gaSteam Gas-Fired Steam Humidifier

Operation and Maintenance Manual

Read and Save these Instructions!

CAREL

Technology & Evolution

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**
- **WHAT TO DO IF YOU SMELL GAS**
  - **Do not try to light any appliance**
  - **Do not touch any electrical switch; do not use any phone in your building.**
  - **Immediately call you gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
  - **If you cannot reach your gas supplier, call the fire department.**
- **Installation and services must be performed by a qualified installer, service agency or the gas supplier.**

IMPORTANT WARNINGS

BEFORE INSTALLING OR HANDLING THE APPLIANCE PLEASE CAREFULLY READ AND FOLLOW THE INSTRUCTIONS AND SAFETY STANDARDS DESCRIBED IN THIS MANUAL AND ILLUSTRATED BY THE LABELS ON THE MACHINE.

- Improper installation, adjustment, alteration, service, maintenance, or use can cause carbon monoxide poisoning, an explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, local gas supplier, or your distributor for information or assistance. The qualified installer or agency must use only factory authorized and listed parts when servicing this product. A failure to follow this warning can cause electrical shock, fire, personal injury, or death.

- Should overheating occur, or the gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

- Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

Introduction

This humidifier produces non-pressurized steam by means of a gas burner firing into a heat exchanger immersed in water inside the steam generating chamber. The steam produced can be used to humidify environments or industrial processes.

This apparatus is produced exclusively to directly humidify rooms or ducts, using a distribution system. It is suitable for this purpose as long as installation, use and maintenance are carried out according to the instructions contained in this manual and on the labels applied internally and externally on the apparatus.

The condition of the environment and the power supply voltage must comply with the specified values.

All other uses or modifications made to the device, which are not expressly authorized by the manufacturer, are considered to be incorrect and void the warranty.

Liability for injury or damage caused by the incorrect use of the device lies exclusively with the user.

Please note that this device utilizes flammable gases, and contains powered electrical devices and hot surfaces.

All service and/or maintenance operations must be performed by expert and qualified personnel who are aware of the necessary precautions and are capable of performing these operations correctly in accordance with the applicable regulations, with particular reference to the AGA National Fuel Gas Code. **Local safety standards must also be applied.**

Disconnect the machine from the main power supply before accessing any internal parts.

Disposal of the humidifier:
The humidifier is made up of metallic and plastic parts. All parts must be disposed of according to local and national standards on waste disposal.

Warranty on materials:
2 years (from the date of installation or two years + 1 month from date of shipment, whichever comes first), excluding the consumable parts. See back of this manual for warranty details.

Certification: Carel Products are certified by Carel's **ISO 9001** certified design and production system, as well as TÜV, and **.**

WARNING: Your humidifier requires water to operate. Do NOT mount it above materials or machinery that could be damaged if a leak occurs. Carel assumes no responsibility for consequential or inconsequential damage as a result of any leaks.

Installation & Maintenance Manual

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1. Receiving and Unpacking Equipment

IMPORTANT: BEFORE beginning installation:

- Check for shipping damage to cartons. Mark the shipping waybill accordingly
- Open cartons and check for any hidden damage. Mark the shipping waybill accordingly.
- Check packing slip to ensure all items have been received. Notify Carel LLC of any shortages or damaged parts. **You must notify Carel USA within 5 working days of any shortages.**

Review Unit Description, Section 19, before beginning installation.

To **open** the front panels of the humidifier, you must:

1. Open the latch on door **A** and swing it open;
2. Remove the screws **V** with a screwdriver;
3. Open the panel **B** by swinging out the top portion about 1 inch, supporting the sides with both hands;
4. Remove the panel **B** by pulling it up and out of the frame.

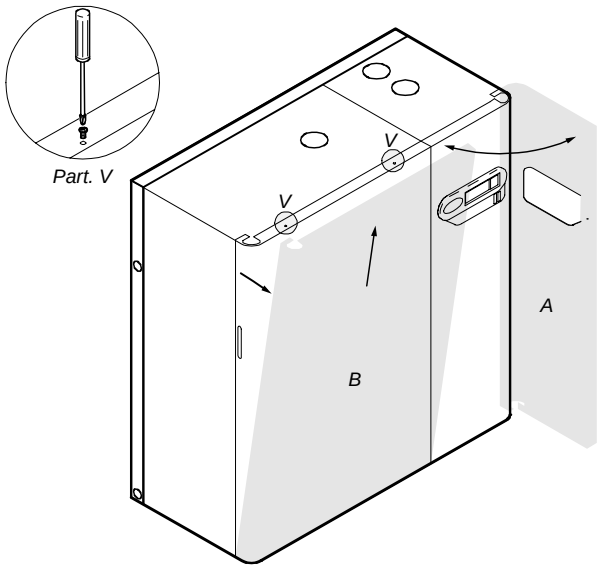
To **close** the front panels, you must:

1. Support panel **B** at the sides, slide the bottom into the frame at an angle;
2. Push the top forward into place;
3. Using a screwdriver install the two **V** screws in the top;
4. Close door **A** and latch it.

Your gaSteam humidifier will consist of:

- **1 gas-fired steam humidifier**
- **1 ¾" X ½" Female manually operated water valve**
- **1 Manually operated gas valve (UG045: ½", UG090: 1")**
- **1 Vent pipe with test plug (test plug may need to be field installed per local/national code).**
- **2 80mm X 3" exhaust vent adapter**
- **1 Y-fitting for steam distribution (UG090 unit contains 2 Y-fittings)**
- **1 Alternate 0.7 gal/min fill valve (packaged loose): See Section "Water Supply" for details.**
- **4 adjustable mounting feet**

To open the electrical and burner compartment, open the right section as below. The hydraulic section is on the left:



2. Installation

1. The installation must conform with local building codes or, in the absence of local codes, to the ANSI Z223.1, National Fuel Gas Code, and/or CAN/CGA B149 Installation Codes.

2. The humidifier shall not be connected to a chimney flue serving any other appliances.

3. Provide for adequate combustion and ventilation air in accordance with Sections 7.2, 7.3 or 7.4, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1, or Section 5.3 of CAN/CGA B149 Installation Codes, or applicable provisions of the local building codes. For proper and safe operation, the appliance needs air for combustion and ventilation. Do not block or obstruct air openings on the appliance, air openings communicating with the area in which the appliance is installed, or the space around the appliance.

4. The required free area of supply air opening is:

   11 in^2 (7,000mm^2), for UG045
   20 in^2 (13,000mm^2), for UG090

   NOTE FOR DIRECT VENT OPTION:
   The combustion supply air opening is not required in the room where the appliance is installed, since the combustion air requirements will be provided through the inlet air duct. To keep electronic components cooled, it is required to keep the environment around the unit at room temperature.

5. Excessive exposure to contaminated combustion air will result in safety and performance related problems.

6. The appliance area must be clear and free of combustible materials, gasoline, and other flammable vapors and liquids.

7. The appliance shall be installed so the electrical components are protected from water.

8. All surfaces are zero clearance to combustible construction.

9. Appliance shall be installed on non combustible flooring only.

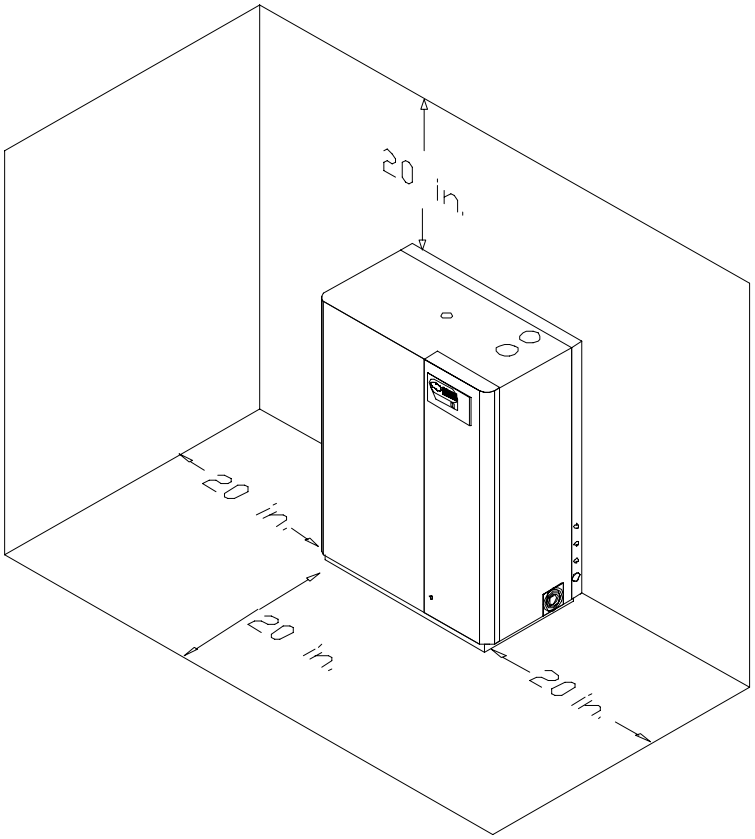
Note: Some insulating materials may be combustible. Prior to installing this appliance examine the area for insulating material. If this appliance is installed in an insulated space, it must be kept free and clear of insulating materials. If insulation is added after the appliance is installed, it will be necessary to examine the area again.

Note: Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

3. Locating and Mounting

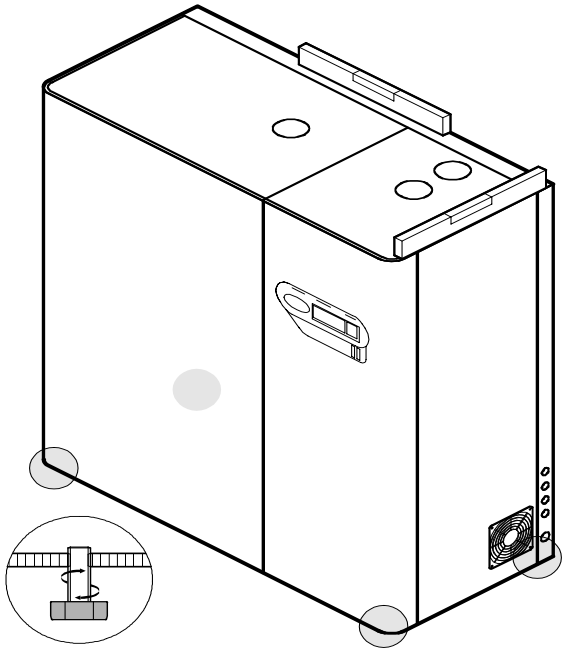
Position the unit to keep the steam distribution lines as short as possible, except in the case of direct space humidification with a top-mounted blower. Plan to place the unit where enough space and floor support for the weight is available (see Dimensions and Weights).

The clearance dimensions shown in this manual are for reference only and are the minimum required for maintenance of the humidifier. Local and National Codes should be consulted prior to final location and installation of the humidifier. CAREL cannot accept responsibility for installation code violations.



The metallic surface of the humidifier will become hot during operation and may exceed temperatures of 120° F, therefore do not place the unit where this will cause personal discomfort or damage to other equipment. Position the humidifier in the space, observing the minimum space requirements shown below, for ease of operation and maintenance.

ATTENTION: Ensure that the electrical compartment ventilator exhaust fan is free from obstruction.
The unit must also be level and plumb, otherwise the float mechanisms that determine water levels in the humidifier will not function properly. Use the feet provided on the bottom of the humidifier to help adjust the level and plumb.



3.1 Water Supply

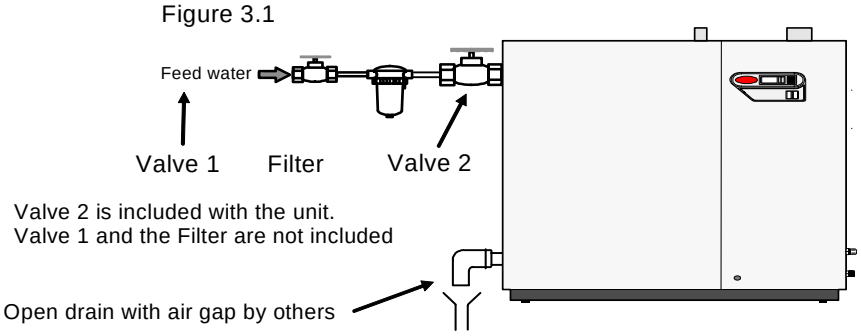
Note: All water supply and drain line connections should be installed in accordance with local plumbing codes, and/or national codes, whichever is more restrictive.

Before making the hydraulic connections, make sure the machine is disconnected from the power supply.
The gaSteam can use water of virtually any quality, including demineralized water from a deionizer or Reverse/Osmosis system. Generally, it is still advisable not to use water that has a high ability to cause foaming, such as water containing high amounts of Phosphates, Nitrates, or softened. **Softened water should NOT be used in any case.**

GaSteam 045: If the unit is attached to a water purification system that cannot produce more than 2.0 gal/min, the existing internal fill valve (2.6 gal/min) must be replaced with the alternate 0.7 gal/min valve included with the humidifier. Additionally, parameter b1 must be changed - see the section of this manual regarding changing of controller parameters. Supply water flow must not be less than 0.7 gal/min
GaSteam 90: system must deliver 2.6 gal/min.

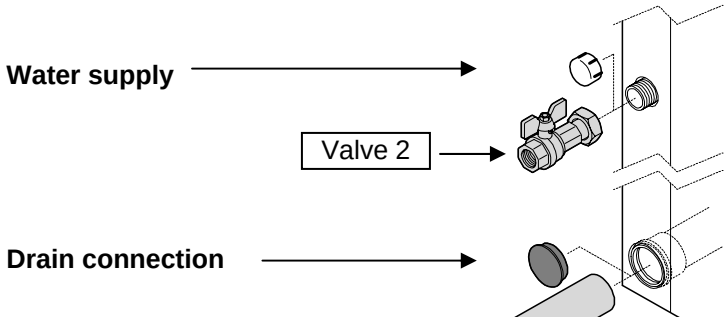
It is recommended that a 5 micron particulate filter be placed after the manual fill Valve 1 to trap solid impurities, as shown below:

Figure 3.1



Note: This plumbing must be supported so that there is no strain on Valve 2

Connect the supply water and drain attachments as shown below.



IMPORTANT NOTE: Prior to starting the unit after installation, bleed the feed water lines for at least 30 minutes before hooking up to the unit. This eliminates any contamination in the lines due to debris or sealing compounds that could lead to foaming in the steam generator.

3.2 Drain Line

The drain water connection requires a piece of 1 ½" ID rubber hose. It must be able to handle a water temperature of 212ºF. The rubber hose should be secured using a standard hose clamp – be careful not to over-tighten and crack the drain fitting. If CPVC or copper pipe is used, adapt to the drain fitting with 1 ½" ID rubber hose.
Insulate the drain line and make sure it has at least a 5 deg. slope to the drain.
WARNING: Drain water can be up to 212 °F.
.
IMPORTANT WARNING: The water drain must be free of obstructions, without backpressure and terminate in an open drain.

3.3 Gas connection

Installation piping must be in accordance with local codes, and ANSI Z233.1, "National Fuel Gas Code", in the United States or CAN/CGA-B149 Installation Codes in Canada.
Should overheating occur, or the gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply

The gas inlet pipe sizes are as follows: UG045 – ½" Male Gas thread, UG090 – 1" Male Gas thread.

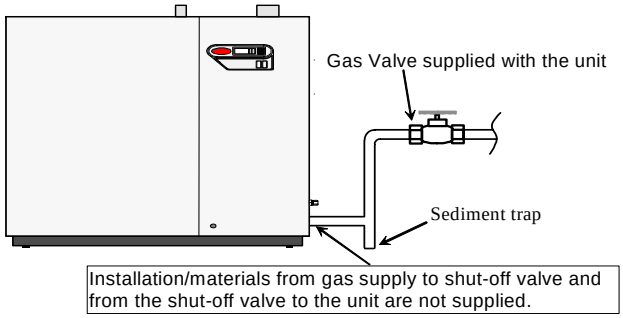
The gas connection may either be made by piping directly to the gas inlet, or by using the supplied flexible, vibration dampening pipe.

The appliance must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply system at test pressures equal to or greater than 14" w.c. (½ psig,3.5 kPa)

Provide an adequate size gas supply line.

A 1/8-inch NPT plugged tapping, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the appliance.

When specified by codes, a sediment trap must be located ahead of the humidifier gas controls.
The external shut-off gas valve, supplied with the unit, must be installed outside of the unit.



NOTE: You must provide support to the gas connection during hookup to avoid loosening internal connections of the gas line!

WARNING: Never use an open flame to check for gas leaks. If a leak does exist, a fire or explosion could occur, resulting in damage, injury or death.

The appliance and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system.

Dissipate test pressure from the gas supply line before reconnecting the humidifier and its manual shut off valve to the gas supply line.

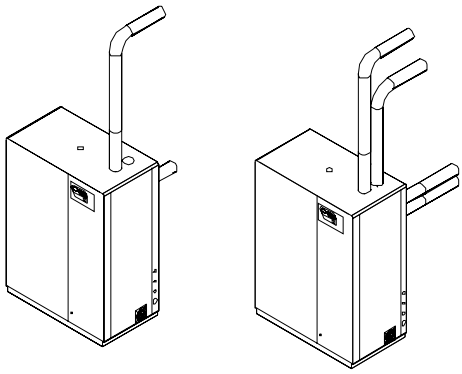
3.4 Vent and Intake

CAUTION: The humidifier shall not be connected to a chimney flue serving any other appliance.

The unit has 4 holes for the air intake and gas vent outlet: 2 on the top and 2 on the back of the unit.
The humidifier is configured from the factory as follows:

- Exhaust vent through to the top of the humidifier;
- Air intake from the back.

Both the exhaust vent and air intake can be moved, according to the requirements of the installation.



Vent and Intake pipe adapters are provided to convert the 80mm Female size to a standard 3" Male size.

Note: Fit the exhaust vent pipe so that the section with the inspection hole is always the first section.
When installing the exhaust or intake pipes in the rear of the unit, a rear clearance of 12" must be maintained. If the included exhaust vent pipe does not have a pre-installed "test plug/inspection hole", one is provided, and must be installed to applicable standards.

IMPORTANT: Vent materials must be approved for use for Category IV gas-burning appliances. These materials are designed to be both air and watertight. You cannot use PVC for the exhaust because the gas temperatures are too high. However, the air intake may be safely run in PVC or any other approved conduit, as long as the ID of the tubing is at least 3".

The maximum distance the vent and intake can be run is 120 equivalent combined feet or a maximum pressure drop of 90 Pa (0.36" w.c.), whichever is more restrictive. Use the National Fuel Gas Code and the vent pipe manufacturer's technical data to determine the venting length.

The vent pipe must be drained of condensate if it is run longer than 6 feet in any direction. When using a condensate drain, a standard loop or p-trap must be used to prevent exhaust gases from venting into the drain. Prior to using the appliance, ensure that the trap is filled with water and that the drain terminates in accordance with local or national plumbing codes.
The vent adapter provided with the humidifier is designed to interface with standard 3", single wall stainless steel exhaust pipe.

Caution: The air intake must never be blocked or obstructed in any way.
The vent system must be installed and terminate so that proper clearances are maintained as cited in local codes or the latest edition of the National Fuel Gas Code, whichever is more restrictive.

The following are possible parts for outside vent terminations: 7390TEE Heat-Fab Inc.
02SVSTTX03 Z-Flex Inc.
SRTT-03 Flex-L International Inc.

Characteristics of vent gases at 100% capacity:

		Type of Fuel			
		Natural Gas		Propane	
Item	**Units**	**UG045**	**UG090**	**UG045**	**UG090**
Nominal heat rate	KW	35.28	68.18	35.28	68.18
	kcal/h	30,362	58,635	30,362	58,635
	BTU/hr	120,490	232,640	120,490	232,640
Flue gas flow rate	Kg/s – lbs/min	0.0167 – 2.21	0.0318 – 4.21	0.0184 – 2.43	0.0297 – 3.93
Flue gas temperature	°F	237	330	237	330
Percentage CO_2 in the flue gas	%	9.2	9.2	11	11

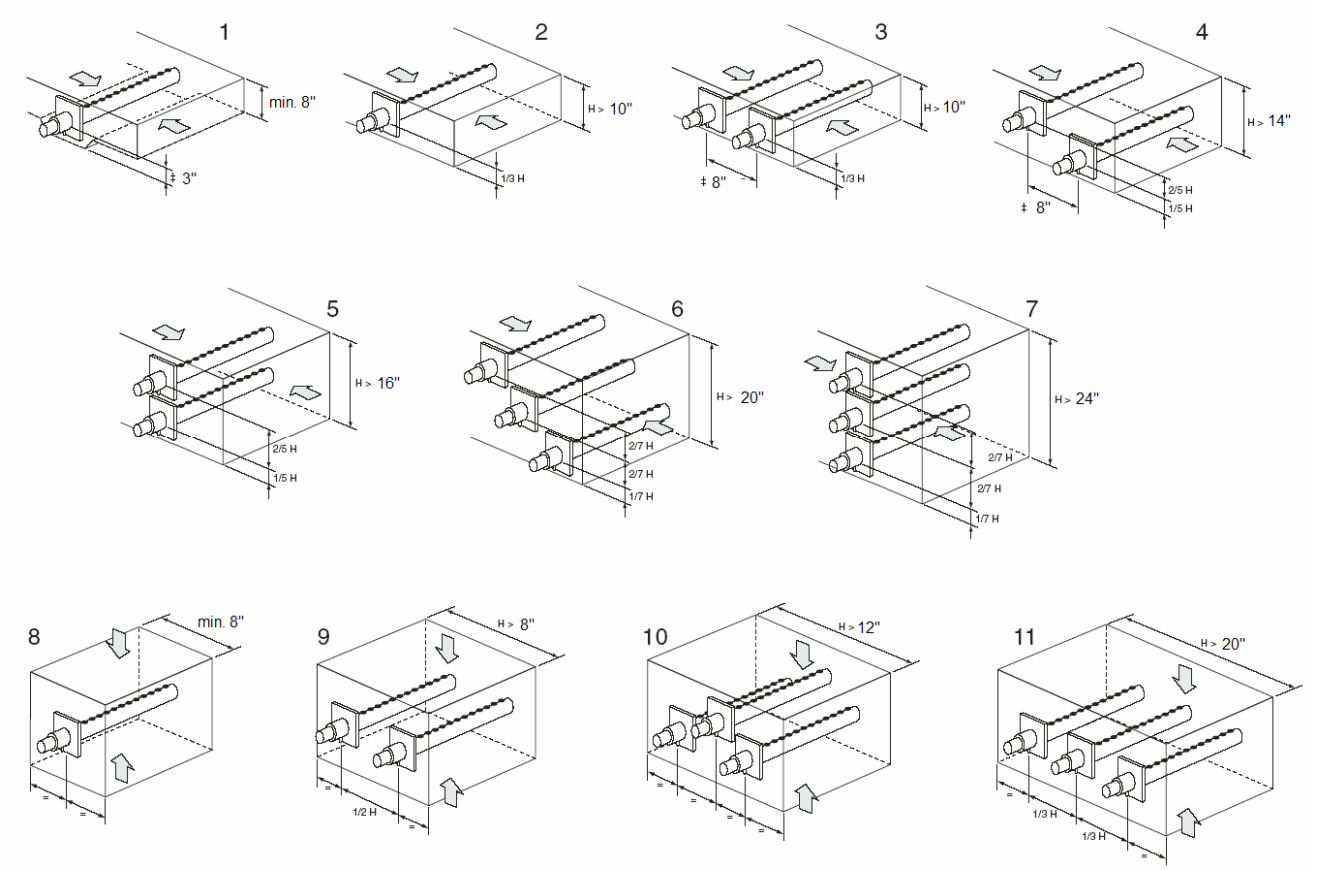
3.5 Installation of Duct Steam Distributors

NOTE: If the ventilated steam distributor is to be used, then go to section 1.4.1B.

Each unit has 1-5/8" (40 mm) diameter steam outlets on top. Some units have multiple outlets. The duct distributors and steam hose must be matched in size to the diameter of the steam outlets for the units:

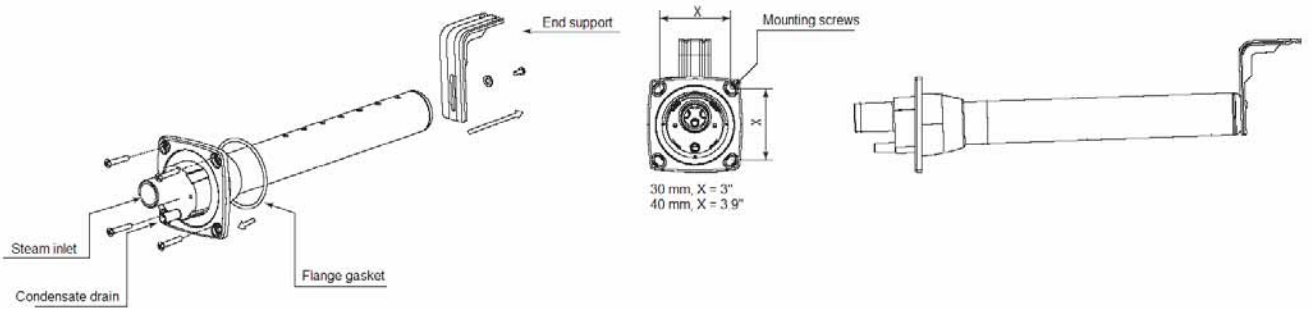
				Quantity per Unit		
			Humidifier Steam Outlets, mm	40	2x40	4x40
			Humidifier Steam Outlets, inches	1-5/8	2x1-5/8	4x1-5/8
Duct Width Inches	Distributor Length Inches	Ordering Code	Description	UG 045	UG 090	UG 180
		40 mm Duct Distributors:				
24	23.7	DP060D40RU	Duct steam distributor, 40mm, 24", 99 lbs/hr	1	2	4
36	33.5	DP085D40R0	Duct steam distributor, 40mm, 36", 103 lbs/hr	1	2	4
48	41.4	DP105D40R0	Duct steam distributor, 40mm, 48", 103 lbs/hr	1	2	4
60	49.3	DP125D40R0	Duct steam distributor, 40mm, 60", 103 lbs/hr	1	2	4
72	65	DP165D40R0	Duct steam distributor, 40mm, 72", 103 lbs/hr	1	2	4
84	80.8	DP205D40R0	Duct steam distributor, 40mm, 84", 103 lbs/hr	1	2	4

Distributor pipes should be mounted per the diagrams shown below, with a minimum of 6" from the center of the distributor pipe to the top of the duct and 3" minimum to the bottom.



To install the distributor pipes:

1. Cut a key shaped hole in the side of the duct to match the steam pipe and condensate return.
2. Apply silicone sealant to the mounting plate and insert the pipe through the hole and secure it with 4 sheet metal screws.
3. Connect the steam and condensate hoses using the hose clamps supplied.



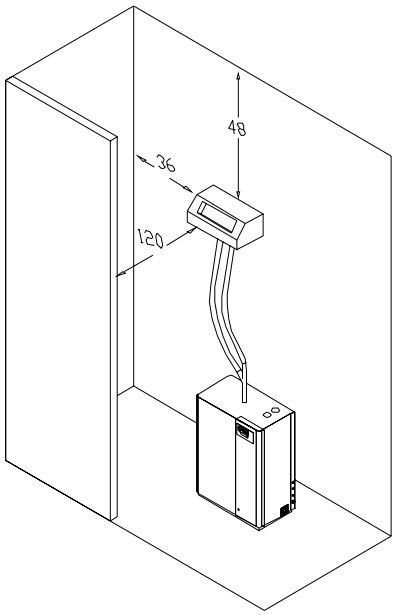
(Note: end support bracked supplied only with 36" and longer distributors.)

IMPORTANT: Allow 2 feet of straight duct downstream of the distributor pipes when the air temperature will be >55°F. Allow 3 feet of straight duct if the air temperature will be <50°F. Always allow 2 feet upstream. Turbulent air flow may require longer lengths.

3.6 Room Distribution Unit

A Room Distribution Unit (VRDXL), used to distribute the steam directly into the room, is available as a remote unit (wall mounting bracket supplied), connected to the gaSteam unit using steam tubing.

The figure on the right shows the minimum recommended distances to avoid the flow of humidified air from coming into direct contact with persons, lights, electrical appliances, false ceilings and cold surfaces before the steam has been totally absorbed by the environment.
Distances: Above (48"), Either side (36"), Front (120")
For the electrical connections, see the wiring schematic in this manual.



UG045 unit needs (1) VRDXL unit.
UG090 unit needs (2) VRDXL units.

Note: For complete operation/installation instructions, see the VRDXL manual.

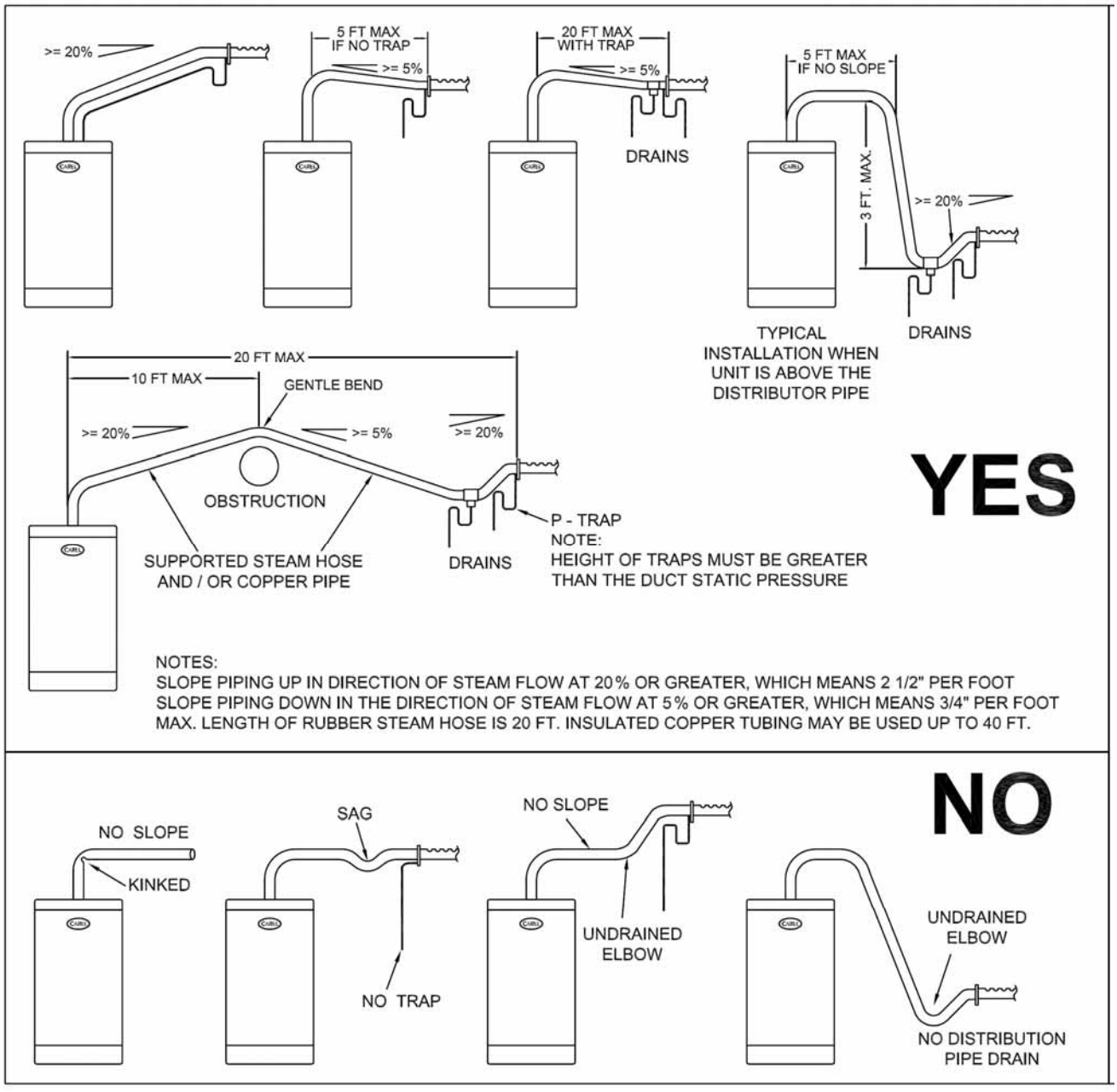
3.7 Installation of the Condensate Return Hose

Condensate naturally forms inside the steam hose and the distributor and must be removed to avoid a gurgling noise, restriction of steam flow and/or a reduction in efficiency. The condensate is drained by gravity using a flexible hose that is suitable for the purpose. The use of unsuitable tubing may cause weakening and cracking with consequent condensate or steam leaks. A drain trap must be made by looping part of the drain hose high enough to overcome the duct static pressure. The end of the condensate hose can be connected to the nearest open drain pipe, with a minimum slope of 5%. Fill the drain trap with water before starting the humidifier.

3.8 Installation of Steam Hoses

NINETY PERCENT (90%) OF ALL OPERATION PROBLEMS ARE CREATED BY IMPROPER STEAM PIPING FROM THE HUMIDIFIER UNIT TO THE DUCT DISTRIBUTOR PIPES. To avoid these problems, remember one simple fact when running the steam hose: steam naturally flows up hill, and condensate naturally flows down hill. Run the steam hose or piping to avoid any kinks, sharp elbows, or low spots that could collect or restrict the flow of steam to the distributor pipe, or the flow of condensate back to the humidifier. Support the hose adequately to avoid sags.

The following diagrams are to provide you with some guidelines. If you have a situation you are unsure of, *please* contact the factory for instructions.



IMPORTANT: Maximum length of rubber steam <u>hose</u> is 20 feet. Insulated copper tubing may be up to 40 feet. In all cases, minimize sharp bends and elbows – use 2-45° elbows instead of 90°s.

4. Connect Power Wiring

Before proceeding with the electrical connection, ensure that power has been removed from the electrical circuit.

The appliance must be installed and electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, and/or the CSA C22.1 Electrical Code.

An external fused disconnect, that complies with National and Local Codes, must be supplied by the installer.

Should overheating occur, or the gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

Verify that the supply voltage corresponds to the value indicated on the data label on the humidifier, located inside the electrical compartment. Insert the power cables and ground connection through the inlet on the side of the unit and secure with the strain relief. Attach the cables to the terminal blocks located in the electrical junction box in the electrical compartment of the humidifier. Connect the power wiring to the terminals marked L1, L2 and GND only. Wiring and internal line fuse sizes should be per the following table unless local codes demand otherwise.

Note: The field junction box located on the bottom of the electrical compartment, must be used when installing power to the unit.

Power wiring terminals (L1, L2, & GND)

Power wiring junction box with strain relief

Power wiring junction box installed

Model	voltage (1) and phase	current (A)	power (W)	Steam Output (2) (lbs/hr)	Wire Size (3)	Internal Fuses(3) F1 & F2	Line Fuses(3)
UG045	230 – 1~	0.34	80	100	14 AWG	2A/ Slow	16A/ Fast
UG090	230 – 1~	1.23	285	200	14 AWG	2A/ Slow	16A/ Fast

1) tolerance -15%, +10%
2) tolerance -10%, +5%
3) recommended values; electrical wiring must match all national and local electrical codes.

5. Connect Control Wiring

A typical humidifier control system includes a wall or return duct sensor or controller, a high limit duct humidistat and an air-proving switch. Placement of these devices is critical to proper operation of the overall system.

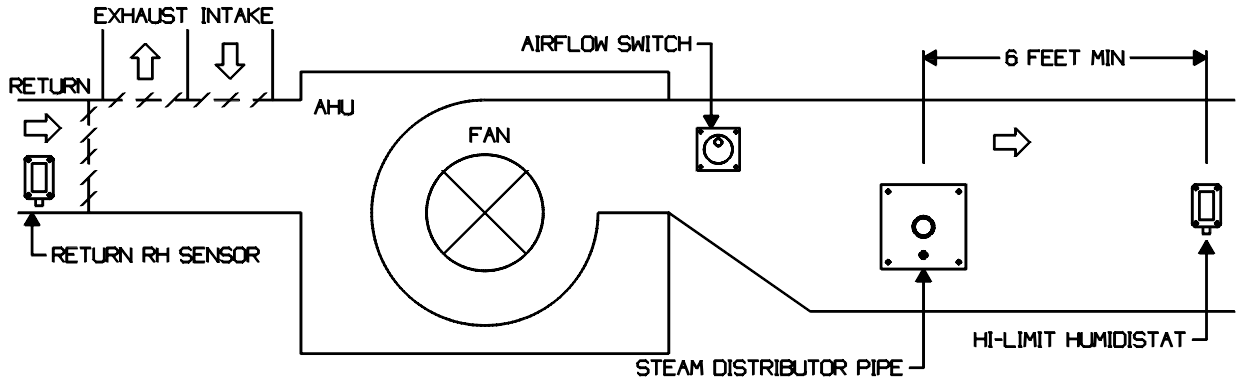
5.1 Controls Placement

(See following diagram)

The return air RH sensor must always be located BEFORE any outside air intake, in order to insure accurate sensing of the air from the space. Alternatively, a room RH sensor or humidistat can be used. Room sensors should be located on an inside wall or post and should not be hit by any discharge air streams from ducts. In a 100% outside air system, the RH sensor may be placed in the supply duct, at least 10 feet down stream of the distributor pipe to act as both hi-limit and control.

The airflow switch must be positioned to accurately open on a loss of airflow, to prevent the humidifier from running when there is no air to absorb the moisture.

The hi-limit humidistat must be positioned far enough down stream of the steam distributor pipe(s) to prevent it from getting wet, but still allow it to accurately prevent over humidification of the duct that could result in condensation.



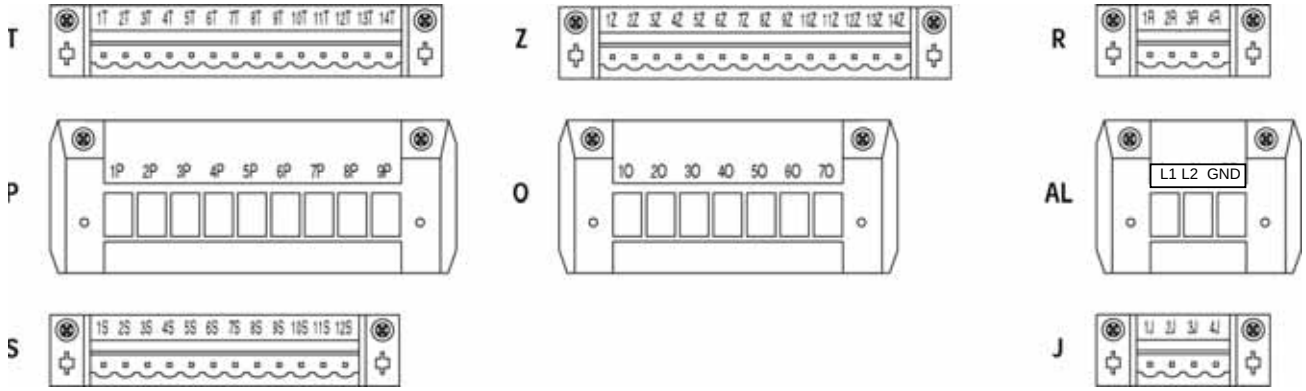
5.2 Connecting External Electrical Connections

Make the control connections by inserting the wires into the appropriate terminal. The terminal blocks are located on the bottom of the electrical panel. Run the exterior wires through the side of the cabinet and hook them to the terminal. All the terminal blocks are pictured below. The AL connector (supply voltage) is protected by a metal enclosure, the wires passing through the grommet and attaching to the connector.

The following chart shows the external connections and their electrical characteristics:

terminal	function	electrical characteristics
1Z	input signal from high-limit sensor	input impedance: 50Ω at 0-20mA or 4-20mA 60kΩ at 0-10V or 0-1V or 2-10V
2Z	GND	
3Z	~32VDC	derived from the 24Vac voltage regulator; max 250mA
4Z	12 VDC	5% precision; Imax=50mA
5Z	input from control sensor or external controller	input impedance: 50Ω at 0-20mA or 4-20mA 60kΩ at 0-10V or0-1V or 2-10V
6Z	GND	
7Z	remote enable	Rmax=50Ω; Vmax=24VDC; Imax=10mA
8Z	remote enable	
9Z	alarm contact NO	250V; 8A with resistive load; 2A with inductive load
10Z	alarm contact common	
11Z	alarm contact NC	
12Z	dehumidify contact NO	250V; 8A with resistive load; 2A with inductive load
13Z	dehumidify contact common	
1J	~32VDC	derived from the 24Vac voltage regulator; max 250mA
2J	L+	standard RS-485
3J	L-	
4J	GND	
IK	remote button switch terminal block for drain control with simultaneous disabling of power supply	NC contact
2K		common
3K		NO contact

Note: The terminals 1K, 2K, and 3K are not visible as they are located inside the control electrical panel.



5.3 Control Wiring

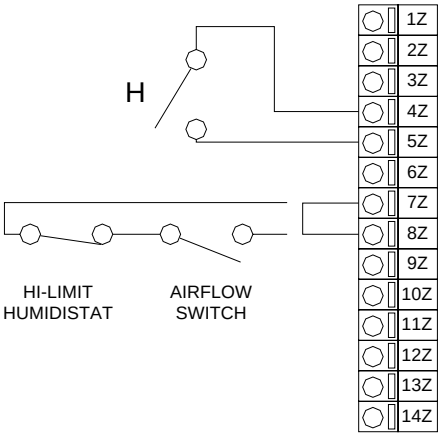
The humidifier has proportional modulation with the ability to vary its capacity from 25 to 100% according to the demands for humidity. The humidifier can be connected using RS485 to a remote panel Carel Humivisor (MT in the following pictures) or to a remote supervisor or BAS system.

5.3.1 Control Wiring for C Type On/Off

The C Type control program is for On/Off operation in response to an external closed contact as from a humidistat or DDC relay.

If the Hi-Limit and Airflow switches are not used, then place a jumper across terminals 7Z and 8Z.

DO NOT apply voltage to any input on a C Type controller.

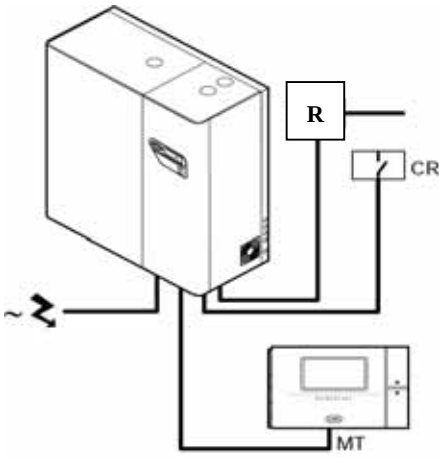


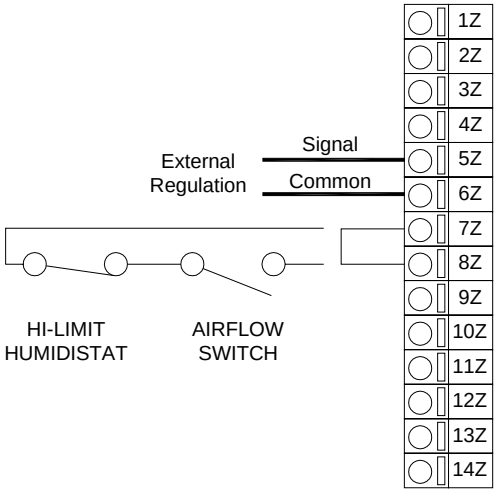
5.3.2 Control Wiring for P Type Proportional Modulating

The P Type control program is designed to accept various modulating input signals: 0-10 Vdc, 2-10 Vdc, 0-20 mAdc, and 4-20 mAdc from an external controller (R).

If the Hi-Limit and Airflow switches are not used, then place a jumper across terminals 7Z and 8Z.

NOTE: The modulating signal must come from a controller or DDC system, not a sensor. The P Type control program follows the input signal directly, being off at low signal and full output at high signal.





5.3.4 Control Wiring for H Type Modulating With Humidity Display

The H Type control program is designed to accept an input signal from a humidity sensor (HT), not a DDC signal. This humidity sensor input signal is then displayed on the controller as the relative humidity. The set point and differential are entered into the controller, making it stand-alone. Figure 5.5.1 is the wiring for the ASWH10000 wall mount sensor and the ASDH10000 duct mount sensor. Figure 5.5.1 also shows the control scheme.

The H Type control program can also accept a second sensor (in this example shown as an ASDH10000 duct sensor), which acts as a high limit and will modulate the output down on approaching either the main set point or the high limit set point (see Figure 5.5.2). This is a very useful feature in VAV systems where the airflow can vary, and also in high precision applications where the on/off cycling of a high limit humidistat would be detrimental to precision.

In place of the control humidity sensor, a temperature sensor could be used in applications where the humidifier will be used for a steam bath.

Figure 5.5.1

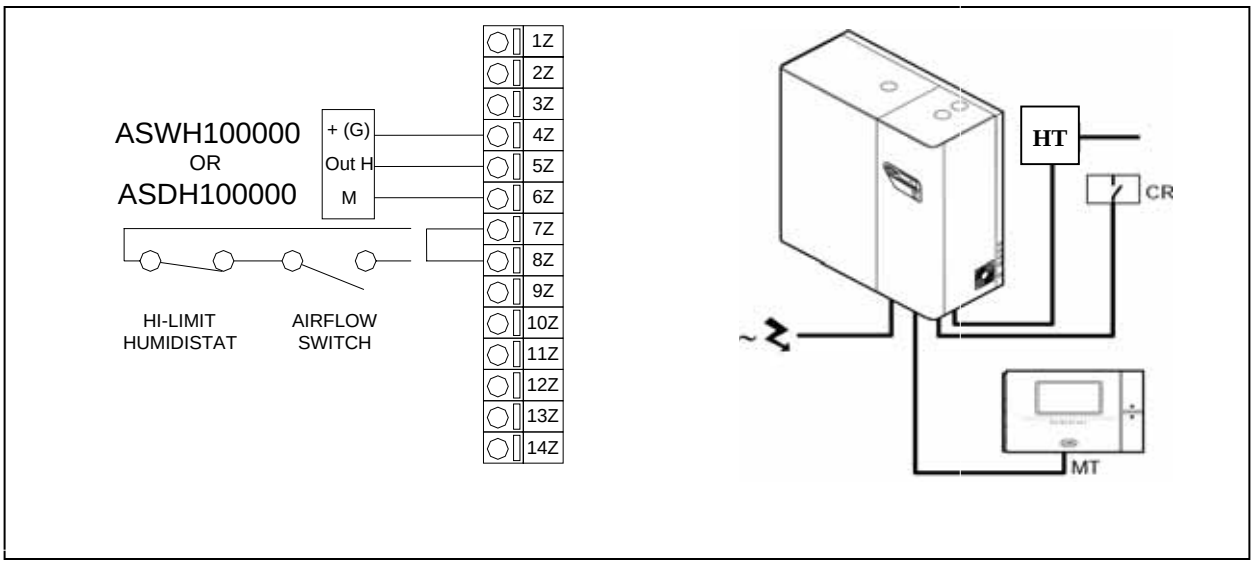
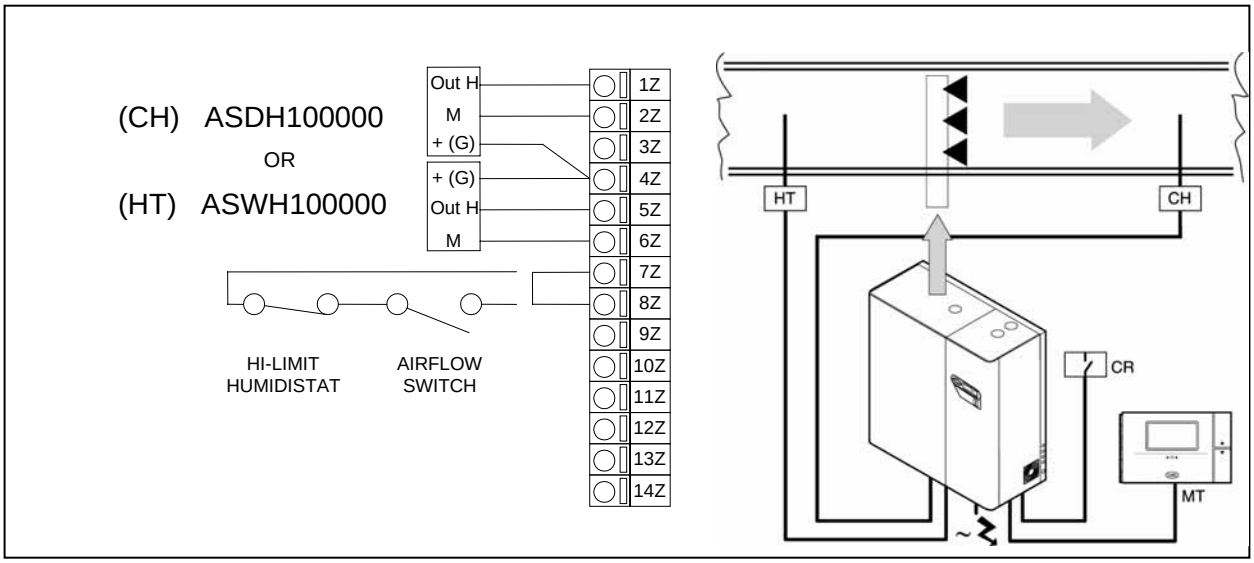


Figure 5.5.2



5.3.5 Alarm Contact

The controller also provides a SPDT relay contact for the remote indication of any alarm conditions. Connection to the alarm contact (max. voltage 250 Vac; max. capacity: 8A res. - 2A ind.) is made through the plug-in Z terminal block, as shown in Figure 5.6.1.

5.3.6 Dehumidification Contact

In the H Type control program, a SPST – N/O relay contact is available, which can be programmed to actuate an external dehumidifier. Connection to the dehumidifier contact (max. voltage 250 Vac; max. capacity: 8A res. - 2A inductive) is made through the plug-in Z terminal block, as shown in Figure 5.7.1.

Figure 5.6.1

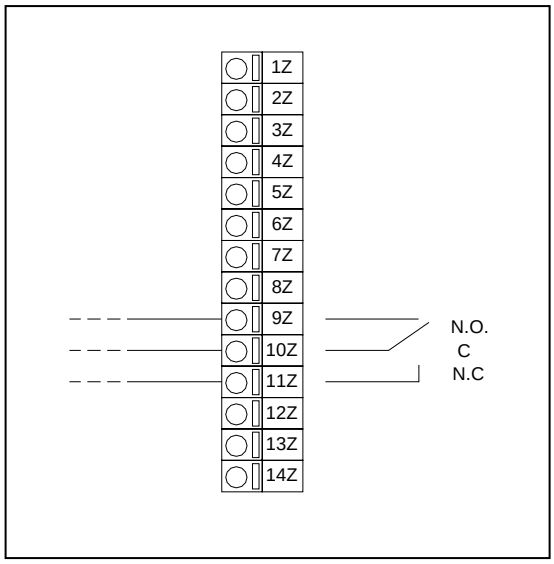
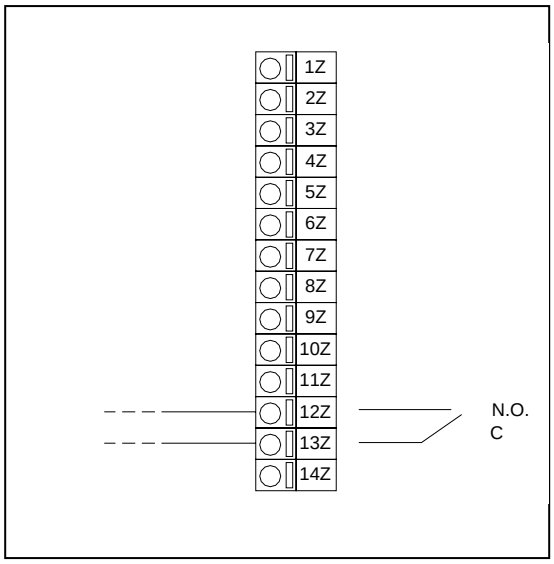


Figure 5.7.1

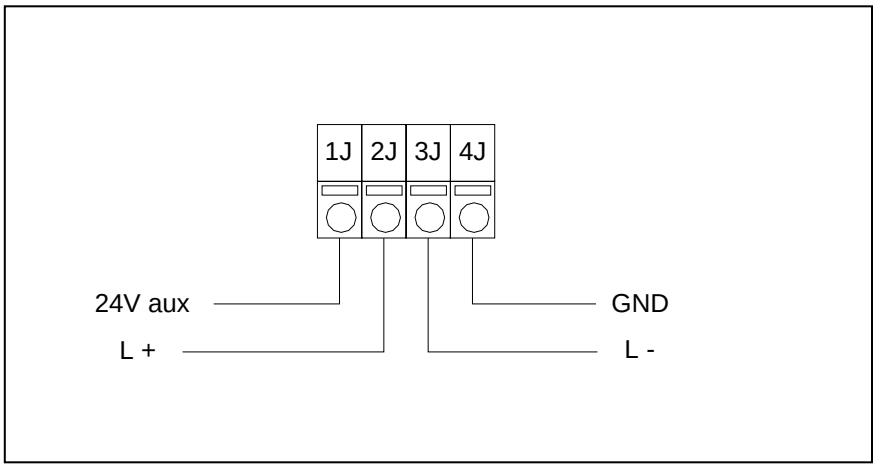


5.3.7 Remote Terminal/Supervisor System

The controller of the humidifier can be connected to an RS485 serial line as shown in Figure 5.8.1, to ultimately connect to:

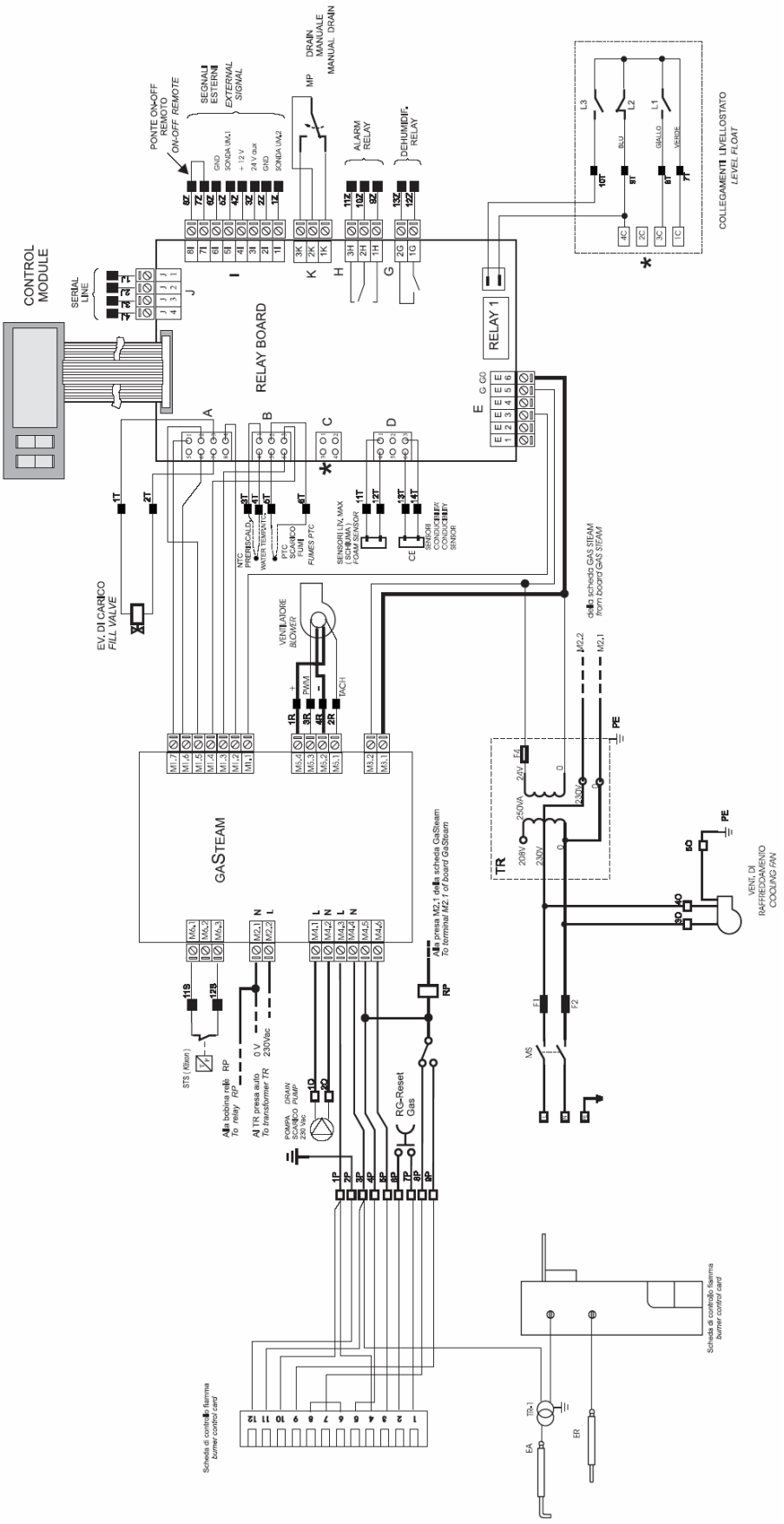
- A Carel control panel (see dedicated manual) to manage up to 4 humidifiers;
- A remote supervisor system. (Maximum network distance = 1 mile.)

Figure 5.8.1



6. Electrical Schematics

UG045



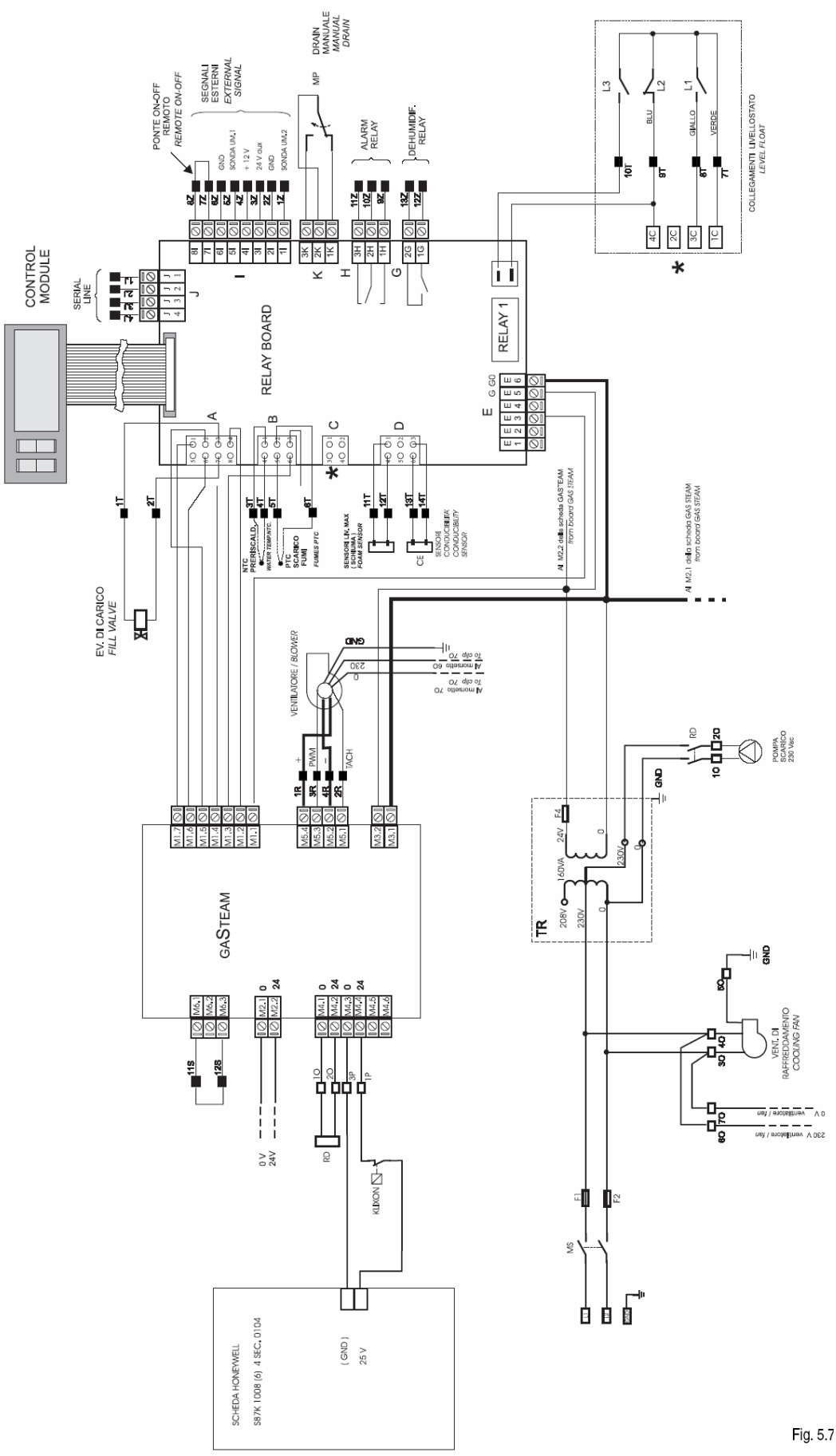

CONTROL MODULE
SERIAL LINE
RELAY BOARD
RELAY 1
PONTE ON-OFF REMOTO
REMOTE ON-OFF
SEGNALI ESTERNI
EXTERNAL SIGNAL
DRAIN MANUALE
MANUAL DRAIN
ALARM RELAY
DEHUMIDIF. RELAY
COLLEGAMENTI LIVELLOSTATO
LEVEL FLOAT
EV. DI CARICO
FILL VALVE
VENTILATORE / BLOWER
GASTEAM
SCHEDA HONEYWELL
S87K 1008 (6) 4 SEC. 0104
KLIXON
POMPA SCARICO 230 Vac
VENT. DI RAFFREDDAMENTO
COOLING FAN
TR
160VA
208V
230V
24V

Fig. 5.7

7. Installation Checklist

The following checklist needs to be reviewed BEFORE contacting your CAREL representative for system start-up.

- ❑ Proper electric power is connected to the control panel. This installation must be in accordance with Local and National Electric Codes.
- ❑ The nominal voltage provided to the humidifier must agree with the data on the units rating label.
- ❑ The power cable has been installed with proper strain-relief.
- ❑ The electrical connections have been made according to the schematics provided.
- ❑ All sensors are installed and connected per the instructions.
- ❑ Airflow switch (if used) is set to close on airflow and open on airflow loss.
- ❑ Hi-limit duct humidistat is set to open on humidity rise and is set for 85 to 90% RH.
- ❑ All computer and/or DDC wiring is completed to the control panel and the signals are verified.
- ❑ All plumbing connections are complete and tested for leaks. NOTE: Flush new water lines before the water solenoid valve. A water filter has been installed.
- ❑ The drain line has a trap installed directly after the humidifier connection.
- ❑ The gas line has been installed according to local or National Fuel Gas Codes. The supplied gas shut-off valve must be installed external to the unit.
- ❑ The vent must be constructed of Category IV vent pipe and installed according to local or National Fuel Gas Codes.
- ❑ Steam line is installed as instructed: with no obstructions or kinks present in the steam distribution piping.
- ❑ The return condensate line from the steam distribution line is installed and free of obstructions. The condensate line must have a steam trap installed according to instructions.

Checklist checked by: _____ **Date** _____

Company: _____

Note: The above checklist MUST be returned before factory startup is begun. If any of the above items are found to be not ready at time of startup, a second startup charge may be assessed.

To start up the gaSteam humidifier, review the checklist above and the one below:

- The water and gas valves are open
- The fuses are installed and connected
- A terminal jumper has been placed across 7Z and 8Z on the plug in terminals (**for testing only** with no high-limit or air flow sensors.)

8. Start-Up and Shut-Down

IMPORTANT WARNING:

1. **Before starting, inspect the humidifier to make sure it is in good condition; that there are no water leaks and the electrical components are dry.**
2. **Don't apply voltage to the unit if it is damaged or wet!**

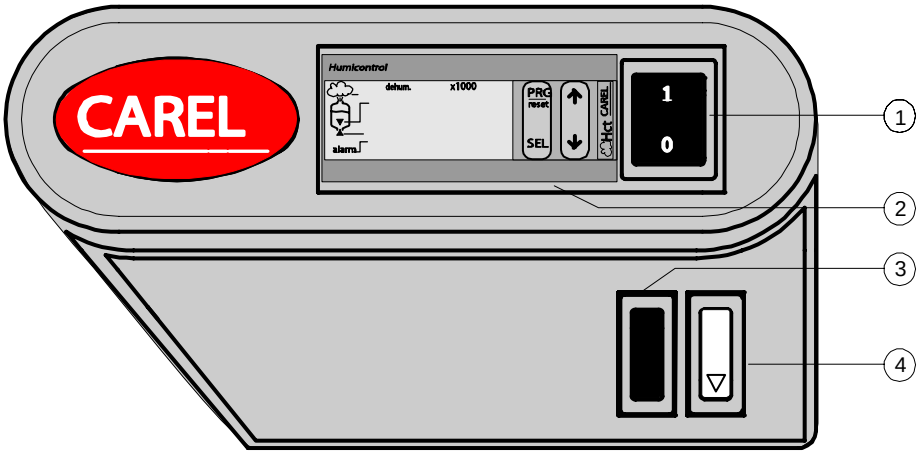
Complete the installation checklist before starting the gaSteam humidifier.

Should overheating occur, or the gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

Note:

When the humidifier is first started, it may take up to 30 minutes for the steam generator to fill with water, heat up, and attain nominal steam production.
To reduce the filling time, the unit can be manually pre-filled using the drain/fill faucet located at the base of the tank. The manual pre-filling can be performed together with the automatic fill, yet must stop before reaching the minimum level sensor: from this point, ONLY proceed with the automatic fill to ensure that the Autotest is performed correctly.

8.1 Startup Sequence

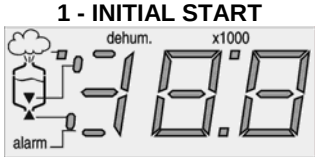


1- ON/OFF
2- Controller
3- Not used
4- interrupt/manual drain

Figure 8.1.1

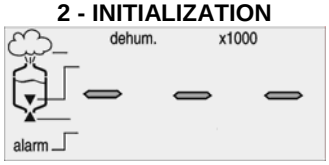
Apply electric power and turn the power switch (see Fig 8.1.1) to the ON (position '1')
When the humidifier is started it goes through a sequence of operation that is displayed on the front panel by the LEDs in the following manner:

1 - INITIAL START



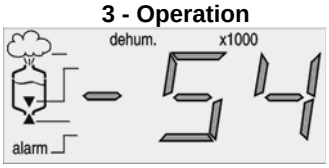
In this phase, which lasts 1 second, all LEDs on the display are lit.

2 - INITIALIZATION



During this phase, which lasts for 4 seconds, the three LEDs shown are illuminated.

3 - Operation



The humidifier begins to function normally and the control indicates the following:

- autotest status (see section 8.2 Autotest)
- steam production (in %) with external proportional control;
- display of the control sensor in stand-alone mode;
- in case the humidifier is disabled, two dashes will appear flashing in the two right digits

In case of an alarm, the alarm LED will turn on and the corresponding alarm code will be displayed.

8.2 Autotest

When the humidifier is started, the controller initiates an Autotest procedure to ensure that the humidifier can fill, drain, and monitor water levels properly. This test may take up to 30 minutes to complete depending on the amount of water in the unit when it is turned on. The Autotest will be signified by a flashing 'At' code on the display (see Figure 8.2.1). Note: The unit performs this test only when first turned on, not each time a call for humidity is received by the controller.

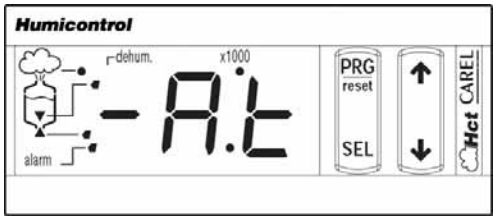


Figure 8.2.1

If the Autotest fails, the appropriate error message will be displayed and the humidifier will pause in operation until it is reset by pressing PRG or manually turned off.

The Autotest consists of the following sequence of events:

a) The tank is either drained or filled to the low level sensor;
b) The tank is then filled to the maximum water level sensor. These first two steps ensure that:
- The low, intermediary, and high water level sensors are working;
- The fill valve is working properly;
- The unit is able to fill quickly enough with water for effective operation/control

c) The tank is then drained to the low level sensor. Successful completion of this step ensures that:
- The drain pump is working properly;
- The drain filter is not clogged or the drain line otherwise obstructed

Once the Autotest has successfully been completed the 'At' message will disappear and the unit will begin normal operation. It will fill to the intermediary level and begin producing a quantity of steam at a rate determined by the controller, depending on the set point and the readings of the probes.

8.3 Bypassing the Autotest

In the first 5 seconds from the start-up of the machine the water/electrical Autotest can be bypassed (the next time the machine is started, the Autotest phase will be performed). To bypass the Autotest phase, within 5 seconds from starting the machine, press the SEL button and hold for at least 2 seconds. The “-nt” message will appear (see Figure 8.3.1) to visually confirm that the water/electrical Autotest will not be performed and that the machine will immediately start the steam production phase.

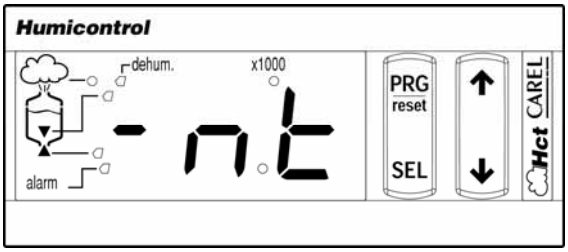


Figure 8.3.1

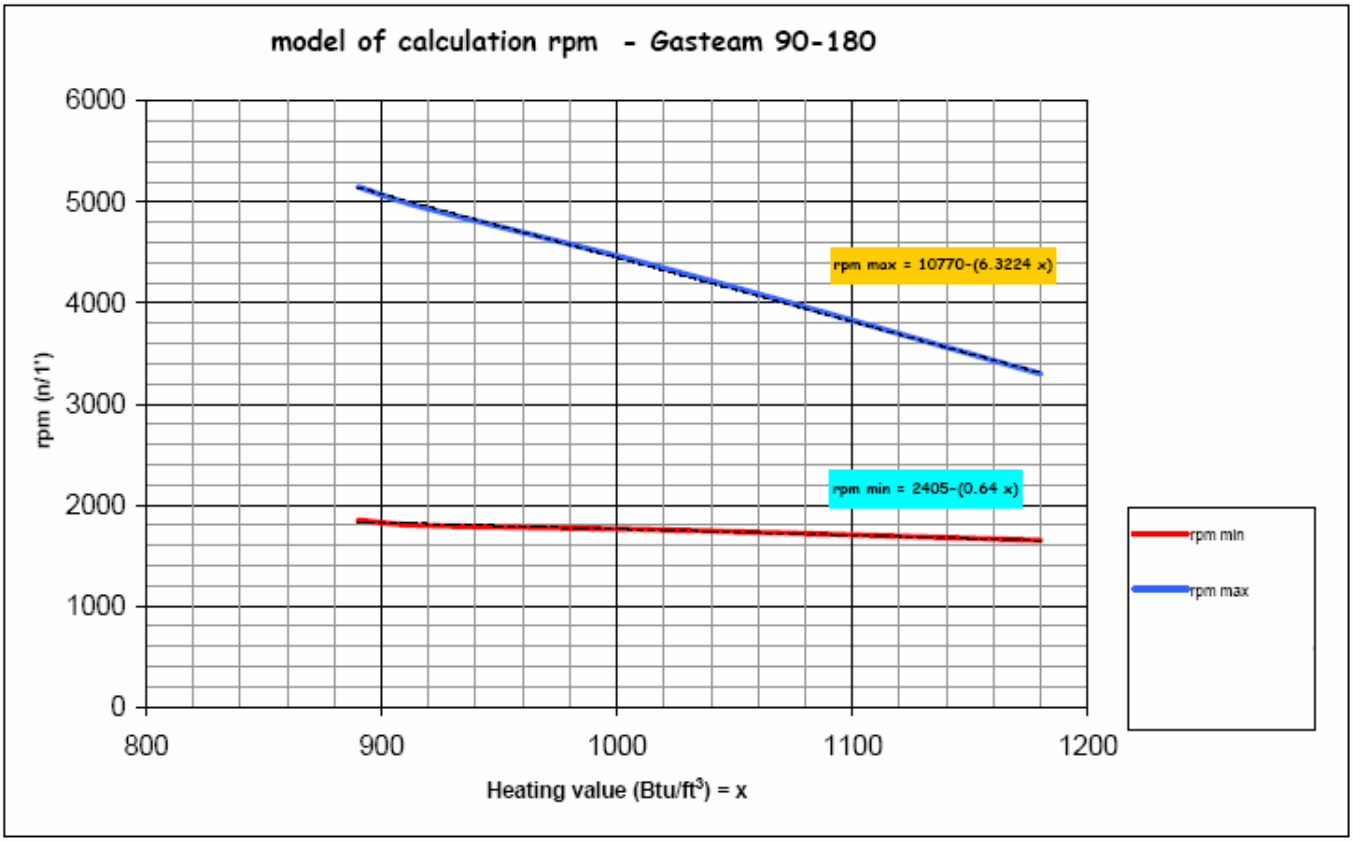
8.4 Adapting the Humidifier to Different Types of Supplied Gas

For proper functioning, the humidifier controller has parameters that must be set to the appropriate values depending on the type of fuel gas supplied. See "Controlling the Humidifier" for information on changing parameter values:

		PARAMETER SETTINGS					*STANDARD CALIBRATION VALUES*		
	GaSteam Model	**bA**	**bb**	**bC**	**bD**	**b0**	**MIN (%CO_2)**	**MAX (%CO_2)**	**Temperature Limit (°F)**
Natural Gas	**UG45**	100	127	50	25	123	8.2 - 8.5	9.0 - 9.4	230
	UG90	100	127	46	25	123	8.2 - 8.5	9.0 - 9.4	311
Propane	**UG45**	100	127	50	25	123	10.3 - 10.7	11.6 - 12.0	230
	UG90	100	127	46	25	123	10.3 - 10.7	11.6 - 12.0	311

Note: The humidifier is set by default for maximum production equal to 70% of the rated output. To change the maximum production, refer to the section “Reading and Programming the Parameters”.

Actual fan speed is dictated for all units based on the BTU heat content of the gas supplied.
The following graph shows the fan RPM value at various heat contents.



In the UG045 & UG090 models using the HumiControl, parameter “bb” is calculated with the following formula:

$$\text{“bb”} = \frac{\text{RPM}}{30}$$

8.5 Setting the Gas Burner

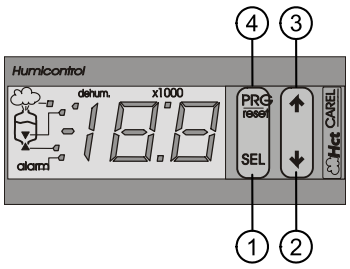
The burner comes tested and pre-calibrated from the factory for natural gas, but must be checked to make sure it is regulating the combustion properly, by a qualified gas technician.

To perform the setting of the burner, the controller parameter bA (fan velocity) must be accessed and modified on the controller.
Before applying voltage to the humidifier, it is necessary to verify that the jumper has been placed across the terminal 7Z and 8Z on the relay board (this is used to disable the remote control function).
The Autotest is a cycle of the controller that checks the integrity of the water level sensors, and ensures that a minimum amount of water will be present in the tank. You must wait until the Autotest has been successfully completed, or bypass it, before you can access the parameter bA.

8.6 Forcing the Output for Burner Calibration

IMPORTANT WARNING: After accessing the parameters, do NOT press button 4 (PRG) - you may alter other parameters if you do so.

Refer to the faceplate drawing to the right. The burner output can be forced for calibration by:

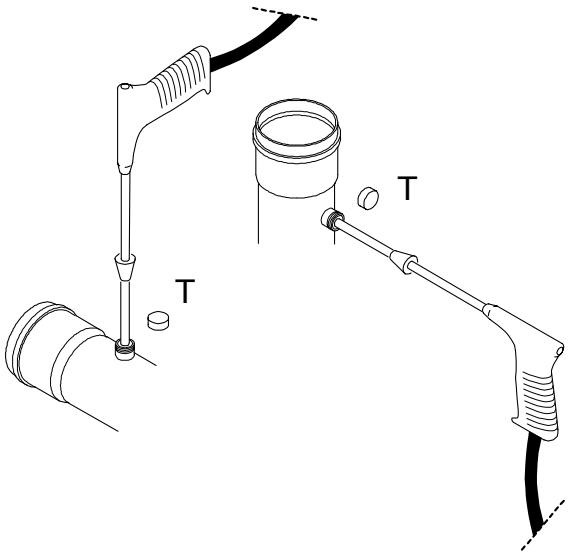


1. Turning on the unit and waiting for the completion of the autotest;
2. Simultaneously press buttons 1and 4 (PRG and SEL) until the display '00' appears;
3. Press buttons 2 and 3 as needed to enter the password '77' and press button1 (SEL) to confirm. If entered correctly, the display will proceed to '**A0**'; otherwise the controller display will default;
4. Press buttons 2 and 3 to cycle up or down through the parameters until '**bA**' is displayed;
5. Press button 1 (SEL) to display the current value of the parameter,
6. Press buttons 2 and 3 to adjust the pace of the fan, from minimum (**bC**) to maximum (**bb**) - note this is independent of the pre-ventilation speed;

- You have 10 minutes from the last keystroke to adjust the burner in each case before the unit exits this menu and returns to the parameter screen.
- To exit the parameter screens, wait 1 minute without pressing any key and the controller will go back to the default screen.

8.7 Preparing for the Analysis of the Vent Gas

Note: If vent pipe does not have the test plug pre-installed, the test plug kit is included, and must be installed to code.



If the vent pipe has been installed vertically:
1) remove the plug T from the exhaust pipe of the humidifier
2) insert the probe of the combustion analyzer as shown;
3) perform the analysis.

If the vent pipe has been installed horizontally:
1) remove the plug T from the exhaust pipe of the humidifier;
2) insert the probe of the combustion analyzer as shown;
3) perform the analysis.

To complete the analysis, replace the plug in the vent pipe.

8.8 Calibrating the Burner at Maximum Capacity

Set the output of the burner to its highest potential by modifying the fan speed to maximum as described in the previous section and perform an analysis of the combustion gases:

1. For burners using natural gas: CO_2= 9.0 - 9.4%
2. For burners using propane: CO_2 = 10.8 - 11.2%
3. If the measured values are different than above, the following steps should be taken to adjust:
4. Open the door to the burner compartment;
5. Turn the adjustment screw 'B' (see Fig 8.9.1) clockwise to decrease and counter-clockwise to increase the value, being careful to turn slowly until the correct CO_2 level is obtained.
6. Proceed to checking the value at minimum output levels.

8.9 Calibrating the Burner at Minimum Capacity

Set the output of the burner to its lowest potential by modifying the fan speed to minimum as described in the previous section and perform an analysis of the combustion gases.

1. for burners using natural gas: CO_2 = 8.2 - 8.5%;
2. for burners using propane: CO_2 = 9.4 – 9.8%;
3. If the measured value is different than the range above, the following steps should be taken to adjust:
4. open the door to the burner compartment;
5. remove the outer safety plug (Torx® T40) and turn the adjustment screw 'A' (see Fig 8.9.1) clockwise to increase and counter-clockwise to decrease the value, being careful to turn slowly until the correct CO_2 level is obtained
6. replace the safety plug
7. Recheck the maximum and minimum adjustment and repeat calibration until they both are within acceptable limits without adjustment.

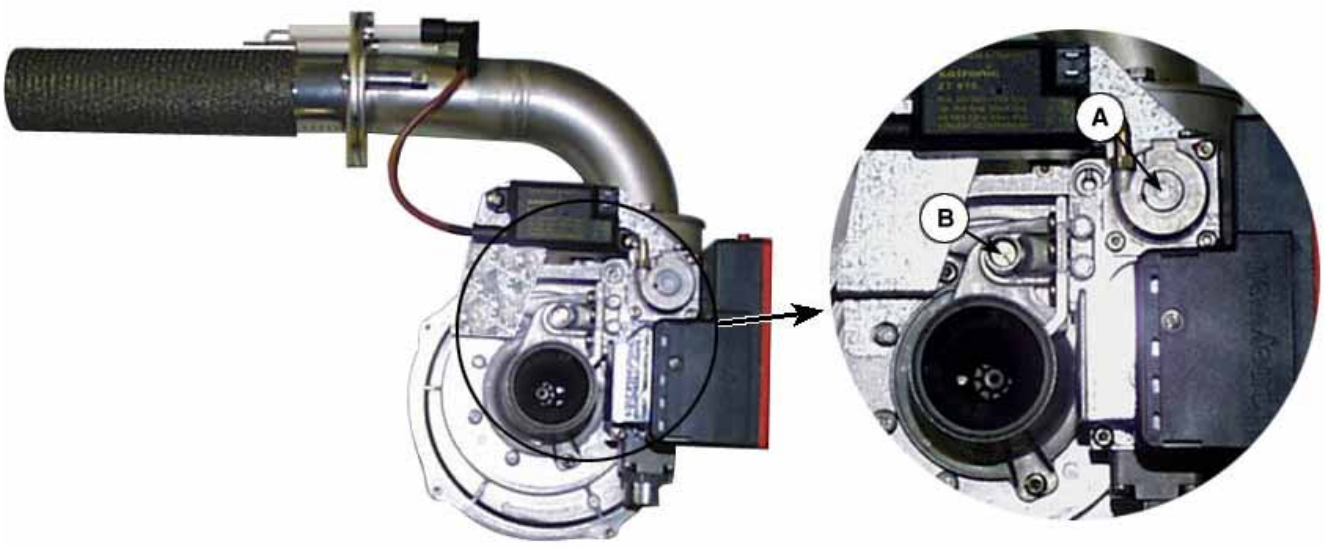


Figure 8.9.1

8.10 Shut-Down

Occasionally it may be desirable to shut down the unit completely for a seasonal pause or for maintenance on the electrical or hydraulic parts.

Caution: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operations.
Power must be disconnected before servicing.
Verify proper operation after servicing.

To place the humidifier out of service:

- Turn the ON/OFF switch (shown in Figure 8.10) to the '0' position and visually verify the front display goes blank;
- Turn off the external power supply to the humidifier
- Close the manual gas and water feed valves

If the purpose of shutting down is to clean the steam generator or cylinder, manually drain the unit before removing power by depressing the manual drain switch to activate the drain pump and keeping it pressed until the unit is completely drained of water.

In the event of a malfunction of the drain pump, it is possible to drain the water from the steam generator by attaching a hose to the bottom drain faucet and allowing the unit to drain through it.

Note:
It is advisable to drain the unit during long periods of shutdown to help prevent corrosion and buildup of hard water in the boiling cylinder.

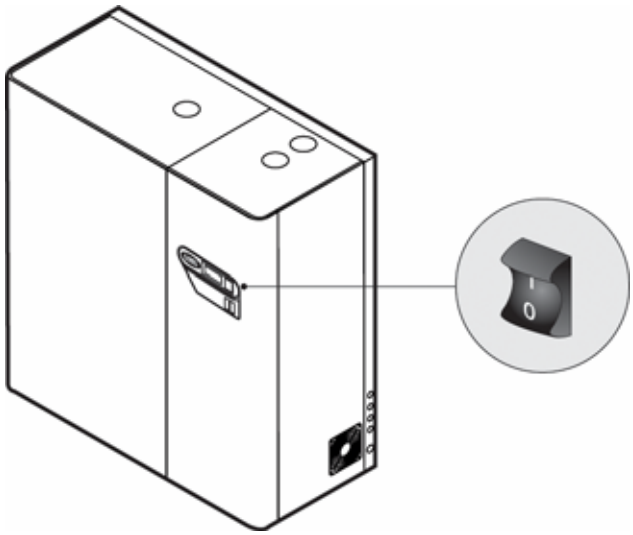
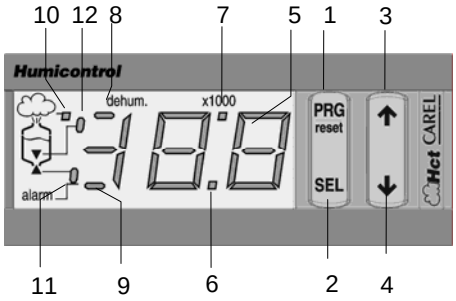


Figure 8.10

9. Control of the Humidifier

Controller with Alphanumeric Display:

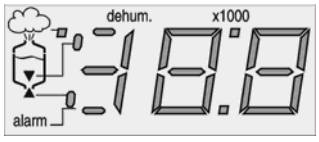


#	Description
1	button to access the working parameters (codes Px,dx); it also resets the internal alarm relay
2	allows you to display the unit of measure of the displayed value; press for 2 seconds to allow display/programming of set point; when pressed and held down for 5 seconds with PRG it allows you to access the menu for programming the configuration parameters
3	button to display the measured value of the main sensor (in ON/OFF control it is always 0); during programming, it increments the displayed value
4	button to display the measured value of the secondary sensor (if used); in programming mode it decrements the displayed value.
5	display provides 2 1/2 digit code for indication of digital values and the codes of any alarms present; during programming the display shows parameter codes and their values
6	LED indicating the decimal point
7	LED indicates that the displayed value is actually 1/1000th the actual value; multiply by 1000 to get actual value
8	LED indicating dehumidify mode
9	LED indicating alarm relay status
10	LED indicating steam production in progress, if flashing, it indicates the quantity of steam produced is less than requested
11	LED indicating the status of the fill valve
12	LED indicating the status of the drain valve

9.1 Starting Sequence

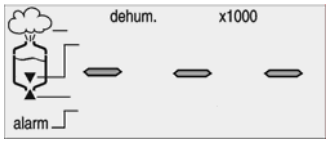
When the humidifier is started it goes through a sequence of operation that is displayed on the front panel by the LEDs in the following manner:

1 - INITIAL START



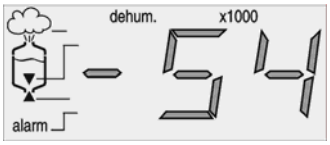
In this phase, which lasts 1 second, all LEDs on the display are lit.

2 - INITIALIZATION



During this phase, which lasts for 4 seconds, the three LEDs shown are illuminated.

3 - FUNCTIONAL PHASE



The humidifier begins to function normally and the control indicates the following:

- Autotest status
- steam production (in %) with external proportional control;
- the display of the main sensor in stand-alone mode;
- in case the humidifier is disabled, two dashes will appear flashing in the two right digits

In case of an alarm, the alarm LED will turn on and the corresponding alarm code will be displayed.

9.2 Displaying Values on the Controller

After the initial start and initialization phases are completed, the display value is determined by the parameter **C0** (in case of remote operation OFF, there will simply be two dashes in the right two digits).
Normally this is:

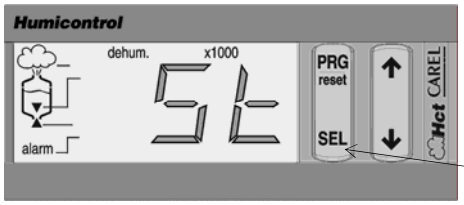
- The measurement from the main probe (stand-alone control).
- The % of steam production in appliances with slave control.

The other values may be accessed by:

- pressing the SEL button. This displays the unit of measure of the value previously displayed.
- holding down the ▲ button. This displays the measurement of the primary sensor, followed for 1 second, by the unit of measure. This value can be observed with the sensor disconnected.
- holding down the ▼ button. This displays the measurement of the secondary sensor, followed for 1 second, by the unit of measure. This value can be observed with the sensor disconnected.
- In case of alarm, pressing the PRG button will reset the alarm message (assuming the cause of the alarm has been removed).

To display the Set Point (main setting):

- Press the SEL button for around 2 seconds, until St appears. On releasing the button, the unit of measure of the Set Point is displayed for 1 second, and finally the current set value.



It is also possible to access the functional parameters of the unit; these values control how the gaSteam operates. Follow the instructions in the appropriate section of this manual to change the parameters.

9.3 Indication of an Alarm State

In case of alarm status, the LED 9 begins to flash while the display indicates the code of the alarm alphanumerically in intervals of 2 seconds, displaying the value of the functional parameter that caused the alarm.
In case of multiple alarms, the controller will display all applicable alarm codes in 2 second sequences. Simultaneously, the controller activates the alarm relay. For interpretation of the alarm codes see the maintenance section of this manual. The controller continuously displays the alarm, even if the reasons for the alarm have been removed, until reset by pressing the PRG button. If there are other alarm conditions they cannot be reset, the alarm will remain activated until they are fixed.

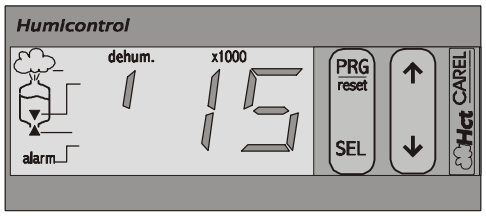
10. Reading and Programming the Parameters

Access to the numeric parameters, the control configuration and the control panel functions, are grouped into three levels:

1. LEVEL ONE - The set point, the principal setting “St” of the humidifier, is directly accessible from the keyboard for reading or modification.
2. LEVEL TWO - Parameters for regulation and measurement are also directly accessible through the keyboard for inspection and modification.
3. LEVEL THREE – Configuration parameters with the data necessary to customize the controls according to the humidification demands. These parameters are accessible only with a password to prevent unauthorized modification to the essential functions of the humidifier.

Each parameter is characterized by the following:

Code	Alphanumeric code representing the parameter under consideration
Range of values	Range of values possible for measurement/selection
Default	Default value of the parameter
Unit of measure	Symbol for the unit of measure employed for the current parameter

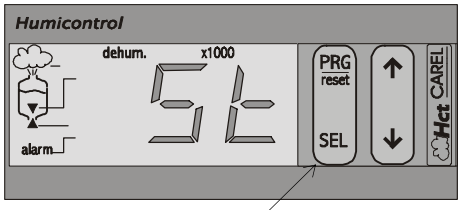


NOTE: Digital values from 200 to 255 are visualized with the / symbol shown to represent the ‘2’ digit. The display shown above therefore displays the value ‘215’.

10.1 Reading and Programming the Set Point

To read and/or change the value of the set point:

- Press the SEL button for approximately 2 seconds until ‘St’ appears;
- When you release the SEL button, the display will show the current unit of measure of the set point for 1 second and after that, it’s current value;
- To modify the set point, press the ▲ and ▼ buttons until you reach the desired value;
- Press SEL or PRG to confirm the displayed value and exit the set-point programming procedure.



Press for
2 seconds

The characteristics of the set point and the values are as follows:
Humidification set-point: accessible only in control mode (A0=2 or 3)

Unit of measure	Default value	Minimum limit	Maximum limit
% rH	50	0	P7

10.2 Reading and Programming the Regulation Parameters

The regulation parameters are the most frequently accessed control parameters (P0 to P9) (see Table below). The measurement parameters are the actual values from the sensors connected to the controller (d1 to d9).

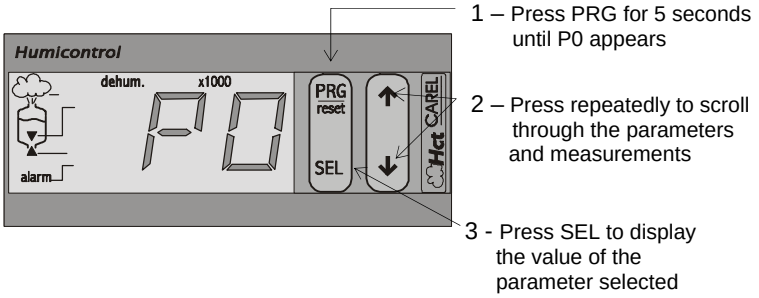
Regulation parameters					
code	**range**	**default**	**Unit of measure**	**description**	
P0	25…100	70	%	Maximum production	
P1	2.0…19.9	5.0	% rH	Humidity differential	Accessible only in automatic regulation (A0=2 or 3)
P2	(P3)…100	100	% rH	High humidity alarm threshold	
P3	0…(P2)	0	% rH	Low humidity alarm threshold	
P4	0…100	1	minutes	Alarm delay	
P5	2…100	10	% rH	Dehumidification dead zone	Accessible only with dehumidification option (see b1)
P6	2.0…19.9	5.0	% rH	Dehumidification differential	
P7	(St)…100	100	% rH	Supply sensor set point	Accessible only in stand-alone regulation with supply air sensor (A0=3)
P8	2.0…19.9	5.0	% rH	Supply sensor differential	
P9	0…100	100	% rH	Supply sensor high threshold alarm	

Displayed measurements					
code	**range**	**default**	**Unit of measure**	**description**	
d1 (1)	0, .., 100	read only	%	Signal of the external controller **or** Display of humidity sensor	Accessible only in external regulation or automatic control (A0=1, 2 o 3)
d2	0, .., 100		% rH	Measure of supply air sensor	Accessible only in stand-alone regulation with supply air sensor (A0=3)
d3	0.0, .., 199		kg/h	Steam production	
d4	0, .., 19900		hours	Hours of operation	
d5	0, .., 1500		µS/cm	Water conductibility	
d6	32, .., 212		°F	Water temperature	Accessible only with pre-heating option enabled (see b1)
d7	0,…, 199		rpm/3	Burner blower speed	
d9	0.0, .., 199		kg/h	Nominal steam production	

(1): in proportional function (A0=1), d1 is in % of the value under parameter A2

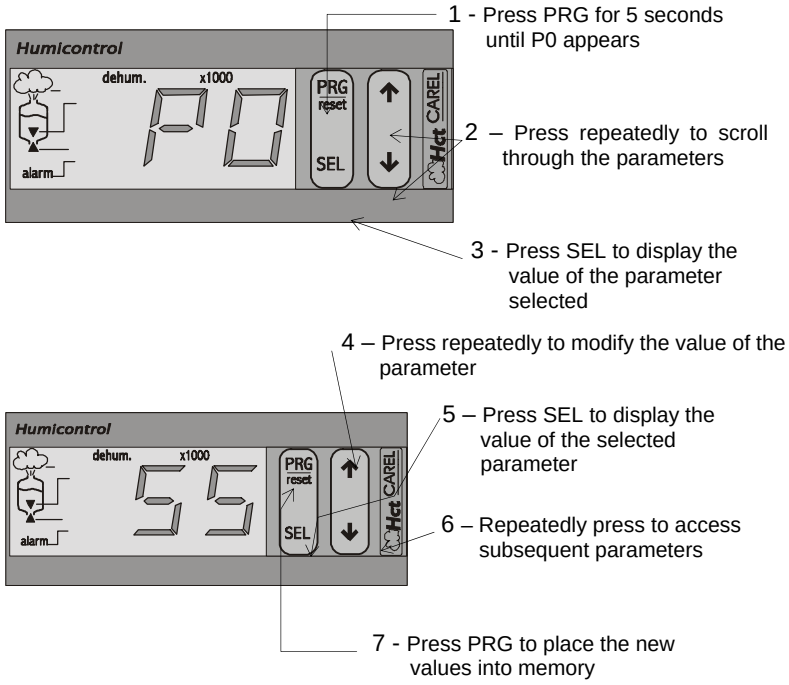
To **display** the regulation parameters and the measurements
you must:

1. Press the PRG button for about 5 seconds until the digits P0 appear, representing the first parameter.
2. Press the buttons ∆ or ∇ to cycle through the parameters P**x** and d**x**, including the Set Point;
3. Press the SEL button to display the value of the selected parameter; the unit of measure will also be displayed for one second;
4. Press the PRG button to terminate the parameter display.



To **modify** the regulation parameters (the measurements can only be displayed) do the following:

1. Press the PRG button for 5 seconds until the digits P0 appear, representing the first parameter.
2. Press the buttons ∆ or ∇ to cycle through the parameters P and d, including the Set Point;
3. Press the SEL button to display the value of the parameter selected; the unit of measure will also be displayed for one second;
4. Press the buttons ∆ or ∇ to modify the value. Hold down the button to increase the speed of the change.
5. Press the SEL button to move to the next value displayed; the code P or d;
6. You can display and alter the subsequent parameters by repeating steps 2 through 5;
7. Press the PRG button to place your changes into effect and to terminate the parameter display.



10.3 Reading and Programming the Configuration Parameters

The configuration parameters serve as a way to control some of the essential functions of the humidifier. The configuration parameters are divided into three groups:

- **Parameters to configure the basic functions** (modulation functions and type of sensors), represented by the codes A0 through A9
- **Parameters to configure the accessory devices** represented by the codes b0 through b9
- **Parameters for setting up the serial link and remote control** represented by the codes C0 through C7

These parameters are accessible **only with a password** to prevent unauthorized modification of the configurations.

parameters for configuration					
Code Display	**range**	**default**	**unit of measure**	**description**	
A0	0...3	2		operating type	0=ON/OFF operation 1=external control 2=stand-alone regulation with control sensor 3=stand-alone regulation with control and hi-limit sensor
A1	0...1	0		unit of measure	0=°C, kg/h 1=°F, lb/h
A2	0...4	0		signal applied to control sensor input accessible only in external control or stand-alone regulation (A0=1, 2 or 3)	0=0/1 V 1=0/10 V 2=2/10 V 3=0/20 mA 4=4/20 mA
A3	0...(A4)	0	% rH	minimum control sensor value	accessible only in stand-alone modes A0 = 2 or 3
A4	(A3)...255 *	100	% rH	maximum control sensor value	(A0=2 or 3)
A5	-10.0...10.0	0	% rH	control sensor offset (calibration)	
A6	0...4	0		signal applied to the high-limit sensor accessible only in regulation mode with high-limit sensor (A0=3)	0=0/1 V 1=0/10 V 2=2/10 V 3=0/20 mA 4=4/20 mA
A7	0...(A8)	0	% rH	minimum high-limit sensor	accessible only in stand-alone modes with high-limit sensor (A0=3)
A8	(A7)...100	100	% rH	maximum high-limit sensor	
A9	-10.0...10.0	0	% rH	high-limit sensor offset	

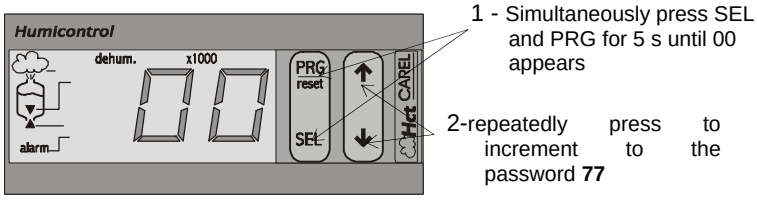
parameters to configure the functions of accessories					
code	**range**	**Default UG45 /UG90**	**unit of measure**	**description**	
b0	(Bc)...(bb)	123 / 123	rpm/30	Pre-ventilation fan speed during burner start-up	
b1	0...3	0		special functions not accessible in ON/OFF mode (A0=0)	1 = preheat 2 = dehumidification 4 = disable maintenance time alarm 8 = use reverse osmosis feed
b2	2.0...19.9	3.0	% rH	offset of the preheat start (referred to the set point: A0=2 or 3) (referred to the start production threshold: A0=1)	Accessible only with enabled preheat function (see b1).
b3	70...90 158...194	80 176	°C °F	preheat temperature	
b4	0...2000	0	µS/cm	conductivity of the feed water: if placed at 0 the conductivity is measured automatically, otherwise this set-point is used	
b5	0...2000	1500	µS/cm	conductivity pre-alarm threshold	
b6	0...2000	2000	µS/cm	conductivity alarm threshold	
b7	0...100	50	%	foam detection threshold regulation (0 = foam detection disabled)	
b8	1...50	10	÷10	ratio limit (water fill to water drain ratio)	
b9	0...20	0	min	minimum time to ramp from 0 to 100% steam production	
bA	(bC)...(bb)	100	rpm/30	fan velocity - this parameter allows the user to modify the fan velocity for 10 minutes to allow adjustment of the burner for ideal combustion (should be set during calibration)	
bb	(bC)...199	175 / 163	rpm/30	fan velocity for rated production	
bC	0...(bb)	50 / 46	rpm/30	fan velocity for minimum production	
bD	0...to the value which is lesser, either 50 or the setting of P0	25	%	minimum production in % of nominal production (should be set during calibration)	
bF	1-199	3	Days	Inactive days, after which the boiler is completely drained.	

parameters for configuring the serial link and remote control					
code	**range**	**default**	**unit of measure**	**description**	
C0	1... 7	3		value normally displayed	1=control sensor measurement 2= high-limit sensor measurement 3= steam production 4= hour counter 5= conductivity 6= water temperature 7= burner fan speed
C1	0...4	4		enable keypad and remote control	
				keypad:	**remote control**:
				0= reading of all parameters (modify only C1)	reading and modification of parameters P**x**, d**x** & St
				1= reading and modification of all parameters	reading and modification of parameters P**x**, d**x** & St
				2= reading of all parameters (modify only C1)	reading of parameters P**x**, d**x** & St
				3= reading and modification of all parameters	reading of parameters P**x**, d**x** & St
				4= reading and modification of all parameters	reading and modification of all parameters
C2	0... 99	0		enable remote control code	
C3	0...199	1		serial address	
C4	0...3	3		baud-rate	0=1200 1=2400 2=4800 3=9600
C5	0...11	0		frame 0=8,N,2 1=8,N,1 2=8,E,2 3=8,E,1 4=8,O,2 5=8,O,1	(bits per character, parity, stop bit) 6=7,N,2 7=7,N,1 8=7,E,2 9=7,E,1 10=7,O,2 11=7,O,1
C6	0...199	0	ms	send serial reply delay	

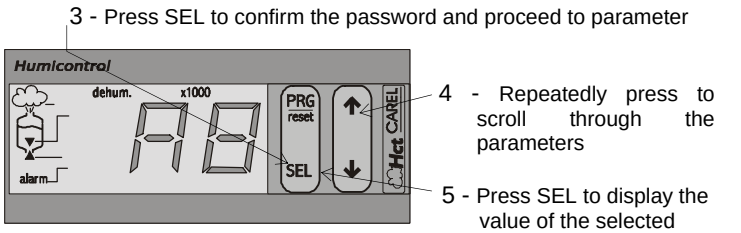
C7	0...3	0		graphic terminal configuration **in cases 1, 2, and 3** the OFF command is forced on start-up.	0=standard terminal 1=terminal with ON/OFF command 2=terminal with ON/OFF and control sensor 3=terminal with ON/OFF and high-limit sensor

To **read** or **modify** the configuration parameters:

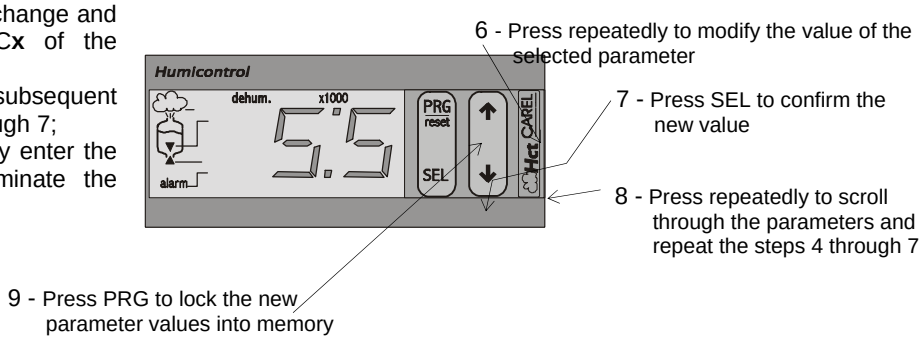
1. Simultaneously press the SEL & PRG buttons for about 5 seconds until 00 appears, signifying that the password is ready to be entered;
2. Press the ∆ and ∇ buttons to enter the **password** (**77**);



3. Press the SEL button to confirm the password. If the password is not correct, the programming cannot continue, otherwise the parameter A0 appears;
4. Press the ∆ or ∇ buttons to cycle through the parameters A**x**, b**x** and C**x**, Set Point inclusive;
5. Press the SEL button to display the value of the parameter - the unit of measure is displayed for one second;
6. Press the ∆ or ∇ buttons to modify the value (holding down the buttons increases the speed of the change);



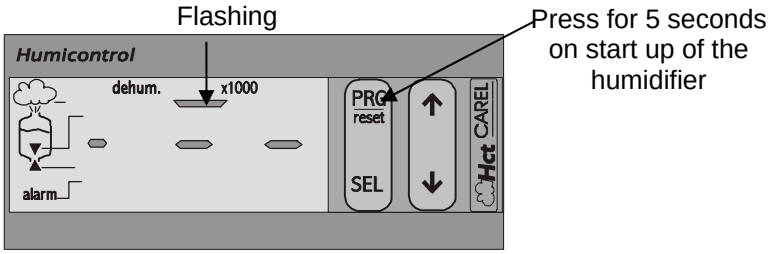
7. Press the SEL button to confirm the change and move to the next A**x**, b**x** and C**x** of the parameter selection (see Fig. 8.3.3);
8. You can display and alter the subsequent parameters by repeating steps 4 through 7;
9. Press the PRG button to permanently enter the new values into memory and terminate the programming mode.



10.4 Validation of the Modified Parameters

The modifications made to the parameters normally take effect when confirmed with the SEL button, and are saved permanently with the PRG button. For some parameters relating to the serial connection, the value will only take effect the next time the unit is switched on. During the programming phase, 5 seconds after the last button is released, the display begins flashing (to remind the user that the programming phase is in progress). Sixty seconds after the last button is released, if the value of a parameter is being displayed, any modifications are ignored and the display returns to the parameter's ID code. After a further 5 seconds, the display begins flashing again, and after 60 seconds the programming phase is terminated and the parameters return to the values previous to the programming phase. If, on the other hand, the parameter's ID code is being displayed, the programming phase is terminated directly after 60 seconds (time out).

10.5 Resetting Factory Values (Default Values)



The factory default can be reset only when the unit is turned on in the following way:

- within 5 seconds of turning on the unit (the three dashes will appear on the display) press the PRG button and keep it depressed for about 5 seconds until the upper dash will appear and blink, as indicated above;
- release the PRG button within 3 seconds; all factory-set parameters will be restored. As a confirmation, the display will show the symbols above for 2 seconds;
- the operation is not carried out if you keep the PRG button pressed for more than 3 seconds after the upper dash appears

The reset of the factory default values does not affect the selection of the unit of measure (parameter A1); therefore it is advisable to check and memorize the unit of measure and then proceed with the reset of the default values. In this mode the default values will be automatically converted to the units of measure selected.

10.6 Resetting the Hour-Counter

To reset the hour-counter (parameter d4) proceed as follows:

- press the PRG button for 5 seconds until the P0 code is displayed, and then press the ▲ or ▼ keys until the parameter d4 is displayed
- press the SEL button until the value of the hour counter is displayed (preceded by 1 second by the unit of measure)
- press simultaneously the ▲ and ▼ keys until the value is reset to zero, preceded by a brief flash
- press the PRG button to exit the procedure

10.7 Displaying and Modifying the Unit of Measure

The unit of measure displayed depends on the type of control and programming of the humidifier. The display of the unit of measure can help avoid misinterpretations of physical values. In the case of non-dimensional values the unit of measure is not displayed. It is possible to use the English units of measure (parameter A1).

The units of measure can be seen in the two right digits of the display:

display	unit of measure		display	unit of measure
°C	temperature in deg. centigrade		**M"**	time in seconds
°F	temperature in deg. Fahrenheit		**M'**	time in minutes
rH	relative humidity in %		**h**	time in hours
Pr	steam production in kg/h		**uS**	conductivity μS/cm
Lb	steam production in lb/h		**%**	Percent

10.8 STANDARD FACTORY SETTINGS

gaSteam Parameters

CODE	DDC 0-10 vdc Natural Gas / Propane	DDC 4-20ma Natural Gas / Propane	ON / OFF Natural Gas / Propane	STAND ALONE Natural Gas / Propane	STAND ALONE WITH HIGH LIMIT Natural Gas / Propane
A0	1	1	0	2	3
A1	1	1	1	1	1
A2	1	4	N/A	0	0
A3	N/A	N/A	N/A	0	0
A4	N/A	N/A	N/A	100	100
A5	N/A	N/A	N/A	0	0
A6	N/A	N/A	N/A	N/A	0
A7	N/A	N/A	N/A	N/A	0
A8	N/A	N/A	N/A	N/A	100
A9	N/A	N/A	N/A	N/A	0
b0	123 / 123	123 / 123	123 / 123	123 / 123	123 / 123
UG045 UG090	123 / 123	123 / 123	123 / 123	123 / 123	123 / 123
b1	0	0	0	0	0
b2	N/A	N/A	N/A	N/A	N/A
b3	N/A	N/A	N/A	N/A	N/A
b4	0	0	0	0	0
b5	1 2	1 2	1 2	1 2	1 2
b6	2 0	2 0	2 0	2 0	2 0
b7	50	50	50	50	50
b8	10	10	10	10	10
b9	0	0	0	0	0
bA	100	100	100	100	100
bb	175 / 164	175 / 164	175 / 164	175 / 164	175 / 164
UG045 UG090	163 / 163	163 / 163	163 / 163	163 / 163	163 / 163
bC	50 / 50	50 / 50	50 / 50	50 / 50	50 / 50
UG045 UG090	46 / 46	46 / 46	46 / 46	46 / 46	46 / 46
bD	25 / 25	25 / 25	25 / 25	25 / 25	25 / 25
UG045 UG090	25 / 25	25 / 25	25 / 25	25 / 25	25 / 25
bF	7	7	7	7	7
C0	1	1	1	1	1
C1	4	4	4	4	4
C2	0	0	0	0	0
C3	1	1	1	1	1
C4	3	3	3	3	3
C5	0	0	0	0	0
C6	0	0	0	0	0
C7	0	0	0	0	0
d1	*	*	*	*	*
d2	*	*	*	*	*
d3	*	*	*	*	*
d4	*	*	*	*	*
d5	*	*	*	*	*
d9	*	*	*	*	*
P0	70	70	70	70	70
P1	N/A	N/A	N/A	0	0
P2	N/A	N/A	N/A	100	100
P3	N/A	N/A	N/A	0	0
P4	N/A	N/A	N/A	1	1
P5	N/A	N/A	N/A	N/A	N/A
P6	N/A	N/A	N/A	N/A	N/A
P7	N/A	N/A	N/A	N/A	100
P8	N/A	N/A	N/A	N/A	5
P9	N/A	N/A	N/A	N/A	100
ST	N/A	N/A	N/A	50	50

*** Read-only parameters**

11. Maintenance

Note: Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

Caution: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operations.
Power must be disconnected before servicing.
Verify proper operation after servicing.

BEFORE ATTEMPTING ANY MAINTENANCE OPERATION:

- **Manually drain the unit using the manual drain switch**
- **Disconnect the unit from the power source**
- **Shut the manual gas and water intake valves**

11.1 Maintaining the Steam Generator

Remove the side panel and door **A** as shown in Figure A:

- detach the steam distributor pipe **T** connected to the steam generator;
- remove the screws **V** and **V1**;
- detach the panel **C**

To extract the heat exchanger do the following:

- disconnect the electrode cables to the burner;
- detach the fan manifold by removing the screws and extracting the combustion head of the burner (see Fig. B);
- disconnect the cables of the electrodes **F** (antifoaming electrodes) (see Fig. B);

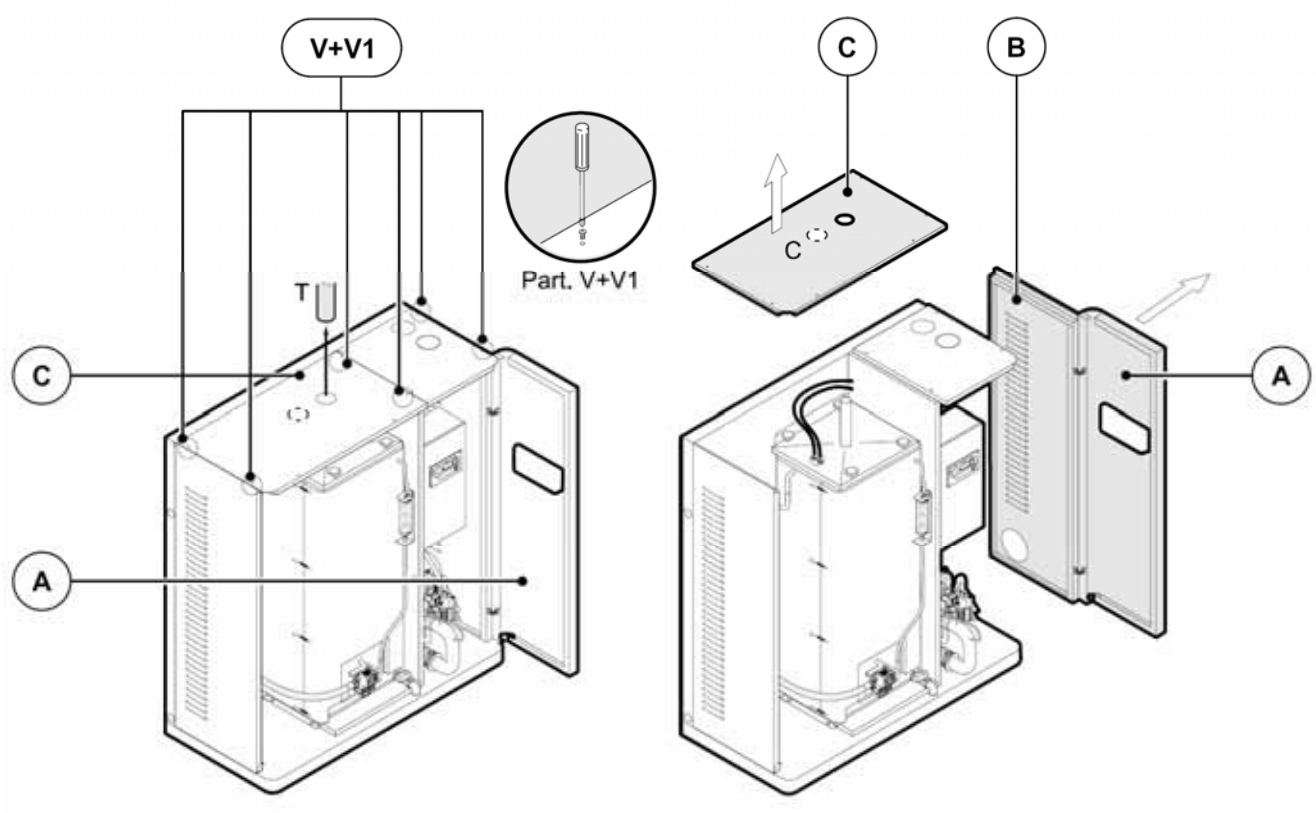


Fig. A

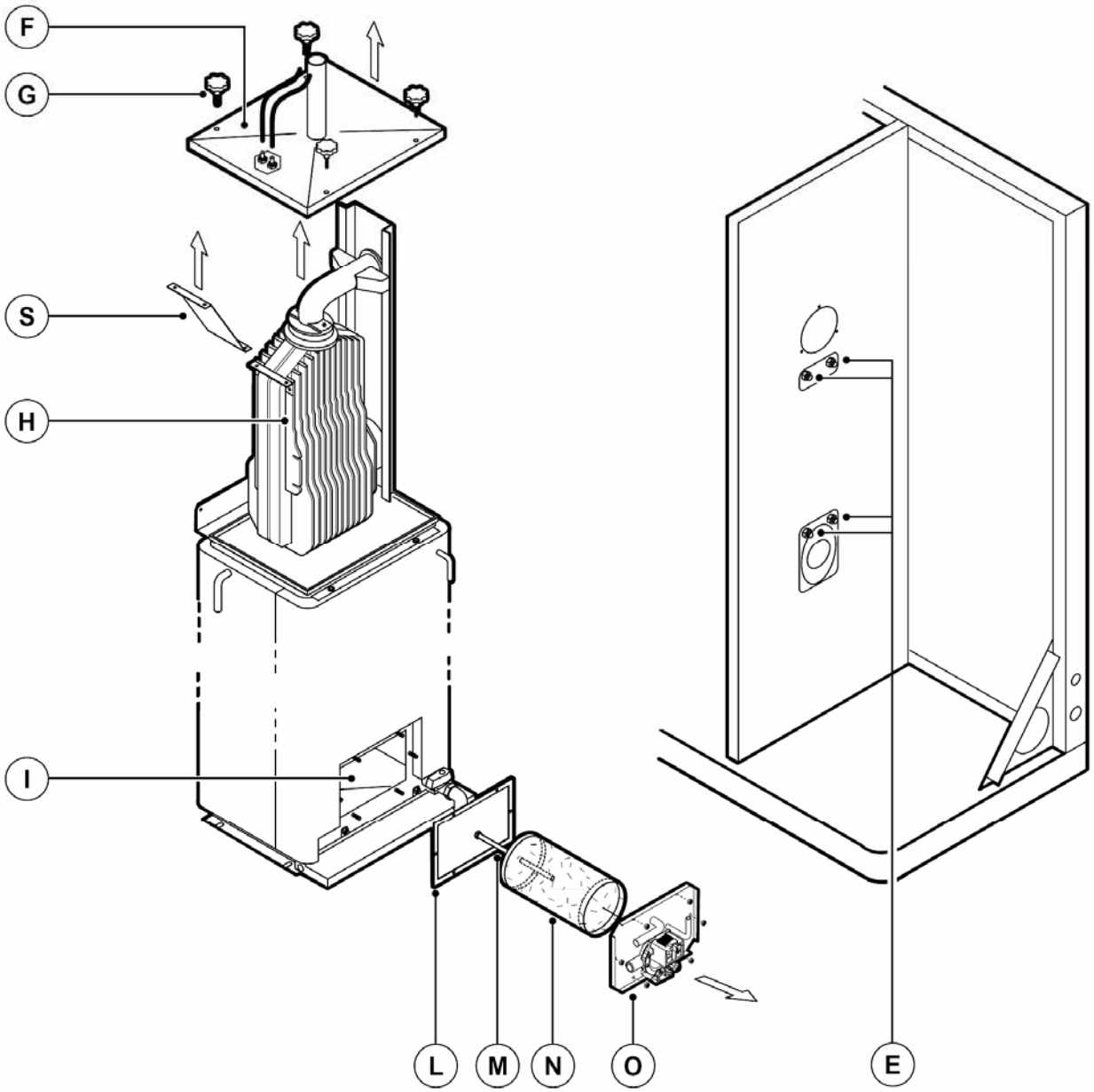


Fig. B

- Unscrew and remove the steam generator lid knobs **G**;
- Remove the steam generator lid;
- For simple cleaning, a poly brush dipped in Lime-Away, CLR or a 5% phosphoric acid solution, may be used to clean off the mineral debris on the heat exchanger and side walls of the boiler. Filling the boiler with water containing the cleaning solutions listed above could also be done.
- For more total cleaning, remove the heat exchanger **H** and wash it down with a mild solution of Lime-Away®**,** CLR or 5% phosphoric acid solution to remove any scaling or buildup that has occurred - **do not use tools that will scratch the coating**;
- Disconnect the cables to the drain and fill pumps and assembly **O;**
- Remove the nuts from assembly **O** and extract it being careful not to damage gasket **L**;
- Unscrew and remove screw **M** to free the filter **N** and wash it also in a mineral removing solution;
- Using a wood or paint scraper and the solution, clean the interior walls of the steam generator

11.2 Cleaning the Gas Burner

The periodic maintenance of the burner must be performed by authorized and qualified personnel one or two times per year according to use. Before handling and cleaning the burner read and perform the following procedures:

- remove the head of the burner; see Fig. C and D
- using a soft brush clean the burner, being careful not to damage the metallic mesh; see Fig. E
- detach all the gas and electrical connections to the gas valve and from the transformer;
- remove the intake air tube and the supports as indicated in Fig. F;
- Brush the fan and the burner intake as shown in Fig. G

WARNING: TO AVOID DAMAGE TO THE BURNER AND FAN DO NOT USE COMPRESSED AIR - JUST A SOFT BRUSH

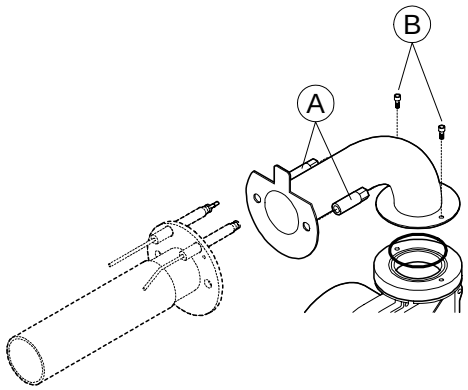


Fig. C

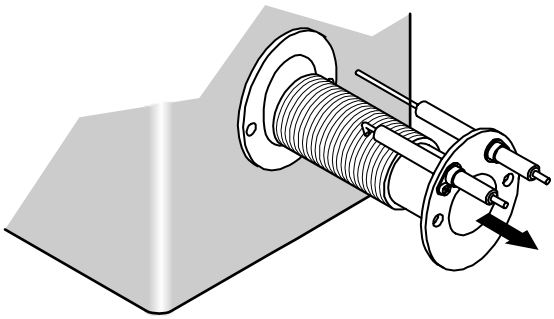


Fig. D

When putting the parts of the unit back together, be sure to check

- the condition of the gaskets (replacing them eventually)
- the position of the electrodes corresponds to Fig. H

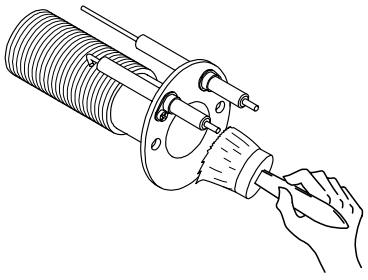


Fig. E

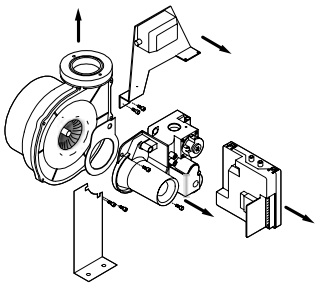


Fig. F

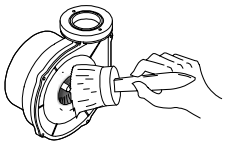


Fig. G

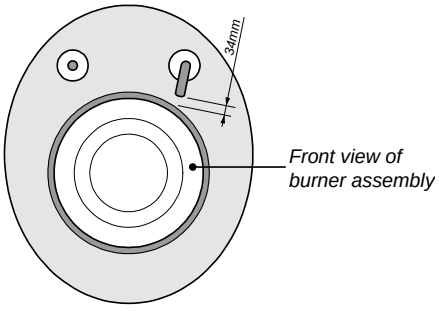
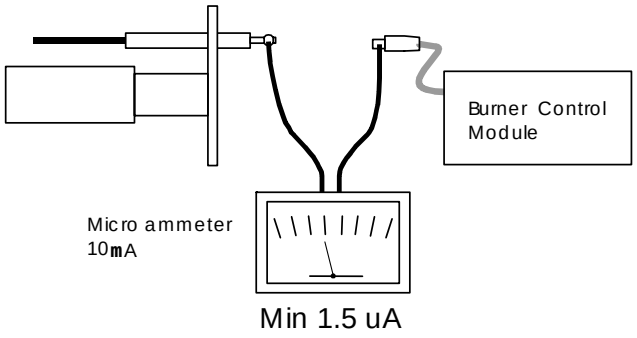


Fig. H

11.3 Checking the Ionization Current

The burner safety consists of an electrode that uses the actual flame of the burner as a current path to determine whether or not the burner is lit. If the flame goes out the circuit will be broken and the controller will shut the gas valve to avoid fuel gas from being released. Verification of this *current of ionization* can be performed by inserting a meter capable of measuring µA (continuous current) in series to the electrode flame. Faulty positioning of the electrode could involve a reduction of the current of ionization and cause the unit to shut down because it interprets this as no flame. Correct operation can be checked as below. Commonly the value of the current of ionization is 5 µA for UG045, and 1.5 µA for UG090.



11.4 Replacing Components

11.4.1 Exchanger

To replace the exchanger, proceed as described in the proceeding description of maintaining the steam generator.
To ensure the perfect seal of the various components, whenever performing any maintenance/replacement operations involving the exchanger, always replace all of the related gaskets.

11.4.2 PTC Over-Temperature Sensor

The PTC sensor is located in the exhaust outlet, and does not require periodical maintenance.
If the sensor needs to be replaced due to a fault, proceed as follows:

- stop the humidifier by moving the ON/OFF switch to 0 and then checking that the display on controller is off;
- loosen terminals 5T and 6T on the terminal block in the lower part of the electrical panel and the probe-holder nut on the adapter joint and then remove the probe and the electrical cable.

Then replace the PTC probe by following the same procedure in reverse.

11.4.3 NTC Temperature Sensor

As in the case of the PTC sensor, the NTC water temperature sensor does not require periodical maintenance.
To replace the sensor, proceed as follows:

- stop the humidifier by moving the ON/OFF switch to 0 and then checking that the display on controller is off;
- using the Velcro strip on the left-hand wall of the cylinder, open enough insulation to allow good visibility of the NTC probe.
- use a special tool to remove the probe-holder split pin, and then remove the NTC probe from its housing.
- Loosen terminals 3T and 4T on the terminal block in the lower part of the electrical panel and remove the probe.

Then replace the NTC probe by following the same procedure in reverse.

11.4.4 Cooling Fan

The cooling fan starts when the machine is switched on, and is used to keep the operating temperature of the electrical panel and the electronics within the designed limits.

If the fan is faulty:

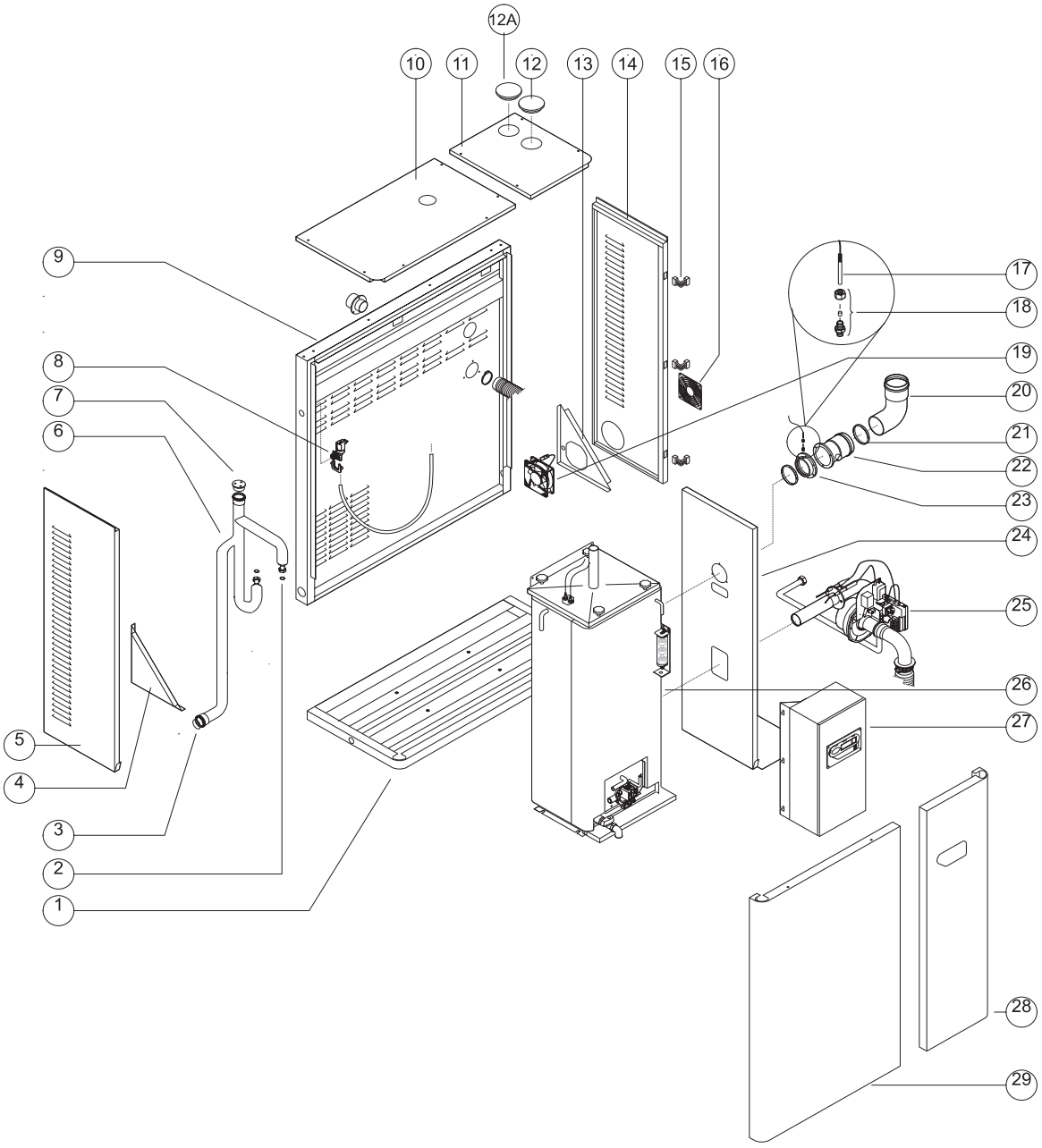
- Disconnect the electrical connections;
- Replace the fan after having unscrewed the fastening screws.

Note: being thermally protected, the fan may switch off temporarily if it overheats, and then will start again after having cooled down.

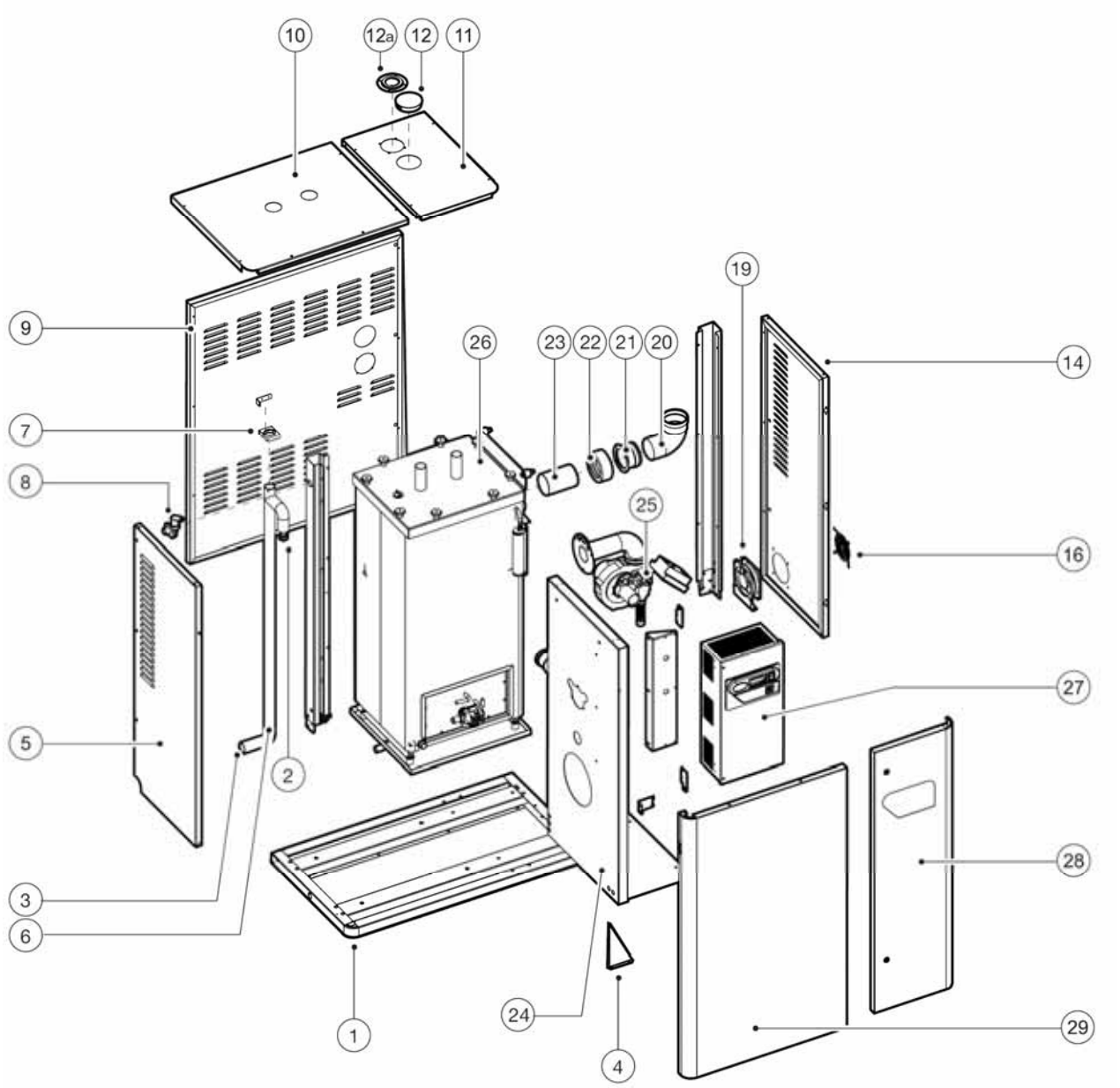
12. GaSteam Parts

12.1 EXPLODED VIEW OF ENCLOSURE

UG045



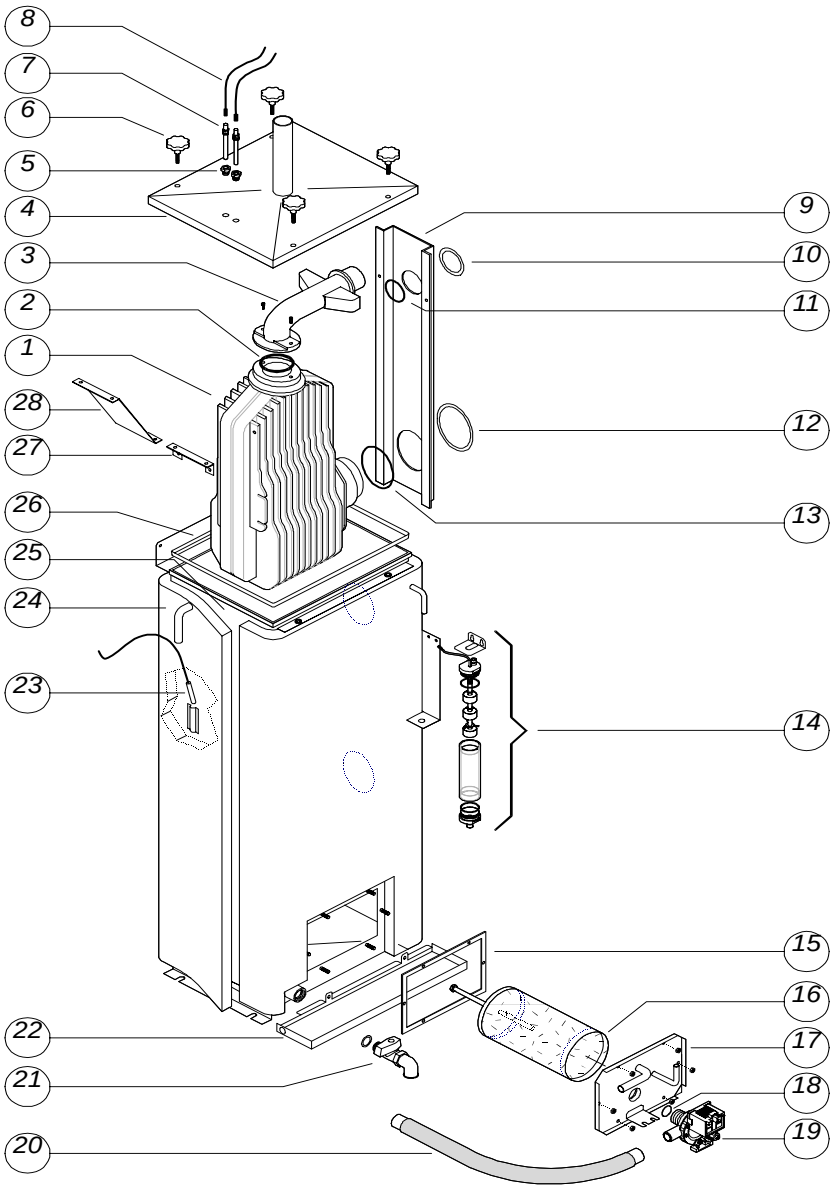
1 base	**11** gas/electronics cover	**21** flue gasket (UGKGUAR040)
2 electric pump gasket (UGKGUAR040)	**12** flue cap	**22** pipe fitting section
3 drain attachment gasket (UGKGUAR040)	**13** right bracket	**23** adapter joint
4 left bracket	**14** right side with 2 hinges	**24** partition
5 left side	**15** door hinge	**25** gas burner assy.
6 drain pipe (1312342AXX)	**16** grill	**26** steam generator assy.
7 drain pipe cap	**17** flue gas temp. probe (61C483A008)	**27** electrical panel (UGQE045U00)
8 fill solenoid valve (1312087AXX)	**18** connection for flue probe	**28** swing door w/ 2 locks
9 back	**19** cooling fan	**29** fixed door
10 plumbing cover	**20** 90 degree elbow	



1 base	**11** gas/electronics cover	**21** flue gasket (UGKGUAR090)
2 electric pump gasket (UGKGUAR090)	**12** flue cap	**22** pipe fitting section
3 drain attachment gasket (UGKGUAR090)	**13** right bracket	**23** adapter joint
4 left bracket	**14** right side with 2 hinges	**24** partition
5 left side	**15** door hinge	**25** gas burner assy.
6 drain pipe (1312334AXX)	**16** grill	**26** steam generator assy.
7 drain pipe cap	**17** flue gas temp. probe (61C514A002)	**27** electrical panel (UGQE090000)
8 fill solenoid valve (1312088AXX)	**18** connection for flue probe	**28** swing door w/ 2 locks
9 back	**19** cooling fan (1312546AXX)	**29** fixed door
10 plumbing cover	**20** 90 degree elbow	

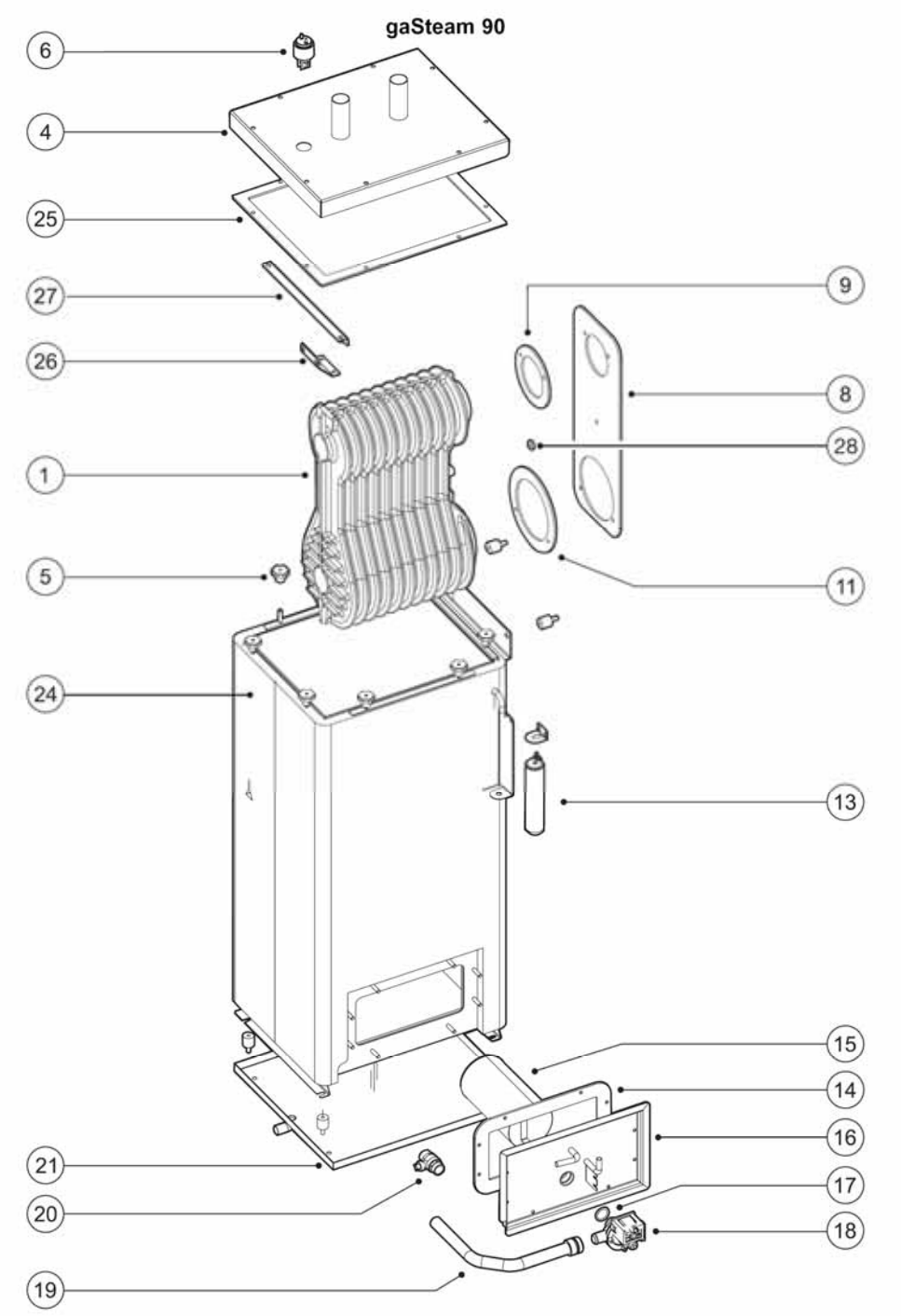
12.2 EXPLODED VIEW OF STEAM GENERATOR ASSEMBLY

UG045



1 heat exchanger (19C483A005)	**11** lower support bar gasket (UGKGUAR040)	**21** 3/4" drain tap
2 gasket (UGKGUAR040)	**12** lower support bar gasket (UGKGUAR040)	**22** water collection tray (NTC030WP00)
3 flue elbow	**13** gasket (UGKSL00000)	**23** NTC preheat probe (1614300AXX)
4 tank cover	**14** level switch (UGKGUAR040)	**24** adapter joint
5 sensor bushing	**15** door gasket (14C483A007)	**25** steam generator (UGKGUAR040)
6 knob (13C483A004)	**16** stainless mesh filter	**26** cover gasket
7 anti-foaming sensor	**17** plumbing access door (UGKGUAR040)	**27** rear exchanger bracket
8 anti-foaming sensor cables	**18** drain pump gasket (1312673AXX)	
9 support bar ((UGKGUAR040)	**19** electric drain pump (13C479A001)	
10 upper support bar gasket (UGKGUAR040)	**20** drain pump pipe	

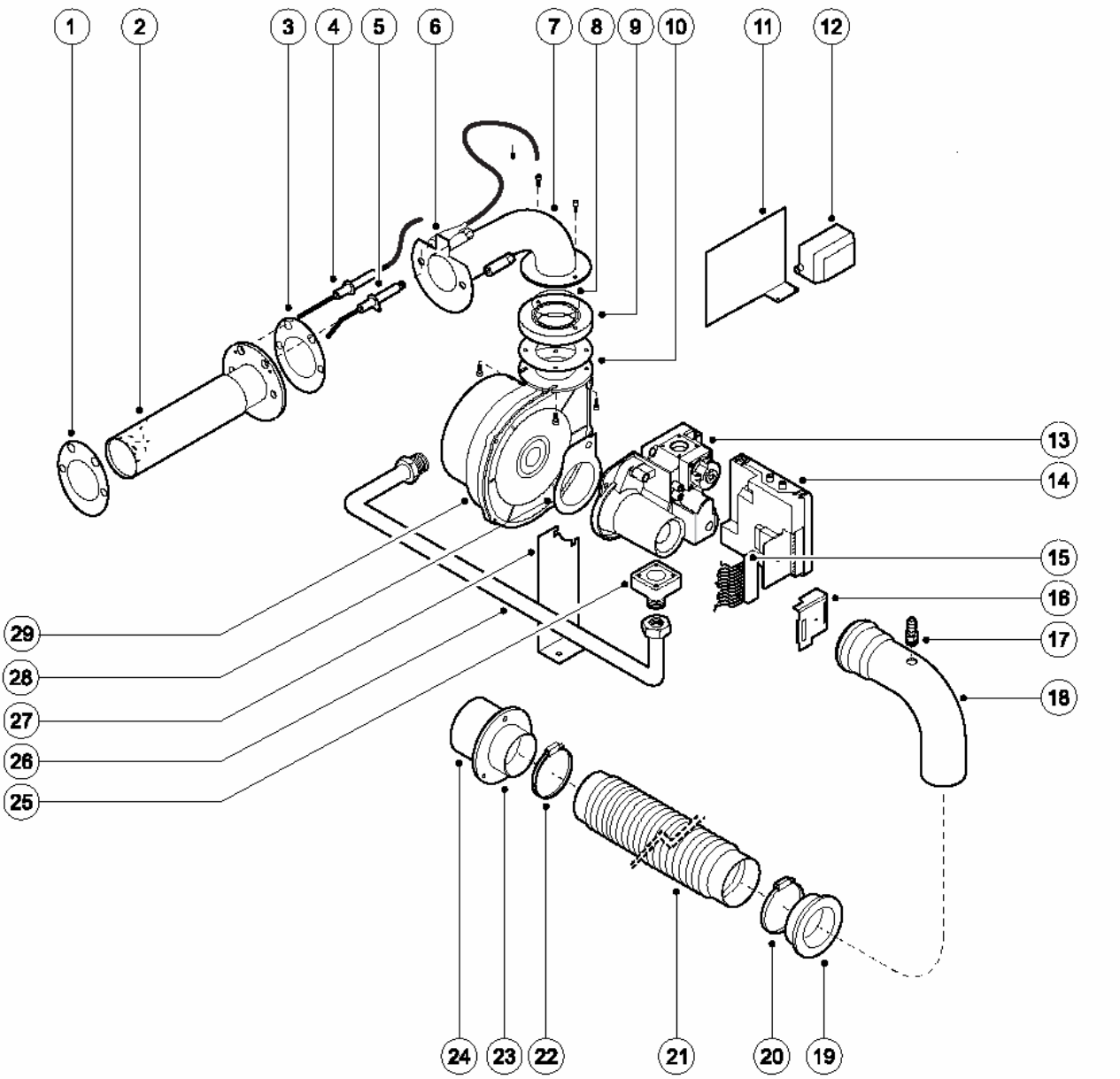
UG090



1 heat exchanger (19C514A003)	**11** lower support bar gasket (UKGUAR090)	**21** water collection tray
2 gasket (UGKGUAR090)	**12** ----------	**22** NTC preheat probe (NTC030WP00)
3 flue elbow	**13** level switch (UGKSL00000)	**23** insulation (1614301AXX)
4 tank cover	**14** door gasket	**24** rectangular container
5 knob	**15** stainless mesh filter (14C483A007)	**25** cover gasket (UGKGUAR090)
6 sensor bushing (13C483A004)	**16** plumbing access door	**26** rear exchanger bracket
7 anti-foaming sensor	**17** drain pump gasket (UGKGUAR090)	**27** tank/exchanger bracket
8 support bar	**18** electric drain pump (1312673AXX)	**28** intermediate gasket (UGKGUAR90)
9 upper support bar gasket (UGKGUAR090)	**19** drain pump pipe (13C479A001)	
10 --------	**20** 3/4" drain tap	

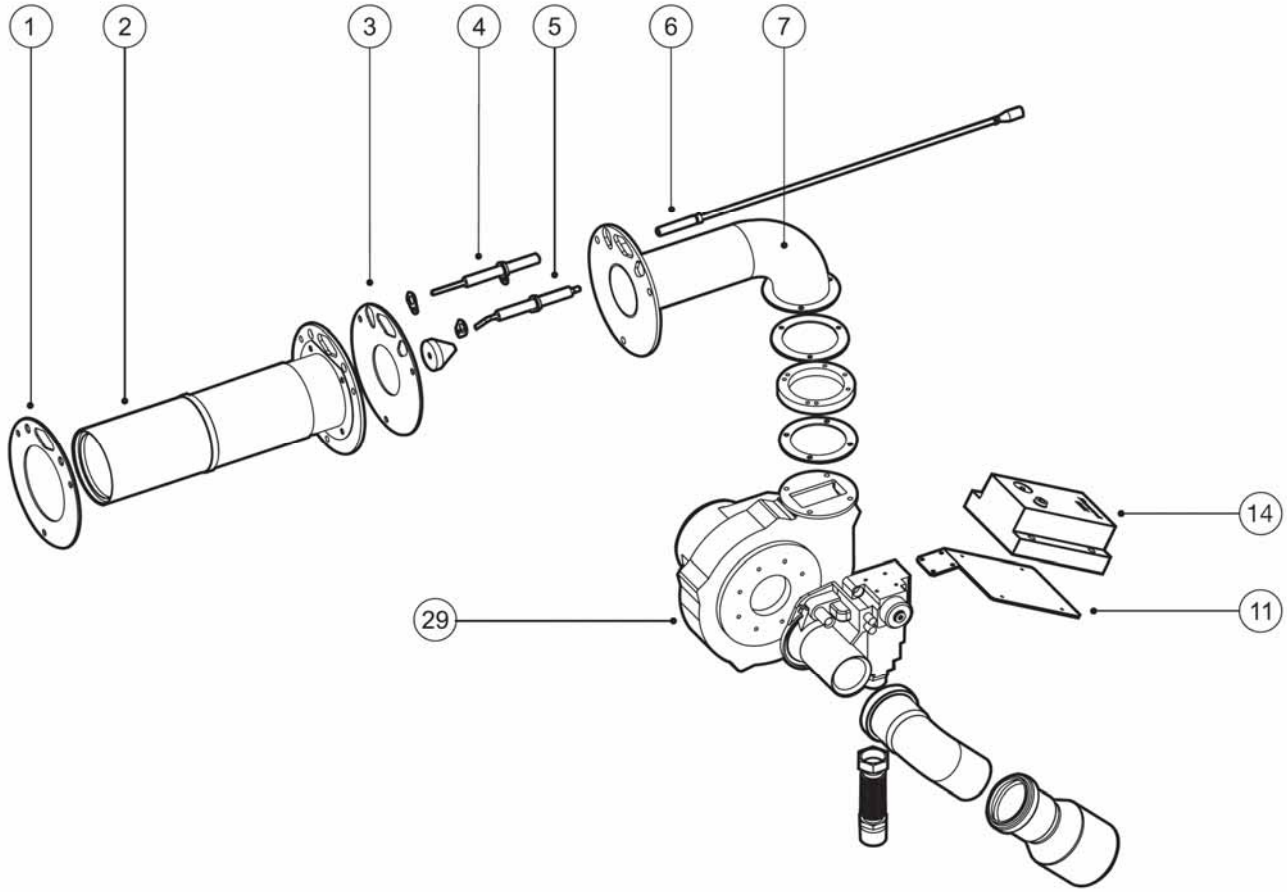
12.3 EXPLODED VIEW OF BURNER ASSEMBLY

UG045



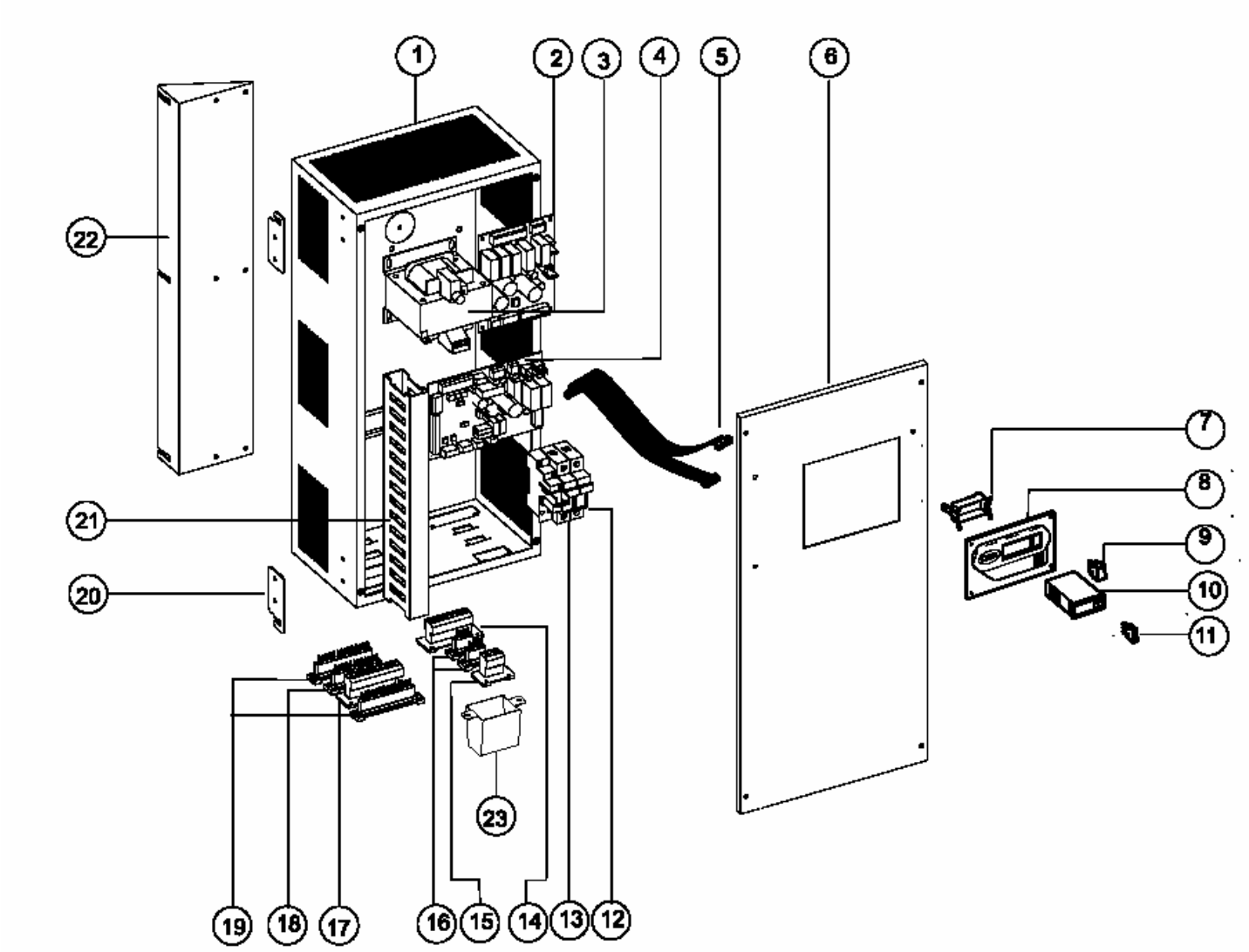
1 head gasket (UGKGUAR040)	**11** transformer support bracket	**21** flexible pipe
2 combustion head	**12** ignition transformer (09C483A017)	**22** flexible pipe clamp
3 gasket (UGKGUAR040)	**13** gas valve (13C483A018)	**23** rear flexible pipe conn.
4 flame detection electrode (61C483A009)	**14** gas valve control board (UGCB000000)	**24** connector with grid filter
5 ignition electrode (61C483A016)	**15** connector	**25** flange adapter
6 ignition cable	**16** connector cover	**26 NOT INCLUDED**
7 flanged fan elbow	**17** air tap	**27** fan support bracket
8 compensation flange (UGKGUAR040)	**18** air intake elbow	**28** venturi fan gasket (UGKGUAR040)
9 fan compensation flange	**19** flexible pipe attachment	**29** fan
10 fan gasket (UGKGUAR040)	**20** flexible pipe clamp	

UG090



1 head gasket (UGKGUAR090)	**11** transformer support bracket	**21** flexible pipe
2 combustion head	**12** ignition transformer	**22** flexible pipe clamp
3 gasket (UGKGUAR090)	**13** gas valve (13C514A004)	**23** rear flexible pipe conn.
4 flame detection electrode (61C483A009)	**14** gas valve control board (UGCB00000M)	**24** connector with grid filter
5 ignition electrode (51C483A016)	**15** connector	**25** flange adapter
6 ignition cable	**16** connector cover	**26 NOT INCLUDED**
7 flanged fan elbow	**17** air tap	**27** fan support bracket
8 compensation flange (UGKGUAR090)	**18** air intake elbow	**28** venturi fan gasket (UGKGUAR090)
9 fan compensation flange	**19** flexible pipe attachment	**29** fan gasket
10 fan gasket (UGKGUAR090)	**20** flexible pipe clamp	

12.4 EXPLODED VIEW OF ELECTRICAL PANEL



1 electrical panel	**11** manual drain switch	**21** cable tray/channel
2 control board (UGBE00000*)	**12** fuse holder	**22** panel rear support bracket
3 transformer (09C483A003)	**13** relay (0100712AXX	**23** electrical connection strain relief
4 interface board (URI000000*)	**14** 7 pin plug	
5 ribbon cable	**15** 3 pin power plug	
6 electrical panel door	**16** 4 pin plug	
7 locking bracket	**17** 9 pin plug	
8 controller panel	**18** 12 pin plug	
9 ON/OFF switch	**19** 14 pin plug	
10 controller (UGH000000*)	**20** panel side support bracket	

13. SPARE PARTS

Description:	UG045	UG090
Drain pipe	1312342AXX	1312334AXX
Fill solenoid valve	1312087AXX	1312088AXX
Gasket kit	UGKGUAR040	UGKGUAR090
Teflon-coated heat exchanger body	19C483A005	19C514A003
Anti-foam sensor	13C483A004	13C483A004
3 position level switch	UGKSL00000	UGKSL00000
Stainless mesh filter	14C483A007	14C483A007
Flue gas temperature probe with connector	61C483A008	61C514A002
Cooling fan	1312546AXX	1312546AXX
Gas burner	UGKBRUC045	UGKBRUC090
Electrical panel	UGKBRUCO45	UGKBRUCO90
Drain pump	1312673AXX	1312673AXX
Drain pump pipe	13C479A001	13C479A001
NTC preheat probe	NTC030WP000	NTC030WP000
Steam generator insulation	1614300AXX	1614301AXX
Flame detection electrode with cable	61C483A009	61C483A009
Ignition electrode	61C483A016	61C483A016
Ignition transformer		----------
Gas valve		13C514A004
Gas valve control board		UGCB00000M
gaSteam control board	UGBE000000	UGBE000000
Panel transformer	09C483A006	09C483A006
Interface board	URI0000000	URI0000000
Controller	UGH0000000	UGH0000000
Relay	0100712AXX	01020001AXX
Socket	5931424AXX	----------
Air-flow switch	1309556AXX	----------

13.1 Fuses

Fuses F1 & F2	2A slow-blow
Fuse F3	6.3A slow-blow

14. Alarms

14.1 Table of Alarms

When an alarm condition occurs, the controller will indicate the alarm state and display the type of alarm.
In the case of a potentially dangerous alarm the controller will immediately shut down the humidifier.
For some alarm events (see chart) the controller will trip the alarm relay and display the fault simultaneously.

When the alarm condition clears, humidifier operation and the alarm relay may be automatically or manually reset, depending on the type of alarm. The alarm message must be manually cleared (except for alarms “Ec” and “CL”) by pressing the PRG/reset button. Some alarms may cause a total shutdown of the humidifier, in which case the power supply must be disconnected. If the humidifier is not powered, the alarm relay will be open, even if the alarm condition still exists. In case of the CL alarm (maintenance intervention requested), the alarm can be reset only by setting the hour counter to zero, see “Resetting the hour counter to zero”.

The alarm “**E1**” may occur in two distinct situations:

1. Malfunction during the reading of the parameter memory (usually on start-up)
The default parameters are temporarily recalled without being stored in the parameter memory (the parameters can be accessed and restored to their correct values).
The recall of the default parameters is recommended.

2. Malfunction during writing to the parameter memory (usually on pressing the PRG button)
Any modifications entered are cancelled; the parameters can be accessed, the values modified again and the storing operation repeated.

14.2 ALARM CODES

controller H	code for remote Carel Humivisor	cause	solution to the problem attempt these fixes once; if the problem persists contact Carel service personnel	result	reset	alarm relay
	E503	the PTC sensor in the vent has measured an over-temperature condition	shut off the humidifier, check the water level, clean the steam generator and burner	shut down	Power ON/OFF	active
	E504	low level of water in the steam generator or level control fault	check the water feed connections; clean the fill valve, the level control, and the steam generator	shut down	Power ON/OFF	active
	E505	high conductivity of the feed water	Shut off the unit and clean the conductivity probes; if the problem persists, change the source of the water or install a water treatment system (partial demineralization) - the problem will not be resolved by the addition of water softeners.	shut down	Power ON/OFF	active
	E511	autotest failed; probably a problem with: filling, draining, or level control of the water	check that the unit is able to fill with water; check that the unit is able to drain water; shut off the unit and clean the fill valve, the drain valve, and remove and replace the water filter.	disable humidifier	Power ON/OFF	active
	E513	power not available; unit is not attaining required steam production or water preheat	check gas pressure; check fan operation	disable humidifier	Power ON/OFF	active
	E514	lack of feed water	Check the feed water lines to the humidifier externally and internally to make sure they are not blocked or kinked; verify that the fill solenoid is working; make sure there is not excessive pressure in the steam distribution preventing the gravity fill into the steam generator; verifiy that there are not bends or other places condensate can build up in the steam distribution piping	disable humidifier	Power ON/OFF	active
	E515	Formation of foam in the steam generator during steam production.	The formation of foam is usually cause by chemicals in the water (solvents, lubricants, detergents, water-treatments, water softeners) or heavy concentrations of dissolved salts. Bleed the water feed lines and clean the steam generator.	warning	automatic	not active
	E517	Blower error; exhaust or inlet pipe obstructed; manual gas valve closed; flame sensor electrode touching the burner grid; blower doesn't follow the speed reference.	switch off the machine: Check for obstructions in vent exhaust piping; check that gas valve is open; remove the blower and check operation.	disable humidifier	Power ON/OFF	active
	E531	pre-alarm for high conductivity feed water	check the conductibility of the feed water; if necessary install water treatment; the problem will not be resolved by the addition of water softeners.	warning	automatic	not active

ALARM CODES CONTINUED

controller	code for remote Carel Humivisor	cause	solution to the problem attempt these fixes once; if the problem persists contact Carel service personnel	result	reset	alarm relay
EU	E533	Water or other material between the high level electrodes with no production (conductivity measured between electrodes)	Turn off the humidifier and check for leaks from the fill solenoid valve or deposits of material between the high level electrodes.	warning	automatic	active
E¯	E521	high ambient humidity	check the functioning of the ambient sensor and the value of parameter P2	warning	automatic	active
E_	E522	low ambient humidity	check the operation of the ambient sensor and the value of parameter P3	warning	automatic	active
E-	E524	over high-limit humidity	check the operation of the high-limit sensor	warning	automatic	active
E0	E501	error in internal memory	contact your service representative at Carel	disable humidifier	reprogram by Carel	active
E1	E512	user parameter error	Re-enter the set parameters or recall the default parameters. Check the electrical connections to the controller.	disable humidifier	reprogram parameter	active
E2	E530	hour-counter error	reset the hour counter	disable hour-counter	manually reset hour-counter	not active
E3	E520	ambient sensor not connected	Check the operation of the sensor and set the parameter A0 to the ON/OFF configuration. (see **Reading and modifying the programming parameters)**	disable humidifier	automatic	active
E4	E523	high-limit sensor not connected	Check the operation of the sensor and set the parameter A0 to the ON/OFF configuration. (see **Reading and modifying the programming parameters)**	disable humidifier	automatic	active
E5	E525	the NTC sensor for measuring the water temperature is not connected (if it is being used)	verify the preheat is occurring and check the parameters b1, b2 and b3 are set correctly (see the section on programming the parameters); verify that the probes are inserted in the steam generator	disable preheat	automatic	active
CL	E532	maintenance warning	shut off the humidifier and perform a complete cleaning of the unit; reset the	display message only	Power ON/OFF	not active
Et	E502	activation of the safety thermostat due to abnormal overheating of the boiler following operation when empty	stop the machine and carry out a complete maintenance routine on the humidifier, resetting the hour counter	shut down	Power ON/OFF	active

15. Troubleshooting Table

problem	cause	solution
The controller does not work.	1. power is not supplied; 2. external interrupt is off; 3. poor electrical connection; 4. blown fuse; 5. bad transformer;	1. check that the correct power has been supplied; 2. turn on the external interrupt; 3. check that the connections to the controller terminals are good; 4. check the condition of the fuses F1/F2; 5. verify that the secondary of the transformer is supplying 24 Vac and fuse F3 is not blown.
The humidifier won't start	1. ON/OFF contact open (jumper on terminals 7I-8I); 2. the regulator/humidity controller or external sensor are not connected properly; 3. broken sensor/humidistat; 4. the configuration parameters have been improperly set; 5. the ventilation fan has gone out	1. close the remote ON/OFF (relay terminals 7I - 8I); 2. connect the external controller correctly; 3. check the external signal from these devices; 4. correctly reprogram the parameters; 5. reset the unit after the cause of the problem has been eliminated;
The humidifier fills and drains with water but will not produce steam	1) Back-pressure during steam outlet 2) Broken water supply valve flow regulator (possible leaks in the hydraulic circuit) 3) Defective water level control 4) Cylinder inlet filter blocked 5) Limestone scales in the fill tank 6) Broken drain valve	1) Check that the steam outlet valve is not crimped or bent 2) Replace the drain valve 3) Clean or replace the water level control if necessary 4) Clean the filter 5) Clean the fill tank 6a) Check the presence of 24 Vac on drain valve 6b) Replace the drain valve
The humidifier trips the external interrupt	1. the overload protection is incorrectly sized; 2. short-circuit	1. make sure the interrupt is sized correctly; it must be rated for a current of 1.5 times the nominal current and voltage of the humidifier; 2. check with a meter to discover any short circuits and correct them
The humidifier wets the duct	1) The distributor is not installed correctly 2) The system is over-sized 3) Humidification is on when the duct fan is off	1) Check that the steam distributor has been installed correctly. (see par. 9.3, page 21) 2) Decrease the steam production on the humidifier control 3) Connect a trigger from the fan to terminals 7I - 8I of the On-Off remote (e.g. differential pressure switch or flow switch contact)
The humidifier leaks	1) The humidifier drain is blocked 2) The hydraulic circuit is over-full or has leaks 3) The condensation drain pipe does not feed into the filler tank 4) The steam outlet pipe is not properly attached to the cylinder	1) Clean the drain outlet in the bottom tank 2) Check the entire hydraulic circuit 3) Check the correct placement of the condensation drain pipe in the fill tank. 4) Check the tightening of the pipe clamp on the steam outlet
Loss of humidity in space and no alarms displayed on the controller	1) Direct Spark Ignition module has shutdown on internal error. 2) Blockage of intake and exhaust vent pipes 3) Loss of flame in burner	1) Turn the power to the unit off 2) Check for blockages in the intake and exhaust vent pipes. 3) Lower humidity set point to its lowest setting, for 30 seconds, and then reset to desired level

16. Operating Principle and Other Functions

16.1 Operating Principle

In a gas humidifier the production of humidity is generated when water inside a boiler is heated to and then held at boiling temperature. The heat required to boil the water is provided by a heat exchanger heated by a type pre-mix, modulating, room-sealed gas burner (standards compliant). This burner takes in air from and discharges the flue gas to the outside through suitable piping. This machine is therefore suitable for rooms where there is not sufficient fresh air.
The operation of the burner is completely automatic and does not use a pilot flame. All the operating phases of the burner are controlled by an electronic board, which also constantly checks the presence of the flame by ionization. The output of the burner continuously responds to the request for heat, according to an ample modulation ratio.
The variable speed fan, managed by the control board, together with the proportional gas valve, allows the output to be modulated (the flow-rate of gas is proportional to that of the air needed for combustion).
The water that evaporates over time is automatically replaced with water from the mains supply.
In stable operating conditions, the level of production required is automatically controlled by adjusting the thermal output of the burner.
The salts introduced by the automatic refilling of the water are partly deposited as lime scale inside the cylinder, contributing to the progressive build up of minerals on the cylinder, and partly remain dissolved in the water.
To avoid excessive accumulation of salts, a quantity of water is periodically and automatically drained and then replaced with fresh water.

16.2 Other Functions

16.2.1 Measurement of the Conductivity of the Supply Water

– Alarm Thresholds

To optimize the operation of the humidifier, by suitably spacing the automatic draining cycles (see Automatic draining), when the fill solenoid valve opens, the conductivity of the water is measured using special conductivity measuring electrodes.
Two high conductivity thresholds can be set for activating, respectively, a pre-alarm and an alarm event (shutting down the appliance) when such thresholds are exceeded for at least 60 minutes, or alternatively instantly if the value measured is three times greater than these.

16.2.2 Automatic Draining

Automatic draining is managed by the control module: part of the water contained in the cylinder is drained automatically, and replaced with fresh water to prevent an excessive concentration of salts following the process of evaporation.
The electric drain pump is opened for a set time at varying intervals, according to the production of steam and the concentration of solids dissolved in the supply water, measured using the conductivity electrodes.
Apart from the salt concentration in the supply water, at least one drain cycle will be performed within a maximum period, based on the quantity of steam produced; this is also valid for supply using demineralized water.

16.2.3 Anti-Foam Procedure

The level of the water inside the cylinder is maintained by the level control at a minimum pre-set distance from the top of the cylinder. Therefore, when the high level electrodes detect water, a foam detection event occurs. A draining procedure is then automatically started, which is then repeated until the problem disappears, or, in the event of multiple activations, an alarm is signaled.

16.2.4 Measuring the Water Temperature and Preheating

The controller measures the water temperature using an NTC sensor, and can be programmed to activate the preheating function around the set start humidification value; in this way, steam is produced much faster.

16.2.5 Dehumidification Request Signal

If activated, this function closes the contact of a relay when the relative humidity measured by the transducer connected to the controller exceeds the set threshold.
This signal can be used to start an external dehumidification device.

16.2.6 Cylinder Deposit Detector

This patented device measures the resistance of the PTC temperature sensor located in the flue. In the event of over-heating (caused by excessive lime scale on the surfaces of the cylinder or alternatively by a low water level not detected by the level sensor), the overheating alarm is activated.

16.2.7 Hour Counter – Cleaning Request Signal

The electronic controller features an operating hour counter based on the percentage of steam production. The counter can be reset. The number of operating hours is continuously compared against an internal limit used to signal the need for cleaning and de-scaling inside the cylinder.
The limit is calculated based on the conductivity of the supply water measured, or alternatively specified manually using parameter b4 on the controller.
The signal may be deactivated (see controller parameter b1).

16.2.8 Safety Thermostat

The mechanical safety thermostat with manual reset is activated in the event of overheating, caused by a lack of water inside the cylinder due to the malfunction of the minimum level control; this deactivates the relay that controls the power supply to the controller and thus places the humidifier in an alarm situation.

16.2.9 Automatic Cylinder Emptying Due to Inactivity

The controller completely empties the cylinder of the water, in case the humidifier stays inactive (without steam production) for more than the time limit set by the bF parameter (default= 3 days).

17. Technical Specifications

Model number	UG045	UG090
Nominal supply voltage (Vac)	230/1~ (from –15% to 10%) 50-60Hz	
Steam outlet connection (in)	1 ½ ID x 1	1 ½ ID x 2
Acceptable operating conditions	temperature 34-104 °F, humidity 10-60% rH	
Acceptable storage conditions	temperature 50-158 °F, humidity 5-95% rH	
Vent category of Appliance	IV	
Auxiliary voltage / frequency (V - Hz)	24 / 50-60	
Maximum auxiliary power (VA)	25	
Instantaneous steam production (1) (lb/h)	100	200
Power input at rated voltage (W)	80	285
Max. flow-rate of the supply water (gal/min)	2.6 (or for UG045, 0.7 with supplied spare valve)	
Pressure of supply water (PSI/bar)	14.5-116 psi (1-8 bar)	

(1) The total steam production is influenced by several factors including ambient temperature, quality of the feed water, and the system for distributing the steam.

17.1 Thermal and Hydraulic Characteristics

			UG045	UG090
Heat Output for natural gas and propane	nominal	BTU/hr	111,980	218,710
	minimum		28,000	50,160
Heat Input	nominal	BTU/hr	120,490	232,640
	minimum		30,740	55,620
Nominal steam production	nominal	lb/hr	100	200
	minimum		25	50
Maximum steam temperature		º F	230	
Water holding capacity		gal	14.8	31.7
NO_x emissions			< 70 mg/kWh	
CO_2	Natural Gas Propane	% vol % vol	9.2 11.0	9.4 11.4
CO		mg/kWh	< 60*	
Diameter of the exhaust		in	3	
Diameter of air intake			3	
Diameter of steam outlet			1 5/8 OD x 1	1 5/8 OD x 2
Natural Gas flow rate	nominal	Sft^3/hr**	131	254
	minimum		34	62
Propane flow rate	nominal	Sft^3/hr**	50	95
	minimum		13	24
Supply gas pressure	Natural gas Propane	in. w.c. (in H_20)	8.0 11.0	
Maximum pressure drop allowed between air inlet and flue outlet		Pa/psi/in H_20	90/0.013/.36	82/0.012/.33

*value referred to combustion with natural gas (G20)

** natural gas at 15°C and an atmospheric pressure of 1013.25 mbar.

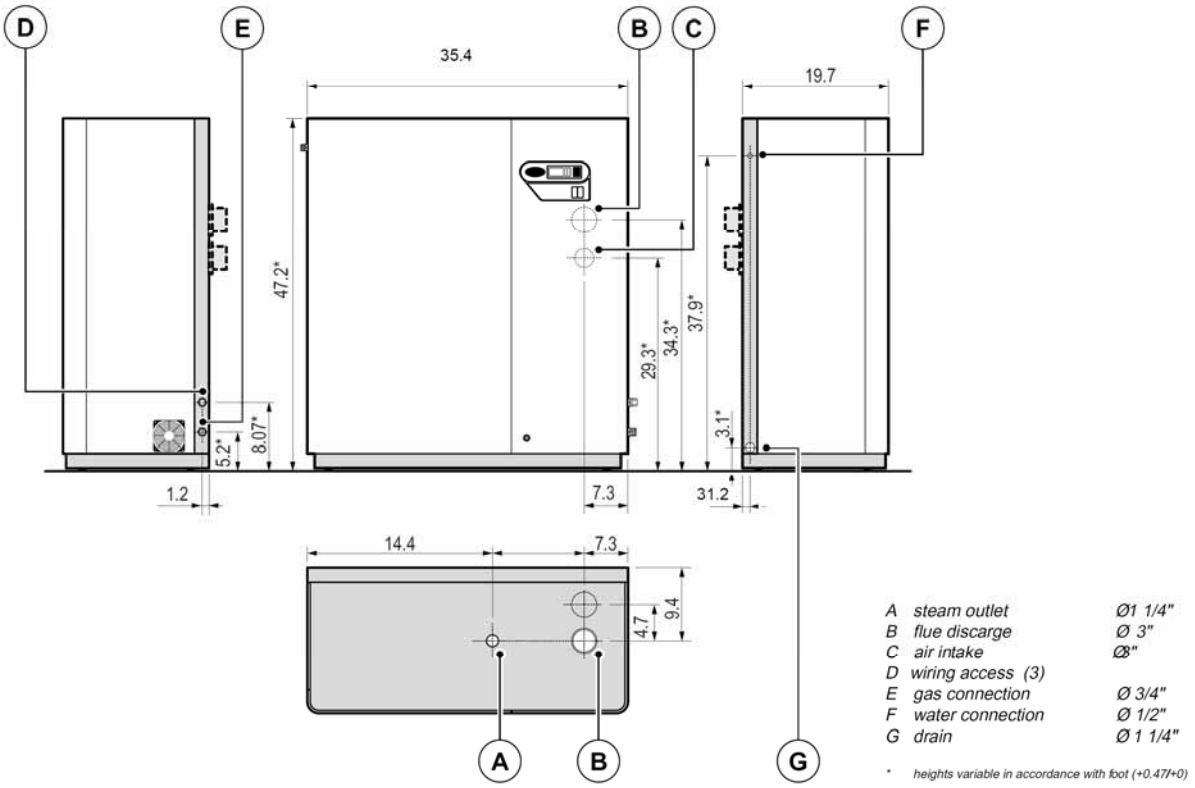
17.2 Weights

(lbs)	UG045	UG090
Packaged	302	364
Empty	275	330
Installed (*)	408	595

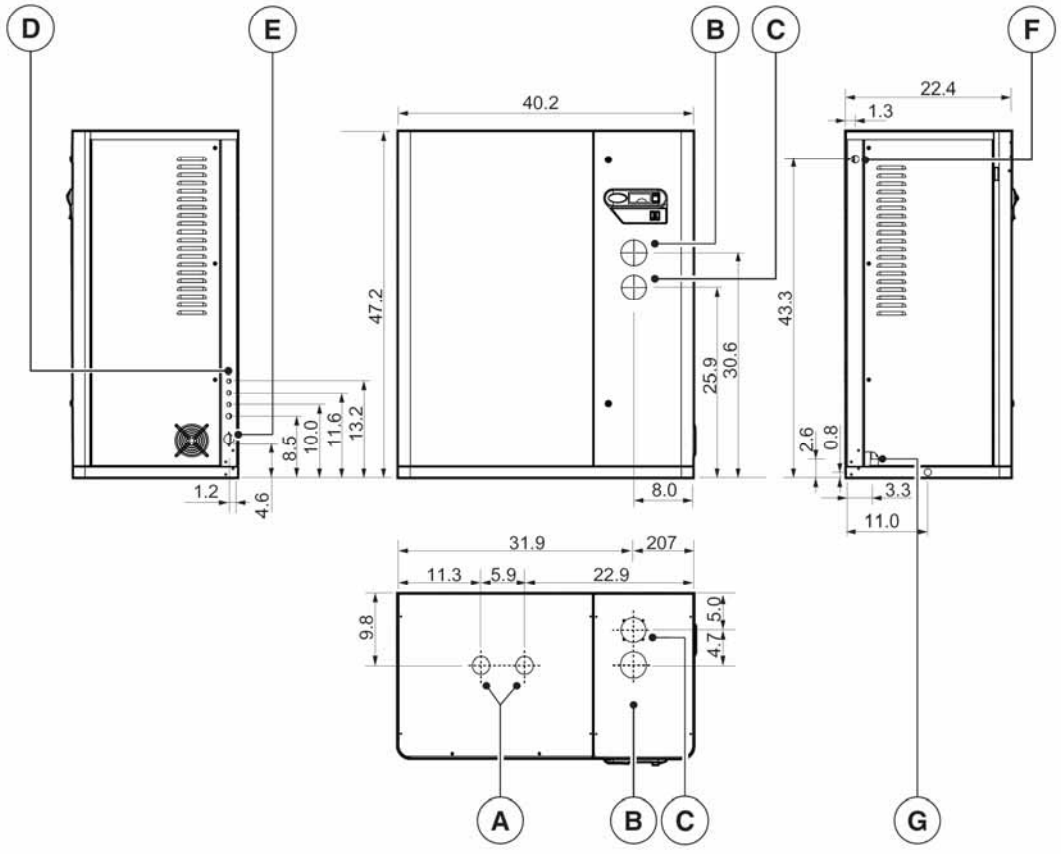
(*) In normal operating conditions, filled with water.

18. Dimensions

gaSteam 45

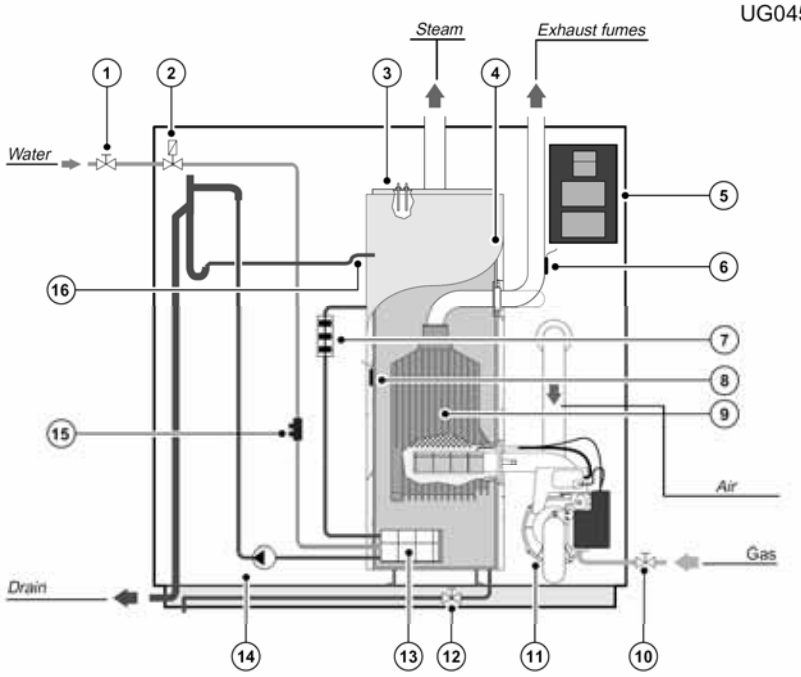


gaSteam 90

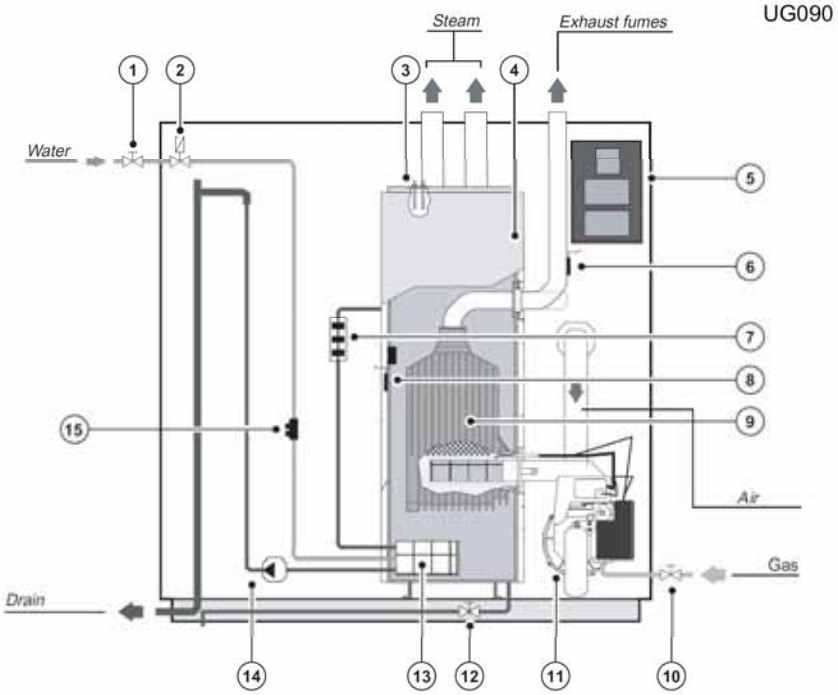


19. Unit Description

UG045



UG090



1	water shut-off tap	9	heat exchanger
2	fill solenoid	10	gas shut-off tap
3	boiler foam sensor	11	gas burner
4	boiler	12	drain and manual fill tap
5	electrical panel	13	water filter
6	exhaust fumes sensor	14	electric drain pump
7	level sensors	15	conductimeter
8	water temperature probe	16	boiler overflow (only on gaSteam 45)

LIMITED WARRANTY

All products manufactured by Carel USA, LLC are warranted to the original purchaser to be free from defects in materials and workmanship in the course of normal and reasonable use for a period of 2 years from the date of installation or 2 years and 1 month from the date of shipment (The OEM controls warranty is 2 years from date of manufacture), whichever comes first, so long as the product has been installed and operated in accordance with all appropriate manuals and wiring diagrams, and started up by a qualified Carel USA technician. Any product or part that is found to be defective will, at the option of Carel USA, LLC be replaced or repaired. Carel USA, LLC reserves the right to inspect any part of installation before replacing or repairing defective parts. After startup of the product, labor for repairs or replacement of part is not covered by this warranty. Products not included in this warranty are NTC and PTC probes, transformers (TRA series), and routinely replaceable parts such as steam cylinders and gaskets. Carel USA, LLC assumes no liability for consequential or inconsequential damage, or damage due to negligence or improper use. Under the terms of this warranty, the original purchaser may have certain legal rights and other rights, which may vary from state to state. The Warranty will not be considered valid if product is damaged due to negligence, mishandling or misapplication, or if the product label is missing. Carel USA will attempt to repair or replace the products within two (2) months of the receipt of the returned goods.

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