SIGMA

PERFECT HUMIDIFICATION

DIRECT WALL SERIES

WALL MOUNTED ULTRA SONIC HUMIDIFIER IOM MANUAL

ultra pure™ SYSTEMS

WARNINGS

This product is compliant with the European directives and other standards specified on the EC declaration of conformity. The customer is responsible for suitably verifying any use of the product that implies application of standards relating to any special environments and/or processes (e.g. heavy industry, medical environments, maritime environments, railway environments, etc.) other than those specified by Carel.

UltraPure Systems Si6ma 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 our website ultrapureus.com. Each UltraPure Systems 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. Failure to complete such operations, which are required/indicated in this user manual, may cause final product to malfunction; UltraPure Systems 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. UltraPure Systems 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 followd. In addition to observing the above warnings and suggestions, the following warnings must be followed for the correct use of each humidifier:

- *DANGER OF ELECTRIC SHOCK: Humidifier contains live electrical components. Disconnect t main power supply before accessing inside parts or during maintenance and installation.*
- *DANGER OF WATER LEAKS: Humidifier automatically fills/drains to operate correctly. Periodically check for leaks around and inside right side of cabinet.*

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.*
- *DI water with the characteristics indicated in this manual must be used for proper operation.*
- *All operations on the product must be carried out according to the instructions provided in this manual and on the labels applied to the product. Any uses or modifications that are not authorized by the manufacturer are considered improper. UltraPure Systems declines all liability for any such unauthorized use.*
- *Do not attempt to open humidifier in ways other than those specified in this 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). Ultra Pure Systems 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 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.*

UltraPure Systems adopts a policy of continual development. Consequently, UltraPure Systems 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 UltraPure Systems in relation to its products is specified in the UltraPure Systems general contract conditions, available on the website www.ultrapureus.com and/or by specific agreements with customers; specifically, to the extent where allowed by applicable legislation, in no case will UltraPure Systems, 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 UltraPure Systems or its subsidiaries are warned of the possibility of such damage.

Content

1. INTRODUCTION AND ASSEMBLY

1.1 Ultra Pure (UP 04-16)

Range of ultrasonic adiabatic humidifiers for direct humidification in rooms, with built-in fans for uniform mist distribution. UltraPure humidifiers are suitable for many applications, such as: production plants, datacenters, warehouses, printing facilities, museums, restoration workshops, theater's, etc., where room humidity is essential to maintain a specific room specification.

1.2 Part numbers

P/N	Description
UP(X)R(*)AS00	with auxiliary card and with humidity probe

Tab. 1.a

(X) = 4 → (4.4lbs/h), 8 → (8.8lbs/h), 13 → (13.2lbs/h), 17 → (17.6 lbs/h)

(*) = D →, 1 → power supply 110 Vac

1.3 Dimensions and weights

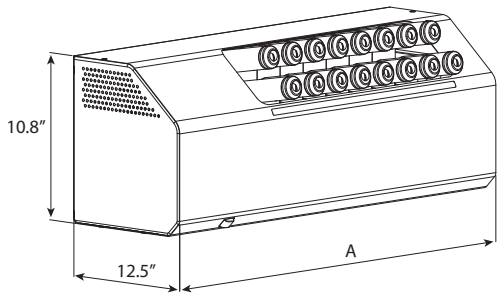


Fig. 1.a

Models	UP04	UP08	UP13	UP17
Production (lbs/h)	4.4lbs/hr	8.8lbs/hr	13.2lbs/hr	17.6lbs/hr
Width A (in)	19	(24	28.9	33.8
Weight (lb)				
packaged	24	31	38	46
empty	21	(28	34	41
installed*	23	32	40	48

Tab. 1.b

* in operating conditions, filled with water.

1.4 Opening the packaging

- □ Make sure package is intact upon delivery and notate any damage on bill of lading along with pictures. Contact UltraPure Systems 1800 729-5192
- □ Move humidifier to site of installation prior to removing out of box.
- □ Humidifier must be stored inside a dry location.

1.5 Material supplied

Make sure the following are included:

1. Wall mounted L brackets
2. User manual.
3. Display
4. 115v 14g 9' cord
5. IOM Manual
6. Secondary Containment Pan
7. (4) S/S Bolts
8. 1/2" Bulkhead
9. 1/2" Black Drain Tube

1.6 Preparing for assembly

- The unit is designed to be assembled on a horizontal support or wall that can support it's weight in normal operating conditions (see par. "Wall-mounting");
- Observe placement where humidifier will be mounted on wall. Avoid any location that is not clear of any obstruction 6' in front and 7' below black nozzles
- Position humidifier horizontally using a level, observing the minimum clearances in (see Fig. 1.b) to ensure correct flow of supply air and allow for required maintenance on both sides of humidifier.
- UP17 clearances depicted below. Smaller humdifiers require less absorbtion. ICall UltraPure Systems for additional information.

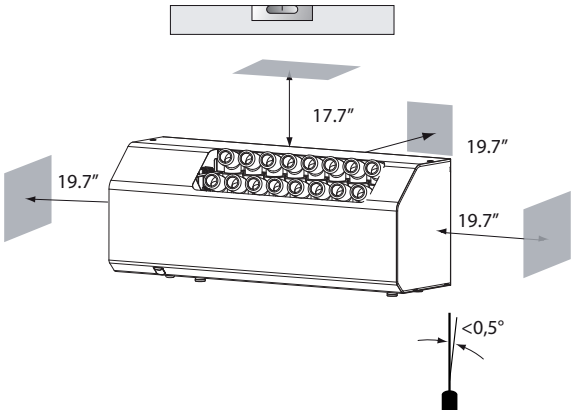


Fig. 1.b

Note: 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 the back/bottom respectively
2. L bracket holes on bottom of humidifier (bolts shipped loose)
3. 3/8" push connection DI water fill, 1/2" push connection drain on back of unit
4. 115v power cord on left side of cabinet (shipped loose)

ASSEMBLY ON A HORIZONTAL SUPPORT

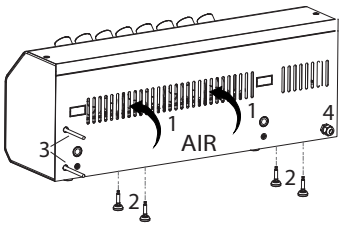


Fig. 1.c

WALL-MOUNTING

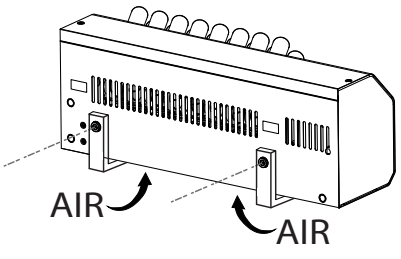


Fig. 1.d

1.7 Wall-mounting

ATTENTION: mount unit using commerial grade anchors only

Assembly instructions:

- Secure L brackets to wall with commercial grade anchors, check horizontal position side to side and front to back of both L brackets with level prior to setting humidifier and securing to L brackets with inlcuded bolts.

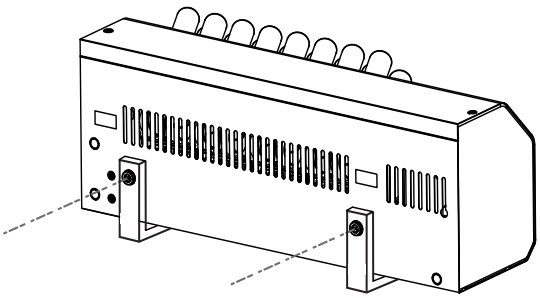


Fig. 1.e

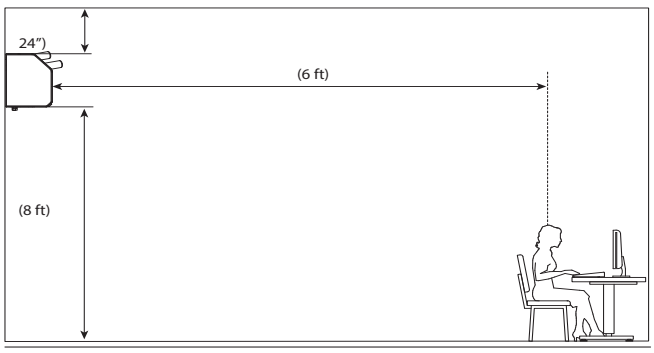


Fig. 1.f

1.8 Identification label

Inside right hand side of each humidifier is UltraPure Systems identification label with model and serial numbers.

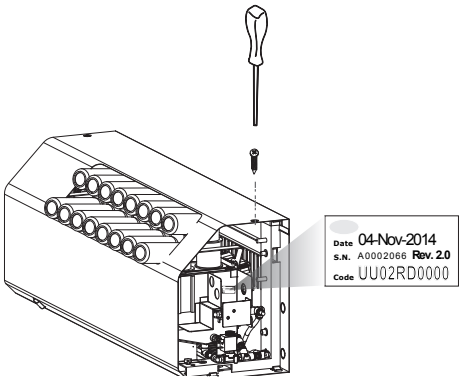


Fig. 1.g

Note: tampering with, removing or failing to reattach the identification labels or anything else that prevents certain identification of the product will void warranty.

1.9 Functional diagram

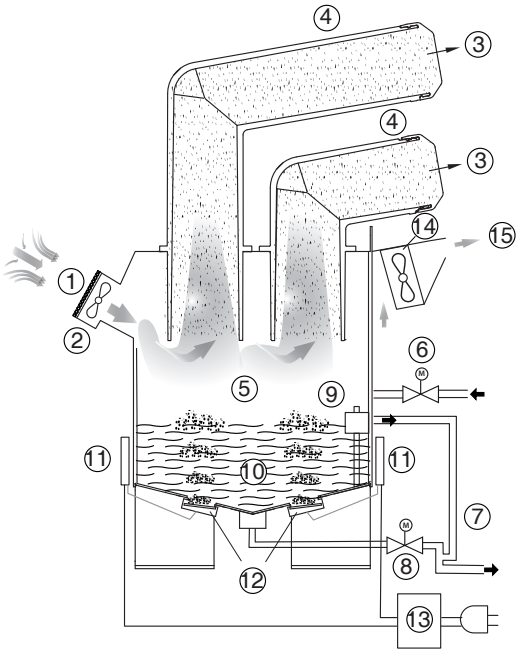


Fig. 1.h

Key

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

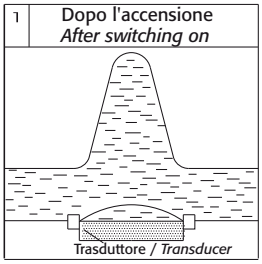
1.10 Operating principle

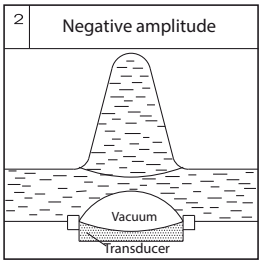
The operation of UltraPure Systems humidifiers is based on the principle of atomizing DI water using ultrasound technology. The humidifier operating principle can be summarised as follows:

- When humidity is below setpoint and hysteresis.
- water fills via a fill solenoid valve until reaching the required level, measured by a float;
- water filled again to the required level;
- fans installed in the humidifier expel droplets of moisture and distribute into the surrounding environment)
- water refills inside humidifier automatically using a float inside humidifier.

Ultrasonic 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 atomized 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.





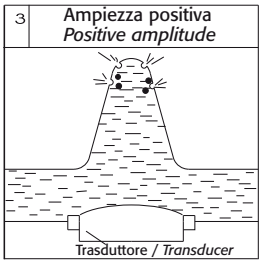


Fig. 1.i

2. WATER CONNECTIONS

IMPORTANT: before proceeding with the water connections, make sure that the humidifier is not plugged in.

2.1 Warnings

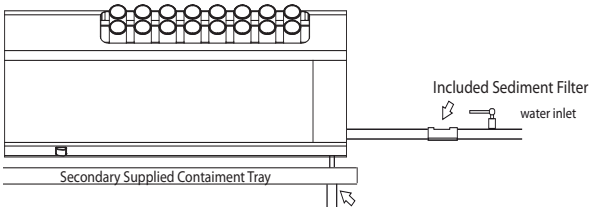
1. Only use DI water. Install a shut-off valve for each humidifier. Allowable water pressure: from 15 to 87 psi);
2. Installed on back is (1) 3/8" push connection for inlet water. On botttom of humdifier is (1) 1/2" push connection for drain. Push 2" black drain line included in clear bag prior to setting humidifier into secondary contaiment pan. Black tube will go into icluded bulkhead drain.
3. DI water inlet to humidifier requires CPVC SCH80 or Stainless Steel pipe.
4. Nominal pressure (87 psi), working temperature at least (35-104°F);
5. Install particulate reduction filter using 3/8" push connection fittings prior to opening water into humdifier.

2.2 Water connections

- Install a manual shut-off valve upstream of the installation to shut off the water supply when needed); the valve must be suitable for use with demineralized water.

Important:

- When installation is completed, flush water supply for 10 minutes by piping water directly into the drain, without sending into the humidifier. After installing the valve, flush with water to eliminate any processing residues and oil and prevent that enter the humidifier;
- Although UltraPure humidifiers are not designed to drain after each cycle. Each humidifier requires a drain. Use 2" black drain line included in clear bag and push into botom drain fitting. This small tube will go into included drain bulkhead that is added to black secondary drain pan. A drain trap must be installed down stream per local code regulations.
- do not obstruct the mist water outlet or air intake openings;
- if there is the risk of the feedwater freezing, insulate or use heating cables on water pipes.



Draining is critical componant for the humidifier
to operate properly. Adapt to bottom of 1/2" bulkhead with 1/2" MPT
fitting and run to drain. 1/2" drain line out of tray is required

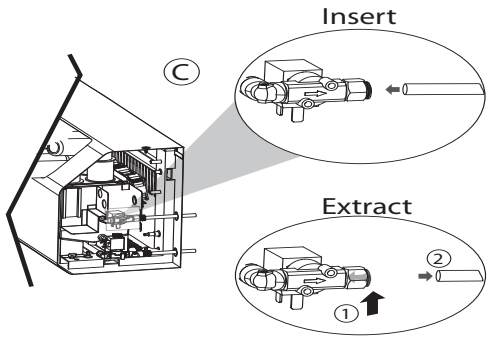


Fig. 2.j

F. Attach fill and drain to the quick connect fittings supplied on back of humidifier

2.3 Humidifier mounted on the wall

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

1. the fill/drain lines, connected to back of panel;
2. included power cable, on the back of panel.

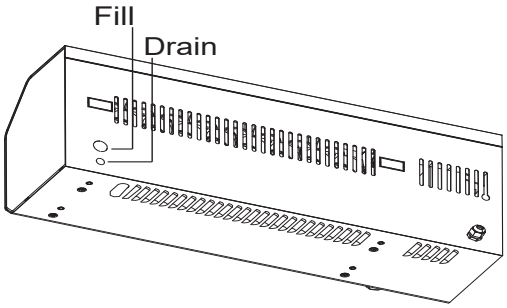


Fig. 2.k

2.4 Feedwater

To ensure correct operation, **Si6ma** humidifiers requires the use of DI water. Refer to UltraPure Systems website for more details.

Mod.	Storage l(gal)	Total expansion l (gal) vessel volume (pre-charge /7psi)	Reverse osmosis system (gph)
UP04	0.62	2.46	1.27
UP08	0.79	3.17	2.01
UP13	0.97	3.87	2.75
UP17	1.14	4.56	3.49

Tab. 1.a

If no storage vessel is available, process water must have an instant flow-rate of .04gl/min per humidifier.

Connecting Si6ma humidifier(s) to our matching RODI cabinet.
UltraPure Systems offers a series of RODI aluminum cabinets to match most all project sizes. Each of our systems are designed to convert municipality water to a suitable water quailty use for ultrasonic humidifers. Our systsems utilize a 6 pass water filtration process in order to acheive DI water. Once water passes through the DI resin and UV sterilizer pressurized water goes into a storage vessel and is held in supplied storage vessel. As water is consumed water is automatically generated to maintain pressure in the storage vessel.

Atomosperic tanks rely on pump pressure to supply water to process.

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

Model	Prod. (gph)	Tank capacity (gal)	Wash (*) l/h (gph)	WTS P/N (only for not American market)
UP04	0.53	0.18	0.74	ROC025500N
UP08	1.06	0.35	0.95	ROC0255000
UP013	1.59	0.53	1.16	ROC0255000
UP016	2.11	0.70	1.37	ROC0255000

Tab. 2.c

2.5 Drain water

This is not toxic and can be drained into a domestic water drain
DRAIN WATER

Quick coupling	1/2" push connection
Typical temperature (°F)	(33° - 104°)

SECONDARY CONTAINMENT PAN INCLUDED WITH EACH UNIT:
06/17/2019

Included with each humdifier is (1) heat bonded containment tray (1) 1/2" bulkhead & (4) 3" bolts.

This tray easily sets onto included L brackets. Line holes up to L bracket holes.
Set humdifier carefully onto standoffs in pan. Line up holes and use included bolts/washers to secure humdifier into place.

Confirm small black drain line included in clear back is pushed into bottom 1/2" push connection prior to setting humdifier nto tray.

CONFIRM BLACK TUBE IS IN BULKHEAD
CONFIRM BOTTOM SCREWS ARE REMOVED ON BOTH SIDE PANELS PRIOR TO SECURING HUMIDIFIER TO L BRACKETS

3. ELECTRICAL CONNECTIONS

3.1 Preparing to connect the power cables

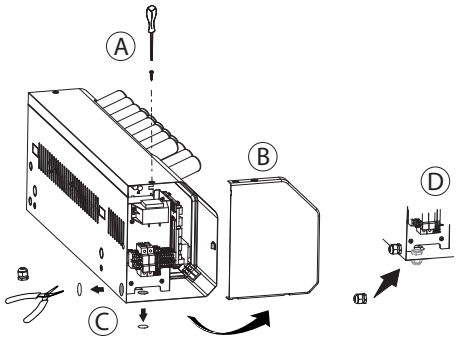


Fig. 3.a

1. UltraPure humidifers are supplied and wired with a #14AWG 115v cord for ease of installation
2. GFCI recepticle is required prior to plugging humidifier into 20a dedicated wall circuit.

3.2 Electrical installation

Important:

- Check that unit's power supply voltage corresponds to the rated data shown on the product label; do not power on unit if water is not level.
- Connect RJ11 fitting into supplied display and secure to wall and inside of left black cover.
- Connect the power cord and push button on front panel.

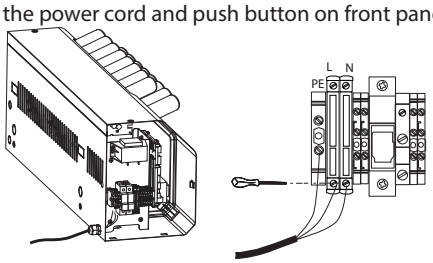


Fig. 3.b

Note: to avoid unwanted interference, power cables should be kept separate from communication wires.

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

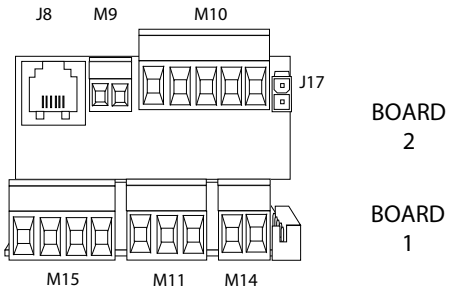


Fig. 3.c

MAIN BOARD

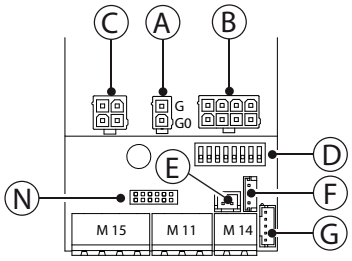


Fig. 3.d

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 (IIC digital serial, part no.: UP_P_0558
M14	remote ON/OFF (M14.1-M14.2)
M11	RS4845 serial (M11)
M15	front fan power
N	auxiliary card connection

AUXILIARY CARD

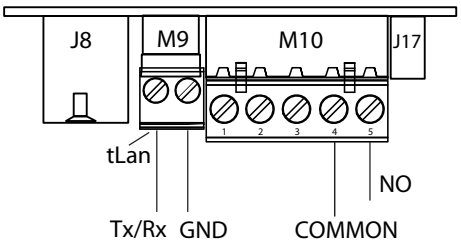


Fig. 3.e

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).

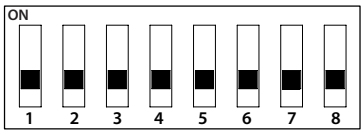


Fig. 3.f

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	Dynamic Proportioanal Control
	ON/ON address 3		OFF
4	Serial 485 / tLAN baud rate		ON
	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).

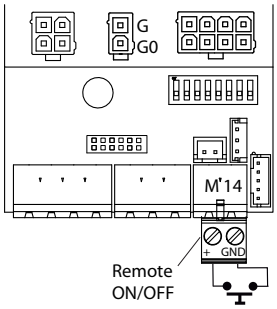


Fig. 3.g

TH HUMIDITY PROBE (Onboard of Humidifier) Standard Offering
If the TH humidity probe is connected to the G terminal mist 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 dipswitches 5-6).

485 SERIAL CONNECTION
MODBUS COMMUNICATION BMS/EMS

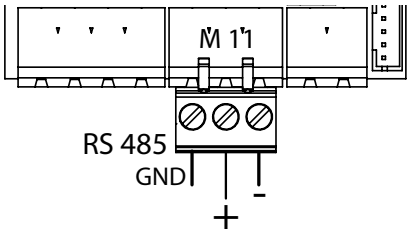


Fig. 3.h

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), 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.

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.

BMS/EMS 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 10V, 2 to 10V, 0 to 20, 4 to 20 mA).

CONTROL WITH HUMIDITY PROBE (OPTIONAL)

- 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 10V, 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).

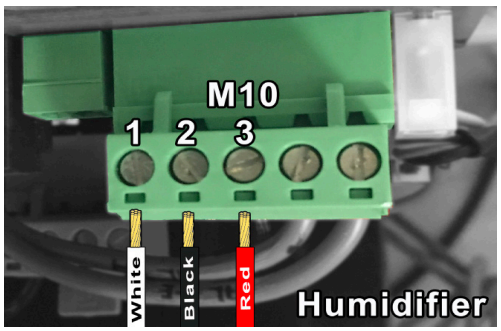
The following conditions represent correct electrical connection:

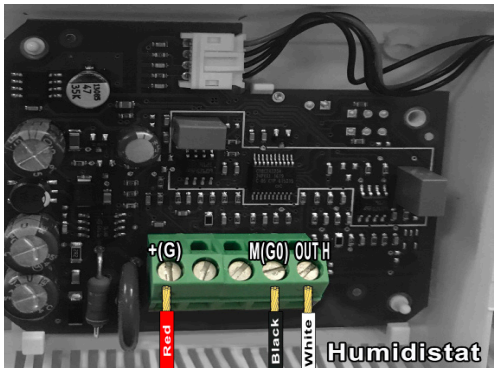
- □ mains power to the humidifier corresponds to the voltage shown on the rating plate;
- □ a mains disconnect switch has been installed so as to be able to disconnect power to the humidifier;
- □ terminals M14.1, M14.2 are jumpered or connected to a contact to enable operation;

if the humidifier is controlled by an external controller (with auxiliary card), the signal earth is electrically connected to the controller earth.

3.4 Remote Humidity Sensor

In order to complete this, press bottom button (return) on display and go
to #77. Press enter and AO Perameter will appear press enter again and change this parameter to 2. Press enter again and esc.
Remote sensor reads humidity only and does not read temperature. Temperature is read from onboard sensor





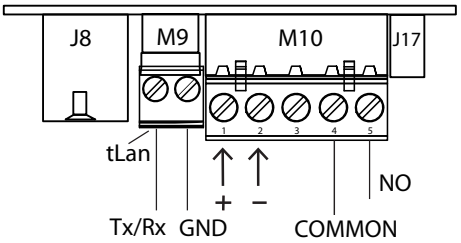
If desired, on board humidistat can be used as a high limit. Permitting remote sensor is used.
ENABLE PROBE TH AS HUMIDITY LIMIT
In control modes A0=0, A0=1, A0=2, the built-in humidity probe TH can be used as a limit probe, setting parameter bH=1. The limit set point and proportional band are set by parameters SL and bL.

3.5 External Proportional Control

Setting perameter AO #1 enables external control BMS/EMS via signal. In order to complete this, press bottom button (return) on display and go
to #77. Press enter and AO Perameter will appear press enter again and change this parameter to 1. Press enter again.
Press the up button until parameter A2 and choose input voltage

0 = On-Off
1= 0-10vdc
2= 2-10vdc
3= 0-20 mA
4= 4-20 mA

Press esc and display will read 0%. Apply field voltage and display will show percentage of output.



DipSwitch #8 must be turned off.

Dynamic Proportional Control cannot be used with External Control signal.

4. STARTING, USER INTERFACE AND BASIC FUNCTIONS

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 opened via jumper on control board.

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:

- 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)
- 0-10, 4-20mA, 2-10vdc signal is used and there is no request

When the humidifier is in standby, the humidifier is emptied every 48hr automatically. When in standby the fan stays on for 5 min.
This assists maintaning accurate RH while in standby.

4.3 Autotest

Whenever humidifier is first started (from off), if enabled and humidity production is required, if internal test is successful, mist production will start. If the test fails, production is disabled (see 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.
- From main screen scroll up, until Enb is shown Press Enter to disable the unit. In order to enable the unit press Enter (bottom button)
- Off by dry contacts "C" will be displayed M14
- Off by Supervisory System "S" will be displayed
- Off by TAM (fan detector "F" will be displayed

4.6 Reset tank hour counter

- DISREGARD WHEN DISPLAY IS SUPPLIED WITH HUMIDIFIER

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:
Refer to parameter B5 for hour counter

- 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.
-

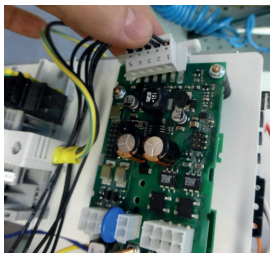


Fig. 4.a

4.7 Automatic washing

Si6ma Ultra Sonic humidifiers are not designed to drain continues water. Water will be used throughout each cyle unless humidifier has been in standby for 48hr at which point water will drain. This mitigates any standing water more then 48hours.
Automatic washing can be acheived by changing parameter BO to 7 if desired.

4.8 Washing due to inactivity

If the humidifier remains inactive (on but in standby) for an extended period (parameter b2, default 48 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 48 hours of no operation, i.e. the humidifier is in standby.

5. LCD TERMINAL (OPTIONAL)

5.1 Remote display terminal (UUKDI00000)

Each Si6ma humidifier will be shipped with a remote display 3" & 8" cable. Longer length is optional. 15ft maximum wiht aux board purchased seperatly.

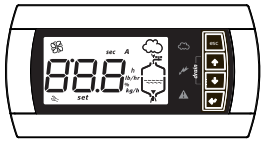


Fig. 5.a

The terminal displays humidifier status and can be used to customize operation by setting perameters and turning humidifier off via display

Unit Disabled at display:
"C" off by dry contacts
"T" off by terminal
"S" off by Supervisory System
"T" off by TAM fan detector (optional)

CONNECTION:

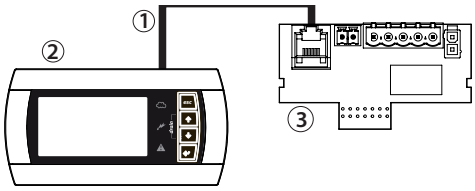


Fig. 5.b

Key:

1	Included 6-wire telephone cable (6,6 ft) Optional 15' length (optional)
2	remote display terminal.
3	Standard Aux card (Integral of humidifier)

(1) For lengths exceeding 15' optional aux power supply card is required P# UP_P_0559

Optional Remote connection of the terminal up to 656'

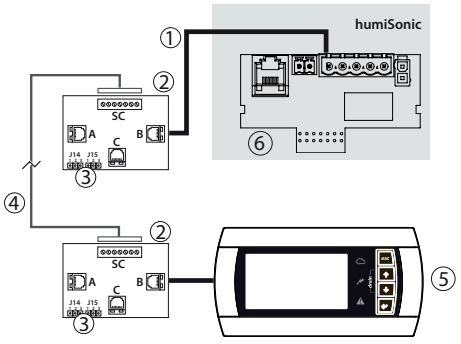


Fig. 1.a

Key:

1 telephone cable (up to 656' distance);
2 UP_P_0559 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 656' away. Connection to the UP_P_0559 board:

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

SC terminal	function
4	RX/TX+
5	GND
6	+VRL

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 (showned even if unit is in stand-by mode, because drain valve is normally open)

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)	for 2 seconds: access the list of parameters
	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 shows control signal status for stand alone proportioanal control. (A0=0, A0=1, A0=3 can be changed for differert contol methods upon startup.

Standard viewable points on display
- display humidity probe reading;
- display temperature
- Humidifier hour counter
- maximum mist 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 problem persists, call 800 729-5192

(*) 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;
- dFt appears, press ENTER and dFt is flashing: press ENTER again to have

6. OPERATING PRINCIPLES

6.1 Ultrasonic atomization

Ultrasonic humidifiers atomize water through propagation of a waves generated by a piezoelectric element to the surface of the water. Droplets of water form on the surface, with the smaller ones being carried by the forced air flow. The quantity of atomized 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. DI water is required, any other form of water has potential of fouling transducers and possibility of white dust accumulating within space is severe.

6.2 Control principles

The humidifier can be controlled using the following signals:

- remote ON/OFF;
- Humidity probe Optional (set by dipswitch);
- 0-10vdc serial.

ON/OFF control M14

The action is humidifier is on or off, 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 mist if the remote ON/OFF contact is also closed;
- contact open: mist production ends.

Proportional control

- Mist 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;
- When 0-10vdc is used, in case of disconnected cable or loss of signal humidifier stops production ie. no voltage no demand.
- If 4-20mA or 2-10vdc is used in case of disconnected cable or loss of signal PU alarm is activated due to loss of voltage. (Preferred for BMS/EMS)
- 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").

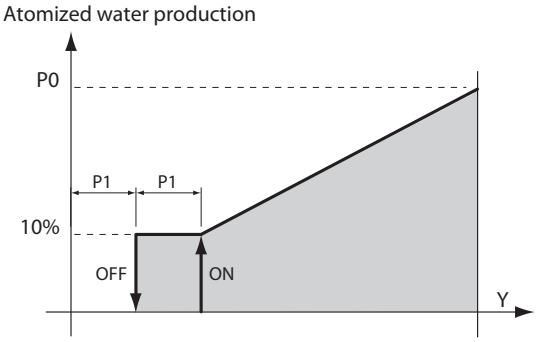


Fig. 6.a

Automatic control with humidity probe

Humidity production is controlled based on the reading of the relative humidity probe.

The humidifier will produce until reaching the set point (St, default 45%RH), with a settable activation hysteresis (P1 default 5%) (see the figure) to maintain the set point.

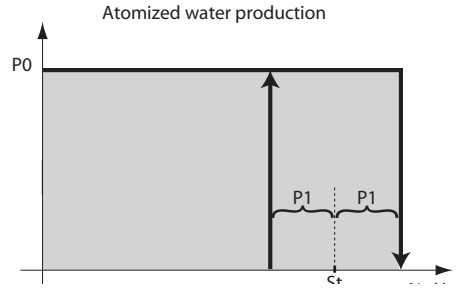


Fig. 6.b

6.3 Dynamic Proportional Control (Dipswitch 8)

Mist 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.

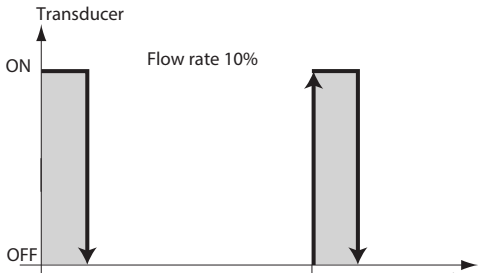


Fig. 6.c

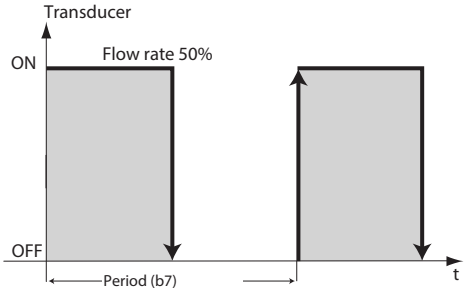


Fig. 6.d

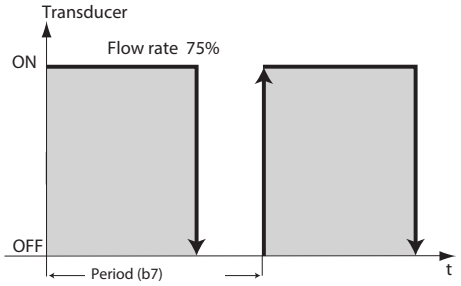


Fig. 6.e

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

6.4 Dynamic Proportioanal Control (Dipswitch 8 ON)

Mist 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 is used 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 in minutes, depending of the size), humidification is interrupted, the drain is activated and the humidifier 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 humidifier waits 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 atomized water production

The humidifier monitors the water level inside the tank during production of atomized 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, atomized water production stops and the humidifier 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.

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).
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 6 and 12.

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	# 3 Default #2 Remote Humidity Sensor
A1	Unit of measure 0 = Celsius ; 1= Fahrenheit	-	0...1	1	
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	Optional (UP_P_0569)
P0	Maximum production	Pm...100	100	80	Default 80%
SP	Humidity Set Point	% rH	20..80	50	Only if terminal connected otherwise values seet by dipswitch
P1	Humidity control hysteresis	2...20	2	5	Default 5°
Pm	Minimum production	5...P0	10	10	
SL	Humidity limit set point	%rH	0..80	70	
bP	Proportional band for control with probe	%rH	2..20	10	
bL	Proportional band for humidity probe	%rH	2..20	10	
C0	Default display (Terminal) 0 = Probe reading/control signal; 1 = P0 maximum production; 2 = Hour counter	-	0...2	0	if CO=1, to access the advacned parameters, first use the arrows to display any value other then PO, then see chap. 5-6

Tab. 8.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…15	5	
A7	Fan speed	%	40…100	50	
A8	Maximum evaporation time for reduced production alarm	min	0…200	30	
A9	Minimum evaporation time for reduced production alarm	min	0…A8	1	
AA	Waiting time for retry	min	1…60	10	
Ab	Percentage of A8 to carry out level test	%	50…90	70	
AC	Maximum time to measure level when refilling	s	1…60	40 (UP02) 60 (UP04) 80 (UP06) 100 (UP08)	
Ad	Maximum time to measure high level	s	1…60	10	
AE	Restart fan time in standby for integrated probe reading	min	0…120	10(**)	
AF	Piezoelectric transducer working life	h	0...9999	9999	DI water only
b0	Operating options (see table for parameter b0) keeps the drain solenoid valve closed during standby (no demand), disables wash cycle due to inactivity and disables autotest upon powering unit on	-	0…255	32	
b1	Time between two washing cycles	min	0…120	0	Disables periodic washing
b2	Inactivity time for washing	h	0…240	24	
b3	Washing time (fill + drain)	min	0…10	0	Disables periodic washing
b4	Start delay time	s	0…120	10	
b5	Operating hours for CL alarm	h	0…9999(*)	9999	
b6	Time to display new CL alarm after reset from keypad (without resetting hour counter)	min	0…240	60	
b7	Transducer modulating control period	s	0…10	2	
b8	Probe disconnected delay	s	0…200	10	
b9	OFF delay from TAM	s	0…60	2	
bA	Maximum fill time	min	0…30	6 (UP02) 9 (UP04) 12(UP06) 15 (UP08)	
bb	Water refill time in production	s	0…120	20 (UP02) 28 (UP04 40 (UP06) 52 (UP08)	
bC	Maximum drain time	s	0…1500	75 (UP02) 100 (UP04) 150 (UP06)200 (UP08)	
bd	Drain opening time to completely empty tank	s	0…1500	60 (UP02)80 (UP04) 120 (UP06)160 (UP08)	
bE	Delay time after measuring low level for refilling	s	1…20	10	
bf	Drain activation delay in standby (if drain solenoid valve in standby = OPEN)	min	0…60	1	
bH	Enable probe TH as humidity limit	-	0...1	0	if enabled, applies to modes AO = 0,1,2
bL	Proportional band for humidity limit	%rH	2...20	10	
bP	Proportional band for control with probe	%rH	2...20	10	
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. 8.b

(1) To be able to modify the value on the terminal, the corresponding dipswitches must all be Off. To be able to use the value set by the dipswitches again, set one of the dipswitches to On and power off. When powering on again, the controller will use the values set by the dipswitches.

(*) 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 0 (zero), for humidifiers without auxiliary card and without humidity/temperature probe.

9. 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

9.1 Supervisor variable list

"A" CAREL - Modbus®	analogue variables* (Modbus®: REGISTERS)	R/W
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: Instant production	R

"I" CAREL	"I" Modbus®	integer variables (Modbus®: REGISTERS)	R/W
1	128	Level access password	R/W
7	134	Humidifier Status	R
2	129	Firmware release	R
15	142	Alarms, refer to Chap.8 ALARMS: • bit0: Alarm E0 bit8: Alarm EE • bit1: Alarm Et bit9: Alarm CL • bit2: Alarm EF bit10 Alarm ES1 • bit3: Alarm Ed bit11: Alarm ES2 • bit4: Alarm EP bit12: Alarm ES3 • bit5: Alarm PU bit 13: Alarm OFL • bit6: Alarm H ¯ bit 14: Alarm EL • bit7: Alarm H_ bit 15: Alarm ETL • bit8: Alarm EE • bit9: Alarm CL	R/W
20	147	Parameter A0: Operating mode	R/W
21	148	Parameter A2: Type of external probe	R/W
22	149	Parameter A3: Probe minimum	R/W
23	150	Parameter A4: Probe maximum	R/W
24	151	Parameter A5: Probe offset	R/W
25	152	Parameter A6: Fan off delay time	R/W
26	153	Parameter A7: Fan speed	R/W
27	154	Parameter A8: Maximum evaporation time for no production alarm	R/W
28	155	Parameter A9: Minimum evaporation time for no production alarm	R/W
29	156	Parameter b0: Operating options	R/W
30	157	Parameter b1: Time between two washing cycles	R/W
31	158	Parameter b2: Inactivity time for washing on next start	R/W
32	159	Parameter b3: Washing time (fill + drain)	R/W
33	160	Parameter b4: Start delay time	R/W
34	161	Parameter b5: Operating hours for CL alarm	R/W
35	162	Parameter b6: Time to display new CL alarm in minutes	R/W
36	163	Parameter b7: Transducer On/Off control interval	R/W
37	164	Parameter b8: Probe delay disconnected	R/W
38	165	Parameter b9 TAM OFF delay	R/W
39	166	Parameter bA: Maximum fill time	R/W
40	167	Parameter bb: Refill time in evaporation	R/W
41	168	Parameter bC: Maximum drain time	R/W
42	169	Parameter bd: Drain opening time to completely empty tank	R/W
43	170	Parameter bE: Delay time after measuring low level for refilling	R/W
44	171	Parameter C0: Default display (Terminal)	R/W
45	172	Parameter C1: Parameter A0: Baud rate	R/W
46	173	Parameter C2: tLAN address (If 0 Master controller)	R/W
47	174	Parameter C3: Serial address	R/W
48	175	Parameter P0: Maximum flow-rate	R/W
49	176	Parameter P1: Humidity control hysteresis	R/W
50	177	Parameter P2: Low humidity alarm threshold	R/W
51	178	Parameter P3: High humidity alarm threshold	R/W
52	179	Parameter SP: Humidity set point	R/W
53	180	Parameter d3: Operating hour counter	R
54	181	Parameter d4: Unit hour counter (not resettable)	R/W
60	187	Request via serial (if digital 37 set)	R/W
62	189	Identification of variable on slave unit to read/write from supervisor (see paragraph 14.4)	R/W
63	190	Value of variable on slave unit identified by integer 62 (see paragraph 14.4)	R/W
65	192	Parameter C4: Timeout for master serial offline	R/W
69	196	AA: Waiting time for retry	R/W
70	197	Ab: Percentage of A8 for carrying out level test	R/W
71	198	Pn: Minimum Production	R/W

"I"		integer variables (Modbus®: REGISTERS)	R/W
CAREL	Modbus®		
72	199	bF: Drain activation delay in standby	R/W
73	200	AC: Maximum time to measure level when refilling	R/W
74	201	Ad: Maximum time to measure high level	R/W
82	209	AE: Restart fan time in standby for integrated probe reading	R
87	214	Slave 1 firmware release	R
89	216	Slave 1 humidifier status	R
92	219	Parameter d3, slave 1: Operating hour counter	R/W
93	220	Slave 2 firmware release	R
95	222	Slave 2 humidifier status	R
98	225	Parameter d3, slave 2: Operating hour counter	R/W
99	226	Slave 3 humidifier status	R
101	228	Slave 3 humidifier status	R
104	231	Parameter d3, slave 3: Operating hour counter	R/W
105	232	Piezoelectric transducer operating hour counter	R
106	233	Parameter d6 Time remaining to end of piezoelectric transducer life	R/W
107	234	Parameter AF: Piezoelectric transducer working life	R/W
112	239	Parameter bH: Enable probe TH as humidity limit	R/W
113	240	Parameter SL: Humidity limit set point	R/W
114	241	Parameter bP: proportional band for control with probe TH or external probe	R/W
115	242	Parameter bL: limit proportional band	R/W

"D"				"D"			
Carel	Modbus	digital variables (ModBus: COILS)		Carel	Modbus	digital variables (ModBus: COILS)	
2	1	Just Started Flag	R	25	24	Aux Relay	R
3	2	• Humidity ready to produce	R	26	25	• Manual Drain	R/W
4	3	• Humidity set point reached	R	27	26	• Disable from Serial	R/W
5	4	• Green LED	R	28	27	• Reset Hour Counter	R/W
6	5	• Red LED	R	29	28	• Reset Alarms	R/W
7	6	• Yellow LED	R	30	29	• Washing due to inactivity	R
8	7	• Remote ON-OFF	R	30	31	• Status of dipswitch 8 Dynamic Control	R
9	8	• Low Level	R	31	30	• Functional Test performed	R
10	9	• High Level	R	33	31	• Unit of measure	R/W
11	10	• Aux Level	R	34	33	• Slave 1 online	R
12	11	• AutoTest Completed	R	35	34	• Slave 2 online	R
14	12	• BMS serial in tLAN mode	R	36	35	• Slave 3 online	R
15	14	• TAM enabled	R	37	36	• Enable control from serial	R/W
16	15	• TAM reading	R	38	37	• Wash activation for serial	R/W
17	16	• Display connected	R	39	38	• Skip auto washing while in test	
18	17	• Production in process	R	40	38	• Slave 1 disabled	R
19	18	• Fill	R	41	40	• Slave 2 disabled	R
20	19	• Drain	R	42	441	• Slave 3 disabled	R
21	20	• Transducer 1	R	43	42	• Reset piezoelectric transducer hour counter	R/W
22	21	• Transducer 2	R				
23	22	• Fan	R	44	43	• Backup unit ready for production	R
24	23	• Alarm Relay	R	46	45	• Production limiting in progress (limit probe)	R
24	23			47	46	• on/off control from keypad	R/W

9.2 Production control via network

To control production via a 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
- setpoint.

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 production stops.

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

9.3 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.

10. 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	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 min. waiting period)	humidification interrupted only per 10 minutes	automatic (after 10 minute wait, see Chap. 5.8)
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	b5 operating hours for recommended maintenance exceeded	Carry out maintenance on tank and transducers (cap. 9)	no	signal only	Reset hour counter (See Chap 5.6 or 6.8)
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
6 slow flashes	ES1 ES2 ES3		Alarm on slave unit 1/2/3	Display slave unit from terminal for details of the alarm	see specific alarm code, chapter "Network connection"	yes	signal only	AUTO
1 slow flash	-bu		Backup unit not available	The backup unit is off or has an alarm: contact J17 on the main unit is open	Check the connection from the alarm relay on the backup unit to input J17 on the main unit. The logic of the alarm relay on the slave unit must be NC, settable by parameter b0	no	signal only	AUTO
9 fast flashes	EtlL		End of piezoelectric tranducer life	The unit has reached AF working hours (default 9999 h)	Replace the piezoelectric transducers to guarantee rated unit production	Yes	signal only	Reset internal piezoelectric transducer counter by setting parameter d6 to zero (See chapter 5.8)

Tab. 10.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

10.1 Troubleshooting

Note: if the problem identified cannot be solved using the following guide, contact UltraPure 800 729-5192.

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

Problem	Cause		Check	Solution
No mist 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
	Feedwater system	Valve closed upstream	Check	Open the valve
The quantity of mist is too low	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	See table 2)
	Other	The humidifier is not installed horizontally	Check visually	Adjust
No mist production	Dust and foreign matter accumulated in the tank (*)			Clean the inside of the tank
	Transducer deterioration		The average life of the transducer is around 10,000 to 15,000 operating hours	Replace
The quantity of mist 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. 10.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 mist 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
				Clean the sensor. If normal operation is not restored, replace
	Other	The fan cables are loose or detached	Check connection after removing the humidifier cover	Restore correct connection to the terminals
The quantity of mist 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	If there is continuity, contact service to replace the level sensor
		Fill valve fault	Water is filled even after switching off the humidifier	Replace the fill valve

Tab. 10.c

11. MAINTENANCE AND SPARE PARTS

11.1 Electrical components

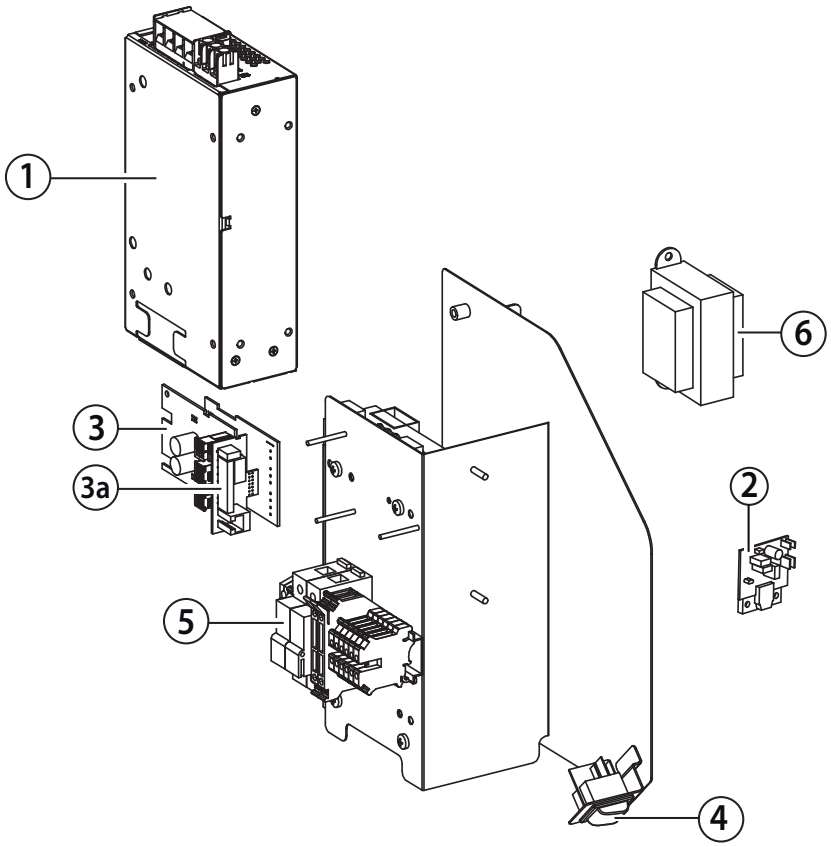


Fig. 11.a

n.	description	Spare part number
1	Power supply	UP_p_0571 size (4.4-8.8 lbs/h)
		UP_P_0572 (13.2-17.6 lbs/h)
2	Driver board	UP_P_0573
3	Based board	UP_P_0574
3a	Auxiliary board	UP_P_0575
4	ON/OFF switch	-
5	Terminal block	-
6	Transformer	UP_P_0576

Tab. 11.a

(X) = 4→ (4.4 lbs/h),
8→ (8.8 lbs/h),
13 → (13.2 lbs/h),
17.6→ (17.6 lbs/h)

11.2 Mechanical components

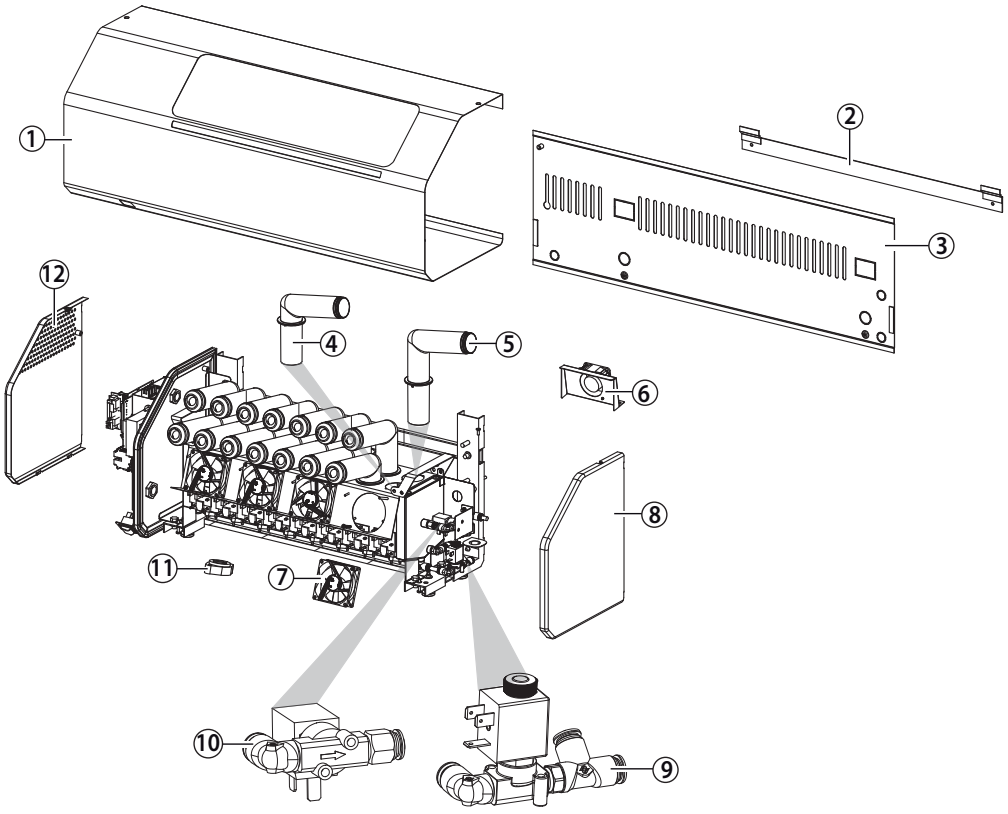


Fig. 11.b

n.	description	Spare part number
1	Cover	-
2	L Brackets	UP_P_0562
3	Rear panel	-
4	Front diffuser	UP_P_0577
5	Rear diffuser	UP_P_0578
6	Rear fan	UP_P_0579
7	Front fan	UP_P_0580
8	Right side closure	
9	Drain solenoid valve kit	UP_P_0560
10	Fill solenoid valve kit	UP_P_0561
11	Piezoelectric transducer	UP_P_0582
12	Left side closure	-
13	Internal tank level sensor	UP_P_0583

Tab. 11.b

11.3 Maintenance

Maintenance on the humidifier must be carried out by a qualified technician or 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;
- Do not apply excessive force while tightening machine nuts. Excessive tightening torque may damage the humidifier.

11.4 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 DI water minimizes 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 is 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.

11.5 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.

11.6 Replacing the components

To access the inlet/drain solenoid, remove the right side closure

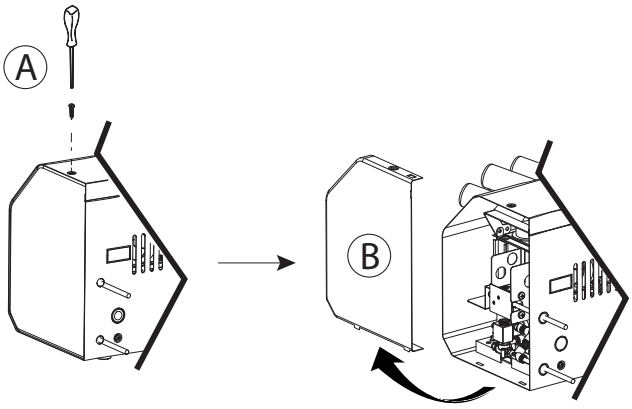


Fig. 11.c

1. loosen and remove the screw (A);
2. remove the cover (B).

Drain solenoid valve

1. 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.

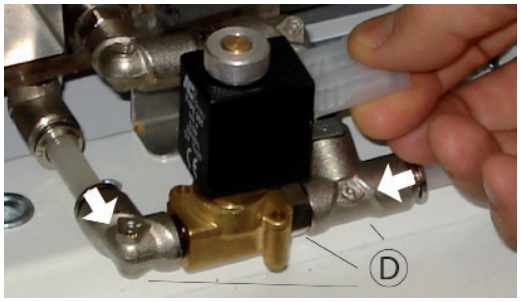


Fig. 11.d

Fill solenoid valve

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

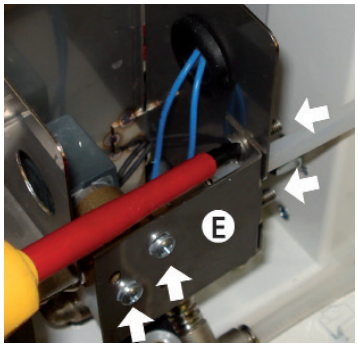


Fig. 11.e

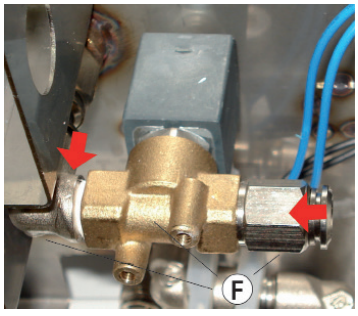


Fig. 11.f

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

Dismantling the rear panel (to access the rear fans

Warning: disconnect the main power supply of the humidifier before proceeding with the following operations.

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).

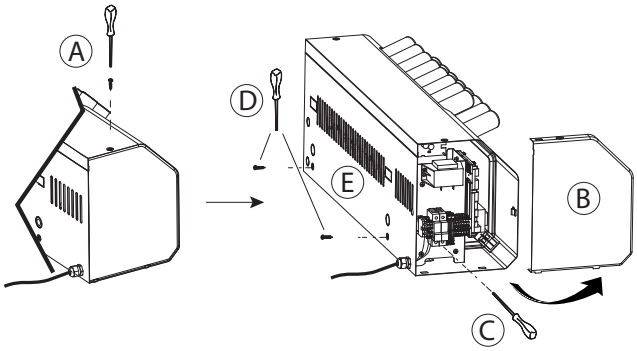


Fig. 11.g

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

To access to the front fans and drivers with the wall-mounted humidifier. Remove humidifier from wall and set onto work bench. Remove side black panels and remove (4) 1/2" bolts that attach the humidifer to the base of the white case. Slide the white panel away from the main humidifier.

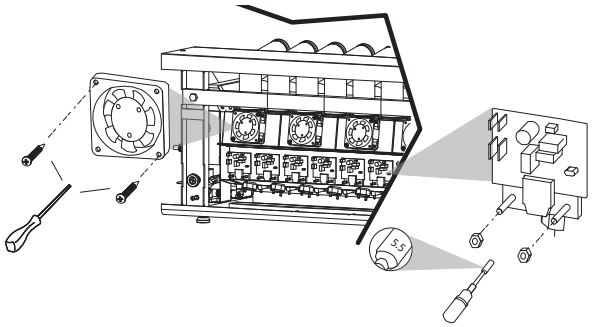


Fig. 11.h

Front fan/driver board

1. Unscrew the screws under the bottom panel;

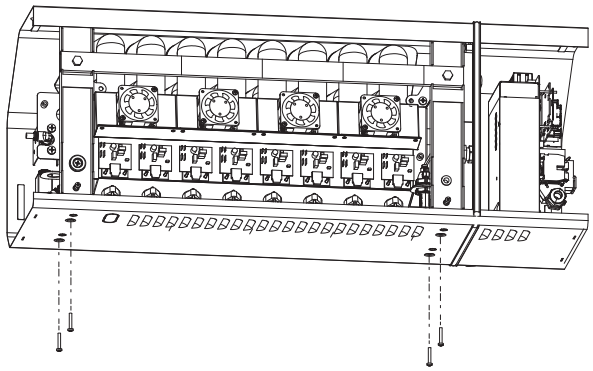


Fig. 11.i

Remove the cover from the two uprights;

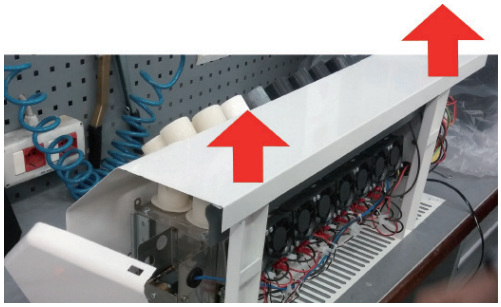


Fig. 11.j

2. Slide out the humidifier body;

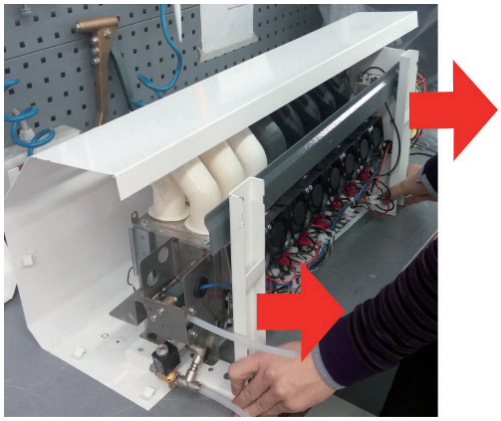


Fig. 11.k

3. To remove the front driver board, loosen and remove the two fastening nuts

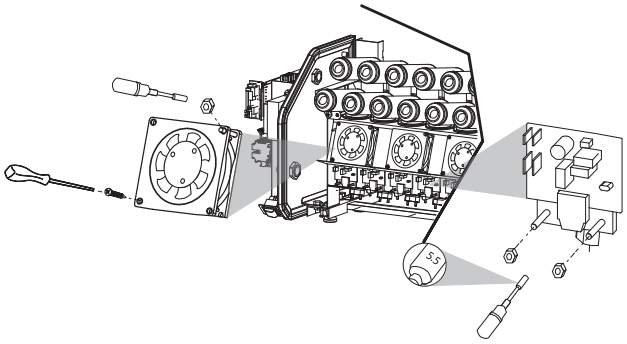


Fig. 11.l

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

Piezoelectric transducer

To access to the Piezoelectric transducers with the wall-mounted humidifier. Remove humidifier from wall and set onto work bench. Remove side black panels and remove (4) 1/2" bolts that attach the humidifer to the base of the white case. Slide the white panel away from the main humidifier.

Note: Mist capacity of the piezoelectric transducer gradually decreases with use. It is recommended the replacement after 10,000 operating hours, if the water in use is DI, although the unit can continue to operate as long as the actual capacity corresponds to the requirements. With drained or tap water, operating hours can be reduced depending on the water quality. DI water is recommended.

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 socket or nut driver (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 mist water production and potential humidifier malfunctions.

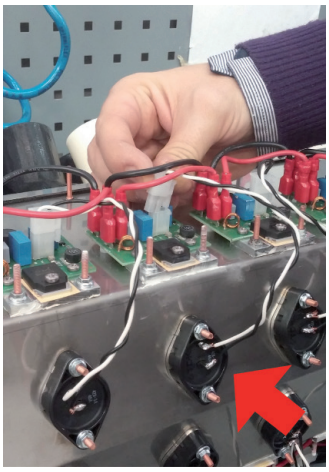


Fig. 11.m

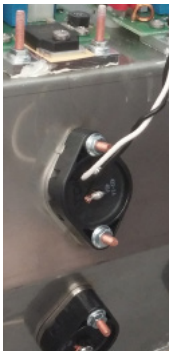


Fig. 11.n

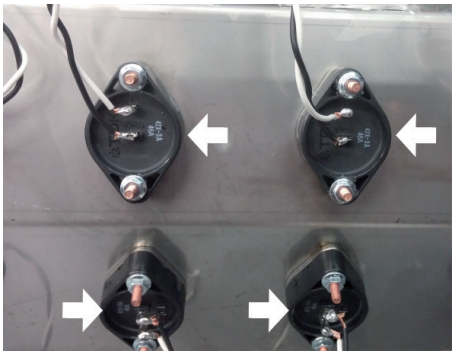


Fig. 11.o

Note: the tightening torque of the nuts that fasten the transducer must be 28±0.5 lb-ft.

Control board and power supply

To access the electronic control board and power supply, just remove the left side lock (Fig. 10.g). 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.

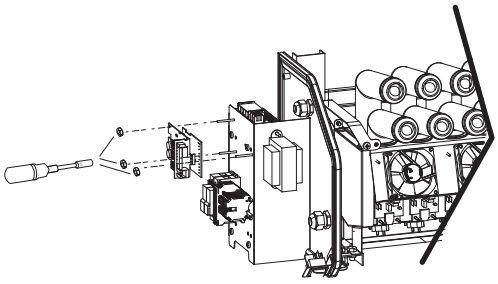


Fig. 11.p

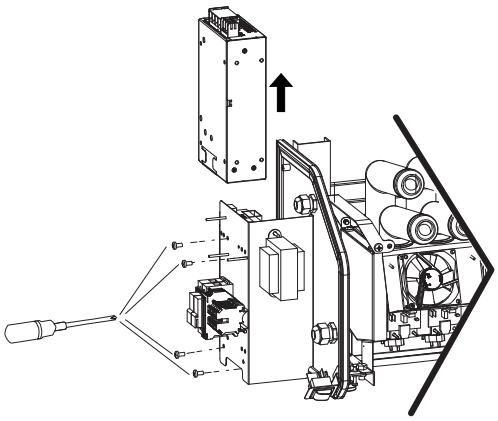


Fig. 11.q

11.7 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.

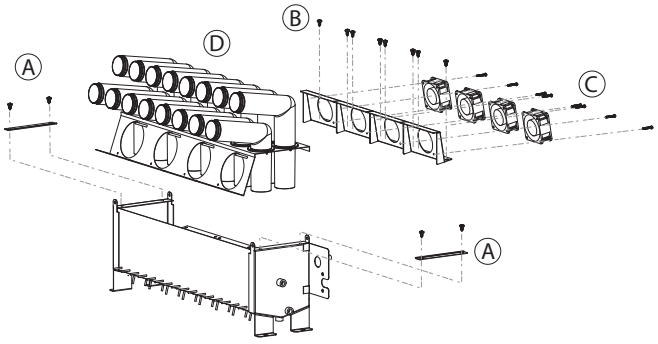


Fig. 11.r

12. WIRING DIAGRAM

12.1 Diagram

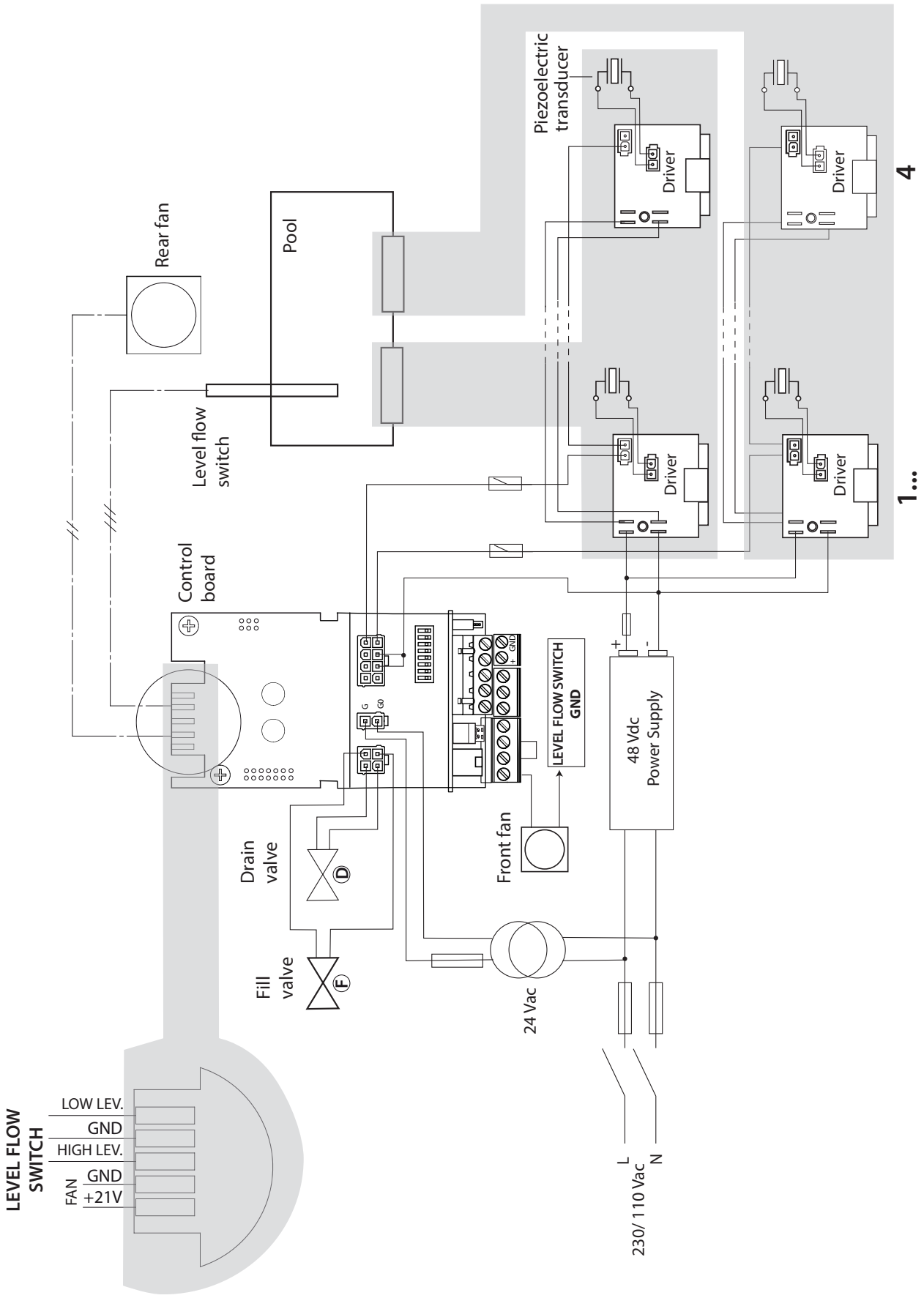


Fig. 1.a

13. GENERAL FEATURES AND MODELS

13.1 Ultrasonic humidifier electrical specifications

The table below summarizes the electrical data (power supply voltages) of the various models, as well as their functional characteristics.

		Power supply			
model	Humidity production [2,4] (lbs/h)	Power [2] (W)	Voltage [1] (V – type)	Current draw [2] (A)	Cable
UP04	(4.4)	180	110	1.65	14g 9' extension cord
UP08	(8.8)	330	110	3	
UP13	(13.2)	480	110	4.4	
UP17	(17.6)	690	110	6.3	

Tab. 13.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, mist production distribution system

⚠ Important: to avoid interference, keep power cables separate from communications wires.

13.2 Technical specifications

Model	UP04	UP08	UP13	UP17
Flow-rate kg/h (lbs/h)	4.4	8.8	13.2	17.6
No. of transducers	4	8	12	16
Rated power (W) (2)	180	330	480	600
Application	room			
Feedwater pressure (psi)	(14.5...87)			
Feedwater temperature (°F)	(41...104)			
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)	33.8 to 104
Ambient operating humidity (% rH)	10-80%

Tab. 13.b

13.3 Fuse table (located inside humidifier)

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)
UP04	4 A	2.5 A	3.15 A
UP08	6 A	2.5 A	3.15 A
UP13	10 A	2.5 A	3.15 A
UP17	12 A	3.15 A	3.15 A

Tab. 13.c

14. NETWORK CONNECTION

14.1 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.

14.2 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.

14.3 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 to1) 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).

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

14.4 Alarms

From the main screen, the Master displays the presence of alarms, of a given slave, trough 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)

14.5 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

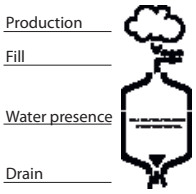


Fig. 9

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

Tab. 14.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. 14.b

Example:

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

Notes