Electric Resistive Steam Humidifier ERS-LC Series, Instructions, Operations, and Maintenance Manual

Armstrong®

1. General Safety Information

1.1 INTRODUCTION

This bulletin should be used by experienced personnel as a guide to the installation of the Armstrong ERS-LC. Selection or installation of equipment should always be accompanied by competent technical assistance. You are encouraged to contact Armstrong International, Inc. for additional information.

Icon Legend

WARNING! **Injury or death and property damage are possible.**

CAUTION! **Potential property damage, expensive repairs,voiding the equipment warranty may result.**

BURN HAZARD! **Contact with steam, hot water, or hot metal surfaces can cause severe skin burns. Skin exposure to 140°F (60°C) water or metal for only five (5) seconds may cause a second degree burn.**

Failure to comply with instructions following a safety icon may result in adverse consequences including property damage, personal injury, or, in extreme cases, death.

General Safety Guidelines:

1. Inappropriate use (beyond typical, intended use) could cause damage to the product and other property. It may also resultin personal injury or, in extreme cases, death.
2. Only designated, qualified, and competent personnel should operate, maintain, and service this equipment in accordance with the directions in this product instruction manual.
3. Improper setup, operation, or maintenance may void the product warranty.
4. When operating and maintaining this product:

   a. ALWAYS select and wear appropriate personal protective equipment (PPE) before carrying out any physical work at the job site, per site-specific requirements. Appropriate PPE may include hard hats, safety glasses, gloves, boots or shoesw/ non-slip soles and toe guards, and protective overalls.

   b. ALWAYS scan the work area and take note of potential hazards before entering. Adjust your travel path or work position to avoid hazards and personal injury.

   c. ALWAYS observe designated safety procedures when working in hazardous locations (areas containing explosive and combustible gases, vapors, and dusts) and confined spaces (locations where the breathable air supply is limited or variable, or where entrapment could occur).

   d. ALWAYS use proper lockout-tagout procedures to disconnect power sources and de-energize machinery before conducting installation, service, and repair.

   e. ALWAYS use great care and appropriate safety gear when working above ground level, especially on ladders and platforms or in the presence of overhead, electrical power lines.

   f. ALWAYS shut off all “live” steam, water supply, and condensate return lines before breaking or loosening any plumbing joints.

   g. ALWAYS carefully relieve any residual internal pressure in the system or connecting pipe work before breaking or loosening any plumbing joints.

   h. ALWAYS allow hot parts to cool before servicing to avoid the risk of skin burns.

1.2 IMPORTANT REMARKS

GENERAL	**Maintenance, service, repairs, as well as the study of the risks and dangers associated with these operations must be carried out by qualified, competent, and authorized personnel.** - Make sure that all risks or dangers are defined beforehand by an authorized person, especially at elevated heights. - We also recommend installing a security perimeter. - Make sure that the power supply is switched off before performing maintenance. - Please periodically tighten all the connection terminals of the power cable.
INTENDED USE	This device manufactured by Armstrong is intended solely for humidification purposes, discharged into the duct of an air-handling system or through a fan package. The user undertakes to use it according to the safety instructions given in this manual. Improper use could result in serious hazards and damages to the user, third parties, and materials.
STORAGE & MAINTENANCE	The device must be stored in a dry, frost-free place, protected from shocks and vibrations. Handling must be carried out by at least two people or suitable lifting equipment.
WATER	Steam humidifiers can be used with potable, demineralized, or softened water. It is absolutely forbidden to inject a chemical into the hydraulic system. Make sure that the water supply pressure does not exceed 87 psi. Always be careful that the installation meets all state and local building codes.
ELECTRICITY	The user ensures that electrical installation will be carried out by an authorized technician in this field. The installer must provide the correct cable section as well as the thermal-magnetic circuit breaker protection, adapted to the regulations in place in the country of installation.
WARRANTY	Armstrong International, Inc. (“Armstrong”) warrants to the original user of those products supplied by it and used in the service and in the manner for which they are intended, that such products shall be free from defects in material and workmanship for a period of one (1) year from the date of installation, but not longer than 15 months from the date of shipment from the factory, [unless a Special Warranty Period applies, as listed below]. This warranty does not extend to any product that has been subject to misuse, neglect or alteration after shipment from the Armstrong factory. Except as may be expressly provided in a written agreement between Armstrong and the user, which is signed by both parties, Armstrong **DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE**.
LIABILITY	**IN NO EVENT SHALL ARMSTRONG BE LIABLE FOR SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE OR PROFITS OR INTERRUPTION OF BUSINESS.** The Limited Warranty and Remedy terms herein apply notwithstanding any contrary terms in any purchase order or form submitted or issued by any user, purchaser, or third party and all such contrary terms shall be deemed rejected by Armstrong.

Contents

1. PRODUCT PRESENTATION

1.1 CHARACTERISTICS

The ERS-LC humidifier is an electric humidifier, designed for air humidification in an air handling unit. Like all the other humidifiers of this range, it's compatible with the EHF Fan Pack.

Standard delivery includes:

1. Steam humidifier

2. Technical documentation

3. (3) hose clamps: (2) for the steam hose and (1) for the drain hose.

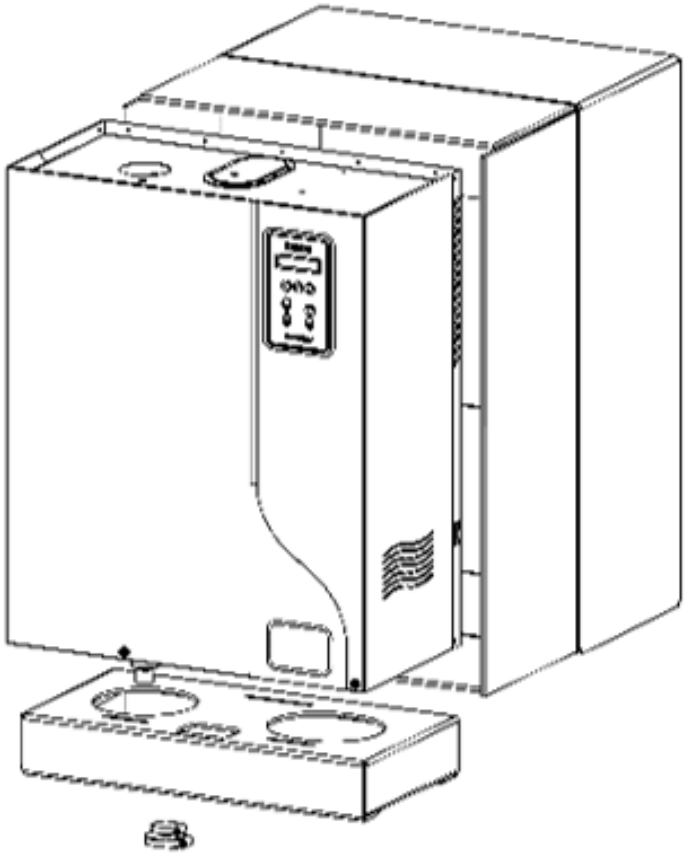


Fig. 1-1: Humidifier

ACCESSORIES (Not supplied)

- Stainless steel steam dispersion tubes
- ExpressPack®
- Blower Pack fan unit
- Steam and condensate hose
- Duct or room humidity sensor
- High Limit Humidistat
- Drain hose
- Stainless steel braided hose in 3/4" FF (with gaskets) for connection to water network.
- Remote information board
- Filling cup extension
- Additional cooling kit
- Mounting bracket

1.2 SIZE

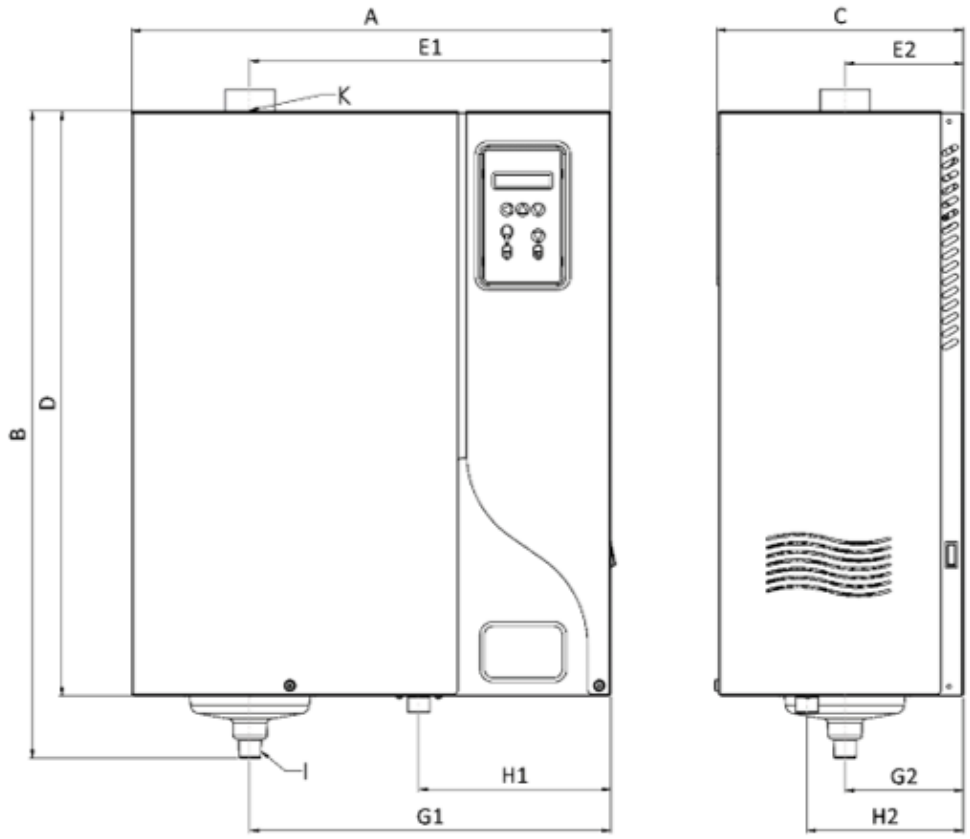


Fig. 1-2: Humidifier sizes

Model name	ERS-LC 3-30
Number of steam outlet	1
Dimension [mm] / [in]	
A: Total width	554 / 21.81
B: Total height	750 / 29.53
C: Depth	285 / 11.22
D: Height	678 / 26.70
E1: Steam outlet position	417 / 16.42
E2: Steam outlet position	137 / 5.39
G1: Drain water position	417 / 16.42
G2: Drain water position	137 / 5.39
H1: Water inlet position	222 / 8.74
H2: Water inlet position	181 / 7.13
I: Condensate outlet diameter	Ø 25
K: Steam outlet diameter	Ø 40
Weight [kg] / [lb]	
Weight in operation	35 / 77.16
Gross weight (packed)	25 / 55.12

1.3 HUMIDIFIER COMPONENT PARTS

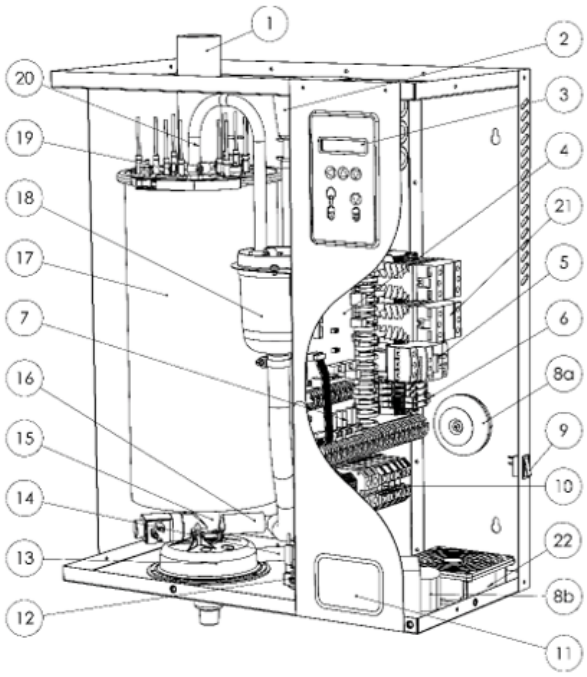


Fig. 1-3: Humidifier component parts

1	Steam hose
2	Filling cup
3	Display board
4	Main board
5	Contactor
6	Fuse holders
7	3 relay board (optional)
8a	Transformer 2x115 / 2x12V S: 50VA
8b	Transformer for UL Standards
9	ON/ OFF Switch
10	Power rail
11	Identification label
12	Inlet valve
13	Funnel
14	Overflow hose
15	Drain valve
16	Filling hose
17	Tank
18	Water level sensor
19	Heater
20	Water level hose
21	Static relay
22	Fan

1.4 IMPORTANT INSTRUCTIONS

- Ambient temperature: between 41°F and 104°F
- Ambient humidity: < 80% Relative humidity
- Back side: this component heats during operation (up to 140°F). Make sure that the support of the device is not made of a heat sensitive material.
- Wall mounting: Please be careful that the support material receiving the device (pillar, wall, etc.) can hold it.
- Weight in operation 77 lbs. Gross dry weight 55 lbs.
- Fixation: use a fastening system adapted to the support material.
- Make sure that the following mounting distances are met .

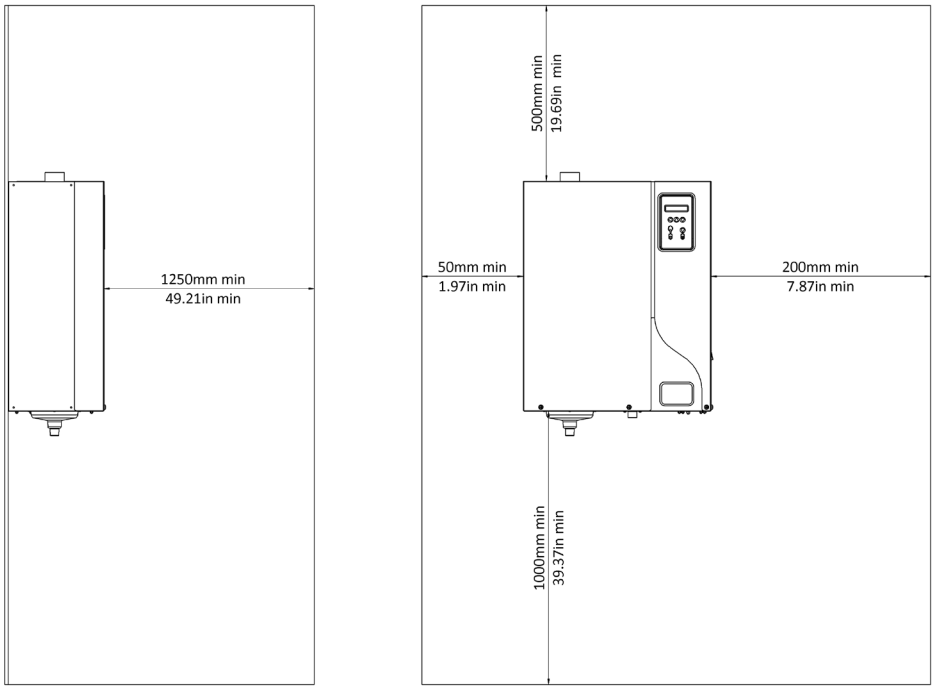


Fig.1-4: Mounting distances

Standard Measurements

Milimeter	Inch
1250	49.21
50	1.97
200	7.87
500	19.69
1000	39.37

Please read and follow the enclosed safety information and the warning labels inside the humidifier before installation or maintenance.

Some steps can be dangerous.

Visit our website or contact our operators for technical support.

2. INSTALLATION

2.1 PROCEDURE

- Mark and drill where indicated (holes size depends on the selected wall anchors and support materials).
- Put the dowels in the holes.
- Screw the top screws into the dowels (M6 recommended), let them protrude by about 0.39 in / 10 mm.
- Hang the device to the top screws and align it vertically and horizontally ensure device is level.
- Tighten up all screws.

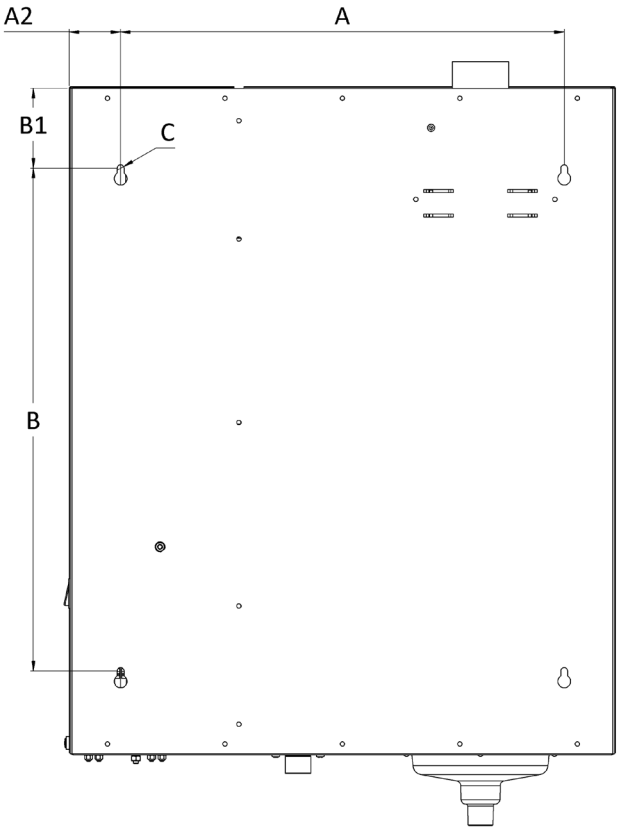


Fig. 2-1: Installation holes

	ERS-LC [mm] / [in]
A:	450 / 17.71
A1:	35 / 1.38
A2:	53 / 2.09
B:	510 / 20.08
B1:	81 / 3.19
C	7 / 0.28

2.2 WATER SUPPLY

2.2.1 Recommendation

Our device is designed to be used with any following water type:

- ✓ Drinking water (according to Directive 98/83/EEC), softened water, use possible under conditions.Please contact our services.
- ✓ Demineralized water, reverse osmosis water

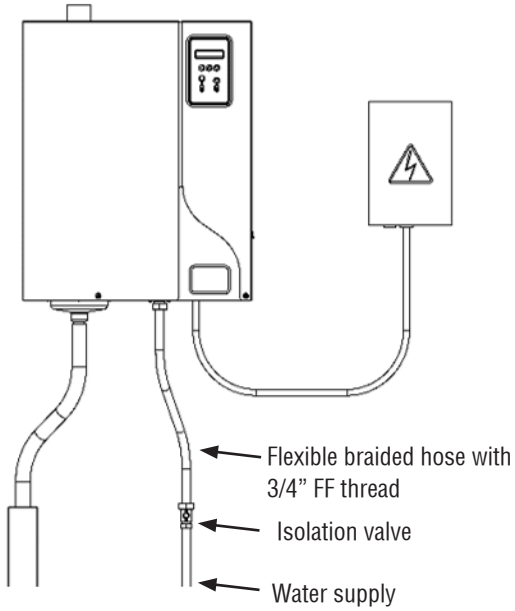


Fig. 2-2: Humidifier water supply

⚠	The demineralized water is corrosive; use appropriate piping material: stainless steel, PVC.

Softened water: Its use is not recommended, but possible.
Water analysis is recommended to determine the level of sodium chloride.
Do not hesitate to contact our services for support.

⚠	An excess of sodium chloride may generate foam which disturbs the correct running of the humidifier. I**t is essential to install a duplex softener.** **Max. chloride content: 80 mg/L**

2.2.2 Recommendations on connection

Network water pressure: The pressure must be stable and between 29 psi and 87 psi MAX.
Network water temperature: < 104°F.

Please note that the water supply is connected at the lower part of the unit.

For easy maintenance, the water inlet valve is equipped with a filter strainer which should be checked periodically.

It is essential to install an isolation valve near the humidifier in order to facilitate maintenance.

⚠	**OVERFLOW RISKS:** It is recommended to install a collecting water tank under the humidifiers to prevent overflow. This is essential if the unit is installed in false ceilings or above important rooms (example: museum room, showroom, laboratory, etc.). Make sure the container is connected to the wastewater system.

2.3 DISPERSION TUBE POSITIONING

Steam dispersion tubes:

The steam from the humidifier is injected in a duct or an air handling unit via a steam dispersion tube.

In order to obtain the best performance of the humidifier, select the longest pipe .

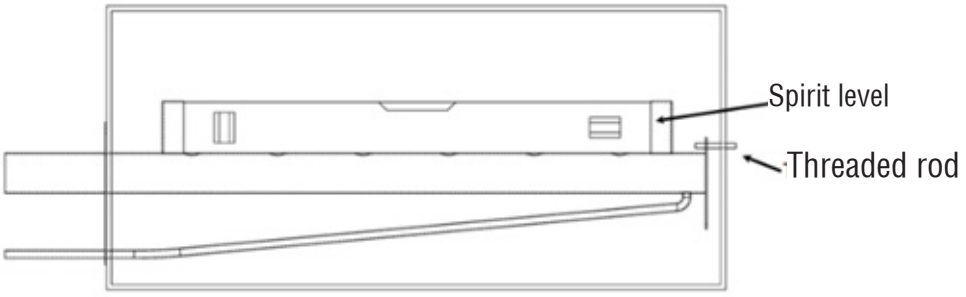


Fig. A 2-3: Steam dispersion tubes positioning

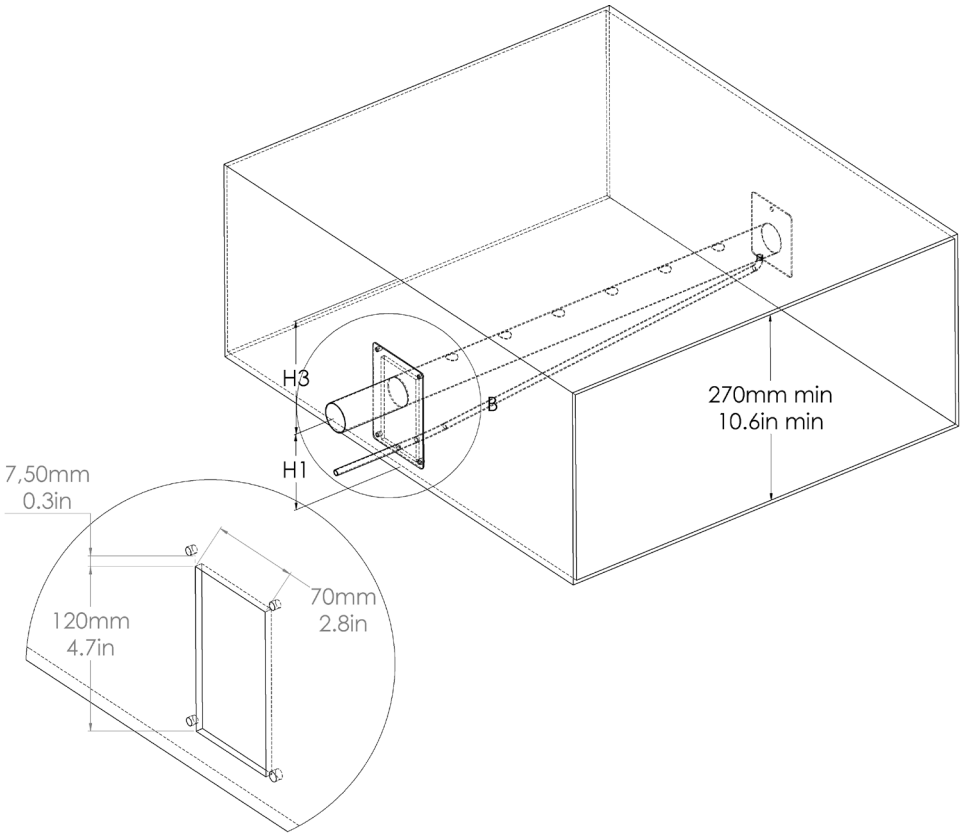


Fig. B 2-3: Hole dimension to be cut in the duct

2.3.1 Absorption distance "D"

Make sure that the absorption distance is met in order to let the air absorb the steam dispersed by the tubes. In this absorption distance, the steam is still visible in the air stream in the form of fog. If any obstruction is placed in this area, condensate may occur. For this reason, it is imperative to consider this absorption distance when placing the humidifiers.

2.3.2 How to calculate absorption distance « D »

In order to determine the absorption distance, the attached calculation table can be used:

- RH1 = relative humidity of air before humidification in %.
- RH2 = relative humidity of air after humidification in %.
- D mini = minimum absorption distance in feet (ft).

	Inlet RH1 [%]							
	5	10	20	30	40	50	60	70
Outlet RH2 [%]	Minimum absorption distance “D” [ft]							
40	2.95	2.62	2.30	1.64	-	-	-	-
50	3.61	3.28	2.95	2.62	1.64	-	-	-
60	4.59	4.27	3.94	3.28	2.62	1.64	-	-
70	5.91	5.58	4.92	4.59	3.94	3.28	2.30	-
80	7.55	7.22	6.89	6.23	5.58	4.92	3.94	2.62
90	11.48	11.15	10.50	9.51	8.86	7.87	6.89	5.58

This calculation table is to be used for temperatures between 68°F and 77°F. (Maximum air speed 985 fpm). For calculated distances, contact your Armstrong agent.

2.3.3 Minimum absorption distance

The steam dispersion pipes must be positioned after the minimum specified absorption distance. Please follow the guidelines depending on the configuration of your air handling unit.

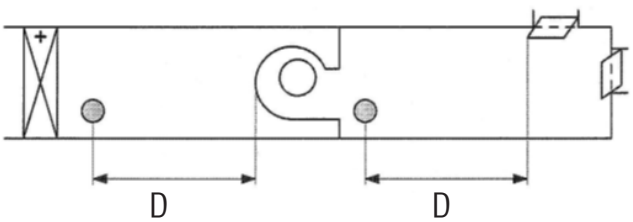


Fig. B 2-3: Before / after a fan

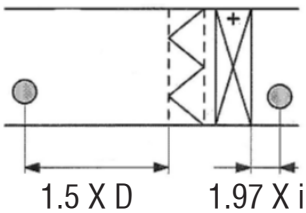


Fig. C 2-3: Before / after heating battery or filter

● = Dispersion tube

1.5 x D before a particle filter or absolute filter

2.3.4 Minimum installation distances

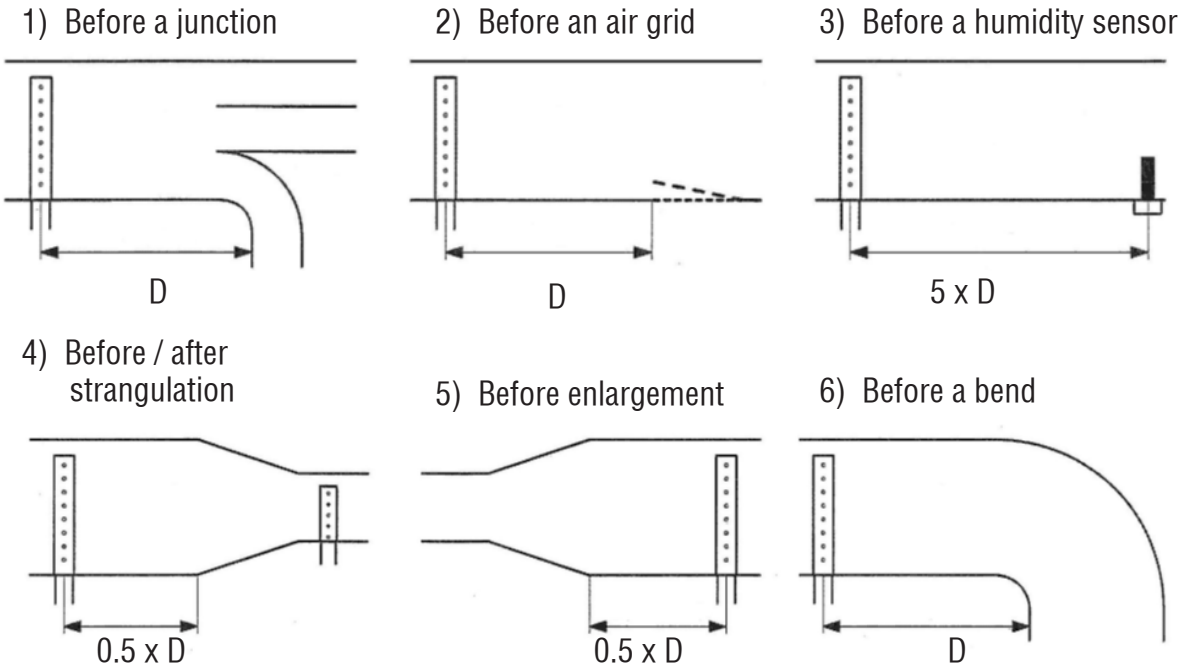


Fig. D 2-3: Installation distances

- A high limit humidistat must be installed in the duct to stop the humidifier in case the level of humidity exceeds the preset value. The high limit humidistat should be installed 1.5 * D after dispersion tube where fog has been absorbed into airflow.
- If the recommended distances cannot be met, please contact Armstrong or their authorized agent for an alternative solution.
- Make sure the distances are met. If this is not possible, please contact your Armstrong agent.

Please ensure that spaces and distances are respected. If you have any doubts about these calculations, please contact us.

H1 = 4.33 in. = Minimum height between the duct floor and the axis of the steam pipe.
H2 = 5.51 in. minimum for a standard mounting / 4.33 in. minimum for a stair mounting.
H3 = 6.30 in. = Minimum height between the axis of the dispersion tube and the top of the duct wall.

The H3 distance can be 3.15 in. at the shortest if the steam pipe is installed at a 30° angle.
In the case of a stair mounting, minimum distance between tubes = 100 mm.

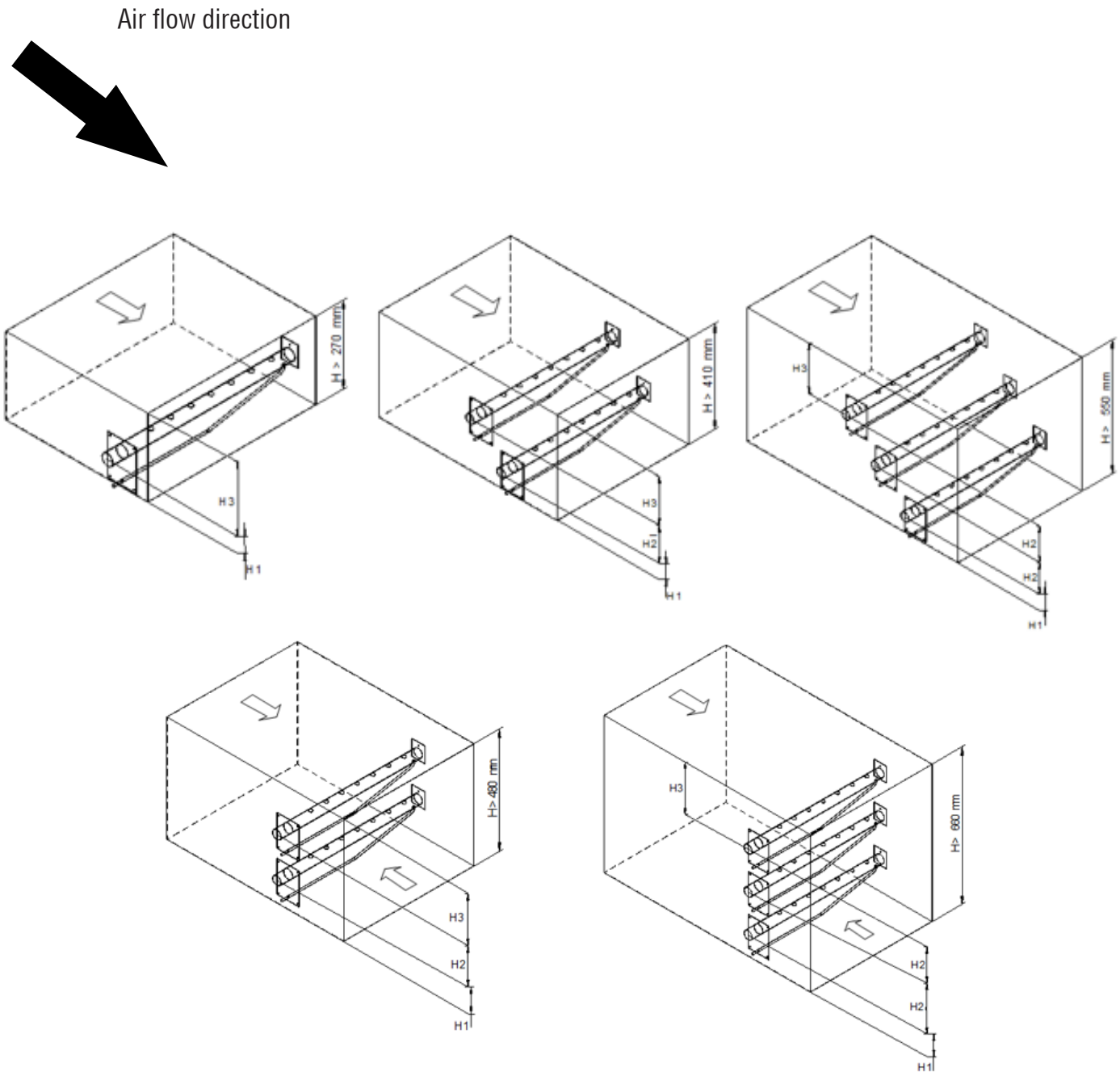


Fig. E 2-3: Minimum heights & flow directions

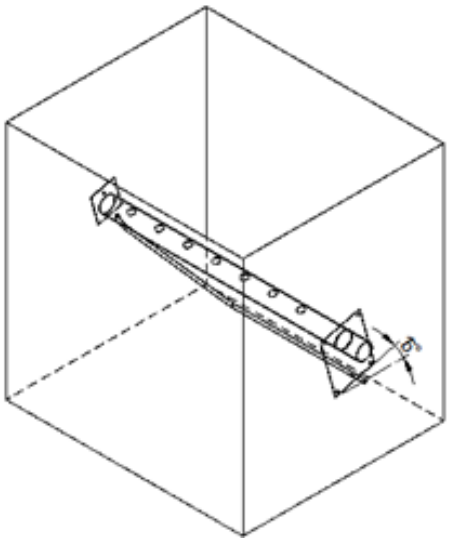


Fig. F 2-3: Vertical ducts

In vertical ducts where the air flow is upward or downward, the steam distribution pipe(s) must be tilted by 15° sideways

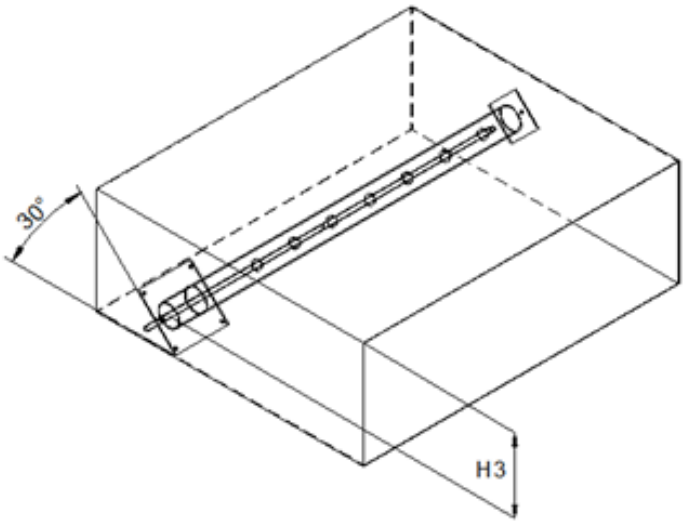


Fig. G 2-3: Ducts with limited height

In ducts with limited height, the distribution pipe(s) can be tilted by 30° to get the 3.15 in. minimum height

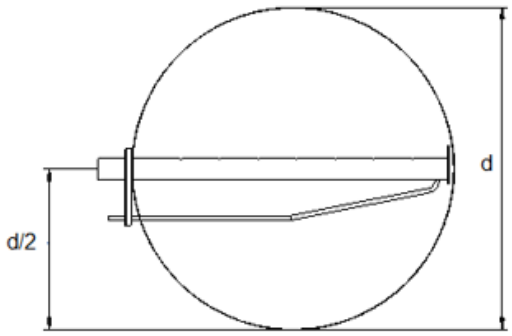


Fig. H 2-3. d = Diameter of the duct

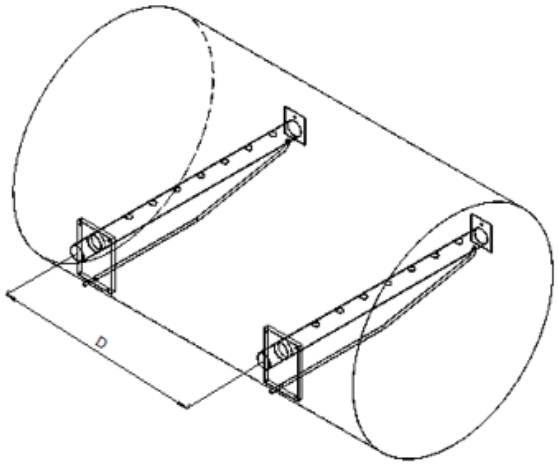


Fig. I 2-3. D = Distance between two tubes

2.4 STEAM OUTLET

1. Preferably use a flexible steam hose that is heat resistant to a temperature of 212°F.
Note: when new hoses are installed, a smell of burnt plastic may be present during the first running of the steam humidifier. This is normal and will eventually diminish.

2. Steam hose selection:

Model	ERS-LC 3 to 15	ERS-LC 20 to 30
Steam outlet diameter	1	1
Steam outlet diameter	Ø 40	Ø 40

3. ERS-LC humidifiers can operate with a back pressure (P) higher than the atmospheric pressure in the ducts, but under the following conditions:
- If P is less than 2,157 Pa (220 mm WC).
- If P is greater than 2,157 Pa (220 mm WC), options are available.

4. For the installation of the steam hose, depending on your environment, please respect the recommenda tions below and use the appropriate tangential hose clamps.
- Flexible steam hose length 9.84 ft (3 m) max.
- Stainless steel or copper pipe with a slightly larger diameter, grounded. Use a flexible steam hose cuff to connect the humidifier to the steam distribution pipe. The length of the pipe must be thermally insulated and should not exceed 19.69 ft (6 m).

The steam hose must be free of kinks and sags to allow for gravity drainage of condensate. (Provide a pitch of 1" per foot towards the unit.) Make sure that the steam hose is not leaking. Failure to follow these instructions can lead to serious malfunctions.

Radius of the diameter steam pipe:
- Ø 40 – 16 in. minimum

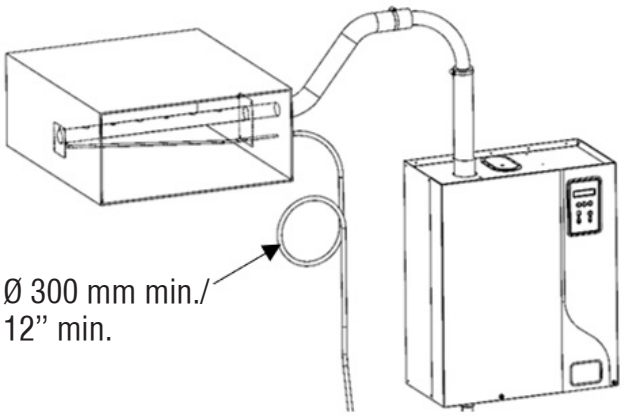


Fig. A 2-4: Standard installation

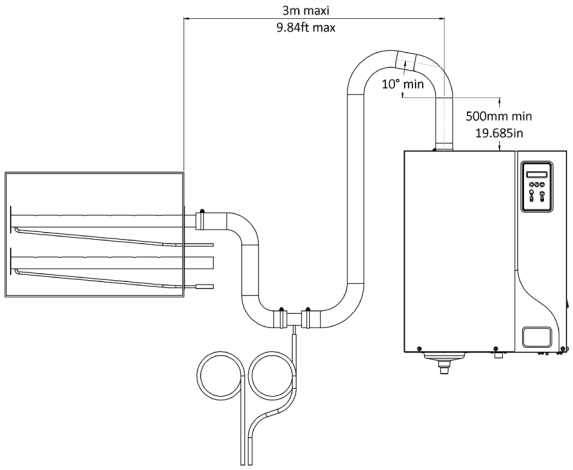


Fig. B 2-4: Additional drip leg when steam distribution below humidifier

2.5 DRAIN HOSE CONNECTION

The following drawing shows the drain hose connection that should be made.

Use a Ø 1" [25 mm] drain hose with the (2) supplied hose clamps, heat-resistant (up to 212°F).
Connect the hose to the draining system. Regular replacement is recommended.

If rigid piping is used, it must be a heat-resistant material (up to 212 °F).
The discharge hose must be free from any obstacle.
It is recommended that each humidifier has its own drainpipe.

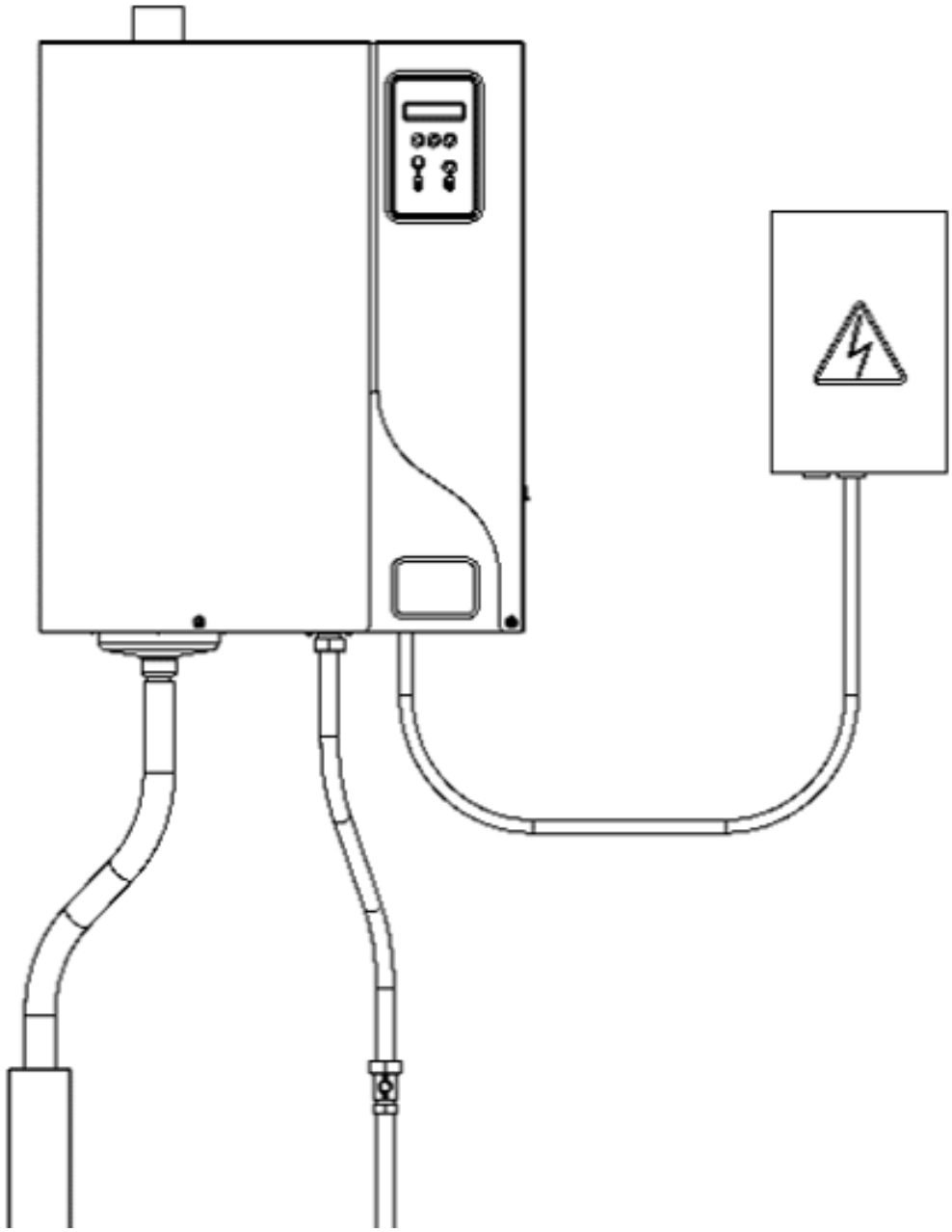


Fig. A 2-5: Example of Installation

An air gap to prevent back flow is required and should be offset from the underside of the unit to prevent any steam and/or condensation from getting into the cabinet.
CAUTION: keep a minimum downward slope of 10° for both the draining & overflow hoses of the humidifier and for the general drain pipe.

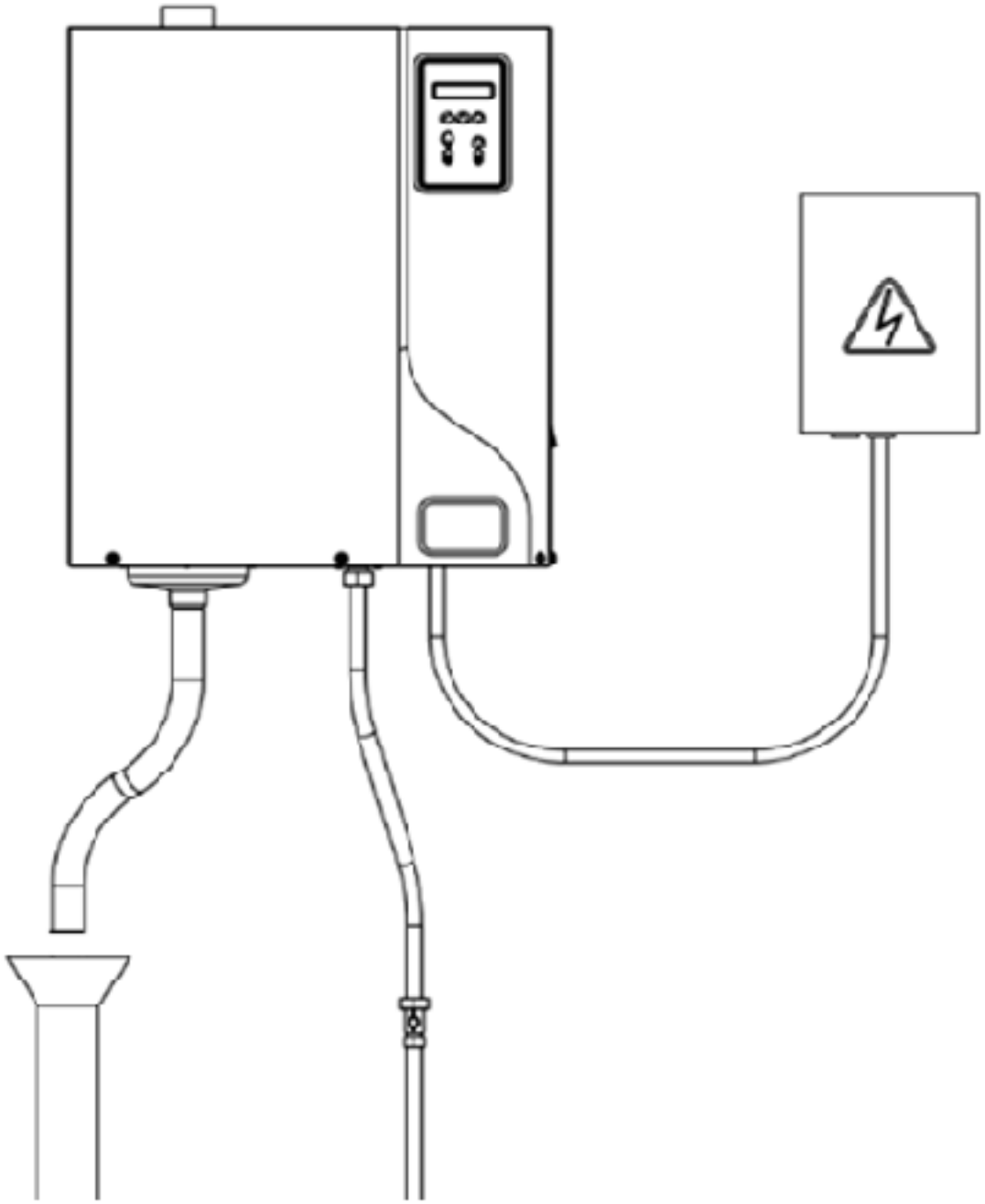


Fig. B 2-5: Example of Installation with funnel

2.6 ELECTRICAL CONNECTIONS

2.6.1 Technical data

Supply (V)	ERS-LC (lbs)	3 (6.6)	5 (11)	7 (15.4)	8(19.6)	10 (22)	15 (33)	20 (44)	30 (66)
230V - 1 ph	kg/h	2.5	6	-	8	-	-	-	-
	kW (Pn)	1.9	4	-	6	-	-	-	-
	I (A)	9	18	-	27	-	-	-	-
230V - 3 ph	kg/h	-	-	-	8	-	-	-	-
	kW (Pn)	-	-	-	6	-	-	-	-
	I (A)	-	-	-	16	-	-	-	-
400V - 3 ph	kg/h	-	6	8	-	12	17	24	29
	kW (Pn)	-	4	6	-	9	13	18	22
	I (A)	-	6	9	-	-	19	26	32
480V - 3 ph	kg/h	-	-	8	-	-	17	25	34
	kW (Pn)	-	-	6	-	-	13	19	26
	I (A)	-	-	8	-	-	16	40	32
600V - 3 ph	kg/h	-	-	8	-	-	17	25	34
	kW (Pn)	-	-	6	-	-	13	19	26
	I (A)	-	-	6	-	-	13	19	26

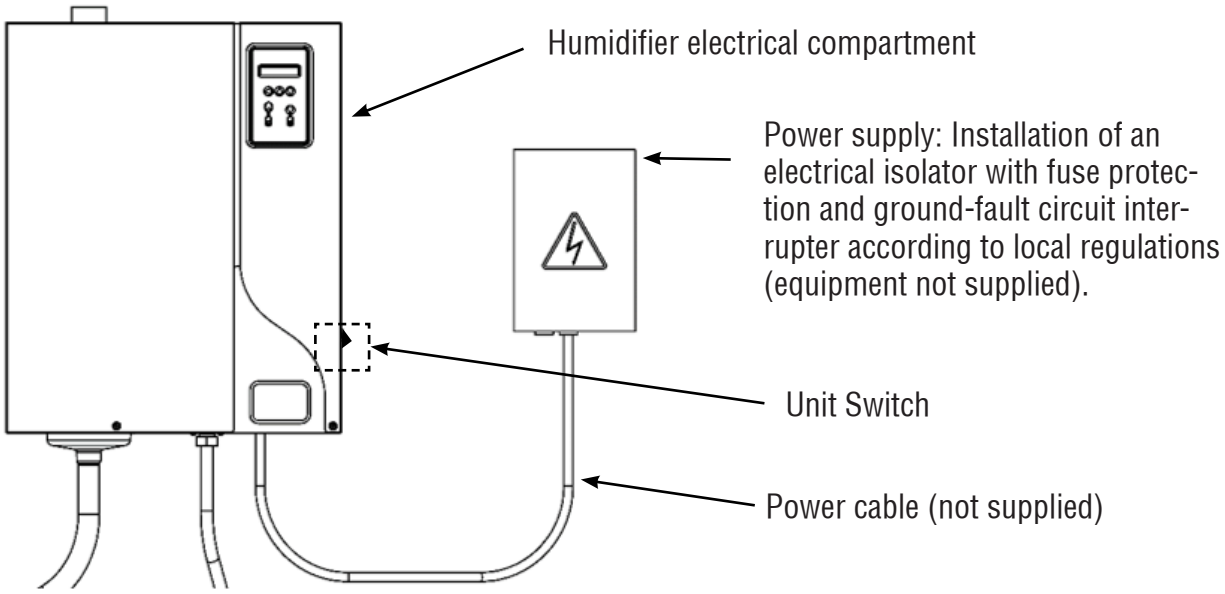


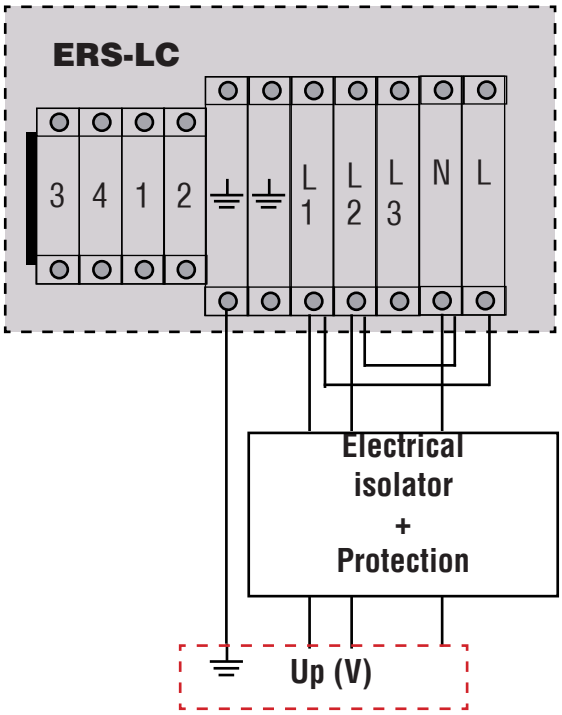
Fig. A 2-6: Electrical connections

	All electrical wiring must enter the unit through a cable gland (not supplied).
	Unit switch: when the unit is switched off, there is still high voltage inside the unit. **Electric shock may be fatal, therefore the electrical isolator must be switched off.**
	**All work on the electrical parts must be carried out by qualified and authorized personnel.** In addition, before making any electrical connections, check that your installation has been determined from the values in the table on page 22. Respect local regulation concerning electrical connections.
	Electronic components are sensitive to electrostatic charges. When working on these components, take appropriate measures to avoid electrostatic discharges.

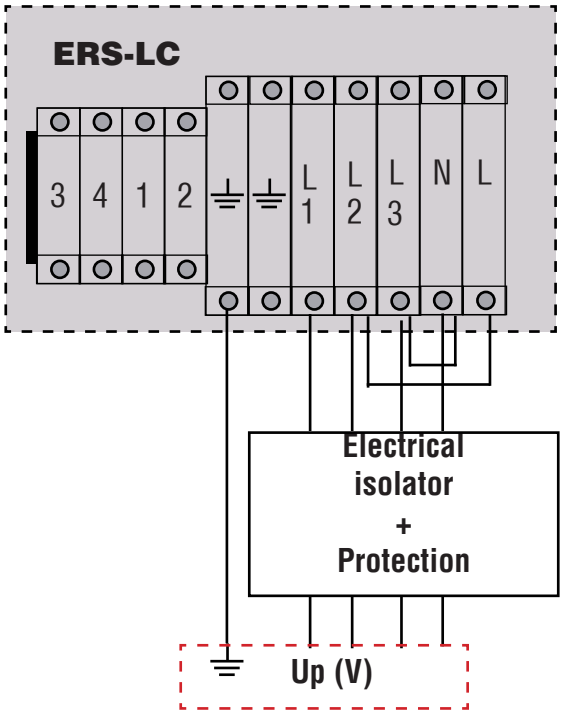
2.7 ELECTRICAL WIRING

Up [V] = POWER VOLTAGE
Uc [V] = CONTROL VOLTAGE

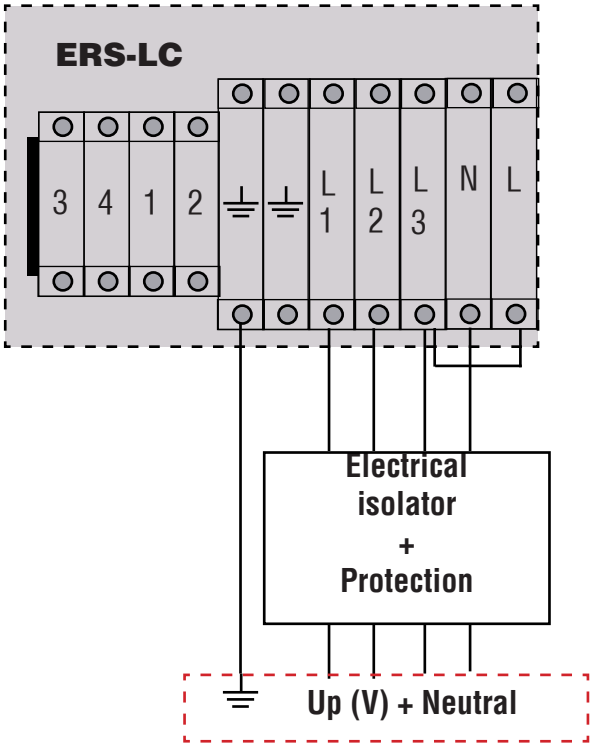
Uc(V) = 1x200 - 230Vac(50-60Hz)



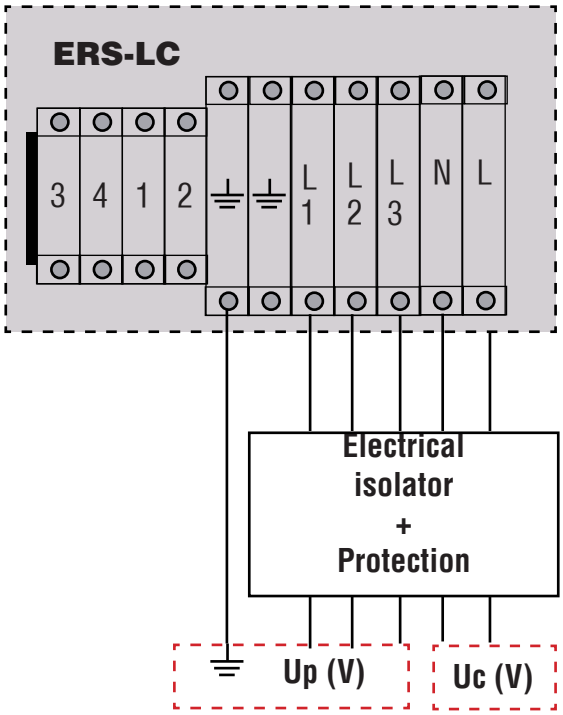
Uc(V) = 3x200 - 230-Vac(50-60Hz)



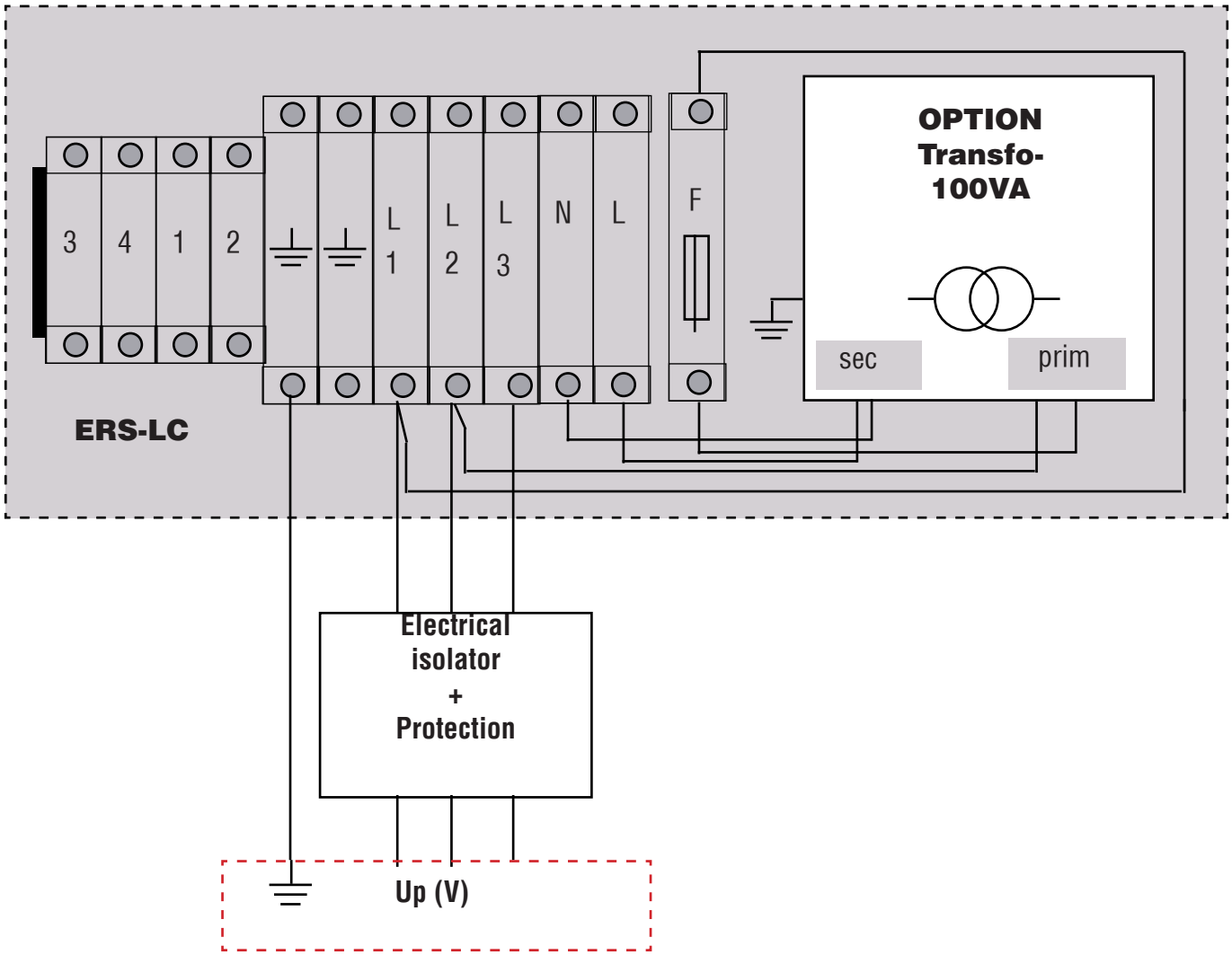
Up(V) = 3x380 - 420Vac(50-60Hz) with neutral



Up(V) = 3x380 - 420Vac(50-60Hz)
Uc(V)= 1x200 - 230-Vac(50-60Hz)



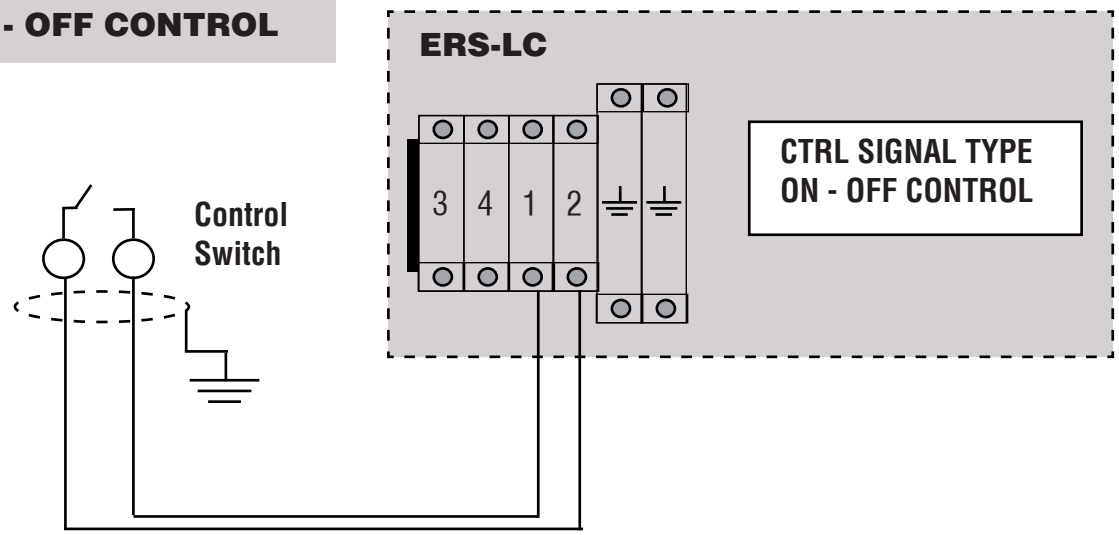
Up(V) = 3x380 - 690Vac(50-60Hz)
OPTION :- Transformer : sec : 2 x 115V



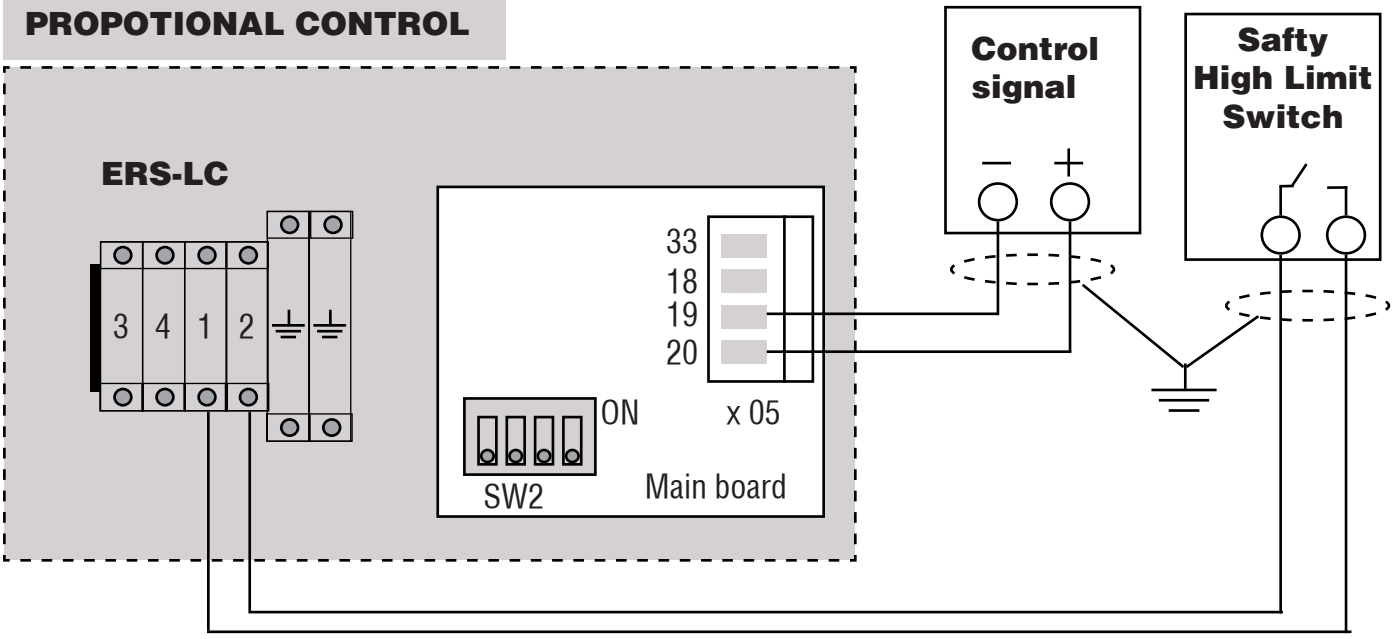
2.8 Control signal connection

The wiring of the optional equipment must be made with 20 AWG shielded cable. This control signal wire should not be routed with a power cable.

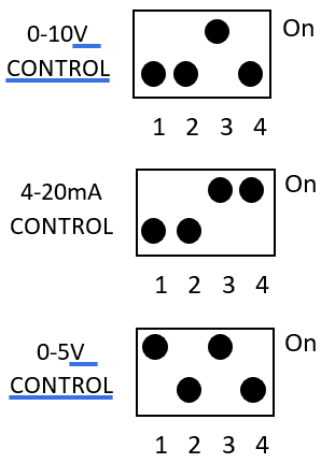
ON - OFF CONTROL



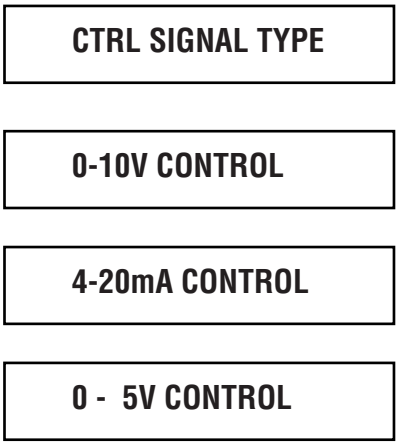
PROPOTIONAL CONTROL



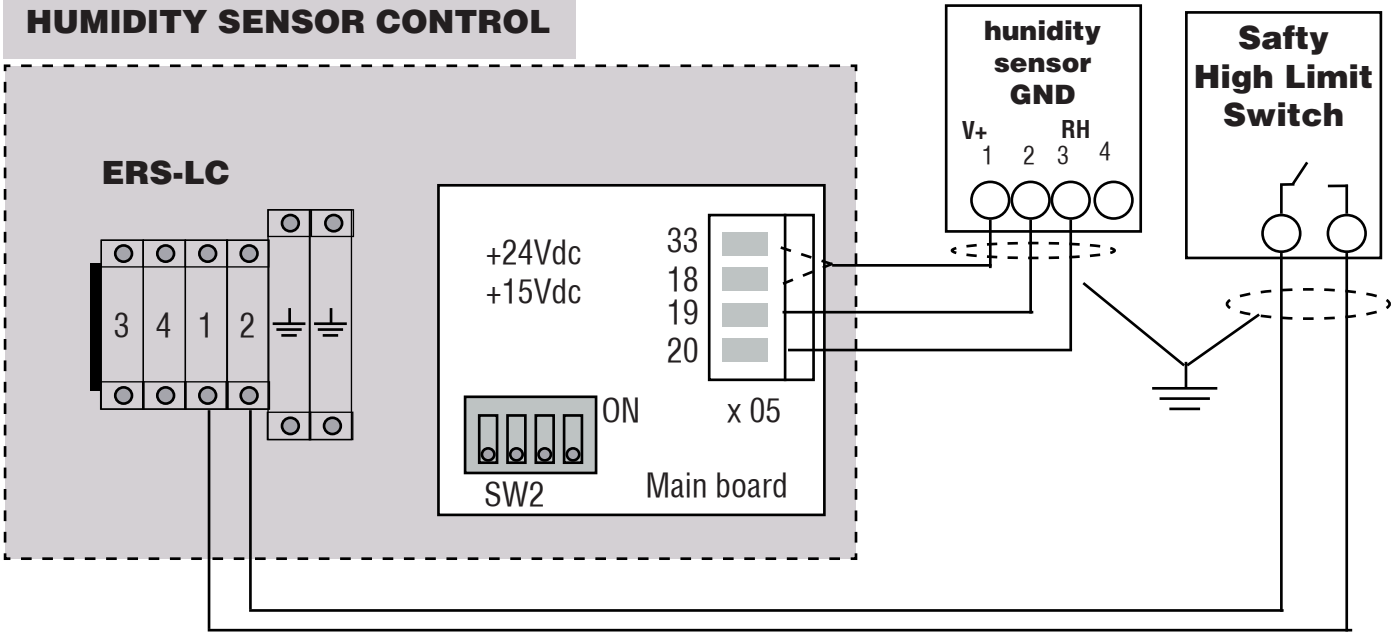
SW2 Dip switch setting to do on main board



Control signal type setting in humidifier menu

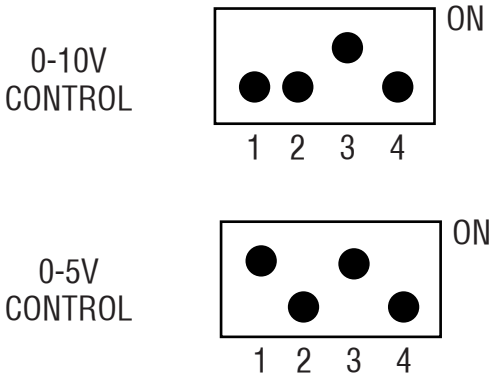


HUMIDITY SENSOR CONTROL



SW2 Dip switch setting to do on main board
Dip switches must be set before signal is applied

Control signal type setting in humidifier menu



CTRL SIGNAL TYPE

0 - 10V SENSOR

0 - 5V SENSOR

WITH DIGITAL CONTROL

Control signal type setting in humidifier menu

CTRL SIGNAL TYPE
DIGITAL CONTROL

2.8.1 MODBUS RTU and BACnet MSTP communication parameters

	Modbus RTU	BACnet MSTP
Speed of communication	2400 / 4800 / 7200 / 9600 (default) / 14400 / 19200 / 28800 / 38400 / 57600 / 115200 / 230400	
Packet size	8 bits	
Parity Bit	Not	
Stop bit	2	1
Timeout response	5000ms (5sec)	
Time between requests (After a response received)	Min. 100ms	Standard

2.8.2 Communication protocol for RS485 interface - MODBUS and BACnet

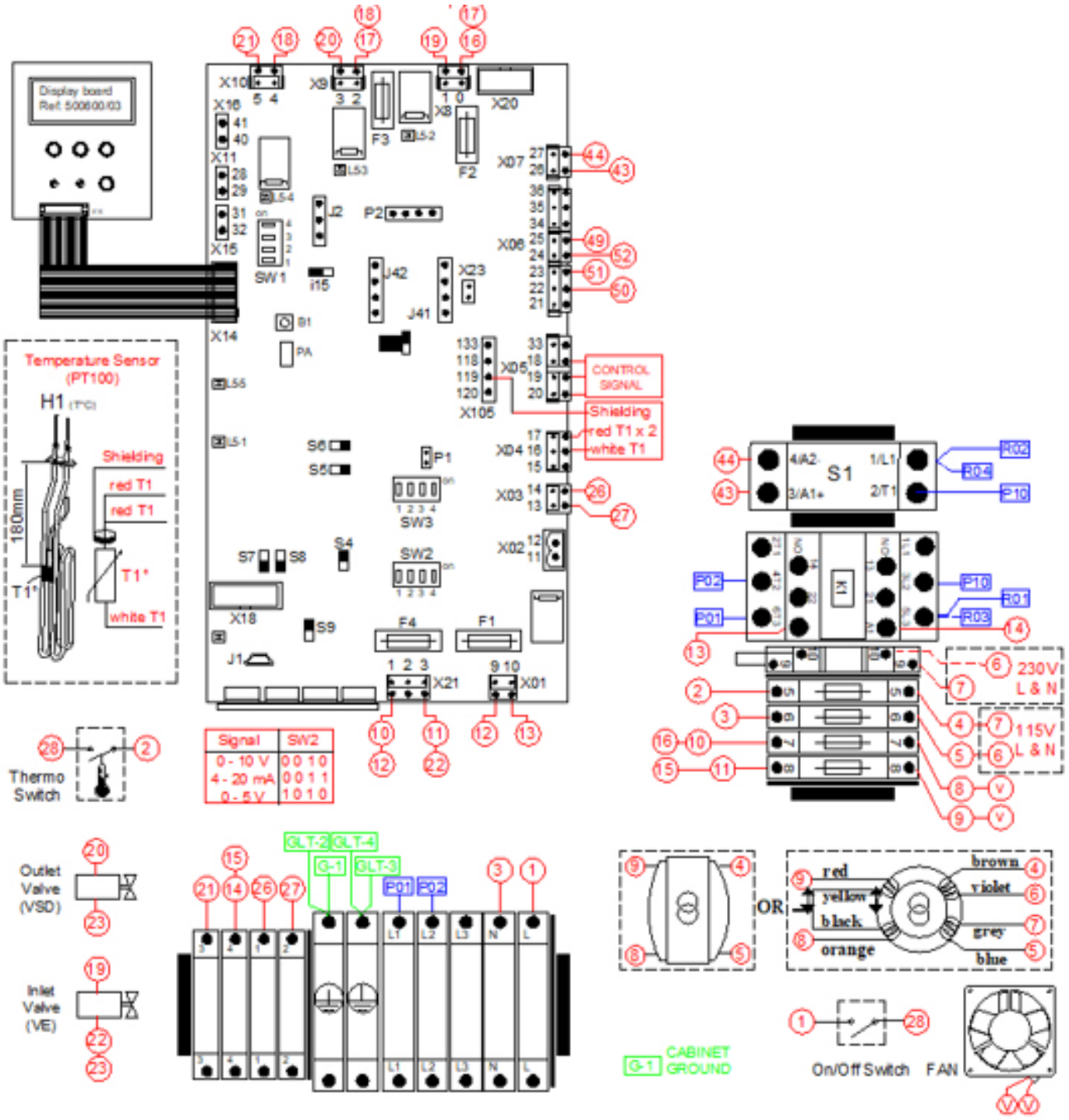
Modbus Register Address	Bacnet Object Class / instance # / ID (hex)			Description	Value
10001	BI	0	00C00000	Fill valve	1 = filling -- 0 = no filling
10002	BI	1	00C00001	Drain valve	1 = draining -- 0 = no draining
10003	BI	2	00C00002	Contactor 1	1 is ON -- 0 is OFF
10004	BI	3	00C00003	Contactor 2	1 is ON -- 0 is OFF
10005	BI	4	00C00004	Blower pack	1 is on -- 0 is off
10006	BI	5	00C00005	Service relay	1 is ON -- 0 is OFF
10007	BI	6	00C00006	Alarm relay	1 is ON -- 0 is OFF
10008	BI	7	00C00007	On/Off Relay	1 is ON -- 0 is OFF
10009	BI	8	00C00008	High limit switch	1: detected -- 0: not detected
10010	BI	9	00C00009	Alarm A1 state	1 is ON -- 0 is OFF
10011	BI	10	00C0000A	Alarm A2 state	1 is ON -- 0 is OFF
10012	BI	11	00C0000B	Alarm A3 state	1 is ON -- 0 is OFF
10013	BI	12	00C0000C	Alarm A4 state	1 is ON -- 0 is OFF
10014	BI	13	00C0000D	Alarm A5 state	1 is ON -- 0 is OFF
10015	BI	14	00C0000E	Alarm A6 state	1 is ON -- 0 is OFF
10016	BI	15	00C0000F	Alarm A7 state	1 is ON -- 0 is OFF
10017	BI	16	00C00010	Alarm A8 state	1 is ON -- 0 is OFF
10018	BI	17	00C00011	Alarm A9 state	1 is ON -- 0 is OFF
10019	BI	18	00C00012	Alarm A10 state	1 is ON -- 0 is OFF
10020	BI	19	00C00013	Rh sensor error	1 is ON -- 0 is OFF

1	BO	01000000	On/Off BMS command	1 = On: Start requested / 0 = Off: Stop Unit
2	BV	01400001	EOS drain statue	1 = On / 0 = Off
30001	AI	00000000	Type unit	7: ERS LC
30002	AI	00000001	Reg version	1
30003	AI	00000002	Demand	(%)
30004	AI	00000003	Steam output	10 x (Kg/hr)
30005	AI	00000004	Run status	1: Idle 2: Warm up cycle 3: Steam production 4: Manual Drain 5: Ready for service 6: Need for service operation 7: Default 8: Aquastat operating
30006	AI	00000005	Estimated time to service	(Hours)
30007	AI	00000006	Production since last service (MSB)	(Kg)
30008	AI	00000007	Production since last service (LSB)	(Kg)
30009	AI	00000008	Total production (MSB)	(Kg)
30010	AI	00000009	Total production (LSB)	(Kg)
30011	AI	0000000A	Total run time (MSB)	(Hours)
30012	AI	0000000B	Total run time (LSB)	(Hours)
30013	AI	0000000C	Remaining idle time to EOS drain	(Hours)
30014	AI	0000000D	Control signal value	10 x V or 10 x ma or %
30015	AI	0000000E	Temperature tank 1	(°C)
30016	AI	0000000F	Temperature tank 2	(°C)
30017	AI	00000010	Alarm A2 counter	Counter for A2 default
30018	AI	00000011	Alarm A3 counter	Counter for A3 default
30019	AI	00000012	Alarm A6 counter	Counter for A6 default
30020	AI	00000013	Alarm A7 counter	Counter for A7 default
30021	AI	00000014	Alarm A8 counter	Counter for A8 default
30022	AI	00000015	Partial drain timer	10 x (s)
30023	AI	00000016	PWM main supply	Trigger value
30024	AI	00000017	PWM counter	Counter
30026	AI	00000019	Max production capability	
30027	AI	0000001A	Number of tank	1 or 2
30028	AI	0000001B	Unit type ID	Unit code name
30029	AI	0000001C	Unit voltage type	Voltage type code
30030	AI	0000001D	Water level status	Level detected from 0 to 3

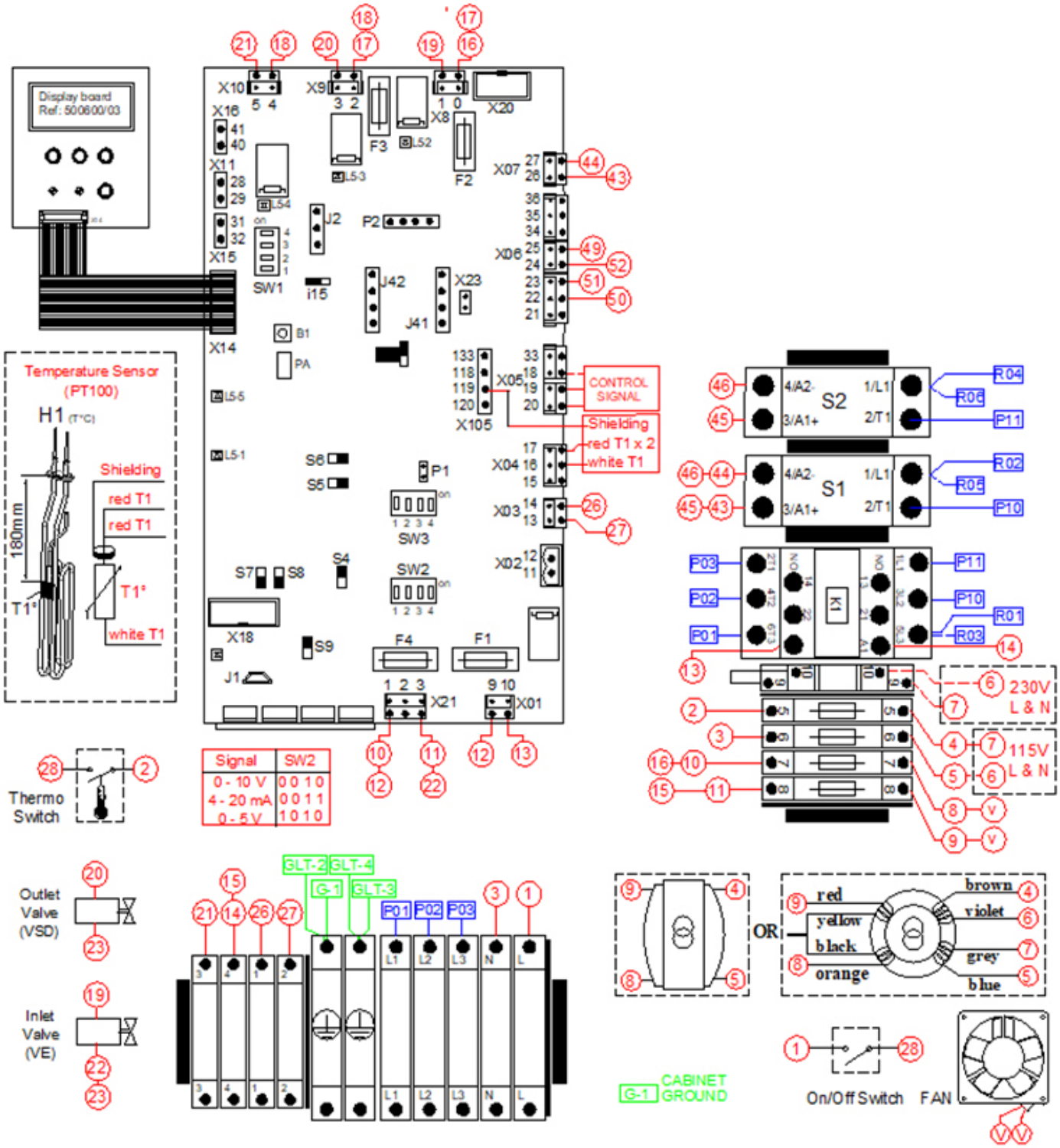
30031	AI	30	0000001E	(kw)
30032	AI	31	0000001F	(kw)
40004	A0	3	00000003	(%) Min = 1 and Max = 100
40005	AV	4	00800004	(%) Min = 1 and Max = 100
40006	AV	5	00800005	(Hour) Min = 1 and Max = 120
40007	AV	6	00800006	(kg / 100) from 1 to 65,000
40008	AV	7	00800007	1 : Enabled -- 2 : Disabled
40009	AV	8	00800008	Min = 10 (°C) and Max = 80 (°C)
40010	AV	9	00800009	20 : on/off 21: digital ctrl 22 : digital sensor 23 : 0-10V ctrl 24 : 1-5V ctrl 25 : 4-20ma ctrl 26 : 0-10V sensor 27 : 0-5V sensor
40012	AV	11	0080000B	(-128 %) Min = 123, Max = 133
40014	AV	13	0080000D	(-128 %) Min = 123, Max = 135
40015	AV	14	0080000E	(-128 %) Min = 123, Max = 136
40016	AV	15	0080000F	Typ. : 10 mini 1 maxi 50
40017	AV	16	00800010	Min = 0 ; Max = 50
40018	AV	17	00800011	Min = 0 ; Max = 50

2.9 Wiring diagrams

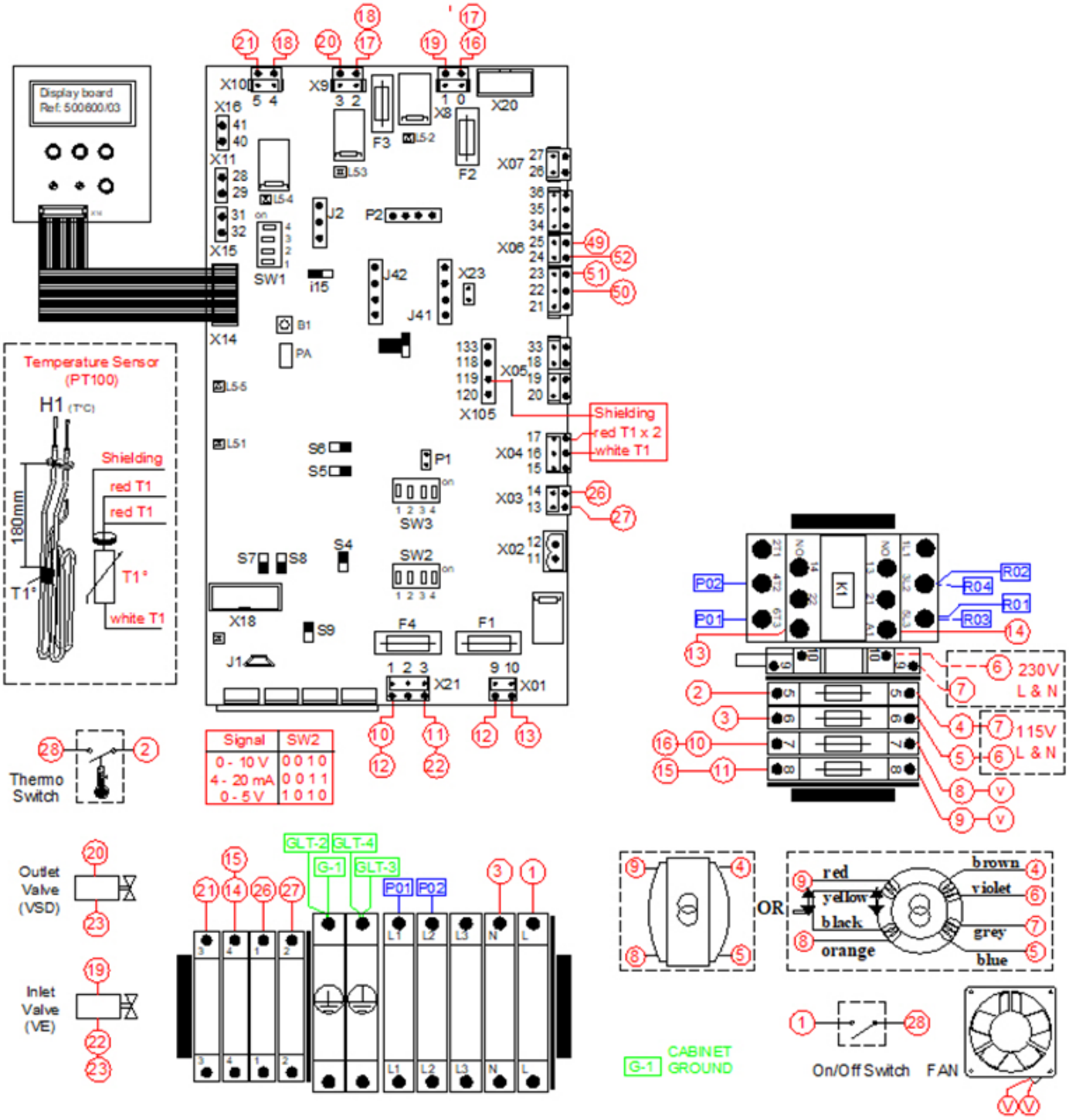
Up[V] – Single Phase 200-240V 50-60Hz



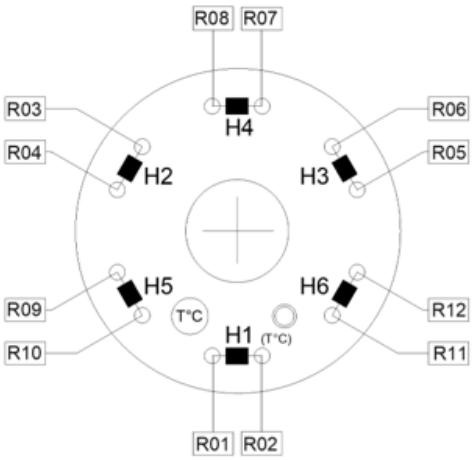
ERS-LC 8-18, Up[V] – 3 Phase 200-240V 50-60Hz

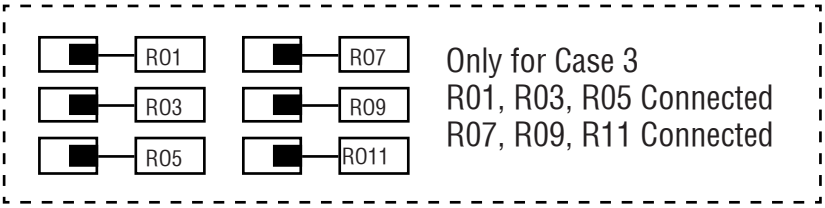


ERS-LC 5-30, Up[V] – 3 Phase 380-690V50-60Hz



2.10 Heating Elements wiring diagrams





Case 1: Up[V] - 1x200-240V 50-60Hz

	TANK		
RTH	**U(V)**	**H1**	**H2**
3	1x200 - 240V	1,9K 230V	-
5	1x200 - 240V	4,3k 230V	-
8	1x200 - 240V	4,3k 230V	1,9k 230V

Case 2: Up[V] - 3x200-240V 50-60Hz

	TANK			
RTH	**U(V)**	**H1**	**H2**	**H3**
8	3x200 - 240V	1,9K 230V	1,9K 230V	1,9K 230V
18	3x200 - 240V	4,3k 230V	4,3k 230V	4,3k 230V

TANK							
RTH	**U(V)**	**H1**	**H2**	**H3**	**H4**	**H5**	**H6**
5	3x380 - 415V	1,9K 277V	1,9K 277V	1,9K 277V	-	-	-
7	3x380 - 415V	1,9K 230V	1,9K 230V	1,9K 230V	-	-	-
	3x440 - 480V	1,9K 277V	1,9K 277V	1,9K 277V	-	-	-
	3x575 - 615V	1,9K 346V	1,9K 346V	1,9K 346V	-	-	-
	3x690V	1,9K 398V	1,9K 398V	1,9K 398V	-	-	-
10	3x380 - 415V	4,3K 277V	4,3K 277V	4,3K 277V	-	-	-
15	3x380 - 415V	4,3K 230V	4,3K 230V	4,3K 230V	-	-	-
	3x440 - 480V	4,3K 277V	4,3K 277V	4,3K 277V	-	-	-
	3x575 - 615V	4,3K 346V	4,3K 346V	4,3K 346V	-	-	-
	3x690V	4,3K 398V	4,3K 398V	4,3K 398V	-	-	-
20	3x380 - 415V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V
	3x440 - 480V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V
	3x575 - 615V	4,3K 346V	4,3K 346V	4,3K 346V	4,3K 346V	4,3K 346V	4,3K 346V
	3x690V	4,3K 398V	4,3K 398V	4,3K 398V	4,3K 398V	4,3K 398V	4,3K 398V
30	3x380 - 415V	4,3K 230V	4,3K 230V	4,3K 230V	4,3K 277V	4,3K 277V	4,3K 277V
	3x440 - 480V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V	4,3K 277V
	3x575 - 615V	4,3K 346V	4,3K 346V	4,3K 346V	4,3K 346V	4,3K 346V	4,3K 346V
	3x690V	4,3K 398V	4,3K 398V	4,3K 398V	4,3K 398V	4,3K 398V	4,3K 398V

2.11 Water level detector wiring

49: Common cable float detector
50: Low level
51: Intermediate level
52: High level

Fig. C 2-7. FLOAT LEVEL DETECTOR

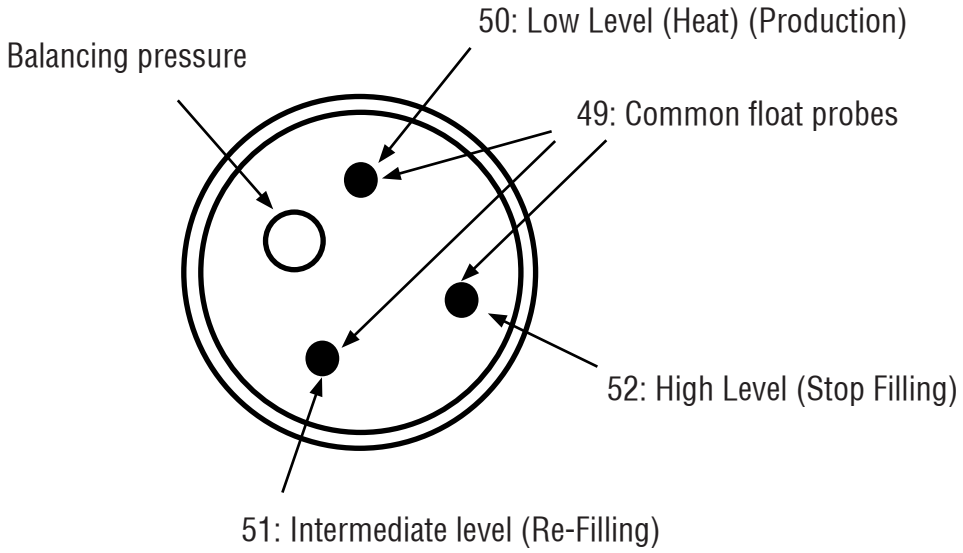
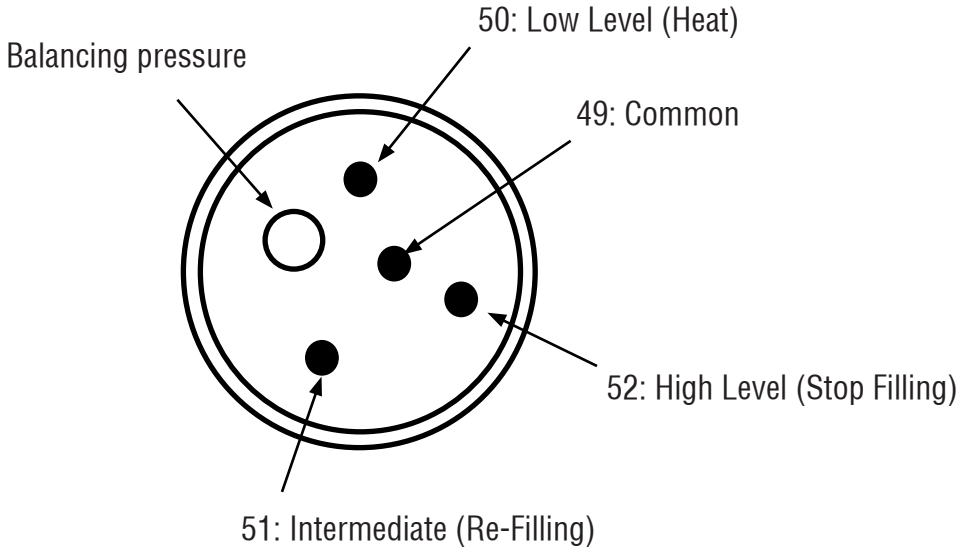
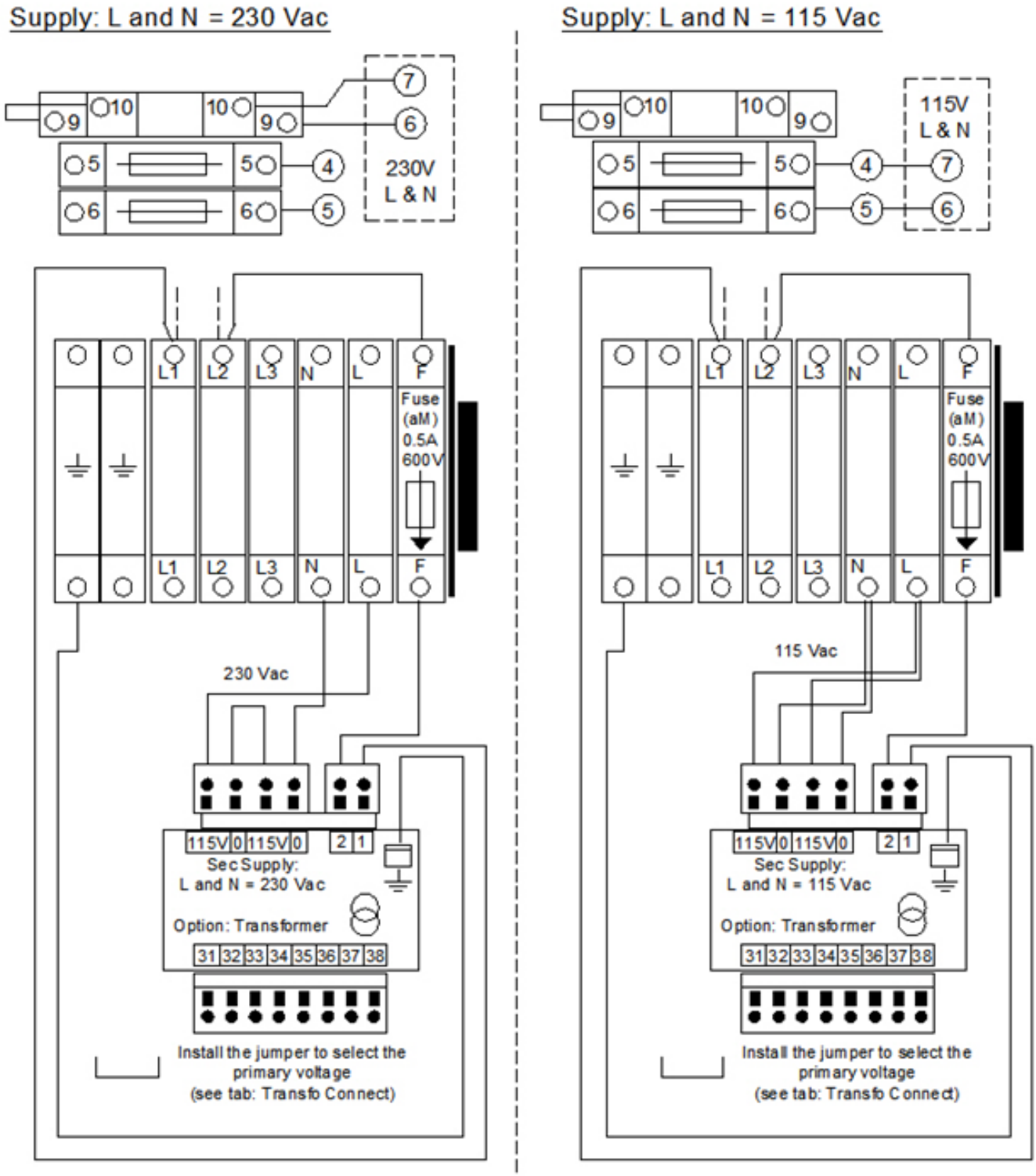


Fig. D 2-7. (OPTION) ELECTRODES LEVEL DETECTOR



2.12 OPTION: Transformer connection



Primary voltage	600V	575V	480V	460V	440V	415V	400V	380V
Jumper position	34-35	33-35	33-36	32-36	32-37	31-37	32-38	31-38

3. COMMISSIONING

	Before operation, please check that your installation complies with the manufacturer's technical recommendations. Check all power cables electrical connections. Remove the blocking blue foam ring from the tank.

Marker 1: Validation & change menu button
Marker 2: Upward button
Marker 3: Downward button
Marker 4: Manual drain button for maintenance
Marker 5: LED = Steam production indication

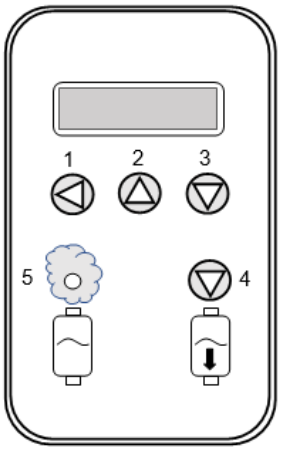


Fig. 3: Humidifier display

- Open the main water supply valve.
- Switch on the main power supply (power and control voltages).
- Switch on the unit switch.

Enter your three-digit code by doing this:

Press one of the keys 1, 2, 3 and the display will show you 0XX, with the flashing zero to eventually change it by pressing 2 or 3.

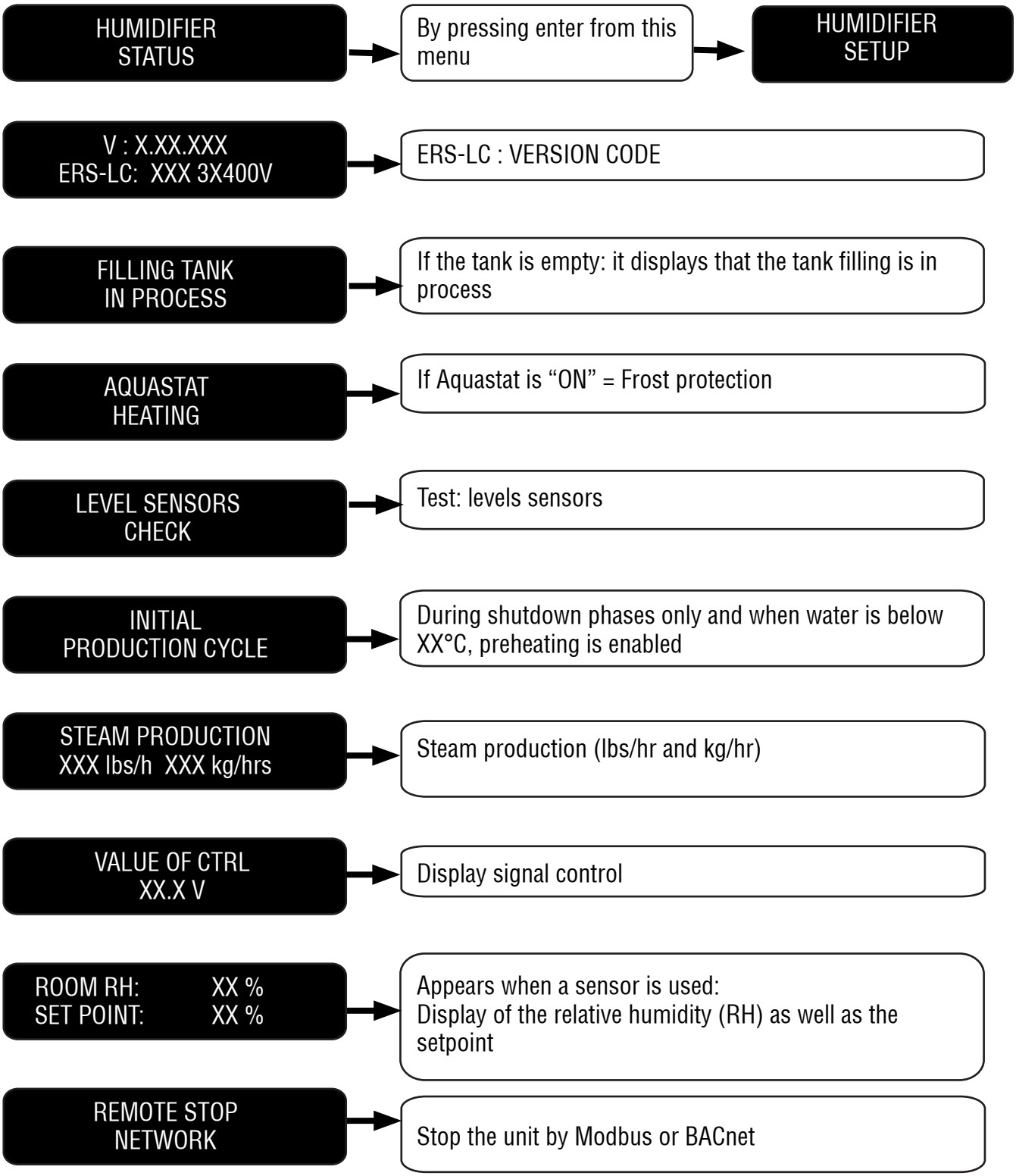
Once arrived at your digit, validate it by pressing key 1 and your second digit flashes. Repeat the previous two operations to show the last two digits.

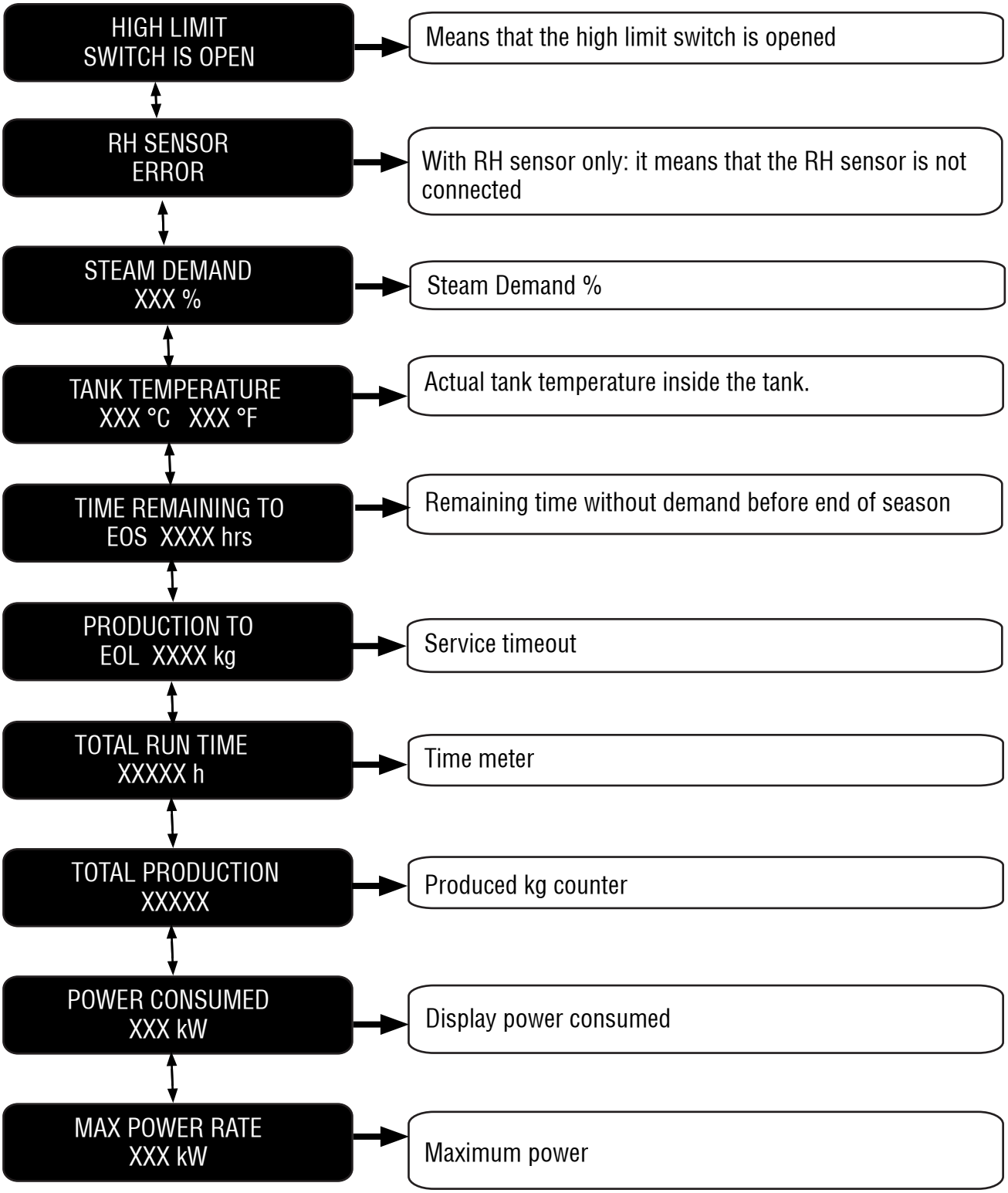
Very important: don't forget to validate the last digit.

- Enter water quality in the displayed menu.
- The device is ready to respond any production request.
- During steam production, the LED (5) lights up.

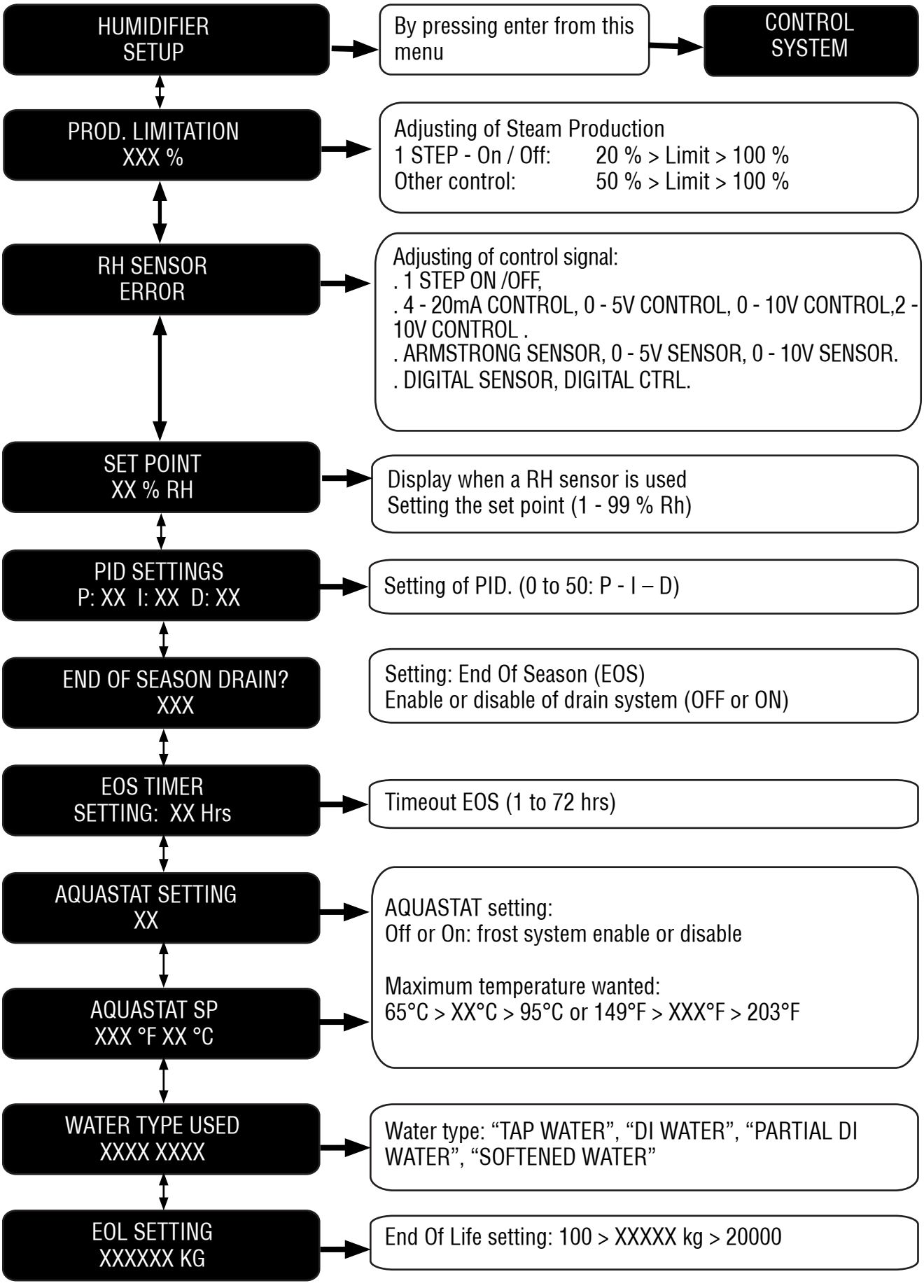
4. SYSTEM MANAGEMENT

4.1 Menu information (read only)

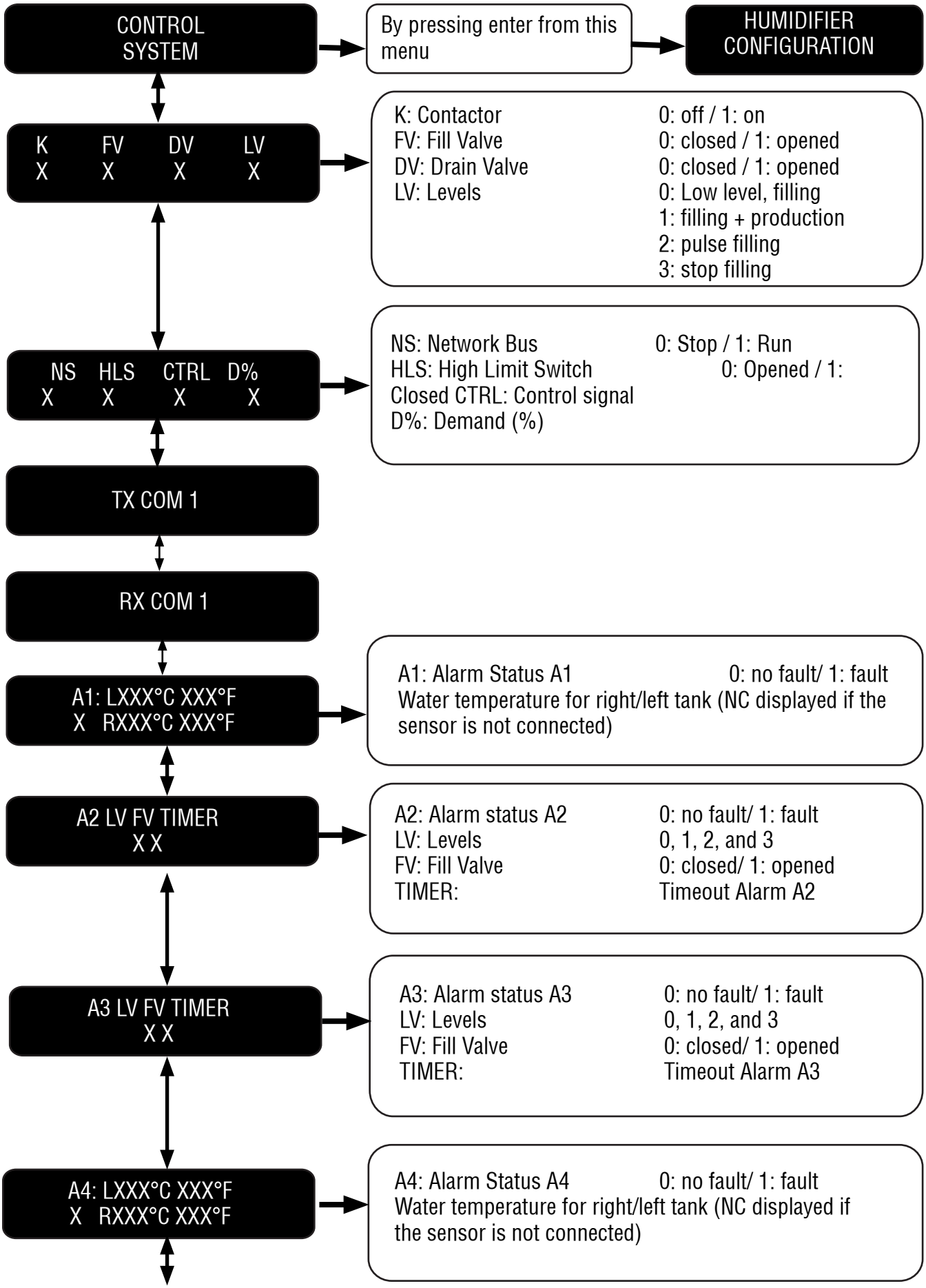


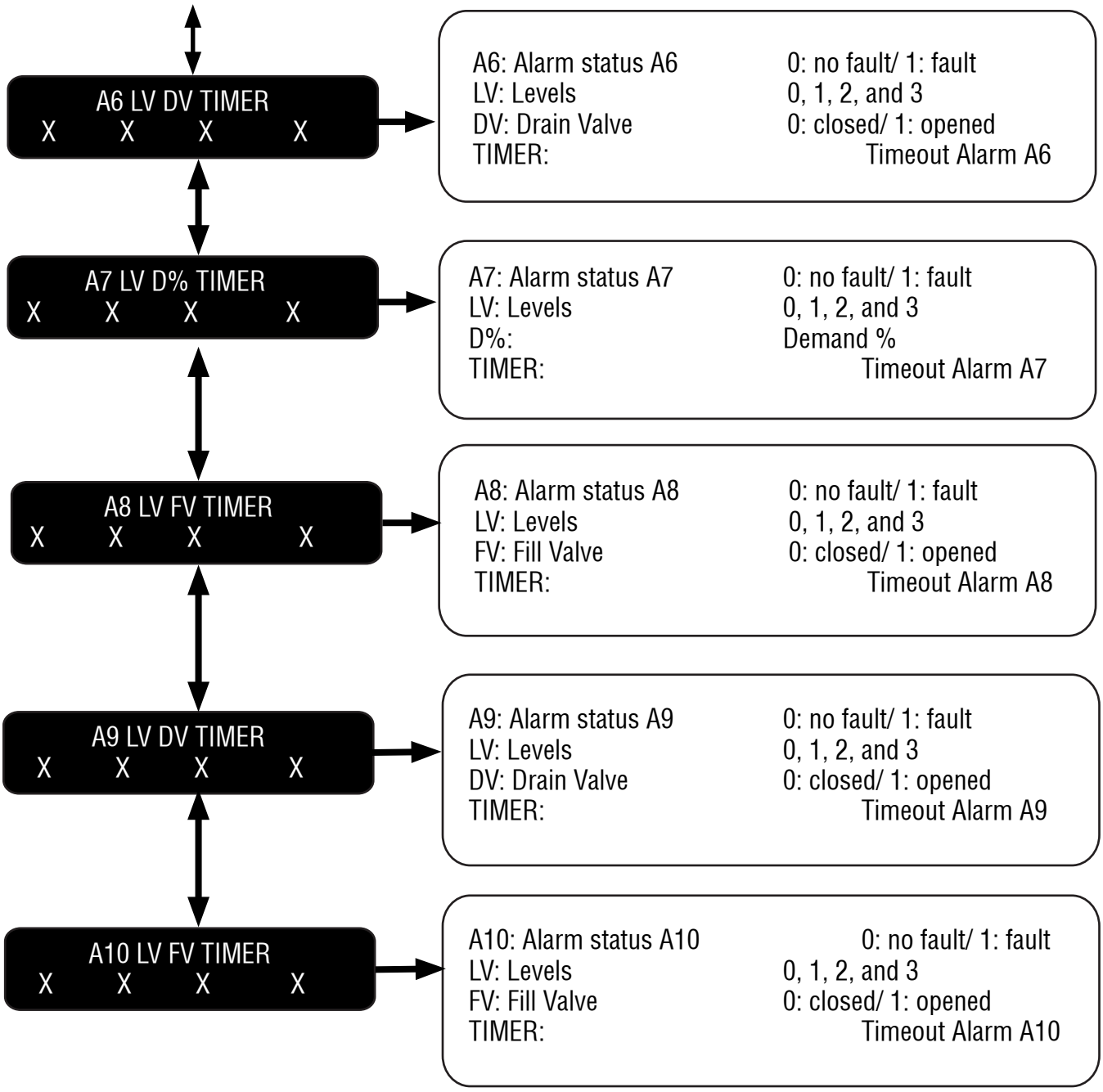

HIGH LIMIT SWITCH IS OPEN
Means that the high limit switch is opened
RH SENSOR ERROR
With RH sensor only: it means that the RH sensor is not connected
STEAM DEMAND XXX %
Steam Demand %
TANK TEMPERATURE XXX °C XXX °F
Actual tank temperature inside the tank.
TIME REMAINING TO EOS XXXX hrs
Remaining time without demand before end of season
PRODUCTION TO EOL XXXX kg
Service timeout
TOTAL RUN TIME XXXXX h
Time meter
TOTAL PRODUCTION XXXXX
Produced kg counter
POWER CONSUMED XXX kW
Display power consumed
MAX POWER RATE XXX kW
Maximum power

4.2 SETUP MENU

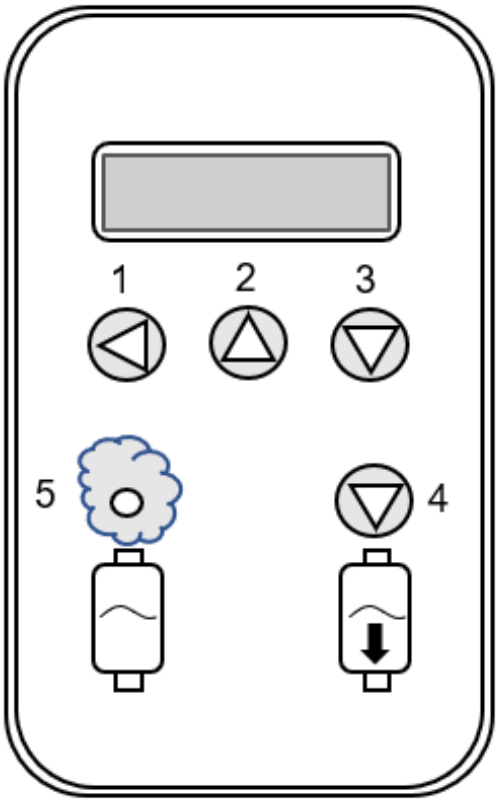


4.3 CONTROL SYSTEM MENU




A6 LV DV TIMER
X X X X
A6: Alarm status A6 0: no fault/ 1: fault
LV: Levels 0, 1, 2, and 3
DV: Drain Valve 0: closed/ 1: opened
TIMER: Timeout Alarm A6
A7 LV D% TIMER
X X X X
A7: Alarm status A7 0: no fault/ 1: fault
LV: Levels 0, 1, 2, and 3
D%: Demand %
TIMER: Timeout Alarm A7
A8 LV FV TIMER
X X X X
A8: Alarm status A8 0: no fault/ 1: fault
LV: Levels 0, 1, 2, and 3
FV: Fill Valve 0: closed/ 1: opened
TIMER: Timeout Alarm A8
A9 LV DV TIMER
X X X X
A9: Alarm status A9 0: no fault/ 1: fault
LV: Levels 0, 1, 2, and 3
DV: Drain Valve 0: closed/ 1: opened
TIMER: Timeout Alarm A9
A10 LV FV TIMER
X X X X
A10: Alarm status A10 0: no fault/ 1: fault
LV: Levels 0, 1, 2, and 3
FV: Fill Valve 0: closed/ 1: opened
TIMER: Timeout Alarm A10

4.4 CHANGE SETTINGS MENU



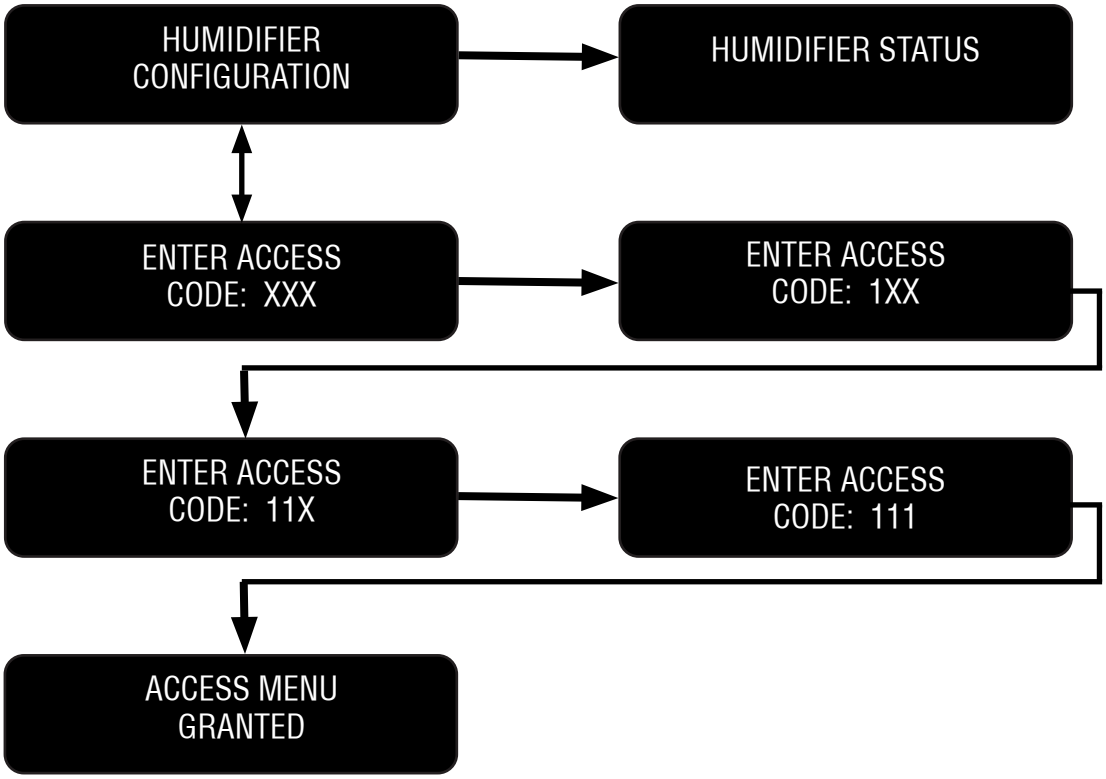
Procedure to enter the access code:

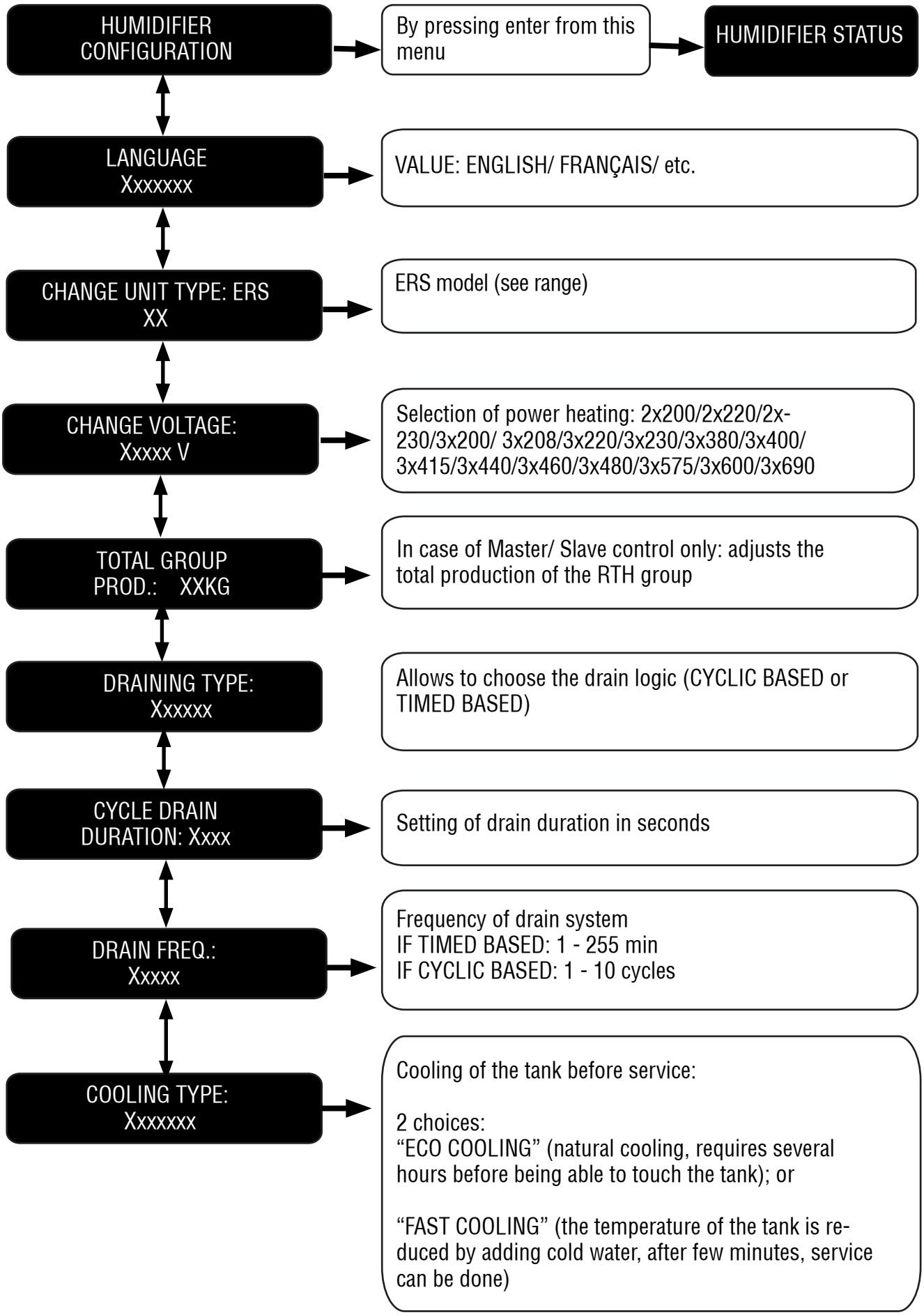
• Press the "1" key.

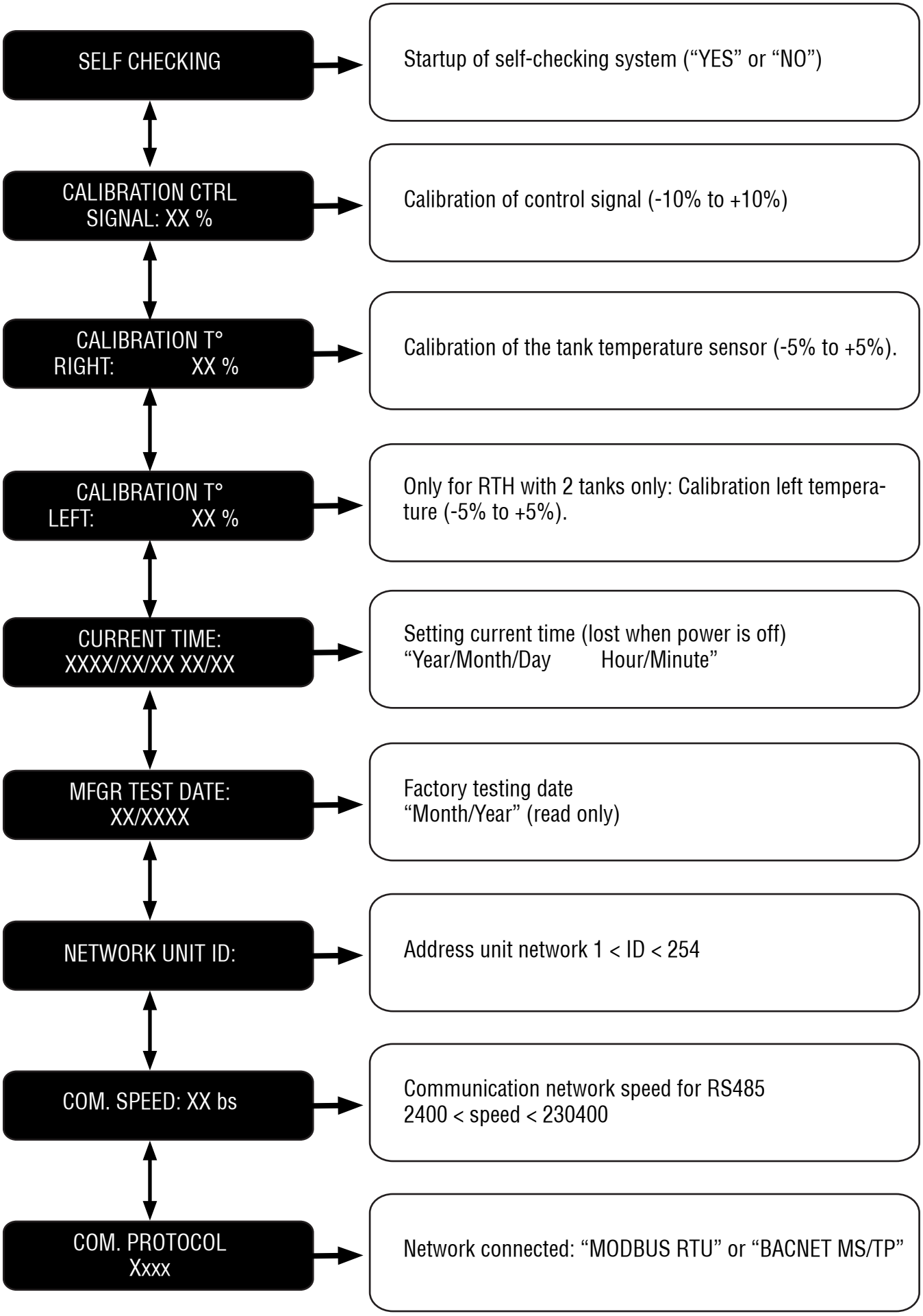
• Press the "2" key to increase the digit or the "3" key to decrease it.

• Once you have reached the desired digit of the code, press the "1" key to validate it: the 2nd cross flashes.

• Proceed in the same way for the following digits, and do not forget to validate the code by pressing the "1" key.

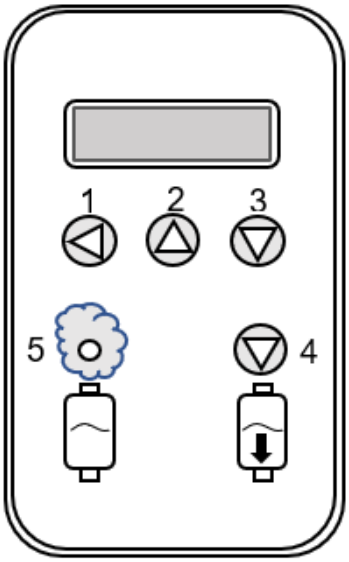





SELF CHECKING
Startup of self-checking system (“YES” or “NO”)
CALIBRATION CTRL
SIGNAL: XX %
Calibration of control signal (-10% to +10%)
CALIBRATION T°
RIGHT: XX %
Calibration of the tank temperature sensor (-5% to +5%).
CALIBRATION T°
LEFT: XX %
Only for RTH with 2 tanks only: Calibration left temperature (-5% to +5%).
CURRENT TIME:
XXXX/XX/XX XX/XX
Setting current time (lost when power is off)
“Year/Month/Day Hour/Minute”
MFGR TEST DATE:
XX/XXXX
Factory testing date
“Month/Year” (read only)
NETWORK UNIT ID:
Address unit network 1 < ID < 254
COM. SPEED: XX bs
Communication network speed for RS485
2400 < speed < 230400
COM. PROTOCOL
Xxxx
Network connected: “MODBUS RTU” or “BACNET MS/TP”

4.5 MAINTENANCE ALERTS

SELF CHECKING	This message is displayed 50 hours after the first start-up. It is then necessary to check the tightness of the electrical and hydraulic connections (steam pipe, drain circuit, water supply, etc.). The device is not stopped.
CALIBRATION CTRL SIGNAL: XX %	The maintenance timer has arrived at 0, it is necessary to maintenance the device. The device is not stopped.
CALIBRATION T° RIGHT: XX % CALIBRATION T° LEFT: XX % CURRENT TIME: XXXX/XX/XX XX/XX	The message M3 is displayed when the M2 display is displayed and 100 hours have elapsed without maintenance. Then the unit is shut down, drained, the tank cooled, and put on hold of mandatory maintenance.
MFGR TEST DATE: XX/XXXX	This message is displayed once after pressing the manual drain button. The drain is activated.
NETWORK UNIT ID:	This means that the manual drain is complete, and you must wait for the tank temperature to go down before servicing.
COM. SPEED: XX bs	The tank is empty and cooled, maintenance can be done. See technical manual.



TO CARRY OUT A RESET FOR THE ABOVE MESSAGES, FOLLOW THIS PROCEDURE:

- Switch the unit to drain by pressing the manual drain button (4).
- Press button 3 for at least 5 seconds.

4.6 Error Message

A1: TANK TEMP. OVER-HEAT	**Meaning:** The temperature inside the tank is too high: 230°F/ 110°C. The heating elements are no longer completely immersed.
	In this case: When this message appears, the tank is drained, the general fault contact is activated, and the unit is then stopped. Replace elements and tank temperature sensor if GFI is faulted as well.

Possible causes and resolutions:

1. Poor water supply to the tank. A block of limestone obstructs the tank water inlet. The tank must be cleaned.

2. Level sensor issue. Check the correct electrical connection between the level sensor and the main board (see wiring diagrams, pg. 40). Visually check float is free to move and clean if needed.

3. Defective temperature sensor or calibration to be redone. If this message appears when the tank is cold, the
temperature sensor (PT100) must be tested and replaced if necessary.

4. Water quality issue. Foam occurs in the tank; the purging time must be increased. From the "CHANGE PARAMETERS" menu find the "DRAIN TYPE" menu and activate the mode: "TIMED". Also, check the regeneration times of the softener if it is supplied with softened water.

5. Electronic issue. Replace the main board and check that there is no steam or water flow in the electrical compartment.

A2: DEFECTIVE TANK FILLING	**Meaning:** Tank filling is not carried out correctly. The water level does not reach the low water detection level in the correct time frame. (Maximum duration of filling before alarm: 20 min).
A3: FILLING PRODUCTION AREA	**Meaning:** Level filling from level 2 to level 3 took too long and has timed out.
A8: WATER RE-FILL Error	**Meaning:** No filling between intermediate level and high level.

In this case:
When these messages appear, the tank is drained, the general fault contact is activated, and the unit is then stopped.

Possible causes and resolutions:

1. **Check water supply.** The pressure must be constant and between 29 – 87 psi (2 – 6 bar). If in doubt, install a pressure regulator set at 29 psi (2 bar) on the supply pipe. Also check the condition of the water inlet valve, the electrical connection, and the condition of fuse F2 (2A) (upper right on main board). Change the valve and fuse if defective.

2. **Check for proper condensate drainage.** Must absolutely be drained, otherwise it will accumulate in the steam hose, creating water projections and pressure rise in the tank, preventing the unit from being filled.

3. **Verify that the bleed valve is properly closed.** A piece of scale can block the valve closure and cause a leak, preventing proper filling of the unit.

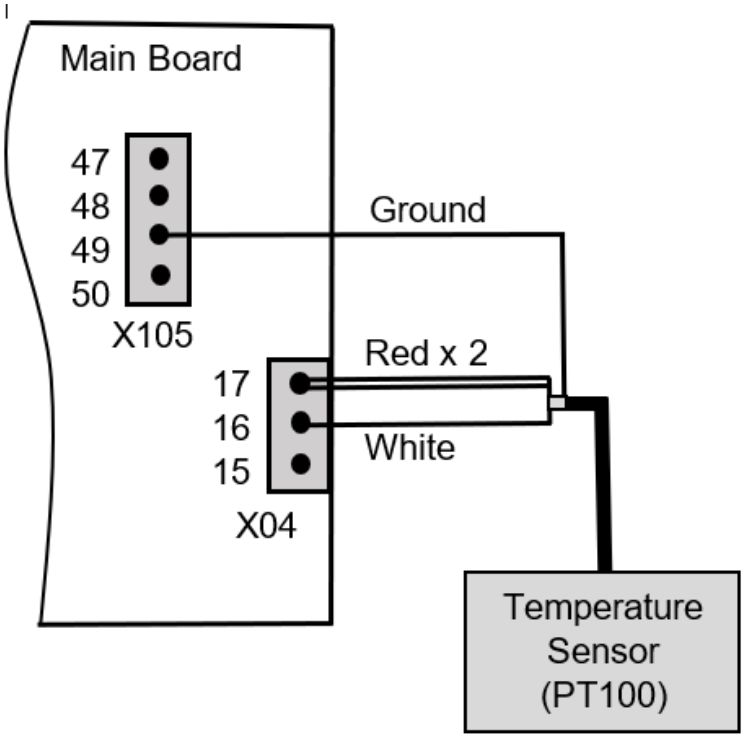
4. **Electronic issue.** Replace the main board and check that there is no steam or water flow in the electrical compartment.

5. **Check equalizing line.** A restriction in the equalizing line could cause improper water level readings.

A4: TEMP. SENSOR DISCONNECTED	**Meaning:** The temperature sensor is either defective or disconnected.
	In this case: When this message appears, the tank is drained, the general fault contact is activated, and the unit is then stopped.

Possible causes and resolutions:

1. Check the electrical connections. The temperature sensor must be connected to the main board on connector X04 terminals 17 (2 red wires) and 16 (white wire). The ground wire is connected to connector X105 on terminal 49.



2. Defective temperature sensor. Disconnect the temperature sensor from connector X04. Use a multimeter to measure the resistance value of the PT100 at room temperature and compare this value using a PT100 resistance table.
   If the value is different, the sensor is defective. Replace the sensor.

3. Electronic issue. Replace the main board and check that there is no steam or water flow in the electrical compartment.

A6: HIGH LEVEL BLOCKED	**Meaning:** This means that the high level is continuously activated (time before detection: 14 minutes).
	In this case: When this message appears, the tank is drained, the general fault contact is activated and the unit is then stopped.

Possible causes and resolutions:

1. **Level sensor issue.** Check the correct electrical connection between the level sensor and the main board (see wiring diagrams, pg. 40). Visually check float is free to move and clean if needed.

2. **Electronic issue.** Replace the main board and check that there is no steam or water flow in the electrical compartment.

A7: VAPORIZATION TOO LONG	**Meaning:** Steam production is not being produced at the correct output rate. This is calculated from the time taken to lose water from level 3 to level 2 in the water level sensor.
	In this case: When this message appears, the tank is drained, the general fault contact is activated, and the unit is stopped.

Possible causes and resolutions:

1. **Incorrect power supply.** Using a voltmeter, check supply voltage (Vac) on terminals L1, L2 and L3 of the heating elements). If the supply voltages are not identical, check the supply circuit up to each heating ele ment and replace the defective components.

2. **Continuous water supply.** Check water supply pressure: 29psi > P > 87psi (2> P (bar) >6). Replace filling valve if necessary.

3. **Level sensor issue.** Check the correct electrical connection between the level sensor and the main board (see wiring diagrams, pg. 29). Visually check float is free to move and clean if needed.
4. **Electronic issue.** Replace the main board and check that there is no steam or water flow in the electrical compartment.

A9: COMPLETE DRAIN TOO LONG	**Meaning:** Water drainage problem.
	In this case: When this message appears, the tank is drained, the general fault contact is activated, and the unit is then stopped.

Possible causes and resolutions:

1. **The drain circuit is clogged.** Press the "MANUAL DRAINING" button and check for proper water flow. Per form the following maintenance: tank (pg. 58), drain valve (pg. 59) and level detector (pg. 60). Also re member to check that nothing is obstructing the drainpipe.

2. **Blown F3 fuse. Replace F3 fuse,** located on the main board. Also replace the drain valve.

3. **Electronic issue.** Replace the main board and check that there is no steam or water flow in the electrical compartment.

A10: LEVEL CHECK FAILED	**Meaning:** Problem with the water level detector or with the draining system.
	In this case: When this message appears, the tank is drained, the general fault contact is activated, and the unit is then stopped

Possible causes and resolutions:

1. **A float level sensor is blocked.** Check and clean the water level detector.

2. **The drain valve is out of order and / or blown F3 fuse.** Replace F3 fuse, located on the main board. Also replace the drain valve.

3. **The drain circuit is blocked.** Clean the drain circuit, tank, drain valve, drain hose, the collecting water tank (option))

4. **Electronic issue.** Replace the main board and check that there is no steam or water flow in the electrical compartment.

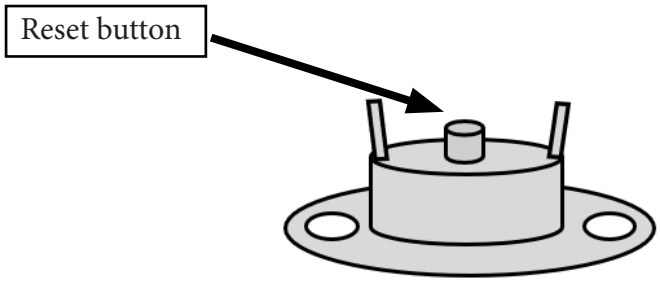
Black screen: Power switch On / display and unit Off after a potential overheat

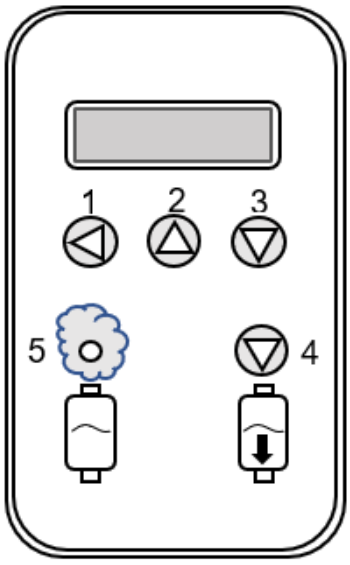
	**Meaning:** Problem "Overheating" is detected by high temperature switch (this switch is installed on the lid of the tank)
	In this case: When this display is off, the control voltage is cut by the high temperature switch and the unit is stopped.

Possible causes and resolutions:

1. **An overheating in the tank has been detected.** Check the water level detector, the cables, and the heating elements.
   Replace the float sensor or / and the heating element out of order, the tank seal, and the temperature sensor.

   Once the problem is solved, press the reset button of high-temperature switch located on the cover of the tank.





TO CARRY OUT A RESET FOR THE ABOVE MESSAGES, FOLLOW THIS PROCEDURE:
- Switch the unit to drain by pressing the manual drain button (4).
- Press button 3 for at least 5 seconds.

5. MAINTENANCE

5.1 STAINLESS STEEL TANK

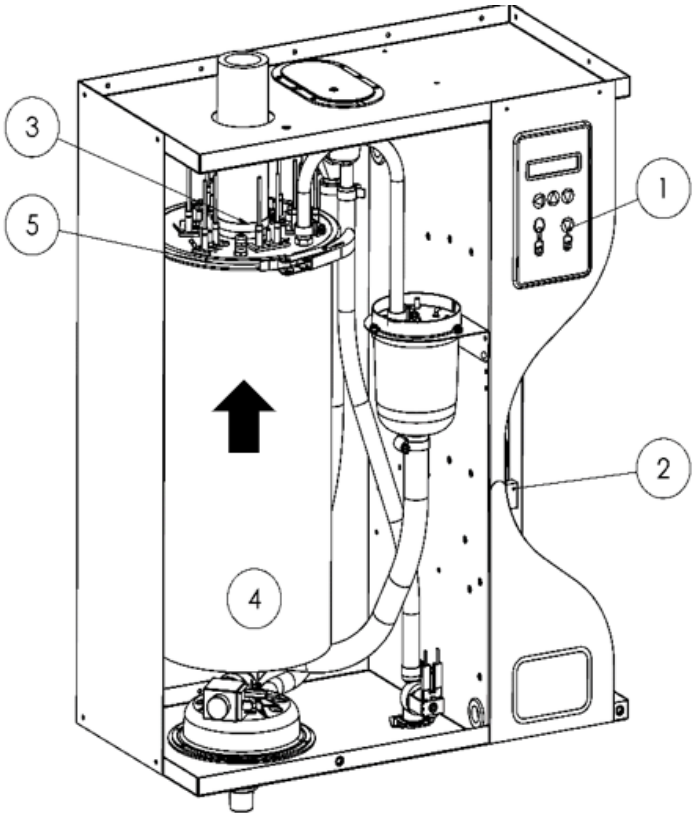


Fig. 5-1. Humidifier Stainless steel tank

Take care: the tank gasket should be changed whenever the tank is maintained.

- Let unit cool completely
- Drain the water by pressing the drain button (1). Wait for «DO MAINTENANCE » display.
- Cut the power supply to the power circuits (in the general electrical cabinet) and control circuits locat ed on the side of the unit (2).
- Remove the door and unscrew the collar (3). Completely disconnect the steam hose and remove it from the unit.
- Pull out the steam tank by lifting it upwards (4) until its base is completely free.
- Pull the clamp handle towards you till the top of the tank is free (5).
- Remove the tank lid with the heating elements.
- Put a container or the optional flexible lime collecting bag on the ground and use it to empty the tank.
- Replace the tank lid with the heating elements and pay attention that no power wires be jammed be tween the tank and the device bottom.
- Before repositioning the tank in the unit, please check the presence of the drain valve seal.
- Tighten cylinder clamp and put the steam hose back on.
- Finally, retighten all clamps.

Do not clean with abrasive materials, hit, or use corrosive liquids on the heating elements.

Very important:

➢ Do not use solvents to clean the water level detector. If necessary, you can use a scraper to clean the level sensors.

5.2 DRAIN VALVE

The drain valve should be maintained whenever the steam tank is maintained or changed.

- Once the tank is out of the humidifier, disconnect the drain valve supply cables **(Item 1).**
- Unscrew the nut and the plastic protection of the supply coil **(Item 2 & 3).**
- Now you can remove the coil (Item 4) from the valve body **(Item 5).**
- Use a pair of pliers or an adjustable wrench to unscrew the valve plug **(Item 6)** from the valve body **(Item 5).**
- Check and clean, if necessary, the inside of the valve body by running water through the hole.

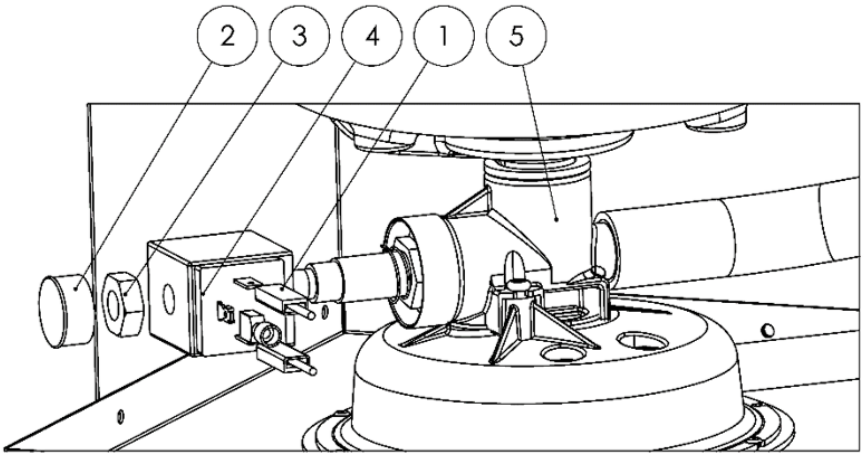


Fig. 5-2. Humidifier drain valve

Reassemble the drain valve as original, before repositioning the tank, by proceeding as follows:

1. Position the tank bottom in the valve connection, push down.
2. Replace the steam hose and do not forget to tighten the hose clamp.

Ensure that all the clamps are properly tightened whenever the humidifier is maintained.

5.3 WATER INLET VALVE

Maintenance of the water inlet valve is to be done after the first 50 hours of operation. Thereafter, twice a year (minimum).

- Switch the appliance off.
- Switch off the water supply to the humidifier and unscrew the water supply hose.
- Disconnect the power cables from the water inlet valve of your humidifier **(Item 1).**
- Loosen the clamp and remove the water supply hose. **(Item 2)**
- Unscrew the two screws securing the valve **(Item 3).**
- Pull out your valve, remove the filter with pliers and remove the coil **(Item 4)** by prying it off with a screwdriver.
- Run water through the valve body and over the filter to remove any particles.

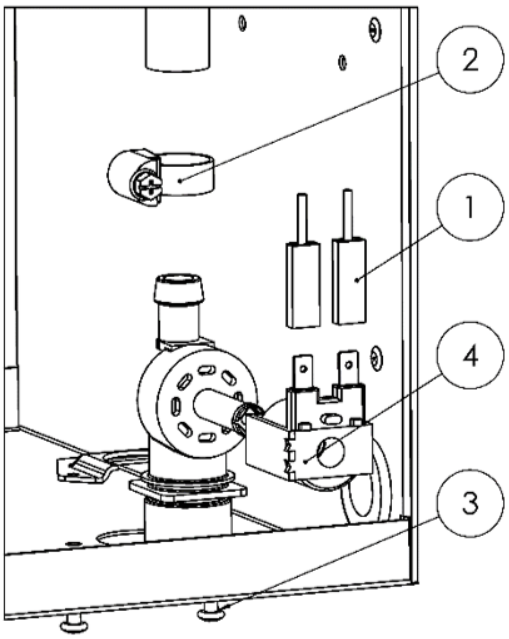


Fig. 5-3. Humidifier water inlet valve

Once all these operations completed, please reassemble the unit, taking care to check the condition of the water supply hose clamp. You can put your appliance back into service.

Ensure that all the clamps are properly tightened whenever the humidifier is maintained.

5.4 WATER LEVEL SENSOR

Maintenance of the detector should be done during each tank maintenance.

- Disconnect the cables of the water level sensor (1).
- Unscrew the clamp of the pressure balancing tube (2) and disconnect it from the cover.
- To release the sensor, unscrew the hose clamp (3) and dis connect the hose. Caution, there may still be water inside the tube.
- Clean the hose.
- Unscrew the 3 screws (4) in order to clean the floats and the body of the level sensor.
- If needed, clean with scraping tool. Do not use solvents.
- Once complete, reassemble
- Tighten all clamps
- Connect cables of the water level sensor

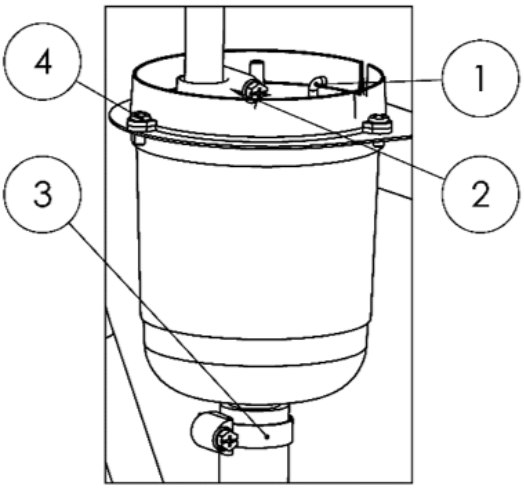


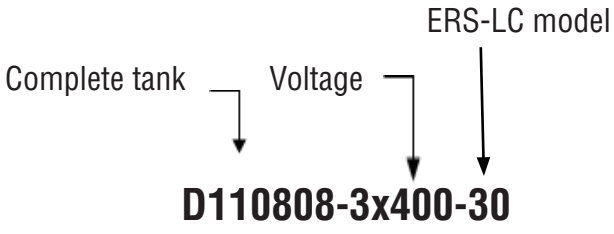
Fig. 5-4. Humidifier water level detector

6. SPARE PARTS

6.1 STAINLESS TANK

N°	Code	Description
1	D110828-SP	Cylinder clamp
2	D7959	Heating element nut M5
3	D110830-SP	Heating element bracket
4	D110832-40-SP	Top with Ø 40mm outlet
5	D110829-SP	Cylinder seal
6	D110754-SP	High temperature switch
7	D110765-230-SP	Heating element 230V 1900W
7	D110765-277-SP	Heating element 277V 1900W
7	D110765-346-SP	Heating element 346V 1900W
7	D110765-398-SP	Heating element 398V 1900W
7	D110761-230-SP	Heating element 230V 4300W
7	D110761-277-SP	Heating element 277V 4300W
7	D110761-346-SP	Heating element 346V 4300W
7	D110761-398-SP	Heating element 398V 4300W
8	D94058	Temperature sensor
9	D110205-SP	Drain filter
10	D110831-SP	Stainless steel cylinder

If the tank is completely changed, use the reference below:



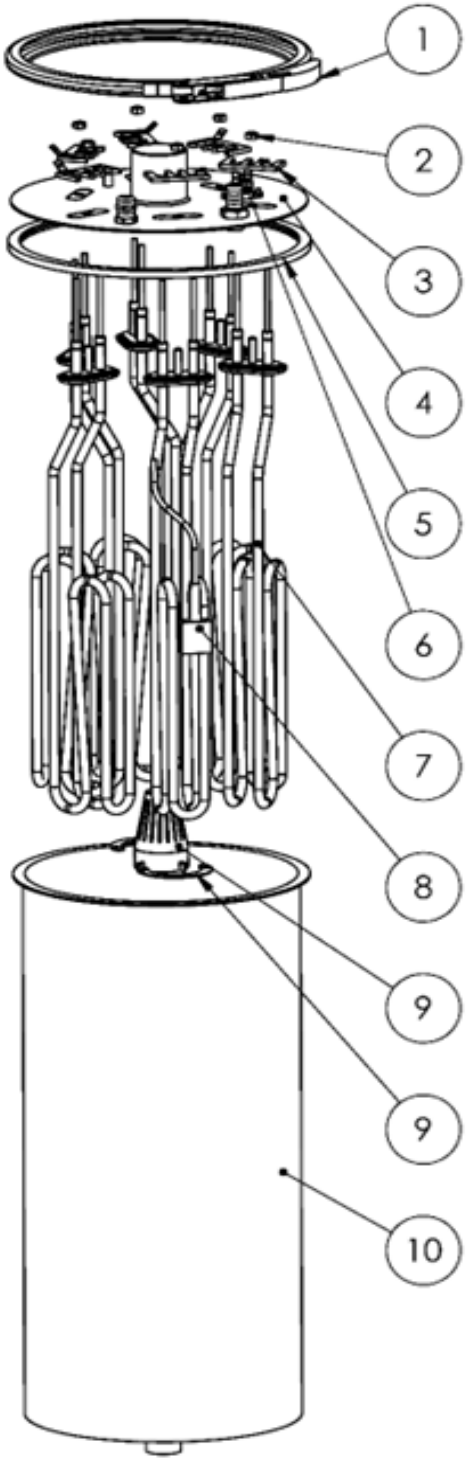


Fig. 6-1. Tank exploded view

6.2 WATER INLET VALVE

N°	Code	Description
1-2	D110157-SP	Water inlet valve 3-30 kg/hr
3	D111775-SP	Valve bracket

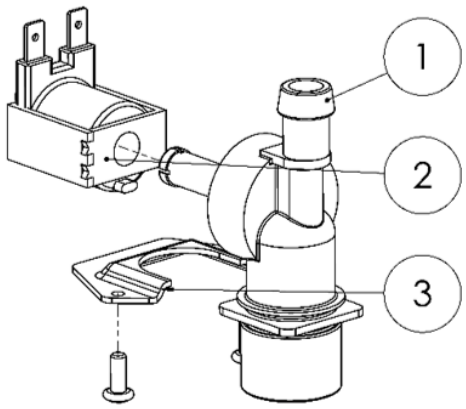


Fig. 6-2. Water inlet valve exploded view

6.3 WATER LEVEL DETECTOR

N°	Code	Description
1 - 4 & 6	D110232-DI-SP	Complete float water level detector

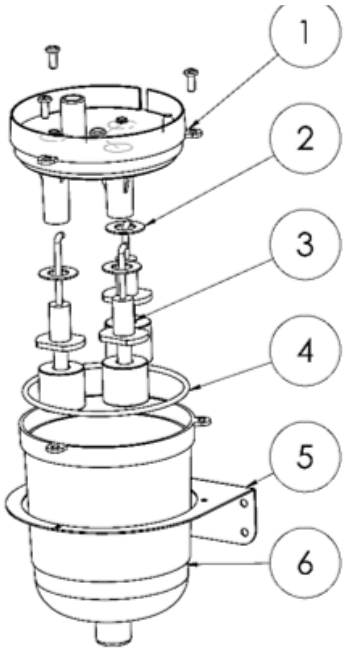


Fig. 6-3. Water level detector exploded view

6.4 DRAINING CIRCUIT

N°	Code	Description
1 - 5 & 8 - 10	D110147-SP	Complete valve
6	D110154-SP	Drain cup upper part
7	D110155-SP	Drain cup lower part

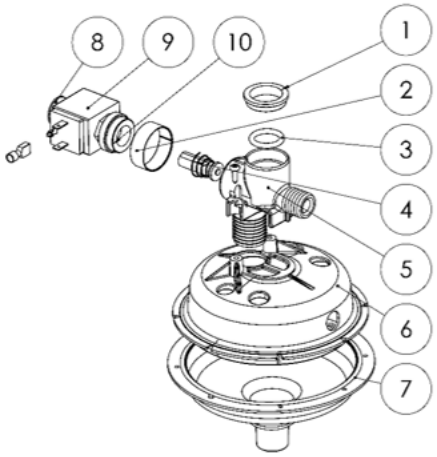


Fig. 6-4. Draining circuit exploded view

6.5 ELECTRICAL PART

N°	Code	Description
1	D110124-SP	Display board
2	D121388-5-SP	Main board ERS-LC (0TI)
3	D50931-SP	Remote information board
4	D109737-SP	Power terminal 35mm² (L1, L2, L3)
5	D110168-SP	Control terminal 16mm² (L, N)
6	D107491-SP	Terminal 2,5mm² (1, 2, 3, 4)
7	D110163-SP	Ground terminal 35mm².
8	D113642-100	Transformer pwr Sec 2x110-240vac Pri 1x200-600vac 100VA
9	D110806-600-60-SP D110806-600-90-SP	Static relay ERS-LC 3 - 15 if Up[v] = 230-600V Static relay ERS-LC 20 - 30 if Up[v] = 230-600V
	D110806-690-75-SP	Static relay ERS-LC 3 - 30 if Up[v] = 690V
10	D50932-SP	24V contactor
11	D110173-SP	Setting terminal 115/230V
12	D110768-SP	Fuse protection terminal 6mm².
13	D110166-SP	Stop terminal
14	D110128-50-SP	Control transformer Prim :2x115V Sec :2x12V
15	D92393-SP	On/Off switch
16	D110739-SP	Cooling fan 24 VAC
		Fast Fuse 2A - 5x20 mm (Bag of 6)
		Fast fuse 5A - 5x20 mm (Bag of 6)

Location	Amp.	Fuse protection
F1	2AT	Power contactor coil
F2	2AT	Inlet valve coil
F3	2AT	Drain valve coil
F4	2AT	Electronic boards
Din rail 5 & 6	2AT	Transformer
Din rail 7 & 8	5AT	Transformer

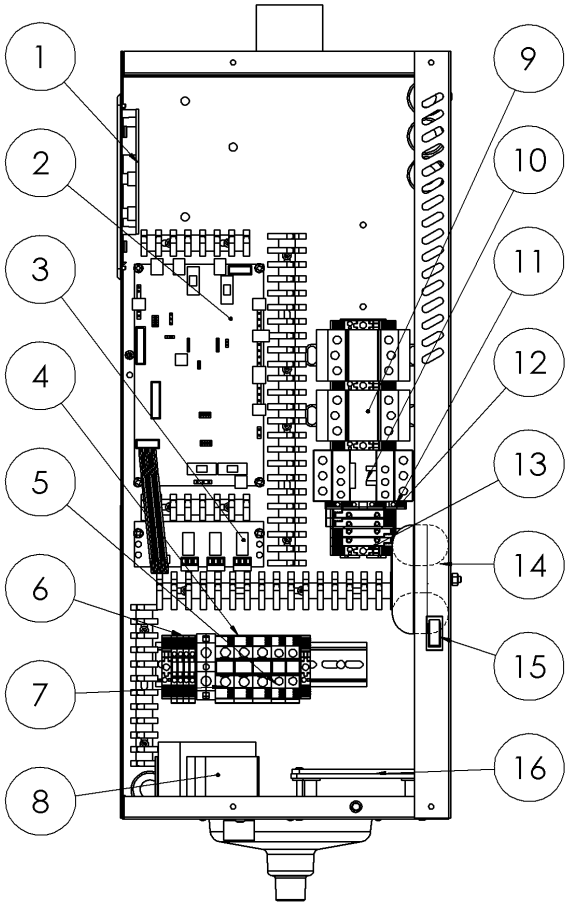


Fig. 6-5: Humidifier electrical compartment

Limited Warranty and Remedy

Armstrong International, Inc. ("Armstrong") warrants to the original user of those products supplied by it and used in the service and in the manner for which they are intended, that such products shall be free from defects in material and workmanship for a period of one (1) year from the date of installation, but not longer than 15 months from the date of shipment from the factory, [unless a Special Warranty Period applies, as listed below]. This warranty does not extend to any product that has been subject to misuse, neglect or alteration after shipment from the Armstrong factory. Except as may be expressly provided in a written agreement between Armstrong and the user, which is signed by both parties, Armstrong **DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

The sole and exclusive remedy with respect to the above limited warranty or with respect to any other claim relating to the products or to defects or any condition or use of the products supplied by Armstrong, however caused, and whether such claim is based upon warranty, contract, negligence, strict liability, or any other basis or theory, is limited to Armstrong's repair or replacement of the part or product, excluding any labor or any other cost to remove or install said part or product, or at Armstrong's option, to repayment of the purchase price. As a condition of enforcing any rights or remedies relating to Armstrong products, notice of any warranty or other claim relating to the products must be given in writing to Armstrong: (i) within 30 days of last day of the applicable warranty period, or (ii) within 30 days of the date of the manifestation of the condition or occurrence giving rise to the claim, whichever is earlier. **IN NO EVENT SHALL ARMSTRONG BE LIABLE FOR SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE OR PROFITS OR INTERRUPTION OF BUSINESS.** The Limited Warranty and Remedy terms herein apply notwithstanding any contrary terms in any purchase order or form submitted or issued by any user, purchaser, or third party and all such contrary terms shall be deemed rejected by Armstrong.

Special Warranty Periods are as follows:

Series EHU-800 Electric Steam Humidifier, Series HC-6000 HumidiClean™ Humidifier and GFH Gas Fired Humidifier with Ionic Beds:

Two (2) years after installation, but not longer than 27 months after shipment from Armstrong's factory.