high temperature components and delivers steam at 100°C/ 212°F.

**Warning:**

- The installation of the product must include an earth connection, using the special yellow-green terminal available in the humidifier.
- The environmental and power supply conditions must conform to the values specified on the product rating labels.
- The product is designed exclusively to humidify rooms either directly or through distribution systems (ducts).
- 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 on the product.
- Only water with the characteristics indicated in this manual must be used for steam production.
- 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. Any uses or modifications that are not authorized by the manufacturer are considered improper. CAREL Industries declines all liability for any such unauthorized use.
- Do not attempt to open the humidifier in ways other than those specified in the manual.
- Observe the standards in force in the place where the humidifier is installed.
- Keep the humidifier out of the reach of children and animals.
- Do not install and use the product near objects that may be damaged when in contact with water (or condensate). CAREL Industries declines all liability for direct or indirect damage following water leaks from the humidifier.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the inside and outside parts of the humidifier, unless specifically indicated in the user manual.
- Do not drop, hit or shake the humidifier, as the inside parts and the linings may be irreparably damaged.

CAREL Industries adotta una politica di continuo sviluppo. Pertanto si riserva il diritto di effettuare modifiche e miglioramenti a qualsiasi prodotto descritto nel presente documento senza preavviso. I dati tecnici presenti nel manuale possono subire modifiche senza obbligo di preavviso.

La responsabilità di CAREL Industries in relazione al proprio prodotto è regolata dalle condizioni generali di contratto CAREL Industries pubblicate nel sito [www.carel.com](http://www.carel.com) e/o da specifici accordi con i clienti; in particolare, nella misura consentita dalla normativa applicabile, in nessun caso CAREL Industries, i suoi dipendenti o le sue filiali/ affiliate saranno responsabili di eventuali mancati guadagni o vendite, perdite di dati e di informazioni, costi di merci o servizi sostitutivi, danni a cose o persone, interruzioni di attività, o eventuali danni diretti, indiretti, incidentali, patrimoniali, di copertura, punitivi, speciali o consequenziali in qualunque modo causati, siano essi contrattuali, extra contrattuali o dovuti a negligenza o altra responsabilità derivanti dall'utilizzo del prodotto o dalla sua installazione, anche se CAREL Industries o le sue filiali/affiliate siano state avvisate della possibilità di danni.

**DISPOSAL**

The humidifier is made up of metal parts and plastic parts. In reference to European Union directive 2002/96/EC issued on 27 January 2003 and the related national legislation, please note that:

1. WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
2. the public/private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment;
3. the equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment;
4. the symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately;
5. in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

**Warranty on the materials:** 2 years (from the date of production, excluding consumables).

**Approval:** the quality and safety of CAREL S.P.A. products are guaranteed by

the ISO 9001 certified design and production system, as well as by the 

  mark.



# Content

<b>1. COMPACTSTEAM OPERATION</b>	<b>9</b>
1.1 Operating stages .....	9
1.2 Cylinder service life.....	9
<b>2. MODELS</b>	<b>11</b>
<b>3. INSTALLATION</b>	<b>12</b>
3.1 Positioning.....	12
3.2 Mounting.....	12
3.3 Characteristics of the supply water .....	14
3.4 Drain water.....	14
3.5 Water connections.....	14
3.6 Steam distribution.....	16
3.7 Electrical connections.....	17
3.8 Power wiring.....	18
3.9 Control wiring.....	18
3.10 On/Off operation.....	19
3.11 Modulating operation .....	19
3.12 RS485 supervisor card (standard for P/Ns CH***N2003).....	20
3.13 Wiring connections.....	21
3.14 Control device wiring diagram .....	21
<b>4. STARTING</b>	<b>23</b>
4.1 Checks when starting.....	23
4.2 CompactSteam control device.....	23
4.3 Starting compactSteam .....	24
4.4 Cylinder pre-wash (first start-up or replacement).....	24
<b>5. COMPACTSTEAM OPERATION</b>	<b>25</b>
5.1 Displaying information .....	25
5.2 Setting the maximum steam production .....	25
5.3 Manual drain cycle.....	25
5.4 Resetting the hour counter.....	25
5.5 Alarms.....	25
<b>6. TROUBLESHOOTING</b>	<b>27</b>
<b>7. MAINTENANCE</b>	<b>28</b>
7.1 Periodical checks.....	28
7.2 Cylinder maintenance .....	28
7.3 Maintenance of other water circuit components .....	29
7.4 Spare parts.....	29
<b>8. TECHNICAL SPECIFICATIONS</b>	<b>30</b>



# 1. COMPACTSTEAM OPERATION

Range of isothermal humidifiers for steam production in rooms. The steam is produced from the water contained in the cylinder (connected to the mains). The water boils and evaporates due to the electric current generated by two immersed electrodes in the cylinder.

## 1.1 Operating stages

- the humidifier opens the fill valve (1) connected to the main water supply;
- the water flows through the hose (2) to the tank (3), the flow restrictor (4) controls the filling speed;
- when the tank is full, the water overflows into the hose (6) and starts filling the cylinder (5);
- once the level of water in the cylinder has been reached, the humidifier closes the fill valve (1);
- the current generated by the immersed electrodes in the cylinder (7) heats the water until it boils;
- the steam exits the cylinder through the outlet (8) and - depending on the model of humidifier - is distributed directly into the room (using a fan), or into the duct (via a steam line).

**Note:**

- if the water in the cylinder exceeds the level sensor (9), the humidifier will activate the drain pump (11) and empty the excess quantity;
- if the current generated in the cylinder exceeds the required level, the humidifier will activate the drain pump (11) and discharge the amount of water needed to restore the correct current;
- before emptying the humidifier activates the tempering valve (10) to cool the water to 60°C/140°F;
- the humidifier automatically controls the quantity of mineral salts dissolved in the water by activating the fill (1) and drain (11) pumps;
- the cylinder is fitted with a filter (12) to prevent the mineral debris from blocking the drain pump (11);
- if the humidifier is in standby and does not produce steam for more than 3 days (72 hours), the water in the cylinder is automatically emptied;
- the fill tank (3) is connected to an overflow hose (13) to prevent contact between the mains water and the water in the cylinder;
- the current running through the cylinder is controlled by the current transformer connected to the electrodes (7).

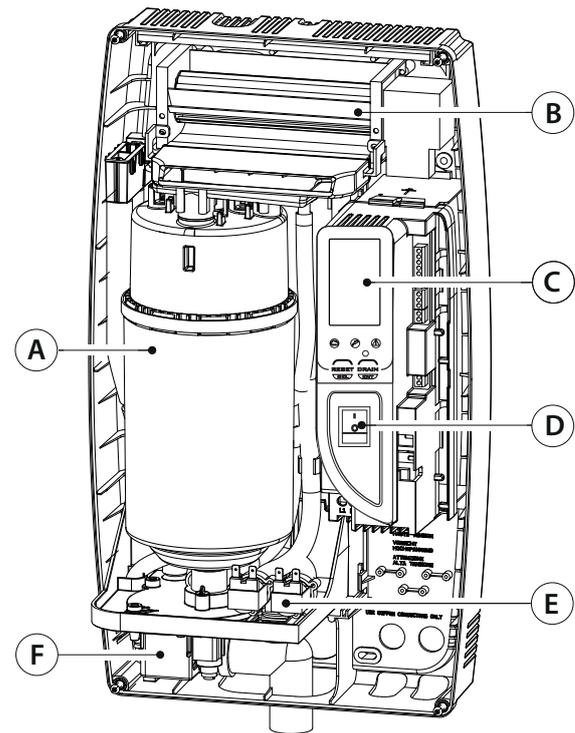


Fig. 1.b

Key:

No.	Description
A	Steam generator cylinder
B	Steam blower (optional)
C	User interface/display
D	On/off button
E	Fill and mixing valves
F	Drain pump

## 1.2 Cylinder service life

### Basic information

The plastic cylinder containing the electrodes is the most important component of the humidifier. During operation, the water in the cylinder boils to produce steam. As the steam does not entrain any of the minerals dissolved in the water, the concentration of such minerals will increase the more steam is produced; moreover, some salts (especially calcium and magnesium bicarbonates) tend to foul the electrodes, until these become electrically insulated. As the electrodes become progressively coated with scale, the water level in the cylinder is increased so that a new portion of clean electrodes can conduct the current. Eventually, the electrodes will be completely coated with scale and will no longer be able to conduct the current needed to produce steam. The humidifier controller can detect when there is low current between the electrodes, indicating the end of the cylinder's service life; this is displayed by alarm code E3. Several factors influence cylinder service life (water characteristics, such as hardness and quality, % of steam production); for the part numbers specified in Table 8.a, the cylinder has a service life of 600 or more hours.

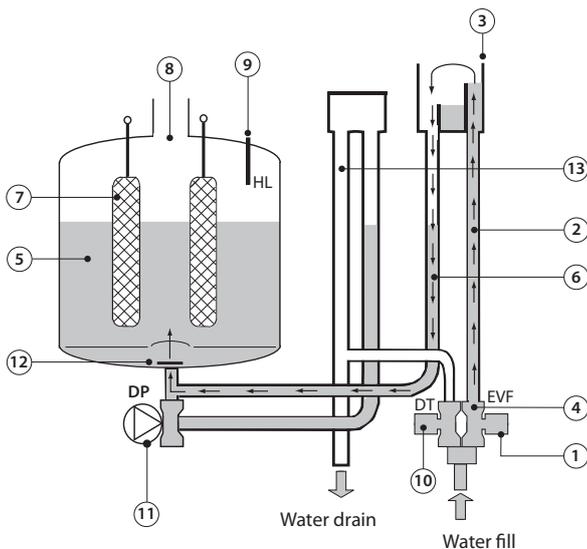


Fig. 1.a

Key:

No.	Description	No.	Description
1	fill valve	8	steam outlet
2	fill hose	9	level sensor
3	fill tank	10	tempering valve
4	flow restrictor	11	drain pump
5	cylinder	12	water drain filter
6	cylinder fill hose	13	overflow hose
7	immersed electrodes		

### Cylinder service life and water characteristics

The characteristics of the water, which vary greatly depending on the location, profoundly affect the cylinder's service life. The most important characteristics are the amount of minerals dissolved in the water and their chemical composition. For example, a high calcium and magnesium bicarbonate content will cause fouling that leads to a rapid reduction in cylinder service life. On the other hand, a considerable chloride content in the water may cause corrosion, with possible electrical discharges between the electrodes.

### Cylinder service life and humidity load

The demand for humidity influences the cylinder's service life. In normal systems, where the humidity load is correctly estimated, the humidifier will operate at maximum capacity only for brief, intermittent periods. In this way, the water level inside the cylinder increases simply to make up for the build-up of scale, and this helps maximise the cylinder's service life.

In some special installations where maximum steam production is required at all times, cylinder service life is reduced, as the water level is generally higher and therefore scale builds up more quickly on the electrodes. It is therefore extremely important to correctly estimate the capacity of the humidifier in relation to the required humidity load.

### Cylinder service life and maximum production

Another factor that influences cylinder service life is the maximum steam production that can be set on the unit. The higher the steam production, the shorter the cylinder life, and vice-versa. Figure 1.c qualitatively shows the ratio between maximum steam production and cylinder service life.

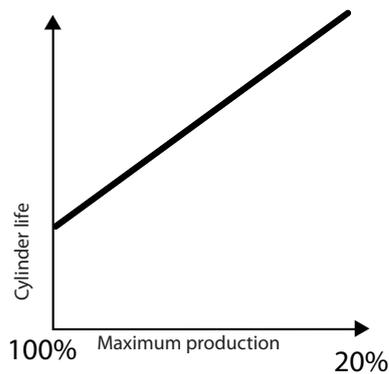


Fig. 1.a

## 2. MODELS

Two versions of compactSteam humidifiers are available:

Duct steam distribution



Fig. 2.a

Direct room distribution  
(not available on the American market)



Fig. 2.b

compactSteam is furthermore manufactured in three different models (see Table 2.a), which differ in terms of voltage (depending on the national grid). Each model is identified by a 10 character alphanumeric part number. The meaning of each character is as follows:

### CH m ss c v xx r

- CH** = stands for compactSteam Humidifier and is always present;
- m** = model: 0 stands for humidification in the duct; F for direct in-room humidification (not available for the American market);
- ss** = nominal steam capacity: 01 = 1.6kg/h, 04 = 4.5kg/h;
- c** = type of control, always N;
- v** = power supply:  
0 = 110/230 VAC single-phase, 2 = 230 VAC single-phase;
- xx** = always 00 std;
- r** = version.

Examples: *CH004N0003: compactSteam for ducted humidification*

modell ( <b>m</b> )	ducted = <b>0</b>
nominal steam capacity 4.5 kg/h / 9.9 pounds/hour ( <b>ss</b> )	110/230 Vac single-phase = <b>4</b>
( <b>xx</b> )	standard = <b>00</b>
version ( <b>r</b> )	<b>3</b>

**Note:** some models may not be available in all regions.

Model	Ref.	Type of installation	Power supply	Approval
CHF01N2003	fig. 2.b	in room	230Vac ~1ph	CE
CHF04N2003			230Vac ~1ph	CE
CH001N2003			230Vac ~1ph	CE
CH004N2003	fig. 2.a	in duct	230Vac ~1ph	CE
CH004N0003			230Vac ~1ph	UL
			230Vac ~1ph	UL
			110Vac ~1ph	UL
			110Vac ~1ph	UL

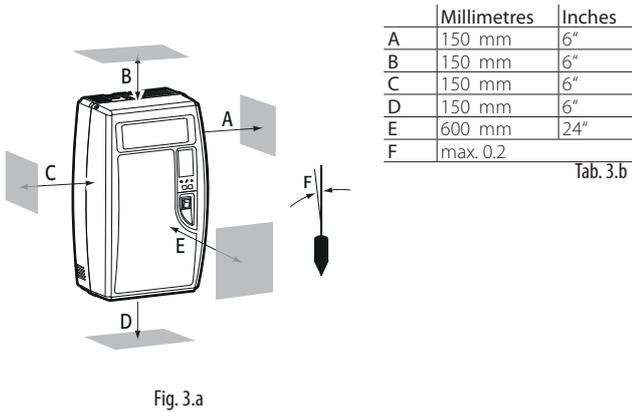
Tab. 2.a

### 3. INSTALLATION

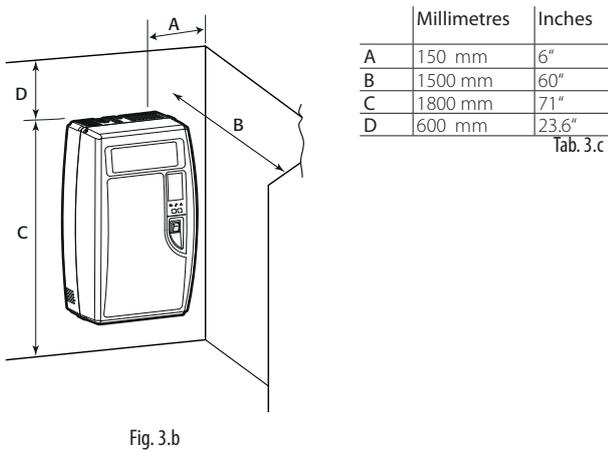
#### 3.1 Positioning

- The compactSteam unit is designed for wall-mounting;
- to ensure correct steam distribution, position the humidifier near the point of steam distribution;
- make sure the humidifier is vertical, leaving the minimum clearances (see Fig.3.a and Tab. 3.a for the installation of the duct model and Fig. 3.b and Tab. 3.b for the room model) to ensure safety and allow for the necessary maintenance operations.

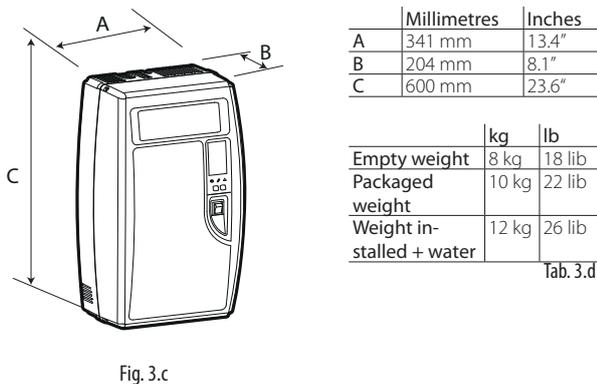
#### Duct steam distribution



#### Direct room distribution



#### Dimensions of the unit (for all models):

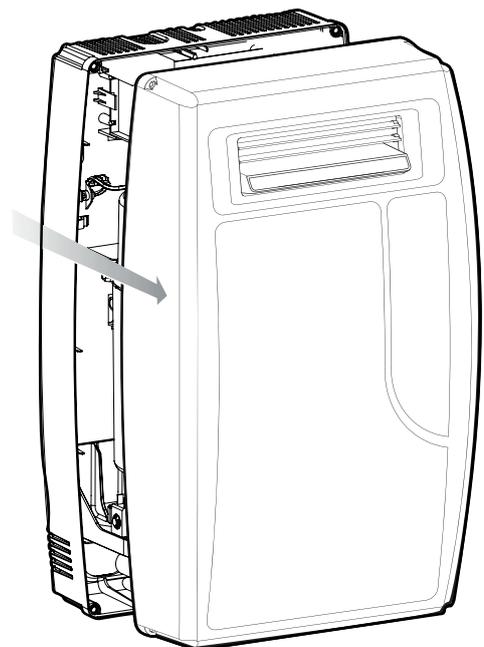


#### 3.2 Mounting

##### Removing the front cover

The front cover is fastened to the body unit using four Phillips head screws located in the four corners of the unit. Use a screwdriver to unscrew the four screws on the cover as shown in Fig. 3.d, then remove the cover by simply pulling it outwards (Fig. 3.e). To replace the cover, perform the same operations in the reverse order.

Be careful not to over-tighten the screws.



Fastening to the wall

Instructions for fastening to the wall:

1. drill the holes in the wall according to the drilling template supplied;
2. fasten compactSteam to the wall using the screws and the anchors supplied.

Fig 3.f shows the measurements in mm (inches in brackets) for wall-mounting.

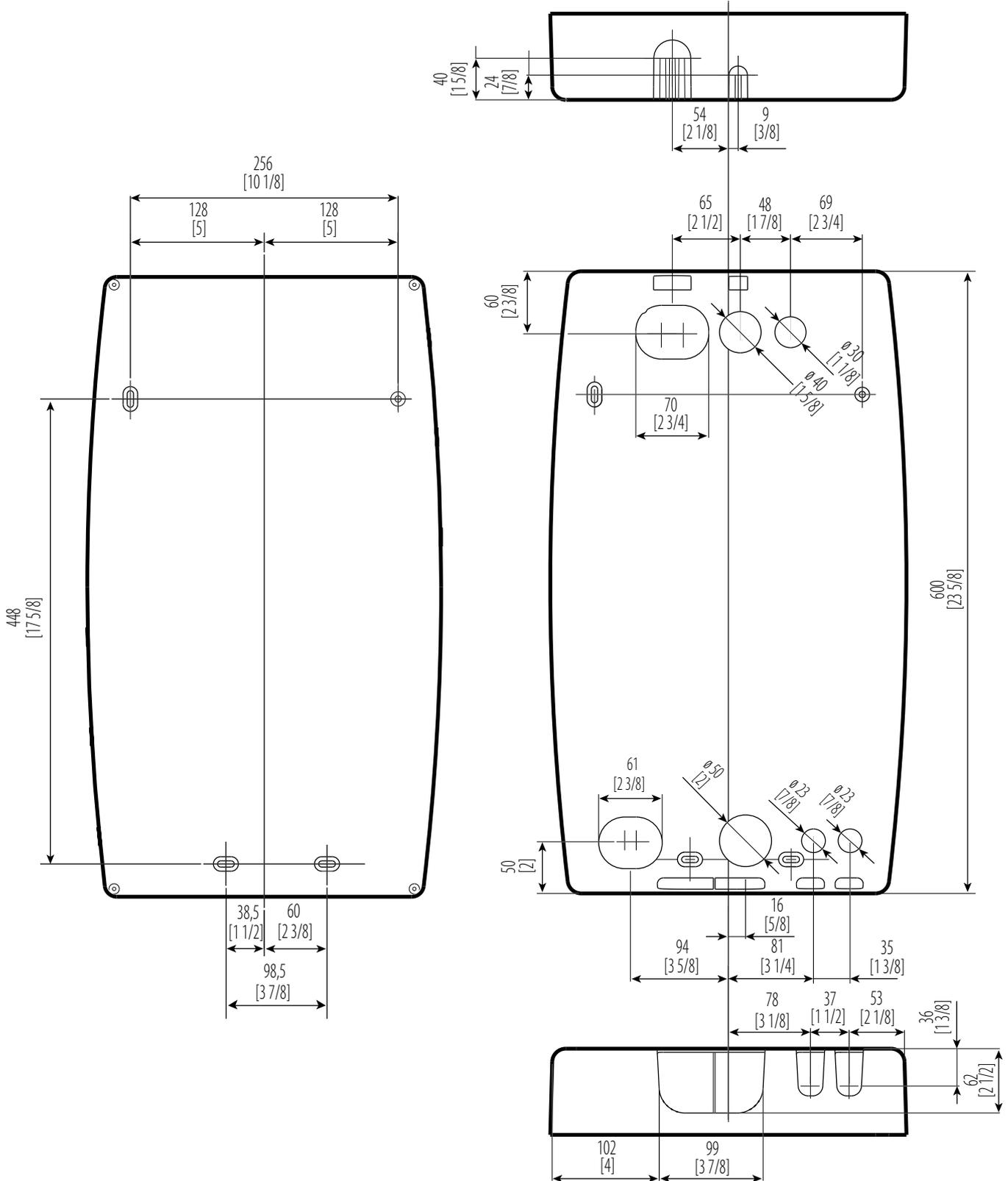


Fig. 3.f

### 3.3 Characteristics of the supply water

The humidifier must be supplied with water with the following characteristics:

- pressure between 20psi and 110psi or 0.1 and 0.8 MPa (1 and 8 bar);
- temperature between 33°F and 104°F or 1°C and 40°C;
- flow-rate minimum of 0.45 L/min or 0.12gpm.

The connection must be 3/4" G (see chap. 8 "Technical specifications"):

- hardness no greater than 40°fH (equal to 400 ppm of CaCO<sub>3</sub>);
- conductivity: from 100 to 1250 µS/cm;
- absence of organic compounds.

The characteristics of the supply-water must fall within the following limits:

supply water characteristics	unit of measure	normal water		water with low salt content	
		min.	max.	min.	max.
Hydrogen ions (pH)		7	8.5	7	8.5
Specific conductivity at 20 °C (σ <sub>R</sub> , 20 °C)	µS/cm	350	1250	100	350
Total dissolved solids (C <sub>T</sub> )	mg/l	(1)	(1)	(1)	(1)
Dry residue at 180 °C (R <sub>180</sub> )	mg/l	(1)	(1)	(1)	(1)
Total hardness (TH)	mg/l CaCO <sub>3</sub>	100 (2)	400	50 (2)	160
Temporary hardness	mg/l CaCO <sub>3</sub>	60 (3)	300	30 (3)	100
Iron + Manganese	mg/l Fe+Mn	=	0.2	=	0.2
Chlorides	ppm Cl <sup>-</sup>	=	30	=	20
Silica	mg/l SiO <sub>2</sub>	=	20	=	20
Residual chlorine	mg/l Cl <sub>2</sub>	=	0.2	=	0.2
Calcium sulphate	mg/l CaSO <sub>4</sub>	=	100	=	60
Metallic impurities	mg/l	0	0	0	0
Solvents, thinners, detergents, lubricants	mg/l	0	0	0	0

Tab. 3.e

(1)= values depend on the specific conductivity; in general:

$$C_T \cong 0.93 * \sigma_{R, 20^\circ C}; R_{180} \cong 0.65 * \sigma_{R, 20^\circ C}$$

(2) = not less than 200% of the chloride content in mg/l Cl<sup>-</sup>

(3) = not less than 300% of the chloride content in mg/l Cl<sup>-</sup>

There is no reliable relationship between hardness and conductivity of the water.

**! Important:**

- do not treat the water with softeners, this may cause the entrainment of foam, affecting the operation of the unit;
- do not add disinfectants or anticorrosive compounds to the water, as these are potential irritants;
- the use of well water, industrial water or water from cooling circuits and, in general, any potentially chemically or bacteriologically contaminated water is not recommended.

### 3.4 Drain water

- This contains the same substances dissolved in the supply water, however in higher quantities;
- it is cooled to 60°C / 140°F by mixing it with supply water;
- it is not toxic and can be drained into the sewerage system.

### 3.5 Water connections

Before proceeding make sure that the humidifier is disconnected from the main power supply.

#### Connection to the main water supply

**NOTICE:** for the Australian market and to comply with Watermark requirements, a watermarked approved dual check valve shall be installed in the supply line to the humidifier when connected to potable water. Should on the other hand the humidifier be fed with treated water from a Carel reverse osmosis system connected to potable water, the dual check valve shall be installed in the supply line to the reverse osmosis system.

Install a manual valve upstream of the installation to be able to cut off the water supply, as illustrated in Fig. 3.h. Connect the humidifier to the main water supply using a hose capable absorbing water hammer, to avoid damaging the fill valve. The hoses are identified by the following CAREL codes: FWH3415000 (1.5 m /4ft long), FWH3 430000 (3 m /9.5ft long ). Alternatively, a hose with a minimum inside diameter of 6 mm / 1/4" can be used.

If soft polymer tubing is used, secure this to the wall to prevent it from detaching from the fill connector and this avoiding water leaks. The threaded fill valve fitting is located at the bottom of the humidifier (see Fig. 3.g). Remember that the fill valve is fitted with a filter that requires periodical cleaning. Make sure there is sufficient clearance for maintenance. The water line can be connected either through the holes at the rear (so that these remain hidden behind the unit) or through the holes at the bottom of the unit.

**! Important:** When installation is completed, flush the supply hose for around 30 minutes by piping water directly into the drain, without sending it into the humidifier. This will eliminate any scale or processing residues that may block the drain pump and cause foam when boiling

#### Water drain

In addition to the connection to the feedwater supply, compactSteam also requires a connection to a drain pipe so as to empty the water from inside the cylinder whenever necessary.

#### CH\*\*\*N2003

The drain pipe can be connected at the rear for these units only (as shown in Fig. 3.i) or at the bottom part of the appliance, using the angle connector supplied (Fig. 3.g and 3.h).

For rear connection, the drain pipe must have a minimum slope of at least 5° (Fig. 3.i) and a drain trap must be installed to prevent drain odours from escaping, as shown in Fig. 3.h.

In both cases, the drain pipe must have a minimum inside diameter of 32 mm (1-1/4") and must be fixed to the humidifier drain outlet without weighing on the unit.

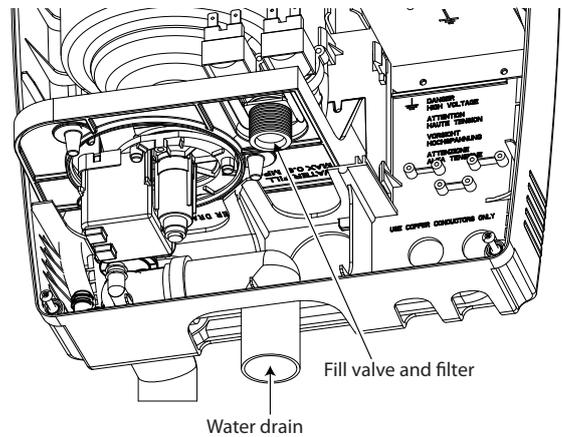


Fig. 3.g

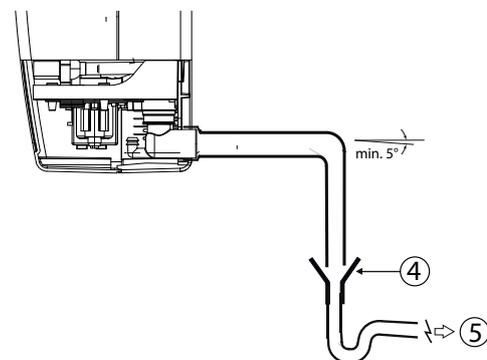


Fig. 3.h  
(for CH\*\*\*N2003)

CH004N0003

In this case, the drain pipe can only be connected at the bottom of the appliance (Fig. and must have a minimum inside diameter of 19 mm (3/4"); it must be fixed to the humidifier drain outlet without weighing on the unit. Observe the following instructions for the installation distances.

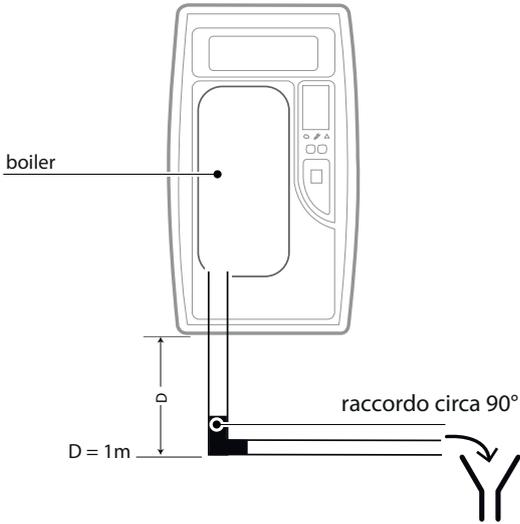


Fig. 3.i

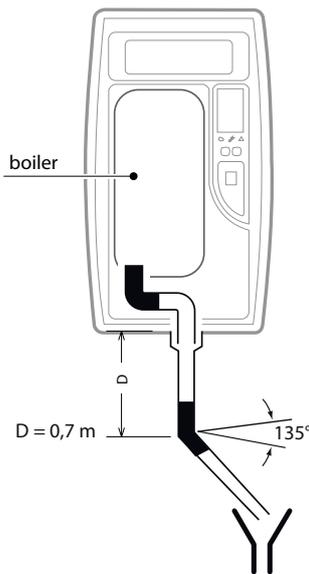


Fig. 3.j

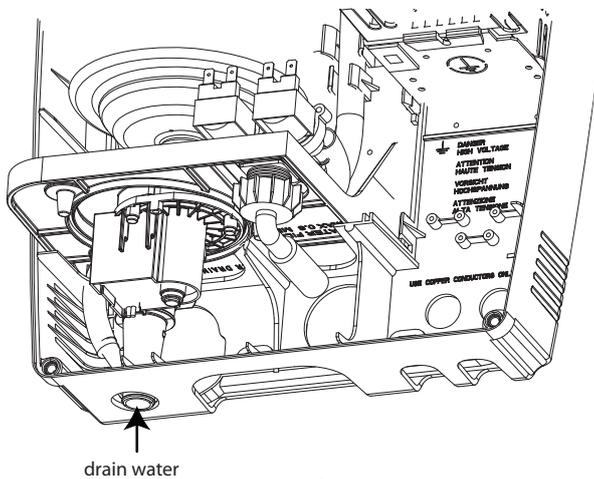


Fig. 3.k

(CH\*\*\*N2003 units only)

General instructions for all units

The characteristics of the drain line are shown in Tab. 3.e. It is also recommended to provide a funnel to interrupt continuity in the drain pipe and avoid flooding inside the appliance. compactSteam is equipped with a mixing valve that, by opening at the same time as the drain pump, introduces cold feedwater into the drain line so as to guarantee a maximum drain water temperature of 60°C (140°F).

Instant drain flow-rate 50Hz	25 l/min / 6.6 gpm
Instant drain flow-rate 60Hz	26.2 l/min / 7 gpm
Nominal connection diameter	32 mm / 1-1/4"
Drain temperature	60°C / 140°F

Tab. 3.f

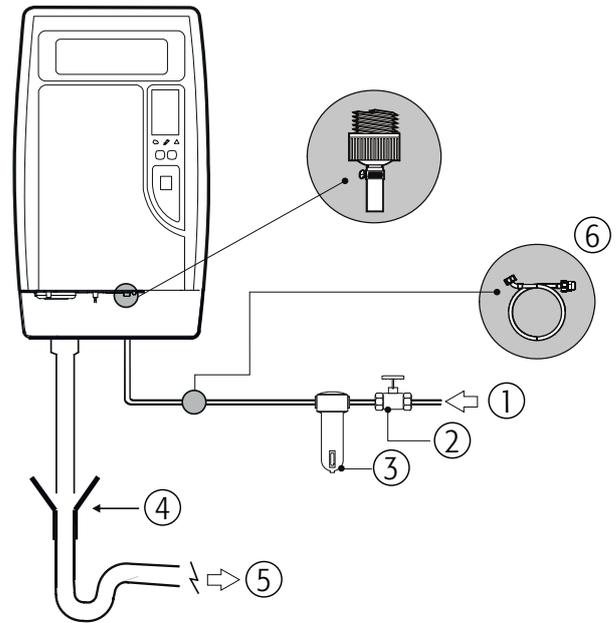


Fig. 3.l

(for CH\*\*\*N2003)

**⚠ Important:** for all units, a distance of xxx must be ensured without any bends, underneath the drain

Key:

1	Supply
2	Manual valve
3	External filter (recommended)
4	Drain funnel
5	Drain
6	Water fill hose (FWH3415000 or FWH3430000)

### 3.6 Steam distribution

#### Steam injection in the duct

The maximum static pressure allowed in the duct is 950 Pa (95 mm water column /3.7" W.C.)

The compactSteam duct models can be used with the plastic nozzle shown in Figure 3.m(CAREL code SDPOEM00\*\*) for the injection of steam in the duct. The dimensions are shown in Table 3.f. These distributors can be fitted horizontally or vertically (hole facing upwards).

#### Installing the CAREL SDPOEM00\*\* jet distributors (see Fig.3.m)

- make a series of holes on the wall according to the distributor drilling template (included in the packaging);
- insert the distributor with the steam opening inside the duct; fasten the flange using 4 screws.

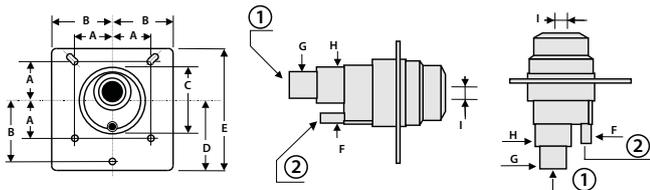


Fig. 3.m

	Millimetres	Inches
A	31.5 mm	1.24"
B	50 mm	1.96"
C	56 mm	2.20"
D	57.5 mm	2.26"
E	100 mm	3.93"
F	∅ 8 mm	∅ 0.31"
G	∅ 22 mm	∅ 0.86"
H	∅ 30 mm	∅ 1.18"
I	12 or 22 mm	0.47 or 0.87"

1	Steam inlet
2	Condensate outlet

Tab. 3.g

Alternatively, a stainless steel distributor for ducts can be used (CAREL code DP0\*\*D22R0):

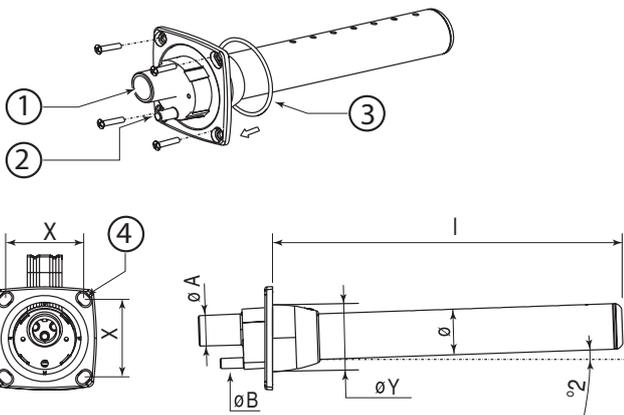


Fig. 3.n

1	steam inlet (∅A)
2	condensate drain (∅B)
3	flange gasket
4	screw max diameter. "M5 / (3/16") (see instruction sheet supplied with the distributor)
∅A	22 mm (7/8")
∅B	10 mm (3/8")
∅Y	58 mm (2 1/4")
∅	35 mm (1 3/8")
X	68 mm (2 11/16")

Tab. 3.h

#### P/N

- DP045D22R0: l = 438 mm / 17 1/4"

Tab. 3.i

#### Assembling the CAREL linear distributor DP045D22R0

##### (Fig. 3.j.a):

- make a series of holes on the wall according to the distributor drilling template (included in the packaging);
- insert the distributor with the steam holes facing upwards;
- fasten the flange using 4 screws.

**! Important:** to allow the condensate to return through the drain connection, fit the distributor at a slight incline (at least 2°, see Fig. 3.n)

#### Condensate drain hose

During operation some of the steam may condense, causing a decline in efficiency and noise (gurgling). To drain the condensate, connect a drain hose (CAREL code 1312353APG) with a drain trap and a minimum slope of 5° to the bottom of the humidifier (see Fig. 3.h). The condensate hose should run through the hole located at the top of the fill tank inside the humidifier, as illustrated in Fig 3.h.

**! IMPORTANT WARNING:** for correct operation, the drain trap should be filled with water before starting the humidifier.

#### Steam cylinder hose adapter

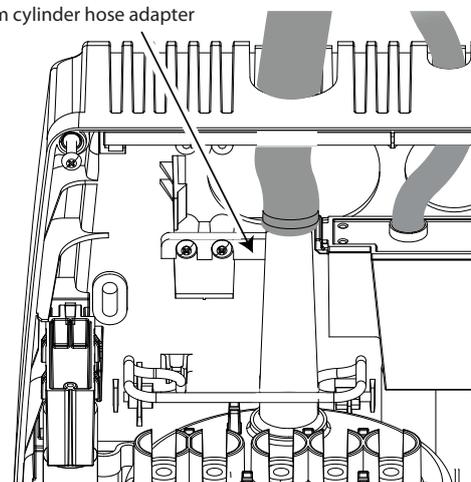


Fig. 3.o

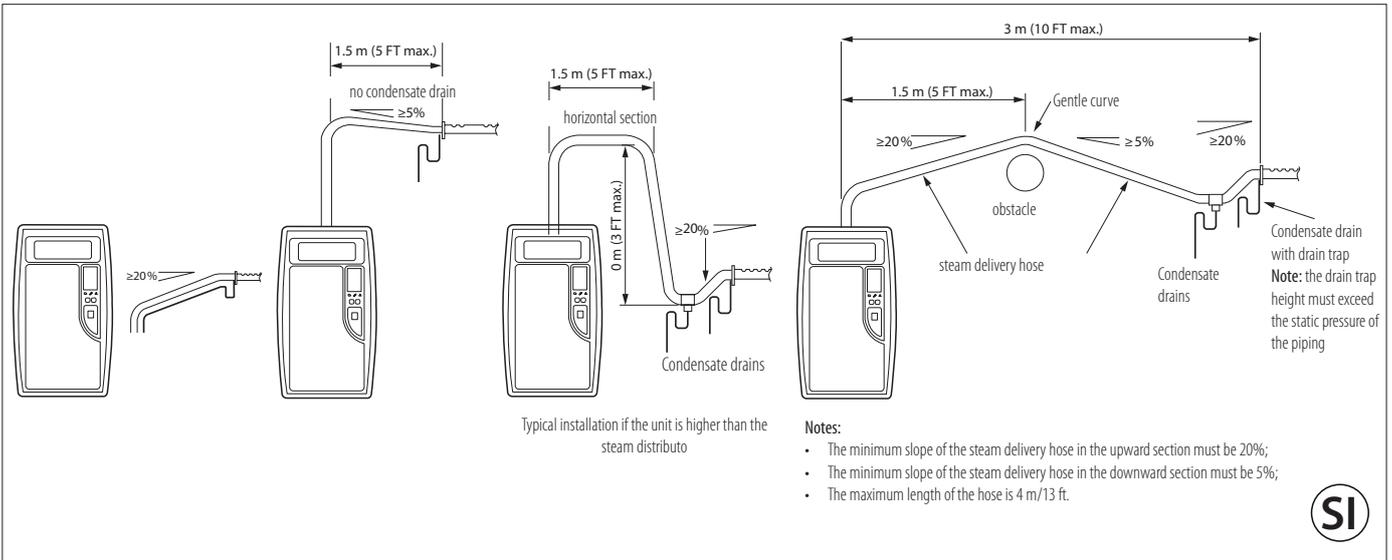
#### Steam hose

- make the connection between the humidifier and distributor using a hose (it is recommended to use the steam hoses supplied by CAREL, code 1312360AXX). Unsuitable hoses may weaken and crack causing steam leaks;
  - avoid the formation of pockets or traps where condensate may form;
  - avoid choking the hose due to tight bends or twisting.
- fasten the end of the hose to the connectors on the humidifier and the steam distributor using metal clamps (not supplied), so that these do not detach due to the high temperature.

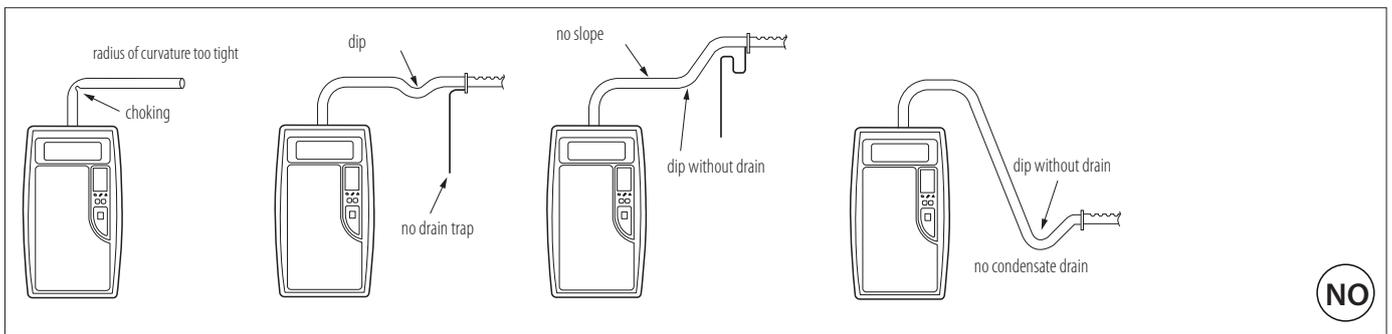
To connect to the cylinder hose steam use the adapter code CHKADAP000.

**! WARNING:** the length of the hose must not exceed 4 m / 13ft.

Figure 3.p shows examples of correct and incorrect installation of the steam delivery hoses and condensate drain hoses.



SI



NO

Fig. 3.p

**ROOM steam distribution**

compactSteam can distribute the steam directly into the room being humidified. For direct humidification, both the compactSteam with built-in blower (CAREL code CHF\*\*\*\*\*\*) and the duct model (code CH0\*\*\*\*\*\*) can be used, the latter connected to a remote room blower (code VRDCHA1000 for 110 Vac models, and VRDCHA2000 for 230 Vac models). The following drawing (Fig 3.q) shows the minimum distance that must be observed when installing the remote steam blower, so as to avoid burning and the condensation of steam on objects such as lights, electrical equipment, cold surfaces, etc. For further details on the installation and use of the blower, see the corresponding manual.

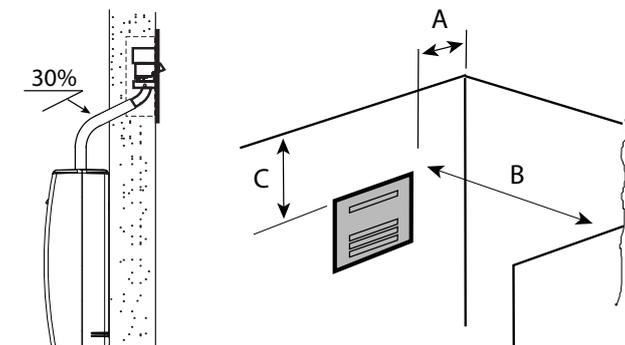


Fig. 3.q

	Millimetres	Inches
A	150 mm	6"
B	1500 mm	60"
C	600 mm	24"

**3.7 Electrical connections**

Before proceeding with the electrical connections:

- make sure that the humidifier is disconnected from the main;
- check that the unit's power supply voltage corresponds to the value indicated on the rating plate inside the electrical panel. (Note: The tolerance allowed on the rated voltage is -15% +10%);
- the humidifier power line must be fitted with a disconnect switch and fuses to protect against short circuits (to be fitted by the installer).

**Note:** To avoid unwanted interference, the power cables should be kept separate from any control wiring. All the wiring must comply with the national and local electrical standards in force.

Power supply voltage selection [ CH004N0003 only]

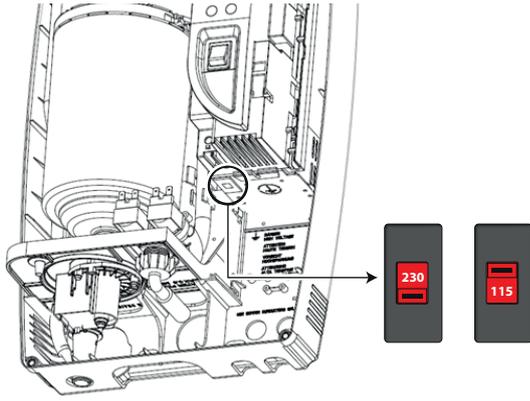


Fig. 3.r

Humidifier model CH004N0003 can be powered at either a nominal voltage of 110 Vac 50/60 Hertz or a nominal voltage of 230 Vac 50/60 Hz. The factory setting is 230Vac. If the mains power supply is 110 Vac, the setting must be changed, following the procedure described below:

1. Make sure the power cable is disconnected from the mains power supply and that the power button is in the OFF position.
2. Remove the top cover from the unit (see par. 3.2).
3. Set the line voltage selector (shown in the figure) to the desired voltage.
4. Close the cover on the unit.

3.8 Power wiring

To connect the humidifier to the mains:

- once the power cables have been run into the unit, use the cable clamps illustrated in Fig 3.s to secure them in the correct position;
- connect the power cables to the terminal block at the bottom left of the control module, as illustrated in Fig. 3.t;
- connect the yellow-green wire to the earth terminal on the unit located on the metal support plate under the control module (Fig. 3.u).

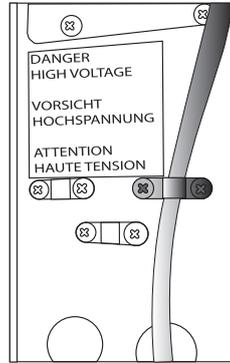


Fig. 3.s

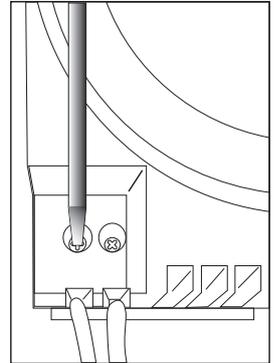


Fig. 3.t

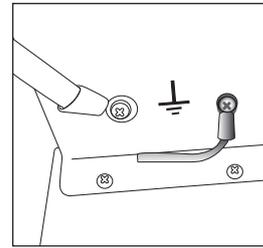


Fig. 3.u

Tab. 3.i shows the electrical data (power supply voltages) for each model of humidifier.

Part number	Power (single phase)	Steam outlet (kg/h)	Steam outlet (lbs/hr)	Power (kW)	Current (A)	External power cables (mm <sup>2</sup> - AWG)	External fuse (A)	(Recommended by Carel) external fuse (A)
CH**1N2003	230Vac 50/60Hz	1.6	3.5	1.2	5.2	1.5 14	10	10
CH**4N2003	230Vac 50/60Hz	4.5	9.9	3.4	14.8	2.5 12	30	20
CH004N0003	110-230Vac 50/60Hz	4.5 @ 230V	9.9 @ 230V	3.4	14.8	2.5 12	30	20
		2.1 @ 110V	4.5 @ 110V	1.6	13.9			

Tab. 3.j

**Note:** some models may not be available in all countries.

3.9 Control wiring

On compactSteam, steam production is controlled by an external signal:

- in on/off mode, a simple contact (for example a humidistat) enables/disables steam production;
- in proportional mode, the humidifier produces a quantity of steam that is directly proportional to the 0 to 10 V signal generated by an external control device.

compactSteam can be connected to any simple or automatic humidistat or safety device, such as limiter humidistat, air flow control switch and remote ON/OFF switch. To connect an external control device, run the cables through the bottom part of the appliance until reaching the top of the control module, and secure them with the cable clamp (see Fig. 3.s). The control wiring terminal blocks are located at the top right of the control module (see Fig. 3.r and 3.s)

**IMPORTANT NOTE:** Select the correct type of control signal on the keypad (see paragraph 5.1.1) before connecting the control wiring.

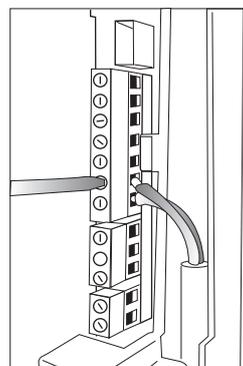


Fig. 3.v

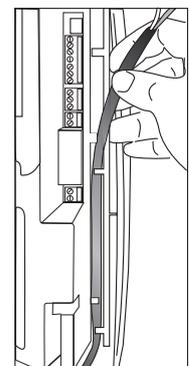


Fig. 3.w

### 3.10 On/Off operation

The diagrams shown in the figures on the side indicate the connections to be performed on the terminal block in the following situations:

- Fig 3.x operation controlled by a simple voltage-free remote enabling contact, indicated as CR;
- Fig 3.y operation controlled by an external humidistat, indicated as H;
- Fig 3.z a combination of the above.

#### Remote enabling contact (fig.3x)

Remove the jumper between terminals AB-AB and connect the voltage-free remote contact (CR) in series to terminals AB-AB; terminals IN-GND must be jumpered. When contact AB-AB is closed, the humidifier is enabled for operation; if the contact is open, steam production stops immediately.

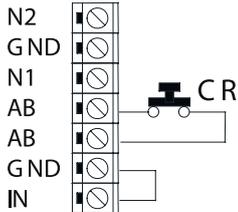


Fig. 3.x

#### External humidistat without enabling (fig. 3.y)

Connect the external humidistat between terminals IN-GND and leave the jumper in position between terminals AB-AB. DO NOT apply any voltage to AB-AB. If the IN-GND contact is closed, steam production starts, while if it is open steam production stops after 5 s.

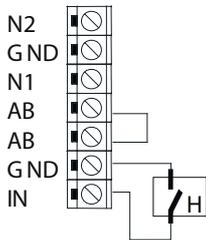


Fig. 3.y

#### External humidistat with enabling (fig. 3.z)

Connect the external humidistat between terminals IN-GND. Remove the jumper between terminals AB-AB and connect any limit devices, air flow switches or remote contacts (CR) in series to terminals AB-AB. Steam production only starts when both contacts, AB-AB and IN-GND, are closed. If contact AB-AB is open steam production stops immediately, while if IN-GND is open production stops after 5 s.

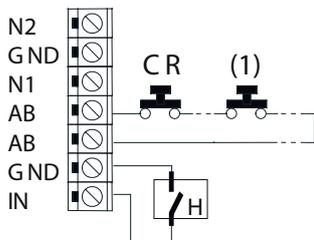


Fig. 3.z

### Interlock between compactSteam for ducts and the system fan controller

In duct applications, compactSteam starts steam production only if there is an external call for humidity (humidistat closed) and the system fan is on. The system fan communicates with compactSteam via the remote input AB-AB. The following sequence of events must be true for compactSteam to produce steam:

- External humidistat close (= steam demand);
- FAN-EXT contact closed by compactSteam, to start the system fan;
- Input AB-AB closed, indicating that the fan has started (= enable steam production).

compactSteam can be connected to an air flow switch (that is, a device that senses the flow of air generated by the fan in the duct). This flow sensor should be connected to the remote enabling input (terminals AB-AB) in series with a limit humidistat (normally closed). When the flow sensor is connected to compactSteam, steam production is only enabled if air flow is measured inside the duct.



#### Fan symbol

- **Off:** no call (IN-GND = open), regardless of whether or not production is enabled (AB-AB = open or closed);
- **Flashing:** call present (IN-GND = closed), awaiting production to be enabled (AB-AB = open);
- **On steady:** call present (IN-GND = closed) and production enabled (AB-AB = closed).



#### Note:

- When enabled (AB-AB = closed), the symbol goes off 30 s after the production call is no longer present (IN-GND = open);
- When the production call is present (IN-GND = closed), the symbol goes off 60 s after production is disabled (AB-AB = open).

### 3.11 Modulating operation

Connect the external 0 to 10 V modulating control device between terminals IN-GND as shown in Fig. 3.aa Then connect any safety switches (limit device, air flow switch, remote on/off) in series to terminals AB-AB. If no safety switches are used, install a jumper between AB-AB. DO NOT apply any voltage to AB-AB.

Steam production is modulated from 20% to 100% of the maximum production, proportionally to the signal provided by the external controller.

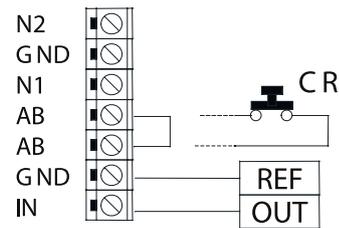


Fig. 3.aa

### 3.12 RS485 supervisor card (standard for P/Ns CH\*\*\*N2003)



Fig. 3.ab

Description of connections on the RS485 card



Fig. 3.ac

The RS485 card is used for communication with a supervisor using the ModBus protocol. For the list of variables, see the table below.



**Caution:**

- for model CH004N0003, the CHK4850000 accessory is required
- for RS485 connections in household (IEC EN 55014-1) and residential (IEC EN 61000-6-3) environments, use shielded cable (with shield connected to PE both on the terminal and controller ends), maximum length specified by the EIA RS485 protocol, equivalent to European standard CCITT V11, using AWG26 twisted pair cable; the input impedance of the 485 stage is 1/8 unit-load (96 kOhms).

#### 3.12.1 Parameter table

DESCRIPTION	TYPE	R/W	CAREL ADD	MODBUS ADD	DEFAULT	MIN	MAX	UNIT	VOLATILE
Humidifier ready (no alarms)	DIGITAL	R	11	11	0	0	1		-
Anti-foam wash	DIGITAL	R	12	12	0	0	1		-
Flag indicating the first 50 operating hours	DIGITAL	R	26	26	-	0	1		-
Unit disabled via remote (display shows -)	DIGITAL	R/W	28	28	0	0	1		YES
0 = humidistat - 1 = 0-10 V controller (set to 0 if control via supervisor and set the % of production using parameter PO)									
Maximum production (PO)	INTEGER	R/W	13	268	100	20	100	%	NO
Proportional hour counter	INTEGER	R	14	269	-	0	-	hour	-
Real hour counter	INTEGER	R	19	274	-	0	-	hour	-
Days of inactivity before wash	INTEGER	R/W	50	305	3	0	10		NO
Select protocol 0=CAREL 1-24 = MODBUS (see table of Modbus values)	INTEGER	R/W	52	307	0	0	24		NO (unit power off neededf)
Alarm identification (see table)	INTEGER	R	83	338	0	0	65535		-
Display current input	ANALOGUE	R	16	16	-	0	14.5	A	-
Production in kg/h	ANALOGUE	R	17	17	-	0	4.5	kg/h	-

Tab. 3.k

#### 3.12.2 Alarm table

(16-bit multi-bit variable number 83 Carel, 339 Modbus)

BIT NUMBER	DESCRIPTION	ALARM CODE
1	MAINTENANCE WARNING (rated current not reached)	E6
2	DRAIN ALARM	E5
3	FILL ALARM	E4
4	MAINTENANCE WARNING (perc. hour counter > 600)	E6
5	HIGH CURRENT ALARM	E1
6	PARAMETERS NOT DOWNLOADED ALARM	E0
7	NOT USED	
8	LOW PRODUCTION WARNING	E2
9	FOAM WARNING	E7
10	END OF CYLINDER LIFE ALARM	E8
11	NOT USED	
12	NOT USED	
13	NO VOLTAGE-CURRENT CONFIGURATION WARNING	EH

Tab. 3.l

#### 3.12.3 Modbus table

To avoid malfunctions, disable any hardware flow control on the supervisor application level

TABLE OF MODBUS VALUES (C7)	TYPE	BAUD RATE
0	CAREL	19200
1	MODBUS 8,N,2	19200
2	MODBUS 8,N,1	19200
13	8,N,2	9600
14	8,N,1	9600

Tab. 3.m

### 3.13 Wiring connections

Terminal	Function	Electrical specifications
L1-L2-EARTH	Power supply and earth connections	Power supply (110 Vac single-phase 50/60 Hz or 230 Vac single-phase 50/60 Hz)
KEY	Programming port	Connection to programming port or supervisor
AB-AB	Remote enabling input	Requires a normally-open external contact; Rmax = 300 Ohm; Vmax = 33 Vdc; Imax = 6 mA; humidifier enabled = contact closed
IN-GND	Control signal input	If programmed as 0-10 V: Input impedance 10 kohm If programmed as ON/OFF (default): Vmax = 33 Vdc, Imax = 5mA, Rmax = 300 Ohm
NC-C-NO	NC alarm contact C common alarm contact NO alarm contact	250V; 8 A max. with resistive load; 4 A max. with inductive load
NO-C	External fan relay	250V; 8 A max. with resistive load; 4 A max. with inductive load
24-GND	Power supply for external humidistat	24 Vac, 2 watts

Tab. 3.n

### 3.14 Control device wiring diagram

CH\*\*\*N2003 Models

Key

EVF	Fill valve
DT	Drain valve
HL	High level sensor
E1, E2	Electrodes

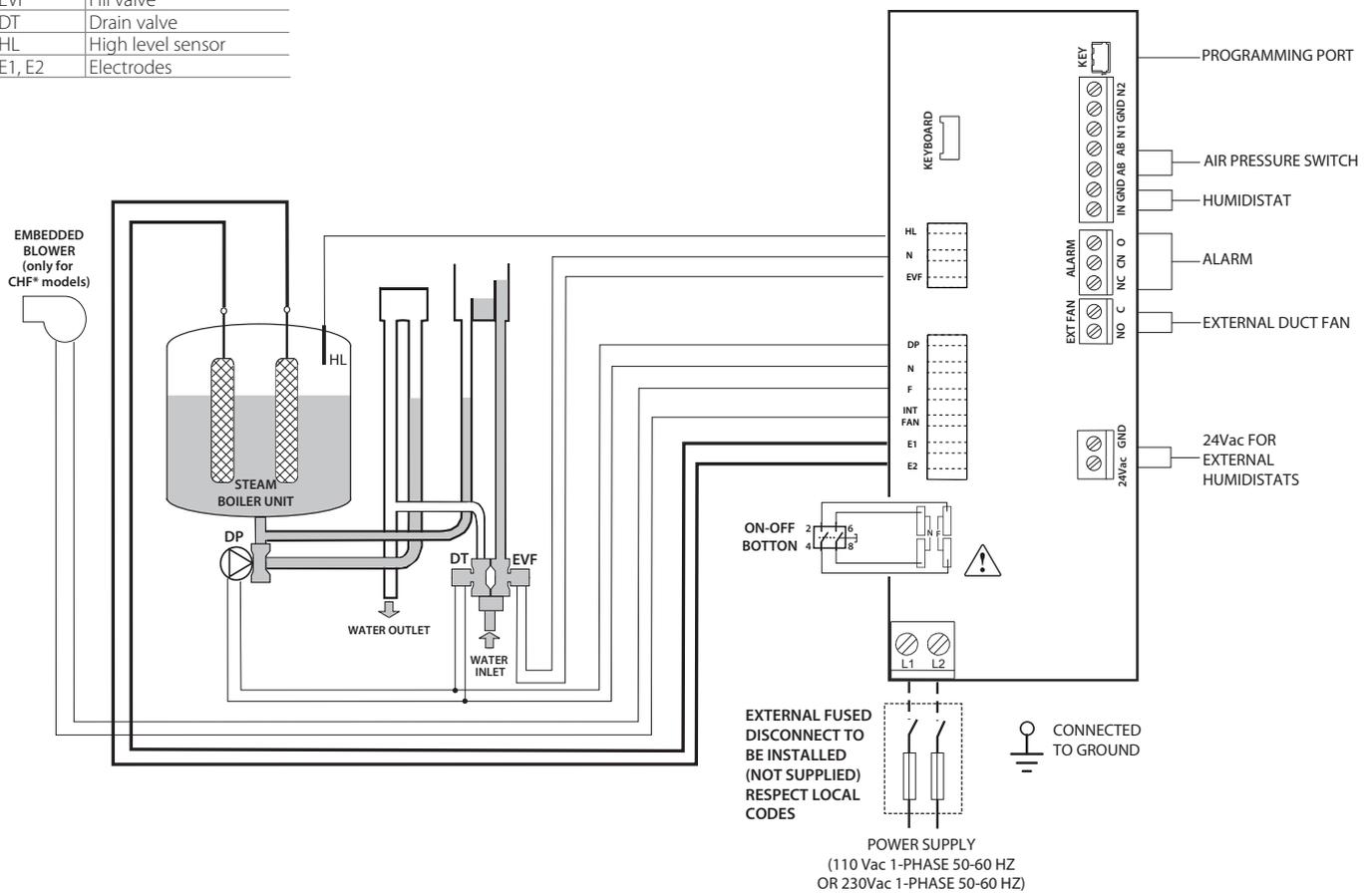


Fig. 3.ad

Models CH004N0003

Legenda

EVF	Fill valve
DP	Drain pump
DT	Drain tempering valve
HL	High level sensor

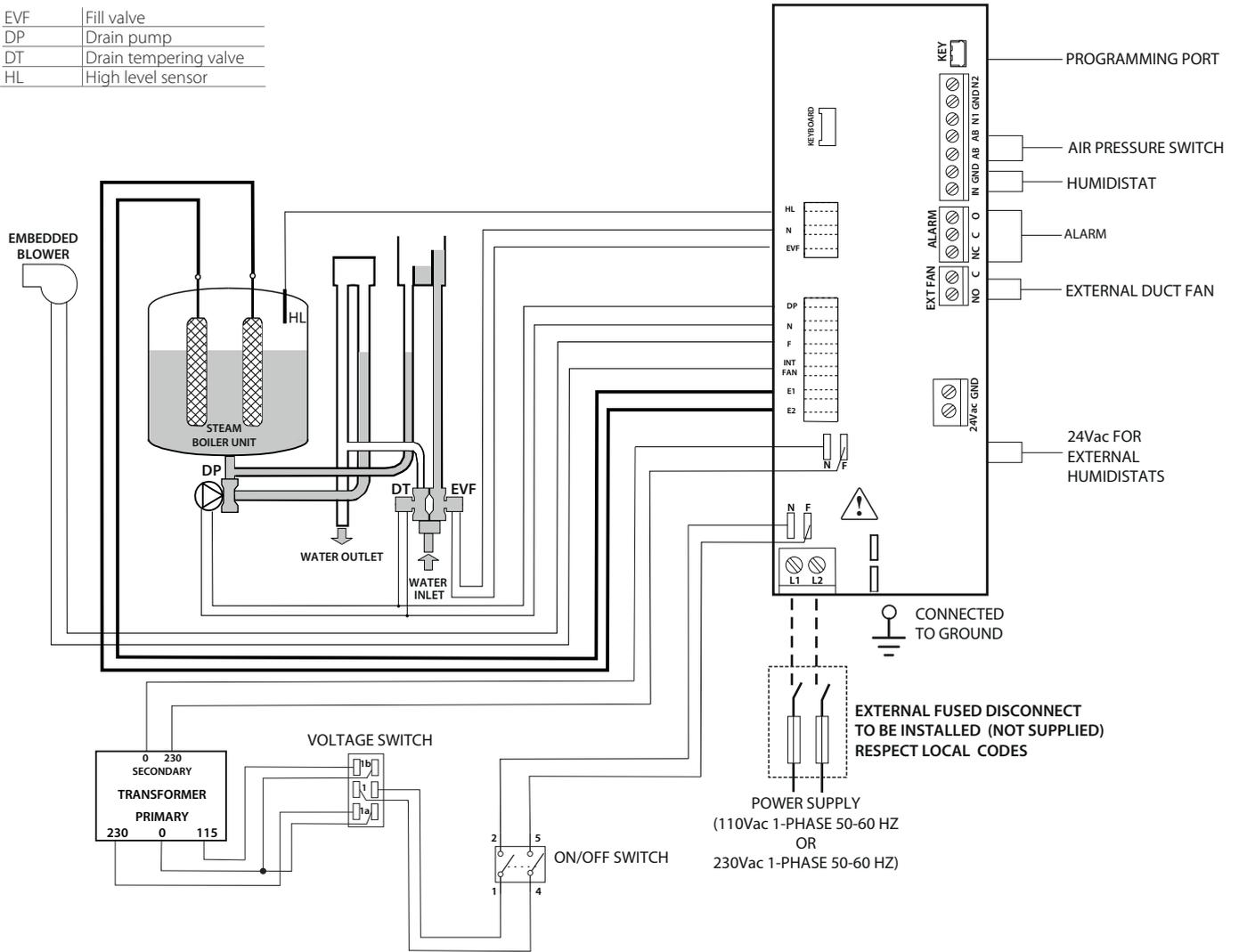


Fig. 3.ae

## 4. STARTING

### ⚠ IMPORTANT WARNINGS:

Before starting:

1. check that the humidifier is in perfect condition,
2. make sure there are no water leaks and that the electrical components are dry.

Do not connect the power supply if the humidifier is damaged or even partially wet!

When installation is completed, flush the supply hose for around 10 minutes by piping water directly into the drain, without sending it into the humidifier; this will eliminate any scale or processing residues that may cause foam when boiling.

**⚠ IMPORTANT:** when starting the humidifier with a new or empty cylinder, it may take some time (several hours) for the water to reach a sufficient concentration of minerals as to allow nominal steam production.

### 4.1 Checks when starting

Before starting the humidifier, check that:

- The water supply is connected, the line has been flushed and the taps are open.
- The drain is connected as explained in the paragraph 3.5 (flood prevention funnel and drain trap under the unit).
- The power supply is connected in accordance with the instructions, the laws in force and the rating labels on the unit.
- The power fuses are installed and intact.
- Any air flow switch is wired to open if there is no air flow.
- Any limit humidistat is wired to open if the humidity increases above the set value.
- All the wire connectors on the unit are tight.
- The steam and condensate hoses are installed correctly, without kinks or twisting, and are correctly sloped in compliance with the manual.

### 4.2 CompactSteam control device

The compactSteam control device features an LCD that, using icons and numbers, displays the operation of the system:

1	Steam production as a % of rated capacity
2	Active alarm icon
3	Instant current flow in amperes (default display)
4	Steam production in progress
5	Cylinder fill in progress
6	Foam detected inside the cylinder
7	Water inside the cylinder
8	Cylinder drain in progress
9	Red LED: alarm
10	Yellow LED: power supply
11	Green LED: operation
12	Drain button for manually emptying the cylinder and confirming the values set for the parameters
13	On/Off button
14	"Reset" button to reset alarms and access the parameters
15	Level of steam production: 33%, 66%, 100%
16	Fan relay active

Tab. 4.a

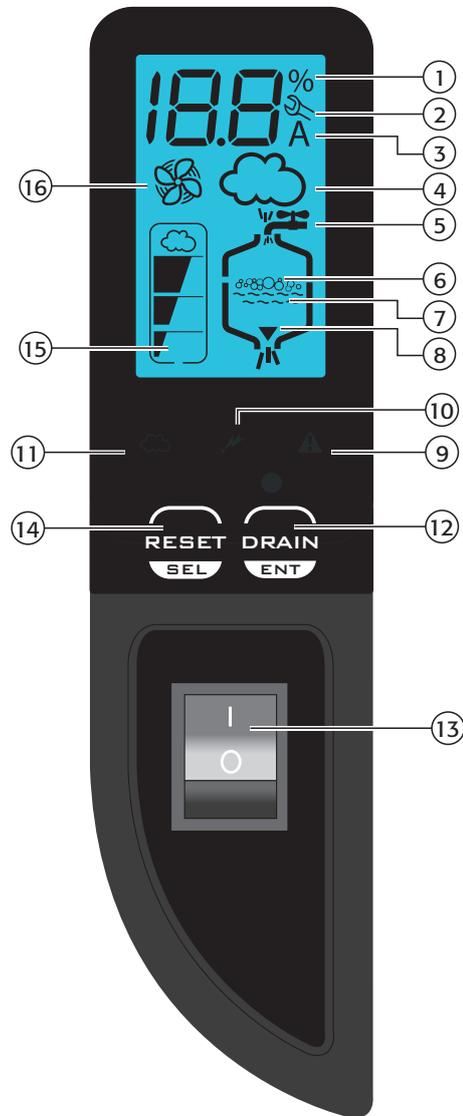


Fig. 4.a

### 4.3 Starting compactSteam

Before starting the unit, verify that the power supply voltage is correct, and the characteristics of the circuit breaker installed.

For CH004N0003 units, make sure that the procedure in paragraph 3.7 for setting the correct supply voltage has been completed.

Press the ON button (13), the unit switches on and the display shows 03, with the 'SET' symbol flashing. To complete the guided configuration procedure, press the 'RESET/SEL' button and then adjust the value shown on the display.

Choose the desired value from the four options shown below and press the 'DRAIN/ENT' button to confirm.

- 1 → 110V 10.4A 1.6 kg/h (model CH004N0003 only)
- 2 → 110V 13.9A 2.1Kg/h (model CH004N0003 only)
- 3 → 230V 10.9A 3,3 kg/h (all models)
- 4 → 230V 14.8A 4.5 kg/h (all models)

At the end of this initialisation operation, a sequence of characters will be shown on the display to indicate the selected size and voltage, according to the following scheme:

CH + size (kg/h) + U + voltage (1 = 115V, 2 = 230V)  
 CH01U1 : 1.6 kg/h 110V (model CH004N0003 only)  
 CH02U1: 2.1 Kg/h 110V (model CH004N0003 only)  
 CH03U2: 3.3 kg/h 230V (all models)  
 CH04U2: 4.5 kg/h 230V (all models)

If, on the other hand, no selection is made within 10 seconds, the unit will start using the default setting (option 3). The unit can be configured again the next time it is switched on.

The yellow power LED comes on and compactSteam is ready to operate.

If humidity production is required, compactSteam powers on the boiler electrodes and the green operating LED comes on. Even if not configured, the unit is enabled for production, but the warning EH will be shown on the display.

### 4.4 Cylinder pre-wash (first start-up or replacement)

1. Switch the unit off if it already on.  
 Press and hold the 'SEL' and 'DRAIN' buttons together and then switch the unit on using the ON/OFF button, while still keeping the two buttons pressed until the spanner symbol starts flashing, then release

the buttons. 

2. Press 'SEL' until the value 04 is shown on the display.  
**Warning: DO NOT confirm any value greater than 04. If a number greater than or equal to 05 is displayed, press 'SEL' until the counter restarts from 0 again and continue until reaching the value 04.**
3. Press 'DRAIN' (at least 1 second). The cleaning cycle starts. In this phase, the electrodes are powered on and the cylinder is filled with water, until one of the following conditions occurs:
  - the water level reaches the maximum fill sensor;
  - the phase current is equal to the nominal value.
 The cylinder is emptied. Carel recommends carrying out two cleaning cycles.  
 Go back and repeat from point 1).

## 5. COMPACTSTEAM OPERATION

### 5.1 Displaying information

The information shown on the display during the normal operation of compactSteam is the instant current in amperes running between the electrodes. To display other information, press and hold the "reset/sel" button until the display shows the required information. When holding the button, every 2 seconds the display will scroll between the current, the percentage (%) of steam production, the hour counter and then the current again (Fig. 5.a).



Fig. 5.a

1. **Instant current:** this is the current that flows through the water to make it boil (default display).
2. **percentage (%)** of steam production: this is the steam production (proportional to the current), expressed as a percentage of rated production.
3. **hour counter:** counts the operating hours, proportional to the % of cylinder production (this must be reset whenever the cylinder is replaced). For example, if the cylinder has worked for 100 hours at 50% production, the number of proportional operating hours is 50. The value is expressed in tens of hours, so for example when the display shows 13, the real number of operating hours is between 130 and 139 hours. Once 1990 hours have elapsed (199 on the display), the hours are displayed in hundreds. Example: 21 = 2100 hours.

#### Selecting the type of signal

**Note:** select the correct control signal type on the keypad before connecting the control wiring.

To select the type of control signal proceed as follows:

1. Turn compactSteam off.
2. Turn compactSteam on again, while holding the two buttons, "reset/sel" and "drain", until the display shows "00" and the wrench symbol flashes; then release the two buttons.
3. Then hold the "reset/sel" button to scroll the numeric parameters on the display. Hold "reset/sel" for a few seconds until the display shows "02".  
**WARNING:** If the display shows a value higher than "02" do not confirm, but rather press "reset/sel" until the display returns to normal operating mode and start again from point 1.
4. Press the "drain" button for at least 1 second to confirm the value: the display will show "P1" for 1 second and then the value of parameter P1 currently set will be displayed alongside.
5. Pressing "reset/sel" switches the value of P1 between "0" and "1":  
0 = humidistat;  
1 = external 0 to 10V modulating signal
6. Press the "drain" button for at least 1 second to confirm the new value of parameter P1 and return to normal operating mode.
7. Turn compactSteam off: now the control wiring can be connected.

**Note:** If no selection is made within 3 s, the software automatically returns to normal operating mode.

### 5.2 Setting the maximum steam production

To adapt the compactSteam to the specifications characteristics of the environment, the maximum steam production can be set between 20% and 100% of rated production, in steps of 5%. To set the maximum steam production:

1. Turn compactSteam off.
2. Turn compactSteam on again, while holding the two buttons, "reset/sel" and "drain", until the display shows "00" and the wrench symbol flashes; then release the two buttons.
3. Then hold the "reset/sel" button to scroll the numeric parameters on the display. Hold "reset/sel" for a few seconds until the display shows "01". **WARNING:** If the display shows a value higher than "01" do not confirm, but rather press "reset/sel" until the display returns to normal operating mode and start again from point 1
4. Press "drain" for at least 1 second to confirm the value: the display shows "P0" for 1 second and then the value of parameter P0 currently set will be displayed alongside.
5. Pressing "reset/sel" scrolls the value of P0 from 20% to 100% in steps of 5%
6. Press the "drain" button for at least 1 second to confirm the new value of parameter P0 and return to normal operating mode.

**Note:** If no selection is confirmed within 3 s, the software automatically returns to normal operating mode.

### 5.3 Manual drain cycle

Holding the "drain" button on the front of the unit activates the manual cylinder drain cycle. Hold the button until the cylinder is empty..

### 5.4 Resetting the hour counter

The hour counter must be set to zero whenever the cylinder is replaced, so as to cancel and restart the maintenance timer:

1. Turn compactSteam off.
2. Turn compactSteam on again, while holding the two buttons, "reset/sel" and "drain", until the display shows "00" and the wrench symbol flashes; then release the two buttons.
3. Then hold the "reset/sel" button to scroll the numeric parameters on the display. Hold "reset/sel" for a few seconds until the display shows "03". **WARNING:** If the display shows a value higher than "03" do not confirm, but rather press "reset/sel" until the display returns to normal operating mode and start again from point 1
4. Press "drain" for at least 1 second to confirm the value: the hour counter is immediately reset and compactSteam returns to normal operating mode.

**Note:** If no selection is confirmed within 3 s, the software automatically returns to normal operating mode.

## 5.5 Alarms

In the event of alarms, the red LED flashes, the alarm relay closes, activating the remote signal (if installed) and the alarm code flashes on the display. There are two types of alarms: warnings and shutdown alarms. The former can be deleted by pressing the "reset/sel" button for 2 s, while the latter are displayed until maintenance is performed. Multiple alarms flash in sequence, alternating with the main display.

The table below (Tab. 5.a) shows all the alarm codes, with a description of the problems that cause these and the actions required to restore normal operation.

Display	Description	Action	Red LED	Alarm relay	Notes
--	Remote ON/OFF open	Unit disabled	OFF	OFF	Jumper terminals AB-AB
EE	Internal memory error	Contact the service centre	ON	ON	This should never occur in the field; have the appliance reprogrammed by the service centre
EH	Warning configuration failure	Complete the configuration procedure (see related paragraph)	OFF	OFF	See paragraph "Starting"
E0	Control board configuration not valid	Unit disabled	ON	ON	This should never occur in the field; have the appliance reprogrammed by the service centre.
E1	High current alarm	Unit disabled	ON	ON	1) Turn off; 2) Check the connections; 3) Check the cylinder (no bridges of lime scale between the electrodes); 4) Check that the electrodes are not shorted.
E2	Low production, low conductivity of the supply water or excessive foam/ lime scale in the cylinder	Unit disabled. Press the "reset/sel" button for 1 second to delete the alarm	ON	ON	Check the conductivity of the supply water and if necessary replace the cylinder with the low conductivity version.
E3	Cylinder almost depleted	Not resettable: the unit continues producing steam; the warning is automatically reset only when the humidifier is able to reach the required steam production in kg/h	Off	Off	Change cylinder (if necessary).
E4	Fill alarm, water not filling or fill too slow (the current does not increase within the set time)	Press the "reset/sel" button for 1 second to delete the alarm; otherwise, the signal will be automatically reset every 10 minutes until the supply water is available again.	ON	ON	1) Check the water supply and the fill valve; 2) Check for any leaks from the drain pump; 3) Make sure the filter on the fill solenoid valve is not blocked (Fig. 3.g); 4) Check that the steam outlet is not working against excessive backpressure, preventing the flow of water into the cylinder by gravity; 5) Check that the steam outlet hose is not choked or that there are no pockets of condensate; 6) Check that the power cables are connected to the cylinder.
E5	Drain alarm, cannot perform the drain (the current does not decrease within the set time)	Press the "reset/sel" button for 1 second to delete the alarm	ON	ON	1) Make sure the drain pump is not blocked 2) Check that there are no blockages in the drain connection.
E7	Foam detected	Press the "reset/sel" button for 1 second to delete the alarm	OFF	OFF	If the problem persists, perform a number of cleaning cycles (see chapter 4.4 "Starting with a new cylinder")
E8	Cylinder lifetime expired	Unit Disabled: Reset the hour counter (read chap. Resetting the hour counter")	On	On	Change the cylinder
E9	High temperature of the control device (above 80°C / 176°F)	The signal is automatically reset if the temperature falls below 80 °C / 176 °F.	OFF	OFF	Replace the control device

Tab. 5.a

## 6. TROUBLESHOOTING

Problem	Cause	Solution
The humidifier does not start	<ol style="list-style-type: none"> <li>1. No electrical power</li> <li>2. Humidifier ON/OFF switch in position 0 (off)</li> <li>3. Control connectors badly connected</li> <li>4. Broken fuses</li> <li>5. Controller fault</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the protection devices upstream from the humidifier and the presence of power</li> <li>2. Close the ON/OFF switch: position I (on)</li> <li>3. Check that the connectors are properly inserted in the terminal block</li> <li>4. Check the condition of the fuses</li> <li>5. Check that this is activated and the correct voltage is connected</li> </ol>
The humidifier does not start	<ol style="list-style-type: none"> <li>1. Remote ON/OFF contact open</li> <li>2. The humidistat has not been connected correctly</li> <li>3. Humidistat fault</li> <li>4. Control signal not compatible with the type set (see note 5.11)</li> <li>5. Value measured by the sensor/sensor higher than the corresponding set point</li> </ol>	<ol style="list-style-type: none"> <li>1. Close the ON/OFF contacts (terminals AB-AB)</li> <li>2. Check the external connections</li> <li>3. Replace the humidistat</li> </ol>
The humidifier fills with water without producing steam	<ol style="list-style-type: none"> <li>1. High steam backpressure</li> <li>2. Fill valve filter blocked</li> <li>3. Minerals in the fill tank</li> <li>4. Leaks from the drain pump</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that the steam hose is not twisted or curved downwards, thus trapping the condensate</li> <li>2. Clean the fill valve filter</li> <li>3. Clean the fill tank</li> <li>4. Check the voltage on the drain pump and/or replace the drain pump</li> </ol>
The humidifier wets the duct	<ol style="list-style-type: none"> <li>1. Distributor not installed correctly (too near the top of the duct or the condensate return is blocked)</li> <li>2. System oversized</li> <li>3. Humidifier active when the fan in the duct is off</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that the steam distributor is installed correctly</li> <li>2. Decrease the set steam production</li> <li>3. Check the connection of the device (flow switch or differential pressure switch) slaving the humidifier to the fan in the duct</li> </ol>
The humidifier wets the floor below	<ol style="list-style-type: none"> <li>1. Humidifier drain blocked</li> <li>2. The supply water or overflow circuit has leaks</li> <li>3. The condensate drain hose pipe does not carry the water to the tank</li> <li>4. The steam hose is not fastened to the cylinder correctly</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean the drain circuit and the fill tank</li> <li>2. Check the entire water circuit</li> <li>3. Check the correct position of the condensate drain hose in the drain tank</li> <li>4. Check the fastening of the hose clamps on the steam outlet</li> </ol>
Sparks form inside the cylinder a few hours after starting	<ol style="list-style-type: none"> <li>1. The supply water contains considerable quantities of iron, copper or other conductive contaminants.</li> </ol>	<ol style="list-style-type: none"> <li>1. If using a softener, check the salts used. If these contain additives, stop use, rinse all the lines and use non-softened water.</li> <li>2. Check the electrodes in the cylinder to make sure they have not been damaged during transport.</li> </ol>
The cylinder fills with water and drains continually, without producing steam	<ol style="list-style-type: none"> <li>1. The minerals have formed a bridge between the electrodes.</li> <li>2. Backpressure from the steam hoses or the duct.</li> <li>3. The flow controller on the fill valve is broken or not calibrated.</li> <li>4. High conductivity of the water.</li> <li>5. Excessive foam forms.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the cylinder.</li> <li>2. Check if the steam hoses have twists or sags that may trap the condensate.</li> <li>3. Replace the fill valve.</li> <li>4. Consider using a mixture of demineralised water and untreated water.</li> <li>5. Check the cylinder and replace it if exhausted.</li> </ol>

Tab. 6.a

## 7. MAINTENANCE

### 7.1 Periodical checks

- After one hour of operation: check for any water leaks.
- Every fortnight or after no more than 300 operating hours: check for any water leaks and check the general operation of the cylinder. Check that during operation no sparks form between the electrodes.
- Every three months or after no more than 1000 operating hours: check operation, check for any water leaks and, if necessary, replace the cylinder. Check for any blackened parts of the cylinder. If there are blackened parts in the cylinder, check the condition of the electrodes and, if necessary, replace the cylinder.
- Every year or after no more than 2500 operating hours: replace the cylinder.



**IMPORTANT: ALWAYS DISCONNECT THE POWER SUPPLY BEFORE PERFORMING ANY MAINTENANCE OPERATIONS!**



Always disconnect the power supply before touching the cylinder in the event of water leaks, as the water may be carrying current.

### 7.2 Cylinder maintenance

Cylinder service life depends on numerous factors, including: the quantity and type of minerals in the water, correct use and sizing of the humidifier, power, and regular, careful maintenance.



**IMPORTANT WARNING:** the humidifier and its cylinder contain live electrical components and hot surfaces. All service and/or maintenance operations must be performed by specialist and qualified personnel who are aware of the necessary precautions. Before performing any operation on the cylinder, make sure that the humidifier is disconnected from the power supply. Remove the cylinder from the humidifier only after having emptied completely, using the "manual drain" procedure described in par. 5.3.

#### Cylinder replacement



**IMPORTANT WARNING:** The cylinder can reach high temperatures. Allow it to cool down before touching it, or wear protective gloves.

#### To remove the cylinder:

- Remove the front of the unit
- Completely drain the water inside the cylinder by pressing and holding the 'DRAIN' button until the cylinder is empty
- Switch the humidifier off and disconnect it from the power supply

#### Units for duct applications (CH0\*\*N2003 and CH004N0003):

Remove the steam hose from the cylinder:

- Disconnect the cables at the top of the cylinder by pulling the black snap-on cap upwards (see the drawing on the yellow label applied to the cylinder);
- Lift the cylinder support bracket, remove the cylinder from the unit and place it in a bucket so as to collect the water remaining inside.

Unit with built-in fan (CHF\*\*N2003, not available for the American market):

- Unscrew the two bolts on the fan
- Disconnect the cables at the top of the cylinder by pulling the black snap-on cap upwards (see the drawing on the yellow label applied to the cylinder);
- Disconnect the fan from the cylinder and remove it from the unit by lifting it up and placing it in a bucket so as to collect the water remaining inside.

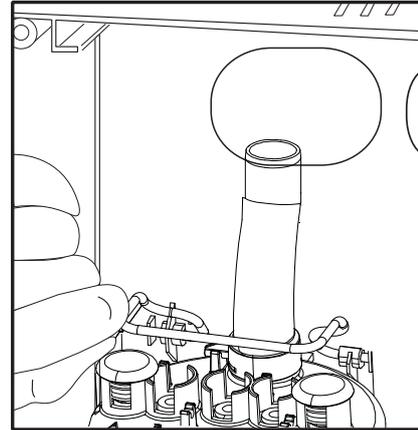


Fig. 7.a

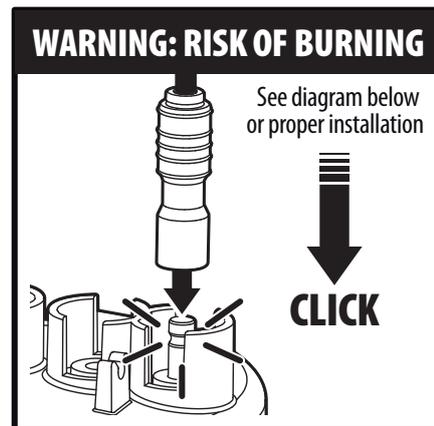


Fig. 7.b

### 7.3 Maintenance of other water circuit components

**⚠ IMPORTANT WARNING:**

- The external power supply must always be disconnected when carrying out any maintenance on the humidifier.
- Do not use detergents or solvents to clean plastic components.
- Scale can be removed with a vinegar solution or a mild acetic acid solution and a soft brush; rinse the cylinder completely with fresh water.
- Cleaning the feed or mixing valve and drain pump
- With the power supply disconnected, shut off the water supply and disconnect the feedwater hose.
- Remove the valves and the drain pump by unscrewing the corresponding screws; check the condition of the valve inlet filters;
- Clean with a solution of vinegar or diluted acetic acid using a soft bristle brush.
- Rinse the parts with fresh water.
- Replace any components that show signs of excessive wear or that cannot be completely cleaned. Make sure the gasket is properly fitted in the drain valves.

**Cleaning the fill tank:** clean the tank from any built-up minerals and check that water flows freely from the tank to the drain via the drain pump.

**Cleaning the feedwater, fill and overflow lines:** check that these are clean and not blocked and replace if necessary.

**⚠ IMPORTANT WARNING:** after replacing or checking the water circuit, make sure that the components have been correctly reconnected with the appropriate gaskets. Restart the humidifier and complete a number of cleaning cycles (from 2 to 4, see paragraph 4.4 "Starting with a new cylinder"), then check that there are no water leaks.

### 7.4 Spare parts

To replace any faulty components, only use original accessories and spare parts available from authorised Carel dealers. No changes must be made without the express authorisation of the manufacturer.

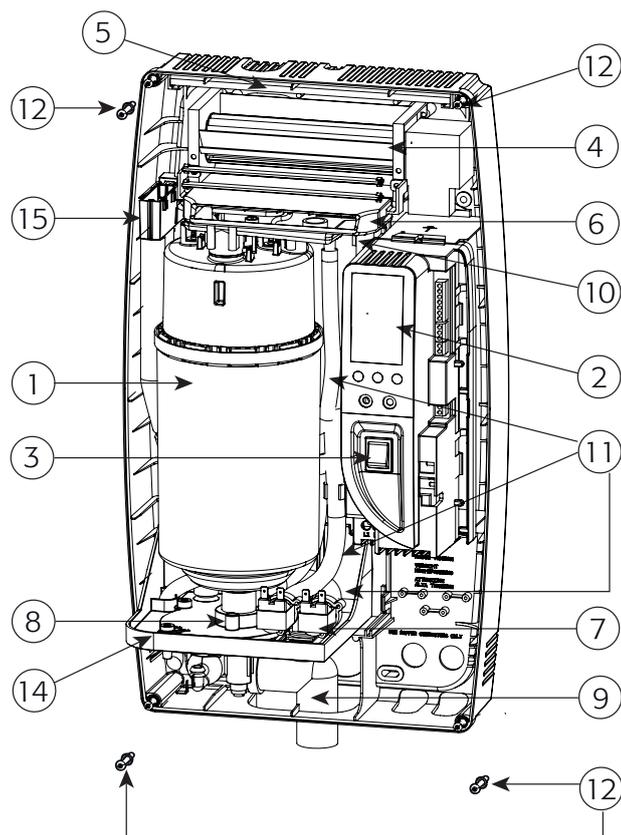


Fig. 7.c

Key:

Part number	Description
1	Cylinder
2	CHM04V0003 Control module 4,5 Kg/h CHM01V2003 Control module 1,6 Kg/h
3	CHSW16000 ON-OFF switch
4	CHKFAN2000 Fan kit 230V
5	CHKFILT000 Fan filter kit
6	CHKDIST000 Steam distributor kit
7	CHKFV02003 fill solenoid valve + drain tempering 230V for drain pump
8	CHKDP02000 Kit for drain pump 230V
9	CHKD900000 Tubing kit to connect to drain 90°
10	CHKFT00000 Fill tank kit + plug for drain pump
15	CHKDT00000 Drain tank + plug for drain pump
11	CHKTR00001 Room tubing kit for drain pump
11	CHKTD00001 Duct tubing kit for drain pump
12	CHKSCREW00 Cover fastening screws
14	CHKBT00001 Bottom tank for drain pump
-	CHKCAB0003 Wiring kit for unit with drain pump
-	MCH2004853 RS485 Kit
-	CHKADAP000 Steam cylinder hose adapter
-	98C425C001 RS232 - RS485 Serial converter
-	CY0S2G0002SP Optional spare part about cod. CH*01N2003
-	CY0S2F0002SP Spare part about cod. CH*01N2003

CYLINDERS

Cylinders code	Nominal steam capacity		Vac single-phase	Supply water conductivity (µS/cm)	compactSteam code
CY0S2F0002SP (1)	3.5 lbs/h	1.6 kg/h	230	100 to 250 µS/cm	CH*01N2003
CY0S2G0002SP	3.5 lbs/h	1.6 kg/h	230	250 to 1250 µS/cm	
CY0S2E0002	9.9 lbs/h	4.5 kg/h	230	100 to 1250 µS/cm	CH*04N*003
	4.9 lbs/h	2.12 kg/h	110		

KITCY0FG00 | Internal filter and gasket valid for all cylinders

Tab. 7.a

## 8. TECHNICAL SPECIFICATIONS

Maximum instant steam production; voltage-phase-frequency, kW	4.5 kg/h (9.9 lbs/h): 230 Vac single-phase 50/60 Hz - 4 kW (*) 3.3 kg/h (7.3 lbs/h): 230 Vac single-phase 50/60 Hz - 2.9 kW (*) 2.1 kg/h (4.9 lbs/h): 110 Vac single-phase 50/60 Hz - 2 kW (*) 1.6 kg/h (3.5 lbs/h): 110 Vac single-phase 50/60 Hz - 1.5 kW (*) 1.6 kg/h (3.5 lbs/h): 230 Vac single-phase 50/60 Hz - 1.42 kW (*)	Note
Steam outlet diameter	22 mm	
Outlet pressure limits (Pa/mmWC/PSI /inWC)	950 Pa/95 mm WC/0.14 PSI / 3.7 in WC	For duct applications only
Dimensions (mm/inch)	600x341x204 mm (24"x14"x8")	(Height x Width x Depth)
Weight when empty/packaged/installed with water	8/10/12 kg (18/22/26 lbs.)	
IP rating	IP20	
Electrode power cables	12 AWG	
Power relays	2 x 30 A	Built-in
Earth connection	Screw	
Type of feedwater	Drinking water	Do not use demineralised or softened water
Range of conductivity	100-1250 µS/cm	
Water fill connection	¾" G	¾" FPS adapter
Instant water fill flow-rate	0.6 l/min 0.16 gpm	
Drain connection	CH***N2003: 32 mm (1.25") CH004N0003: 19 MM (0.75")	<ul style="list-style-type: none"> <li>• Adjustable from horizontal to vertical.</li> <li>• Possible at the rear or bottom of the appliance.</li> </ul>
Maximum drain temperature	< 60°C (< 140°F)	Drain mixing device
Drain flow at 50Hz	max. 25 l/min (max. 6.6 gpm)	
Drain flow at 60Hz	max. 26.2 l/min (max. 7 gpm)	
Built-in fan flow	92 m <sup>3</sup> /hour - 54 cfm 50dB	Direct in-room humidification
Operating room temperature °C (°F)	1 to 40 (33.8 to 104)	
Operating room humidity (% rH)	10 to 60	
Storage temperature °C (°F)	-10 to 70 (14 to 158)	
probe inputs (general specifications)	If programmed as ON-OFF (default): Vmax=33Vdc, Imax=5mA, Rmax=300 Ohm	
	If programmed as 0 to 10V: input impedance 10Kohm	
Remote enabling input	Voltage-free contact, normally-open; Rmax = 300 Ohm; Vmax = 33 vdc; Imax = 6mAdc; humidifier enabled = contact closed. Requires an external connection	
Alarm relay	250V; 8A max with resistive load; 4A max with inductive load	
External relay	250V; 8A max with resistive load; 4A max with inductive load	
Power supply for external humidistat	24Vac, 2 watts	
Serial communication	RS485	

Tab. 8.a

(\*): peak maximum power.

### Limited warranty

All products manufactured by CAREL Industries are guaranteed to the original purchaser to be free from defects in materials and workmanship in the course of normal and reasonable use for a period of 2 years from the date of shipment. The humidifier spare parts are guaranteed for 90 days from the date of the invoice. The components replaced under warranty are guaranteed for the remaining duration of the original warranty or for 90 days, whichever is longer, as long as the product has been installed and operated in accordance with all appropriate manuals and wiring diagrams, and started up by a qualified CAREL Industries technician. Any product or part that is found to be defective will, at the option of CAREL Industries be replaced or repaired. CAREL Industries reserves the right to inspect any part or installation before replacing or repairing defective parts. After startup of the product, labour for repairs or replacement of parts is not covered by this warranty. Replacement of routinely replaceable parts such as steam cylinders and gaskets are not covered by this warranty. CAREL Industries assumes no liability for consequential or inconsequential damage, or damage due to negligence or improper use. Under the terms of this warranty, the original purchaser may have certain legal rights and other rights, which may vary from state to state. The warranty is void if the product is damaged due to negligence, mishandling or improper use, or if the product label is missing. CAREL Industries shall repair or replace the products within two (2) months of receiving the returned goods.

CAREL reserves the right to modify or change its products without prior warning.



# CAREL

**CAREL INDUSTRIES HQs**

Via dell'Industria, 11 - 35020 Brugine - Padova (Italy)

Tel. (+39) 0499 716611 - Fax (+39) 0499 716600

carel@carel.com - www.carel.com

Agenzia: