

humiSonic

CAREL

Umidificatori a ultrasuoni
versione direct per ambiente

Ultrasonic humidifiers
direct version for room application



ITA Manuale d'uso

ENG User manual

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QUESTE ISTRUZIONI**
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THESE INSTRUCTIONS**

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- PERICOLO SCOSSE ELETTRICHE: L'umidificatore contiene componenti sotto tensione elettrica. Togliere l'alimentazione di rete prima di accedere a parti interne, in caso di manutenzione e durante l'installazione.
- PERICOLO PERDITE D'ACQUA: L'umidificatore carica/scarica automaticamente e costantemente quantità d'acqua. Malfunzionamenti nei collegamenti o nell'umidificatore possono causare perdite.



Attenzione:

- Condizioni ambientali e tensione di alimentazione devono essere conformi ai valori specificati nelle etichette 'dati di targa' del prodotto.
- Il prodotto è progettato esclusivamente per umidificare ambienti in modo diretto.
- Installazione, utilizzo e manutenzione devono essere eseguite da personale qualificato, consapevole delle precauzioni necessarie e in grado di effettuare correttamente le operazioni richieste.
- Per la produzione di acqua nebulizzata si deve utilizzare esclusivamente acqua con caratteristiche indicate nel presente manuale.
- Tutte le operazioni sul prodotto devono essere eseguite secondo le istruzioni contenute nel presente manuale e nelle etichette applicate al prodotto. Usi e modifiche non autorizzati dal produttore sono da considerarsi impropri. CAREL non si assume alcuna responsabilità per tali utilizzi non autorizzati.
- Non tentare di aprire l'umidificatore in modi diversi da quelli indicati nel manuale.
- Attenersi alle normative vigenti nel luogo in cui si installa l'umidificatore.
- Tenere l'umidificatore fuori dalla portata di bambini e animali.
- Non installare e utilizzare il prodotto nelle vicinanze di oggetti che possono danneggiarsi a contatto con l'acqua (o condensa d'acqua). CAREL declina ogni responsabilità per danni conseguenti o diretti a seguito di perdite d'acqua dell'umidificatore.
- Non utilizzare prodotti chimici corrosivi, solventi o detersivi aggressivi per pulire le parti interne ed esterne dell'umidificatore, salvo non vi siano indicazioni specifiche nei manuali d'uso.
- Non fare cadere, battere o scuotere l'umidificatore, poiché le parti interne e di rivestimento potrebbero subire danni irreparabili.

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SMALTIMENTO



L'umidificatore è composto da parti di metallo e parti di plastica. In riferimento alla Direttiva 2002/96/CE del Parlamento Europeo e del Consiglio del 27 gennaio 2003 e alle relative normative nazionali di attuazione, informiamo che:

1. sussiste l'obbligo di non smaltire i RAEE come rifiuti urbani e di effettuare, per detti rifiuti, una raccolta separata;
2. per lo smaltimento vanno utilizzati i sistemi di raccolta pubblici o privati previsti dalla legge locali. È inoltre possibile riconsegnare al distributore l'apparecchiatura a fine vita in caso di acquisto di una nuova;
3. questa apparecchiatura può contenere sostanze pericolose: un uso improprio o uno smaltimento non corretto potrebbe avere effetti negativi sulla salute umana e sull'ambiente;
4. il simbolo (contenitore di spazzatura su ruote barrato) riportato sul prodotto o sulla confezione e sul foglio istruzioni indica che l'apparecchiatura è stata immessa sul mercato dopo il 13 Agosto 2005 e che deve essere oggetto di raccolta separata;
5. in caso di smaltimento abusivo dei rifiuti elettrici ed elettronici sono previste sanzioni stabilite dalle vigenti normative locali in materia di smaltimento.

Garanzia sui materiali: 2 anni (dalla data di produzione, escluse le parti di consumo).

Omologazioni: la qualità e la sicurezza dei prodotti CAREL sono garantite dal sistema di progettazione e produzione certificato ISO 9001, nonché dal marchio .



WARNINGS

CAREL 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. Each CAREL 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 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 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 heeded for the correct use of the product:

- DANGER OF ELECTRIC SHOCK: The humidifier contains live electrical components. Disconnect the mains 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.



Important

- Environmental and power supply conditions must conform to the values specified on the product rating labels.
- The product is designed exclusively to humidify rooms directly.
- 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 atomized water 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 authorised by the manufacturer are considered improper. CAREL declines all liability for any such unauthorised 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 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 adopts a policy of continual development. Consequently, CAREL reserves the right to make changes and improvements to any product described in this document without prior warning. The technical specifications shown in the manual may be changed without prior warning. The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, available 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 CAREL, its employees or subsidiaries 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, use or impossibility to use the product, even if CAREL or its subsidiaries are warned of the possibility of such damage.


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 or 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 materials: 2 years (from the date of production, excluding consumables).

Approval: the quality and safety of CAREL products are guaranteed by the ISO 9001 certified design and production system, as well as by the .

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1. INTRODUCTION AND ASSEMBLY

1.1 humiSonic (UU0*R)

Range of ultrasonic adiabatic humidifiers for direct humidification in rooms, with built-in fans for uniform atomised water distribution. humiSonic is suitable for many applications, such as: the humidification in production plants, datacenters, warehouses, printing facilities, museums, restoration workshops, theatres, etc., where optimisation of room humidity is essential in ensuring personal comfort and safeguarding goods.

1.2 Part numbers

P/N	Description
UU0(X)R(*)0000	without auxiliary card, without humidity probe
UU0(X)R(*)AS00	with auxiliary card and with humidity probe

Tab. 1.a

(X) = 2,4,6,8 kg/h; (*) = D/1 = 230/110 V power supply

1.3 Dimensions and weights

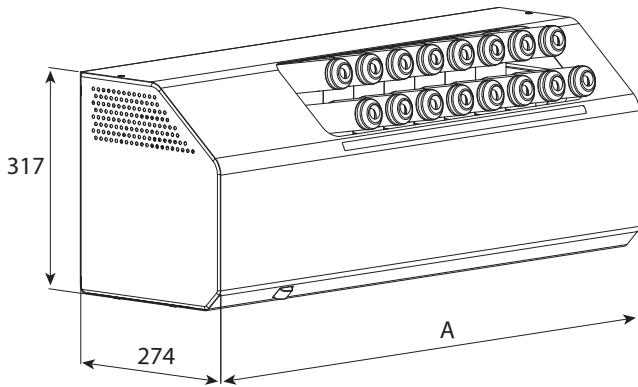


Fig. 1.a

Models	UU02	UU04	UU06	UU08
Production (kg/h)	2	4	6	8
Width A mm (in)	317(12,5)			
Height mm(in)	274(10,8)			
Depth mm (in)	483(19)	608(24)	733(28,9)	858(33,8)
Weight kg (lb)				
packaged	11(24,2)	14(30,9)	17(37,5)	21(46,3)
empty	9,5(20,9)	12,5(27,6)	15,5(34,2)	18,5(40,8)
installed*	10,3(22,7)	14,1(31,1)	17,9(39,5)	21,7(47,8)

Tab. 1.b

* in operating conditions, filled with water.

1.4 Opening the packaging

- Make sure the package is intact upon delivery and immediately notify the transporter, in writing, of any damage that may be due to careless or improper transport;
- move the humidifier to the site of installation before removing from the packaging, grasping the neck from underneath;
- open the cardboard box, remove the protective material and remove the humidifier,
- the unit must be always stored in a dry place before installation.

1.5 Material supplied

Make sure the following are included:

1. wall-mounting bracket;
2. kit of screws and anchors;
3. 1 cable gland;
4. 4 feet;
5. user manual.

1.6 Preparing for assembly

- The unit is designed to be assembled on a horizontal support or wall that can support its weight in normal operating conditions (see par. "Wall-mounting");
- Install the humidifier in a safe place where it cannot be tampered with, as far as possible from any air flows;
- Position the humidifier horizontally using a spirit level, observing the minimum clearances in mm (see Fig. 1.b) to ensure the correct flow of supply air and allow the required maintenance operations.

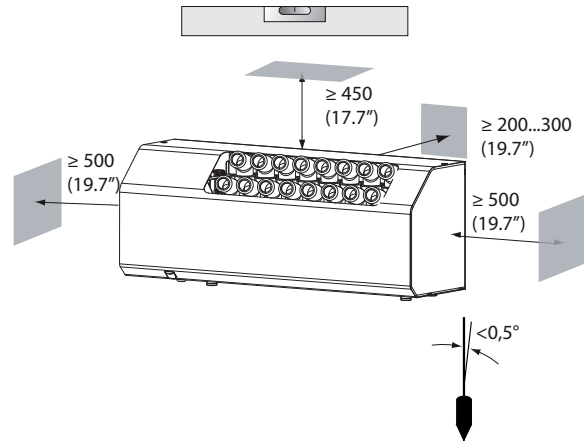


Fig. 1.b

Note: the minimum distance at the rear is recommended for assembly on a horizontal support.



Important: for installation on a horizontal support/wall:

1. the humidifier takes in air through by the slits at the back/bottom respectively;
2. the feet/spacers are fitted at the bottom/rear;
3. the fill/drain hoses are attached at the rear/on the bottom;
4. the power cable gland is fitted at the rear/on the bottom;
5. remove the rear bracket for assembly on a horizontal support.

ASSEMBLY ON A HORIZONTAL SUPPORT

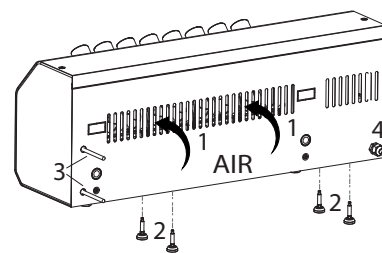


Fig. 1.c

WALL-MOUNTING

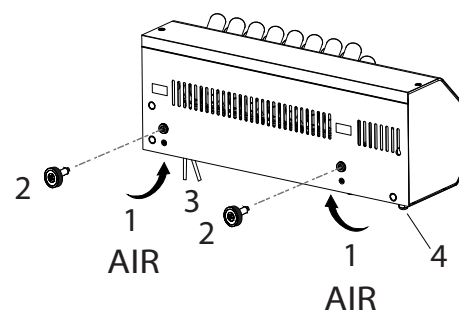


Fig. 1.d

1.7 Wall-mounting

! ATTENTION: mount the unit only to a masonry wall.

Fit the humidifier to the wall using the support bracket already fixed to the humidifier, and the kit of screws supplied (for the dimensions and weights see the previous paragraph).

Assembly instructions:

- fasten the wall bracket, checking horizontal position with a spirit level. Drill the holes in the wall using the bracket as a template. If mounting on a masonry wall, use the plastic anchors (Ø 8 mm, Ø 0.31 in) and screws (Ø 5 mm x L= 50 mm, Ø 0.19 in x L= 1.97 in) supplied;
- use cutting nippers to open the knock-outs on the panel;

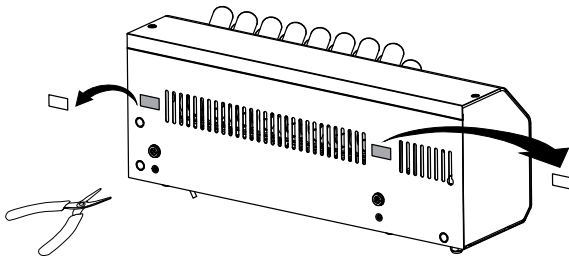


Fig. 1.e

- attach the humidifier to the bracket;

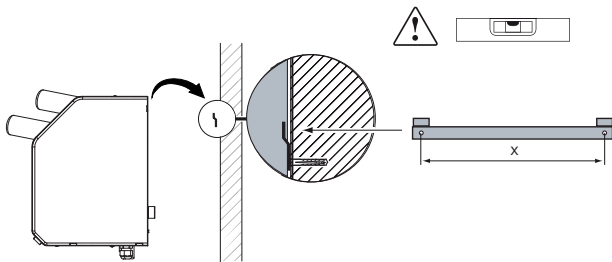


Fig. 1.f

Dimensions mm (in)	UU02	UU04	UU06	UU08
X	198 (7.8)	323 (12.7)	448 (17.6)	573 (22.5)

Tab. 1.c

- adjust the feet at the rear to make sure the humidifier is parallel to the floor, using a spirit level.

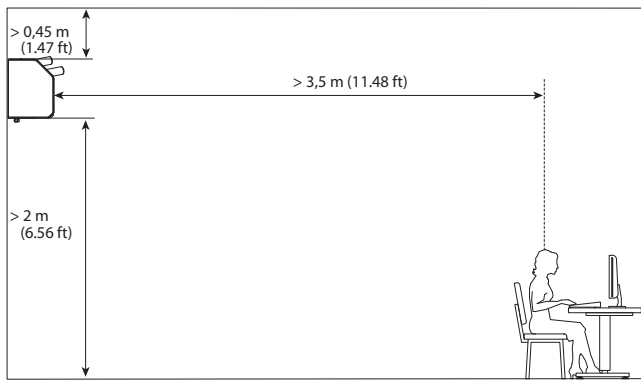


Fig. 1.g

1.8 Identification label

The humidifiers are identifiable from the packaging label and the identification label accessible after having removed the cover.

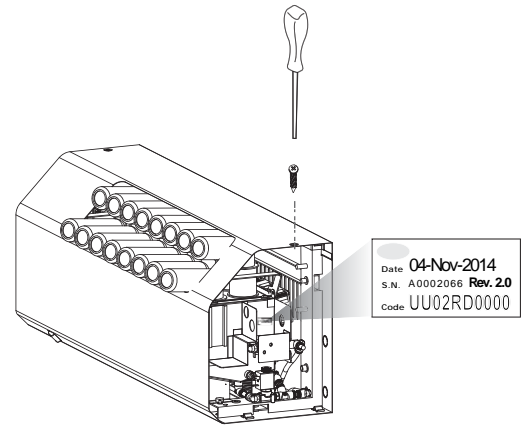


Fig. 1.h

Note: tampering with, removing or failing to reattach the identification labels or anything else that prevents certain identification of the product will make installation and maintenance operations more difficult.

1.9 Functional diagram

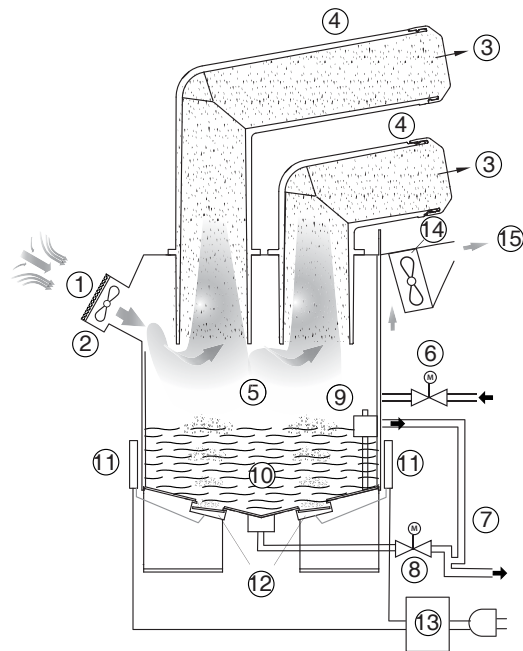


Fig. 1.i

Key

1	Air filter	9	Float level sensor
2	Rear fans	10	Tank
3	Atomised water	11	Driver
4	Diffuser	12	Piezoelectric transducer
5	Atomisation chamber	13	Power supply
6	Fill valve	14	Front fans
7	Overflow pipe	15	Laminar air flow
8	Drain valve		

1.10 Operating principle

The operation of humiSonic humidifiers is based on the principle of atomisation of demineralised water using ultrasound technology. The humidifier operating principle can be summarised as follows:

- water fill via a fill solenoid valve until reaching the required level, measured by the float;
- if the autotest is enabled (default), the drain solenoid valve opens and empties the tank (function designed to clean the tank of any residues/dirt);
- water filled again to the required level;
- start ultrasonic atomisation (the fans installed on the humidifier expel the particles of moisture and distribute them into the surrounding environment);
- water refill based on the float measures that the level has fallen below the recommended value.

Ultrasound technology uses a voltage input signal that is transformed via an oscillating circuit into a high frequency signal (1.7 MHz). This signal supplies a transducer, the top of which is in contact with the water, which starts vibrating at high frequency. The surface of the transducer vibrates at very high speed (1.7 million times a second), a speed that does not allow the water to move, due to its inertial mass. Consequently, a column of water is created above the transducer. During the negative amplitude of the transducer cycle, a void is created that is not filled by the water (as this cannot respond to the extremely fast movements of the transducer). The cavity thus created leads to the production of bubbles that are pushed to the edge of the water column during the positive amplitude of the cycle, thus colliding. During this process, very fine particles of water are atomised on the edge of the water column. The resulting intersecting sound waves created directly underneath the surface of the water cause very small droplets of water to separate, forming a fine mist of water that is immediately absorbed by the flow of air.

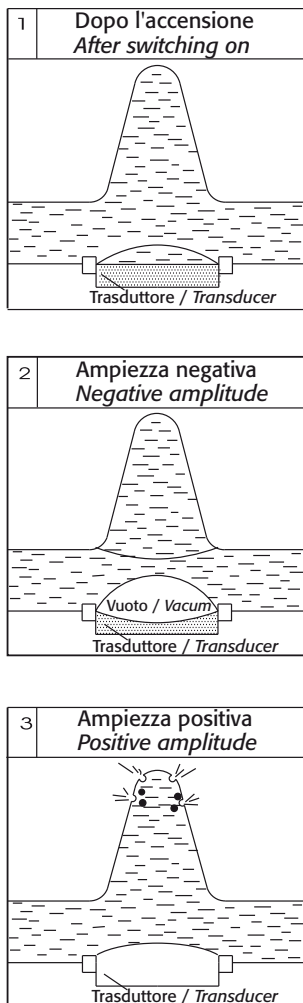


Fig. 1.j

1.11 Structure

The figure shows the body of the humidifier, once having removed the side panels and the cover (see chap. "Maintenance and Spare parts").

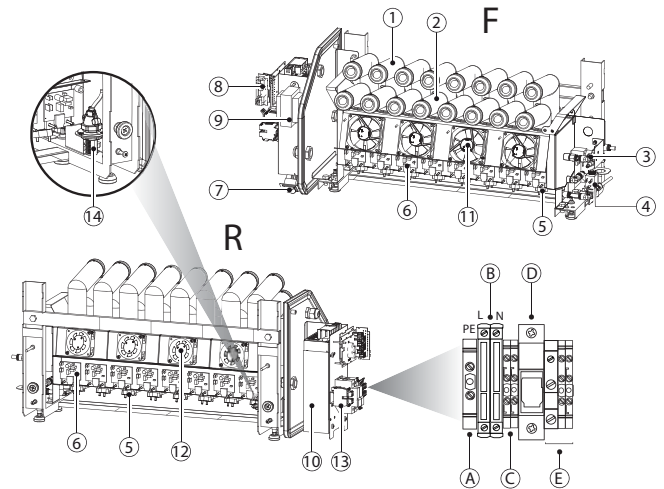


Fig. 1.k

Key

F	Front	10	Power supply (48 V)
R	Rear	11	Front fan
1	Rear diffuser	12	Rear fan
2	Front diffuser	13	Terminal block
3	Fill valve	A	Earth terminal (PE)
4	Drain valve	B	Power terminals (L, N) with fuse carrier
5	Piezoelectric transducer	C	Alarm relay terminals
6	Driver	D	Power supply (48 V) terminal with fuse carrier
7	ON/OFF switch	E	Reserved
8	Electronic control board	14	Humidity probe (where featured)
9	Transformer (24 V)		

2. WATER CONNECTIONS

! IMPORTANT: before proceeding with the water connections, make sure that the humidifier is not connected to the mains power supply.

2.1 Warnings

1. Only use demineralised water. Install a shut-off valve for each humidifier. Allowable water pressure: from 1 to 6 bars;
2. The pipes/hoses and connections between the pipes/hoses in contact with demineralised water and the humidifier must be made from resistant material suitable for this use (e.g. PVC or stainless steel);
3. The water lines must not be fouled by dust particles or other substances. Carefully clean the lines before connecting to the humidifier;
4. All humiSonic ultrasonic humidifiers are supplied with quick couplings for connecting the fill hose (OD / ID = 8/6 mm);

2.2 Water connections (parts not included)

- Install a manual shut-off valve upstream of the installation (so as to shut off the water supply); the valve must be suitable for use with demineralised water.
- Install a mechanical filter (10 µm) downstream of the manual shut-off valve to trap any solid impurities; the filter must be fitted with shut-off devices to allow cleaning.

! 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. After installing the valve, flush with water to eliminate any processing residues and oil and prevent that enter the humidifier;
- the drain hose must have a minimum diameter of 6 mm; it must not have any bends that block water flow; the drain line must comply with national and local standards in force and must include a funnel to ensure interruption of continuity and a drain trap to prevent the return of bad odours. The end of the line must have a downwards slope to assist drainage;
- do not obstruct the atomised water outlet or air intake openings;
- if there is the risk of the feedwater freezing, insulate the water pipes.

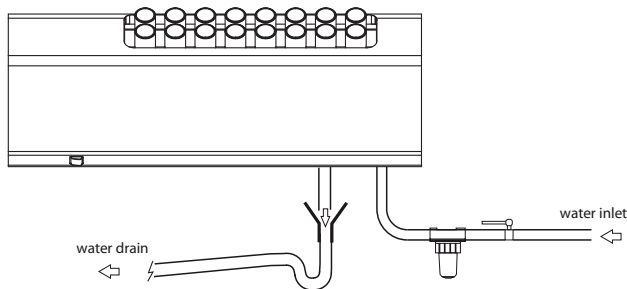


Fig. 2.a

2.3 Humidifier installed on a horizontal support

If the humidifier is installed on a horizontal support:

1. the fill/drain lines are connected through the rear panel;
2. the power cable gland is installed on the rear panel.

To connect the fill/drain lines:

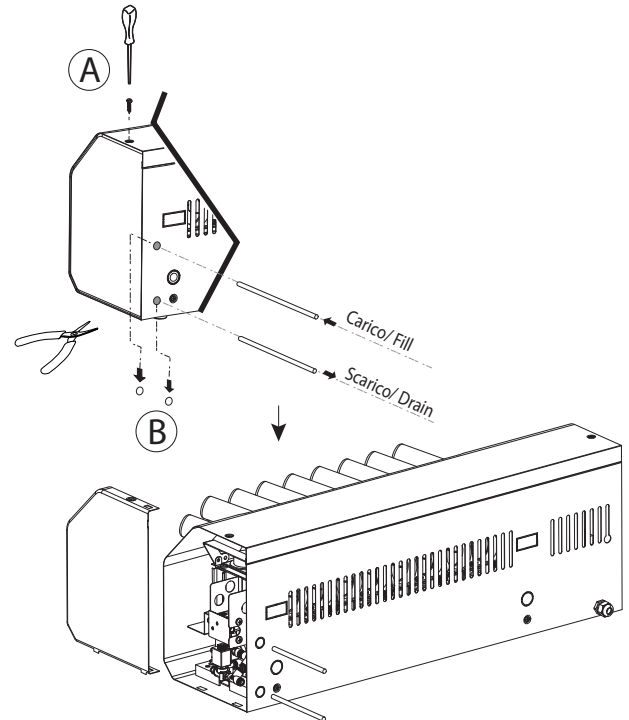


Fig. 2.b

- A. Unscrew the screw and remove the right-side panel;
- B. Cut the knock-outs to make openings for the fill/drain lines;

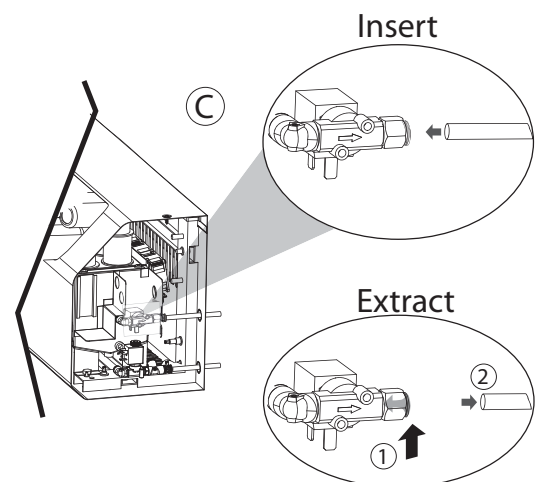


Fig. 2.c

- C. Attach the piping to the quick couplings so as to connect the fill and drain valves.
 1. press the quick coupling locking ring;
 2. insert the pipe.

2.4 Humidifier mounted on the wall

If the humidifier is wall-mounted, proceed as described in the previous paragraph to remove the covers, and then install:

1. the fill/drain lines, connected through the bottom panel;
2. the power cable gland, on the bottom panel.

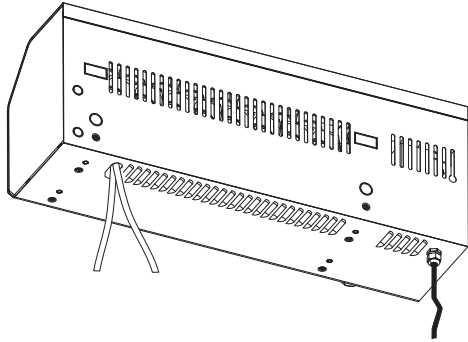


Fig. 2.d

2.5 Feedwater

To ensure correct operation, humiSonic requires the use of demineralised water, with the chemical and physical characteristics specified in the table. To ensure these water quality values, a reverse-osmosis demineralisation system is typically used.

FEEDWATER

Quick coupling	OD 8 mm (0,32")
Temperature limits °C (°F)	1...40 (33.8 to 104)
Pressure limits MPa (bar)	0.1...0.6 (1 to 6)
Specific conductivity at 20°C	20...80 µS/cm
Total hardness	0...25 mg/l CaCO3
Temporary hardness	0...15 mg/l CaCO3
Total quantity of dissolved solids (cR)	Depending on - specific conductivity (1)
Dry residue at 180°C	Depending on specific conductivity (1)
Iron + manganese	0 mg/l Fe+Mn
Chlorides	0 to 10 ppm Cl
Silicon dioxide	0 to 1 mg/l SiO2
Chlorine ions	0 mg/l Cl
Calcium sulphate	mg/l CaSO4
Instant flow- sill SV (l/min)	2

Tab. 2.a

(1) = in general $C_R = 0.65 * \sigma_{R,20} \text{ } ^\circ\text{C}; R_{180} = 0.93 * \sigma_{R,20} \text{ } ^\circ\text{C}$

To avoid excessive oversizing of the reverse osmosis system, it is recommended to avoid sizing the system based on instant flow-rate. Rather, an expansion vessel should be installed between the water treatment system and humiSonic.

The sizing calculations need to consider discontinuous water consumption, comprising the following stages:

- filling (fill valve open);
- production (fill valve closed);
- washing (fill valve open).

The table below suggests the minimum sizes for connection to a generic reverse osmosis system.

Mod.	Storage	Total expansion vessel volume (pre-charge 1.5 bars)	Reverse osmosis system
UU02	2,8 l	11.2 l	4.8 l/h
UU04	3,6 l	14.4 l	7.6 l/h
UU06	4,4 l	17.6 l	10.4 l/h
UU08	5,2 l	20.8 l	13.2 l/h

Tab. 2.a

If no storage vessel is available, the reverse osmosis system must guarantee the instant flow-rate of the fill SV, equal to 2 l/min.

Connecting humiSonic to the Carel WTS Compact

The Carel product range includes a series of reverse osmosis systems ("WTS Compact") designed to produce water according to the feedwater specifications and optimise connection to and operation with humiSonic (see manuals +0300017 and +0300019).

All WTS Compact systems (P/N ROC%) always come with an expansion vessel, that maintains the required pressure in the circuit downstream. Operation of the system is managed by pressure switches in the outlet circuit. The basic rule for connection to the humidifier is that the water contained in the expansion vessel must be sufficient to satisfy initial filling and, if necessary, the washing cycle, while the WTS production time must cover humiSonic production demand and fill the vessel as quickly as possible.

The table below suggests the water consumption values and connections for all sizes of humidifiers.

Model	Prod.	Tank capacity	Wash (*)	WTS
UU02	2 l/h	0.8 l	2.8 l	ROC025500N
UU04	4 l/h	1.6 l	3.6 l	ROC0255000
UU06	6 l/h	2.4 l	4.4 l	ROC0255000
UU08	8 l/h	3.2 l	5.2 l	ROC0255000

Tab. 2.b

(*) Water consumption during the washing cycle is calculated based on the default settings (1 wash every 60 minutes, lasting 1 minutes, which ends by totalling filling and emptying the volume of the tank). Consumption depends on the fill solenoid valve flow-rate, which is 2 litres/minute. The duration and frequency of the washing cycles are parameters that can be set by the user, and these have a significant impact on the sizing of the WTS system.

Periodical washing is also recommended so as to maintain the WTS that supplies the humidifier in good working condition. The water inside the reverse osmosis system needs to be stirred periodically to avoid excessive build-up of minerals on the membranes.



Important:

- 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 prohibited.

2.6 Drain water

This is not toxic and can be drained into the sewerage system. (Council Directive 91/271/EEC on Urban Waste Treatment).

DRAIN WATER

Quick coupling	OD 8 mm (0,32")
Typical temperature °C (°F)	1-40 (33.8-104)

3. ELECTRICAL CONNECTIONS

3.1 Preparing to connect the power cables

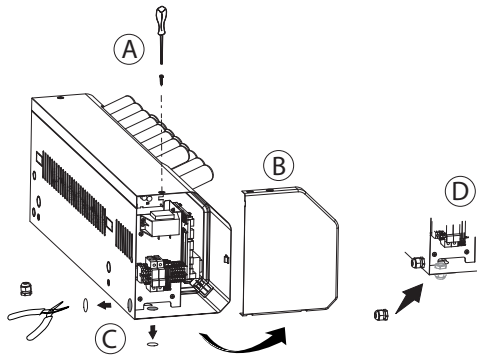


Fig. 3.a

1. Unscrew the screw (A) and remove the cover (B);
2. If the humidifier is wall-mounted/installed on a horizontal support, remove the corresponding metal knock-out using cutting nippers on the bottom/rear panel (C);
3. Fit the cable gland (D).

3.2 Electrical installation

! Important:

- before proceeding with the electrical connections, ensure that the unit is disconnected from the mains power supply;
- check that the unit's power supply voltage corresponds to the rated data shown on the product label;
- do not power on the unit if tilted or upside down: the transducers may be damaged.

Connect the power cable to the terminal block through the cable gland.

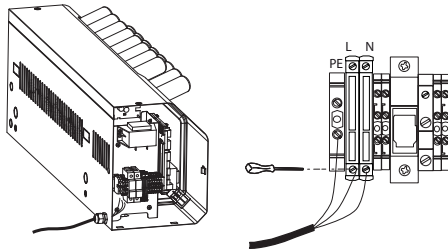


Fig. 3.b

Note: to avoid unwanted interference, power cables should be kept separate from probe signal cables.

The humiSonic electronic control board in fact comprises two boards, a main board (1) installed horizontally, and an auxiliary card (2) installed vertically.

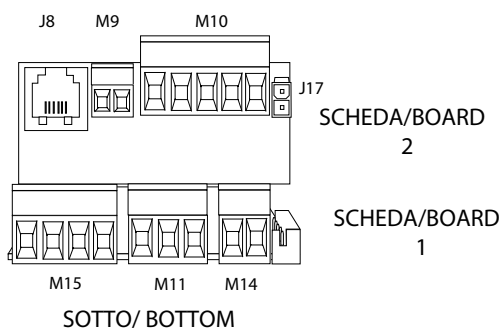


Fig. 3.c

MAIN BOARD

Direct version for room applic. +0300062IE - rel. 1.0 - 10.09.2015

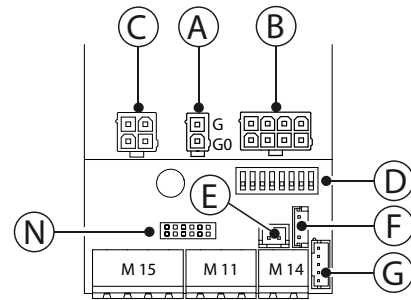


Fig. 3.d

Key:

A	board power supply input from transformer 24 V
B	transducer control;
C	valve power cables (L drain / R fill)
D	configuration dipswitch
E	RESERVED
F	Power ON/OFF switch lights
G	TH humidity probe connection (IIC digital serial, part no.: HYHU000000) optional.
M14	remote ON/OFF (M14.1-M14.2)
M11	RS485 serial (M11)
M15	front fan power
N	auxiliary card connection

AUXILIARY CARD

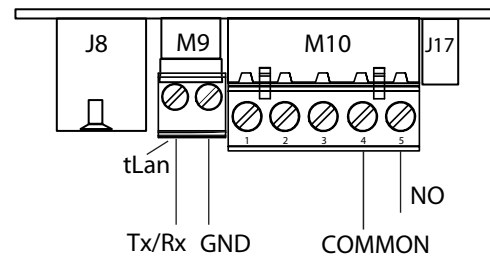


Fig. 3.e

J8	tLAN terminal connection (optional)
M9	tLAN AUX serial connector
M10	M10.1 - + proportional control signal/probe/humidistat
	M10.2 - GND reference signal
	M10.3 - +21 Vdc for power to active probes
	M10.4 - Alarm relay - CO
	M10.5 - Alarm relay - NO
J17	Reserved

Tab. 3.a

Dipswitch configuration: configuration must be performed before switching on the humidifier (default position shown in Fig. 3.f).

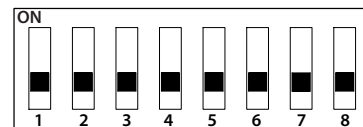


Fig. 3.f

1.	Communication	5-6	Humidity Setpoint
	OFF Serial 485 Carel/Modbus		OFF/OFF 50 %rH
	ON tLAN		OFF/ON 30 %rH
2-3	tLAN address (if 1 is ON)		ON/OFF 40 %rH
	OFF/OFF --		ON/ON 60 %rH
	OFF/ON address 1	7	RESERVED
	ON/OFF address 2	8	Production transducer management
	ON/ON address 3		OFF parallel
4	Serial 485 / tLAN baud rate		ON in series
	OFF 19200		
	ON 9600		

Tab. 3.b

3.3 Main board connections

Depending on the type of signal used, atomized water production can be enabled and/or managed in different ways (ON/OFF or modulating).

HUMIDISTAT OR REMOTE CONTACT (ON/OFF action)

Production is enabled by closing terminal M14.
M14 can be connected to a switch, a humidistat or a controller (voltage-free contact, max 5 Vdc open, max 7 mA closed).

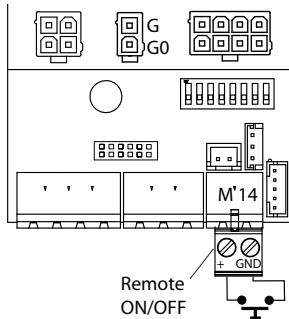


Fig. 3.g

TH HUMIDITY PROBE (Optional)

If the TH humidity probe is connected to the G terminal atomized water production starts if:

- The terminal M14 is closed;
- The humidity value measured by the probe is below the setpoint (preset at 50%rH and modified via dialswitches 5-6).

485 SERIAL CONNECTION

Carel/Modbus protocol

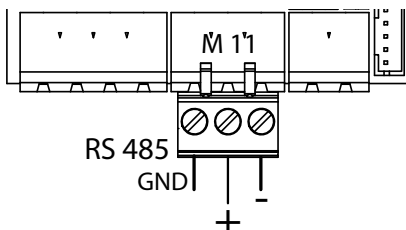


Fig. 3.h

Important: 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 kOhm). This configuration allows a maximum of 256 devices to be connected, with cables in separate conduits from the power cable.

ALARM RELAY

The connections can be used to directly control a light or an auxiliary relay coil or signal when reaching the humidity set point (see table of parameter b0 values).

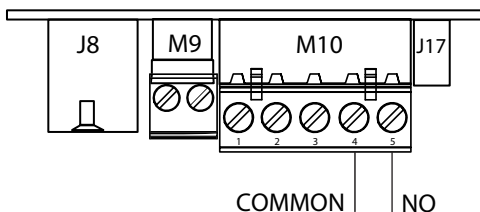


Fig. 3.i

Note: in industrial environments (IEC EN61000-6-2) the signal cables leaving the unit must not exceed 10 m (33 ft)⁽¹⁾ in length: remote on/off digital input (terminals M14.1...M14.2) and shielded cable for RS485 communication.

3.4 Auxiliary card connections

See chap. "Configuration parameters" for the description of parameters A0, A1, A2.

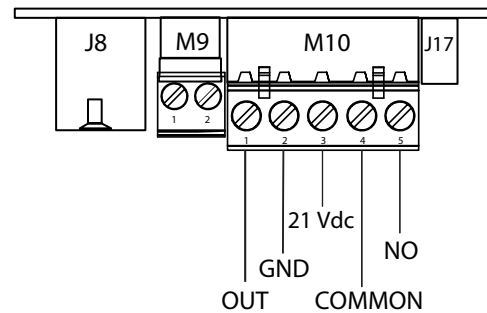


Fig. 3.j

The auxiliary card features the following connections

ON/OFF CONTROLLER (humidistat or remote switch)

- jumper inputs M14.1 and M14.2 (enable) on the main board;
- connect terminals M10.1 and M10.2 to a humidistat or a remote switch (voltage-free contact);
- set parameter A0=0 to enable On/Off operation.

EXTERNAL PROPORTIONAL CONTROLLER (modulating)

- jumper inputs M14.1 and M14.2 (enable) on the main board;
- connect terminals M10.1 and M10.2 (production request) to an external controller;
- set parameter A0=1 to enable modulating control and parameter A2 depending on the chosen signal (0 to 10 V, 2 to 10V, 0 to 20, 4 to 20 mA).

CONTROL WITH CAREL HUMIDITY PROBE

- jumper inputs M14.1 and M14.2 (enable) on the main board;
- connect the probe to terminals M10.1, M10.2. The power line M10.3 can be connected with cable of maximum length of 2 m (6,6 ft); for greater lengths use an external power supply with the signal earth electrically connected to the signal earth of the controller;
- set parameter A0=2 to enable probe control and parameter A2 depending on the chosen signal (0 to 10 V, 2 to 10V, 0 to 20, 4 to 20 mA).

If non-CAREL probes are used, check:

- voltage signal: 0 to 10 Vdc, 2 to 10 Vdc, terminal M10.1 (GND: M10.2);
- current signal: 4 to 20, 0 to 20 mA, terminal M10.1 (GND: M10.2).

Final checks

The following conditions represent correct electrical connection:



- mains power to the humidifier corresponds to the voltage shown on the rating plate;
- a mains disconnect switch has been installed so as to be able to disconnect power to the humidifier;
- terminals M14.1, M14.2 are jumpered or connected to a contact to enable operation;
- if the humidifier is controlled by an external controller (with auxiliary card), the signal earth is electrically connected to the controller earth.

4. STARTING, USER INTERFACE AND BASIC FUNCTIONS

Before starting the humidifier, check:



- water connections: in the event of water leaks, do not start the humidifier before having restored the connections;
- electrical connections

4.1 Starting

See chap. Electrical connections

- 1 The humidifier, once powered and enabled for production (remote on-off/humidistat, terminal M14), is ready for operation
- 2 If there are no other external connections, the humidifier will start, and operation will only stop if the enabling signal (M14) is no longer present.
- 3 If TH humidity probe (optional) is connected to terminal G, the humidifier will operate until reaching the humidity set point (default 50%rH). See chap. Operating principles

4.2 Shutdown/Standby

- 1 To switch the humidifier off, disconnect power
- 2 The humidifier goes into standby when:
 - the remote ON/OFF contact is open
 - TH probe is fitted and the humidity set point has been reached
 - the ON/OFF contact is open and serial enabling is set to 0 (see chapter Humidifier control via network)
 - a modulating signal is used (optional card) and there is no request

When the humidifier is in standby, the unit is emptied automatically. When in standby the fan stays on for 5 min.

4.3 Autotest

Whenever the humidifier is first started (from off), if enabled and humidity production is required, a test cycle is run. A complete fill and drain cycle is performed, during which the level sensor is monitored; if the test is successful, regular atomized water production will start. If the test fails, production is disabled (see the alarm table).

4.4 ON/OFF switch lights

The ON/OFF switch has 2 lights: white and red:

	WHITE LIGHT
Steady	Humidity production
Flashing slowly*	Stand-by or Set point reached
Flashing quickly*	Autotest or wash

*Flashing slowly: 1s ON and 1s OFF

** Flashing quickly: 0.2s ON and 0.2s OFF

The red LIGHT means an alarm is active. See Alarm table for information on alarms.

4.5 Disabling

The humidifier can be disabled in 2 different ways:

- Opening contact M14.1 and M14.2 (enabling signal)
- There are active alarms.

4.6 Reset tank hour counter

The humidifier is fitted with an hour counter that records operation. After a set number of hours (5000), a signal is activated to indicate maintenance should be performed on the tank and operation of the piezoelectric elements checked (see ...). To reset the hour counter at any time, proceed as follows:

- Switch the humidifier OFF;
- Close the water-tap and wait for the tank to empty completely;
- Disconnect the Lumberg (see Fig. 4.a) connector on the control board;
- Open the ON/OFF contact;
- Switch the humidifier (with the Lumberg connector disconnected from the control board). White and red lights will be flashing;
- Close the ON/OFF contact, white and red lights remain on steady;
- Switch the humidifier OFF;
- Plug the Lumberg connector (see Fig. 4.a) onto the board, making sure it is inserted in the correct direction;
- Switch the humidifier ON.



Fig. 4.a

4.7 Automatic washing

The humidifier automatically runs a washing cycle at intervals in operating time set by parameter b1 (default 60 minutes, parameter b0 can be used to convert this value into hours, see b0 parameter table). The washing cycle involves a complete drain cycle, a phase in which fill and drain are activated together (default 1 minute, parameter b3) to flush out any residues in the tank, a complete fill cycle and finally another complete drain cycle.

During this operation, atomized water production is stopped.

4.8 Washing due to inactivity

If the humidifier remains inactive (on but in standby) for an extended period (parameter b2, default 24 hours) a washing cycle is performed, as described in the previous paragraph. This cleans the tank of any residues (e.g. dust) that may have accumulated during the period of inactivity. Parameter b0 can be used to set the time when this washing cycle is performed. By default, the washing cycle is run after 24 hours (continuous) of no operation, i.e. the humidifier is in standby. This is because the humidifier is normally connected to a reverse osmosis system, which needs to operate frequently in order to avoid malfunctions. B0 (see parameter b0 reverse osmosis) can be set so that the washing cycle is performed when first restarting after a period of continuous inactivity set by b2.

5. LCD TERMINAL (OPTIONAL)

5.1 Remote display terminal (UUKDI00000)

The LCD terminal is an option and can only be used if the auxiliary card is fitted, this too an option.

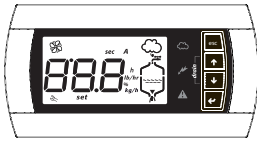


Fig. 5.a

The terminal displays humidifier status and can be used to customise operation by setting the parameters.

CONNECTION:

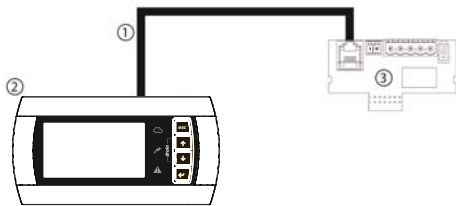


Fig. 5.b

Key:

- 1 6-wire telephone cable P/N S90CONN000 or equiv., max. length 2 m (6,6 ft)⁽¹⁾;
- 2 remote display terminal.
- 3 optional card

⁽¹⁾ For lengths exceeding 2 m (6,6 ft), use shielded cable with the shield connected to the PE both at the terminal and controller end.

Remote connection of the terminal up to 200 m

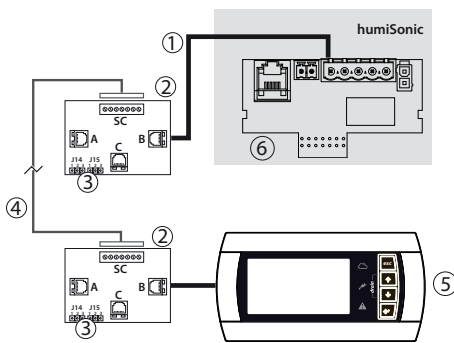


Fig. 5.a

Key:

- 1 telephone cable (up to 0,8 m distance);
- 2 CAREL TCONN6J000 board;
- 3 pin strip J14 and J15 in position 1-2 (power supply available on the telephone connectors A, B and C and screw SC);
- 4 WG20-22 shielded cable with 3 twisted pairs to move the display terminal up to 200 m away. Connection to the TCONN6J00 board:

SC terminal	function	SC terminal	function
0	EARTH (shield)	4	RX/TX+
1	+VRL	5	GND
2	GND	6	+VRL
3	RX/TX-		

- 5 remote display terminal
- 6 optional card

5.2 Meaning of the symbols

	Power supply (Green LED)
	Humidifier operating (yellow LED) Steady: humidity production not yet at the set point Flashing: nebulized water production at the set point
	Alarm (red LED) On activation of an alarm: LED flashing and buzzer active. When an alarm is active, pressing ESC mutes the buzzer and the LED comes on steady, pressing ESC again resets the alarms (see chap. "Alarms")

sec	Time in seconds
h	Hour counter
%	Humidity production as a percentage of rated capacity
	Maintenance request (active alarm)
	On steady: humidifier fan operating. Flashing: fan on during deactivation phase
888	3 digits, after 999 the display shows to indicated the 1000s (the three digits are displayed with a dot at the top between the first and second digit).
	Humidity production in progress
	Tank filling
	Water in the tank
	Water draining from the tank

Tab. 5.a

5.3 Keypad

Button	Function
Esc	return to the previous display
	UP from the main screen: display the humidification values, see the following paragraph from the list of parameters: scroll the parameters and set the values
	DOWN from the main screen: display the humidification values from the list of parameters: scroll the parameters and set the values
	ENTER (PRG) inside the list of parameters: select and confirm (like "Enter" on a computer keyboard)
drain	manual drain: press UP and DOWN together

Tab. 5.b

5.4 Main display

The humidifier display normally shows control signal status. For ON/OFF or proportional input signal (A0=0, A0=1, A0=3 and Th probe disconnected):

- display input signal;
- tank hour counter (h);
- maximum atomized water production control (parameter P0) (*);
- control hysteresis (parameter P1) (*).

For humidity probe input signal (A0=2, A0=3 and Th probe connected):

- display humidity probe reading;
- display temperature (Th only);
- tank hour counter (h);
- maximum atomized water production control (parameter P0) (*);
- control hysteresis (parameter P1)(*);
- Humidity Setpoint (parameter St)(*).

To return to the main display press ESC. Parameter C0 (see chap. "Configuration parameters") can be used to change the value shown on the main display (default: display input signal).

If the humidifier is disabled (contact ON-OFF open, see Fig. 4.d), the display shows "—" alternatively to the main screen (LED signal: Standby).

If the display shows "----", it means a communication error between display and humidifier: control connection cable. If the problem persists, call for service.

(*) To modify the parameter displayed press:

- ENTER (display: **set**);
- UP or DOWN to set the value
- ENTER to confirm the new value.

Press ESC to return to the main screen. The parameters can also be accessed from the list of parameters (see chap. "Configuration parameter").

5.5 Display software release

1) on power-up the display shows "rel. x.y" (e.g. rel. 1.2);

2) during operation;

- on the display: from the main screen press ESC and UP together, the following are shown in sequence: humidifier size, supply, number of phases and software release;
- via network on integer variable 81. Format "## = #.#" (e.g. 12 = release 1.2)"

5.6 Accessing and setting parameters

The configuration parameters can be used to set and control humidifier functions and status. From the main screen press:

- ENTER for 2 seconds;
- enter the password 77 using UP or DOWN;
- ENTER to confirm and access the list of parameters;
- UP or DOWN to scroll the list;
- ENTER to select a parameter (display: 'set');
- UP to modify (increase) the value of the parameter. To scroll faster press DOWN together;
- DOWN to modify (decrease) the value of the parameter. To scroll faster press UP together;
- ENTER to save the new value and return to the list of parameters, or ESC to return to the list without saving the value.

Press ESC to return to the main screen.

5.7 Parameters: Recall default values

The default values of the parameters can be recalled at any time from the main screen. From the main screen press:

- ENTER for 2 seconds;
- enter the password 50 using UP or DOWN and press ENTER;
- The message dEF flashes: to recall the default values press ENTER, or ESC to exit.

If no button is pressed for 30 seconds, the display returns to the main screen without recalling the default values.

5.8 Reset hour counter from display

- Access parameter 'd3' (see chapt. "Configuration parameter");
- press UP and DOWN for 5 seconds.

When reset is complete, 'res' is shown on the display.

6. OPERATING PRINCIPLES

6.1 Ultrasonic atomisation

Ultrasonic humidifiers atomise water through propagation of a wave generated by a piezoelectric element to the surface of the water. Droplets of water thus form on the surface, with the smaller ones being carried air by the forced air flow. The quantity of atomised water depends on water level, water temperature and distribution in the air. Water level is kept constant using fill and drain valves, and a level sensor. Demineralised water is recommended: if using mains water, the scale that accumulates over time will foul the piezoelectric transducer, affecting atomisation. To avoid excessive scaling, humidifier periodically drains and automatically refills the water (periodical washing)

6.2 Control principles

The humidifier can be controlled using the following signals:

- remote ON/OFF;
- Humidity probe (set by dipswitch);
- Serial.

ON/OFF control

The action is all or nothing, activated by an external contact that consequently determines the control set point and differential. The external contact may be a humidistat, whose status determines the operation of the humidifier:

- contact closed: the humidifier produces atomized water if the remote ON/OFF contact is also closed;
- contact open: atomized water production ends.

Proportional control (only with auxiliary card)

- Atomized water production is proportional to the value of a signal "Y" from an external device. The type of signal can be selected between the following standards: 0 to 10 Vdc, 2 to 10 Vdc, 0 to 20 mA, 4 to 20 mA;
- Maximum humidifier production, corresponding to the maximum value of the external signal, can be set from 10% to 100% of the rated value of the humidifier (parameter P0).

Minimum production has an activation hysteresis, equal to the value of P1 (default 5% of the proportional band of external signal "Y").

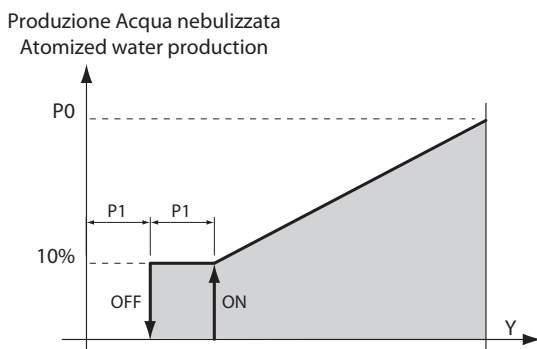


Fig. 6.a

Automatic control with humidity probe

Humidity production is controlled based on the reading of the relative humidity probe (TH or connection via optional card).

The humidifier will produce until reaching the set point (St, default 50 %rH), with a settable activation hysteresis (P1 default 5%) (see the figure) to maintain the set point.

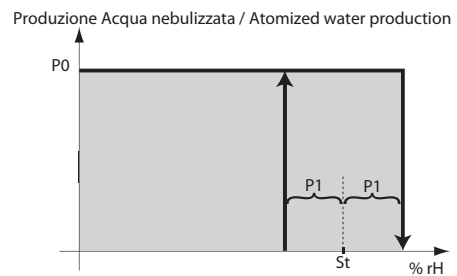


Fig. 6.b

6.3 Flow-rate modulation (Dipswitch 8 and Off)

Atomised water flow-rate can be varied from 5% to 100% (parameters Pm and P0) by alternating on-off cycles of the transducers over a set period (parameter b7, default 1 second).

Flow-rate is set based on parameter P0 (default 100%) and the request from the external signal (with optional card and proportional control).

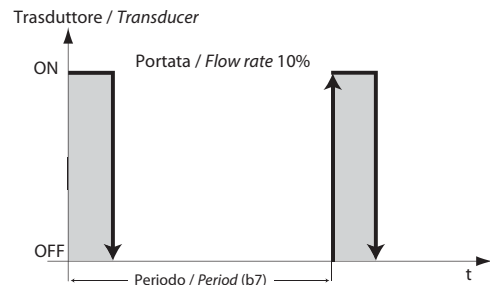


Fig. 6.c

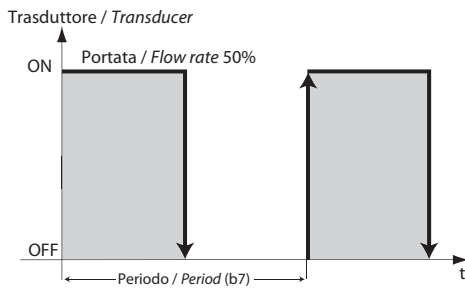


Fig. 6.d

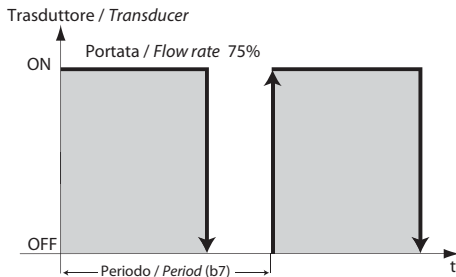


Fig. 6.e

If the flow-rate is 100%, the transducers are always on.

6.4 Series flow-rate modulation (Dipswitch 8 ON)

Atomised water flow-rate can be modulated as a percentage of rated production, from 10% to 100%. Each humidifier is managed with two transducer lines (front and rear) and each line generates 50% of total production. If humidity demand from the external signal (when using the optional card and proportional control) and parameter P0 are both 100%, both transducer lines will be activated. For lower demand, production will be split between the two pairs of transducers as follows:

- 51% - 99%: one pair of transducers is always activated to generate 50% of required production, while the other pair modulates - as described in the previous paragraph - to generate the remaining percentage of production. (e.g. 75% demand: one pair of transducers is always activated, the other modulates at 50%, as shown in Fig. 6.d)
- 10% - 50%: one pair of transducers is always off, the other modulates - as described in the previous paragraph - to generate the required percentage of production. (e.g. 25% demand: one pair of transducers is always off, the other modulates at 50%, as shown in Fig. 6.d)

Distribution of production between the two pairs of transducers is rotated every hour of operation, to avoid uneven ageing of the transducers.

6.5 Automatic insufficient supply water management

The humidifier detects if the water supply is interrupted (or insufficient) by monitoring the status of the level sensor after opening the fill solenoid valve. If the sensor is not activated within the time set for parameter bA (default 15 minutes), humidification is interrupted, the drain is activated and the appliance waits a set number of minutes (parameter AA, default 10), during which the display shows "Rty" (Retry), before attempting to fill with water again.. If this attempt succeeds, production will resume, otherwise the appliance waits a further AA minutes. The process is repeated until the water supply returns, as measured by the sensor. For the first two attempts, no alarm is generated, while if on the third attempt the procedure is not successful, alarm EF is generated, which is reset automatically when the humidifier verifies that the water supply is available again.

6.6 Automatic control of atomised water production

The humidifier monitors the water level inside the tank during production of atomised water. If the level does not fall, it means one of the following faults may have occurred:

- Malfunction of the piezoelectric transducers
- Leaky fill solenoid valve
- Fan malfunction

If after the set time for variable A8 (in minutes, default 30) the water level does not fall below the low level threshold, atomised water production stops and the appliance waits a set number of minutes (parameter AA, default 10), during which the display shows "Rty" (Retry), before attempting to resume production. If the situation is repeated, alarm EP is activated, which shuts down the unit.

If after a percentage of A8, set by parameter Ab (default 70%) the water is above the high level threshold, atomised water production stops, warning EL is generated and the appliance waits AA minutes (default 10), during which the display shows "Rty" (Retry), before attempting to resume production. The warning signal EL is reset at the end of a production cycle that is completed correctly.

6.7 Automatic control of leaking drain solenoid valve and fill solenoid valve flow-rate

Parameter A9 sets a minimum production time (default 1 minute); if the production cycle lasts less than this time, it may mean that the drain solenoid valve is leaking or that the fill solenoid valve flow-rate is too low. In this case, the controller carries out the following operations:

1. At the end of the first cycle that ends after a time less than A9, the water refill time is increased (50% higher than parameter bb) and the reduced power supply voltage to the drain solenoid valve is deactivated with the objective of increasing tightness.
2. At the end of the second cycle that ends after a time less than A9, the water refill time is increased further (100% higher than parameter bb) and a chattering* cycle is activated on the drain solenoid valve, performed during the first automatic wash cycle.
3. At the end of the third cycle that ends after a time less than A9, the water refill time is increased further (150% higher than parameter bb) and a washing cycle is performed, during which chattering* is applied, as enabled in the previous step. Warning Ed is also generated.
4. After the final step, a new production cycle will be activated. If the problem persists, the controller will restart the procedure from the first step, until completing a cycle in the expected time. In this case, any warnings will be reset.

*Chattering: a sequence in which the drain solenoid valve is opened/closed in rapid succession, with the aim of removing any residues (scale, dust, etc.) that prevent it from closing correctly.

6.8 Automatic protection of the piezoelectric transducers

The piezoelectric transducers will, by nature, be rapidly damaged and eventually break if operated without water. To prevent this from happening, the control board makes sure, via the level sensor, that even in the event of anomalies the transducers are never activated when no water is present. When starting with the tank empty, the transducers are only activated when the low level is measured. When refilling during operation, i.e. after the water level has fallen below the minimum as a result of consumption due to atomisation, with consequent activation of the fill solenoid valve, if the level does not rise in the minimum time (AC), the transducers are switched off, while the filling cycle continues until the level has been replenished or bA minutes have elapsed since the water fill cycle started. If the level is replenished correctly, the piezoelectric transducers are immediately restarted.

7. CONFIGURATION PARAMETERS

To access and set the following parameters, see chapters "LCD terminal" and "Humidifier control via network".

7.1 Basic parameters

Parameter	UOM	range	def	note
A0 Operating mode 0 = On/Off mode from auxiliary card probe input 1 = Proportional mode from auxiliary probe input 2 = Humidity probe mode from auxiliary card probe input 3 = Auto mode: if fitted, humidity probe TH reading is used, otherwise On/Off mode from contact on main board. Parameter A2 is not used	-	0...3	3	
A1 Unit of measure 0 = Celsius ; 1 = Fahrenheit	-	0...1	0	
A2 Type of external sensor (optional card) (0 = On/Off ; 1 = 0-10V; 2 = 2-10V; 3 = 0-20 mA; 4 = 4-20 mA)	-	0...4	1	
P0 Maximum production ⁽¹⁾	%	10...100	100	only if terminal connected, otherwise values set by dipswitch
P1 Humidity control hysteresis	%rH	2...20	2	
St Default display (Terminal)	%rH	20...80	50	only if terminal connected, otherwise values set by dipswitch
C0 Default display (Terminal) 0 = Probe reading/control signal 1 = P0 maximum production 2 = Hour counter	-	0...2	0	

Tab. 7.a

7.2 Advanced parameters

Parameter	UOM	range	def	note
A3 Probe minimum	%rH	0...100	0	
A4 Probe maximum	%rH	0...100	100	
A5 Probe offset	%rH	-99...100	0	
A6 Fan off delay time	min	0...240	5	
A7 Fan speed	%	40...100	100	
A8 Maximum evaporation time for reduced production alarm	min	0...200	30	
A9 Minimum evaporation time for reduced production alarm	min	0...200	1	
AA Retry waiting time	min	1...60	10	
Ab Percentage of A8 at which to run the level test	%	50...90	70	
AC Maximum time to measure level when refilling	s	1...60	10	
Ad Maximum time to measure high level	s	1...60	10	
AE Fan restart time in standby on built-in probe reading	min	0...120	10(**)	
b0 Operating options (see table of parameter b0 values)	-	0...255	7	
b1 Time between two washing cycles	min/h	0...120	60	
b2 Inactivity time for washing	h	0...240	24	
b3 Washing time (fill + drain)	min	0...10	1	
b4 Start delay time	s	0...240	10	
b5 Operating hours for CL alarm	h	0...3000(*)	1500	
b6 Time to display new CL alarm after reset from keypad (without resetting hour counter)	m	0...240	60	
b7 Transducer modulating control period	s	0...10	1	
b8 Probe disconnected delay	s	0...200	10	
b9 Reserved	s	0...60	2	
bA Maximum fill time	m	0...30	15	
bb Water refill time in production	s	0...120	10	
bC Maximum drain time	s	0...240	60	
bd Drain opening time to completely empty tank	s	0...240	30	
bE Delay time after measuring low level for refilling	s	0...240	20	
bf Drain activation delay in standby (if drain solenoid valve in standby = OPEN)	min	0...60	0	
P1 Humidity control hysteresis	%rH	2...20	2	
P2 Low humidity alarm threshold	%rH	0...100	20	
P3 High humidity alarm threshold	%rH	0...100	80	

Tab. 7.b

(1) To change the value from the terminal it is necessary set all related dipswitch to Off. To again use the value given by the dipswitch it is necessary set one of the dipswitch to On and power off. At the next reboot the control will use again the values set by the dipswitch.

(*) after 999 the display shows **100** to indicate the 1000s (the three digits are displayed with a dot at the top between the first and second digit).

(**) the default is equal to 0 (zero), for humidifiers without auxiliary card and without humidity/temperature probe.

Setting the value of parameter b0 in the range from 0 to 255 (default 7) changes the humidifier operating options as regards the following preferences:

1. Unit of measure of parameter b1 (time between two periodical washing cycles): M = minutes; H = hours;
2. Periodical wash: EC = on expiry of the set time between two periodical washing cycles (parameter b1), the humidifier waits until the end of production before starting the washing cycle; IN = on expiry of the set time between two periodical washing cycles, the humidifier stops production in order to perform the washing cycle;
3. Position of the drain solenoid valve in standby: OPEN = standby empty, the NO valve is not powered and the humidifier tank is emptied; CLOSED = standby full, the NO valve remains powered, keeping the humidifier tank full during standby;
4. Alarm relay activation: AL = signals alarms are present; SP = signals

the set point has been reached;

5. Alarm relay operating logic: NO = normally open; NC = normally closed;
6. Enable washing due to inactivity: ON/OFF;
7. Washing due to inactivity: ON = the humidifier performs the washing cycle regularly when the time between two washing cycles due to inactivity expires (parameter b2); OFF = the humidifier performs the washing cycle before starting production (the time b2 must have already elapsed);
8. Enable autotest when starting from unit off: ON/OFF.



Note: if connecting to a reverse osmosis system, it is recommended to leave preferences 6 and 7 ON.

b0	1. Unit of measure of parameter b1 M = minutes; H = hours	2. Periodical washing EC = wash at the end of the production cycle IN = wash during the production cycle	3. Drain solenoid valve in standby	4. Alarm relay activation AL= alarms present SP= set point reached	5. Alarm relay logic NO= norm. open NC= norm. closed	6. Enable washing due to inactivity	7. Off= washing due to inactivity at next start On= washing due to inactivity at regular intervals	8. Autotest
0	M	IN	Open	AL	NO	Off	Off	Off
1	M	IN	Open	AL	NO	Off	Off	On
2	M	IN	Open	AL	NO	On	Off	Off
3	M	IN	Open	AL	NO	On	Off	On
4	M	IN	Open	AL	NO	Off	On	Off
5	M	IN	Open	AL	NO	Off	On	On
6	M	IN	Open	AL	NO	On	On	Off
7	M	IN	Open	AL	NO	On	On	On
8	M	IN	Open	AL	NC	Off	Off	Off
9	M	IN	Open	AL	NC	Off	Off	On
10	M	IN	Open	AL	NC	On	Off	Off
11	M	IN	Open	AL	NC	On	Off	On
12	M	IN	Open	AL	NC	Off	On	Off
13	M	IN	Open	AL	NC	Off	On	On
14	M	IN	Open	AL	NC	On	On	Off
15	M	IN	Open	AL	NC	On	On	On
16	M	IN	Open	SP	NO	Off	Off	Off
17	M	IN	Open	SP	NO	Off	Off	On
18	M	IN	Open	SP	NO	On	Off	Off
19	M	IN	Open	SP	NO	On	Off	On
20	M	IN	Open	SP	NO	Off	On	Off
21	M	IN	Open	SP	NO	Off	On	On
22	M	IN	Open	SP	NO	On	On	Off
23	M	IN	Open	SP	NO	On	On	On
24	M	IN	Open	SP	NC	Off	Off	Off
25	M	IN	Open	SP	NC	Off	Off	On
26	M	IN	Open	SP	NC	On	Off	Off
27	M	IN	Open	SP	NC	On	Off	On
28	M	IN	Open	SP	NC	Off	On	Off
29	M	IN	Open	SP	NC	Off	On	On
30	M	IN	Open	SP	NC	On	On	Off
31	M	IN	Open	SP	NC	On	On	On
32	M	IN	Closed	AL	NO	Off	Off	Off
33	M	IN	Closed	AL	NO	Off	Off	On
34	M	IN	Closed	AL	NO	On	Off	Off
35	M	IN	Closed	AL	NO	On	Off	On
36	M	IN	Closed	AL	NO	Off	On	Off
37	M	IN	Closed	AL	NO	Off	On	On
38	M	IN	Closed	AL	NO	On	On	Off
39	M	IN	Closed	AL	NO	On	On	On
40	M	IN	Closed	AL	NC	Off	Off	Off
41	M	IN	Closed	AL	NC	Off	Off	On
42	M	IN	Closed	AL	NC	On	Off	Off
43	M	IN	Closed	AL	NC	On	Off	On
44	M	IN	Closed	AL	NC	Off	On	Off
45	M	IN	Closed	AL	NC	Off	On	On
46	M	IN	Closed	AL	NC	On	On	Off
47	M	IN	Closed	AL	NC	On	On	On
48	M	IN	Closed	SP	NO	Off	Off	Off
49	M	IN	Closed	SP	NO	Off	Off	On
50	M	IN	Closed	SP	NO	On	Off	Off
51	M	IN	Closed	SP	NO	On	Off	On
52	M	IN	Closed	SP	NO	Off	On	Off
53	M	IN	Closed	SP	NO	Off	On	On
54	M	IN	Closed	SP	NO	On	On	Off
55	M	IN	Closed	SP	NO	On	On	On
56	M	IN	Closed	SP	NC	Off	Off	Off
57	M	IN	Closed	SP	NC	Off	Off	On
58	M	IN	Closed	SP	NC	On	Off	Off
59	M	IN	Closed	SP	NC	On	Off	On
60	M	IN	Closed	SP	NC	Off	On	Off
61	M	IN	Closed	SP	NC	Off	On	On

b0	1. Unit of measure of parameter b1 M = minutes; H = hours	2. Periodical washing EC = wash at the end of the production cycle IN = wash during the production cycle	3. Drain solenoid valve in standby	4. Alarm relay activation AL= alarms present SP= set point reached	5. Alarm relay logic NO= norm. open NC= norm. closed	6. Enable washing due to inactivity	7. Off= washing due to inactivity at next start On= washing due to inactivity at regular intervals	8. Autotest
62	M	IN	Closed	SP	NC	On	On	Off
63	M	IN	Closed	SP	NC	On	On	On
64	M	EC	Open	AL	NO	Off	Off	Off
65	M	EC	Open	AL	NO	Off	Off	On
66	M	EC	Open	AL	NO	On	Off	Off
67	M	EC	Open	AL	NO	On	Off	On
68	M	EC	Open	AL	NO	Off	On	Off
69	M	EC	Open	AL	NO	Off	On	On
70	M	EC	Open	AL	NO	On	On	Off
71	M	EC	Open	AL	NO	On	On	On
72	M	EC	Open	AL	NC	Off	Off	Off
73	M	EC	Open	AL	NC	Off	Off	On
74	M	EC	Open	AL	NC	On	Off	Off
75	M	EC	Open	AL	NC	On	Off	On
76	M	EC	Open	AL	NC	Off	On	Off
77	M	EC	Open	AL	NC	Off	On	On
78	M	EC	Open	AL	NC	On	On	Off
79	M	EC	Open	AL	NC	On	On	On
80	M	EC	Open	SP	NO	Off	Off	Off
81	M	EC	Open	SP	NO	Off	Off	On
82	M	EC	Open	SP	NO	On	Off	Off
83	M	EC	Open	SP	NO	On	Off	On
84	M	EC	Open	SP	NO	Off	On	Off
85	M	EC	Open	SP	NO	Off	On	On
86	M	EC	Open	SP	NO	On	On	Off
87	M	EC	Open	SP	NO	On	On	On
88	M	EC	Open	SP	NC	Off	Off	Off
89	M	EC	Open	SP	NC	Off	Off	On
90	M	EC	Open	SP	NC	On	Off	Off
91	M	EC	Open	SP	NC	On	Off	On
92	M	EC	Open	SP	NC	Off	On	Off
93	M	EC	Open	SP	NC	Off	On	On
94	M	EC	Open	SP	NC	On	On	Off
95	M	EC	Open	SP	NC	On	On	On
96	M	EC	Closed	AL	NO	Off	Off	Off
97	M	EC	Closed	AL	NO	Off	Off	On
98	M	EC	Closed	AL	NO	On	Off	Off
99	M	EC	Closed	AL	NO	On	Off	On
100	M	EC	Closed	AL	NO	Off	On	Off
101	M	EC	Closed	AL	NO	Off	On	On
102	M	EC	Closed	AL	NO	On	On	Off
103	M	EC	Closed	AL	NO	On	On	On
104	M	EC	Closed	AL	NC	Off	Off	Off
105	M	EC	Closed	AL	NC	Off	Off	On
106	M	EC	Closed	AL	NC	On	Off	Off
107	M	EC	Closed	AL	NC	On	Off	On
108	M	EC	Closed	AL	NC	Off	On	Off
109	M	EC	Closed	AL	NC	Off	On	On
110	M	EC	Closed	AL	NC	On	On	Off
111	M	EC	Closed	AL	NC	On	On	On
112	M	EC	Closed	SP	NO	Off	Off	Off
113	M	EC	Closed	SP	NO	Off	Off	On
114	M	EC	Closed	SP	NO	On	Off	Off
115	M	EC	Closed	SP	NO	On	Off	On
116	M	EC	Closed	SP	NO	Off	On	Off
117	M	EC	Closed	SP	NO	Off	On	On
118	M	EC	Closed	SP	NO	On	On	Off
119	M	EC	Closed	SP	NO	On	On	On
120	M	EC	Closed	SP	NC	Off	Off	Off
121	M	EC	Closed	SP	NC	Off	Off	On
122	M	EC	Closed	SP	NC	On	Off	Off
123	M	EC	Closed	SP	NC	On	Off	On
124	M	EC	Closed	SP	NC	Off	On	Off
125	M	EC	Closed	SP	NC	Off	On	On
126	M	EC	Closed	SP	NC	On	On	Off
127	M	EC	Closed	SP	NC	On	On	On
128	H	IN	Open	AL	NO	Off	Off	Off
129	H	IN	Open	AL	NO	Off	Off	On
130	H	IN	Open	AL	NO	On	Off	Off
131	H	IN	Open	AL	NO	On	Off	On
132	H	IN	Open	AL	NO	Off	On	Off
133	H	IN	Open	AL	NO	Off	On	On
134	H	IN	Open	AL	NO	On	On	Off
135	H	IN	Open	AL	NO	On	On	On
136	H	IN	Open	AL	NC	Off	Off	Off
137	H	IN	Open	AL	NC	Off	Off	On
138	H	IN	Open	AL	NC	On	Off	Off
139	H	IN	Open	AL	NC	On	Off	On
140	H	IN	Open	AL	NC	Off	On	Off
141	H	IN	Open	AL	NC	Off	On	On
142	H	IN	Open	AL	NC	On	On	Off

b0	1. Unit of measure of parameter b1 M = minutes; H = hours	2. Periodical washing EC = wash at the end of the production cycle IN = wash during the production cycle	3. Drain solenoid valve in standby	4. Alarm relay activation AL= alarms present SP= set point reached	5. Alarm relay logic NO= norm. open NC= norm. closed	6. Enable washing due to inactivity	7. Off= washing due to inactivity at next start On= washing due to inactivity at regular intervals	8. Autotest
143	H	IN	Open	AL	NC	On	On	On
144	H	IN	Open	SP	NO	Off	Off	Off
145	H	IN	Open	SP	NO	Off	Off	On
146	H	IN	Open	SP	NO	On	Off	Off
147	H	IN	Open	SP	NO	On	Off	On
148	H	IN	Open	SP	NO	Off	On	Off
149	H	IN	Open	SP	NO	Off	On	On
150	H	IN	Open	SP	NO	On	On	Off
151	H	IN	Open	SP	NO	On	On	On
152	H	IN	Open	SP	NC	Off	Off	Off
153	H	IN	Open	SP	NC	Off	Off	On
154	H	IN	Open	SP	NC	On	Off	Off
155	H	IN	Open	SP	NC	On	Off	On
156	H	IN	Open	SP	NC	Off	On	Off
157	H	IN	Open	SP	NC	Off	On	On
158	H	IN	Open	SP	NC	On	On	Off
159	H	IN	Open	SP	NC	On	On	On
160	H	IN	Closed	AL	NO	Off	Off	Off
161	H	IN	Closed	AL	NO	Off	Off	On
162	H	IN	Closed	AL	NO	On	Off	Off
163	H	IN	Closed	AL	NO	On	Off	On
164	H	IN	Closed	AL	NO	Off	On	Off
165	H	IN	Closed	AL	NO	Off	On	On
166	H	IN	Closed	AL	NO	On	On	Off
167	H	IN	Closed	AL	NO	On	On	On
168	H	IN	Closed	AL	NC	Off	Off	Off
169	H	IN	Closed	AL	NC	Off	Off	On
170	H	IN	Closed	AL	NC	On	Off	Off
171	H	IN	Closed	AL	NC	On	Off	On
172	H	IN	Closed	AL	NC	Off	On	Off
173	H	IN	Closed	AL	NC	Off	On	On
174	H	IN	Closed	AL	NC	On	On	Off
175	H	IN	Closed	AL	NC	On	On	On
176	H	IN	Closed	SP	NO	Off	Off	Off
177	H	IN	Closed	SP	NO	Off	Off	On
178	H	IN	Closed	SP	NO	On	Off	Off
179	H	IN	Closed	SP	NO	On	Off	On
180	H	IN	Closed	SP	NO	Off	On	Off
181	H	IN	Closed	SP	NO	Off	On	On
182	H	IN	Closed	SP	NO	On	On	Off
183	H	IN	Closed	SP	NO	On	On	On
184	H	IN	Closed	SP	NC	Off	Off	Off
185	H	IN	Closed	SP	NC	Off	Off	On
186	H	IN	Closed	SP	NC	On	Off	Off
187	H	IN	Closed	SP	NC	On	Off	On
188	H	IN	Closed	SP	NC	Off	On	Off
189	H	IN	Closed	SP	NC	Off	On	On
190	H	IN	Closed	SP	NC	On	On	Off
191	H	IN	Closed	SP	NC	On	On	On
192	H	EC	Open	AL	NO	Off	Off	Off
193	H	EC	Open	AL	NO	Off	Off	On
194	H	EC	Open	AL	NO	On	Off	Off
195	H	EC	Open	AL	NO	On	Off	On
196	H	EC	Open	AL	NO	Off	On	Off
197	H	EC	Open	AL	NO	Off	On	On
198	H	EC	Open	AL	NO	On	On	Off
199	H	EC	Open	AL	NO	On	On	On
200	H	EC	Open	AL	NC	Off	Off	Off
201	H	EC	Open	AL	NC	Off	Off	On
202	H	EC	Open	AL	NC	On	Off	Off
203	H	EC	Open	AL	NC	On	Off	On
204	H	EC	Open	AL	NC	Off	On	Off
205	H	EC	Open	AL	NC	Off	On	On
206	H	EC	Open	AL	NC	On	On	Off
207	H	EC	Open	AL	NC	On	On	On
208	H	EC	Open	SP	NO	Off	Off	Off
209	H	EC	Open	SP	NO	Off	Off	On
210	H	EC	Open	SP	NO	On	Off	Off
211	H	EC	Open	SP	NO	On	Off	On
212	H	EC	Open	SP	NO	Off	On	Off
213	H	EC	Open	SP	NO	Off	On	On
214	H	EC	Open	SP	NO	On	On	Off
215	H	EC	Open	SP	NO	On	On	On
216	H	EC	Open	SP	NC	Off	Off	Off
217	H	EC	Open	SP	NC	Off	Off	On
218	H	EC	Open	SP	NC	On	Off	Off
219	H	EC	Open	SP	NC	On	Off	On
220	H	EC	Open	SP	NC	Off	On	Off
221	H	EC	Open	SP	NC	Off	On	On
222	H	EC	Open	SP	NC	On	On	Off
223	H	EC	Open	SP	NC	On	On	On

b0	1. Unit of measure of parameter b1 M = minutes; H = hours	2. Periodical washing EC = wash at the end of the production cycle IN = wash during the production cycle	3. Drain solenoid valve in standby	4. Alarm relay activation AL= alarms present SP= set point reached	5. Alarm relay logic NO= norm. open NC= norm. closed	6. Enable washing due to inactivity	7. Off= washing due to inactivity at next start On= washing due to inactivity at regular intervals	8. Autotest
224	H	EC	Closed	AL	NO	Off	Off	Off
225	H	EC	Closed	AL	NO	Off	Off	On
226	H	EC	Closed	AL	NO	On	Off	Off
227	H	EC	Closed	AL	NO	On	Off	On
228	H	EC	Closed	AL	NO	Off	On	Off
229	H	EC	Closed	AL	NO	Off	On	On
230	H	EC	Closed	AL	NO	On	On	Off
231	H	EC	Closed	AL	NO	On	On	On
232	H	EC	Closed	AL	NC	Off	Off	Off
233	H	EC	Closed	AL	NC	Off	Off	On
234	H	EC	Closed	AL	NC	On	Off	Off
235	H	EC	Closed	AL	NC	On	Off	On
236	H	EC	Closed	AL	NC	Off	On	Off
237	H	EC	Closed	AL	NC	Off	On	On
238	H	EC	Closed	AL	NC	On	On	Off
239	H	EC	Closed	AL	NC	On	On	On
240	H	EC	Closed	SP	NO	Off	Off	Off
241	H	EC	Closed	SP	NO	Off	Off	On
242	H	EC	Closed	SP	NO	On	Off	Off
243	H	EC	Closed	SP	NO	On	Off	On
244	H	EC	Closed	SP	NO	Off	On	Off
245	H	EC	Closed	SP	NO	Off	On	On
246	H	EC	Closed	SP	NO	On	On	Off
247	H	EC	Closed	SP	NO	On	On	On
248	H	EC	Closed	SP	NC	Off	Off	Off
249	H	EC	Closed	SP	NC	Off	Off	On
250	H	EC	Closed	SP	NC	On	Off	Off
251	H	EC	Closed	SP	NC	On	Off	On
252	H	EC	Closed	SP	NC	Off	On	Off
253	H	EC	Closed	SP	NC	Off	On	On
254	H	EC	Closed	SP	NC	On	On	Off
255	H	EC	Closed	SP	NC	On	On	On

Tab. 7.c

7.3 Serial connection parameters

Parameter	UOM	range	def	note
C1 Baud rate 0 = 4800 bps; 1 = 9600 bps; 2 = 19200 bps; 3 = 38400 bps	-	0...3	2	
C2 tLAN address (if 0 = master)		0...3	0	
C3 Serial address	-	1...207	1	
C4 Timeout for master offline alarm	s	0...240	30	The alarm is only generated if online production control is active (See chap. "Humidifier control via network")

Tab. 7.d

7.4 Read-only parameters

Parameter	UOM	range	def	note
d0 Th probe temperature reading	°C/°F	0...1000	0	
d1 Th probe humidity reading	%rH	0...1000	0	
d2 Configurable input reading (optional card)	% / %rH	0...100	0	
d3 Tank operating hour counter (resettable, see 6.10 and 12.8)	h	0...9999(*)	0	
d4 Unit hour counter (read-only)	h	0...9999(*)	0	

Tab. 7.e

(*) after 999 the display shows  to indicate the 1000s (the three digits are displayed with a dot at the top between the first and second digit).

8. HUMIDIFIER CONTROL VIA NETWORK

The variables shown in the list are a set of all the internal variables. DO NOT CONFIGURE ANY VARIABLES THAT ARE NOT SHOWN IN THE TABLE, OTHERWISE HUMIDIFIER OPERATION MAY BE AFFECTED.

The serial connection (M11) is configured by default with the following parameters:

- Address 1
- Baud rate 19200 bps
- Frame 8,N,2

8.1 Supervisor variable list

"A"		analogue variables* (Modbus®: REGISTERS)	R/W
CAREL - Modbus®			
1		param. d0: Th probe temperature reading	R
2		param. d1: Th probe humidity reading	R
3		param. d2: Probe reading	R
4		param. d5: Set point trimmer reading	R
"I"		integer variables (Modbus®: REGISTERS)	R/W
CAREL	Modbus®		
1	129	Level access password	R/W
2	130	Firmware release	R
15	143	Alarms, see Cap. "ALARMS": bit0: E0 Alarm bit5: PU Alarm bit1: Et Alarm bit6: H ^ Alarm bit2: EF Alarm bit7: H_ Alarm bit3: Ed Alarm bit8: EE Alarm bit4: EP Alarm bit9: CL Alarm	R/W
20	148	Parameter A0: Operating mode	R/W
21	149	Parameter A2: Type of external sensor	R/W
22	150	Parameter A3: Probe minimum	R/W
23	151	Parameter A4: Probe maximum	R/W
24	152	Parameter A5: Probe offset	R/W
25	153	Parameter A6: Fan off delay time	R/W
26	154	Parameter A7: Fan speed	R/W
27	155	Parameter A8: Maximum evaporation time for no production alarm	R/W
28	156	Parameter A9: Minimum evaporation time for no production alarm	R/W
29	157	Parameter b0: Operating options	R/W
30	158	Parameter b1: Time between two washing cycles	R/W
31	159	Parameter b2: Inactivity time for washing on next start	R/W
32	160	Parameter b3: Washing time (fill + drain)	R/W
33	161	Parameter b4: Start delay time	R/W
34	162	Parameter b5: Operating hours for CL alarm	R/W
35	163	Parameter b6: Time to display new CL alarm in minutes	R/W
36	164	Parameter b7: Transducer On/Off control interval	R/W
37	165	Parameter b8: Probe delay disconnected	R/W
38	166	Reserved	R/W
39	167	Parameter bA: Maximum fill time	R/W
40	168	Parameter bb: Refill time in evaporation	R/W
41	169	Parameter bC: Maximum drain time	R/W
42	170	Parameter bd: Drain opening time to completely empty tank	R/W
43	171	Parameter bE: Delay time after measuring low level for refilling	R/W
44	172	Parameter C0: Default display (Terminal)	R/W
45	173	Parameter C1: Parameter A0: Baud rate	R/W
46	174	Parameter C2: tLAN address (If 0 Master controller)	R/W
47	175	Parameter C3: Serial address	R/W
48	176	Parameter P0: Maximum flow-rate	R/W
49	177	Parameter P1: Humidity control hysteresis	R/W
50	178	Parameter P2: Low humidity alarm threshold	R/W
51	179	Parameter P3: High humidity alarm threshold	R/W
52	180	Parameter SP: Humidity set point	R/W
53	181	Parameter d3: Operating hour counter	R
54	182	Parameter d4: Unit hour counter (not resettable)	R/W
60	188	Serial request (If digital 37 is setted)	R/W
65	192	Parameter C4: Timeout for offline master serial	R/W
87	215	FW release slave 1	R
88	216	Instantaneous production slave 1	R
89	217	Slave 1 status	R
90	218	Phase slave 1	R
91	219	Alarm mask slave 1	R
92	220	Hour counter operation slave 1	R
93	221	FW release slave 2	R
94	222	Instantaneous production slave 2	R
95	223	Slave 2 status	R
96	224	Phase slave 2	R
97	225	Alarm mask slave 2	R
98	226	Hour counter operation slave 2	R
99	227	FW release slave 2	R
100	228	Instantaneous production slave 3	R
101	229	Slave 3 status	R
102	230	Phase slave 3	R

"I"		integer variables (Modbus®: REGISTERS)	R/W
CAREL	Modbus®		
103	231	Alarm mask slave 3	R
104	232	Hour counter operation slave 3	R

Tab. 8.a

"D"		digital variables (Modbus®: COILS)	R/W
CAREL - Modbus®			
2		Just started flag	R
3		Humidifier ready to produce	R
4		Humidity set point reached	R
5		Green LED	R
6		Red LED	R
7		Yellow LED	R
8		Remote On/Off	R
9		Low level	R
10		High level	R
11		Aux level	R
12		Autotest completed	R
14		BMS serial in tLAN mode	R
15		Reserved	R
16		Reserved	R
17		Terminal connected	R
18		Production in progress	R
19		Fill	R
20		Drain	R
21		Transducer 1	R
22		Transducer 2	R
23		Fan	R
24		Alarm relay	R
25		Auxiliary relay	R
26		Manual drain	R/W
27		Disable from serial	R/W
28		Reset hour counter	R/W
29		Reset alarms	R/W
30		Washing due to inactivity activated	R
31		Functional test performed	R
33		Unit of measure	R/W
37		Serial control enable	R/W
38		Activate wash from serial	R/W

Tab. 8.b

8.2 Production control via network

To control production via a he connection, configure the humidifier using following parameters:

Digital 27, Digital 37 and Integer 60 (Modbus 188)

When the D37 is at 1, the humidifier excludes the external command signals (external regulator or probes) and uses the value of Integer 60 (modbus 188) as like comand signal. The humidity production can be managed in two modes:

To manage the production level in percentual mode:

- Set D 37 = 1;
- Set parameter A0 = 1 (Carel 20, Modbus 148, Proportional Mode);
- Set integer variable 60 Carel (188 Modbus) to the desired level (0-1000 = 0-100.0%).

To manage the production with a humidity probe managed by the master:

- Set D 37 = 1;
- Set parameter A0 = 2 (Carel 20, Modbus 148, Humidity probe Mode);
- Set integer variable 60 Carel (188 Modbus) to the desired level (0-1000 = 0-100.0 rH%);
- Set integer variable 52 Carel (180 Modbus) to the desired humidity setpoin.

When the D37 is at 1, if the communication is lost for the seconds settled by parameter C4, is generated the "Master Offline" alarm (see alarms table) and the production stops.

Production is activated/deactivated via digital parameter D27 (see parameter table).

If D27 = 1 the humidifier is disabled and production stops
if D27 = 0 the humidifier is enabled and production is activated.
D27 is independent from the state of D37.






8.3 Washing cycle activation via network

A washing cycle can be performed at any time by managing digital variable 38.

Setting the variable to 1 will immediately activate a washing cycle, even if the unit is in standby, and even if both automatic washing and washing due to inactivity are disabled by their corresponding parameters.

The variable will keep the value 1 throughout the duration of the washing cycle, and will automatically be reset at the end of the cycle.

9. ALARMS

red LED signal (*)	code and symbol on display (flashing)		meaning	cause	solution	alarm relay activation	action	reset
2 fast flashes	Et	-	Autotest failed	- Fill not connected or insufficient - drain open - faulty float	Check: • water supply and fill valve; • blockage of filter on fill solenoid valve; • check drain solenoid valve and drain connection;	yes	humidification interrupted	ESC / Digital 29
5 fast flashes	EP		No production fill SV leak fan malfunction	Malfunction of piezoelectric transducers	Carry out maintenance on tank	yes	humidification interrupted	ESC / Digital 29
3 fast flashes	EF		No water	Interruption to water supply or fill solenoid valve malfunction	Check: • water supply and fill valve; • blockage of filter on fill solenoid valve	yes (in the 10 minute waiting period)	humidification interrupted only per 10 minutes	automatic (after 10 minute wait)
4 fast flashes	Ed		No drain	Drain solenoid valve/circuit malfunction	Check drain valve and drain connection	yes	humidification interrupted	ESC / Digital 29
5 slow flashes	CL		Tank maintenance request signal	1500 operating hours for recommended maintenance exceeded	Carry out maintenance on tank and transducers	no	signal only	Reset hour counter
6 fast flashes	PU	-	External control signal not connected correctly	Cable interrupted/disconnected/not connected correctly.	Check the reference signal (4 to 20 mA or 2 to 10V).	yes	humidification interrupted	AUTO
2 slow flashes	H^		High humidity	The signal from the probe indicates humidity above 80%rH	Check humidity probe signal/cable	yes	humidification interrupted	AUTO
3 slow flashes	H_		Low humidity	The signal from the probe indicates humidity less than 20%rH	Check humidity probe signal/cable	yes	humidification interrupted	AUTO
4 slow flashes	EE		EEPROM alarm	Problems in the EEPROM	If the problem persists, contact the CAREL service centre	yes	humidification interrupted	If this persists contact service
1 fast flash	E0		Functional test not performed	Functional test not performed by manufacturer/EEPROM problems	If the problem persists, contact the CAREL service centre	yes	humidification interrupted	If this persists contact service
7 slow flashes	OFL		Master Offline	Loss of connection from the serial master (If D37=1)	Check state of the Master / Cable	yes	humidification interrupted	AUTO
8 fast flash	EL		Water level alarm	Level too high during atomised water production due to: • fill SV leak • transducer malfunction • fan malfunction	Check: • fill SV • transducers • fans	yes	humidification interrupted	AUTO

Tab. 9.a

To reset the alarms, press ESC once to mute the buzzer, press ESC a second time to completely reset the alarm.

(*) Fast flash: 0.2 seconds ON and 0.2 seconds OFF
Slow flash: 1 second ON and 1 second OFF

9.1 Troubleshooting



Note: if the problem identified cannot be solved using the following guide, contact CAREL technical service.

1. Firstly, check the humidifier and the surrounding area.

Problem	Cause		Check	Solution
No atomised water production	Power supply	Humidifier switch in the OFF position	Check the switch	Switch ON
		No power	Measure the voltage at the humidifier input terminals	Connect power
		Power supply fault	Measure the voltage at the power supply output terminals	Replace the power supply
The quantity of atomised water is too low	Feedwater system	Valve closed upstream	Check	Open the valve
	Power supply	Low power supply voltage	Check the voltage at the power supply output terminals	Replace the power supply, if damaged
		Feedwater system	Water level during production is too high and overflowing	Check visually
	Other	The humidifier is not installed horizontally	Check visually	Adjust
No atomised water production	Dust and foreign matter accumulated in the tank (*)		The average life of the transducer is around 10,000 to 15,000 operating hours	Clean the inside of the tank
	Transducer deterioration			Replace
The quantity of atomised water is too low	Dust and foreign matter accumulated in the tank (*)		Check a view the inside of the tank	Clean the inside of the tank and replace the transducers
	Scale build-up on the surface of the piezoelectric transducers (*)			

Tab. 9.b

(*) These malfunctions can be avoided by carrying out preventive maintenance.

2. If the cause has not been identified with the previous checks, there may be faulty components. Check the inside of the humidifier.

Problem	Cause		Check	Solution
No atomised water production	Feedwater system	Float level sensor fault	Empty the tank, remove the electronic board and check continuity of the level sensor	Contact service to replace the level sensor
		Float level sensor blocked		Clean the sensor. If normal operation is not restored, replace
		Fill valve fault	No water filled even when the tank has been emptied	Replace the valve
	Other	The fan cables are loose or detached	Check connection after removing the humidifier cover	Clean the sensor. If normal operation is not restored, replace
The quantity of atomised water is too low	Water level overflow	Float level sensor blocked	If the water level in the tank reaches the overflow pipe, remove the connector from the control board and check continuity of the level sensor	Restore correct connection to the terminals
		Fill valve fault	Water is filled even after switching off the appliance	If there is continuity, contact service to replace the level sensor

Tab. 9.c

10. MAINTENANCE AND SPARE PARTS

10.1 Electrical components

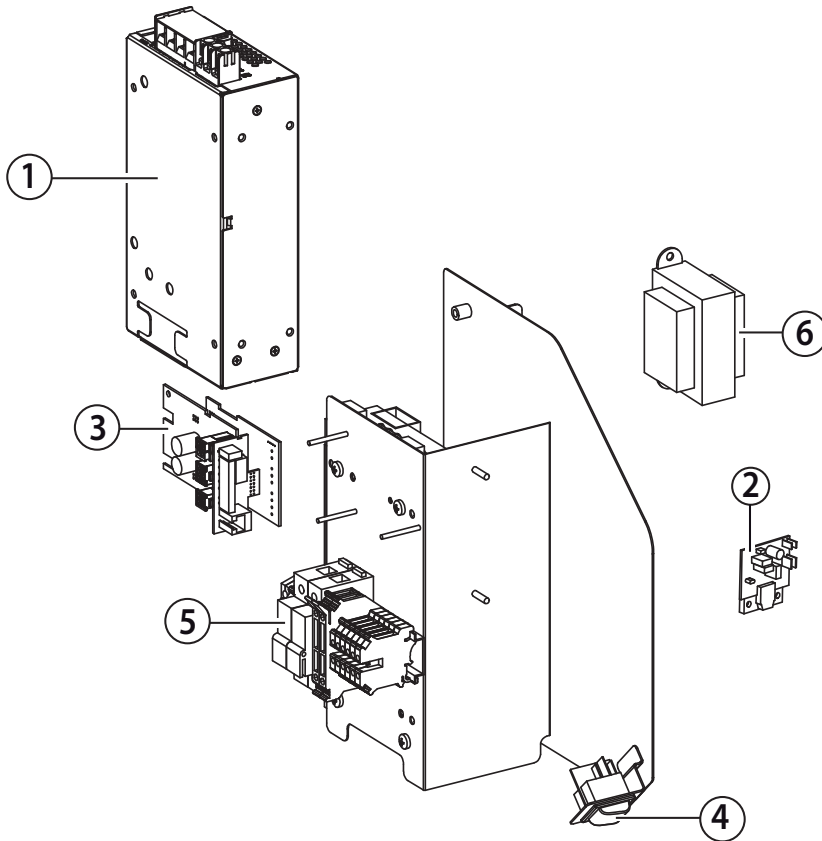


Fig. 10.a

n.	description	Spare part number
1	Power supply	300 W: UUKA300000 (2-4 kg/h)
		600 W: UUKA600000 (6-8 kg/h)
2	Driver board	UUKDE00000
3	Electronic control board	Main board: UUF02S0000
		Auxiliary card: UUKAX00000
4	ON/OFF switch	
5	Terminal block	
6	Transformer	UUKTR00000

Tab. 10.a

10.2 Mechanical components

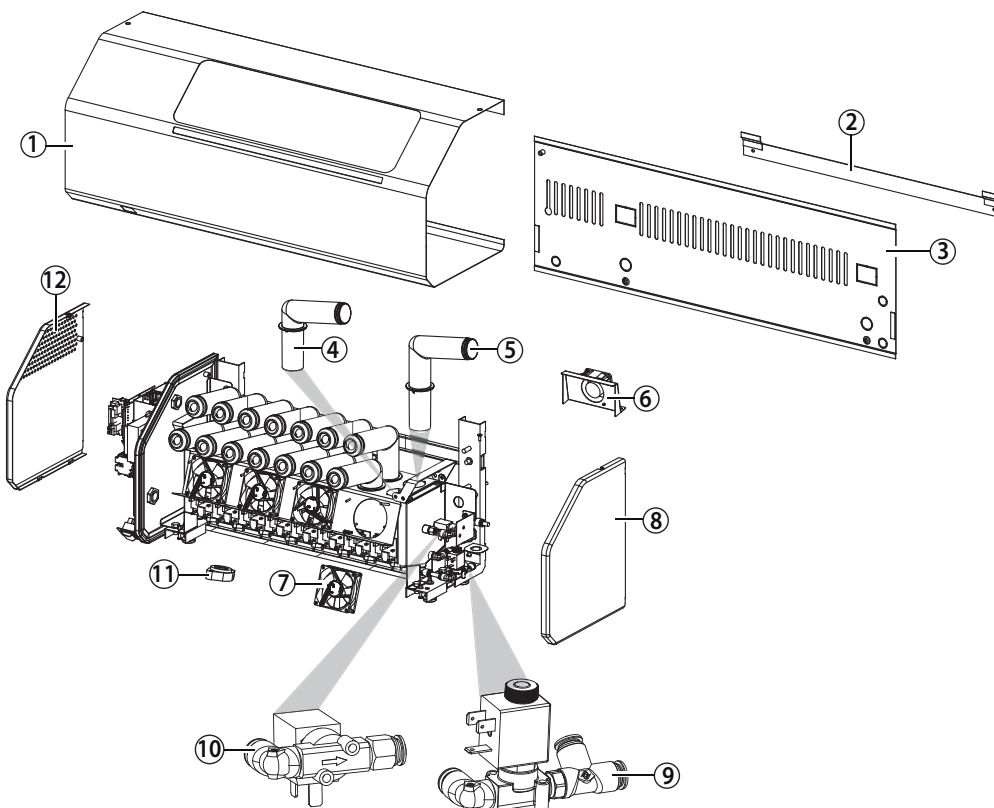


Fig. 10.b

n.	description	Spare part number
1	Cover	
2	Wall-mounting bracket	
3	Rear panel	
4	Front diffuser	UUKDR00000
5	Rear diffuser	UUKDR10000
6	Rear fan and bracket (80X80)	UUKFN00000
7	Front fan (80X80)	UUKFN10000
8	Right side cover	
9	Drain solenoid valve kit	UUKDN00000
10	Fill solenoid valve kit	UUKFR00000
11	Piezoelectric transducer	UUKTP00000
12	Left side cover	

Tab. 10.b

10.3 Maintenance

Maintenance on the humidifier must be carried out by CAREL technical service or other professionally qualified personnel.

Important: before performing any operations:

- power the unit off at the switch (off);
- wait for all of the water to be emptied from the humidifier tank.

The fill valve is normally closed and the drain valve is normally open, consequently, when powering down the humidifier, the unit is drained automatically.

Note: preventive maintenance on the humidifier is recommended to ensure optimum system performance. Maintenance includes:

- checking tightness of the electrical connectors;
- cleaning and visual inspection of the components;
- checking water level and making sure there are no leaks.

Important:

- the piezoelectric transducer is very delicate: when cleaning the inside of the tank, make sure not to scratch it, for example with a screwdriver;
- tighten the nuts applying the maximum allowed torque (4 ± 0.5 kg-cm). Excessive tightening torque may damage the humidifier.

10.4 Routine maintenance

Routine maintenance on humidifiers involves cleaning all the parts in contact with the water:

1. fill/drain lines;
2. water tank.

Maintenance intervals depend on water quality and humidifier operating hours. The use of demineralised water minimises maintenance requirements.

Note: it is recommended to perform routine maintenance at least once a year, irrespective of water quality and humidifier operating hours.

It is recommended to periodically check operation of the piezoelectric transducers, the corresponding driver boards and the fans, by carrying out a visual inspection:

1. make sure there a water column above each of the piezoelectric transducers during humidifier operation;
2. check that the LEDs on the driver boards are on and are yellow during humidifier operation;
3. check that the fans are running during humidifier operation.

10.5 Special maintenance and repairs

Special maintenance and repairs may involve replacement of:

1. fill/drain solenoid valve;
2. driver board;
3. piezoelectric transducer;
4. fan;
5. electronic control board;
6. power supply.

10.6 Replacing the components

Drain solenoid valve

To remove the right side cover:

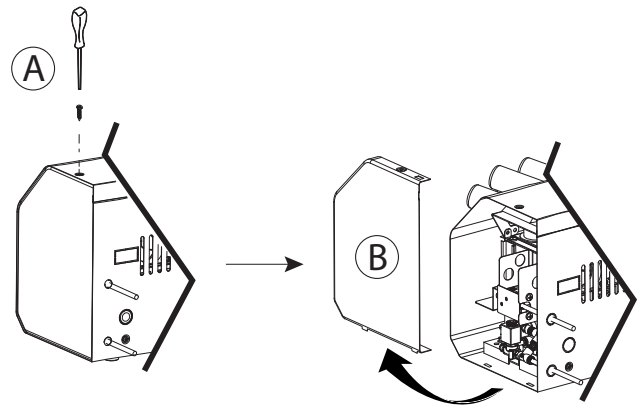


Fig. 10.c

1. loosen and remove the screw (A);
2. remove the cover (B);
3. remove the electrical connectors and move the spring fasteners so as to remove the hoses, then remove the block (D): elbow connector, drain valve, T-connector.

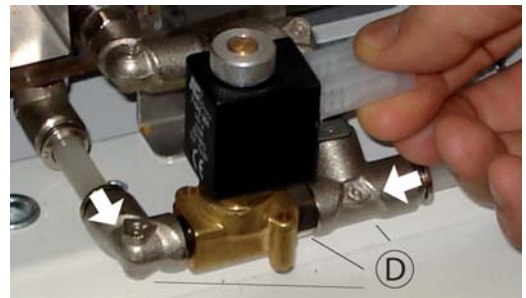


Fig. 10.d

Fill solenoid valve

1. loosen and remove the screws (arrows) so as to remove the bracket (E);

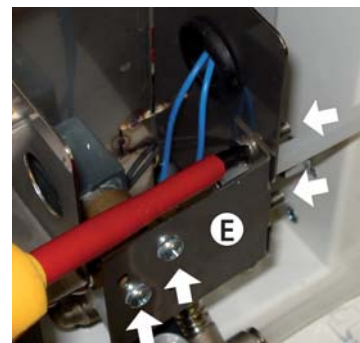


Fig. 10.e

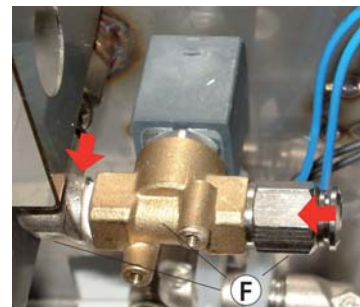


Fig. 10.f

2. remove the electrical connectors and move the spring fasteners so as to remove the hoses, then remove the block (F): elbow connector, fill valve, connector.

Dismantling the rear panel (to access the fans)

To remove the rear panel, first take off the left side cover:

1. loosen and remove the screw (A);
2. remove the cover (B);
3. unscrew the screws (C) to disconnect the power cable from the terminal block, and the screws (D) to remove the rear panel (E).

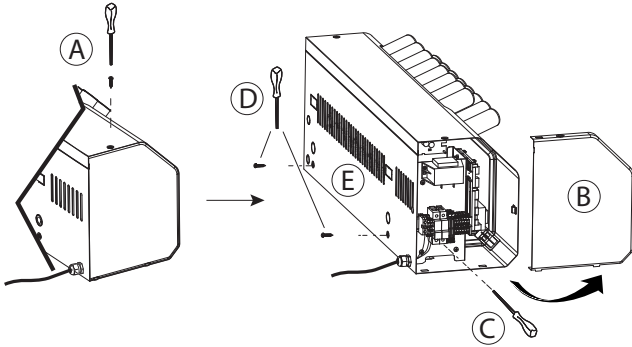


Fig. 10.g

Diffusers

The diffusers are only attached to the top cover. Once the cover has been removed, to replace the diffusers simply lift them off.

Rear fan/driver board

Remove the rear panel as explained in the previous paragraph.

1. disconnect the electrical cables running from the fan to the driver board;
2. remove the fastening screws using a screwdriver;
3. remove the fan;
4. to remove the front driver board, loosen and remove the two fastening nuts with a tube spanner;

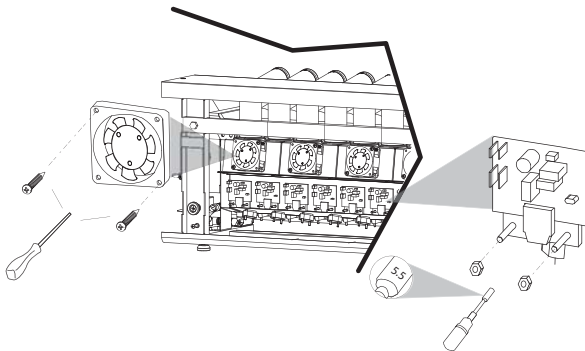


Fig. 10.h

Front fan/driver board

1. Unscrew the screws under the bottom panel;

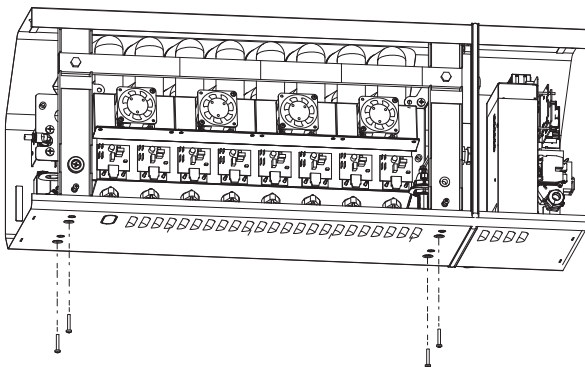


Fig. 10.i

2. Remove the cover from the two uprights;

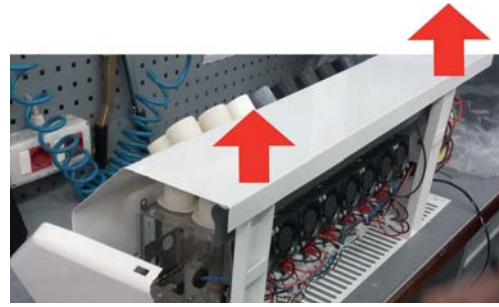


Fig. 10.j

3. Slide out the humidifier body;

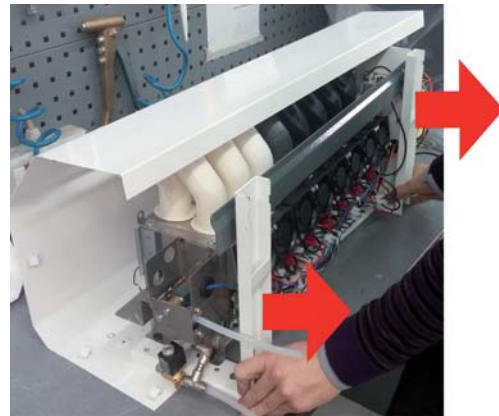


Fig. 10.k

4. To remove the front driver board, loosen and remove the two fastening nuts with a tube spanner.

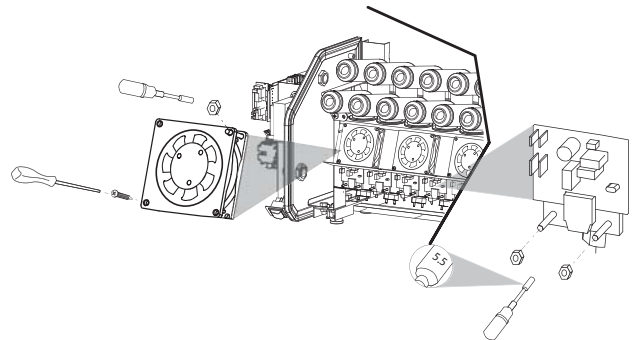


Fig. 10.l

Note: together with the driver board, it is recommended to also replace the corresponding piezoelectric transducer.

Piezoelectric transducer

Note: the atomisation capacity of the piezoelectric transducer gradually decreases with use. It must be replaced after around 10,000 operating hours (depending on water quality), even if the unit can continue operating while effective capacity still responds to requirements.

To remove the piezoelectric transducer:

1. turn the humidifier body over and identify the piezoelectric transducer to be replaced;
2. remove electrical cable terminals from the corresponding driver board;
3. using a tube spanner (5.5), loosen the fastening nuts, remove the transducer and replace it;
4. when replacing the transducer, pay attention to the white markings (arrow): the top line of transducers has the markings on the right, and the bottom line has the markings on the left. The transducer must have the markings positioned in the same ways as the adjacent ones.

Important:

if the transducer is fitted rotated 180°; incorrect assembly will cause a reduction in atomised water production and potential humidifier malfunctions.

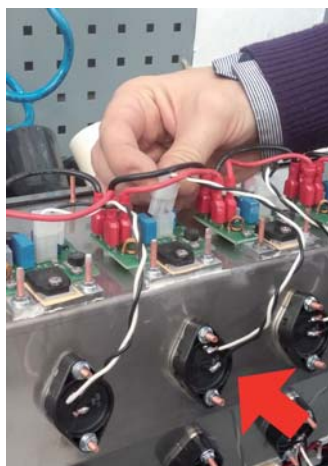


Fig. 10.m



Fig. 10.n



Fig. 10.o

Note: the tightening torque of the nuts that fasten the transducer must be 4 ± 0.5 kg cm.

Control board and power supply

To remove the control board (Fig 10.p):

1. unscrew and remove the nuts and remove the control board;
2. to remove the power supply (Fig. 10.q), unscrew the screws and lift it out from above.

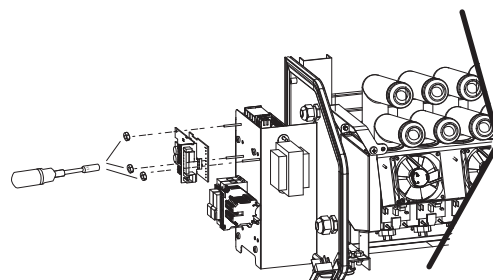


Fig. 10.p

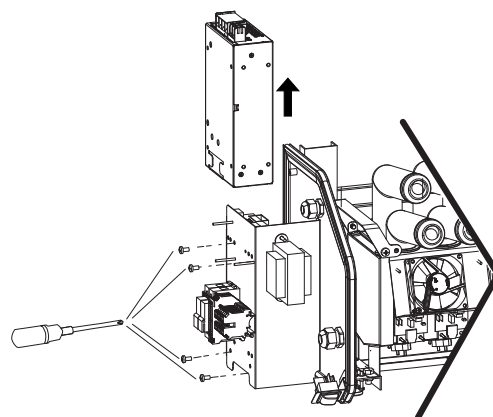


Fig. 10.q

10.7 Cleaning the tank

To access the tank and carry out the cleaning operations:

- A. unscrew the screws that secure the cover and remove the fastening brackets;
- B. unscrew the screws that fasten the fan supports and the fans;
- C. if necessary, unscrew the screws to detach the fans and clean the air filters;
- D. lift the cover out to access the tank.

To clean the tank, use a soft brush.

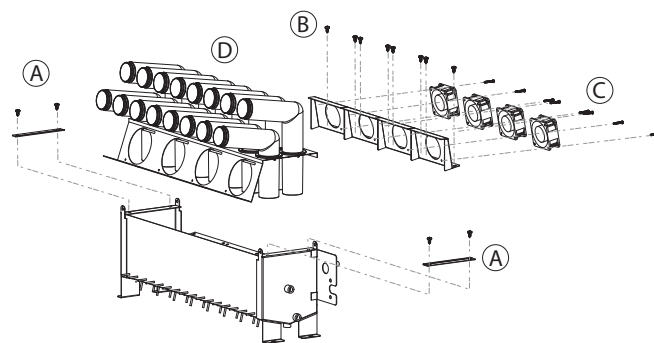


Fig. 10.r

11. WIRING DIAGRAM

11.1 Diagram

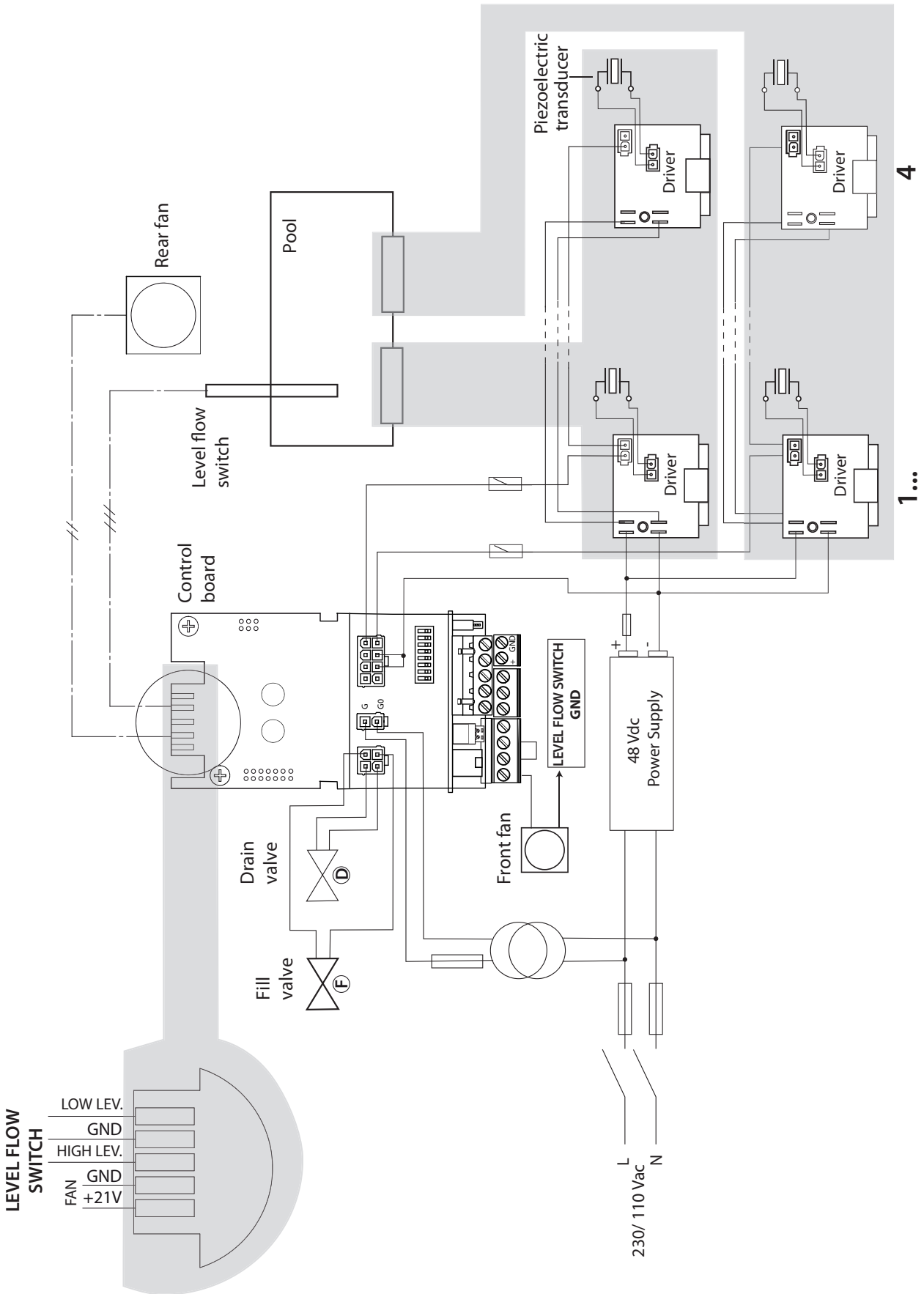


Fig. 11.a

12. GENERAL FEATURES AND MODELS

12.1 Ultrasonic humidifier models for fan coils and electrical specifications

The table below summarises the electrical data (power supply voltages) of the various models, as well as their functional characteristics. Note that some models can be powered at different voltages, obviously with different current and humidity production values.

model	Humidity production (kg/h) ^(2,4)	Power (W) ⁽²⁾	Power supply Voltage ⁽¹⁾ (V - type)	Current draw ⁽²⁾ (A)	Power supply current ⁽²⁾ (A)	Cable ⁽³⁾ (mm ² - AWG)
UU02RD%	2	180	230	0.8	3	0.823 - 18
UU02R1%	2	180	110	1.65	3	
UU04RD%	4	330	230	1.5	6	
UU04R1%	4	320	110	3	6	
UU06RD%	6	480	230	2.1	9	
UU06R1%	6	480	110	4.4	9	
UU08RD%	8	690	230	3	12	
UU08R1%	8	690	110	6.3	12	

Tab. 12.a

- (1) tolerance allowed on rated mains voltage: -15%, +10%;
- (2) tolerance on rated values: +5%, -10% (EN 60335-1);
- (3) recommended values, referring to PVC or rubber cable in a closed conduit, 10 m (32.8 ft) long; compliance with standards in force is always required;
- (4) max instant rated atomised water production: average atomized water production may depend on external factors, such as: room temperature, water quality, atomised water production distribution system



Important: to avoid interference, keep power cables separate from probe cables.

12.2 Technical specifications

Model	UU02R*	UU04R*	UU06R*	UU08R*
Flow-rate l/h	2	4	6	8
No. of transducers	4	8	12	16
Rated power (W) (2)	180	330	480	600
Application	room			
Feedwater pressure	1 to 6 bars			
Feedwater temperature (°C)	5 to 40			
Ingress protection	IP20			
Electronic controller				
Auxiliary voltage / frequency (V/ Hz)	24V/50 – 60 Hz			
Maximum auxiliary power (VA)	3			
Probe inputs (general features)	Can be selected for these signals: 0 to 10 Vdc, 2 to 10 Vdc, 0 to 20 mA, 4 to 20 mA Input impedance: 20 kΩ with signals: 0 to 10 Vdc, 2 to 20 Vdc 100 Ω with signals: 0 to 20 mA, 4 to 20 mA			
Power supply to active probes (general features)	21 Vdc, max 150 mA			
Alarm relay output (general features)	24 V (max 3 W)			
Remote enabling signal input (general features)	Voltage-free contact. Max resistance 100 Ω; max 5 Vdc open, 7 mA closed			
Serial communication	RS485 (Carel/Modbus protocols) 1/8 unit load (96 kΩ)			
Environmental conditions				
Ambient operating temperature °C (°F)	1 to 40 (33.8 to 104)			
Ambient operating humidity (% rH)	10...90			

Tab. 12.b

12.3 Fuse table

Humidifier P/N	48 Vdc power supply fuse (1 fuse type 10.3 x 38)	Power supply fuse (2 fuses type 5 x 20)	250 Vac transformer fuse (1 fuse type 6.3 x 32 T)
UU02RD%	4 A	1 A	3.15 A
UU02R1%	4 A	2 A	3.15 A
UU04RD%	6 A	2 A	3.15 A
UU04R1%	6 A	3.15 A	3.15 A
UU06RD%	10 A	2.5 A	3.15 A
UU06R1%	10 A	5 A	3.15 A
UU08RD%	12 A	3.15 A	3.15 A
UU08R1%	12 A	6.3 A	3.15 A

Tab. 12.c

13. NETWORK CONNECTION

13.1 Setup

The Master unit is able to control the operation of a maximum of 3 Slave units connected via tLAN network. For electrical connections refer to diagram on following.

The Master unit's dipswitches 1-3 must be all set to OFF.

Each slave unit must be properly configured via the following dipswitches:

1: Set to ON for the conversion of the serial port (M11) from 485 to tLAN;

2/3: Slave address, as shown in the following figure.

13.2 Control logic

The master unit controls each Slave unit, through the following parameters:

- enable / disable the operation;
- level of production of atomized water.

The control signals (probes / humidistat / external regulator) are read and handled only by the Master who shall then adjust the operation of the slave. The production level of the Master is passed to all the Slaves:

Es.1: Master configured proportional control (see cap.4.4 the manual) and 90% of request: The master and each slave modulate 90% of its capacity (see chap. "Operating principles").

ES.2: Master configured in the control room sensor, set point 50% rH: The setpoint is reached the Master and all Slave interrupt the production of waterspray.

Each unit (Master or Slave) is autonomous as regards the control logic of the production of atomized water and all the other functions.

13.3 Management of slave by terminal (master)

From the main screen press the PRG button for 3 seconds and enter the password 90. The terminal displays the status of slaves connected according to the following logic:

a digit from the left: Unit 1 Status, Unit 2 Status, Unit 3 Status.

The symbol 1 means "online unit" and the symbol - means "unit offline".

In Fig.1 is the example of online Unit 1 (left Digit to 1) while Unit 2 and 3 Offline (middle digit and the right to -).

Pressing the ENTER key on the terminal goes into the selection menu of the drive you want to check with the UP and DOWN to select the desired unit. Fig.2 shows the selection screen of Unit 1.

Press ENTER to access the control menu of the desired unit, with UP and DOWN you can scroll through the following views:

- Percentage of demand from the master (Fig. 3).
- Operating hour counter (Fig. 4), resettable by pressing UP + DOWN for 5 seconds (see parameter d3, Sect. 7.4 of manual - cod. +0300056EN).
- Units alarms (Fig. 5, if absent -- is displayed), can be reset by pressing UP + DOWN for 5 seconds.
- Access to configuration parameters menu (Fig. 6).

In this view, the icons show the status of the selected unit (Fig.9)

Press ENTER at the login screen of the configuration parameters menu to access the list of parameters (Fig. 7).

For the meaning of the parameters, see chap. "Configuration parameters".

Parameter b8 is used as a timeout for the recognition of a unit offline. According to the number of connected slaves it may be necessary change this parameter (default is 10 seconds).

13.4 Alarms

From the main screen, the Master displays the presence of alarms, of a given slave, through the code ESX.

With X meant as the slave address that the alarm is active (Fig. 8, alarm slave 1).

For details of the alarm being you must enter the menu on the slave.

Each unit is autonomous in managing their alarms, except those related to control signals connected to the Master that inhibit the entire network of humidifiers (See Table 13.a)

13.5 Control via Supervisor (Carel/Modbus®)

Using supervision variables I62 and I63 (Modbus 189 and 190) you can view and set the parameters of the slave.

The variable I62 (Modbus 189) must be written as in table 13.b. If the variable is required for reading the value will be present in the variable I63 (Modbus 190) after writing the I62, if the variable is required for writing, the value written will be present in the variable I63, which must be written first.

Ex: Write the parameter P0 Slave 2 to 70

- Writing I63 into 70;
- Writing I62 into 50224 (See table 13.b for example):



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

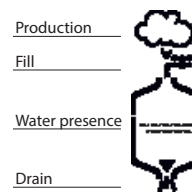


Fig. 9

Code	Description
PU	External Signal not connected
OFL	Supervisor unconnected and Master Unit with serial request enabled

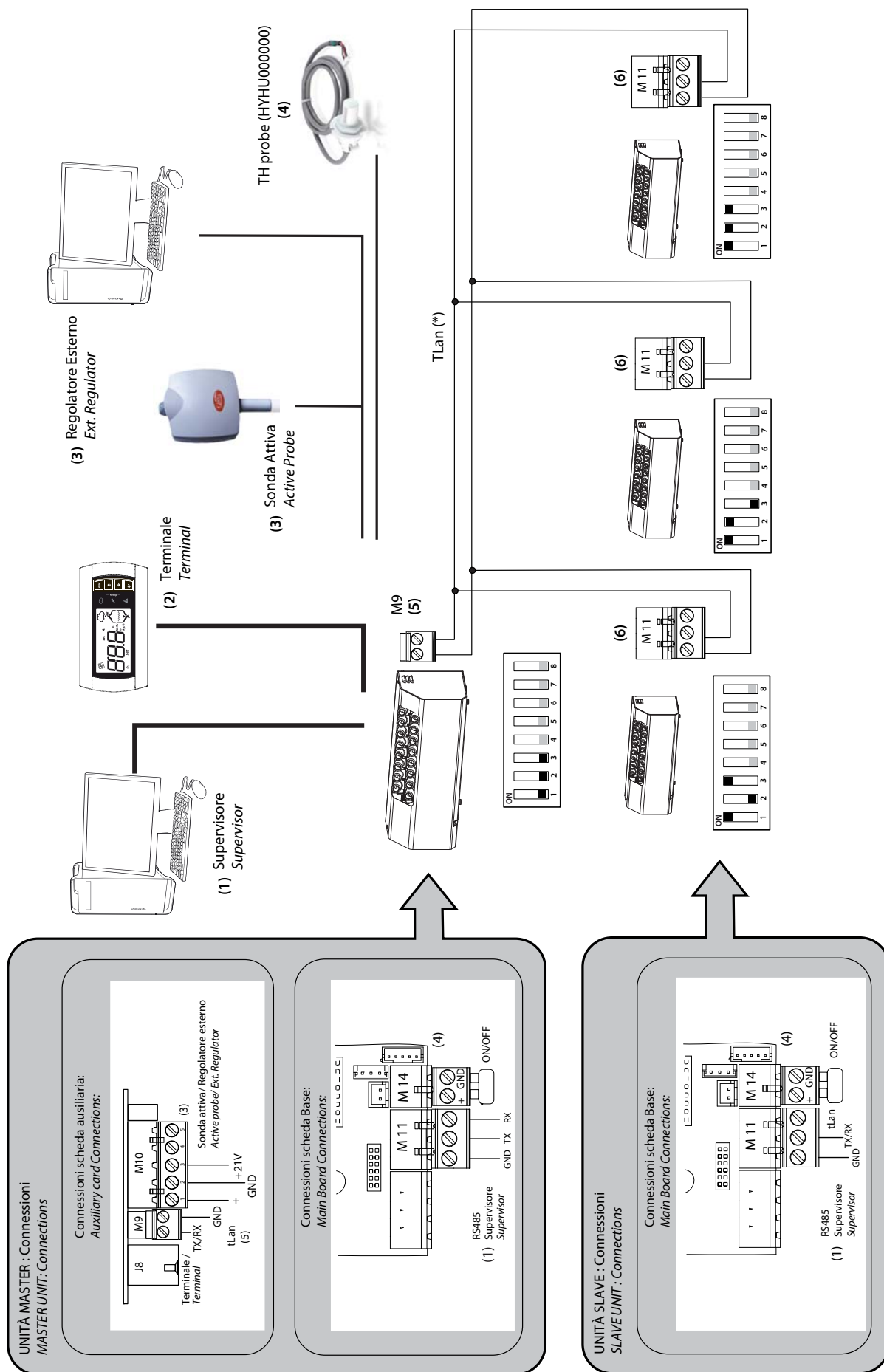
Tab. 13.a

Bit 15 Mode	Bit 13-14 Slave Address	Bit 8-12 Variable Type	Bit 0-7 Carel Supervisor Address
0=Reading 1=Writing	01 = Slave 1 10 = Slave 2 11 = Slave 3	00100=Int. 01000=Analog 10000=Dig	Es.: 0000 1000=8

Tab. 13.b

Example:

Writing	Slave 2	Int. variable	P0= Address 48	
1	10	00100	00110000	=1100010000110000=50224



Note: connect the shield of the serial cable to the humidifier earth terminal (PE)
Shielded cable AWG 20/22 max. 10 m/33 ft

CAREL

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