heaterSteam - UR

Electric resistance humidifier

CAREL



ENG **User manual**

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

NO POWER & SIGNAL CABLES TOGETHER

READ CAREFULLY IN THE TEXT!

High Efficiency Solutions

WARNINGS



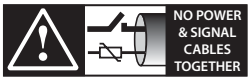
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DANGER ELECTRIC SHOCK: The humidifier includes live electrical parts. Disconnect the power supply before accessing internal parts, in case of maintenance and during installation.
DANGER WATER LEAKS: The humidifier automatically and constantly sucks in/drains quantities of water. Malfunctions in the connections or humidifier may cause leaks.
DANGER OF BURNS: The humidifier contains hot parts and delivers steam at 100 °C / 212 °F.

- The product is designed exclusively to humidify rooms either directly or through distribution systems (ducts).
- Installation, operation and maintenance must be performed by qualified personnel, aware of the necessary precautions and able to perform the required operations correctly.
- All operations on the product must be carried out according to the instructions given in this manual and on the labels applied to the product. Any uses or modifications unauthorized by the manufacturer are considered improper. CAREL Industries denies all responsibility for such unauthorized uses.
- Do not attempt to open the humidifier in any way other than the ones described in the manual.
- Follow the regulations in force in the place where the humidifier is installed.
- Keep the humidifier out of the reach of children and pets.
- Do not install and use the product near objects that can be damaged by contact with water (or condensate). CAREL Industries denies all responsibility for direct or indirect damage as a result of loss of water from the humidifier.
- Do not use corrosive chemicals, aggressive solvents or detergents to clean the internal or external parts of the humidifier, unless specifically indicated in the user's manual.

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ATTENTION



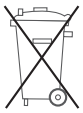
READ CAREFULLY IN THE TEXT!

Separate the probe cables and the digital input cables as much as possible from the inductive load and power cables to prevent possible electro-magnetic interference.
Never introduce power cables and signal cables (including those of electric control board) into the same cable troughs.



The installation of the product must absolutely include the grounding connection, using the special yellow-green terminal on the terminal block. Do not use the neutral as grounding connection.

DISPOSAL



The humidifier consists of metal parts and plastic parts. With reference to the European Parliament and Council Directive 2002/96/EC issued on 27 January 2003 and the related national implementation legislation, please note that:

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

Warranty for materials: 2 years (from the manufacture date, excluding consumables).

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

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1. INTRODUCTION AND INSTALLATION

1.1 HeaterSteam (UR*)

Range of isothermal resistance humidifiers, equipped with LED display for the control and distribution of steam.
Available models (identified by means of the code on the label, packaging and on the technical data plate located inside the electrical cabinet):

- UR002, UR004, UR006, UR010, UR013 with steam production capacity up to 13 kg/h (28,66 lb/h), hydraulic connections under the base of the humidifier;
- UR020, UR027, UR040, UR053, UR060, UR080 with steam production capacity from 20 to 80 kg/h (from 44.09 to 176.37 lb/h), hydraulic connections next to the humidifier.

1.2 Dimensions and weights

Models UR002..UR013 | Models UR020...UR080

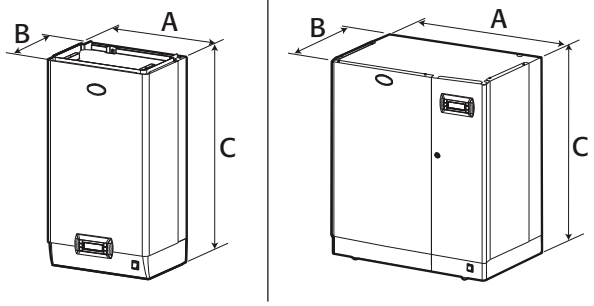


Fig. 1.a

		UR002…13	UR020…40	UR053…80
Size mm (in)	A	365 (14,37)	690 (27,16)	876 (34,48)
	B	275 (10.82)	445 (17,51)	445 (17,51)
	C	712 (20,03)	888 (34,96)	888 (34,96)

Tab. 1.a

		UR002…13	UR020…40	UR053…80
Weights kg (lb)	packaged	31(68.3)	73(160.9)	98(216.0)
	empty	26(57.3)	63(138.8)	87(191.8)
	installed*	35(77.1)	97(213.8)	155(341.7)

Tab. 1.b

* in operating conditions, filled with water.

1.3 When opening the packaging

- check the integrity of the humidifier upon delivery and notify to the carrier immediately, in writing, any damage that can be attributed to improper or careless transport;
- move the humidifier to the installation site before removing it from the packaging, grasping the neck from beneath;
- open the cardboard box, remove the protective material and remove the humidifier, keeping it upright at all times.

1.4 Positioning

- the unit is designed for wall mounting, suitable to support the weight under operating conditions (see par. "Wall mounting"). The models UR020*... UR080 * can be floor installed;
- to ensure proper distribution of steam, place the humidifier next to the steam distribution point;
- place the humidifier horizontally (using a spirit level), observing the minimum clearances (see Figure 1b) to allow for necessary maintenance.

Caution: during operation, the external metal panels heat up, and the back leaning against the wall can reach temperatures above 60 °C (140 °F).

Models UR002..UR013 | Models UR020...UR080

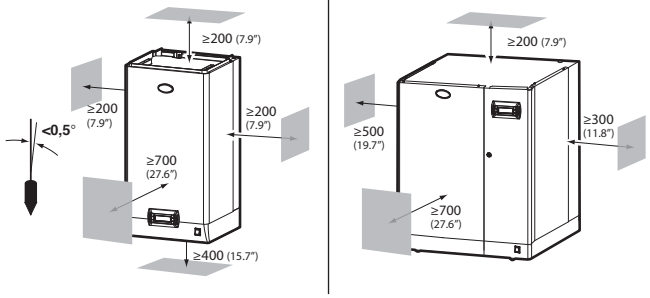


Fig. 1.b

1.5 Wall mounting

Mount the humidifier on the wall using the support bracket pre-attached to the humidifier, using the screws kit supplied (for mounting dimensions see table below).

instructions for fastening:

1. unscrew the wall bracket from the one attached to the humidifier;
2. secure the bracket to the wall (see Fig. 1.c), checking with a spirit level the horizontal position; if the unit is mounted on a masonry wall, you can use the plastic anchor plugs (Ø 8 mm, Ø 0.31in) and the screws (Ø 5 mm x L= 50 mm, Ø 0.19 in x L= 1.97 in) supplied;
3. hang the humidifier on the bracket using the profile on the upper edge of the unit's rear.
4. lock the humidifier to the wall by means of the hole / holes found / on the lower part of the rear panel of the machine.

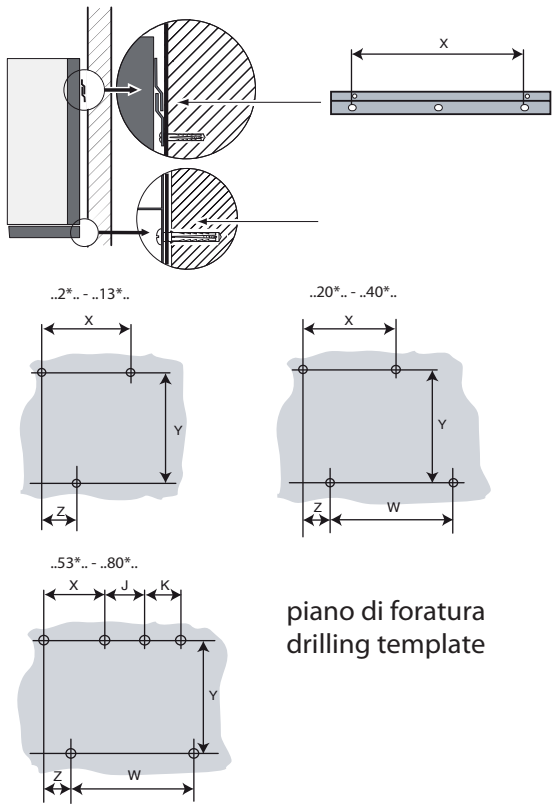


Fig. 1.c

Seize mm (in)	UR002-13	UR020-40	UR053-80
X	220 (8.7)	335 (13.2)	286 (11.3)
Y	591 (23.3)	753 (29.6)	737 (29.0)
Z	82 (3.2)	25 (1)	75 (3)
W	-	400 (15.7)	496 (19.5)
J	-	-	236 (9.3)
K	-	-	179 (7.0)

Tab. 1.c

1.6 Removing the front panel

Models UR002…UR013:

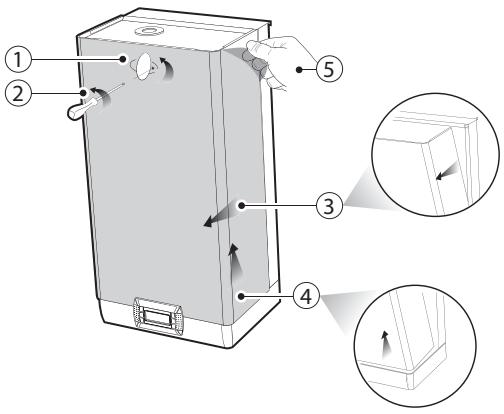


Fig. 1.d

1. turn the oval plate with the CAREL logo until the ground screw head can be seen;
2. loosen the screw with a screwdriver;
3. grab the sides of the panel, lift it about 20 mm (0.79 in), and detach it from the protruding edges of the humidifier;
4. remove the panel by pulling it forward;
5. remove the protective film.

Models UR020...UR080:

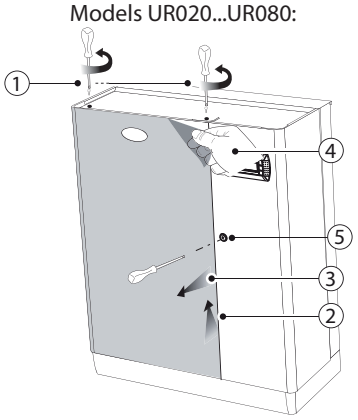


Fig. 1.e

1. remove the screws on the top of the humidifier using a screwdriver;
2. grab the panel by lifting it from the top about 20 mm (0.79 in);
3. remove the panel by pulling it forward;
4. remove the protective film (on all external surfaces of the humidifier).

1.7 Mounting the front panel

Models UR002…UR013:

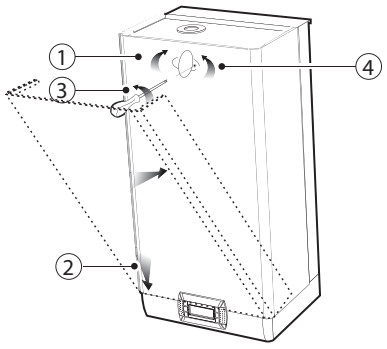


Fig. 1.f

1. turn the red oval plate with the CAREL logo so that the fastening hole below is visible;
2. slide the panel on the frame (keeping it slightly raised and tilted) until it stops on the rear edges;
3. fasten the ground screw using a screwdriver, ensuring its tightening;
4. turn the red oval plate with the CAREL logo so that the fastening hole below is no longer visible;

Models UR020...UR080:

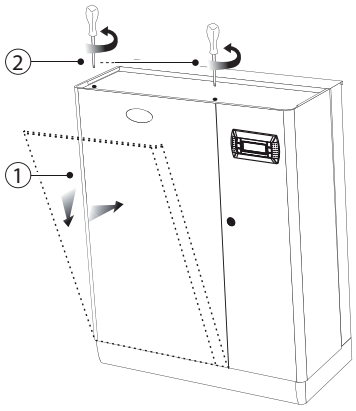


Fig. 1.g

1. slide the panel on the base, keeping it slightly tilted;
2. put it in vertical position and tighten the screws on the top cover with a screwdriver.

Caution: in models UR020...UR080 open the electrical compartment of the humidifier using the slotted lock.

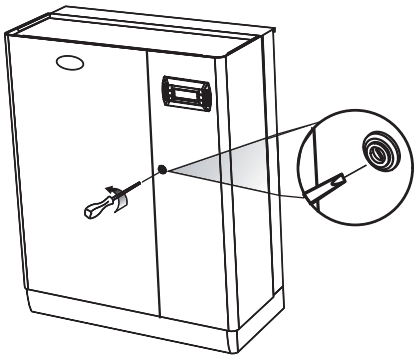


Fig. 1.h

1.8 Material supplied with the appliance

Once the packaging opened and the front panel removed, check if there is a:



screws and anchor kit for wall mounting



only for models UR020...UR080: Code FWHDCV0003 non-return valve with connection tube

1.9 Technical data plate

Humidifiers can be identified by means of the technical plate placed on the partition wall of the electrical cabinet.

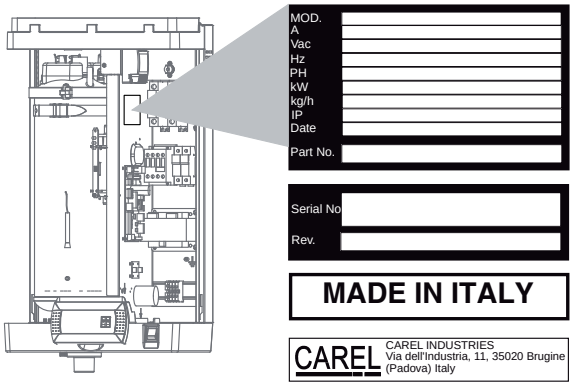


Fig. 1.i

Note: tampering, removal, lack of the identification plate or other does not allow the safe identification of the product and will make any installation or maintenance operation to be performed difficult.

1.10 Hydraulic circuit

Models UR002 – UR013

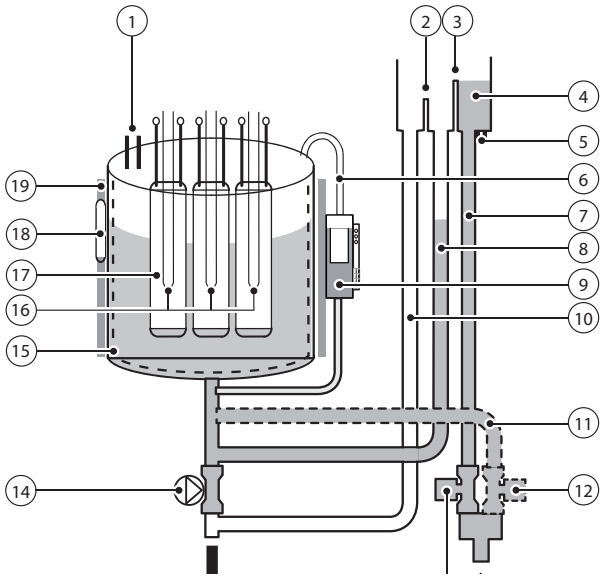


Fig. 1.j

Models UR020 – UR080

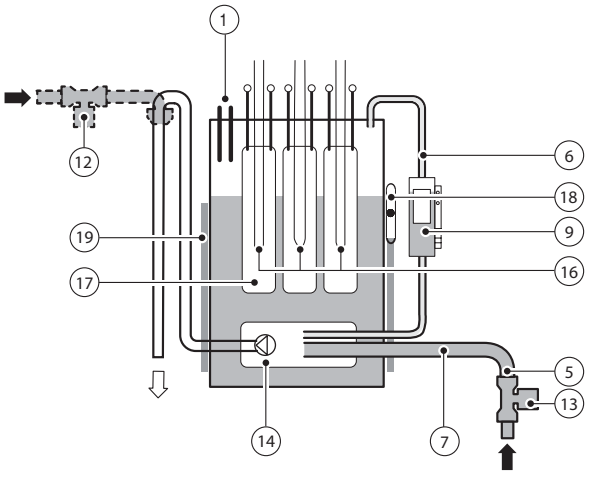
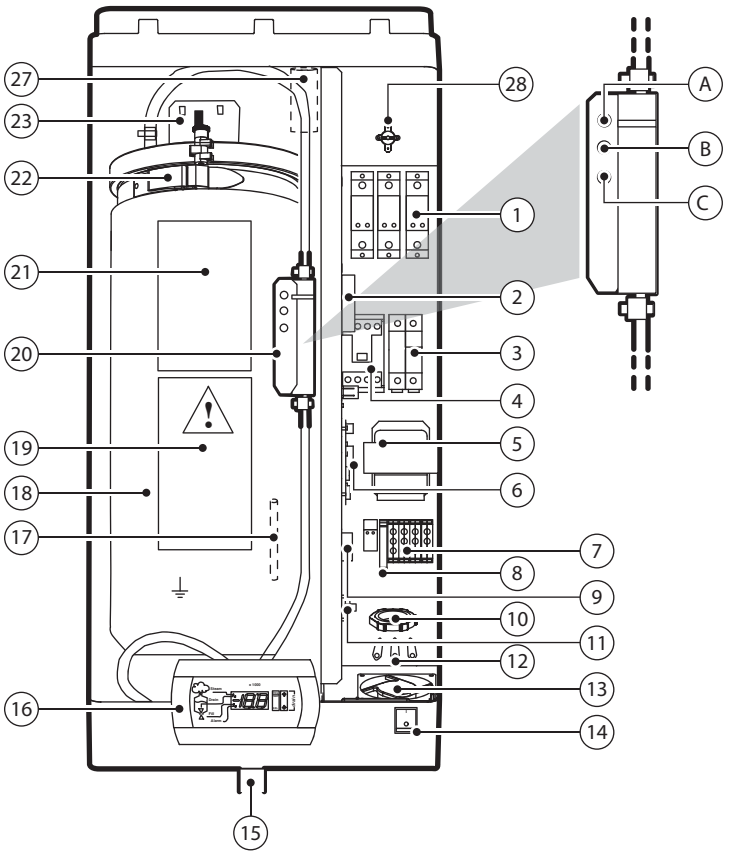


Fig. 1.k

1	Anti-foaming sensor	11	Drain tube tempering (*)
2	Overfill diaphragm	12	Drain valve tempering (*)
3	Fill diaphragm	13	Inlet valve
4	Feeding tank	14	Drain pump
5	Electrodes for conductivity measurement	15	Anti-adhesive film (**)
6	Equaliser pipe	16	Overtemperature sensors (PTC)
7	Feeding pipe	17	Heaters
8	Fill-up pipe	18	Water temperature sensor (NTC) (**)
9	Level sensor	19	Thermal insulation mattress (**)
10	Overflow pipe		

(*) for the units equipped with it
(**) for full option modules only

1.11 Structure of models UR002 – UR0013



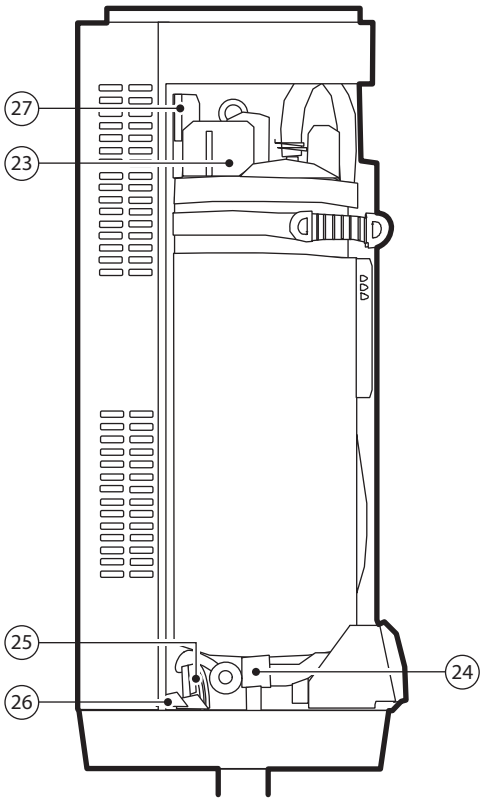
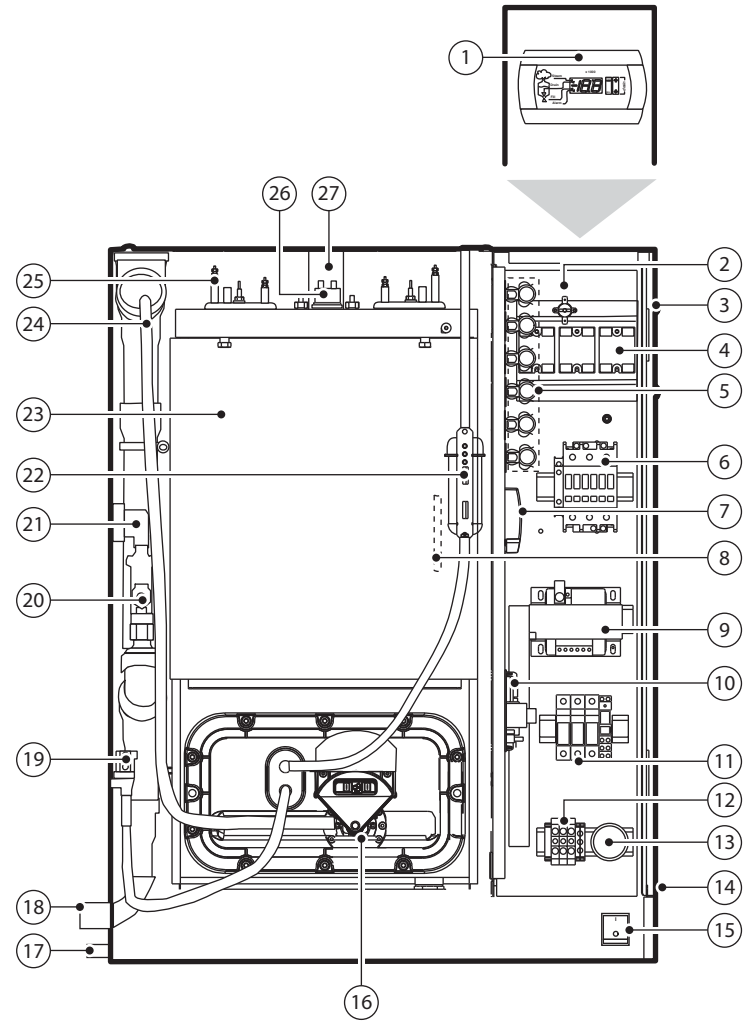


Fig. 1.l

Key:

1	Solid state relay (SSR)
2	Safety module (Motor protector, THP)
3	Fuse-holder base (F1, F2)
4	CONTACTOR
5	Transformer
6	Control card
7	Power cable terminal block
8	Pump fuse (F3)
9	Anti-jamming filter (where provided)
10	Cable gland for power cables
11	Fan control board
12	Cable gland for auxiliary circuit
13	Cooling fan
14	ON/OFF switch
15	Unloading
16	Electronic controller
17	NTC probe holder
18	Water heater
19	Warning label
20	Level sensor
	A: Green LED: normal operation
	B: yellow LED: loading
	C: red LED: safety level
21	Heater wiring label
22	Locking belt
23	Resistance
24	Drain pump
25	Infeed valve
26	Drain tempering valve (where provided)
27	Feeding tank
28	Thermal switch (klixon) SSR

1.12 Structure of models UR020 – UR0080



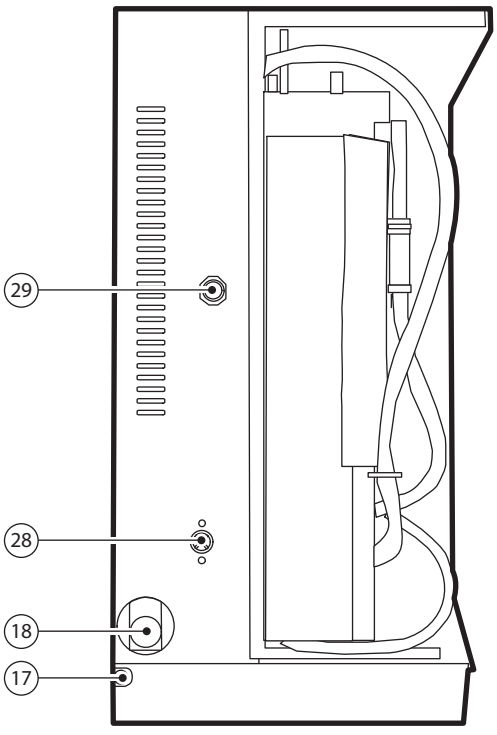


Fig. 1.m

Key:

1	Electronic controller
2	Thermal switch (klixon) SSR
3	Cooling fan
4	Solid state relay (SSR)
5	Heater fuse (where provided)
6	CONTACTOR
7	Safety module (Motor protector, THP)
8	NTC probe holder
9	Transformer
10	Control card
11	Fuse-holder base (F1, F2, F3)
12	Power cable terminal block
13	Anti-jamming filter (where provided)
14	Power cable inlet
15	ON/OFF switch
16	Drain pump
17	Collection tray drain
18	Unloading
19	Infeed valve
20	Drain tempering valve (where provided)
21	Drain tempering inlet (where provided)
22	Level sensor
23	Water heater
24	Drain pipe
25	Resistance
26	Thermal switch (klixon) boiler
27	Anti-foaming sensor
28	Water fill-up
29	Drain tempering water fill-up

2. HYDRAULIC CONNECTIONS

Attention:before making the hydraulic connections disconnect the humidifier from the power supply.

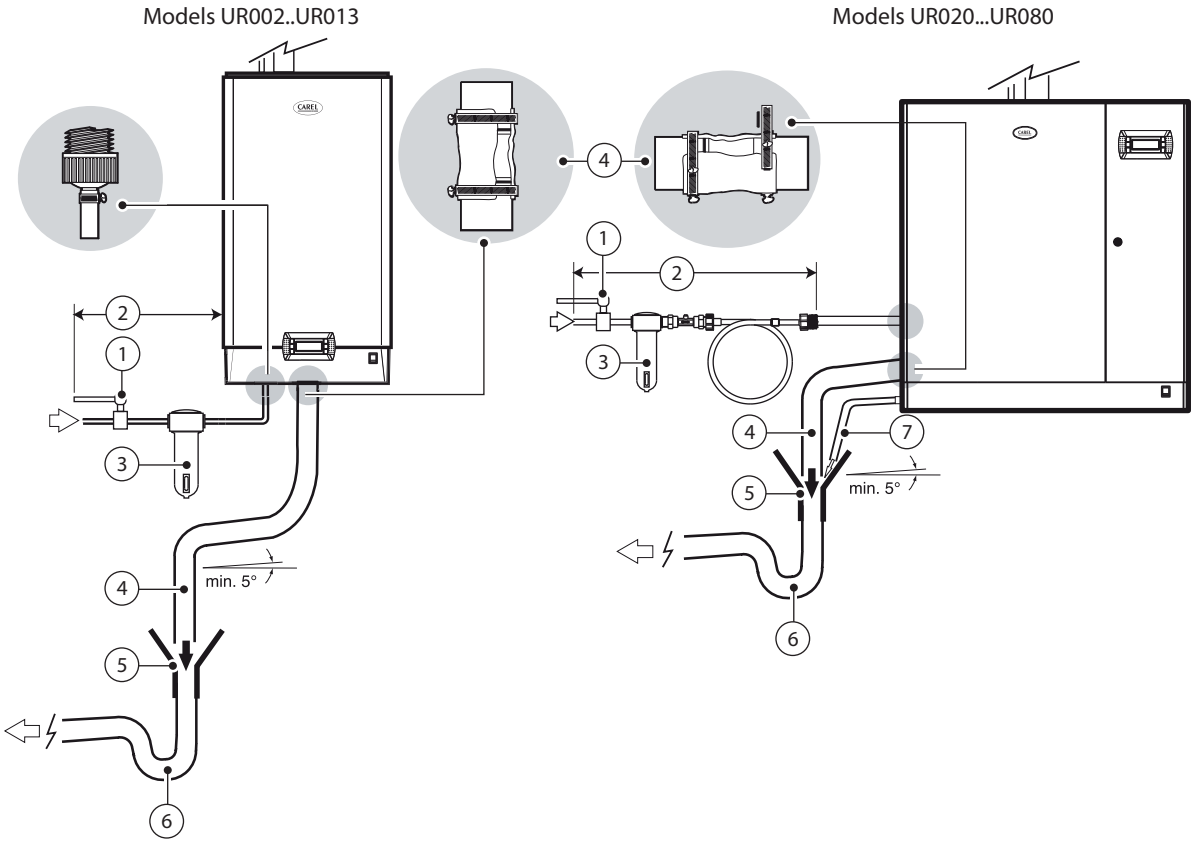


Fig. 2.a

HYDRAULIC CONNECTIONS:

1. install a manual valve upstream (to cut off the water supply);
2. connect the humidifier to the water supply. For UR002...UR013 models, use a flexible pipe 3/4"G connection. For UR020...UR080 models connect the flexible pipe with the non-return valve (supplid - code FWHDCV0003), to avoid the water inside the humidifier not making contact with the one in the mains;
3. install a mechanical filter to retain any solid impurities (connect downstream with respect to the tap.
4. connect a section of pipe for draining (resistant to temperatures of 100 ° C (212 ° F)) and with a minimum internal diameter of 40 mm (1.6 in) for models UR002-UR013 and 50 mm (2 in), for models UR020 UR080;
5. provide a funnel to ensure continuity interruption in the drain piping;
6. connect a syphon to prevent the return of odours;
7. for models UR020...UR080: connect a drain pipe from the tank to the bottom of the humidifier (this can run into the funnel used for draining).
8. for drain tempering versions, water temperature will be 60 °C, so input temperature is 25 °C guaranteed.

Caution:

- once the installation is complete, flush the supply pipe for about 30 minutes by carrying water directly in the drain and without introducing it into the humidifier. This will eliminate any waste or processing residues that could clog the inlet valve and/or cause foam when boiling water;
- the drain pipe must run vertically downwards at least 30 cm (figure) to prevent the return of steam.

Set up for hydraulic connections:

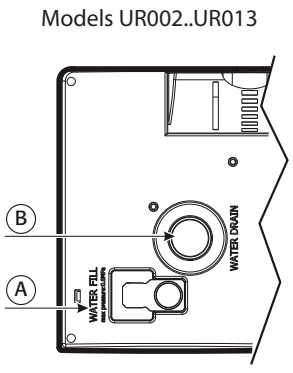


Fig. 2.b

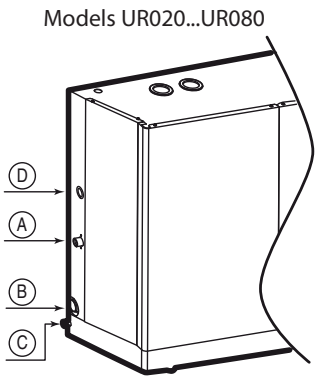


Fig. 2.c

Key:

A	Supply water inlet
B	Drain water outlet
C	bottom tank drain water outlet (only for models UR020-UR080)
D	Drain tempering inlet (see explanation on chapter 12)

Hydraulic connections heights:

Drain / Fill

Models UR002…UR013 (view from below):

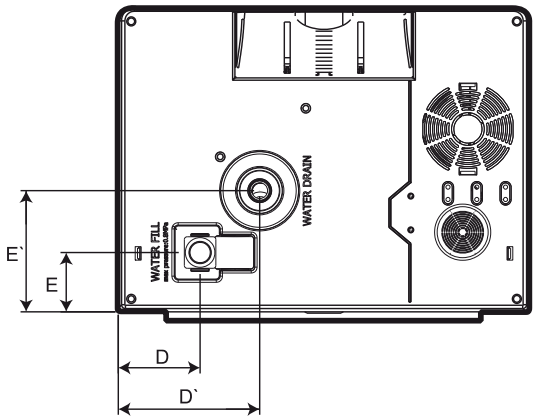


Fig. 2.d

mm (in)

D	75 (2.95)	E	62 (2.44)
D'	126 (4,96)	E'	116 (4.57)

Water fill	Water fill	Water drain	Water drain

Models UR020…UR080 (left side view):

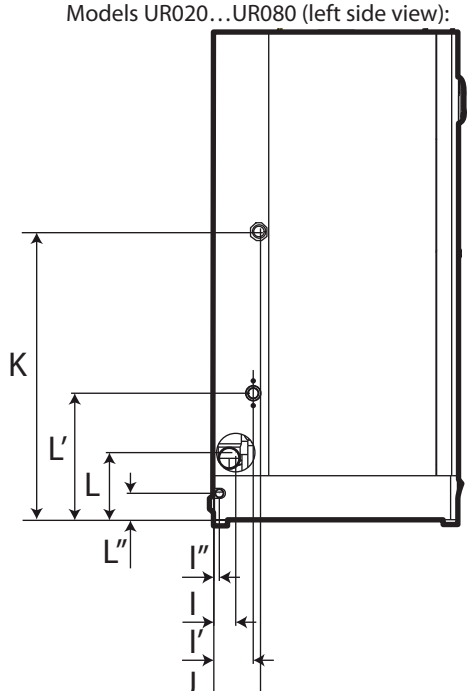


Fig. 2.e

mm (in)

I	50 (1.96)	L'	230 (9.0)
I'	120 (4.72)	L"	54 (2.1)
I"	20 (0.78)	J	132(5.2)
L	122 (4.8)	K	571(22.5)

Water fill	Water fill	Water drain	Water drain

Steam exhaust and condensate drain

Models UR002…UR013 (view from above):

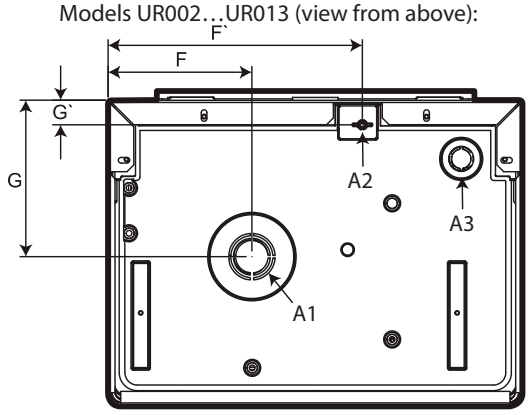


Fig. 2.f

seize mm (in)	Models UR002-UR013
F	126.7 (5)
F'	224 (8.8)
G	137.9 (5.4)
G'	21.7 (0.85)

A1	Steam outlet
A2	Juncture for the steam distributor condensate drain pipe
A3	Fan head power cable passageway (ancillary)

Models UR020…UR080 (view from above):

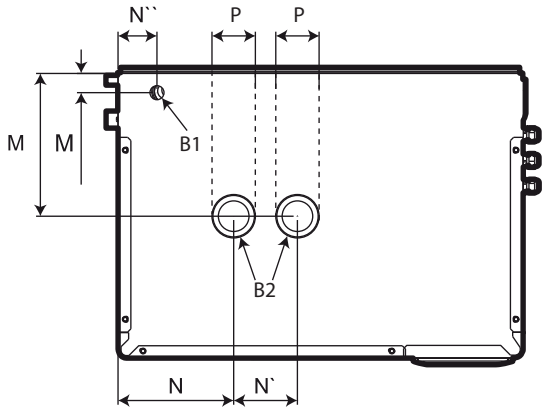


Fig. 2.g

seize mm (in)	Models UR020...UR040	Models UR053-UR080
M	172 (2.0)	172 (6.8)
M'	31 (1.2)	52 (2.0)
N	273 (10.7)	260 (10.2)
N'	---	190 (7.4)
N"	46 (1.8)	52 (2.0)
P	60 (2.4)	60 (2.4)

B1	Set up for steam distributor condensate drain pipe
B2	Steam outlet

2.1 Supply water

The supply water for the electric resistance humidifier must not be corrosive, must not emit bad odours, and must not contain too much lime to avoid excessive deposits. The water, supplied from mains of drinking water or demineralised water, must have the following characteristics:

LIMIT VALUES FOR THE RESISTANCE HUMIDIFIERS WATERS

		Resistances			
		Non ricoperte		Covered with anti-adhesive film	
		Min	Max	Min	Max
Specific conductivity at 20°C /68°fH	σ20 - µS/cm	20	1500	1	1500
Total dissolved solids	TDS – mg/l	(1)	(1)	(1)	(1)
Fixed residual at 180°C/ 356°fH	TDS – mg/l	(1)	(1)	(1)	(1)
Hydrogen ion activity	pH	6.5	8	6	8.5
Total hardness	TH– mg/l CaCO3	0 (2)	400	0	400
Temporary hardness	mg/l CaCO3	0 (3)	30	0	300
Chlorides	ppm Cl	=	20	=	50(4)
Iron + Manganese	mg/l Fe+Mn	=	0.2	=	0.2
Silica	mg/l SlO2	=	20	=	20
Residual Chlorine	mg/l Cl-	=	0.2	=	0.2
Calcium sulphate	mg/l CaSO4	=	100	=	100
Metallic impurities	mg/l	0	0	0	0
Solvents, diluents, detergents, lubricants	mg/l	0	0	0	0

Tab. 2.a

(1) Values depending on the specific conductivity; in general: TDS ≈0,93 * σR, 20 °C; R180 ≈0,65 * σR , 20 °C;
(2) Not lower than 200% the content of chloride in mg/l Cl- ;
(3) Not lower than 300% the content of chloride in mg/l Cl- ;
(4) It could be necessary to intervene on the drain rate to avoid a concentration in the boiling water higher than 300 mg/l Cl-.

Attention:treating the water with water softeners or polyphosphates dispensers is not allowed; it allows for reduced maintenance but favors the concentration of dissolved salts in the water in the cylinder, leading to potential corrosion to the heating elements and possible operation irregularities due to the formation of foam. Should this be impossible to avoid, it requires dilution with ordinary mains water in such a quantity as to guarantee at least 60% of its initial hardness value, and not less than 5°f. Water treatment with reverse osmosis demineralisers is allowed.

Not recommended:

1. the use of well water, industrial water or water from cooling circuits and, in general, water which may be chemically or bacteriologically contaminated;
2. the addition to the water of disinfectants or anticorrosion compounds, as these may cause irritation.

Note: no relationship can be proven between water hardness and conductivity; nonetheless, as an indication only, water with a hardness of 40°f should have a conductivity of approximately 900-1000 mS/cm a 20 °C.

2.2 Drain water

- contains the same substances dissolved in the supply water, but in larger amounts;
- it can reach a temperature of 100 °C (212° F);
- it is not toxic and can be drained in the white waters collection system.

3. for drain tempering versions, water temperature will be 60 °C, so input temperature is 25 °C guaranteed.

Attention: completely demineralised water is aggressive. For connection to a water system with fully demineralized water use only installation items made of plastic resistant to chemicals (eg. Polypropylene) or stainless steel.

3. STEAM DISTRIBUTION

3.1 CAREL jet distributors (SDPOEM00**)

They can be mounted either horizontally or vertically (steam exhaust facing upwords).
See chapter 12 for distributors models.

Mounting instructions (see figure):
1. drill a series of holes in the wall of the pipe, using the drilling jig of the distributor;
2. insert the distributor;
3. fasten the flange of the distributor using 4 screws.

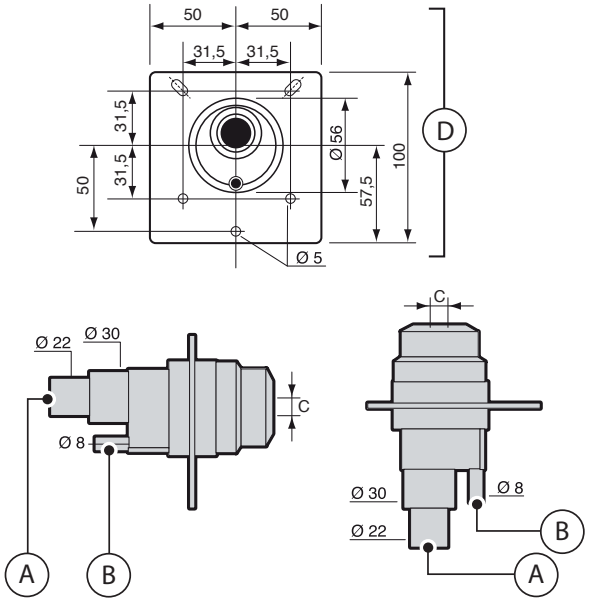


Fig. 3.a

Key:

A.	steam inlet
B.	condensate drain
C.	steam outlet The hole dimensions vary depending on the distributor model: • model SDPOEM0000: hole to be drilled manually, up to 30 mm (1.2 in) diameter; • model SDPOEM0012: hole diameter 12 mm (0.5 in); • model SDPOEM0022: hole diameter 22 mm (0.9 in);
D.	drilling jig

Note: if you use distributors steam with an inner diameter of 30 mm (1.2 in) remove the 22 mm (0.9 in) steam inlet section from the steam distributor.

3.2 Linear distributors for air pipes (DP***DR0) from CAREL

Install far from any obstacle (curves, ramification, section changes, grilles, filters, fans).
Minimum distance between distributor and obstacle: 1…1,5 m (3.3…4.9 ft).

Increase distance in case of:
1. increase in speed of the air in the duct;
2. turbulence decrease.

See paragraph 12.5 for installation examples.

Mounting instructions (see figure):
- drill a series of holes in the wall of the pipe, using the drilling jig of the distributor (found in the packaging of the distributor);
- insert the distributor with the steam outlet holes facing upwards;
- fasten the flange of the distributor using 4 screws.

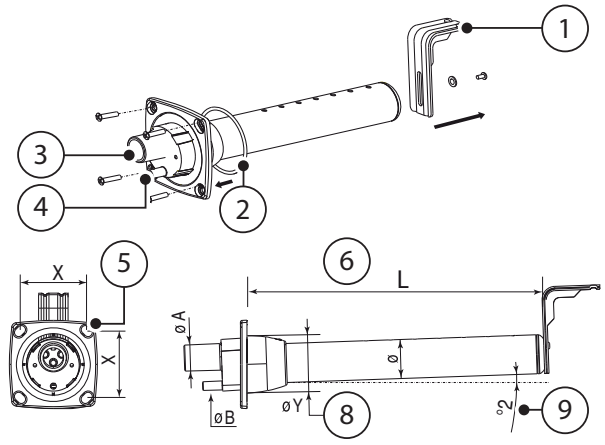


Fig. 3.b

Key:
1. L-shaped mounting bracket (where applicable)
2. flange gasket
3. steam inlet (ØA)
4. condensate drain (ØB)
5. screw diameter (see instructions sheet that comes with the distributor)
6. L = length (depending on the model of distributor, see paragraph "Linear distributors" chap. 11)
7. tilt angle (about 2 °) for condensate drain
8. diameter of the hole in the wall (ØY)

Seize in mm (in)

	linear distributors from CAREL		
	DP***D22R0	DP***D30R0	DP***D40R0
ØA	22 (0.9)	30 (1.2)	40 (1.6)
ØB	10 (0.4)	10 (0.4)	10 (0.4)
ØY	58 (2.3)	68 (2.7)	89 (3.5)
Ø	35 (1.4)	45 (1.8)	60 (2.4)
X	68 (2.7)	77 (3.0)	99 (3.9)

Tab. 3.a

Caution:
1. mount the distributor slightly tilted (at least 2°, to facilitate the condensate discharge);
2. the L-shaped supports (see element 1 Fig. 3. b) is supplied with steam distributors models from DP085* to DP025*. For shorter lengths the bracket can be supplied as optional (code 18C478A088).

3.3 CAREL ventilated steam distributors for rooms (VSDU0A*, only models UR002... UE013)

Steam distributors for humidifiers up to 18 kg/h (39.7 lb/h). They can be connected onto the humidifier or in a remote position (see fig. 3 c.) These distributors have a power supply inside the electrical panel (24 Vac, Terminals X1, X2).

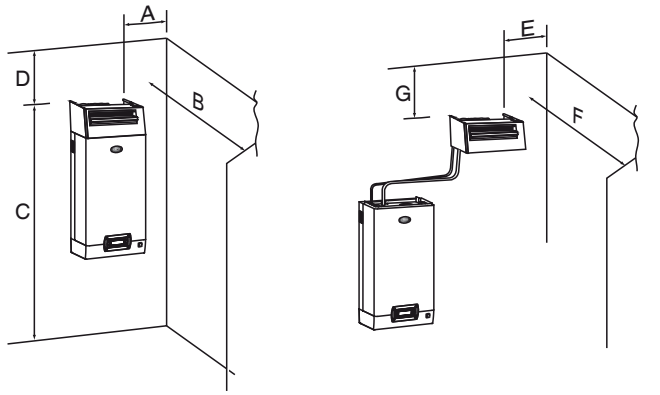


Fig. 3.c

A	> 0,5 m	E	> 0,5 m
B	> 5 m	F	> 5 m
C	> 2.1 m	G	> 1 m
D	> 1 m		

Caution: in order to achieve proper steam distribution observe the distances indicated in the fig. above.

For the humidifiers larger than 18 kg/h, the are ventilated steam distributors code VRDXL00000 with 230 Vac power supply (maximum capacity 45 kg/h). The distributors are designed for installation in a remote position, and require two steam hoses with a 30 mm diameter.

A	> 0,9 m (>36")	E	> 0,9 m (>36")
B	> 3 m (>120")	F	> 3 m (>120")
C	> 1.8 m (>72")	G	> 1.2 m (>48")
D	> 1.2 m (>48")		

3.4 Steam transport pipe

- use CAREL flexible hoses (max 4 m long, see section "Models of steam conducting pipes paragraph 12.2);
- avoid the formation of pockets or traps (cause of condensate accumulation)
- avoid choking the pipe with sharp bends or twists.
- Use metal clamps to fasten the ends of the pipe to the connections on the humidifier and the steam distributor, so that they do not come loose as a result of the temperature.
- avoid strains which include mechanical stress on the cylinder steam outlet tailpiece

3.5 Condensate drain pipe

During the operation of the humidifier part of the steam can condense, causing efficiency loss and noise (gurgling).
To drain the condensate connect to the base of the distributor a discharge pipe with a water trap and a minimum slope of 5° (see fig.).
CAREL condensate drain pipes: code 1312353APG.

Caution: the condensate drain pipe trap must be filled with water prior to turning on the humidifier.

Examples of correct and incorrect installation of the steam conduct pipe and of the condensate drain pipe:

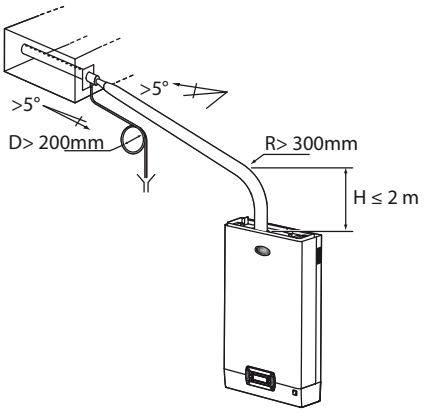


Fig. 3.d

All the UR models

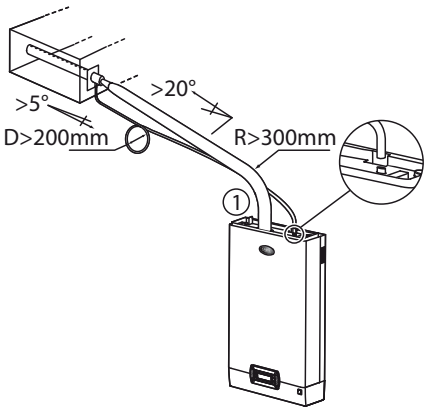


Fig. 3.e

Models UE002...UE013 (1): connection with fill tray

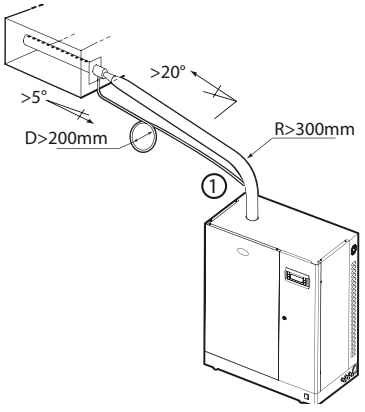


Fig. 3.f

Models UE020...UR080 (1) extend the pipe inide the humidifier up to the base tank.

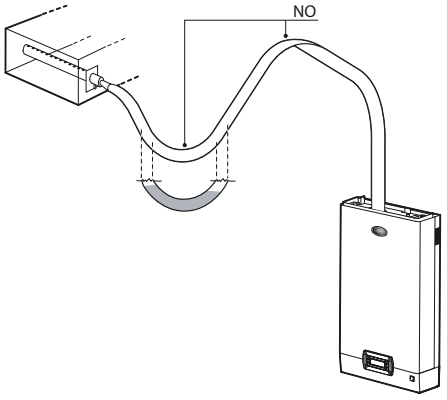


Fig. 3.g

All the UR models

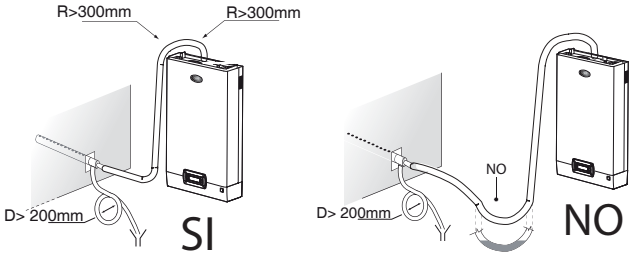


Fig. 3.h

4. ELECTRICAL CONNECTIONS

4.1 Set up for power cables passageway

Models UR002-UR013

Exterior, view from below

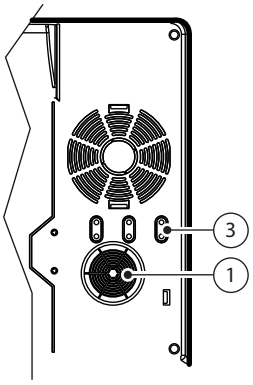


Fig. 4.a

Interior, view from above

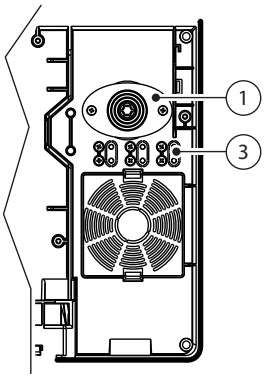


Fig. 4.b

Models UR20-UR80

Exterior, side view

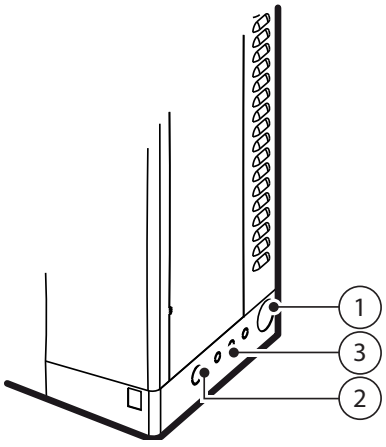


Fig. 4.c

Key:
1. power supply cable inlet;
2. inlet (after drilling) for any other purpose;
3. probe cables inlet (after drilling).

4.2 Power supply cable connection

Before making the connections, ensure that the machine is disconnected from the mains: set the master switch of the system and that of the humidifier to OFF.

Attention:please note that the ON/OFF switch of the humidifier cuts the power only to the electronic control, not the resistances, which remain powered.

Check that the voltage of the appliance's power supply corresponds to the value indicated on the data plate inside the electrical panel. Remove the front panel as shown in chapter 1.
In order to insert the power cables and probes:

Models UR002-UR013

1. loosen the screws and remove the cover (A);
2. if necessary cut the top of the cone cable gland (B) and insert the power cable;
3. connect the electrical cables to the terminal block, reinsert the cover and fasten it with the screws;

To secure the probe cable:
4. remove the precut cable clamp (C) and loosen the screws;
5. insert the cable into the probe using the newly drilled hole: then secure the cable with screws.

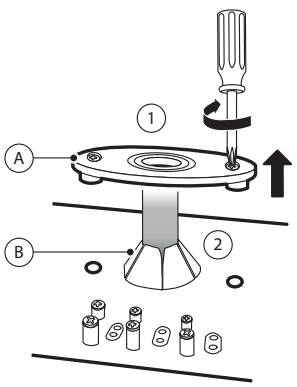


Fig. 4.d

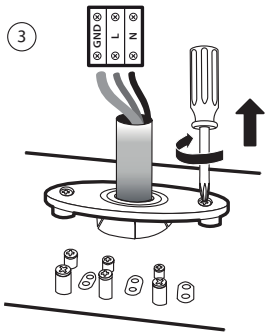


Fig. 4.e

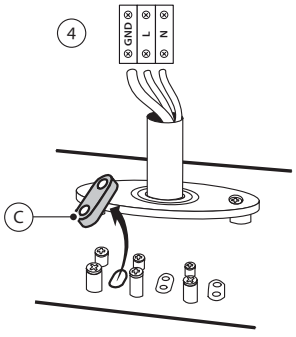


Fig. 4.f

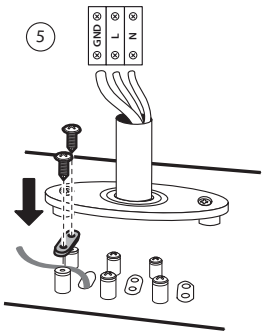


Fig. 4.g

Models UR020-UR080

1. Locate the grommet (A) on the right side of the appliance and pass the power cable through it;
2. inside the electrical panel: unscrew the cable gland (B), connect the wires to the terminal block and tighten the screws again to ensure tightness.

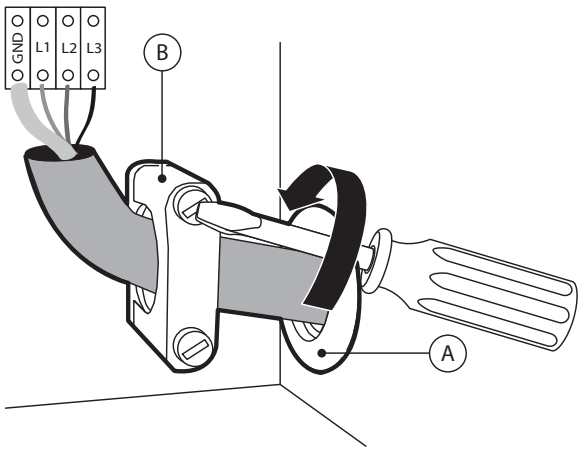


Fig. 4.h

The power line to the humidifier must be fitted with a cut-off switch and fuses protecting against short-circuits, to be mounted by the installer. The table in chapter 12 shows the recommended cross-sections of the power cable and the recommended sizes of the fuses; note, however, that this data is purely indicative and, in the event of non-conformity with local standards, the latter must prevail.

Note: in order to avoid unwanted interference, it is recommended to keep the power cables separated from the signal ones from the probes:

Caution: connect the yellow-green cable to the ground terminal (GND).

4.3 Control board

The control board (S) is located inside the electrical panel, in the partition wall.

UR002-UR013

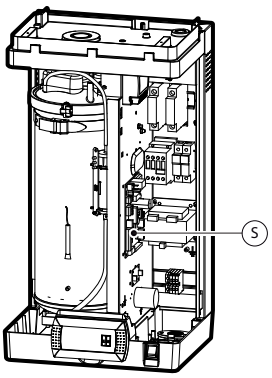


Fig. 4.i

UR020-UR080

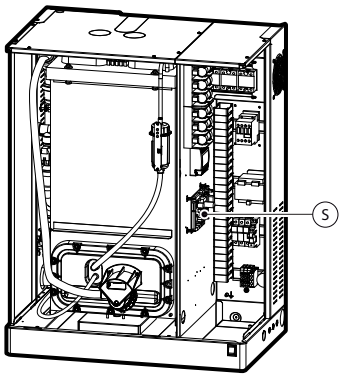


Fig. 4.j

The auxiliary connections (probes, remote terminal, alarm), must be made by introducing the external cables into the electrical panel. For this purpose use the smaller fairlead on the base of the machine, passing the cables through the raceway on the internal partition to the removable screw terminals placed on the control board.

CONTROL BOARD

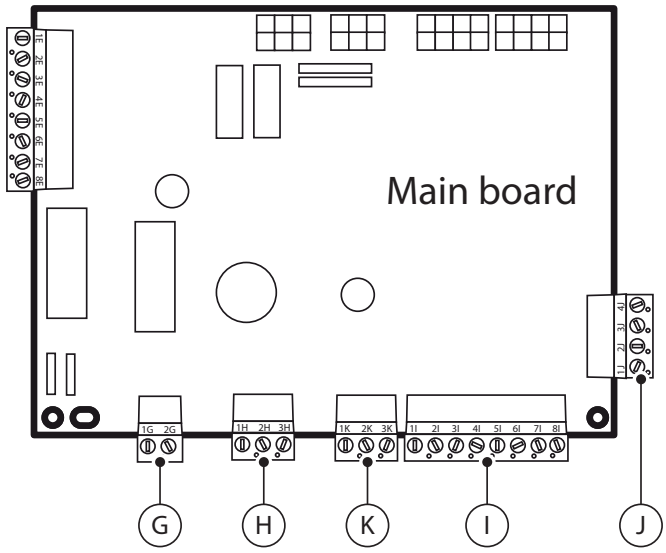


Fig. 4.k

Key:
Terminal E: reserved;
Terminal G: reserved;
Terminal H: alarm contact
Terminal K: reserved
Terminals I: control signals
Terminals J: connection
with remote terminal or supervisory system

terminal	function	electrical characteristics	
1I	humidity level probe signal input	Input impedance:	50 kΩ if set up for 0…20 mA or 4…10 mA 60 kΩ if set up for 0…1 V or 0…10 V or 2…10 V
2I	GND		
3I	≈ 32 Vdc	derived from rectifying of 24 Vac; max 250mA	
4I	12 Vdc stabilised	accuracy ± 5%; Imax=50 mA	
5I	room probe signal input or signal from external regulator	Input impedance:	50 kΩ if set up for 0…20 mA or 4…10 mA 60 kΩ if set up for 0…1 V or 0…10 V or 2…10 V
6I	GND		
7I 8I	remote enabling	Rmax=50 Ω; Vmax=24 Vdc; Imax=10 mAdc	
1H	NO alarm contact	250 V; 8A with resistive load; 2A with indicative load	
2H	common alarm contact		
3H	NC alarm contact		
1G 2G	Reserved		
1J	≈ 32 Vdc	derived from rectifying of 24 Vac; max 250 mA	
2J	L +	standard RS485	
3J	L -		
4J	GND		
1K 2K 3K	Reserved		

Tab. 4.a

4.4 Steam production command signals

Attention:follow this sequence of steps in order to avoid damaging the control board:

1. program the controller and turn it off;
2. make the electrical connections;
3. switch the controller on.

The humidifier is fitted with solid-state relays, therefore its capacity can vary from zero to 100% depending on the control requirements. In addition, it can be connected by means of RS485 serial to a remote supervisor. Depending on the type of signal used you can obtain different types of enabling and/or management of the steam production (ON/OFF or modulating). Production enabling is achieved by electrically connecting the terminals 7I and 8I (jumper).

1. Steam production can be launched as follows:

HUMIDISTAT (ON/OFF):

- connect the inputs 4I and 5I (production command) to a humidistat;
- set parameter A0=0 to enable action ON/OFF

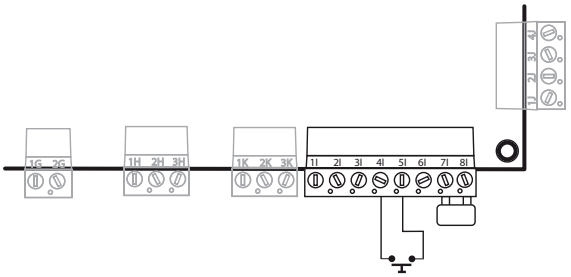


Fig. 4.l

HUMIDISTAT and REMOTE CONTACT (on/off)

- connect the inputs 4I and 5I (production command) to a humidistat;
- connect the inputs 7I, 8I (enabling) to a remote contact (e.g.: switch, timer, ...);
- set parameter A0=0 to enable action ON/OFF

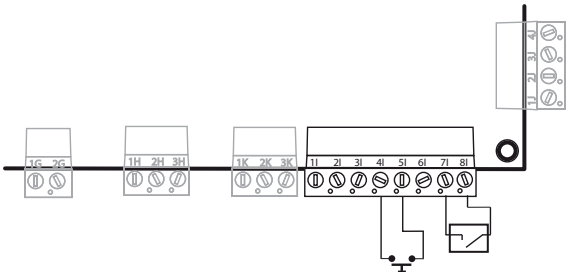


Fig. 4.m

2. Enabling and adjusting steam production as follows:

EXTERNAL PROPORTIONAL REGULATOR (modulating action)

- jumper connect inputs 7I, 8I;
- connect outputs 5I, 6I (production command) to an external regulator;
- set parameter A0=1 to enable the modulating action (see chapter 7) and parameter A2 according to the signal chosen (0...10V, 2...10V, 0...20, 4...20mA).

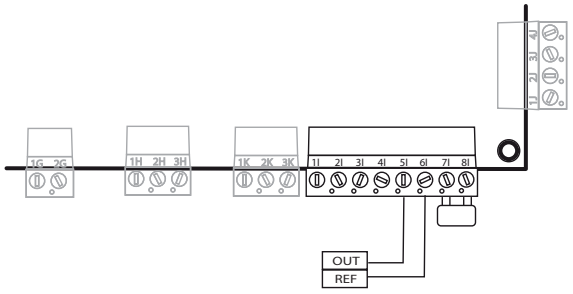


Fig. 4.n

EXTERNAL PROPORTIONAL REGULATOR and REMOTE CONTACT (modulating action)

- connect inputs 7I and 8I to a remote contact (enabling);
- connect outputs 5I and 6I (production command) to an external regulator;
- set parameter A0=1 to enable the modulating action (see chapter 7) and parameter A2 according to the signal chosen (0...10V, 2...10V, 0...20V, 4...20mA).

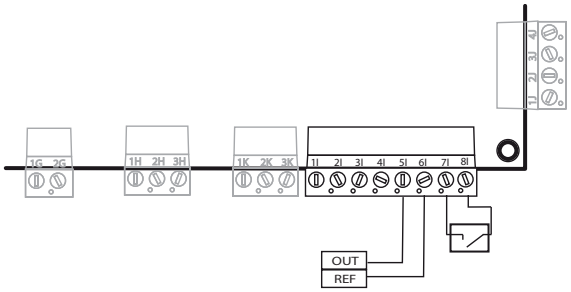


Fig. 4.o

Note: in the industrial sector (CEI EN61000-6-2) signal cables that come out of the appliance must not exceed 30 m in length: steam production signal cable (terminals 5I, 6I), the remote ON/OFF digital input (terminals 7I, 8I) and shielded cable for RS485 communication.

4.5 Control with humidity probes

The main control board, connected to an environment humidity control probe, adjusts the steam production according to the humidity measured. You can connect a second humidity probe on the outlet: in this configuration, typical of air treatment plants, the main control board continues to adjust the steam production according to humidity, which depends however on the value of the relative humidity measured in the outlet pipe.

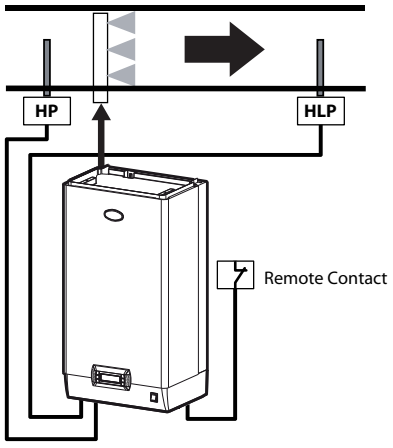


Fig. 4.p

Key:

HP	Environment humidity regulating probe (intake/environment humidity probe)
HLP	Humidity limit probe (outlet humidity probe)
Remote Contact	Remote contact

Attention: prior to connecting the signal you must set the parameters A0-A2-A6

Connection with control board

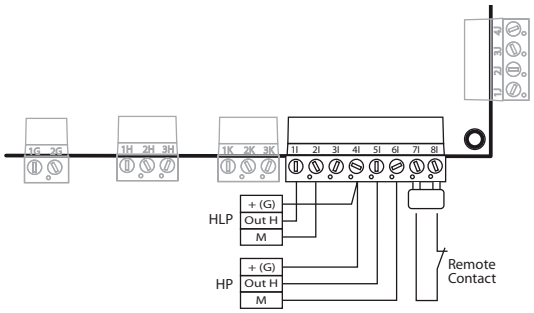


Fig. 4.q

Connectable probes:

CAREL probes available for rooms	DPWC111000
for air ducts	DPDC110000
	DPDC210000
for special applications	DPPC210000
	DPPC210000

Note: it is possible to connect active non CAREL probes to the control.

Control with temperature probes

The control of this appliance features autonomous internal control, and is connected to a temperature probe TT (Fig. 4.i).

This performs complete control according to the temperature measured inside the environment being controlled.

Fig. 4 s shows the connection of the CAREL probe type ASET030001, with measurement range -30T90 °C (Fig.4.s). The CAREL recommended probes have a 0 to 1V output. The control signal must be connected to terminal 5I, whose reference (GND) is represented by terminal 6I. The control can be connected to non-CAREL active probes.

Using different brand probes

Different brand probes can be used, with output signals selected, by programming the parameter A2, (see tab. 4.a) from the following:

- voltage signal: 0 to 1 Vdc; 0 to 10 Vdc; 2 to 10 Vdc;
- current signal: 0 to 20 mA; 4 to 20 mA.

In addition, the maximum and minimum values must be programmed for the signal (parameters A3 and A4 for the room probe; A7 and A8 for the outlet probe).

The probes can be powered at the following voltages:

- 12 V stabilised at terminal 4I;
- 32 Vdc from the rectifying of 24 Vac at terminal 3I.

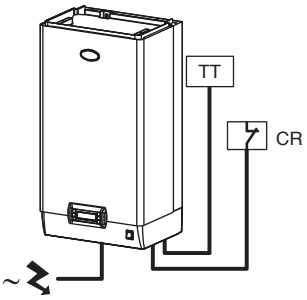


Fig. 4.r

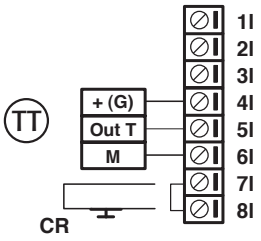


Fig. 4.s

Using different brand probes

Different brand probes can be used, with output signals selected, by programming the parameter A2, (see THE HUMIDIFIER CONTROLLER) from the following:

- voltage signal: 0 to 1 Vdc; 0 to 10 Vdc; 2 to 10 Vdc;
- current signal: 0 to 20 mA; 4 to 20 mA.

In addition, the maximum and minimum values must be programmed for the signal (parameters A3 and A4 for the room probe; A7 and A8 for the outlet probe).

The probes can be powered at the following voltages:

- 12 V stabilised at terminal 4I;
- 32 Vdc from the rectifying of 24 Vac at terminal 3I.

The control signals must be connected:

- for the control probe HT (TT in the case of controls for steam baths) to terminal 5I, whose reference ground (GND) is terminal 6I;
- for the limiting probe CH, to terminal 1I, whose reference ground (GND) is terminal 2I.

IMPORTANT WARNINGS:

- To avoid disturbances to control, the ground of the probes or the external regulators must be electrically connected to the ground of the appliance's control;
- For humidifier operation terminals 7I and 8I must be connected by an enabling contact or a jumper (default solution). If terminals 7I and 8I are not connected, all internal and external devices commanded by the control are disabled.

4.6 Alarm contact

The humidifier's control module features a voltage-free switching contact for the remote signalling of the presence of one or more anomalous events or alarms. Connection to the alarm contact (250 Vac; maximum load: 8 A resistive - 2 A inductive) is made using the removable terminal block H, as per Fig. 4.t.

Set up for remote indication of the presence of one or more alarms (terminals 1H, 2H, 3H).

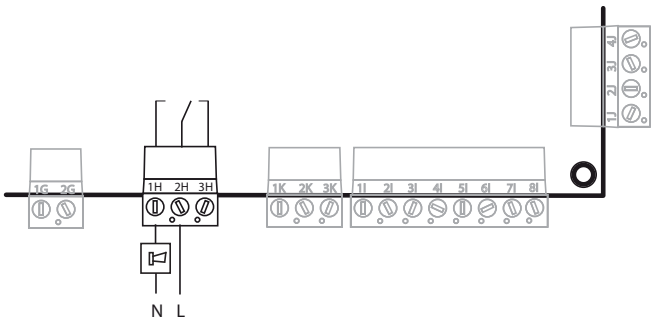


Fig. 4.t

4.7 Final checks

The following conditions represent correct electrical connection:

1. the network voltage of the appliance corresponds to the voltage on the specification plate;
2. the fuses installed are suitable for the line and the voltage of the power supply;
3. humidifier to be disconnected;
4. the humidifier has been grounded correctly;
5. the power cable is fastened to the tear-proof cable clamp;
6. terminals 7I and 8I are connected by jumper or an enabling contact;
7. if the appliance is controlled by an external regulator, the ground of the signal is electrically connected to the ground of the controller'.

5. SUPERVISOR NETWORK

5.1 RS 485 SUPERVISOR NETWORK

The control board of the humidifier can be connected serially RS485 with a remote supervisor system.

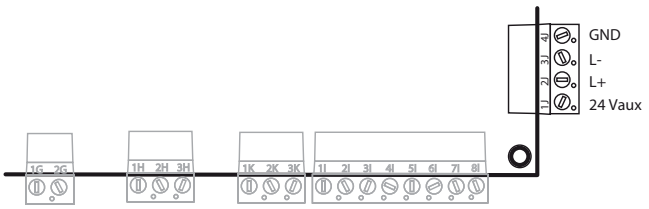


Fig. 5.a

The transmission line can reach a maximum distance of 1000 metres between the two most distant points.

Attention: for the RS485 connections in industrial (CEI61000-6-2) environment, use shielded cable (with shield connected to PE just on one side, either the terminal or the controller side) with maximum shielded cable length of 30 m.
Use shielded twisted pair cable (AWG26), the 485 input stage impedance is 1/8 unit-load (96kOhm). RS485 cables must lay in separate conduits from the power cables.

6. PREPARING FOR OPERATION

Attention: upon installation completion, drain the supply pipe for around 30 minutes by passing water directly through the pipe and without introducing it into the humidifier. This will allow the elimination of any scoria and processing residues that may cause the formation of foam during the boiling.

Attention: before starting the humidifier, check that it is in perfect condition, that there are no water leaks and that the electrical parts are dry. Do not supply voltage if the humidifier is damaged or even partially wet!

6.1 Preliminary checks

Before starting the humidifier, check that:
- the water and electrical connections are made and the steam distribution system is configured according to the instructions contained herein;
- the shut-off tap for water into the humidifier is open;
- the power fuses are installed and in tact;
- terminals 7I and 8I are connected by jumper or connected to the remote ON/OFF contact, and that the latter is closed;
- the probes or the external control device are correctly connected (and that the ground of these devices is electrically connected to the ground of the main control board);
- the steam outlet pipe is not choked;
- in the event of ducted humidification, the operation of the humidifier is slave to the operation of the air fan (replacing or in series with the remote ON/OFF contact);
- the distributor condensate return pipe is installed and free;
- the drain pipe is correctly connected and free.

6.2 Removing the heating element centring spring (only for three-phase models)

To prevent the heating elements in three-phase models hitting each other or against the internal wall of the cylinder and thus damaging the appliance, due to vibrations or bumps during transport, the heating elements are factory-fitted with a centring spring, which has no function during the operation of the appliance. As the centring spring may hinder the removal of lime-scale from the elements and diminish the interval between cleaning cycles, the spring should be removed before the initial start-up. To do this, remove the cylinder by following the relative instructions (see Maintenance of the cylinder).

7. COMMISSIONING

Once you have completed the steps in "Preparing for operation", you can start the humidifier.

7.1 Start

After closing the main switch of the humidifier's power supply, turn the appliance on by setting the switch located on the front panel, bottom right , in position I, "ON". The start sequence is then initiated. This includes the initial phase, the autotest phase, and finally, the actual operating phase. Each phase of the starting sequence is characterized by a different display view.

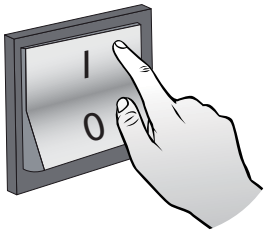


Fig. 7.a

7.2 Start-up sequence

1. Supply launching

All the LED's of the display are activated for about 1 s.

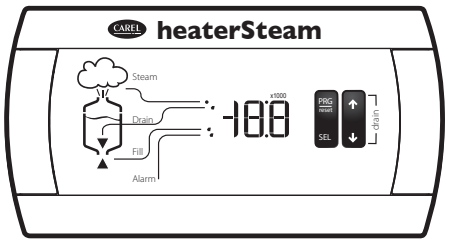


Fig. 7.b

2. INITIALIZATION

3 dashes are displayed for about 4 s.

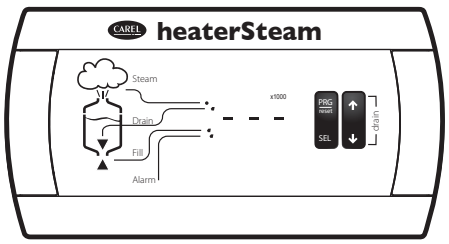


Fig. 7.c

3. AUTOTEST PROCEDURE

Indicated by code "At". See following paragraph.

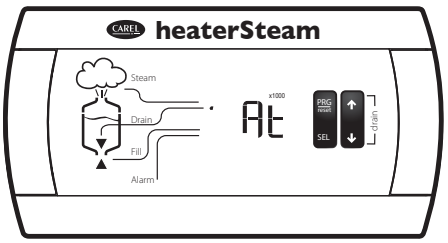


Fig. 7.d

4. OPERATION

The humidifier starts to operate and standard view is displayed.

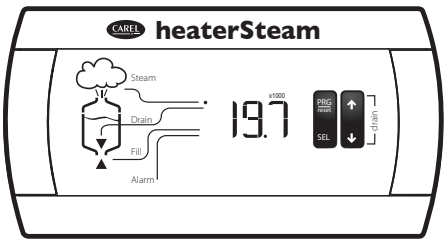


Fig. 7.e

In case of allarm, the "Alarm" LED flashes and the display shows the related code (see chaper"Alarms")

7.3 Autotest procedure

Every time you turn on the humidifier (turn the switch from OFF to ON, an autotest procedure is performed by default. It checks the level control operation and the applicance operation.

The autotest may be temporarily disabled manually by pressing the key SEL whithin the first 5 s after turn on, immediately after the 3 dashes are displayed: the code "-nt" is displayed. Note that this procedure disables the autotest only for the current start and not permanently, for permanent disabling set parameter b1 as described in the table in Sec. 12.

When starting the appliance and at every discharge cycle the operation of the level control is automatically checked,which opens the supply solenoid valve until the signal of the level control green LED . Subsequently, the drain pump is activated until minimum level is reported.

Note: in case of malfunction the counter is deactivated and the corresponding alarm starts.

7.4 Shut down

- To avoid stagnations, drain the water in the cylinder by simultaneously pressing and holding the UP and DOWN keys;
- press and hold the buttons UP and DOWN until complete drainage of the cylinder;
- Turn the switch to 0 "OFF".

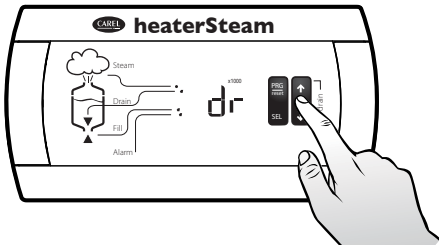


Fig. 7.f

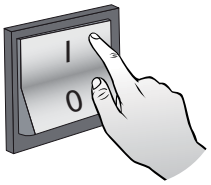


Fig. 7.g

7.5 User interface

The front panel contains the display and keyboard, made up from 4 keys, which, pressed individually or together, allow to perform all of the controller programming operations.

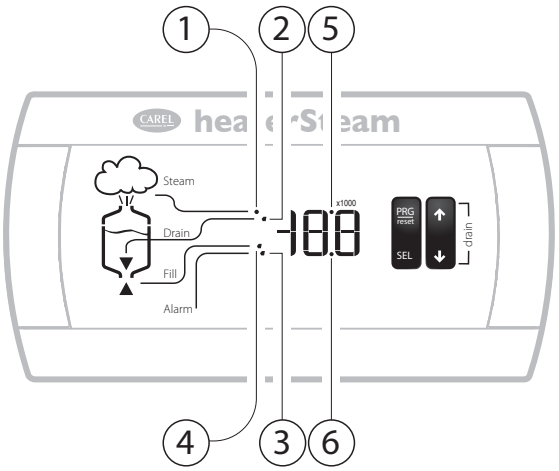


Fig. 7.h

Ref.	Function	Normal operation			Notes
		ON	OFF	BLINK	
1	Steam production	Active	Not active	Preheating	
2	Water drain	Active	Not active	-	Discharge solenoid valve active
3	Alarm		Not active	Alarm relay active	
4	Water fill	Active	Not active	-	Supply solenoid valve active
5	X 1000	Active	Not active	-	Lights up if the value displayed must be multiplied by 1000
6	Decimal point				

Tab. 7.a

Note: display standard view can be selected by configuring parameter C00.

7.6 Display

The display shows various types of variables: temperature (°C or °F), relative humidity (%), amount of steam (kg / lb / h), electrical conductivity (mS / cm), and so on.
The unit of measurement can be changed by means of parameter A1. The symbols of the unit of measurement are described inthe table:

Display	Unit of measurement:
°C	Temperature in degrees centigrade
°F	Temper. in degrees Fahrenheit
rH	Relative humidity in %
Pr	Steam production in kg/h
Lb	Steam production in lb/h
M"	Time in seconds
M'	Time in minutes
h	Time expressed in hours
uS	Conductivity µS/cm
□	Percent

Tab. 7.a

In case of alarm, standard display alternates with the codes of all the alarms that are active. During programming, the display shows the codes and values of the parameters.

Note: the numerical values from 200 to 255 of the parameter A4 are displayed with the symbol / in the place of the hundreds digit 2.

Example 1: number 215 is displayed.

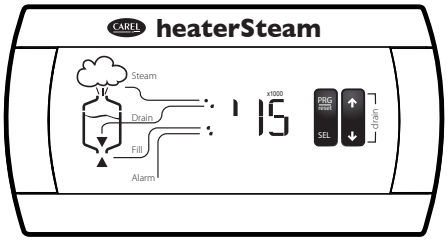


Fig. 7.i

Example 2: the appliance has been operational for 2300 hours

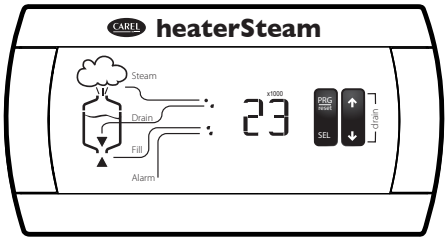


Fig. 7.j

7.7 Keypad

PRG reset	Pressing the button alone: • Press for 5 s: access to the adjusting (P...) and reading (d...) parameters • reset alarm relay (if the alarm is no longer active)
SEL	Pressing the button alone: • Displays the unit of measure of the value shown on the display; • Press for 2 s: access to setpoint display/programming Pressing together with other buttons: • Pressed together with PRG/reset for 5 s gives access to all the parameters, including the configuration ones
↑ UP	Pressing the button alone: • Displays the value measured by the temperature/humidity probe: • Increase/go to the next parameter
↓ DOWN	Pressing the button alone: • Displays the value measured by the humidity limit probe (if applicable) • Decrease/go to the previous parameter

7.8 Programming

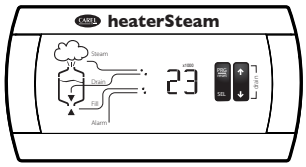
The operating parameters can be modified using the front keypad. Access differs depending on the type:
- set point;
- adjusting and reading parameters;
- configuration parameters.

Access to the configuration parameters is protected by a password that prevents unwanted modifications or access by unauthorised persons.

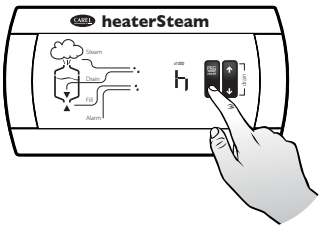
7.9 Setting the set point (St)

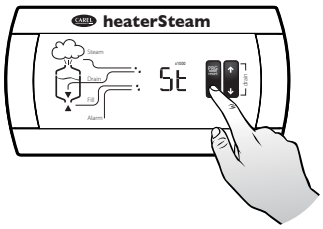
Note: For H-type humidifiers the set point is expressed in % r.H., for type-T humidifiers (for steam baths) the set point is expressed in temperature.

To set the set point (default= 50% r.H. or 20°C)
Procedure:

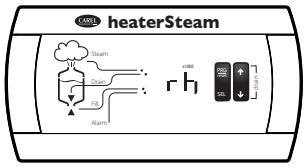


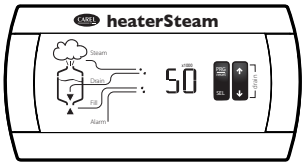
1 The display shows standard view



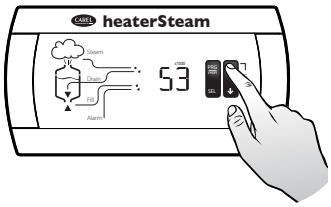


2 Press SEL for 2 s until "St" is displayed;

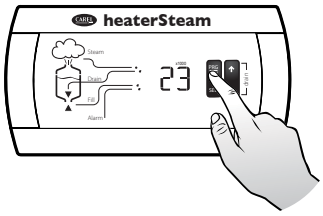




3 Release the SEL key. the unit of measurement and the set point are displayed in succession



4 press UP/DOWN to reach the desired value

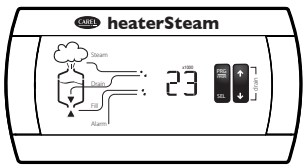


5 press PRG or SEL to save the St new value and exit the Set Point setting procedure

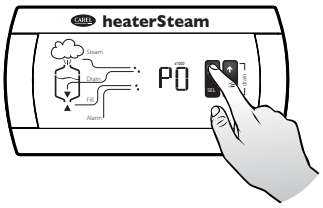
7.10 Setting the adjusting and reading parameters;

The adjustment and reading parameters can be set without password: they include parameters that start with the letter P (adjusting parameters) and with the letter d (measures reading).

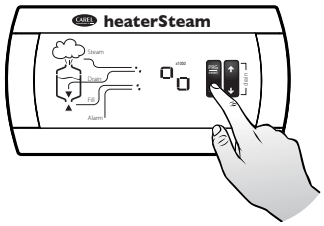
Procedure:

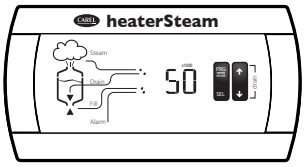


1. The display shows standard view

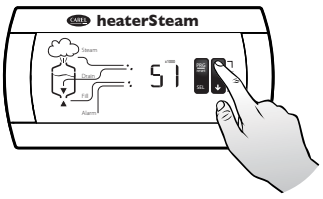


2. Press PRG for 5 s until THE PARAMETER "P0" is displayed; If necessary, press UP / DOWN to reach the parameter to be changed

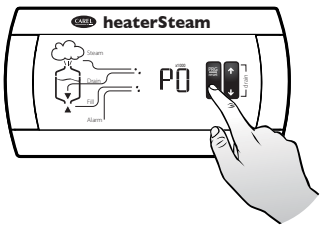




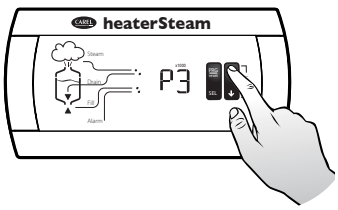
3. Press the SEL button to display the value of the parameter, preceded by the corresponding unit of measurement;



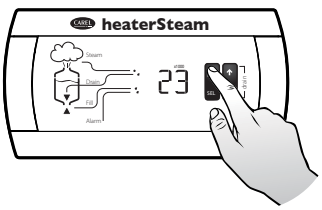
4. press UP/DOWN to change the value of the parameter



5. press SEL to acknowledge the value



6. To view and change other parameters repeat the steps from 3 to 6

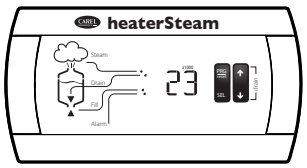


7. Press PRG to save the modification permanently. This exits the parameter setting procedure

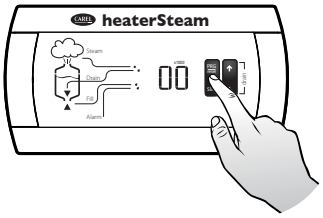
7.11 Modification of the configuration parameters

The configuration parameters include, apart from the adjusting and reading parameters, the type-A parameters (basic operation), type b (accessory functions), type C (serial communication).

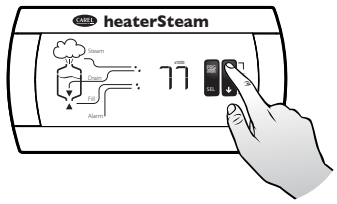
Procedure:



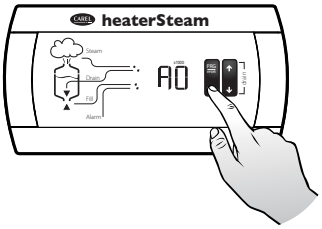
1. The display shows standard view



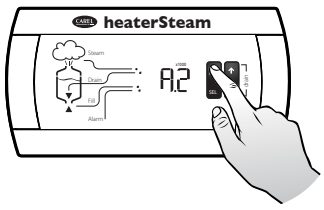
2. Press simultaneously for 5 s the keys PRG and SEL: the number "00" will be displayed;



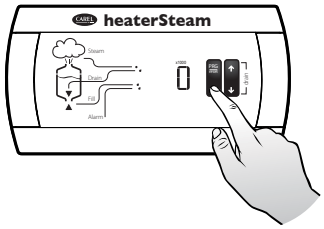
3. Press UP and DOWN until you view the password=77



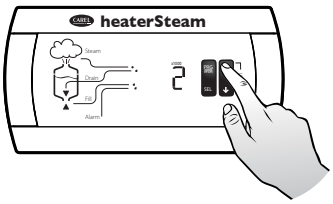
4. Acknowledge with SEL: the first configuration parameter is displayed: "A0"



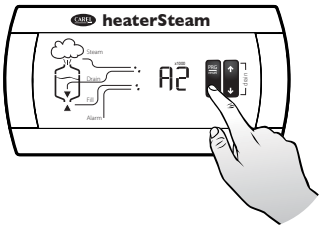
5 Press the keys UP or DOWN until reaching the parameter the value of which you want to set



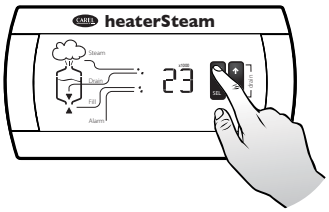
6 Press SEL to display the associated value



7 Increase or decrease the value using respectively the keys UP or DOWN, until reaching the desired value



8 Press SEL to temporarily save the new value and display the parameter code again;
Repeat steps 6) to 9) to set other parameters



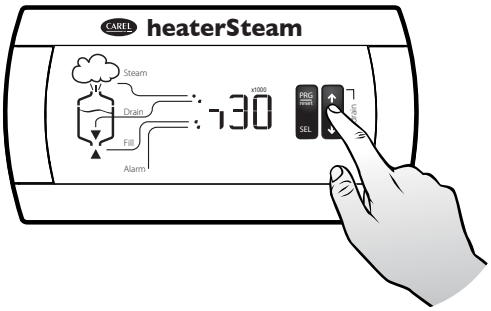
9 To permanently save the new values of the parameters press PRG. This exits the parameter setting procedure

Caution:

- If no key is pressed while the value of a parameter is displayed, after 5 s the display starts flashing and after about 1 minute it shows the parameter code. Similarly, after 5 s the parameter code starts flashing and after about 1 minute the control goes back to the display standard view without saving the parameters' modifications;
- To increase the scrolling speed, press and hold the UP or DOWN button for at least 5 seconds;

7.12 Procedures

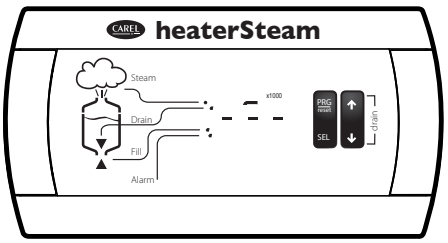
7.12.1 Release software view



1. Press simultaneously PRG and UP;
2. The display shows the control software revision (e.g. 3.0)

7.12.2 Setting the default parameters

1. Switch the device off;
2. Press and hold PRG;
3. Switch the device on;

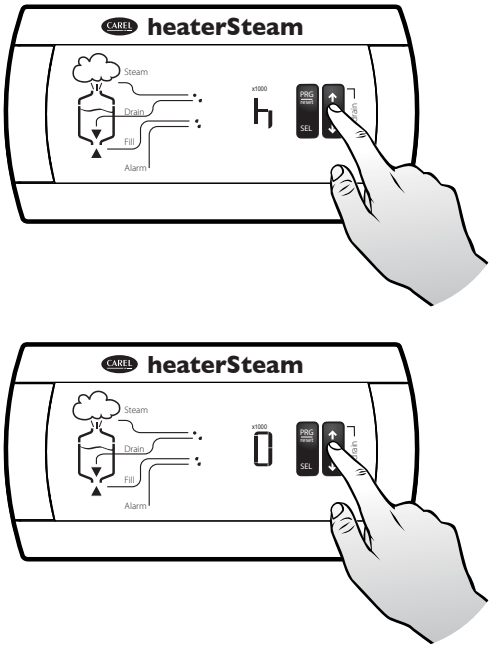


4. The display shows the 3 dashes and then the upper dash;
5. Release the PRG button to confirm the recall and permanent saving of the default parameters; to confirm value saving, the upper dash will stay on for 2 s;
6. The operation is not performed if the PRG button is pressed for more than 3 seconds, until the upper dash disappears.

Note: this procedure does not change the parameter relating to the unit of measure (A1), it is thus recommended to check and if necessary select and save the unit of measure as required, and then recall the default parameters. In this way the default values will automatically be converted.

7.12.3 Counter reset

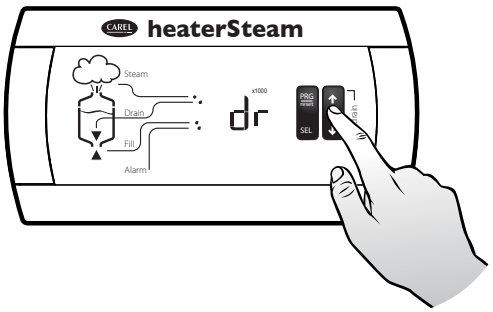
To reset the counter (parameter d4):



1. Press PRG until the display shows P0;
2. Press UP or DOWN until reaching parameter d4;
3. Press the SEL button to display the value of the counter preceded for 1 second by the unit of measure;
4. Press simultaneously UP or DOWN for 5 s until the value is reset, preceded by the display of the unit of measure.

7.12.4 Total drainage (manual)

Procedure:



1. Within the first 5 s after the appliance is turned on, press and hold simultaneously the buttons UP and DOWN;
2. Total drainage is launched (view "dr").

To complete drainage early:

1. Press UP and DOWN for 5 s.

8. CONFIGURATION PARAMETERS

8.1 Parameter access and setting

See chapter 6 "Start and user interface"

Note: variable type: A = analog I=full, D = digital.

8.2 Basic operation parameters

Par.	Description	UM	range	def	Variable type	CAREL protocol	notes
A0	Operating mode		0,…,3	2	I	9	0= ON/OFF command 1= external proportional signal 2= autonomous adjusting with room probe 3= autonomous adjusting with room probe and limit probe
A1	Unit of measurement:		0,1	0	I	10	0=°C, kg/h – 1 = °F, lb/h
A2	signal applied to room probe input autonomous control (A0=1, 2 or 3)		0,…, 4	0	I	11	0= 0…1 V 1= 0…10 V 2= 2…10 V 3= 0…20 mA 4= 4…20 mA
A3	room probe minimum	%rH	0, .., (A4)	0	I	12	can only be accessed in autonomous control (A0=2 or 3)
A4	room probe maximum	%rH	(A3), .., 255 *	100	I	13	
A5	room probe calibration	%rH	-10.0,…,10.0	0	A	4	
A6	signal applied to the outlet probe input can only be accessed in autonomous control with outlet probe (A0=3)		0,…,4	0	I	14	0= 0…1 V 1= 0…10 V 2= 2…10 V 3= 0…20 mA 4=4…20 mA
A7	minimum limit probe	%rH	0,…,(A8)	0	I	15	can only be accessed in autonomous control with outlet probe (A0=3)
A8	maximum limit probe	%rH	(A7), .., 100	100	I	16	
A9	limit probe calibration	%rH	-10…10	0	A	5	

Tab. 8.a

8.3 Auxiliary function parameters

Par.	Description	UM	range	def	Variable type	CAREL protocol	notes
b0	period of modulation (if set to 0 modulation is disabled)	s	0,…,199	**	I	17	
b1	Check the functions assigned to parameter b1 in the table given in chapter 12.		0…63	0	I	18	
b2	start pre-heating offset (referred to set point)	%% r.H.	2,…,19.9	3.0	A	6	They can only be accessed with pre-heating function enabled (b1=1 or 3)
b3	pre-heating temperature	°C	70,…,90	80	I	19	
b5	conductivity pre-alarm threshold (displayed as 1•2)	µS/cm	0,…,2000	1250	I	21	
b6	conductivity alarm threshold (displayed as 1•5)	µS/cm	0,…,2000	1500	I	22	
b7	control of the foam detection threshold (if set to 0 foam detection is disabled)	%	0,…,100	50	I	23	
b8	setting the maximum number of evaporation cycles between two drain cycles for dilution step:1 The actual value used is internally calculated based on the value read for the conductivity of the water supply (the higher the conductivity, the lower the calculated value), however if the calculated value is greater than b8, b8 will be used. If b8=0, it shall be automatically set to 2 at first heaters start-up and if conductivity measured in the supply water is <= 100 µS/cm, or at 5.	-	0…50	0	I	33	
b9	minimum time for passing from 0 to 100% of steam production	min	0,…,100	0	I	24	
bA	percentage reduction in the duration of the water fill time	%	20…100	100	I	34	
bb	steam production value (step 0.1%) it allows the user to "adjust" the value displayed by parameter d3, if there is a system available for measuring the difference between the value displayed d3 and the actual steam production. Example of use: d3= 10 kg/h and bb= +10% changes d3 to 11 kg/h (= 10 kg/h + 10%)	%	-19.9…19.9	0	A	7	
bC	automatic total drain for inactivity (see par. 12)	days	1…199	3	I	35	
bd	user-adjustable duration of dilution drain (see par. 12)	%	0…190	100	I	36	
bE	fill-up cycle duration, after dilution drain, in pwn mode	s	1…199	5	I	37	

Tab. 8.b

8.4 Serial communication parameters

Par.	Parameter	UM	range	def	Variable type	CAREL protocol	notes
C0	normally displayed value 1 = room probe measurement; 4= hour counter 2 = limit probe measurement; 5= conductivity 3= steam production; 6= water temperature	-	1…6	1	I	25	
C1	Keyboard enablement 0= reading of all parameters, (modification of C1 only) 1= reading and modification of all parameters 2= reading of all parameters, (modification of C1 only) 3= reading and modification of all parameters 4= reading and modification of all parameters		0…4	4	I	26	
C3	Serial address	-	0…199	1	I	28	
C4	Baud-rate 0=1200; 2=4800 1=2400; 3=9600	-	0…3	3	I	29	
C5	Frame (character bits, parity, stop bits) 0=8,N,2; 6 = 7,N,2 1=8,N,1; 7 = 7,N,1 2=8,E,2; 8 = 7,E,2 3=8,E,1; 9 = 7,E,1 4=8,O,2; 10 = 7,O,2 5=8,O,1; 11 = 7,O,1		0…11	0	I	30	
C6	serial reply send delay	ms	0…199	0	I	31	
C7	graphic terminal configuration: in cases 1, 2, 3 at start-up is forced the OFF command 0 = standard terminal; 2= term. with ON/OFF and room probe 1= terminal with ON/OFF command; 3= term. with ON/OFF and delivery limit probe	-	0…3	0	I	32	

Tab. 8.c

8.5 Control parameters

Par.	Description	UM	range	def	Variable type	CAREL protocol	notes
P0	maximum production; in the event of modulation disabled (b0=0), the production is always at 100% of the rated value, irrespective of the value of the parameter	%	10…100	100	I	2	
P1	humidification differential	% r.H.	2.0,…,19.9	5.0	A	1	can only be accessed in autonomous control (A0=2 or 3)
P2	high humidity alarm threshold	% r.H.	(P3),…,100	100	I	3	
P3	low humidity alarm threshold	% r.H.	0,…,(P2)	0	I	4	
P4	alarm delay (0*= 30 seconds)	min	0,…,100	1	I	5	
P7	limit setpoint	% r.H.	(St),…,100	100	I	7	can only be accessed in autonomous control with outlet probe (A0=3)
P8	limit differential	% r.H.	2.0, .., 19.9	5.0	A	3	
P9	high humidity alarm threshold	% r.H.	0,…,100	100	I	8	
Pm	minimum production	%	0,…,10	4	I	40	

Tab. 8.d

8.6 Measurement reading parameters

Par.	Description	UM	range	def	Variable type	CAREL protocol	notes
d1(1)	measurement signal from external regulator measurement from room probe	% % r.H.	0,…,100	-	A	52	can only be accessed in slave or autonomous control (A0=1, 2 or 3)
d2	measurement from outlet probe	% r.H.	0,…,100	-	A	53	can only be accessed in independent control with outlet probe (A0=3)
d3	steam production	kg/h	0.0,…,199	-	A	54	
d4	hour counter	h	0,…,19900	-	I	71	
d5	conductivity	µS/cm	0,…,1500	-	I	72	
d6	water temperature	°C	0,…,100	-	I	73	can only be accessed with pre-heating function enabled (b1=1 or 3)
d9	rated steam production	kg/h	0.0,…,199	-	-	-	

Tab. 8.e

(1) in proportional operation (A0=1), d1 is expressed in % of operating range selected with A2

9. ALARMS

9.1 Alarms table

When an alarm is activated a message identifying the alarm is displayed on the control module. In the event of potentially dangerous alarms, the control automatically deactivates the humidifier (disablement). For some alarm events, an alarm relay is activated simultaneously with the signal (see table).
If the cause of the alarm is no longer valid, the humidifier and alarm relay output can be reset automatically or manually, according to the type of problem, while the message displayed is deactivated manually by pressing the reset-PRG button. If no longer active, the alarm status continues to be indicated until the reset-PRG button is pressed.

Still active alarms can not be reset.

Unless you are in the programming phase, in the presence of an alarm condition, the alarm LED starts to flash and the display will show the alarm code with an alphanumeric code. The message is displayed cyclically, for a duration of two seconds, alternating with the measurement normally displayed (if the measurement normally displayed corresponds to a disconnected probe, the measurement is not displayed; this will automatically return to the display if the probe is reconnected). In the event of more than one alarm, the display indicates all the corresponding codes in sequence, at two second intervals.

Example: room probe alarm E3.

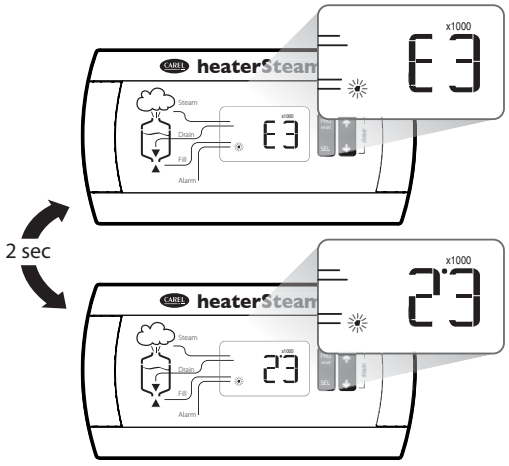


Fig. 9.a

The Ec alarm cannot be reset (high water conductivity).
In the event of the alarm CL (regular maintenance required), the alarm can be reset only by resetting the hour counter; see Resetting the hour counter (see chapter 4).

The alarm E1 may appear in two distinct cases:

1. Malfunctioning during parameter memory reading (typically upon start-up)
   The default parameters are reset simultaneously without being stored in parameters memory (the user can edit the parameters and reset the correct values). However, we recommend you use the default parameter access procedure (see chapter 4);
2. Malfunctioning during parameter memory reading (typically when pressing the PRG key)
   Any changes made are cancelled; te parameters can be accessed, the value can be modified and the memorization operation can be repeated.

The table below lists the alarm indications, the causes, the conditions and the possible solutions.

alarm code	cause	solution (once having tried the suggestion, if the problem persists , contact the CAREL service department)	action	reset	alarm relay
Et Overtemperature	• the PTC probes of the heaters have detected an overtemperature • Klixon activation • motor protector outlet is open	• check the earth current of the heaters, and replace them, if necessary. • manually reset the Klixon • problem dependent mainly on operation without water or in the presence of lime on heater surface; • turn the machine off and, once it has cooled down,reactivate the thermostat on the cylinder cover after having cleaned the cylinder and the level control, checking the efficiency of the components; • check that the electrical and water connections are in order and that the machine is supplied correctly; • it may be necessary to replace the PTC sensors if installed		Unavailable	Active if Et persists for at least one minute
EL Water level	malfunction ball cocks	• check the correct supply of water to the boiler; • turn the machine off and clean: the boiler, the level control and the fill solenoid valve	see procedure "AR"	manual	Active only if EE is displayed during AR
EC High conductivity	high conductivity of the supply water	• turn the machine off and clean the water conductivity measuring electrodes; • if the problem persists, change the source of the supply water or install a suitable treatment system (demineralisation, even partial); • the problem will not be resolved by softening the supply water	total shutdown	automatic	active
EE Autotest	autotest failed; probable problems in: water supply, level control or solenoid valve	• ensure that the machine is supplied with water; • turn the machine off and clean the level control and the fill valve	see procedure "AR"	manual	Active only on the second EP or after the EE during AR
EP Steam production	• electrical power not available; on machine start-up no steam is produced or the water is not pre-heated • ball cock locked in high level position.	with the machine off and disconnected from mains power supply, check that there are no defective of malfunctioning electrical connections	see procedure "AR"	manual	active
EF No water	No water	• check that the supply pipe from the water supply to the humidifier and the internal pipe is not blocked or choked and that the pressure is sufficient (0.1...0.8 MPa, 1...8 bar); • check the operation of the fill solenoid valve; • check that the steam supply does not have to work against excessive back-pressure, preventing the flow of water into the boiler due to gravity; • check that the steam supply pipe is not choked or that there are no pockets of condensation	disabl. umidifier after 10 min of wait reset automatically the alarm and attempt a new loading	manal or automatic (if after 10 min of wait water returns)	active
EA Foam present	formation of foam in the boiler during boiling	• the formation of foam is usually due to the presence of surfactants in the water (lubricants, solvents, detergents, water treatment or softening agents) or an excessive concentration of dissolved salts. Drain the water supply line; • clean the boiler	signal only	manual	not active
Ec High water conductivity	high conductivity pre-alarm of water	• check the conductivity of the supply water; • if necessary, install a suitable water treatment system; • the problem will not be resolved by softening the supply water	disabl. umidifier	automatic	not active
E- High room humidity	high ambient humidity (high temperature in T control)	check the operation of the probe and the limit set by parameter P2	signal only	automatic	active
E_ Low room humidity	low ambient humidity low temperature in T control)	check the operation of the probe and the limit set by parameter P3	signal only	automatic	active
E= High delivery humidity	high delivery humidity	check the operation of delivery probe	signal only	automatic	active
E0 EEprom	internal memory error	contact the CAREL service department	disablement umidifier	reprogram-ming CAREL	active
E1 User parameters	user parameter error	with the machine off check that there are no defective or malfunction-ing electrical connections	disablement umidifier	reprogram-ming parameters	active
E2 Hour meter	hour counter error	reset the hour counter (see Resetting the hour counter)	disablement memorization hour counter	manual reset hour counter	not active
E3 Room probe	room probe not connected	check the connection of the probe and the setting of parameter A0 for ON/OFF configuration (see Reading and programming the parameters)	disablement umidifier	automatic	active
E4 Delivery probe	limit probe not connected (if any)	check the connection of the probe or the setting of parameter A0 (see Reading and programming the parameters)	disablement umidifier	automatic	active

alarm code	cause	solution (once having tried the suggestion, if the problem persists , contact the CAREL service department)	action	reset	alarm relay
E5 NTC probe	NTC probe for measuring the water temperature not connected (if featured)	• check the pre-heating operation and the setting of parameters b1, b2, b3 (see Reading and programming the parameters); • check the connections to the terminal block on the boiler cover	disablement pre-heating	automatic	active
CL (*) Cleaning the boiler	scheduled maintenance signal	stop the machine and carry out complete maintenance. of the humidifier and then reset the hour counter (see chapter 4)	signal only	manual	not active
Ed Drain	no drain pre-alarm or filter blocked	• check the drain valve/pump; • check if the pipes or the manifold are blocked; • check if the level sensor is faulty or the pipes are blocked; • the filter inside the boiler may be clogged.	see procedure "AR"	manual	active at according to Ed
EU Boiler full	boiler full of water with no humidification demand pre-alarm	• check if the fill valve is leaking; • check if the high level sensor is dirty.	signal only	automatic	active

Tab. 9.a

(*) The number of hours after which the CL error occurs cannot be foreseen and depends on the conductivity of the water, the number of operating hours etc.. based on an internal calculation.

9.2 Autotest Retry procedure (Fault tolerance)

AUTOTEST RETRY ("AR")

Step	Description	Drain status	Fill status	contactor status	Duration	Condition that can stop "AR" Vis. Display	
1	Interruption production. Contactor Opening	Off	Off	Off	3 sec	None.	
2	Drain by time	On	Off	Off	If at the end of a set time the float is below to the minimum reed, the procedure goes to step 3, otherwise it drains again and then goes to step 3	High level sensor active	EE
3	Wait. Stabilization. of level	Off	Off	Off	3 sec	High level sensor active	EE
4	Water fill-up	Off	On	Off	Ends when the float reaches the control reed	Contradiction of the levels High level sensor active The fill time exceeds a maximum limit	EE
5	Wait. Stabilization. of level	Off	Off	Off	10 sec	Contradiction of the levels High level sensor	EE
6	Drain	On	Off	Off	Ends when the float reaches the control level	Contradiction of the levels High level sensor active The drain time exceeds a maximum limit	EE
7	Wait. Stabilization. of level	Off	Off	Off	1 sec	Contradiction of the levels High level sensor active	EE

Tab. 9.b

Note:

- During the Autotest Retry procedure the display shows the code "AR" alternating with the alarm code that triggered the procedure.
- If the PRG button is pressed during the Autotest Retry procedure, the procedure is stopped and normal humidifier operation resumes.

9.3 Troubleshooting

Problema	Cause	Solution
The control does not turn on	1. no electrical power supply; 2. humidifier external switch in position 0 (OFF); 3. control connectors poorly installed; 4. fuses blown; 5. transformer faulty.	1. check the protection devices upstream of the humidifier and the mains power supply; 2. close the switch on the panel: position I (ON); 3. check that the connectors are properly installed on the terminal block; 4. check the state of fuses F1/F2; 5. check that the secondary circuit of the transformer has an output of 24 Vac.
The humidifier does not start	1. remote ON/OFF contact open (relay/terminals 7I - 8I); 2. the external regulator/humidistat or probe has not been connected correctly; 3. probe/humidistat malfunction; 4. programming parameters are set incorrectly; 5. safety thermostat activated; 6. fan circuit breaker activated (H or T control);	1. close ON/OFF contacts (relay/terminals 7I - 8I); 2. check the external connection; 3. check the external signal; 4. reprogram the parameters correctly; 5. reset the thermostat after having eliminated the cause of the problem; 6. reset the circuit breaker after having eliminated the cause of the problem;
The humidifier fills with water without producing steam	1. steam outlet back-pressure too high; 2. leaking flow regulator in the water fill electrovalve (with leaks in the water circuit); 3. level control malfunction; 4. cylinder inlet filter blocked; 5. lime in the fill tank; 6. drain solenoid valve malfunction;	1. check that the steam outlet pipe is not bent or choked; 2. replace the feeding solenoid valve; clean or replace the level gauge, if required; 3. clean the filter; 4. clean the fill tank; 5. check for the presence of 24Vac at the drain solenoid valve; clean the drain solenoid valve;
Line circuit breaker is activated	1. the line circuit breaker is rated too low; 2. resistors short-circuited	1. check that the circuit breaker is rated for a current of at least 1.5 times the rated current of the humidifier; 2. check, by measuring, the value of the resistors and replace them if necessary
The humidifier wets the duct	1. the distributor is not installed correctly; 2. the system is rated too high; 3. the humidifier is active when the duct fan is off;	1. check that the steam distributor has been installed correctly; 2. reduce the steam production set on the control; 3. check the connection of the device (flow switch or differential pressure switch) linked to the humidifier for ventilation in the duct (terminals 7I - 8I)
The humidifier wets the floor below	1. the humidifier drain pipe is blocked; 2. the water supply or overfflow circuit has leaks; 3. the condensate drain pipe does not drain the water back to the fill tank; 4. the steam outlet pipe is not properly attached to the cylinder;	1. clean the drain pipe in the bottom tank; 2. check the entire hydraulic circuit; 3. check the correct positioning of the condensate drain pipe in the fill tank; 4. check the fastening of the pipe clamp on the steam outlet pipe.

Tab. 9.c

10. SPARE PARTS AND MAINTENANCE

Exploded view models UR002- UR013

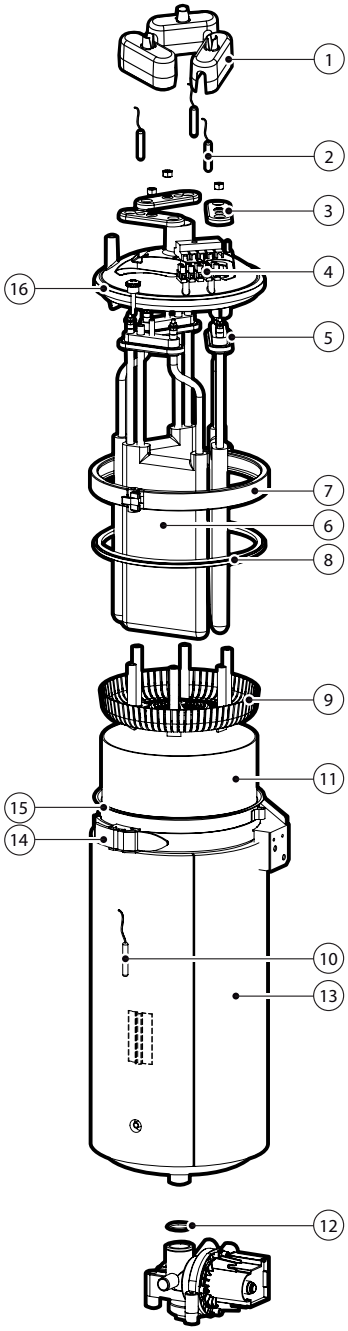


Fig. 10.a

code UR 2	code UR 4	N.	description	no. of kit for single UR UR 2 / UR 4
URKCR00020		1	"power connection protection cover (single package)"	1
URKCOPC02S		16	boiler cover kit	1
URKPTCS020		2	PTC probe (single package)	1
URKTB00000		4	PTC probe wiring terminal board kit	1
heater kit with non-adhesive film (single package)				
208V: URKH02A204	208V: URKH02A203	3	heater counter-flange	1
230V: URKH02A204	230V: URKH02A202	5	heater gasket	
		6	heater	
low heater kit (single package)				
208V: URKH02R104	208V: URKH02R103	3	heater counter-flange	1
230V: URKH02R104	230V: URKH02R102	5	heater gasket	
		6	heater	
URKBR00000		7	cover closure strip	1
hydraulic gasket kit				
URKG20000M		8	boiler cover gasket	
		12	drain pump manifold o-ring	
UEKF000020		9	boiler filter kit	1
URKNTC0000		10	NTC probe kit	1
URKB100020		11	steel boiler kit	1
URKBLOCK20		14	boiler fastening bracket	1
URKBAG1000		15	Lime collection bag	1
URKTI10000		13	Boiler thermal cover	1

Tab. 10.a

where not indicated "(single package)", the kits comprise the quantity of parts needed for the specific machine

code UR 6 - 1~	code UR 6 - 3~	code UR 10 - 3 ~	code UR 13 - 3 ~	N.	description	no. of kit for single UR UR6 1 ~	UR6 3 ~	UR10 3 ~	UR13 3 ~
URKCR00020				1	"power connection protective cover (single package)"	3			
URKCOPC02M				16	boiler cover kit	1			
URKPTCS020				2	PTC probe (single package)	3			
URKTB00000				4	PTC probe wiring terminal board kit	1			
heater kit with non-adhesive film (single package)									
208V: URKH02A204	208V: URKH02A204	208V: URKH02A202	208V: URKH02A203	3	heater counter-flange	3			
230V: URKH02A200	230V: URKH02A200	230V: URKH02A201	230V: URKH02A202	5	heater gasket				
	400V: URKH02A200	400V: URKH02A201	400V: URKH02A202						
-	-	460V: URKH02A204	460V: URKH02A201	6	heater				
		-	575V: URKH02A200						
low heater kit (single package)									
208V: URKH02R104	208V: URKH02R104	208V: URKH02R102	208V: URKH02R103	3	heater counter-flange	3			
230V: URKH02R100	230V: URKH02R100	230V: URKH02R101	230V: URKH02R102	5	heater gasket				
	400V: URKH02R100	400V: URKH02R101	400V: URKH02R102						
-	-	460V: URKH02R104	460V: URKH02R101	6	heater				
		-	575V: URKH02R100						
URKBR00000				7	cover closure strip	1			
hydraulic gasket kit									
URKG20000M				8	boiler cover gasket	1			
				12	drain pump manifold o-ring				
UEKF000020				9	boiler filter kit	1			
URKNTC0000				10	NTC probe kit	1			
URKNTC0000				11	steel boiler kit	1			
URKBLOCK20				14	boiler fastening bracket	1			
URKNTC0000				15	Lime collection bag	1			
URKTI10000				13	Boiler thermal cover	1			

Tab. 10.b

where not indicated "(single package)", the kits comprise the quantity of parts needed for the specific machine

Exploded view models UR002- UR080

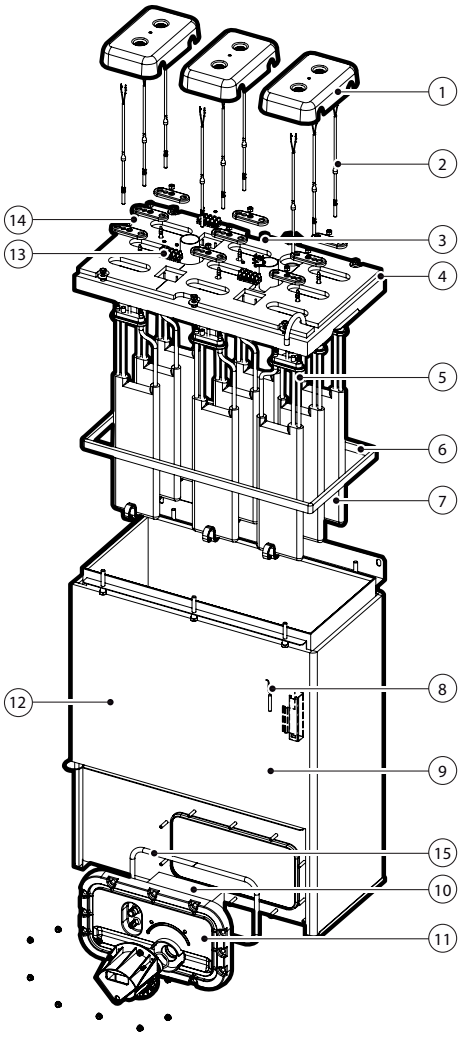


Fig. 10.b

code			N.	description	no. of kit for single UR		
UR 20	UR 27	UR 40			UR20	UR27	UR40
URKCR10020			1	"power connection protective cover (single package)"	3		6
URKCOP3020		URKCOP4020	4	boiler cover			
URKPTCL020			2	PTC probe (single package)	3		6
URKTB00000			13	PTC probe wiring terminal board kit	1		2
heater kit with non-adhesive film (single package)							
208V: URKH02A206	-	-	14	heater counter-flange	3		6
230V: URKH02A205	230V: URKH02A206	-	5	heater gasket			
400V: URKH02A205	400V: URKH02A206	400V: URKH02A205					
460V: URKH02A208	460V: URKH02A205	460V: URKH02A208	7	heater			
575V: URKH02A207	575V: URKH02A209	575V: URKH02A207					
low heater kit (single package)							
208V: URKH02R106	-	-	14	heater counter-flange	3		6
230V: URKH02R105	230V: URKH02R106	-	5	heater gasket			
400V: URKH02R105	400V: URKH02R106	400V: URKH02R105					
460V: URKH02R108	460V: URKH02R105	460V: URKH02R108	7	heater			
575V: URKH02R107	575V: URKH02R109	575V: URKH02R107					
hydraulic gasket kit							
URKG2000XL			6	boiler cover gasket	1		
			15	utilities flage gasket			
URKF0000XL			10	boiler filter kit	1		
URKNTC0000			8	NTC probe kit	1		
URKB400020			9	steel boiler kit	1		
URKTI40000			12	Boiler thermal cover	1		
URKFLAN020			11	kit of utilities flange with gasket	1		
URKFS00000			3	ani-foam sensor kit	1		

Tab. 10.c

where not indicated "(single package)", the kits comprise the quantity of parts needed for the specific machine

code			N.	description	no. of kit for single UR		
UR 53	UR 60	UR 80			UR53	UR60	UR80
URKCR10020			1	"power connection protective cover (single package)"	2	3	
URKCOP5020	URKCOP6000		4	boiler cover	1		
URKPTCL020			2	PTC probe (single package)	6	9	
URKTB00000			13	PTC probe wiring terminal board kit	2	3	
heater kit with non-adhesive film (single package)							
400V: URKH02A206	400V: URKH02A205	400V: URKH02A206	14	heater counter-flange	6	9	
460V: URKH02A205	460V: URKH02A208	460V: URKH02A205					
575V: URKH02A209	575V: URKH02A207	575V: URKH02A209	5	heater gasket			
			7	heater			
low heater kit (single package)							
400V: URKH02R106	400V: URKH02R105	400V: URKH02R106	14	heater counter-flange	9		
460V: URKH02R105	460V: URKH02R108	460V: URKH02R105					
575V: URKH02R109	575V: URKH02R107	575V: URKH02R109	5	heater gasket			
			7	heater			
hydraulic gasket kit							
URKG200XXL			6	boiler cover gasket	1		
			15	utilities flage gasket			
URKF0000XL			10	boiler filter kit	1		
URKNTC0000			8	NTC probe kit	1		
URKB600020			9	steel boiler kit	1		
URKTI60000			12	Boiler thermal cover	1		
URKFLAN020			11	kit of utilities flange with gasket	1		
URKFS00000			3	ani-foam sensor kit	1		

Tab. 10.d

where not indicated "(single package)", the kits comprise the quantity of parts needed for the specific machine

Other hydraulic parts (codes need to be updated)

Important warning: do not use detergents or solvents to clean the plastic components. To remove the deposits use a 20% acetic acid solution, then rinse thoroughly with water.

Hydraulic UR 2-13 kg/h

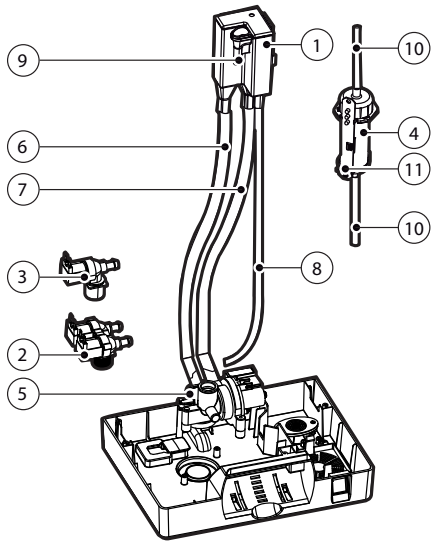


Fig. 10.c

code		position	description
UR 2 - 4	UR 6 - 13		
fill tray kit			
UEKVASC100		1	fill tray
		9	conduction meter
KITFD11211		2	"drain tempering solenoid valve (for the models equipped with it)"
KITVC10011		3	fill solenoid valve
URKSL00004		4	level control
		10	compensation pipes
		11	cable
UEKDRAIN01		5	drain pump
hydraulic pipes kit			
URKT00002M	URKT00002M	6	drain pipe
		7	overflow pipe
URKTDT002M (only for drain temperng)	URKTDT002M (only for drain temperng)	8	feeding pipe
		10	compensation pipe

Tab. 10.e

where not indicated "(single package)", the kits comprise the quantity of parts needed for the specific machine

Hydraulic UR 20-80 kg/h

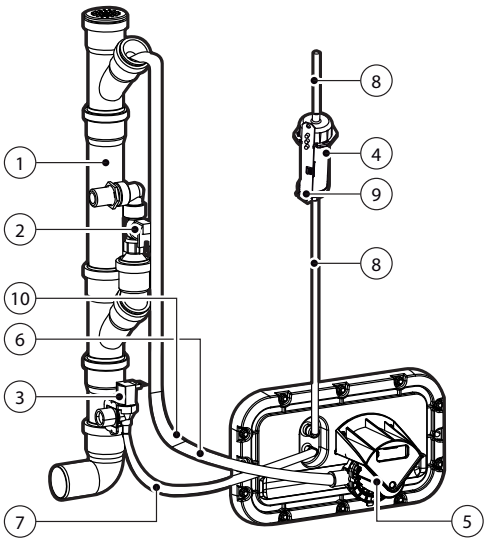


Fig. 10.d

code		position	description
UR 20 - 40	UR 53 - 80		
URKDH00020		1	drain column kit
KITVC00040	KITVC00100	2	fill solenoid valve
URKDTV0000		3	"drain tempering solenoid valve (for the models equipped with it)"
KITVC00100		4	level control
		8	compensation pipes
		9	cable
URKPS00020		5	drain pump
hydraulic pipes kit			
URKT0002XL	URKT0002XL	6	drain pipe
URKTDT02XL (only for drain temperng)	URKTDT02XL (only for drain temperng)	7	feeding pipe
		8	compensation pipe
KITCN00000		10	conduction meter

Tab. 10.f

Electric components

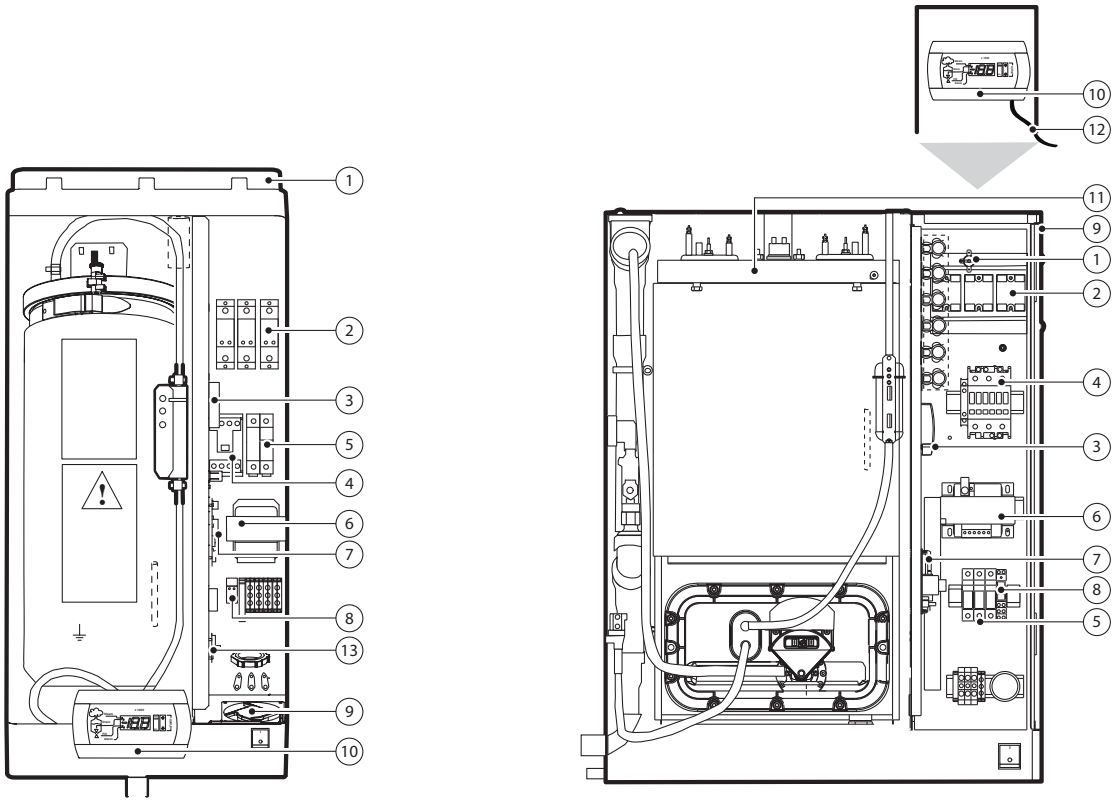


Fig. 10.e

code											N.	description
UR2-10	UR13	UR13	UR20		UR27		UR40		UR53-60	UR80		
ALL	"208-230V 3ph"	"400-460V 575V 3ph"	"208-230V 3ph"	"400-460V 575V 3ph"	230V 3ph	"400-460V 575V 3ph"	400 3ph	460V -575V 3ph	"400-460V 575V 3ph"	"400-460V 575V 3ph"		
URKKL20000											1	Thermal protection kit SSR (klixon)
URKSSR1020			URKSSR3000							URKSSR4000	2	Solid state relay (SSR) (single package)
THP00A0000											3	Motor protector (safety thermostat)
UEKCONT200	URKCONT200	UEKCONT200	URKCONT400	URKCONT200	URKCONT300	URKCONT200	URKCONT400	URKCONT200	URKCONT300	URKCONT300	4	Contactor
URKFH10000			URKFH20000								5	Fuse holder base
UEKTR30000											6	Transformer
URI0000000											7	Main control board
-			URKREL2300								8	Pump relay
URKFANS000			URKFANL200								9	Fan
URHxxv00z2 (**)			"Control module version H (with humidity regulator)"								10	Electronic controller
URSxxv00z2 (**)			"Control module version for steam bath (with temperature regulator)"									
-			URKKL00000								11	Boiler head safety thermostat (klixon)
59C460A003			59C486A003								12	flat cable
URKCFAN000			-								13	fan control board

Tab. 10.g

(**): xx replace with capacity in kg/h: 00 (to be configured by the user), 02, 04, 06, 10, 20, 27, 40, 60; "v" replace with power supply code from the following list: 0 (to be configured by the user); (single-phase) C= 200 Vac; U= 208 Vac; D= 230 Vac; (three-phase) J= 200 Vac; W= 208 Vac, K= 230 Vac, L= 400 Vac, M= 460 Vac, N= 575 Vac; "z" replace with S= for the UR020*, 0= all other models.

10.1 Maintenance

Maintenance interventions on the humidifier should be carried out by CAREL Support SErvice or by specifically qualified staff.

Important: before proceeding with any operation:

- cut off the power supply setting the master switch of the machine to "OFF";
- close the shut-off valve of the water supply line.
- ON/OFF swithc on the device cuts off power to electronic circuit only, not to heaters!

10.2 Maintenance operations

Routine maintenance of humidifiers using tap water provides:

1. cleaning all the parts that come into contact with water:
   a. feeding solenoid valve;
   b. loading/unloading group:
   c. drain pump;
   d. heaters;
   e. collection tray with lime collection basket (models UR002-UR013);
2. boiler gasket replacement.

Non-routine maintenance is carried upon every time scheduled maintenance request (code "CL" on display). Therefore, it is necessary to perform complete maintenance of the humidifier and reset the hour counter.

10.3 Maintenance frequency

Maintenance frequency depends on the amount of water and steam generated.

Tap water

Water hardness	15…25 °f	25…40 °f
Daily operating hours	8…10	8…10
No. of maintenance/ year	2	3

Tab. 10.h

Demineralised water

The use of demineralised water minimises maintenances times.

Note: we recommend you carry out non/routine maintenance at least once a year, regardless of the operating hours and the data shown on the hour counter.

10.4 Maintenance of the cylinder-boiler

This operation is necessary as the lime deposits that form inhibit the exchange of heat between the heating elements and the water.

Warning:

- do not use detergents or solvents to clean the components in the boiler and all other plumbing;
- do not use mechanical devices to clean the heating elements;
- the boiler may be hot! Wait for the boiler to cool down before touching it or use safety gloves.

To access the boiler:

- shut down the device and open the breaker of the power supply line;
- completely empty the boiler from water (see the "Shutdown" section);
- open and remove the front panel (see chapt. 1).

Models UR002-UR013 (refer to the following figures):

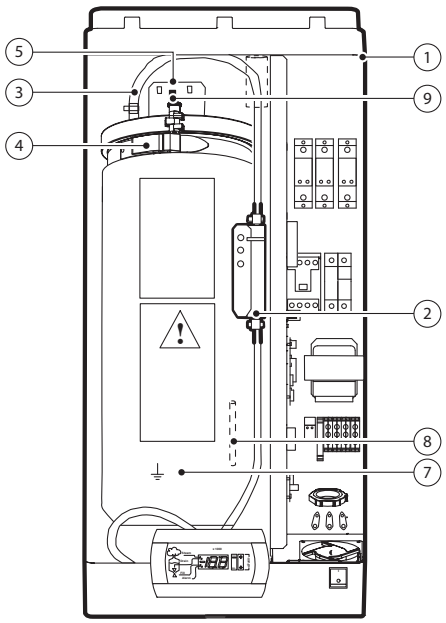


Fig. 10.f

1. loosen the seal strip and remove the steam pipe (1);
2. disconnect level gauge connector (2);
3. remove the pressure regulation pipe (3), connected to the level gauge, from boiler cover
4. loosen te fastening clamp (4) and incline the boiler outwards.
5. remove the cover that protects the heaters (5), loosen the fastening nuts and remove the wires. Remove the ground cable screw as well (7);
6. disconnect the probe connector and remove the NTC probe from the well (9);
7. remove the boiler. Place it on a flat surface resistant to water and limestone that may come out during cleaning;
8. cylinder opening; loosen the screw and open the ring nut;
9. lift the cover to which are fastened the heaters and remove it from the cylinder;

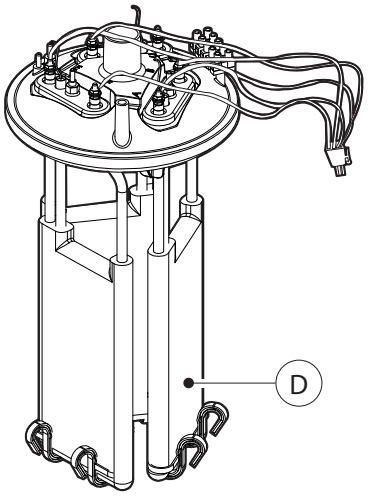


Fig. 10.g

10. remove the spacer (D);
11. to replace the heaters refer to the next section;
12. clean the heaters (see the next section);
13. remove the lime collection basket from the bottom of the cylinder: rinse it and clean it with a soft brush;

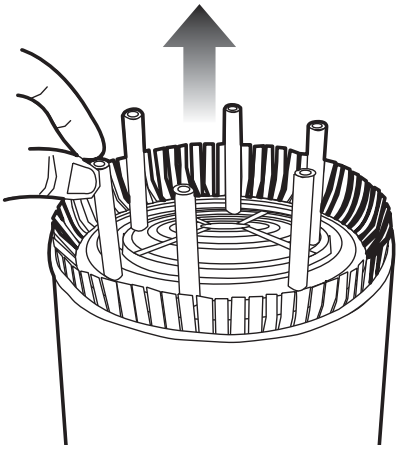


Fig. 10.h

14. clean the anti-adhesive film that may be present on the inner walls of the boiler (see next section);
15. clean and remove the lime from the boiler and reinsert the film (where needed);
16. after you have completed the maintenance interventions, reinstall the boiler following the operations described above reversely.

Models UR020-UR080:

1. loosen the screws (figure);

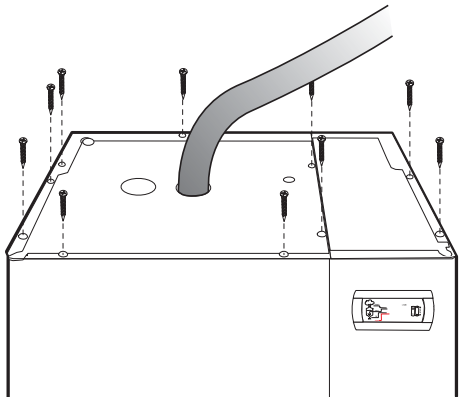


Fig. 10.i

2. unthread the top panel and remove it;

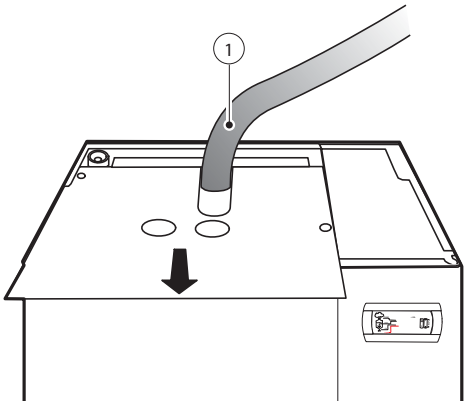


Fig. 10.j

3. loosen the seal strip and remove the steam pipe (1);

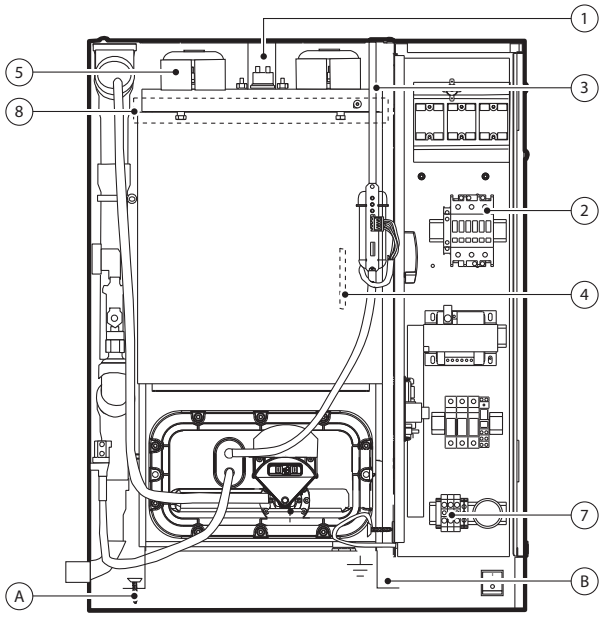


Fig. 10.k

4. disconnect level gauge connector (2);
5. remove the pressure regulation pipe (3), connected to the level gauge, from boiler cover;
6. remove the cover that protects the heaters (5), loosen the fastening nuts and remove the wires and the ground cable (7);.
7. disconnect the probe connector and remove the NTC probe from the well (9);
8. remove the screw (A) and the screws of the rear fastening bracket (B);
9. remove the boiler sliding it onto the guides (8);
10. remove the outer insulating mattress;
11. unscrew and remove the nuts (10) to raise the cover and remove it from the boiler;

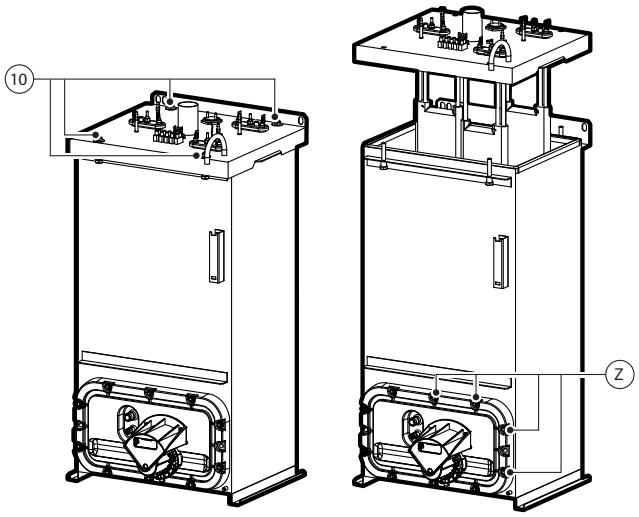
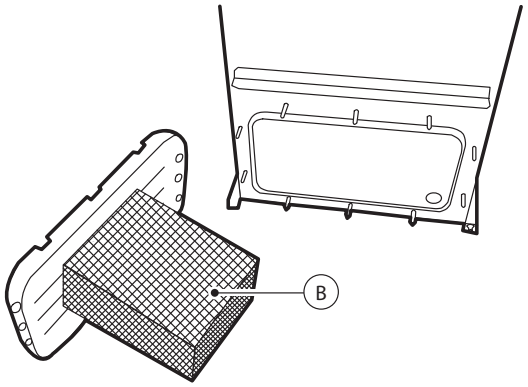


Fig. 10.l

Fig. 10.m

12. to replace the heaters refer to the next section;
13. remove the spacer (D) located on the bottom of the boiler;
14. clean the heaters (see the next section);
15. the heaters (R) can also be cleaned without unmounting the top cover; this can be achieved by removing the front flange and loosening the fatening nuts (Z);
16. now remove the flange with the filter (B);



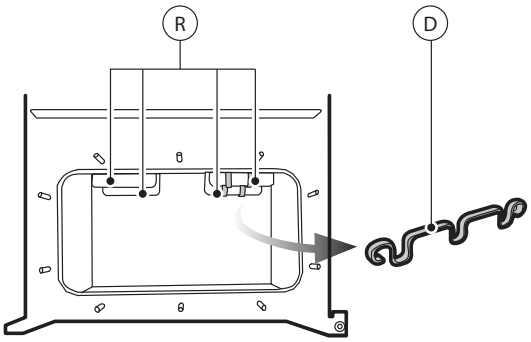


Fig. 10.n

17. rinse the inner walls of the boiler and remove the lime using a soft brush;
18. reinstall the boiler and repeat the previously described operations reversely; please remind to secure the grounding screws.

For power connections please refer to the wiring diagrams of the heaters next to the heads.

Anti-adhesive film (optional)

On the inner wall of the boiler is present (depending on model) a film made in anti-adhesive material that prevents lime from adhering to the inner walls of the same. For cleaning and replacement:

- remove the boiler cover following the steps given in the previous section;
- slowly remove the film towards boiler inlet, without forcing it to avoid damaging the same;
- open the film after having released the click-on couplings;
- clean with water and use a plastic brush, if necessary; replace it if damaged;
- clean the boiler and remove lime;
- rewind the film on itself by hooking the click-on couplings and reinsert it into the boiler.

Cleaning the heaters

After you have removed the limestone that detached more easily, immerse the heaters for 30 minutes in a lukewarm solution of 20% acetic acid, using a non-metallic spatula to remove the surface deposits that are still present. Rinse thoroughly; are plates are coated with anti-adhesive film; avoid using any type of metal tools to avoid damaging the anti-adhesive film;

10.5 Feeding/drain tempering solenoid valve

UR020-UR080

After having disconnected the cables and the pipes, remove the feeding electrovalve (V2) and check the cleanliness condition of the inlet filter, cleaning it if necessary using water and a soft brush. Carry out the same operations on "drain tempering" valve (V1), if present.

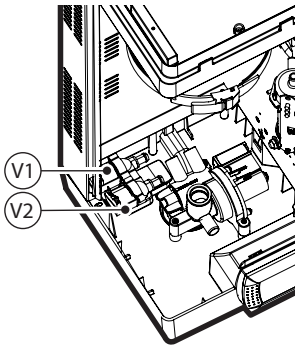


Fig. 10.o

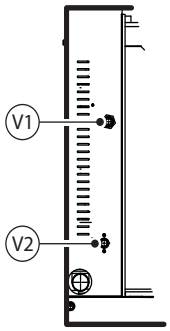


Fig. 10.p

10.6 Fill tray

UR002-UR013

Check that there are no blockages or solid particles in the tray (V) and that the conductivity measuring electrodes are clean; remove any impurities and rinse.

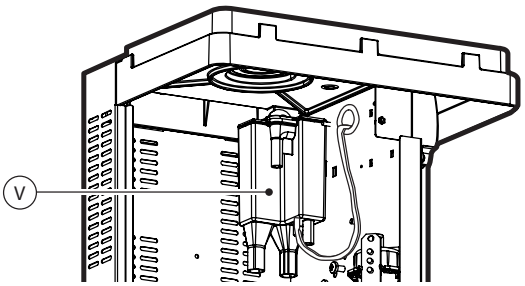


Fig. 10.q

10.7 Parts replacement

Fuses (auxiliary circuits)

These measure 10.3 x 38 mm and are housed in the fuse cartridge; to check the state of the fuses, check their continuity using a tester. Use the fuses as specified in the table.

	models											
	UR002	UR004	UR006 1ph	UR006 3ph	UR010	UR013	UR020	UR027	UR040	UR053	UR060	UR080
Transformer supply fuses F1-F2	1 A GL, 10,3 x 38											
Pump safety fuses F3	1 A AT 5 x 20 ceramic						1 A GL, 10,3 X 38					
Fuse 4 of transformer secondary circuit	4 A AT 5 x 20 ceramic											

Tab. 10.i

*: single-phase **: three-phase

Heaters fuses (humidifiers UR027 at 230 V, UR060 – UR080 at 460 - 575 V, UR053 – 460 V)

Dimension of fast fuses 27x60 housed in fuse carrier bases that can be selected. Check their continuity using a tester.

	models				
	UR027 (230V 3 ph)	UR053 (460V 3ph)	UR060 (460V 3ph)	UR080 (460V 3ph)	UR080 (575V 3ph)
Fuses F5 - F6 - F7	40 A, GG (KTK)	40 A, GG (KTK)	50 A, GG (KTK)	40 A, GG (KTK)	40 A, GG (KTK)
Fuses F8 - F9 - F10	40 A, GG (KTK)	40 A, GG (KTK)	40 A, GG (KTK)	40 A, GG (KTK)	40 A, GG (KTK)
Fuses F11 F12 - F13	not used	not used	not used	40 A, GG (KTK)	40 A, GG (KTK)

Tab. 10.j

Heaters

To replace the heaters, unmount them removing the fastening nut (D) on the cover; in this case it is advisable to replace the seal (G).

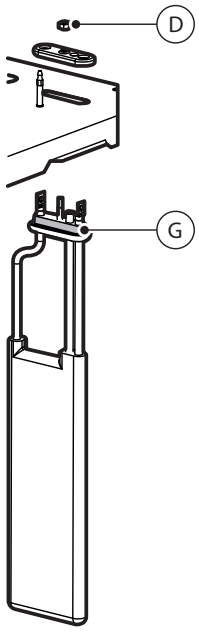


Fig. 10.r

PTC temperature sensor

The PTC sensors (one for each heating element) do not require regular maintenance; they should only be replaced if the safety thermostat is activated due to operation without water: in fact, the intervention of just one PTC will cause the control module to shut-down operation.

To replace them, remove the boiler (models UR002-UR013) or the top panel of the humidifier (models UR020-UR080) as explained in the previous paragraphs and then:

- remove the covers that protect the heaters;
- disconnect the terminals of the PTC sensor (A) from the terminal block (ST), remove it from probe housing and replace it;
- insert the new sensor and restore wiring.

Note: the sensor should be inserted until it reaches the limit switch.

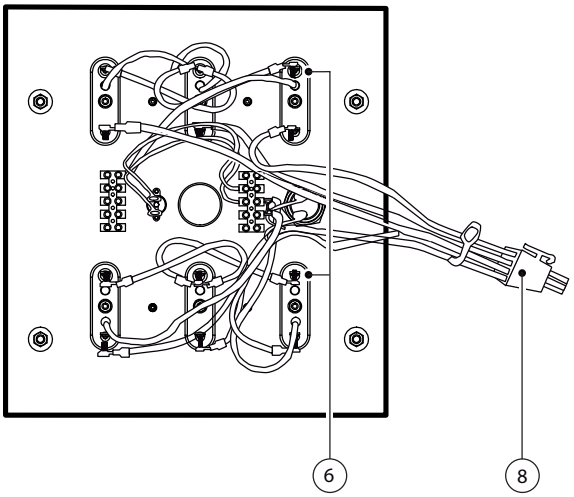


Fig. 10.s

NTC temperature sensor

The NTC temperature sensor is located in probe housing (P) outside the boiler, under the insulation mattress.

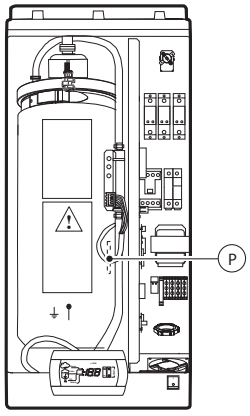


Fig. 10.t

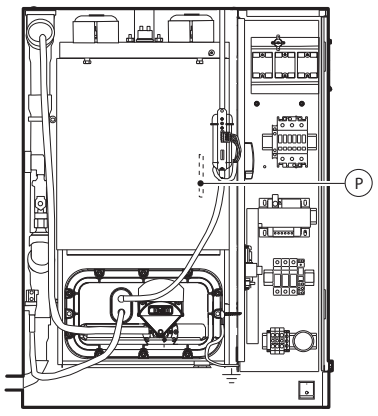


Fig. 10.u

- disconnect the terminals of NTC sensor from the terminal block (8), remove it from probe housing and replace it;

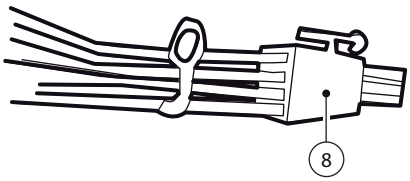


Fig. 10.v

Drain pump

Models UR002-UR013

Procedure:

- remove the boiler as shown in section 9.3;
- identify the drain pump on the base of the humidifier, unthread the 3 screws and remove it;
- check the condition of gasket (G) and replace it, if required.

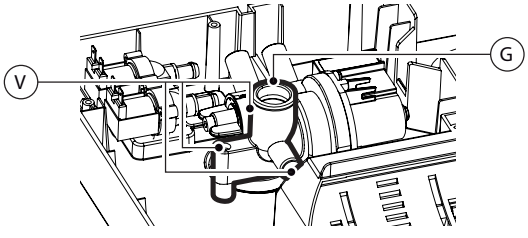


Fig. 10.w

Models UR020-UR080

Procedure:

- unthread the 2 screws (V), remove the cover (C) and the drain pump;
- Check the condition of gasket (G) and replace it, if required.

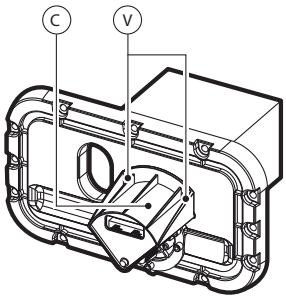


Fig. 10.x

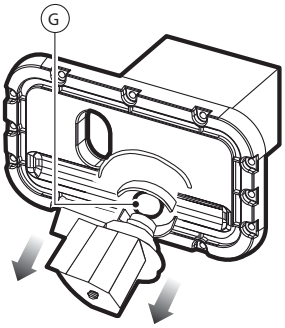


Fig. 10.y

Solid state relay (SSR)

The solid-state relays (one in the single-phase units, two or three in the three-phase unit) may damage in two modes: by short-circuit or burn-out. With regard to power supply, the possible consequences are: continuous conduction or permanent opening. In the event of malfunctioning, check the conduction of the relay using a tester.

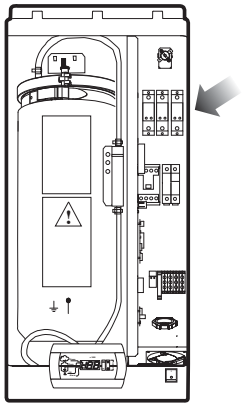


Fig. 10.z

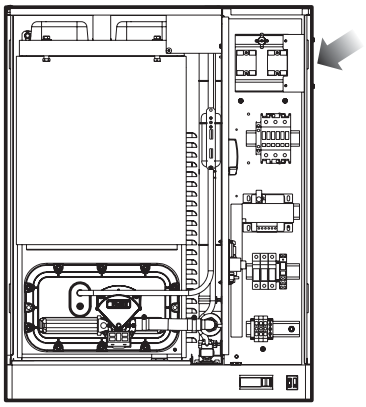


Fig. 10.aa

For the replacement of the solid-state relay:

- turn the humidifier off;
- open the breaker of the power supply line;
- disconnect the power and auxiliary cables from the solid-state relay terminal block;
- remove the relay from the electrical panel by using a screwdriver to lower the fastening lever to the DIN guide;
- hook the guide to the new relay and reconnect the wires.

Fan

SSR relays are cooled by a fan at the base of the humidifier, for models UR002-UR013, and placed on top, on the right side of the unit for models UR020-UR080. With insufficient ventilation the temperature of the electrical panel may rise excessively until it reaches 65°C. Power to the solid-state relays is cut off by a special Klixon (heat sensor) with manual reset (see the wiring diagram), without signalling the intervention. In this case, check:

- if an SSR thermal breaker has been triggered;
- whether the fan control board is powered (check the input terminals: 24 Vac) and in turn powers the fan (output terminals: 24 Vdc) (only for models up to 10 Kg/h).

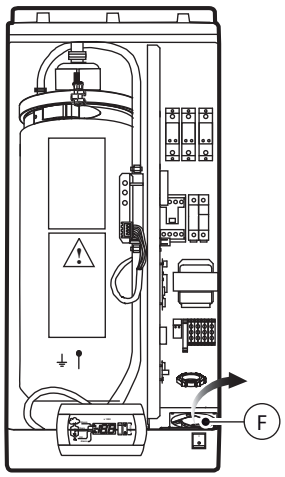


Fig. 10.ab

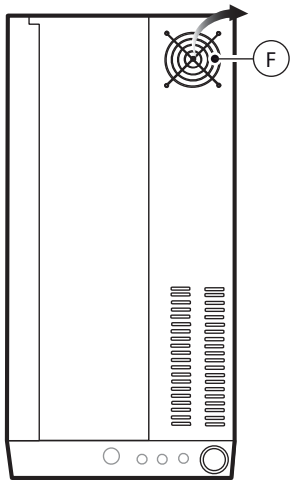


Fig. 10.ac

If the fan is faulty:

Models UR002-UR013:

- replace it after having unthreaded the fastening screws;

Models UR020-UR080:

- unscrew the 4 fastening screws placed on the right side of the structural work and extract the fan from the inside of the panel.

In case of malfunction, the thermal switch can be replaced unscrewing the fastening screws.

Note:

- for models UR002-UR013 the fan is of suction type;
- for models UR020-UR080 the fan is of exhaust type.

10.8 Mechanical discharge of water in the cylinder

Discharge by gravity without turning on the humidifier is recommended if:

- the humidifier is out of order
- it is required to empty the cylinder without turning on the humidifier.

Procedure:

- make sure the humidifier is not powered;
- remove the front panel;
- enable the mechanical device located below the cylinder (A).

Models UR002-UR013

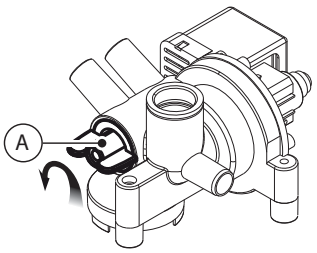


Fig. 10.ad

10.9 Electrical connection of boiler heaters

The cable end should be coupled to the top nut applying a torque equal to 3 N · m.

Single-phase
2-4 kg/h 208-230 V

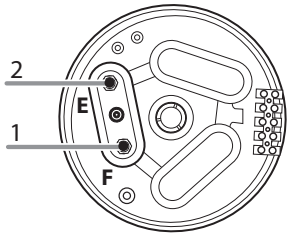


Fig. 10.ae

Single-phase
6 kg/h 208-230 V

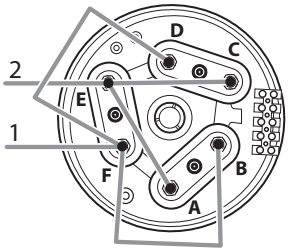


Fig. 10.af

Three-phase - STAR
6 kg/h 400 V
10 kg/h 400-460 V
13 kg/h 400-460-575 V

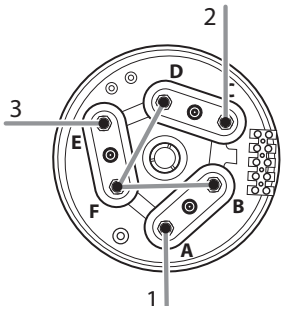


Fig. 10.ag

Three-phase - TRIANGLE
6 kg/h 208-230 V
10 kg/h 208-230 V
13 kg/h 208-230 V

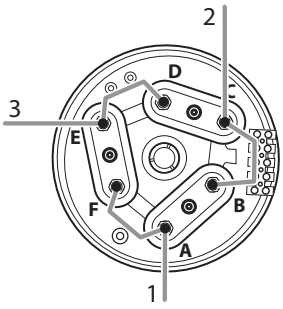


Fig. 10.ah

Three-phase - STAR
20-27 kg/h 400-460-575 V

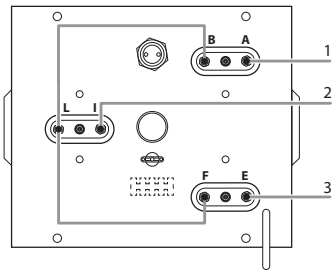


Fig. 10.ai

Three-phase - STAR
53 kg/h 400-460-575 V

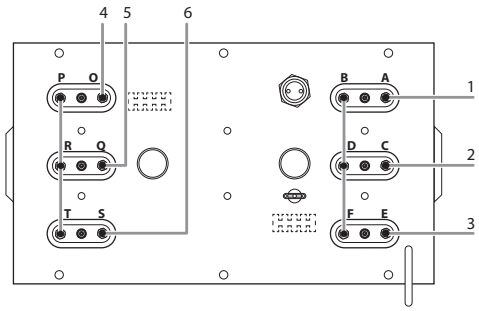


Fig. 10.aj

Three-phase - TRIANGLE
20-27 kg/h 208-230 V

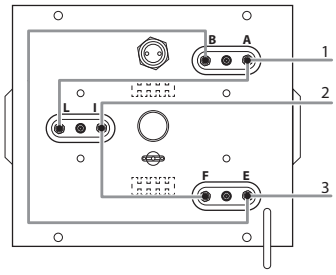


Fig. 10.ak

Three-phase - STAR
60 kg/h 400-460-575 V
80 kg/h 400 V

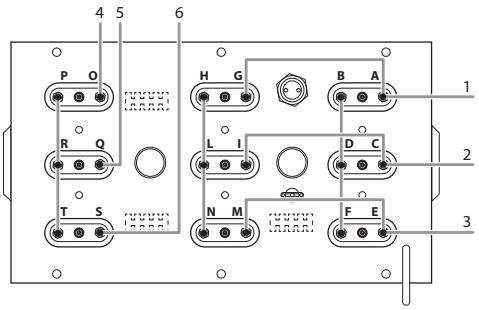


Fig. 10.al

Three-phase - STELLA
40 kg/h 400-460-575 V

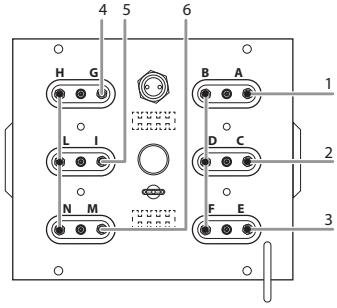


Fig. 10.am

Three-phase - STAR
80 kg/h 460-575 V

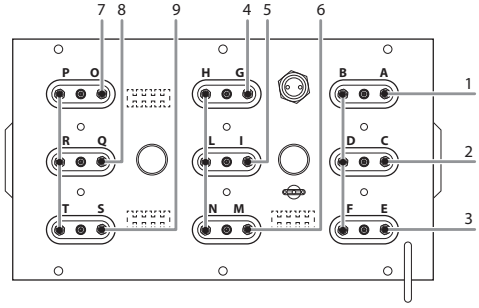


Fig. 10.an

Key window

1-2-3-4 5-6-7-8-9	three-phase power supply terminals
1-2	single-phase power supply terminals

11. WIRING DIAGRAMS

11.1 Wiring diagram UR002-UR004 single-phase 208 V

* To be carried out by the installer

TB	Terminal Board
THP	Motor Protector
QC1	Fast coupling
K	Contactor
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC	Heater temperature sensor
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R	Electrical resistor
SSR1-2	Solid state relay
FSB	Fan control board
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor

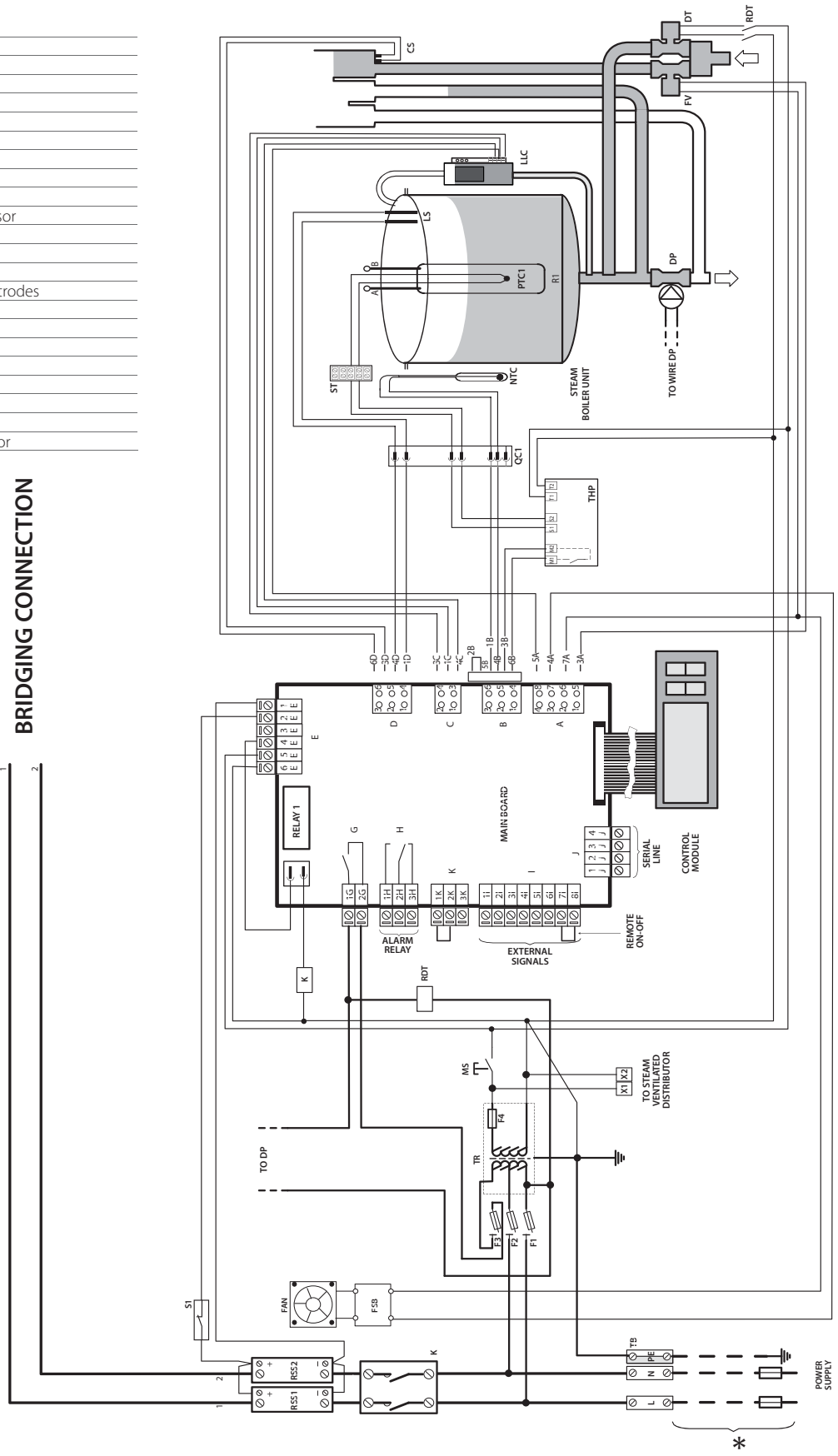


Fig. 11.a

11.2 Wiring diagram UR002-UR004 single-phase 230 V

* To be carried out by the installer

TB	Terminal Board
THP	Motor Protector
QC1	Fast coupling
K	Contactor
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC	Heater temperature sensor
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R	Electrical resistor
SSR1-2	Solid state relay
FSB	Fan control board
FAN	Fan
NTC	Water temperature sensor

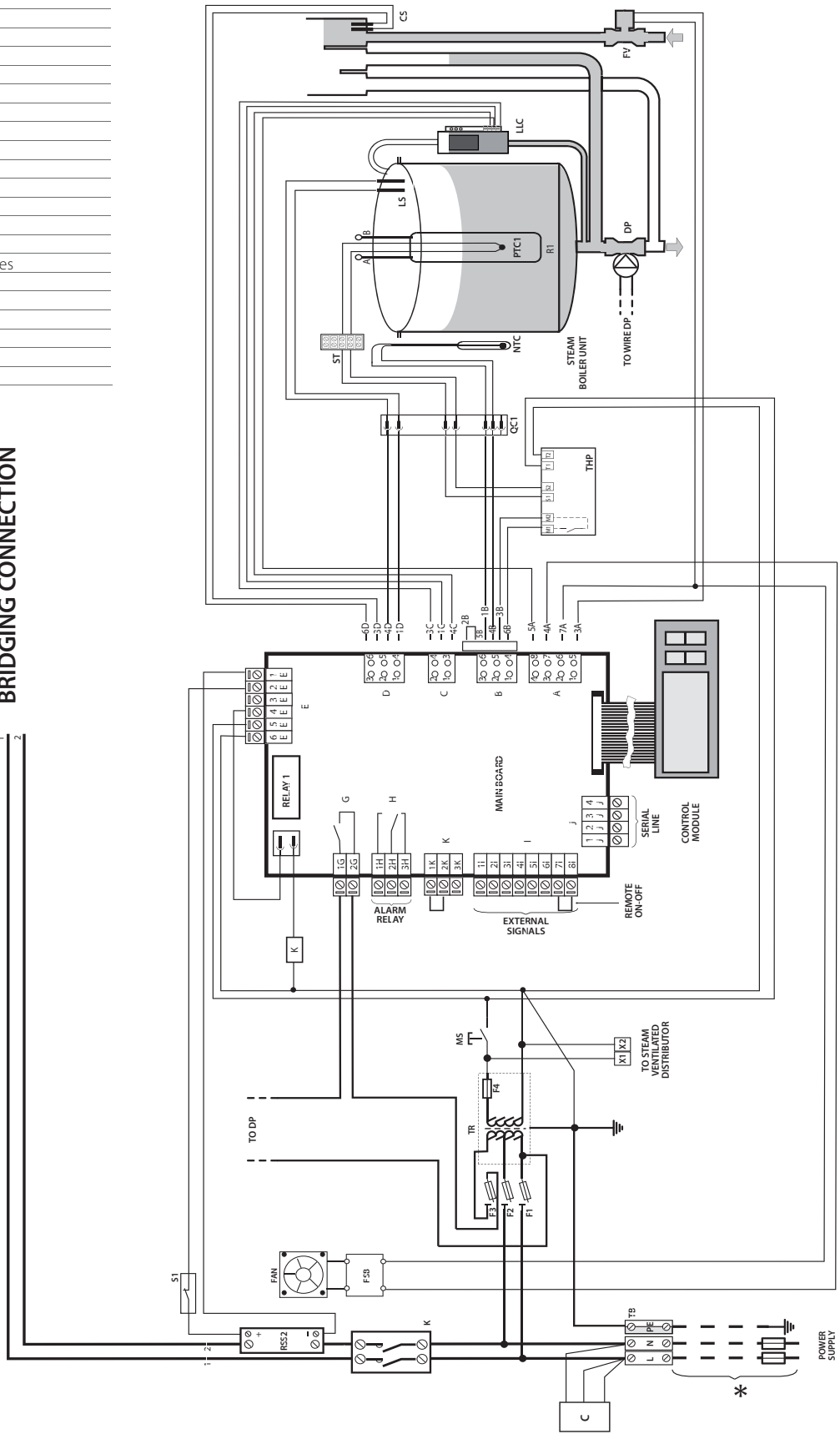


Fig. 11.b

11.3 Wiring diagram UR006 single-phase 208 V

* To be carried out by the installer

TB	Terminal Board
THP	Motor Protector
QC1	Fast coupling
K	Contactor
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…3	Temperature sensor heater 1…3
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…3	Electric heater 1…3
SSR1…2	Solid state relay
FSB	Fan control board
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor

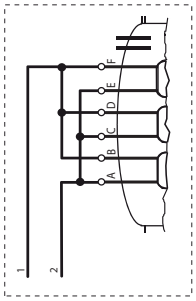


Fig. 11.c

11.4 Wiring diagram UR006 single-phase 230 V

* To be carried out by the installer

TB	Terminal Board
THP	Motor Protector
QC1	Fast coupling
K	Contactor
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…3	Temperature sensor heater 1…3
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…3	Electrical resistor
SSR1…2	Solid state relay
FSB	Fan control board
FAN	Fan
NTC	Water temperature sensor

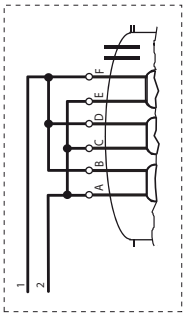


Fig. 11.d

11.5 Wiring diagram UR006-UR010-UR013 three-phase (208-230-460-575 V)

* To be carried out by the installer

TB	Terminal Board
THP	Motor Protector
QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…3	Temperature sensor heater 1…3
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…3	Electric heater 1…3
SSR1…3	Solid state relay 1…3
FSB	Fan control board
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor

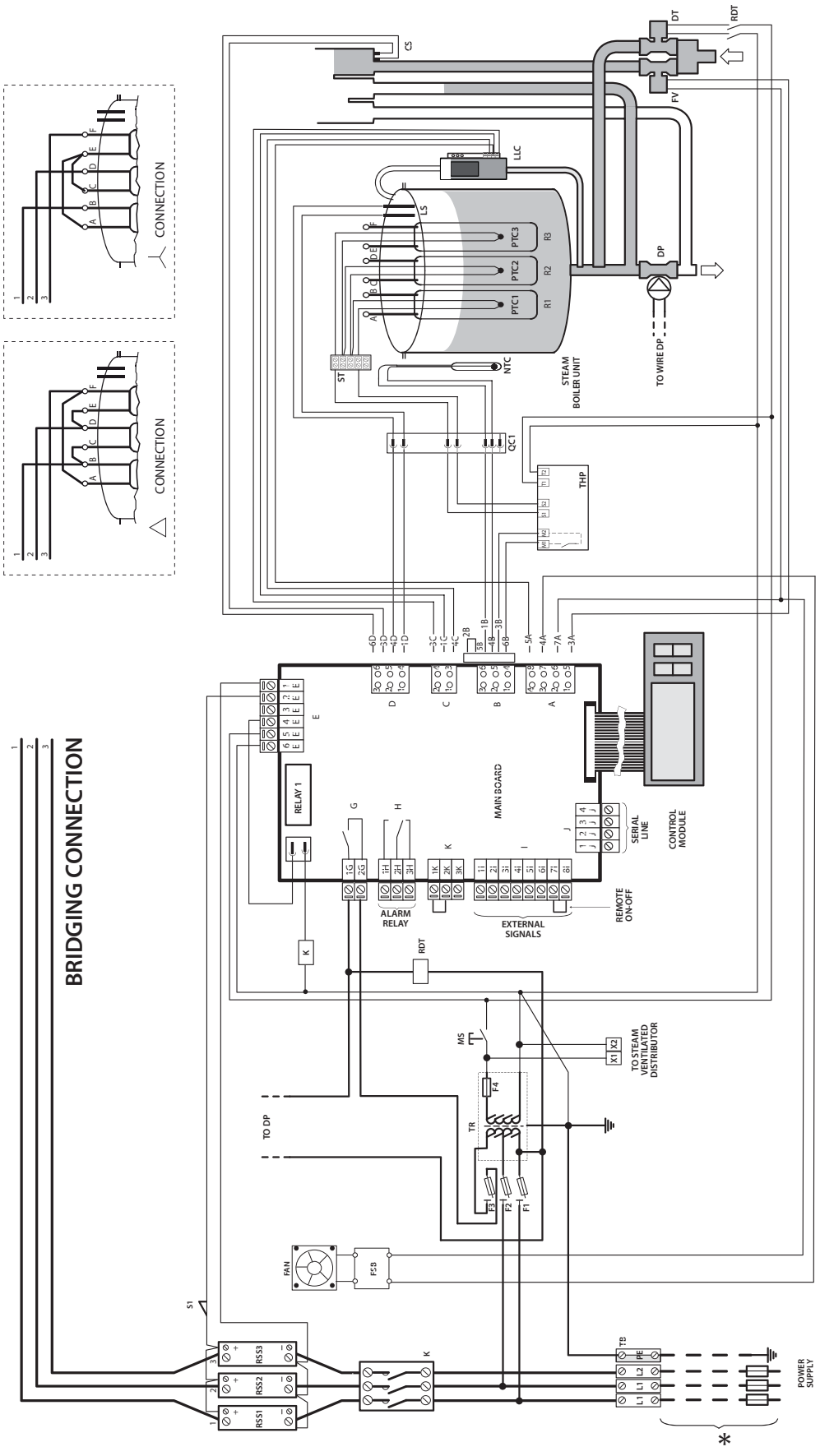


Fig. 11.e

11.6 Wiring diagram UR006-UR010-UR013 three-phase (400 V)

* To be carried out by the installer

TB	Terminal Board
THP	Motor Protector
QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…3	Temperature sensor heater 1…3
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…3	Electric heater 1…3
SSR1…2	Solid state relay 1…2
FSB	Fan control board
FAN	Fan
NTC	Water temperature sensor

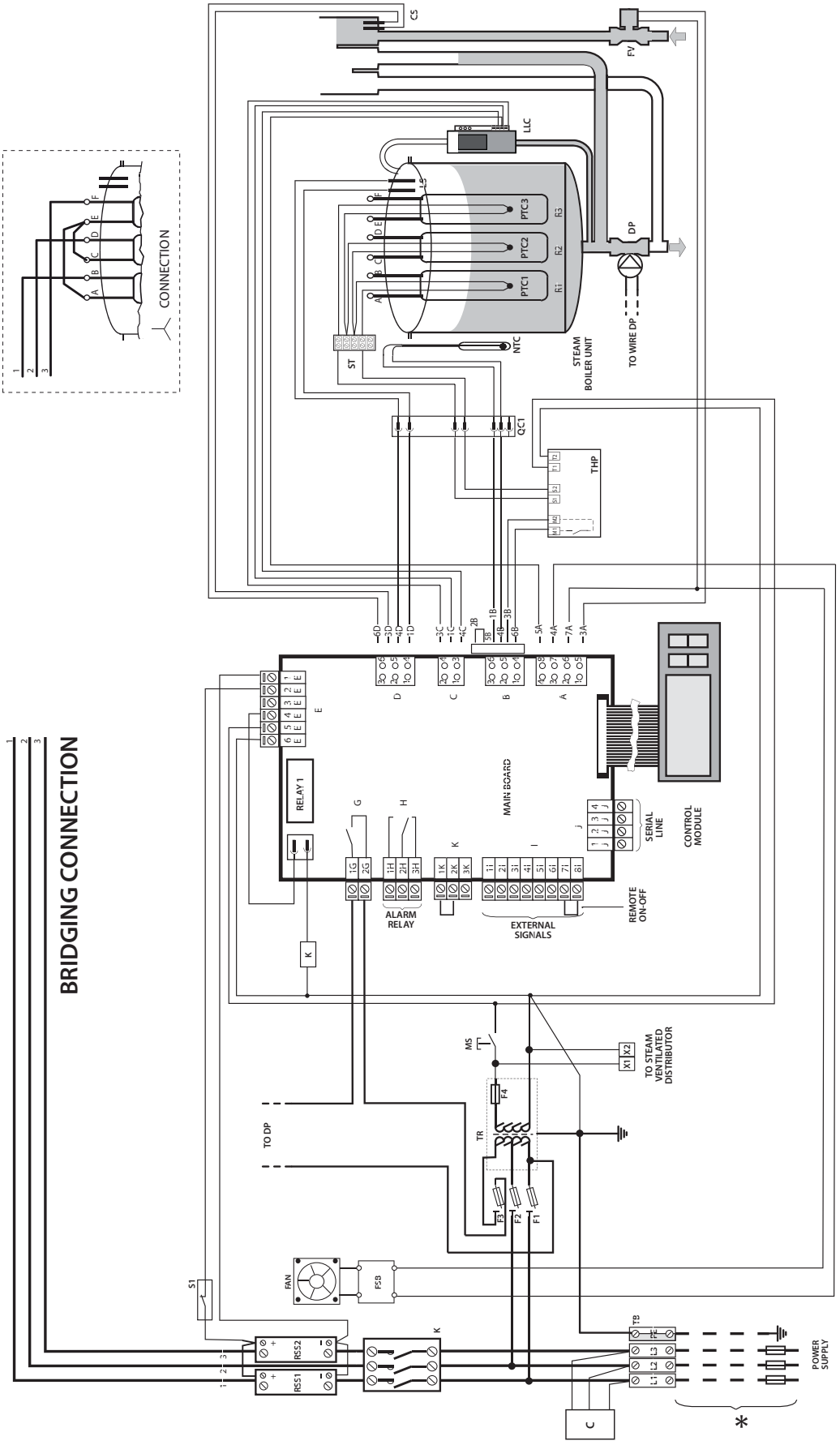


Fig. 11.f

11.7 Wiring diagram UR020-UR027 three-phase (208-230-460-575 V)

* To be carried out by the installer

THP	Motor Protector
QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…3	Temperature sensor heater 1…3
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…3	Electric heater 1…3
SSR1…3	Solid state relay 1…3
FSB	Fan control board
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

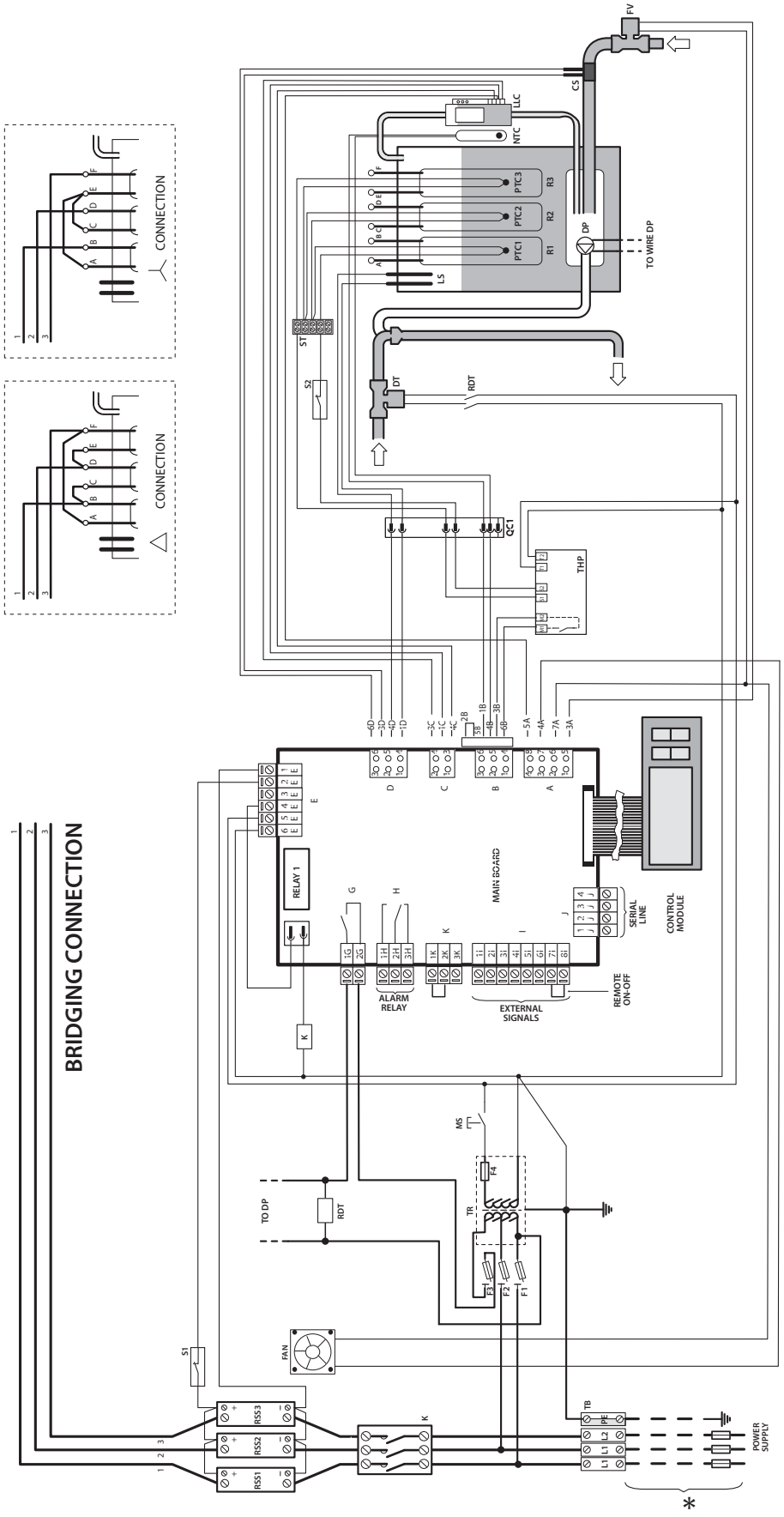


Fig. 11.g

11.8 Wiring diagram UR020-UR027 three-phase (400 V)

* To be carried out by the installer

THP	Motor Protector
QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…3	Temperature sensor heater 1…3
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…3	Electric heater 1…3
SSR1…3	Solid state relay 1…3
FAN	Fan
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

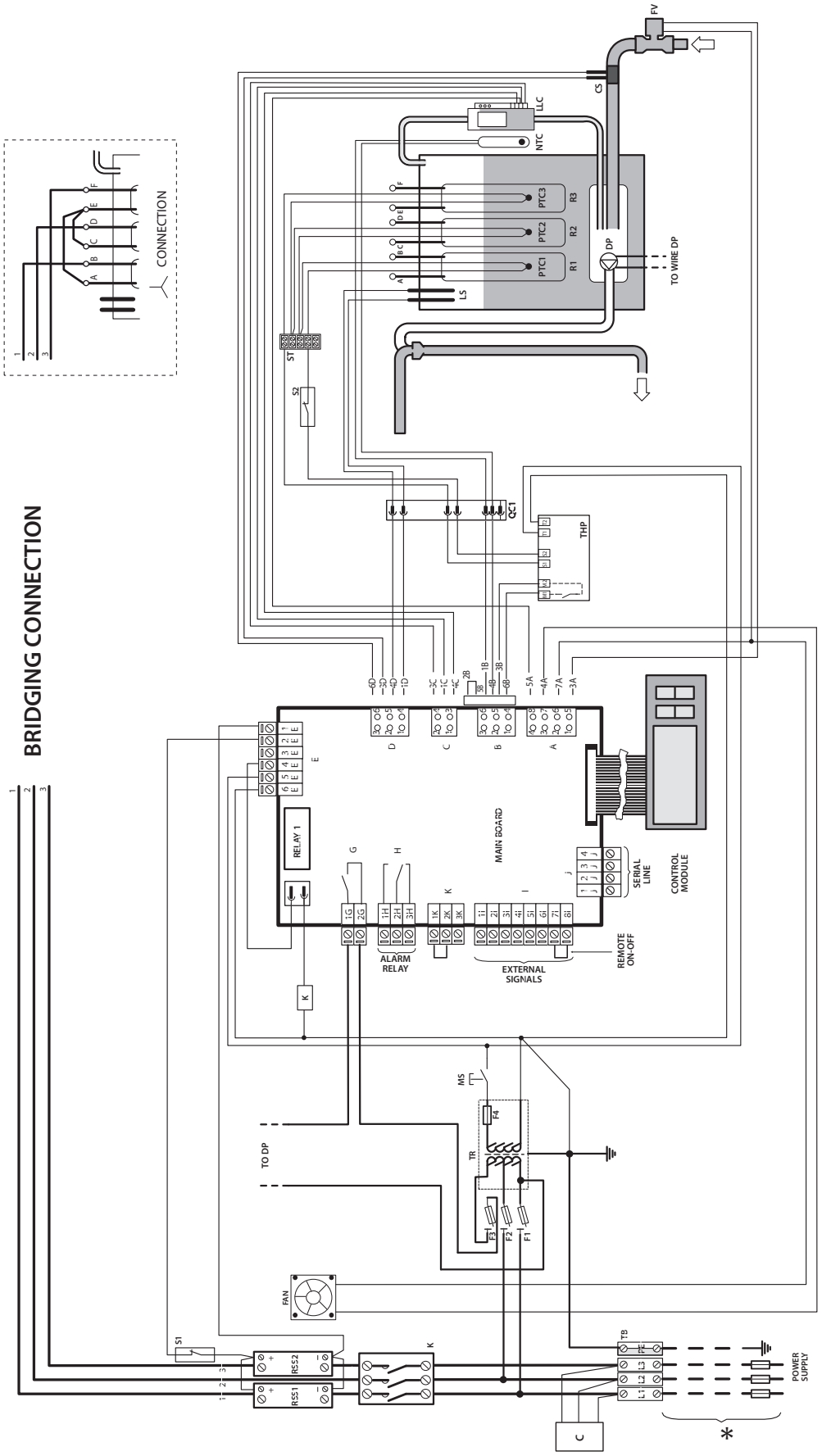


Fig. 11.h

11.9 Wiring diagram UR027 three-phase (230 V)

* To be carried out by the installer

THP	Motor Protector
QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST	Sensor terminal block
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…3	Temperature sensor heater 1…3
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…3	Electric heater 1…3
SSR1…3	Solid state relay 1…3
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

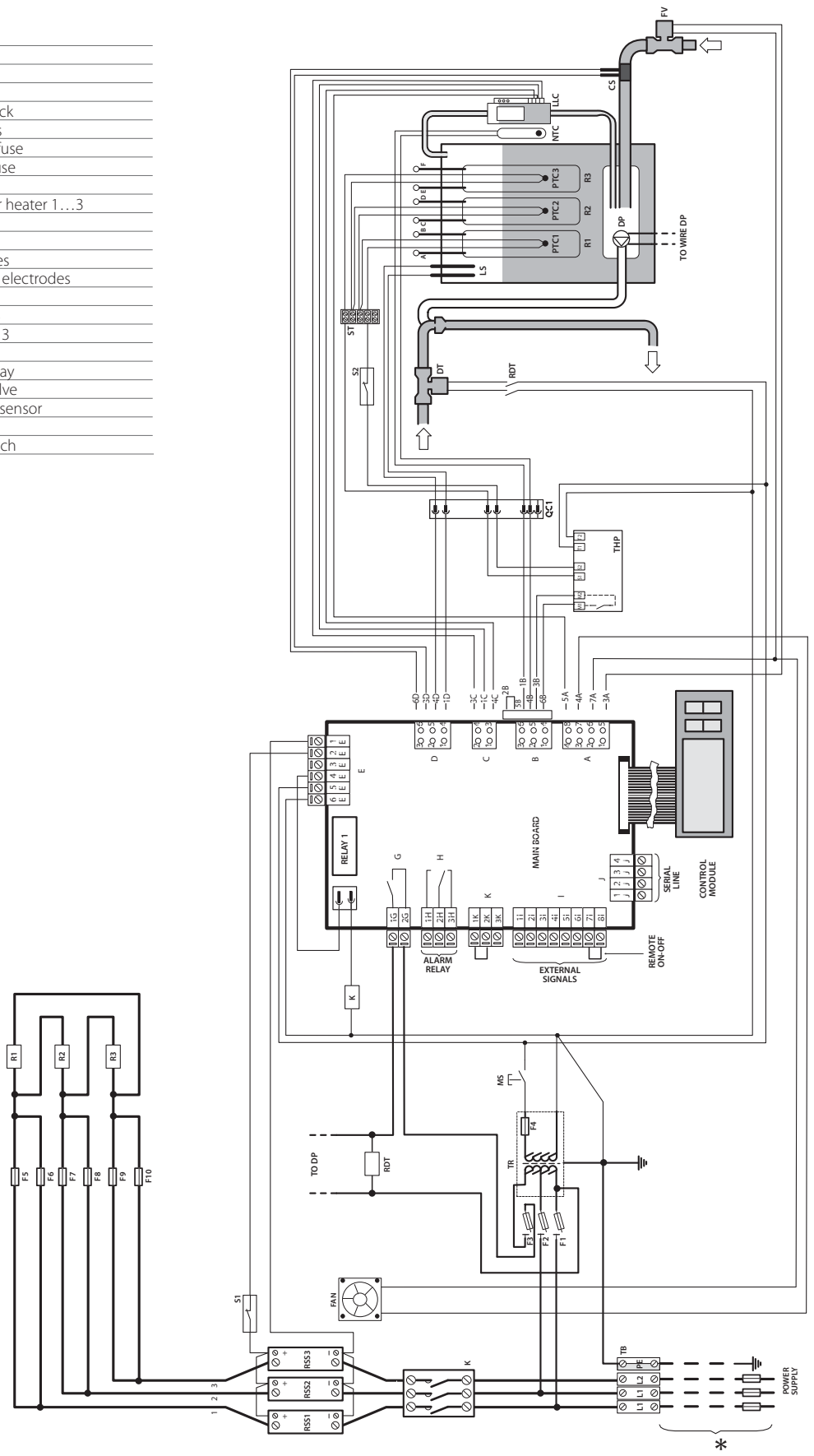


Fig. 11.i

11.10 Wiring diagram UR040-UR053 three-phase (460-575 V)

* To be carried out by the installer

THP	Motor Protector
QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST1…2	Sensor terminal blocks
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…6	Temperature sensor heater 1…6
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…6	Electric heater 1…6
SSR1…3	Solid state relay 1…3
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

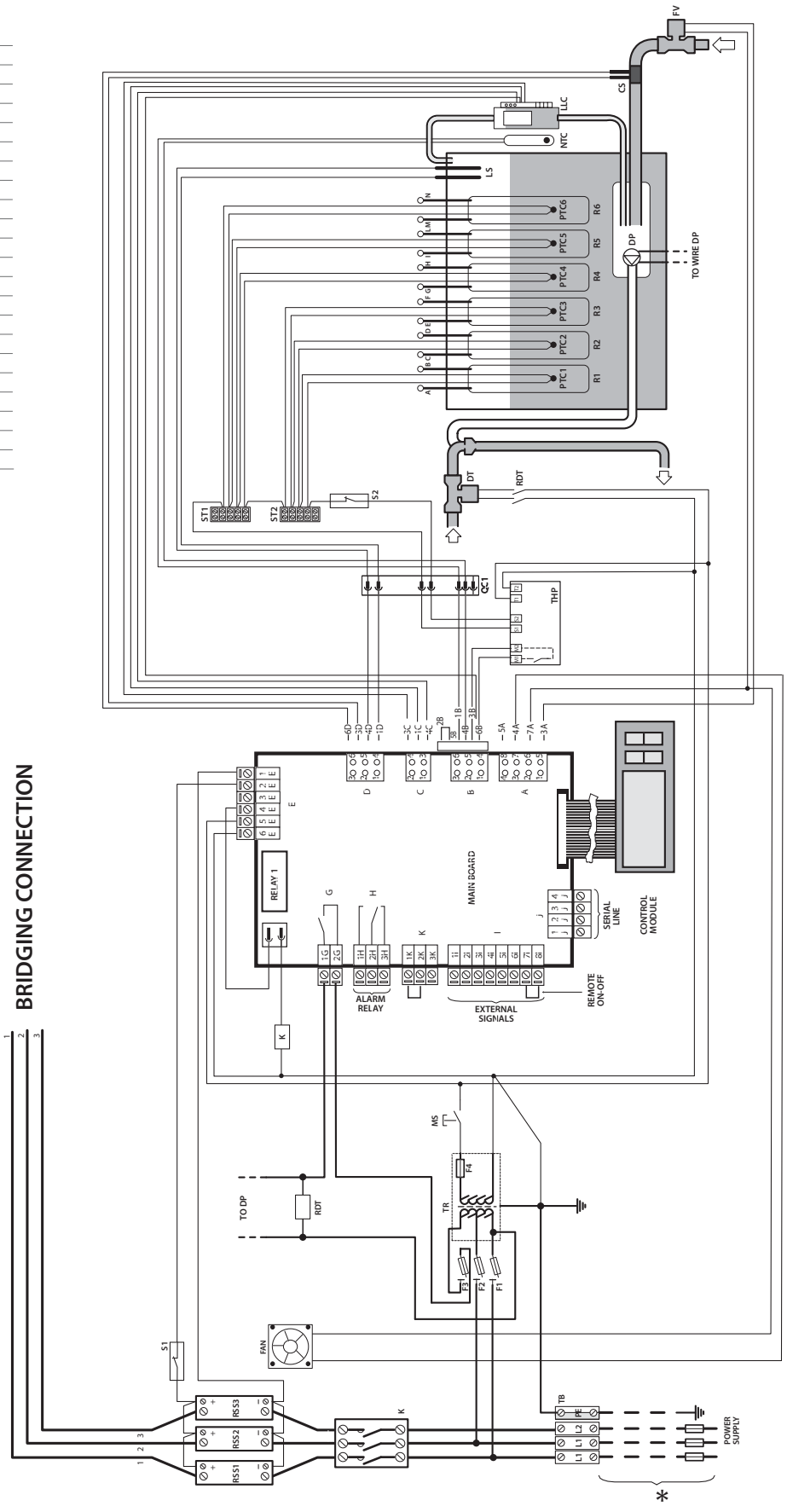


Fig. 11.j

11.11 Wiring diagram UR040 - UR053 three-phase (400 V)

* To be carried out by the installer

THP	Motor Protector
QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST1…2	Sensor terminal blocks
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…6	Temperature sensor heater 1…6
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…6	Electric heater 1…6
SSR1…3	Solid state relay 1…3
FAN	Fan
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

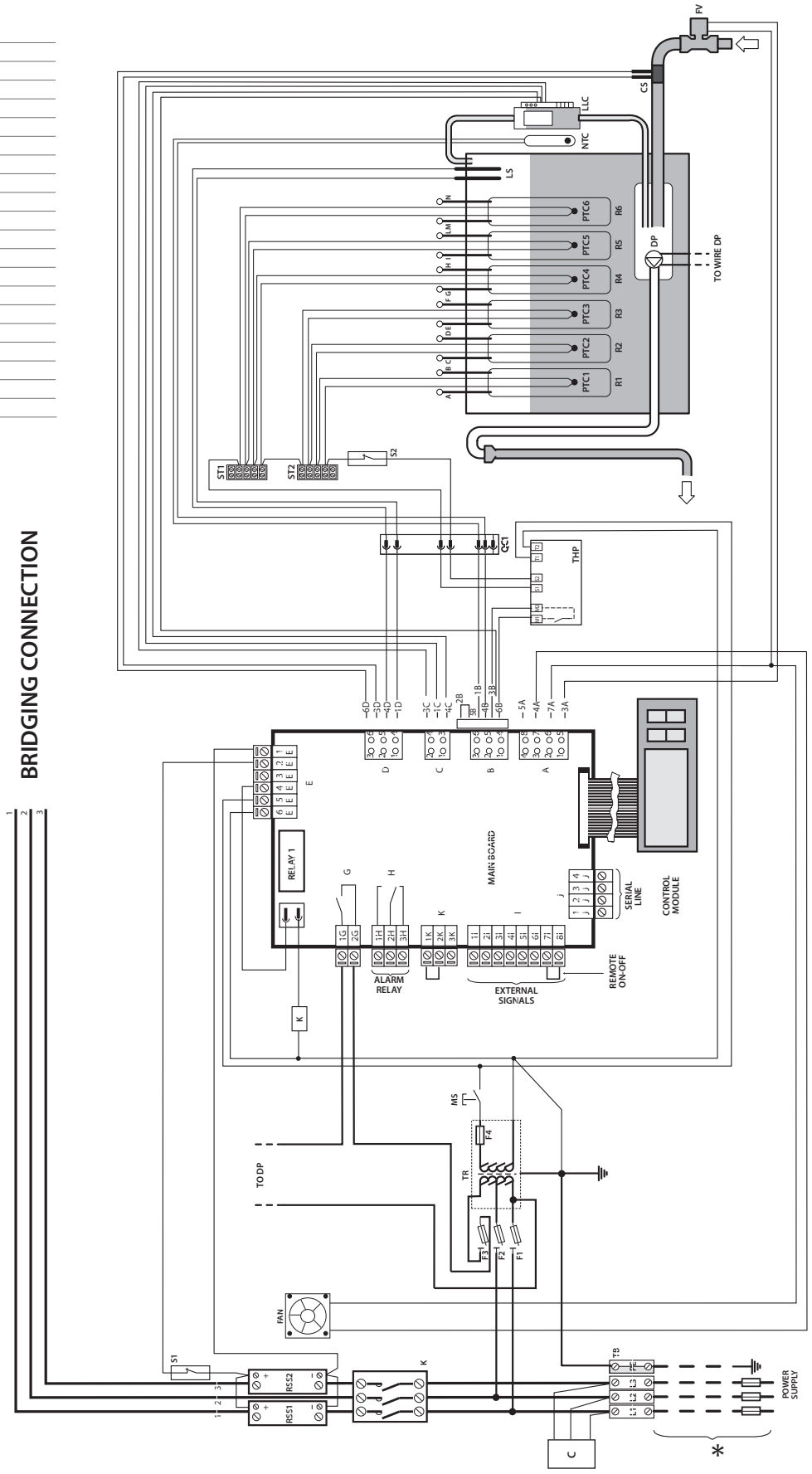


Fig. 11.k

11.12 Wiring diagram UR053 three-phase (460 V)

* To be carried out by the installer

QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST1…2	Sensor terminal blocks
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…6	Temperature sensor heater 1…6
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…6	Electric heater 1…6
SSR1…3	Solid state relay 1…3
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

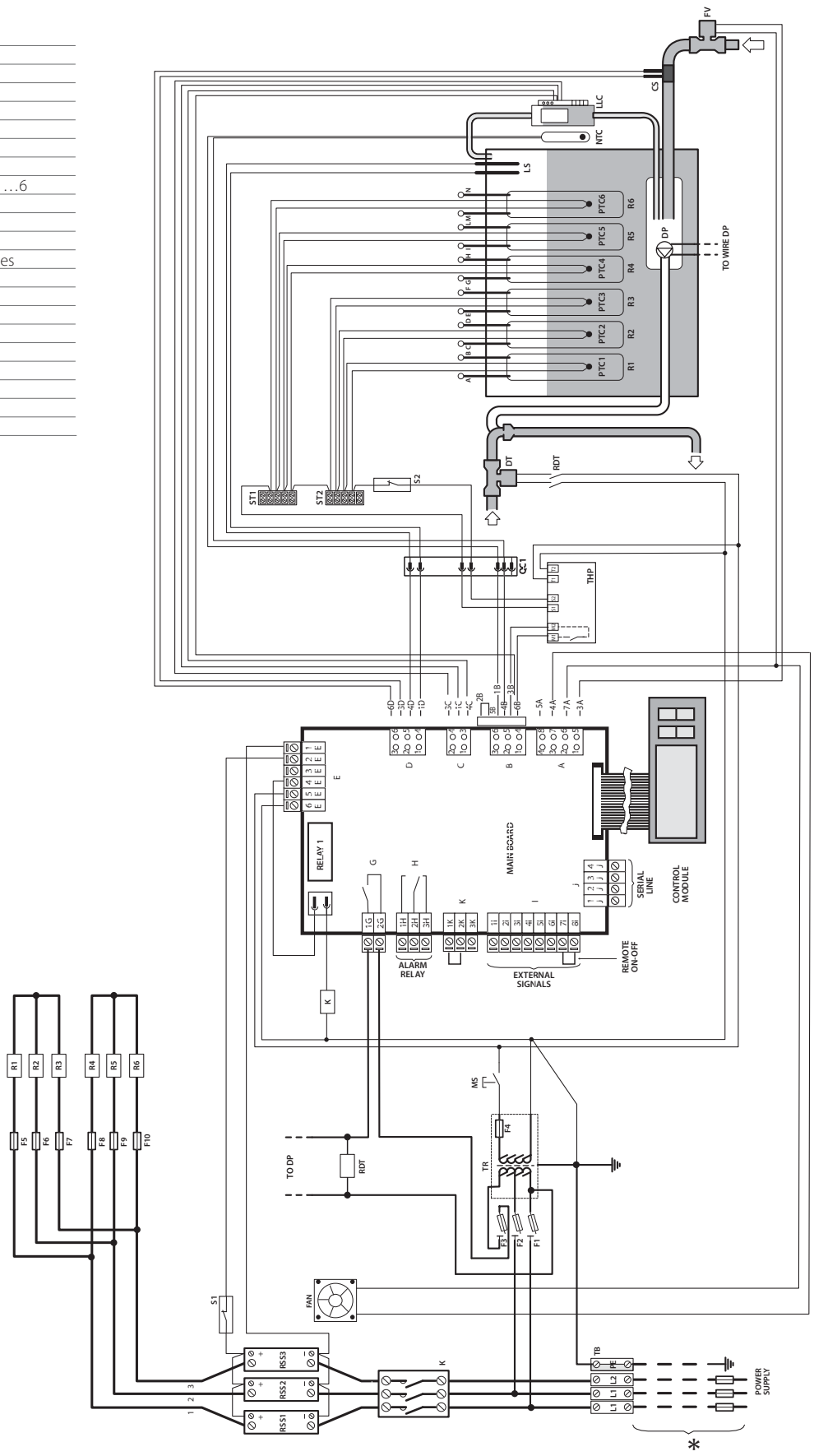


Fig. 11.I

11.13 Wiring diagram UR060 three-phase (575 V)

* To be carried out by the installer

QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST1…3	Sensor terminal blocks
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…9	Temperature sensor heater 1…9
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…9	Electric heater 1…9
SSR1…3	Solid state relay 1…3
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

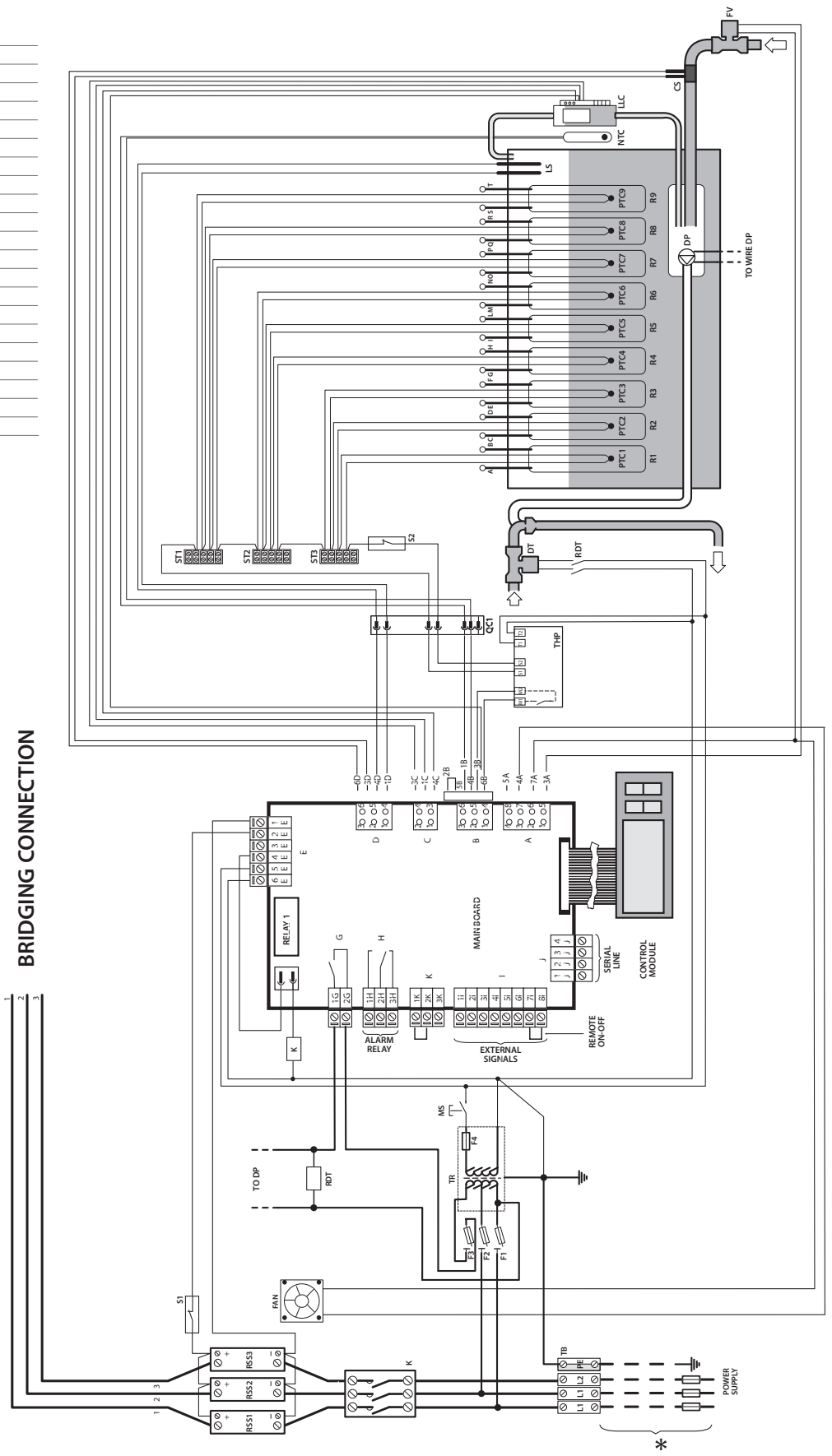


Fig. 11.m

11.14 Wiring diagram UR060 (460-575 V)

* To be carried out by the installer

QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST1…3	Sensor terminal blocks
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…9	Temperature sensor heater 1…6
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…9	Electric heater 1…9
SSR1…2	Solid state relay 1…2
FAN	Fan
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch
C	Filter

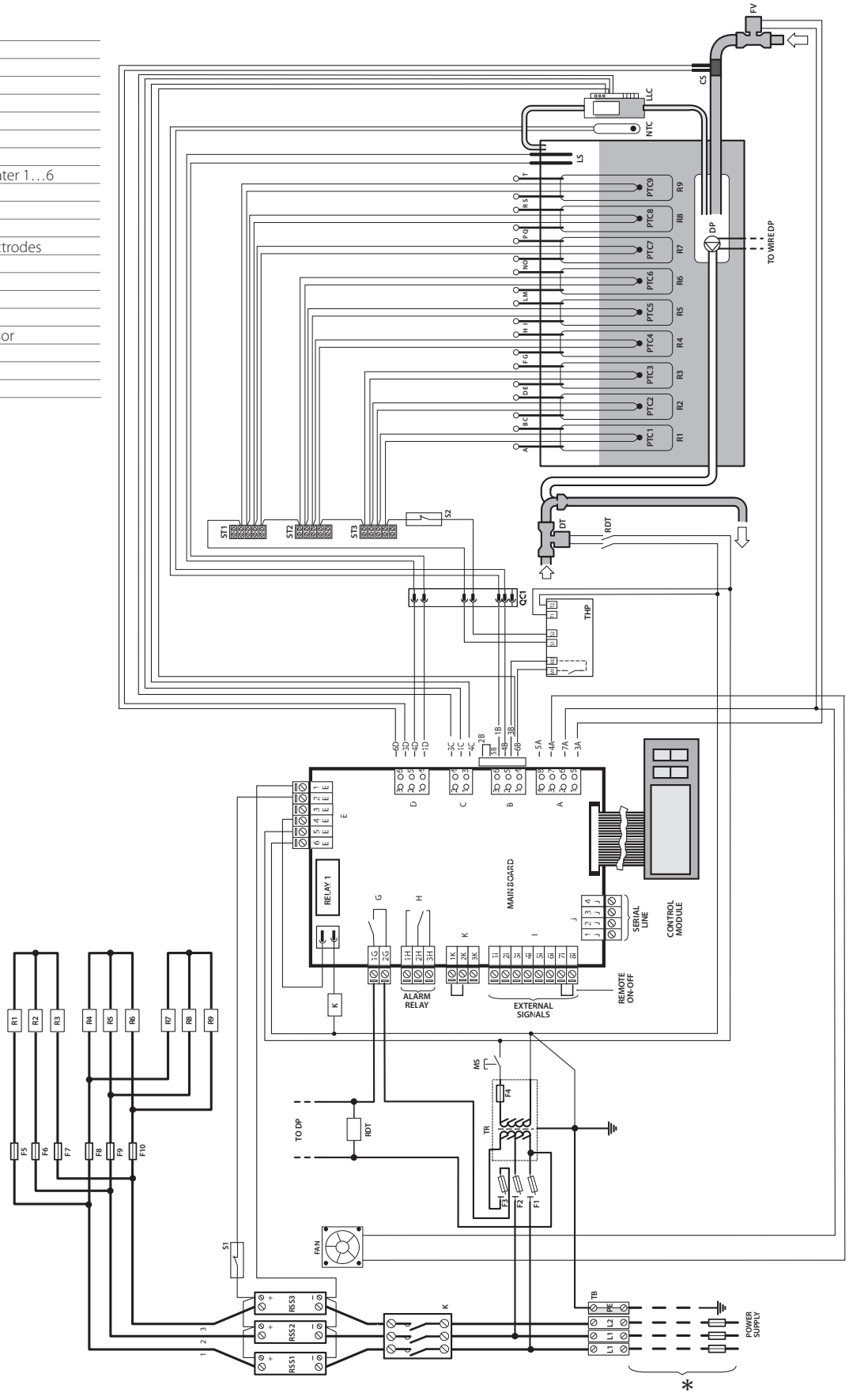


Fig. 11.n

11.15 Wiring diagram UR060-UR080 three-phase (400 V)

* To be carried out by the installer

K	CONTACTOR
LLC	Level gauge
ST1…3	Sensor terminal blocks
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…9	Temperature sensor heater 1…9
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…9	Electric heater 1…9
SSR1…3	Solid state relay 1…3
FAN	Fan
RDT	Drain tempering relay
DT	Drain tempering valve
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch

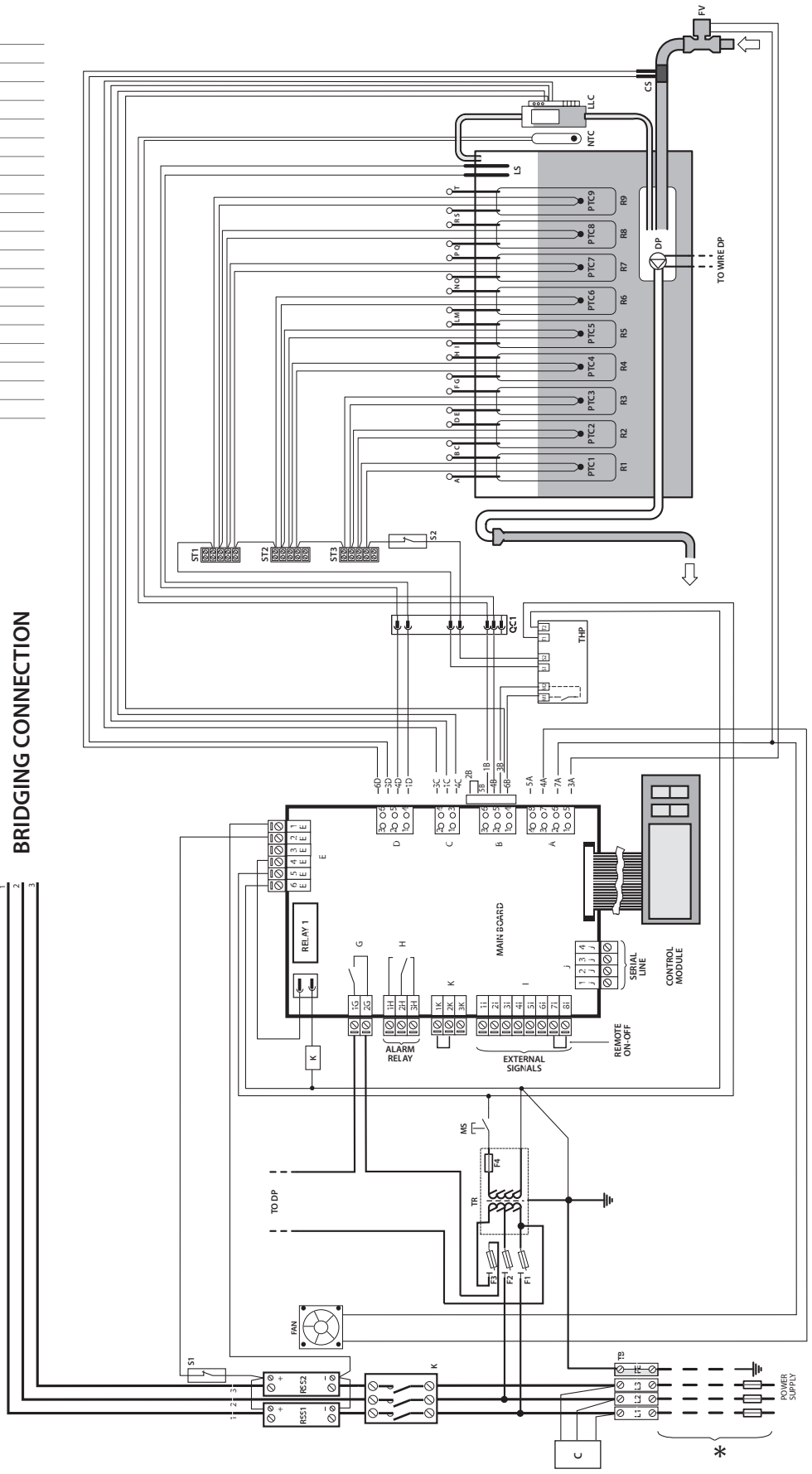


Fig. 11.o

11.16 Wiring diagram UR080 three-phase (460-575 V)

* To be carried out by the installer

QC1	Fast coupling
K	CONTACTOR
LLC	Level gauge
ST1…3	Sensor terminal blocks
F1 - F2	Primary circuit fuses
F3	Drain pump safety fuse
F4	Secondary circuit fuse
FV	Infeed valve
PTC1…9	Temperature sensor heater 1…6
TR	Transformer
DP	Drain pump
LS	High level electrodes
CS	Conductivity meter electrodes
MS	Manual switch
R1…9	Electric heater 1…9
SSR1…2	Solid state relay 1…2
FAN	Fan
NTC	Water temperature sensor
S1	SSR thermal switch
S2	Heater thermal switch
C	Filter

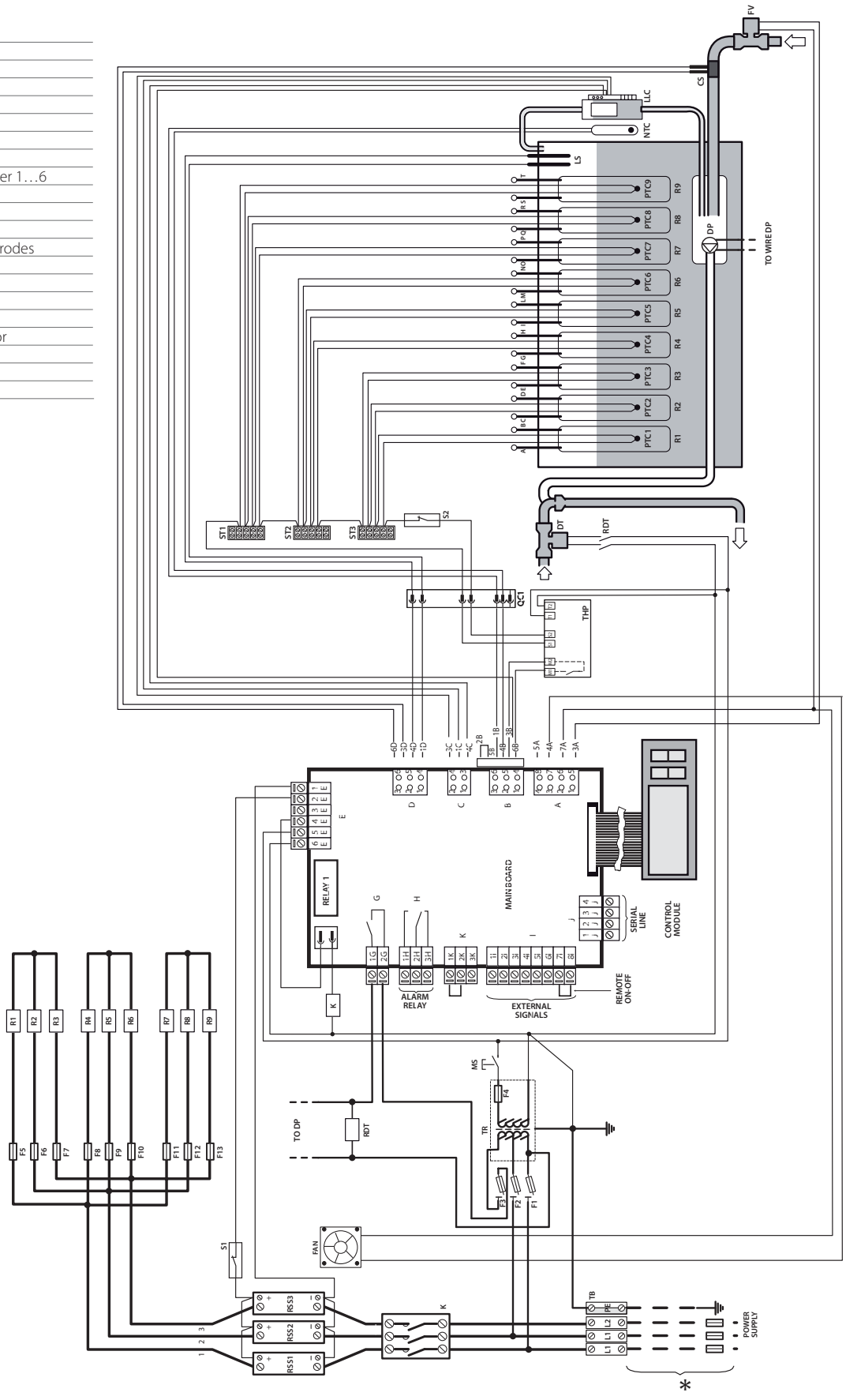


Fig. 11.p

12. GENERAL FEATURES AND MODELS

12.1 heaterSteam models and electrical features

The table below contains the electrical data regarding the power supply voltages of the various models and the functional characteristics of each. Note that some models may be powered at different voltages, obviously with different consumption and steam output.

Standard mod.	Output (2,4) (kg/h)	Power (2) (KW)	Code	Voltage (@50/60 Hz)	Elements (n° x W)	Type of connection	Current (A)	Cable sect. (mm2)	Fuse-line (A/type)
UR002	2,0	1,6	U	208	1 x 1597	–	7,7	2.5	10 / fast
	2,0	2,0	D	230	1 x 1952	–	8,5	2.5	10 / fast
UR004	4,0	3,6	U	208	1 x 3605	–	17,3	2.5	25 / fast
	4,0	3,3	D	230	1 x 3306	–	14,4	2.5	20 / fast
UR006	6,0	4,8	U	208	3 x 1597	–	23	6	32 / fast
	6,0	4,7	D	230	3 x 1555	–	20,3	6	25 / fast
	6,0	4,8	W	208	3 x 1597	Δ	3 x 13.3	2.5	16 / fast
	6,0	4,7	K	230	3 x 1555	Δ	3 x 11.7	2.5	16 / fast
	6,0	4,7	L	400	3 x 1568	Y	3 x 6.8	2.5	10 / fast
UR010	10,0	8,1	W	208	3 x 2703	Δ	3 x 22.5	6	32 / fast
	10,0	7,4	K	230	3 x 2460	Δ	3 x 18.5	6	25 / fast
	10,0	7,4	L	400	3 x 2480	Y	3 x 10.7	2.5	16 / fast
	10,0	7,8	M	460	3 x 2603	Y	3 x 9.8	2.5	16 / fast
UR013	13,0	10,8	W	208	3 x 3605	Δ	3 x 30	10	50 / fast
	13,0	9,9	K	230	3 x 3306	Δ	3 x 25	6	32 / fast
	13,0	10,0	L	400	3 x 3333	Y	3 x 14.4	2.5	20 / fast
	13,0	9,8	M	460	3 x 3280	Y	3 x 12.4	2.5	16 / fast
	13,0	9,7	No.	575	3 x 3240	Y	3 x 9.8	2.5	16 / fast
UR020	20,0	16,2	W	208	3 x 5407	Δ	3 x 45.0	16	60 / fast
	20,0	15,1	K	230	3 x 5038	Δ	3 x 37.9	16	60 / fast
	20,0	15,2	L	400	3 x 5079	Y	3 x 22.0	6	32 / fast
	20,0	15,1	M	460	3 x 5022	Y	3 x 18.9	6	25 / fast
	20,0	15,0	No.	575	3 x 5008	Y	3 x 15.1	6	20 / fast
UR027	27,0	19,8	K	230	3 x 6612	Δ	3 x 49.8	16	60 / fast
	27,0	20,0	L	400	3 x 6666	Y	3 x 28.9	10	50 / fast
	27,0	20,2	M	460	3 x 6717	Y	3 x 25.3	6	32 / fast
	27,0	19,8	No.	575	3 x 6599	Y	3 x 19.9	6	25 / fast
UR040	40,0	30,5	L	400	6 x 5079	Y	3 x 44.0	16	50 / fast
	40,0	30,1	M	460	6 x 5022	Y	3 x 37.8	16	50 / fast
	40,0	30,0	No.	575	6 x 5008	Y	3 x 30.2	10	50 / fast
UR053	53,0	40,0	L	400	6 x 6666	Y	3 x 57.7	25	80 / fast
	53,0	40,3	M	460	6 x 6717	Y	3 x 50.6	16	60 / fast
	53,0	39,6	No.	575	6 x 6599	Y	3 x 39.8	16	60 / fast
UR060	60,0	45,7	L	400	9 x 5079	Y	3 x 66	25	80 / fast
	60,0	45,2	M	460	9 x 5022	Y	3 x 56.7	25	80 / fast
	60,0	45,1	No.	575	9 x 5008	Y	3 x 45.3	16	50 / fast
UR080	80,0	60,0	L	400	9 x 6666	Y	3 x 86.6	50	125 / fast
	80,0	60,5	M	460	9 x 6717	Y	3 x 75.9	35	100 / fast
	80,0	59,4	No.	575	9 x 6599	Y	3 x 59.6	25	80 / fast

Tab. 12.a

(1) tolerance allowed on rated mains voltage: -15%, +10%;
(2) tolerance on rated values: +5%, -10% (EN 60335-1);
(3) recommended values; referred to the laying of the cable in closed PVC or rubber raceways with a length of 20 m (65.6 ft); the standards in force must in any case be followed;
(4) instant max nominal steam output: the average steam production may be influenced by external factors such as: room temperature, water quality, steam distribution system;
(5) please refer to the wiring diagrams

The data are not absolute and may not comply with the local standards, which should prevail.

12.2 Technical features

	model										
	UR002	UR004	UR006	UR010	UR013	UR020	UR027	UR040	UR053	UR060	UR080
Number of heaters	1	1	3	3	3	6	6	6	6	9	9
steam											
Connection Ø mm (in)	30 (1.2)					40 (1.6)			2 x 40 (2x1.6)		
delivery pressure limits Pa (PSI)	0…1500 (0...0,218)					0...2000 (0...0.290)					
supply water											
connection	3/4" G										
temperature limits °C (°F)	1...40 (33.8...104)										
pressure limits (MPa)	0.1...0.8 (1...8 bar)										
hardness limits (°fH)	≤ 40										
instant flow rate (l/min)	1.1	1.1	1.1	1.1	1.1	4	4	4	10	10	10
drain water											
Connection Ø mm (in)	40 (1.6)					50 (2)					
typical temperature °C (°F)	≤100										
instant flow rate (l/min)	5 (50 Hz) - 9 (60 Hz)					17.5 (50 Hz) - 24.3 (60 Hz)					
drain tempering instant flow rate (l/min)*	23 (60Hz)					54,3 (60Hz)					
environmental conditions											
room operating temperature °C (°F)	1...40 (33.9...104)										
room operating humidity (% rH)	10...60										
storage temperature °C (°F)	-10...70 (33.8...158)										
storage humidity (% rH)	5…95										
protection rating	IP20										
system											
type	URH-URS										
voltage / auxiliary frequency (V / Hz)	24 / 50/60										
maximum auxiliary power (VA)	90										
probe inputs (general characteristics)	selectable input signal: 0…1 Vdc, 0…10 Vdc, 2…10 Vdc, 0…20 mA, 4…20 mA										
	input impedance: 60 kΩ with signals: 0…1 Vdc, 0…10 Vdc, 2…10 Vdc										
	50 Ω with signals: 0…20 mA, 4…20 mA										
power supply for active probes (general features)	24 Vdc (24 Vac rectified), Imax= 250 mA										
	12 Vdc 5%, Imax= 50 mA										
alarm relay outputs (general features)	250 V 8 A (2 A)										
	type of micro-switching action 1C										
remote enabling input (general characteristics)	dry contact; max resistance 50 Ω; Vmax=24 Vdc; Imax=5 mA										
serial communication	two-lead RS485										

Tab. 12.b

12.3 Steam duct pipe models

humidifier model:	UR002	UR004	UR006	UR010	UR013	UR020	UR027	UR040	UR053	UR060	UR080
ø of steam outlet mm (in):	30 (1.2")					40 (1.6")			2x40 (1.6")		
maximum capacity kg/h (lb/h):	"2 (4.4)"	"4 (8.8)"	"6 (13.2)"	"10 (22)"	"13 (28.6)"	"20 (44)"	"27 (59.5)"	"40 (88)"	"53 (116.8)"	"60 (132.2)"	"80 (176.36)"
1312365AXX	√	√	√	√	√						
1312367AXX						√	√	√	√	√	√

Tab. 12.c

12.4 Models of steam nozzles with concentrated jet

humidifier model:		UR002	UR004	UR006	UR010	UR013	UR020	UR027	UR040	UR053	UR060	UR080
ø of steam outlet mm (in):		30 (1.2")					40 (1.6")			2x40 (1.6")		
maximum capacity kg/h (lb/h):		2 (4.4)	4 (8.8)	6 (13.2)	10 (22)	13 (28.6)	20 (44)	27 (59.5)	40 (88)	53 (116.8)	60 (132.2)	80 (176.36)
"inlet diameter nozzle ø mm (in)"	maximum capacity nozzle kg/h (lb/h)	code										
30 (1.2")	18 (39.7)	SDPOEM0022	1	1	1	1	1	1	(2)*				
30 (1.6")	"18 (39.7)												
with hole of 30 (1.6"")"	SDPOEM0000	1	1	1	1	1	1	(2)*	(4)*	(4)*	(4)*		

Tab. 12.d

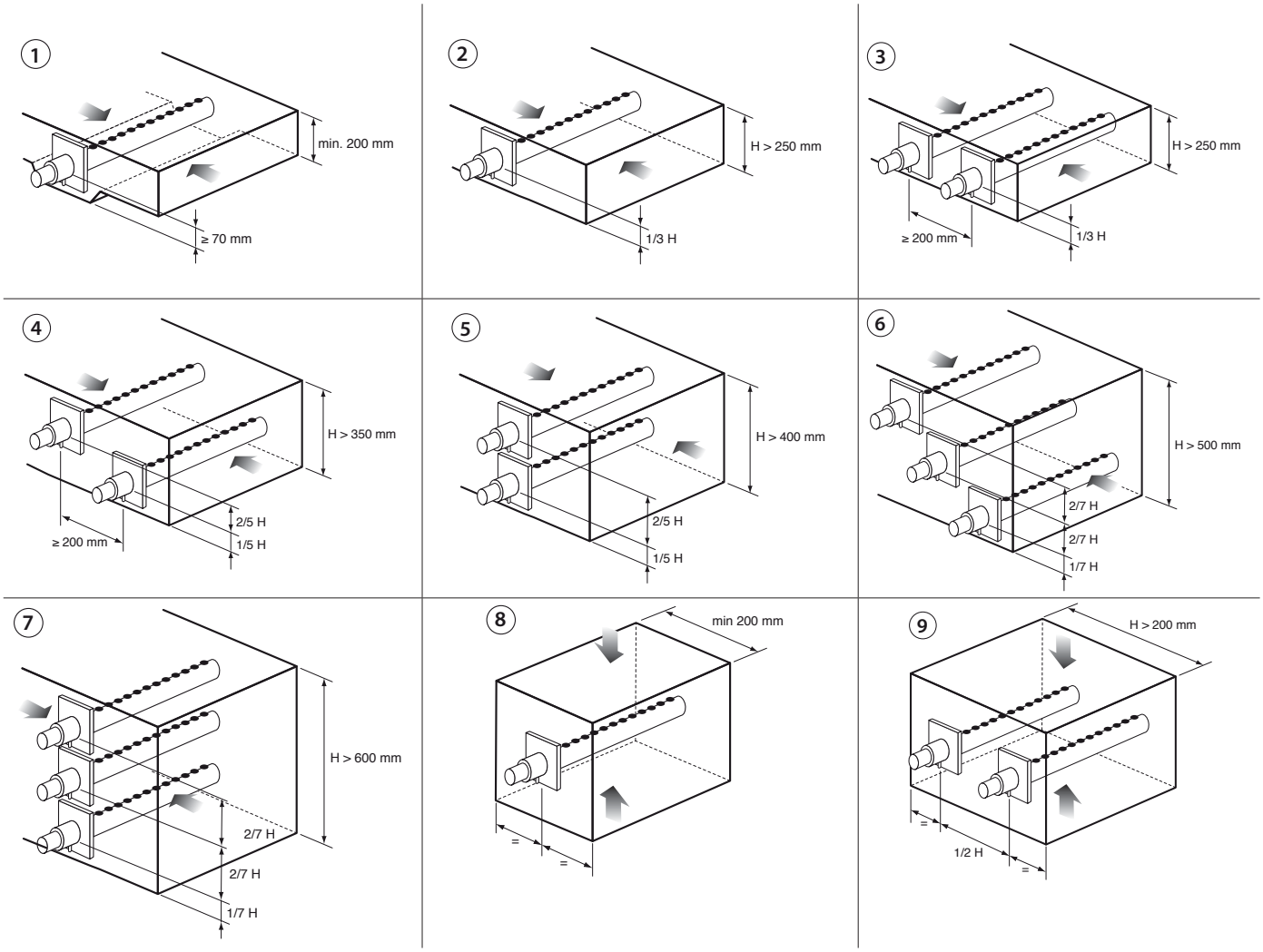
*: use Y-type CAREL kit code UEKY000000, inlet 40mm (1.6")
and 2 outlets 30mm (1.2")
**: use Y-type CAREL kit code UEKY40Y400, inlet 40mm (1.6")
and 2 outlets 40mm (1.6")

12.5 Models of linear nozzles and typical installations

humidifier model:				UR002	UR004	UR006	UR010	UR013	UR020	UR027	UR040	UR053	UR060	UR080
ø of steam outlet mm (in):				30 (1.2")					40 (1.6")			2x40 (1.6")		
maximum capacity kg/h (lb/h):				2 (4.4)	4 (8.8)	6 (13.2)	10 (22)	13 (28.6)	20 (44)	27 (59.5)	40 (88)	53 (116.8)	60 (132.2)	80 (176.36)
"nozzle steam inlet ø mm (in)"	maximum nozzle capacity kg/h (lb/h)	length of nozzle mm (in)	code											
30 (1.2")	5 (11)	350 (13.7)	DP035D30R0	1	1									
30 (1.2")	8 (17.6)	450 (17.7)	DP045D30R0	1	1	1								
30 (1.2")	12 (26.4)	600 (23.6)	DP060D30R0		1	1	1		(2)*					
30 (1.2")	18 (39.6)	850 (33.5)	DP085D30R0		1	1	1	1	(2)*	(2)*				
30 (1.2")	18 (39.6)	1050 (41.3)	DP105D30R0		1	1	1	1	(2)*	(2)*				
30 (1.2")	18 (39.6)	1250 (49.2)	DP125D30R0		1	1	1	1	(2)*	(2)*				
30 (1.2")	18 (39.6)	1650 (65)	DP165D30R0				1	1	(2)*	(2)*				
40 (1.6")	25 (55)	850 (33.5)	DP085D40R0						1	1	(2)**	(4)**	(4)**	(4)**
40 (1.6")	35 (77)	1050 (41.3)	DP105D40R0						1	1	(2)**	2	2	(4)**
40 (1.6")	45 (99)	1250 (49.2)	DP125D40R0						1	1	1	2	2	2
40 (1.6")	45 (99)	1650 (65)	DP165D40R0							1	1	2	2	2
40 (1.6")	45 (99)	2050 (80.7)	DP205D40R0								1	2	2	2

Tab. 12.e

For typical installations of linear distibutors see figure 11.f on page 36.



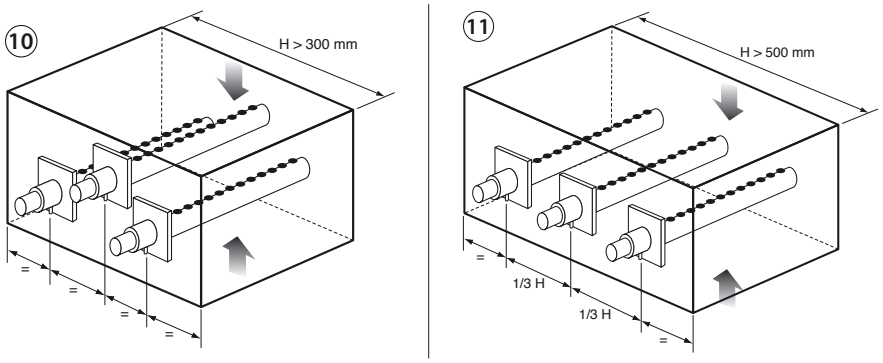


Fig. 12.a

12.6 Table of parameter b1

b1	pre-heating	Warning "cl"	cumulative alarm relay triggered when…	Automatic total drain due to inactivity	autotest
def. 0	OFF	ON	Alarms present	ON	ON
1	ON	ON	Alarms present	ON	ON
2	OFF	ON			
3	ON	ON			
4	OFF	OFF			
5	ON	OFF			
6	OFF	OFF			
7	ON	OFF			
8	OFF	ON	Alarms absent		
9	ON	ON			
10	OFF	ON			
11	ON	ON			
12	OFF	OFF			
13	ON	OFF			
14	OFF	OFF			
15	ON	OFF			
16	OFF	ON	Alarms present	OFF	
17	ON	ON			
18	OFF	ON			
19	ON	ON			
20	OFF	OFF			
21	ON	OFF			
22	OFF	OFF			
23	ON	OFF			
24	OFF	ON	Alarms absent		
25	ON	ON			
26	OFF	ON			
27	ON	ON			
28	OFF	OFF			
29	ON	OFF			
30	OFF	OFF			
31	ON	OFF			
32	OFF	ON	Alarms present	ON	OFF
33	ON	ON			
34	OFF	ON			
35	ON	ON			
36	OFF	OFF			
37	ON	OFF			
38	OFF	OFF			
39	ON	OFF			
40	OFF	ON	Alarms absent		
41	ON	ON			
42	OFF	ON			
43	ON	ON			
44	OFF	OFF			
45	ON	OFF			
46	OFF	OFF			
47	ON	OFF			
48	OFF	ON	Alarms present	OFF	OFF
49	ON	ON			
50	OFF	ON			
51	ON	ON			
52	OFF	OFF			
53	ON	OFF			
54	OFF	OFF			
55	ON	OFF			
56	OFF	ON	Alarms absent		
57	ON	ON			
58	OFF	ON			
59	ON	ON			
60	OFF	OFF			
61	ON	OFF			
62	OFF	OFF			
63	ON	OFF			

Tab. 12.f

12.7 Variables accessible in serial mode only

Description	Type	SPV CAREL	R/W	NOTES
St: ambient setpoint	I	1		
Release software	I	81	R	
Humidifier status 0 Start / 7 Water fill-up 1,2,3,4 Autotest / 8 Water drain 5 No production / 9 AFS drain 6 Steam production in progress / 10 Block alarm	I	83	R	
Block alarms b0 EE alarm / b4 Er alarm b1 Not used / b5 Et alarm b2 EC alarm / b6 E0 alarm (as b7) b3 EL alarm / b7 E0 alarm	I	84	R	Bit setup: b7 = bit 7, bit = 1 means alarm enabled
Alarms with humidifier disablement b0 EF alarm / b4 E4 alarm b1 EP alarm / b5 E5 alarm b2 Warning Ed / b6 Not used b3 E3 alarm / b7 E1 alarm	I	85	R	Bit setup: b7 = bit 7, bit = 1 means alarm enabled
Warning b0 Warning E / b4 Warning EU b1 Warning E_ / b5 Warning CL b2 Warning / b6 Warning Ec b3 Warning EA / b7 Warning E2	I	86	R	Bit setup: b7 = bit 7, bit = 1 means alarm enabled
Command via RS485 1 Reset alarms 2 Hour counter reset	I	95		
Response upon RS485 call 1 Command completed successfully 2 Command completed unsuccessfully 3 Command failed	I	96		
Humidifier disabled via remote ON/OFF or via terminals 7I-8I contacts or setting D15 =1 (see below for D15)	D	9	R	
Water level < min level	D	10	R	
Water level > operating level	D	10	R	
Serial disablement command: 1 = humidifer disabled 0 = humidifier enabled	D	15	R/W	Similar to remote on/off command
Humidifier ready upon request	D	17	R	
Humidification request present	D	19	R	
Pre-heating command in progress	D	20	R	

Tab. 12.g

Description	Type	SPV CAREL	R/W	NOTES
Reset hardware	D	24		It produces an effect similar to shutdown and subsequent restart of the humidifier: if D24 is set to 1, control restarts as it would have been unpowered and powered again. To be sent in the following cases: • to set the new serial address after having changed c3; • to restart the humidifier as it would have been unpowered and powered again.
EE alarm	D	33	R	
EC alarm	D	35	R	
Er alarm	D	37	R	
Et alarm	D	38	R	
E0 alarm	D	39	R	
E1 alarm	D	40	R	
EF alarm	D	41	R	
EP alarm	D	42	R	
Ed alarm	D	43	R	
E3 alarm	D	44	R	
E4 alarm	D	45	R	
E5 alarm	D	46	R	
E1 alarm	D	48	R	
Warning E–	D	49	R	
Warning E_	D	50	R	
Warning E–	D	51	R	
Warning EA	D	52	R	
Warning EU	D	53	R	
Warning CL	D	54	R	
Warning Ec	D	55	R	
Warning E2	D	56	R	

Tab. 12.h

12.8 Production control via variables A52 and A53

a. Through the network, just after switching on the humidifier, set the digital variable D15 = 0 (there is no need to repeat this step during operation, unless the humidifier is turned off);
b. Set the internal variable I32=3;
c. Set the variable I9 (A0) = 0,1,2,3,4 for the on / off control, proportional control, control with ambient humidity probe, ambient probe control humidity and limit probe, control with ambient temperature sensor;
d. Send the request ambient/signal probe in the analog variable A52 in the format from 0000 to 1000 (0% to 100%). Refer to the chart below for I9 (A0) = 1; same applies to I9 (A0) =0,2,3,4;
e. If I9 (A0) = 3, send the limit probe signal in the analog variable A53 with format from 0000 to 1000 (0.0% to 100.0%)

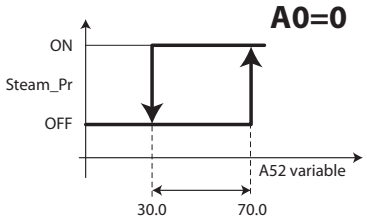


Fig. 12.b

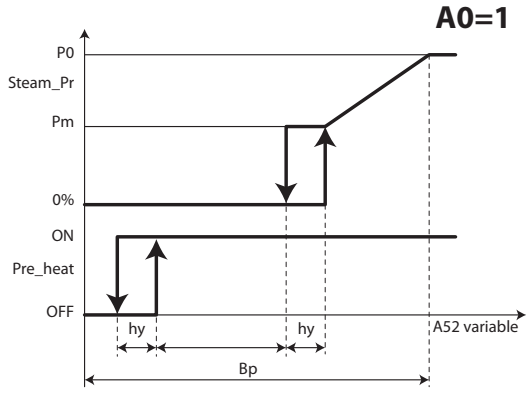


Fig. 12.c

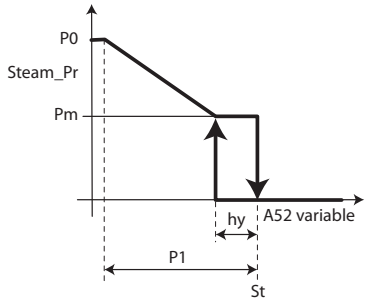


Fig. 12.d

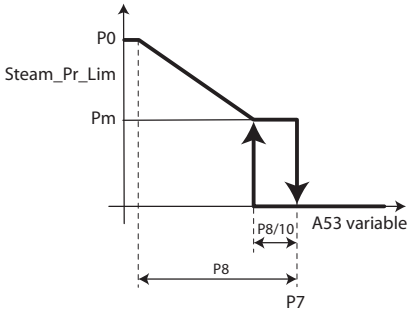


Fig. 12.e

Legend: Steam_pr = steam production, Pre_heat _= pre-heating, Steam_Pr_Lim = steam production limit

13. ADVANCED FUNCTIONS

13.1 Operating principle

HeaterSteam is an isothermal humidifier with steam produced by heating the heaters completely immersed in a tank filled with water. This can be tap water or completely demineralised water. The heat generated by the heaters increases water temperature up to about 100 ° C. The use of demineralized water ensures long service life of the cylinder and the heaters because virtually no lime deposits can form and grow gradually. Instead, when using tap water, a part of the minerals dissolved in water accumulates in the cylinder as solids of various composition. To prevent this phenomenon, when the water conductivity of the cylinder exceeds a certain value, a part of the water is drained and reintroduced periodically to obtain the necessary dilution. For the specific models, the drain water is mixed with tap water to avoid exceeding the maximum temperature specified by the applicable local and national regulations (drain tempering function). The steam generated has a temperature of about 100 ° C and minimum positive pressure (steam without pressure). It is virtually demineralized and germ-free.
Steam production is regulated with ON / OFF logic or by continuous modulation of the nominal power (from 0% to 100%), by means of solid state relays (SSR); the control logic is of PWM type (pulse length variation) with programmable time base.

13.2 Regulation principles

The appliance is fitted with solid-state relays and steam production can be controlled continuously as a function of the required quantity, in one of the following modes.

13.2.1 ON/OFF regulation (parameter A0=0)

The action is of all or nothing type and it is activated by an external contact connected to terminals 4I, 5I (see chap. 4), with the setpoint and the control differential determined by parameters St and P1, respectively. In case of command from external variable (Analog 52: A52), steam production is enabled/disabled according to the figure.

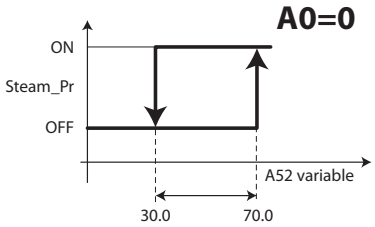


Fig. 13.a

13.2.2 Slave control, with signal from an external regulator (parameter A0 = 1)

Steam production is proportional to the value of an external signal Y, (selected by programming one of the following standards: 0 to 1Vdc; 0 to 10Vdc; 2 to 10Vdc; 0 to 20mA; 4 to 20mA) the entire range of which is indicated by BP (proportional band). The maximum output Pmax (parameter P0), corresponding to the maximum value of the external signal Y can be programmed between 10% and 100% of the nominal value of the humidifier. The minimum production Pmin (parameter Pm) can be set between 0% and 10% (default 4%) of the humidifier's rated value. The activation hysteresis hy is based on the value of Pmin (parameter Pm), however referring to the external signal Y (e.g.: Pmin = 4%, hy = 2%). If enabled, the pre-heating function overlaps the control diagram, and is activated when the external signal Y is lower than the activation point for steam production by a quantity b2.

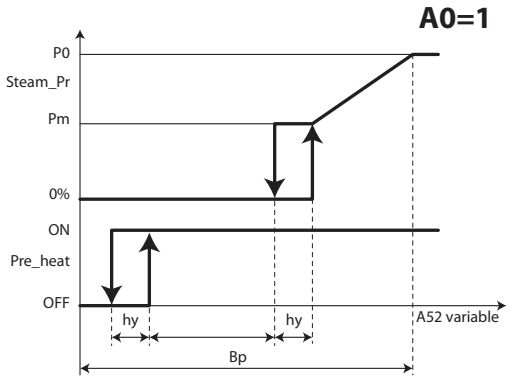


Fig. 13.b

Key window

Steam_pr	Steam production	Pre_heat	Pre-heating
P0	Max production	hy	Activtion hysteresis
Pm	Min production	b2	Pre-heating start offset
Y	External signal	Bp	Proportional band

13.2.3 Independent control with relative humidity transducer (parameter A0 = 2)

Steam production is linked to the measurement of % rH, performed by the relative humidity transducer connected to the regulator, and increases as the distance from the set point St increases. The maximum production Pmax (parameter P0), which occurs when the relative humidity is less that the set point by a value P1, can be programmed between 10% and 100% of the rated value of the humidifier.
The minimum production Pmin (parameter Pm) can be programmed between 0% and 10% (default 4%) of the nominal value of the humidifier, with an activation hysteresis (hy) equal to 10% of P1. The pre-heating function, if enabled, overlaps the control diagram and is activated when the relative humidity % rH, measured by the transducer, is higher than St by a programmable quantity b2. To check that the relative humidity measured by the transducer is within the pre-set values, the control module with autonomous control allows two alarm thresholds to be programmed:

- high relative humidity alarm threshold P2;
- low relative humidity alarm threshold P3.

When these thresholds are exceeded, after a programmable delay P4, an alarm state is activated, with the closing of the contact of the corresponding relay on the main control board. With independent control (parameter A0=2) it is also possible to have an ON/OFF action, as represented in the graph, by disabling power modulation (setting parameter b0=0).

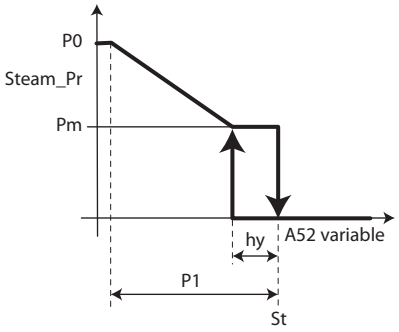


Fig. 13.c

Key window

Steam_pr	Steam production	%rH	Humidity measurement
P0	Max production	hy	Activtion hysteresis
Pm	Min production		

13.2.4 Independent control with relative humidity transducer and one for delivery humidity limitation (parameter A0 = 3)

Even in this case, the controller modulates the production of steam according to the measurement of% rH, performed by the main transducer of relative humidity but, in addition, it limits the value if the relative humidity% rH2 measured by a second offset transducer placed in air duct downstream of the humidifier exceeds the maximum desired value. To prevent the relative humidity measured by the transducer in the air duct downstream from the humidifier exceeding a value considered as excessive, the control module with independent control and second transducer connected allows a high outlet relative humidity alarm threshold P9, to be programmed. If this threshold is exceeded, after a programmable delay P4, an alarm state is activated, with closing of the contact of the corresponding relay on the main control board.

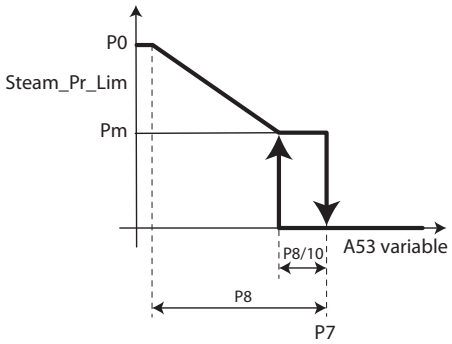


Fig. 13.d

Key window

Steam_ pr_Lim	Steam production limit	%rH2	Delivery limit humidity probe
P0	Max production	P8	Delivery differential
Pm	Min production	P7	Delivery humidity setpoint

13.2.5 Application for steam baths (T-type control module)

In applications for steam baths, where the control probe measures temperature rather than humidity, the same considerations are valid as for the type H control module with modulating action and independent control.

Recommended CAREL transducer: SSTOOB/P40, ASET030001 or ASET030000.

13.3 Setting the alarm thresholds (type H or T control module)

The control module panel allows the setting of limit thresholds for the activation of the alarm in the event where these are exceeded. These alarm thresholds can be programmed using the following control parameters:

- P2: high relative humidity alarm threshold, measured by the room probe;
- P3: low relative humidity alarm threshold, measured by the room probe;
- P4: alarm signalling delay (to prevent false signals);
- P9: high relative humidity alarm threshold, measured by the outlet probe (for ducted humidification).

The parameters P2, P3, P4 can be programmed only when A0 = 2 or 3; parameter P9 can be programmed only when A0 = 3. Furthermore, the control module provides the signaling of excessive conductivity (and hence the concentration of salts) of the supply water, but only as a default setting.

⚠ Warning: the parameter A0 and the operating and alarm parameters: Px and b0 are set in the factory (default values valid for normal applications). Nonetheless, these can be modified by the user, following the instructions contained in: "Start-up and user interface".

13.4 Automatic total drain due to inactivity

For hygiene reasons it is recommended to empty the boiler to prevent water residues from remaining inside it in case there isn't any humidification request for a long time.

For models UR*H* and UR*T* * the user can set the automatic total drain in case of inactivity as follows:

- The drain for inactivity is active by default. To disable it, simply go to parameter "b1" and operate as described in the table in chapter 12;
- Vice versa, if the drain for inactivity has been disabled, to enable it go to parameter "b1" and operate as described in the table in chapter 12 and set the maximum inactivity period through the parameter bC.

The automatic total drain for inactivity is enabled by default and the max. allowable default inactivity period is 3 days: which means that the boiler is emptied automatically after heaterSteam has been on for at least 3 days without humidification request.

Parameter bC

Variation range	1 to 199 days
Default	3 giorni
Step	1 day
Comments	the heaterSteam should remain turned on to empty the boiler UR*H* and UR*T*: the display shows "idr" during the automatic total drain for inactivity.

Tab. 13.i

13.5 User-adjustable duration of dilution drain

The duration of the dilution drain can be adjusted through the new user parameter bD which defines the new duration as a % of the internally set default duration: new duration= default duration x bD / 100.

Example: if the internally set duration is 10 s and bD= 50%, the new duration shall be = 10 s x 50 / 100= 5 s.

Parameter bD

Variation range	0 to 190 % (0 % disables the dilution drains. Attention: see the comments below
Default	100 %;
Step	10 %.
Comments	bD= 0 % means that dilution drains are NOT DONE at all. WARNING: RISK OF FOAM/CORROSION as the internal conductivity will increase. We recommend to set bD= 0 after a very careful evaluation of the water quality and consequences. bD= 100 % means that the default duration will be used bD< 100 % means that the duration is < default duration: less fresh water is introduced after the drain thus reducing its negative impact on the steam production (good for high precision applications), but the drain valve will open more frequently in order to control the internal conductivity (decreasing lifetime). Attention: RISK OF FOAM IN CASE THE bD VALUE IS TOO SMALL IN RELATION TO WATER QUALITY setting the bD for a high-precision control of %UR: bD should be decreased as much as possible, yet avoiding foam/corrosion. Find the most suitable value

Tab. 13.j

13.6 User-adjustable max. allowed no. of evaporation cycles between 2 dilution drains

The number of evaporation cycles between 2 consecutive drains for dilution is calculated internally, based on the conductivity of the supply water. The parameter b8 allows the user to set the maximum number of evaporation cycles allowed between 2 dilution drains. If the number calculated is greater than b8, it shall be used the value of this parameter in place of that calculated internally.

Parameter b8:

Variation range	1…50
Default	0. **Note:** if b8=0, when the heaters are powered for the first time b8 shall be automatically set to 2 if conductivity measured in the supply water is <= 100 µS/cm, or at 5.
Step	1

Tab. 13.k

13.7 Reduced fills to restore water level after evaporation

When, during the steam production, the upper floater switches because the water level has decreased, a fill starts for restoring the water level. The duration of the fill can be decreased through the new user parameter bA which defines the new duration as a % of the internally set default duration: new duration=default duration xbA/100. It should be noted that, regardless of the value set for bA, the water leve shall always be restored up to the upper ball cock.

Parameter bA

Variation range	20…100%
Default	100%
Step	10%
Comments	bA= 100 % means that the default duration will be used
	bA< 100 % means that the duration is < default duration: less fresh water is introduced into the cylinder, reducing the negative impact on steam production (important in applications of high accuracy) but the filling valve will be opened more frequently

Tab. 13.l

13.8 PWM fills after dilution and high-level/ foam drains

After a dilution or high-level/foam drain, water is filled into to restore the water level up to the upper ball cock.
The filled fresh water disturbs the steam production because it decreases the average temperature of the water inside the boiler: in order to reduce the negative influence of the fresh water on the steam production, the user can enable the PWM fills after the dilution and high-level/foam drain.
PWM fills work as follows:

1. the mass of fresh water required to restore the water level is divided into smaller masses of fresh water;
2. by keeping the partial fills as farther apart as possible from each other, each partial mass of fresh water is given the maximum possible time for heating up before the next one arrives, thus reducing the effect of the fresh water on the steam production.

The duration of each fill can be defined in seconds by the new user parameter bE:

Variation range	1 to 199 days
Default	5 seconds
Step	1 second

Tab. 13.m

Notes

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