EN	*Maintenance and service manual of condensing warm air heater AH-Sport*

VER. 00.00.2017

Dichiarazione di Conformità
Statement of Compliance

CE

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Il presente documento dichiara che la macchina:
With this document we declare that the unit:

Modello: ***Model:***	**Unità trattamento aria AH** ***Air Handling Unit AH***

è stata progettata e costruita in conformità con le disposizioni delle Direttive Comunitarie:
has been designed and manufactured in compliance with the prescriptions of the following EC Directives:

- **Direttiva macchine 2006/42/CE**
  Machinery Directive 2006/42/CE
- **Regolamento Apparecchi a Gas 2016/426/CE**
  Gas Appliance Regulation 2016/426/CE
- **Direttiva compatibilità elettromagnetica 2014/30/UE**
  Electromagnetic Compatibility Directive 2014/30/UE
- **Direttiva Bassa Tensione 2014/35/UE**
  Low Voltage Directive 2014/35/UE
- **Regolamento ErP 2016/2281/UE**
  ErP Regulation 2016/2281/UE

è stata progettata e costruita in conformità con le norme:
has been designed and manufactured in compliance with the standards:

- **EN1020:2009**
- **EN 1196:2011 (only PCH)**
- **EN60335-1**
- **EN60335-2-102**
- **EN60730-1 (only PCH)**
- **EN 60068-2-1 (only PCH)**
- **EN 60068-2-2 (only PCH)**
- **EN55014-1**
- **EN55014-2**
- **EN61000-3-2**
- **EN61000-3-3**

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Notified body:
Kiwa Cermet Italia S.p.A
0476
PIN 0476CQ0451

La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante
This declaration of conformity is issued under the sole responsibility of the manufacturer

Pessano con Bornago
02/11/2018

Apen Group S.p.A.

Un Amministratore

CODE

SERIAL NUMBER

INDEX

1. GENERAL CAUTIONS

This manual is an integral part of the product and must always accompany it.
Should the equipment be sold or passed on to someone else, always make sure that this manual is supplied with the equipment for future reference by the new owner and/or installer.
The manufacturer shall not be held civilly or criminally responsible for injuries to people or animals or damages to things caused by incorrect installation, calibration and maintenance or by failure to follow the instructions contained in this manual or by operations carried out by unqualified staff.
This product must be used only for the applications for which it was designed or approved. Any other use must be regarded as hazardous.
During the installation, operation and maintenance of the equipment described in this manual, the user must always strictly follow the instructions given in all the chapters of this use and instruction manual.

The condensing warm air heater must be installed in compliance with current regulations, according to the manufacturer's instructions and by qualified staff, technically specialised in the heating field.

First start-up, conversion between different types of gas and maintenance operations must be carried out only by suitably qualified staff of Technical Service Centres complying with the requisites required by the regulations in force in their country of competence.
Maintenance must be carried out with methods and timescales in compliance with the regulations in force in the country where the appliance is installed.

APEN GROUP commercial organisation has an extensive network of authorised Service Centres. For any information see Internet site www.apengroup.com or directly contact the manufacturer.
The warranty conditions are specified on the warranty certificate supplied with this equipment.

2. SAFETY-RELATED WARNINGS

The following symbol is used in this Manual whenever it is necessary to draw the operator's attention on a safety issue.

Safety rules for users or operators of the equipment and for nearby workers.

Please find below the safety regulations for the installation room and the air vents.

2.1. Fuel

Before starting the burner/heater, check that:
- gas supply specifications match those written on the rating nameplate;
- the combustion air is supplied in such a way as to avoid even partial obstructions of the intake grille;
- the gas seal of the feeding system has been tested and approved in compliance with the applicable standards;
- the heater burner is supplied with the same type of fuel it has been designed for;
- the unit is correctly sized to match required flow rate, indicated in the manual, and includes all safety and control devices required by the law;
- the inside of the gas pipes and air distribution ducts for ducted heaters has been thoroughly cleaned;
- the fuel flow rate is suitable for the power required by the heater;
- the fuel supply pressure is between the range specified on the nameplate.

When connecting gas supply pipe to gas valve, do not tighten excessively in order to avoid damaging sealing gaskets.

2.2. Gas leaks

If you smell gas:
- do not operate electrical switches, the telephone or any other object or device that can cause sparks;
- immediately open doors and windows to ventilate the room;
- close the gas valves;
- call for **qualified staff.**

2.3. Power supply

The heater must be correctly connected to an effective earthing system, fitted in compliance with current legislation.

Cautions:
- Check the efficiency of the earthing system and, if required, call out a qualified engineer.
- Check that the mains power supply is the same as the power input stated on the equipment nameplate and in this manual.
- Do not reverse live and neutral; the heater can be connected to the mains power supply with a plug-socket only if the latter does not allow live and neutral to be swapped.
- The electrical system and, more specifically, the cable section, must be suitable for the equipment maximum power input, shown on the nameplate and in this manual.
- Do not pull electric cables and keep them away from heat sources.

NOTE: It is compulsory to install, upstream of the power cable, a switch with a protection (fuses or automatic), as required by existing regulations. The switch must be visible, accessible and placed at a distance lower than 3 metres from the control compartment; any electrical operation (installation and maintenance) must be performed by qualified staff.

2.4. Use

Do not allow children or inexperienced people to use any electrically powered equipment.
The following instructions must be followed:

- do not touch the equipment with wet or damp parts of your body and/or with bare feet;
- do not leave the equipment exposed to the elements (rain, sun etc...) unless it is adequately protected;
- do not use the gas pipes to earth electrical equipment;
- do not wet the heater with water or other fluids;
- do not place any object over the equipment;
- do not touch the moving parts of the heater.

Avoid contact with hot heater surfaces. Such surfaces, generally located near the flame, overheat during operation and remain hot for some time after the burner has stopped.
If the equipment is not to be used for a certain period of time, open the main electrical switch of the thermal station and close the manual valve on the duct which brings the fuel to the burner.
If, instead, the equipment is not to be used any more, perform the following operations:

- a qualified person shall disconnect the power supply cable from the main switch;
- close the manual valve on the duct supplying fuel to the burner by removing or locking the control handwheel.

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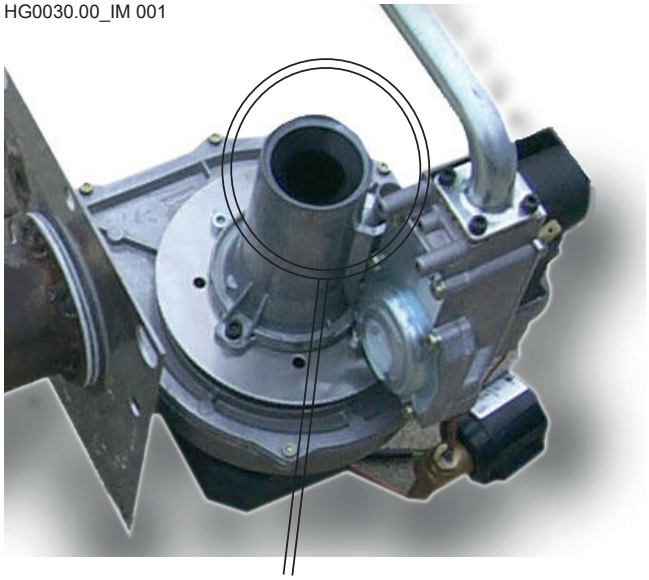


DO NOT COVER IT WITH YOUR HAND OR OTHER OBJECTS!

2.5. Air Vents

The room where gas fired heater will be installed must be provided with one or more air vents.
These air vents must be fitted:

- to the ceiling for gases with density lower than 0.8;
- to the floor for gases with density higher than or equal to 0.8.

The air vents must be fitted to walls facing the open air. The sections must be sized according to the heat output installed.
In case of doubt, measure the CO_2 with the burner working at maximum output rate and the room ventilated only through the air vents for the burner and then measure again with the door closed. $C0_2$ value must be the same under both conditions. If in the same room there are several burners or aspirators that can work together, measure with all the equipment working at the same time.
Do not obstruct the room air vents, the burner fan intake opening, any air ductwork and intake or dissipation grilles, avoiding in this way:

- stagnation in the room of any toxic and/or explosive mixture;
- smouldering combustion: dangerous, expensive, pollutant.

The heater, if not built for outdoor installation, shall be sheltered from rain, snow, and frost. If air is pulled from outdoor, the intake must be protected by a rain deflector or similar device that prevents water from penetrating into the heater.
The room where the heater-burner group is installed must be clean and deprived of volatile substances that can be drawn by the fan and obstruct burner inner hoses or combustion head. Dust itself can be a problem if it is left depositing on fan blades, thus reducing fan flow rate and making combustion polluting.

2.6. Installation

The heater must be used in the following conditions:

- The fuel used must have a sulphur content according to the European standard, namely: maximum peak, for short periods, 150 mg/m3, annual average lower than 30 mg/m3;
- Combustion air must not contain chlorine, ammonia, alkalis or sulphides; for example, installation near swimming pools or laundries exposes the heater to the effects of such agents; if this is the case we suggest taking air from the outside.

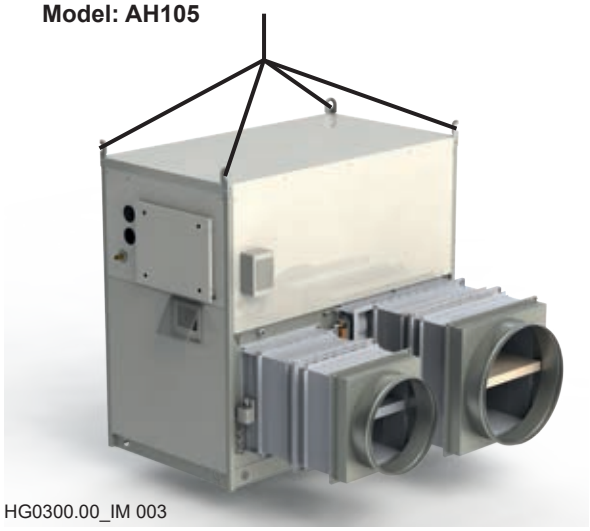
2.7. Maintenance

Before carrying out any cleaning and maintenance operations, isolate the boiler from the mains power supply using the switch located on the electrical system and/or on the shut-out devices.
If the heater is faulty and/or incorrectly operating, switch it off and do not attempt to repair it yourself, but contact the local Technical Service Centre.
All repairs must be carried out by using genuine spare parts. Failure to comply with the above instructions could compromise the safety of the equipment and invalidate the warranty.

2.8. Transport and handling

The heater is supplied with its own base or placed and properly fixed to a wooden pallet.
Unload the heater from the truck and move it to the site of installation by using means of transport suitable for the shape and for the weight of the load.
Any lifting and transport operations must be carried out by skilled staff, adequately trained and informed on the working procedures and safety regulations. Instructions in this Manual shall have to be followed when handling the exchanger.
Based on their weight and dimensions, heaters can be lifted with lift trucks or wheel-mounted crane.

Model: AH105



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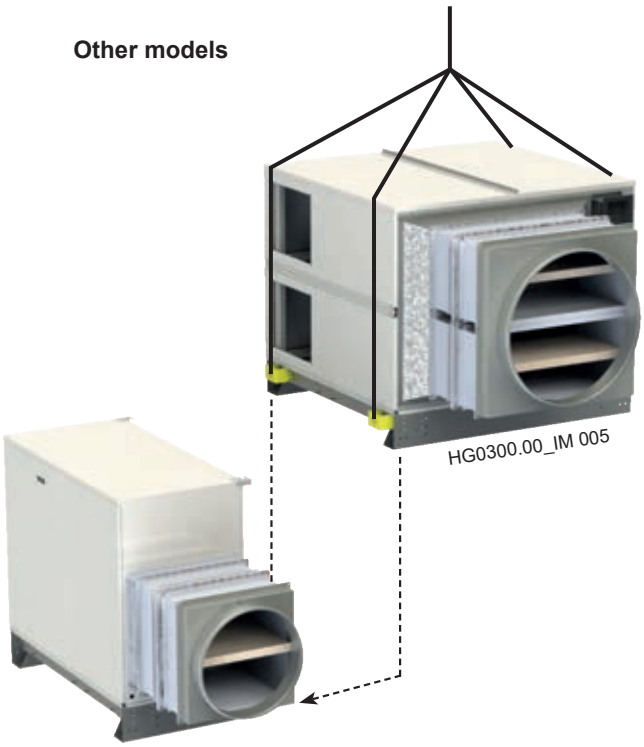
Other models



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In the first case, use fork extensions as long as heater width.

Model: AH105

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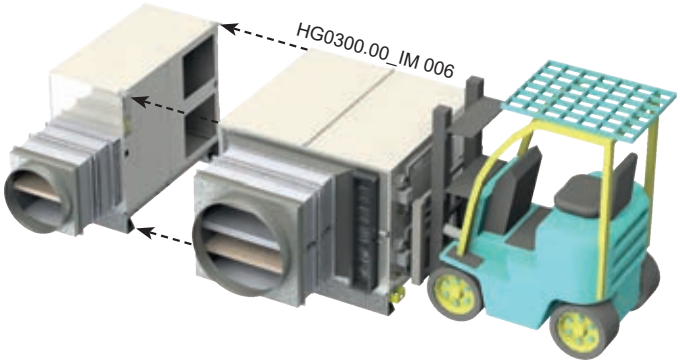
Other models



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2.9. Unpacking

The unpacking operation must be carried out by using suitable tools or safety devices where required. Recovered packaging materials must be separated and disposed of according to applicable regulations in the country of use.
While unpacking the unit, check that the unit and all its parts have not been damaged during transport and match the order. If damages have occurred or parts are found to be missing, immediately contact the supplier.
The manufacturer is not liable for any damages occurred during transport, handling and unloading.

Packing material disposal
The packing safeguards the product from transport damages. All the materials used are environmentally friendly and recyclable. Please contact a specialised distributor or your local administration for more information on waste disposal.

2.10. Dismantling and demolition

Should the machine be dismantled or demolished, the person in charge with the operation shall proceed as follows:

Disposal of end-of-life products

This equipment is marked in compliance with European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). This Directive defines the rules for collecting and recycling waste equipments throughout the entire territory of the European Union.
WEEE contain both pollutants (which may affect the environment negatively) and raw materials (which may be re-used). Therefore WEEE must undergo specific treatment operations to remove and dispose of the pollutants in a safe manner and extract and recycle the raw materials. It is forbidden to dispose of WEEE in unsorted municipal waste. These operations facilitate recovery and recycling of the materials, thus reducing the environmental impact.

NOTE: All materials recovered will be processed and disposed of according to what provided for by the laws in force in the country of use and/or according to the standards indicated in the safety sheets of the chemicals.

INFORMATION FOR DISPOSAL valid in ITALY (Legislative Decree 49/2014)
The AH series air handling units and relating accessories are considered “professional WEEE - waste electrical and electronic equipment”. According to the legislation in force in Italy, professional WEEE must be sent to treatment plants suitable for these types of waste. Please contact the Apen Group for end-of-life products so as to obtain all the information necessary for their correct waste disposal, which is possible thanks to the Collective System (Union) to which the company is associated. Please remember that product disposal without complying with the mode described above is a violation liable to administrative and penal sanctions.

INFORMATION FOR DISPOSAL valid abroad (EU COUNTRIES except Italy).
The European Directive 2012/19/EC shall be implemented in every EU member state. There may be different application modalities for the various member states, even in terms of modality for waste disposal depending on its type (House-hold or Professional WEEE). To this regard at the end of the life of the product, we highly recommend you call the distributor or installer so as to obtain information on the correct disposal, in compliance with the existing laws of the installation country.

3. TECHNICAL FEATURES

3.1. Main Components

AH-T and AH-P heaters have been designed for heating sport facilities, respectively AH-T for tensostatic sport structures and AH-P for pressure static sport structures (sport facility cloth roofs - air domes), and consist of:

- PCH module (stainless steel condensing heat exchanger with premix burner)
- Centrifugal fans with permanent magnet electronic motor and inverter
- Frame made of Magnelis® sheet (special surface treatment)
- Prepainted, white sheet panelling
- Safety Devices and Controls
- Smart Web

PCH module
The PCH condensing module, integrated in the machine, is made entirely of stainless steel. It is controlled by the monitoring and adjusting PCB CPU-PLUS that manages its switching on and off, burner modulation and fault indication. In the modulating operating mode the thermal output and, therefore, the heat output (fuel consumption) vary according to the heat demand. When the heat demand from the environment reduces, the heater uses less gas and increases its efficiency - up to 108% (a Net caloric value).

The heat exchanger complies with construction requirements set by standard EN1196 for equipment where combustion gases produce condensate.

The combustion chamber and the surfaces in contact with condensation (such as the pipe bundle and exhaust hood), are made of AISI 441, in order to provide high resistance to condensation and temperature.
The following table shows the conversion of stainless steels used:

USA-AIS	EN-No.	COMPOSITION
AISI 441	1.4509	X2 CrTiNb 18

Centrifugal fans
Air handling is controlled by the centrifugal fans with permanent magnet electronic motor and high-efficiency inverter, powered with direct current with integrated rotation speed control.
All motors used, except those with direct drive to the fan, have the following characteristics:

- Supply 230V - single-phase - 50 Hz
- Manufacturing Direct Drive
- Protection degree IP44
- Isolation level cl.F
- Efficiency IE5
- Operating temperature MIN = -20°C - MAX = +40°C; up to the limit of +50°C (derating from +40°C to +50°C)

Motor data for every type of machine is indicated further in this manual.

If the air flow rate decreases, the heat output shall automatically diminish.

Frame and body
The frame is made of Magnelis® sheet columns firmly linked to the main panels (intake section, fan section and delivery section), also made of Magnelis®, constituting the bearing structure. The white prepainted containment panelling finishes and completes the machine externally.

Safety Devices and Controls
All heaters are supplied with the following thermostats:

- STB — Manual reset safety thermostat, inside the air flow, which switches off the burner immediately if the temperature is too high;
- NTC — Fume probe, modules and stops the burner operation before the safety thermostat activates;
- FUME thermostat — Manual reset fume thermostat for protecting the PP individual or common flues.

3.2. Technical Data

There are 2 configurations of AH-T and/or AH-P, listed below:

A Single module;
B Multiple modules.

A - Single module

The single-module heaters comprise a single heat exchanger. The range includes the AH105 model for tenso or pressure structures. The heat output ranges from 22.77 to 97.15 kW produced.

NOTE:

* Symbol in compliance with Reg.EU/2281/2016.

(1) PCH module envelope losses are considered null since it is positioned inside the AH unit ventilation section.

(2) Max. condensation produced acquired from testing at 30%Qn.

(3) Value referred to cat. H (G20).

(4) Weighted value to EN1020:2009 ref. to cat. H (G20), referred to net calorific value (Hi, N.C.V).

(5) Weighted value to EN1020:2009 ref. to cat. H (G20), referred to gross calorific value (Hs, G.C.V).

(6) Reference air flow rate for the calculation of yields and season energy efficiencies and emissions listed in the table.

Model		**AH105**	
Type of equipment		B23P - B53P - C13 - C43 - C53 - C63 - C83 (Ref. PCH module)	
EC approval	PIN.	0476CQ0451 (Ref. PCH module)	
NOx Class	Val	5 (Ref. PCH module)	
Type of fuel		Gaseous	
PCH module heater efficiency		**1 x PCH105**	
		min	max
Burner heat output (Hi)	kW	21.00	100.00
Useful heat output [P_{min}, P_{rated}]*	kW	22.77	97.15
Hi Efficiency (N.C.V.) [η_{pl}, η_{nom}]*	%	108.40	97.15
Hs efficiency (G.C.V.) [η_{pl}, η_{nom}]*	%	97.68	87.52
Flue losses with burner on (Hi)	%	0.2	2.8
Flue losses with burner off (Hi)	%	<0,1	
Envelope loss factor [F_{env}]* (1)	%	0%	
Seasonal space heating energy efficiency [Reg.EU/2281/2016] [$\eta_{s,h}$]*	%	93.1	
Emission efficiency [Reg.EU/2281/2016] [η_{sflow}]*	%	97.0	
Max. condensation (2)	l/h	2.7	
Flue gas - PCH module emissions		**PCH105 x 1**	
Carbon monoxide - CO - (0% of O_2) (2)	ppm	< 5	
Nitrogen oxide emissions - *NOx** (0% of O_2) (Hi) (4)		39 mg/kWh - 22 ppm	
Nitrogen oxide emissions - *NOx** (0% of O_2) (Hs) (5)		35 mg/kWh - 20 ppm	
Pressure available at the flue	Pa	120	
		Flue gas temperature, CO_2 content and maximum flue gas flow rate: see tables in Sec. 8.3 and subsequent	
		Electrical Characteristics	
Supply voltage	V	400V/3F+N - 50 Hz	
Rated power [el_{min} - el_{max}]* - TENSOSTRUCTURES	kW	0.020	1.644
Rated power [el_{min} - el_{max}]* - PRESSURE STRUCTURES	kW	0.020	4.044
Power input in stand-by [el_{sb}]*	kW	0.005	
Protection Rating	IP	IP X5D (Ref. PCH module)	
Operating Temperatures	°C	from -15°C to +40°C - for lower temperatures, a burner housing heating kit is required	
		Connections	
Ø gas connection		UNI/ISO 228/1- G 3/4"	
Intake/exhaust pipes Ø	mm	80/80	
		Air flow rate	
Air flow rate (15°C)(6)	m^3/h	See diagram "air flow rates - pressure drops"	
Heat exchanger pressure drop	Pa	See diagram "air flow rates - pressure drops"	
		Weight	
Net Weight	kg	385	

B - Multiple modules

The multiple-module heaters consist of two or more heat exchangers; the number of burners and gas equipments match the number of heat exchangers.
The gas connection is individual for each module.
The wiring connection is on the other hand common for the entire machine.
The range includes the two-module models, AH160 and AH210 and the three-module model, AH240 and AH320.
The heat output ranges from 35.54 to 291.45 kW produced.

NOTE:

* Symbol in compliance with Reg.EU/2281/2016.

(1) PCH module envelope losses are considered null since it is positioned inside the AH unit ventilation section.

(2) Max. condensation produced acquired from testing at 30%Qn.

(3) Value referred to cat. H (G20).

(4) Weighted value to EN1020:2009 ref. to cat. H (G20), referred to net calorific value (Hi, N.C.V).

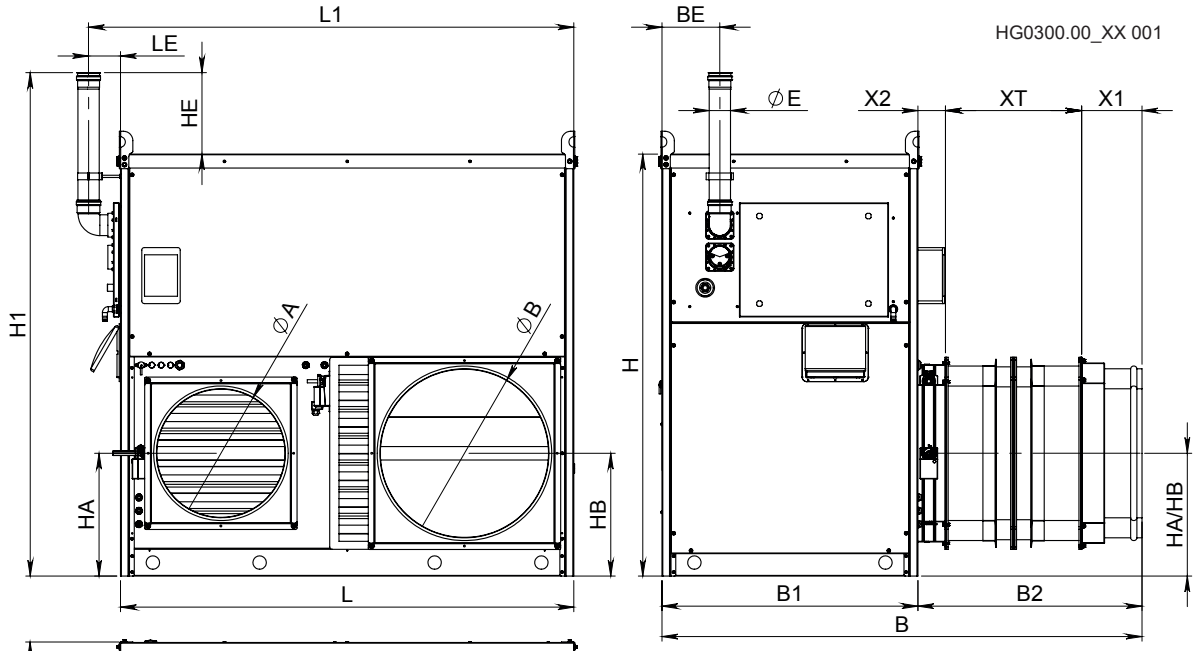
(5) Weighted value to EN1020:2009 ref. to cat. H (G20), referred to gross calorific value (Hs, G.C.V).

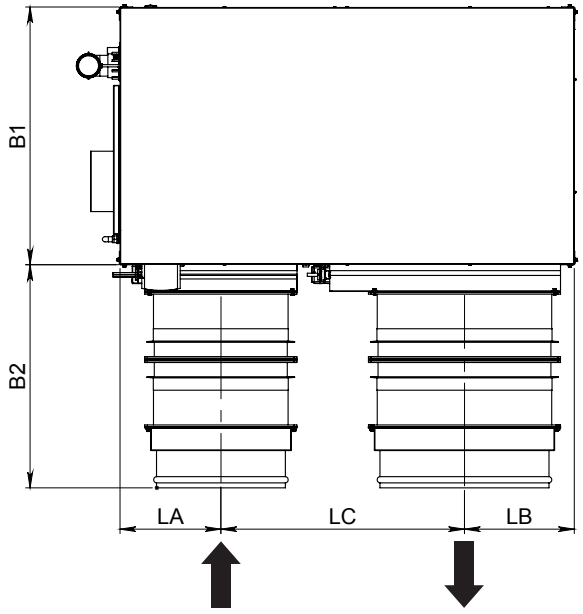
(6) Reference air flow rate for the calculation of yields and season energy efficiencies and emissions listed in the table.

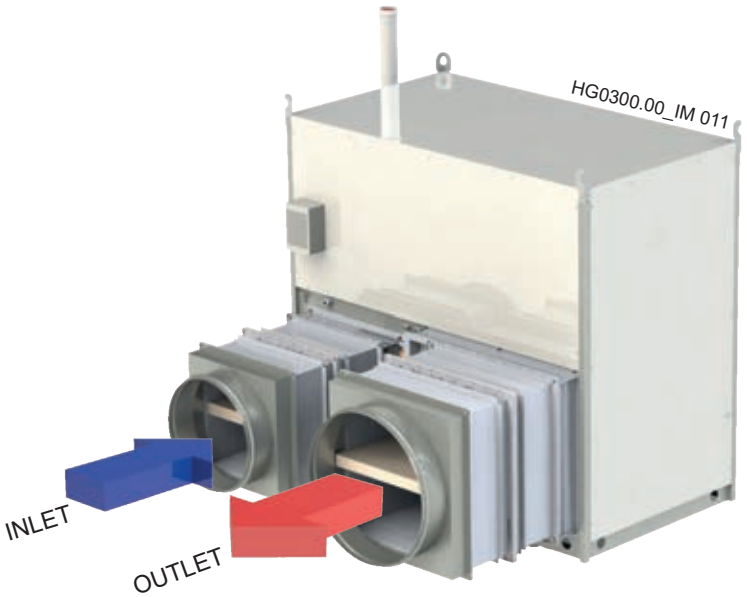
Model		AH160		AH210		AH240		AH320	
Type of equipment		B23P - B53P - C13 - C43 - C53 - C63 - C83 (Ref. PCH module)							
EC approval	PIN.	0476CQ0451 (Ref. PCH module)							
NOx class [EN1020:2009]	Val	5 (Ref. PCH module)							
Type of fuel		Gaseous							
PCH module heater efficiency		**2 x PCH080**		**2 x PCH105**		**3 x PCH080**		**3 x PCH105**	
		min	max	min	max	min	max	min	max
Burner heat output (Hi)	kW	32.80	164.00	42.00	200.00	49.20	246.00	63.00	300.00
Useful heat output [P_{min}, P_{rated}]*	kW	35.54	160.06	45.54	194.30	53.31	240.09	68.31	291.45
Hi Efficiency (N.C.V.) [η_{pl}, η_{nom}]*	%	108.35	97.60	108.40	97.15	108.35	97.60	108.40	97.15
Hs efficiency (G.C.V.) [η_{pl}, η_{nom}]*	%	97.62	87.93	97.68	87.52	97.62	87.94	97.68	87.52
Flue losses with burner on (Hi)	%	0.3	2.4	0.2	2.8	0.3	2.4	0.2	2.8
Flue losses with burner off (Hi)	%	<0,1		<0,1		<0,1		<0,1	
Envelope loss factor [F_{env}]* (1)	%	0%		0%		0%		0%	
Seasonal space heating energy efficiency [Reg.EU/2281/2016] [$\eta_{s,h}$]*	%	94.0		94.0		93.2		94.2	
Emission efficiency [Reg.EU/2281/2016] [η_{sflow}]*	%	97.9		97.9		97.1		98.1	
Max. condensation (7)	l/h	6.6		5.4		9.9		8.1	
Flue gas - PCH module emissions		**PCH080 x 2**		**PCH105 x 2**		**PCH080 x 3**		**PCH105 x 3**	
Carbon monoxide - CO - (0% of O_2) (2)	ppm	< 5		< 5		< 5		< 5	
Nitrogen oxide emissions - *NOx** (0% of O_2) (Hi) (3)		41 mg/kWh - 23 ppm		39 mg/kWh - 22 ppm		41 mg/kWh - 23 ppm		39 mg/kWh - 22 ppm	
Nitrogen oxide emissions - *NOx** (0% of O_2) (Hs) (4)		37 mg/kWh - 21 ppm		35 mg/kWh - 20 ppm		37 mg/kWh - 21 ppm		35 mg/kWh - 20 ppm	
Pressure available at the flue	Pa	120		120		120		120	
		Flue gas temperature, CO_2 content and maximum flue gas flow rate: see tables in Sec. 8.3 and subsequent							
		Electrical Characteristics							
Supply voltage	V	400V/3F+N - 50 Hz							
Rated power [el_{min} - el_{max}]* - TENSOSTRUCTURES		0.040	3.446	0.040	8.260	0.060	5.169	0.060	12.390
Rated power [el_{min} - el_{max}]* - PRESSURE STRUCTURES	kW	0.040	8.246	0.040	8.260	0.060	12.369	0.060	12.390
Power input in stand-by [el_{sb}]*	kW	0.005							
Protection Rating	IP	IP X5D (Ref. PCH module)							
Operating Temperatures	°C	from -15°C to +40°C - for lower temperatures, a burner housing heating kit is required							
		Connections							
Ø gas connection		UNI/ISO 228/1-2 x G 3/4"		UNI/ISO 228/1-2 x G 3/4"		UNI/ISO 228/1-3 x G 3/4"		UNI/ISO 228/1-3 x G 3/4"	
Intake/exhaust pipes Ø	mm	2 x 80/80		2 x 80/80		3 x 80/80		3 x 80/80	
		Air flow rate							
Air flow rate (15°C)(5)	m^3/h	See diagram "air flow rates - pressure drops"							
Heat exchanger pressure drop	Pa	See diagram "air flow rates - pressure drops"							
		Weight							
Net Weight	kg	900		900		1200		1200	

3.3. Dimensions

Models: AH105xx-T and AH105xx-P



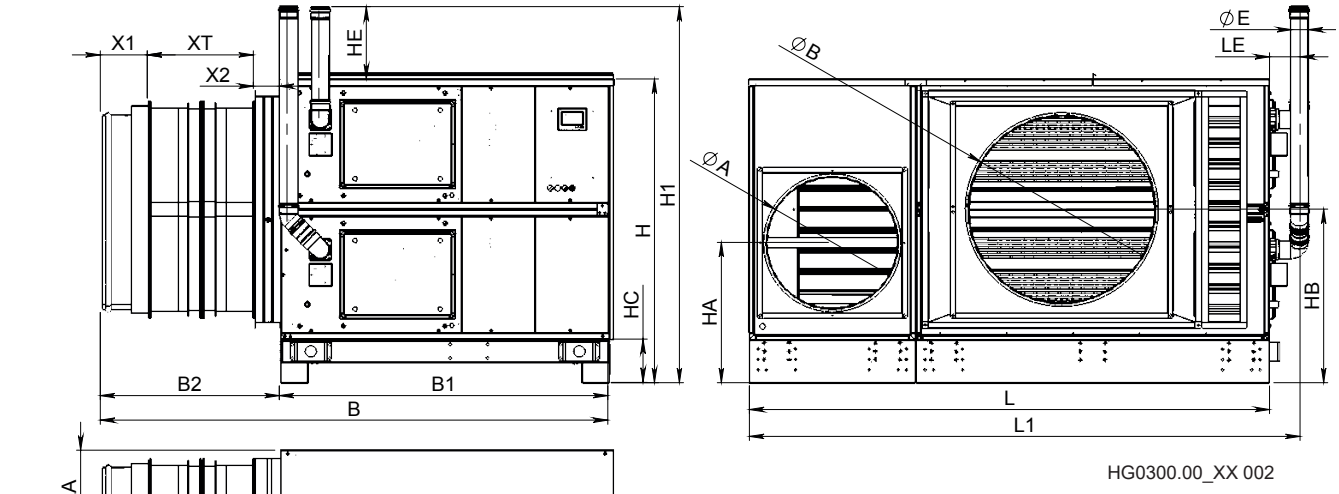




Model	Overall dimensions			Dimensions			Louver								Chimney				Gas
									Intake			Delivery							
	B	L	H	B1	L1	H1	B2	LC	LA	HA	ØA	LB	HB	ØB	BE	LE	HE	ØE	
AH105	1800	1700	1580	960	1820	1885	840	912	378	460	483	410	460	633	217	120	305	1x80	1 x G 3/4"

	X1	X2	XT
AH105	225	105	510
AH160 / AH210	225	125	510
AH240 / AH320	225	200	510

Other models:



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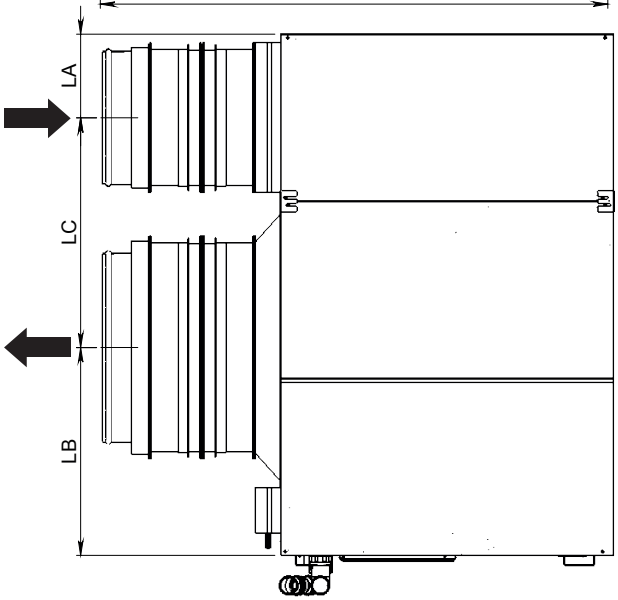
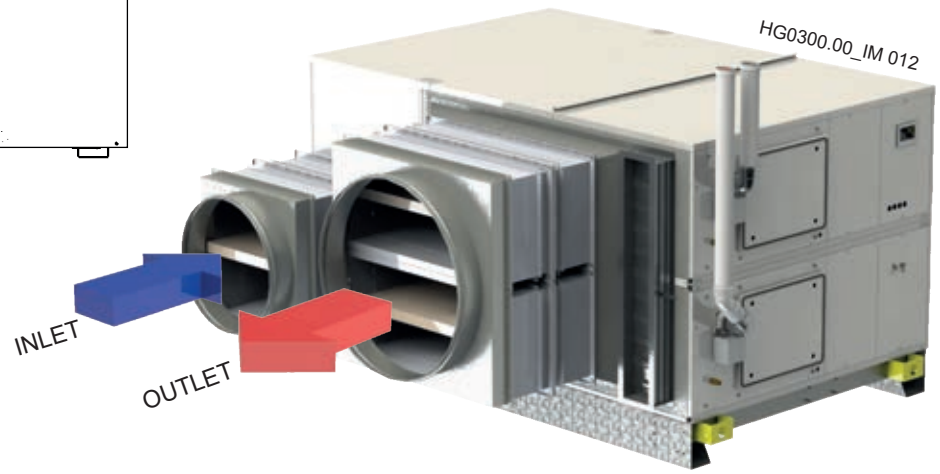




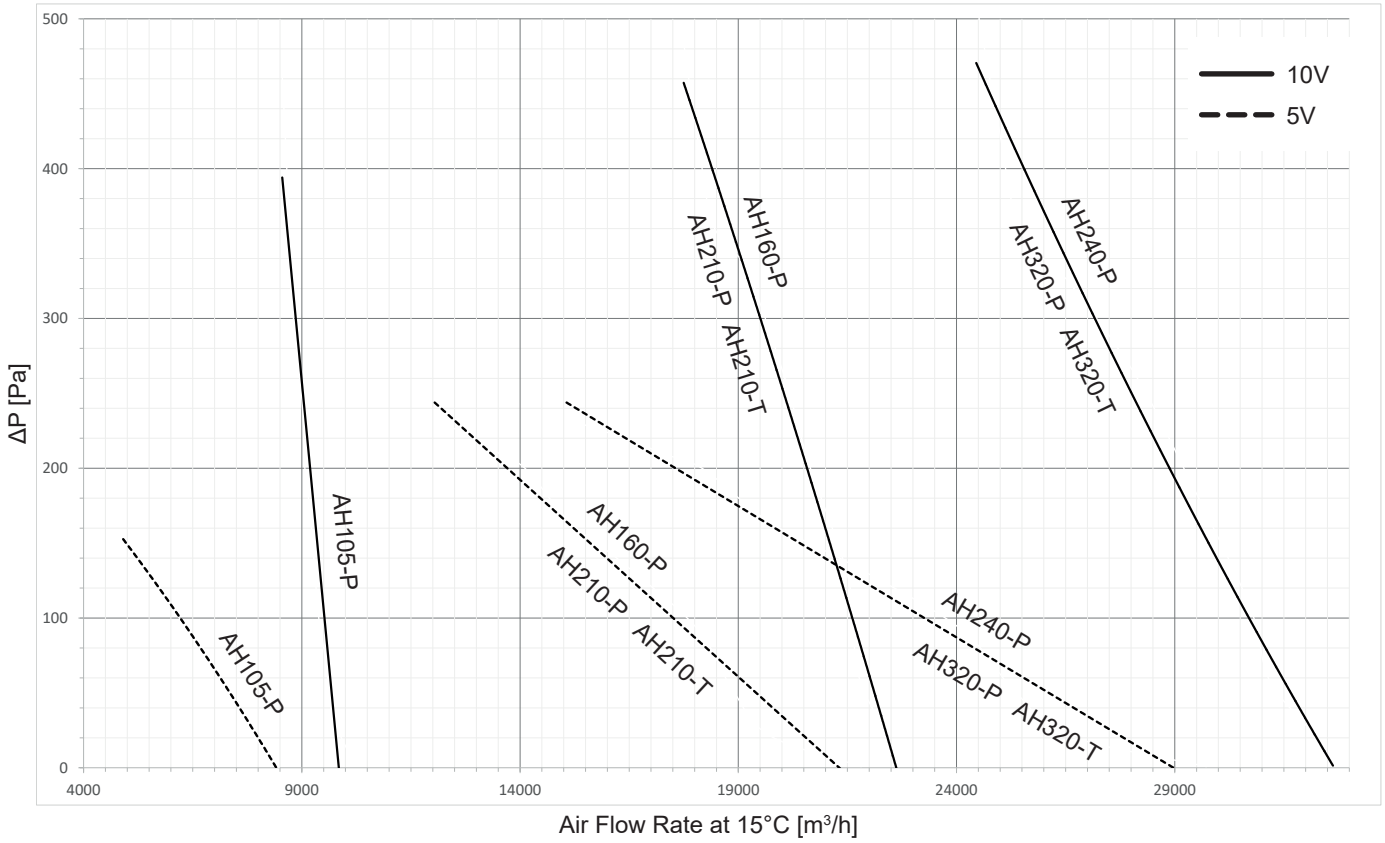
HG0300.00_IM 012

Model	Overall dimensions			Dimensions				Louvers								Chimney			Gas
										Intake			Delivery						
	B	L	H	B1	L1	H1	HC	B2	LC	LA	HA	ØA	LB	HB	ØB	LE	HE	ØE	
AH160	2460	2500	1485	1600	2650	1810	210	860	1105	400	675	633	995	835	900	145	350	2x80*	2 x G 3/4"
AH210	2460	2500	1485	1600	2650	1810	210	860	1105	400	675	633	995	835	900	145	350	2x80*	2 x G 3/4"
AH240	2535	2815	2110	1600	2965	2435	210	935	1260	560	945	900	995	1147	1200	145	350	3x80*	3 x G 3/4"
AH320	2535	2815	2110	1600	2965	2435	210	935	1260	560	945	900	995	1147	1200	145	350	3x80*	3 x G 3/4"

*Note: the flue outlet may be “independent exhaust” or “common exhaust”, please refer to par.5.5 “Chimney connections”.

3.4. Air flow rate curves - Available pressure/Power consumption

DDMP 2000 W fans



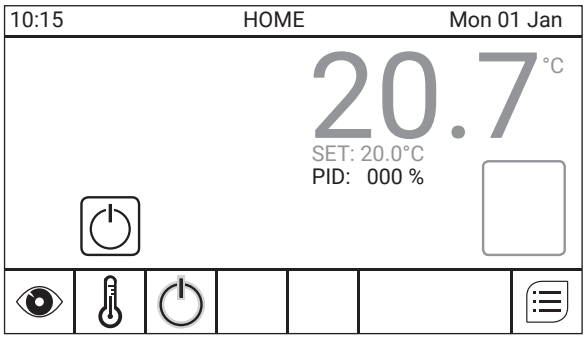
4. USER'S INSTRUCTIONS

4.1. Smart Web

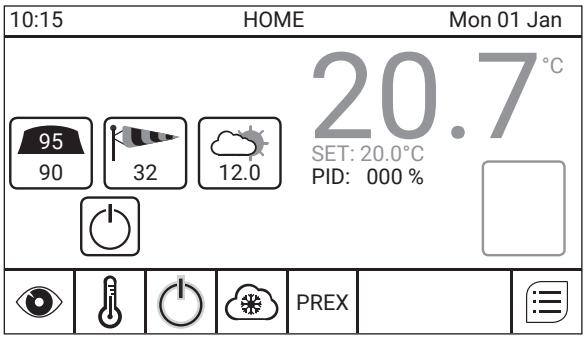
The Smart Web remote control equipped as standard is supplied already configured with the type of system and with all the parameters necessary for the heater to work to its best (except in case of particular installation and/or system conditions). The final user must take care only, if needed, to reconfigure some setpoints and/or time ranges according to their needs.

Here below are shown briefly some main menu pages, for the other functions, or for further information, please refer to the manual supplied with the chronothermostat.

In TENSOSTATIC sport structures the Smart Web is set as "Hot Air Heater" system and the "HOME" page looks as follows:



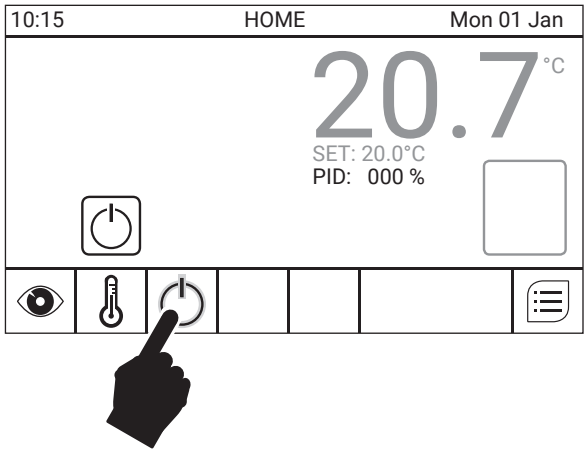
In PRESSURE STATIC sport structures the Smart Web is set as "Sport Structure" system and the "HOME" page looks as follows:



Here below are shown the factory settings and parameters that the user may modify.

4.1.1. PRIORITY ON/ OFF

The Smart Web is supplied by default in "Priority OFF". This setting may be modified directly with the ON/OFF key located in the "HOME" page as shown in the picture:




RED = System OFF


GREEN = System ON

To switch on the system move the ON/OFF Priority switch to ON (Green icon).

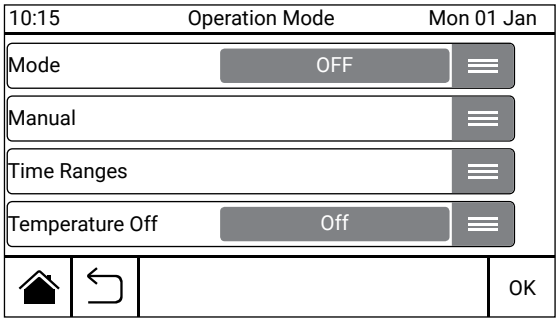
NOTE: Every time you wish to change the "ON/OFF Priority" status a message for confirming the action to be performed is displayed. Press "OK" to confirm. Press the back key ⮌ to cancel

ATTENTION: In PRESSURE STATIC structures the ON/OFF Priority function DOES NOT affect ventilation, but only heating.

4.1.2. OPERATION MODE

The "Operation Mode" default settings are the following:

- Mode - OFF
- Manual - OFF
- Time Ranges - OFF

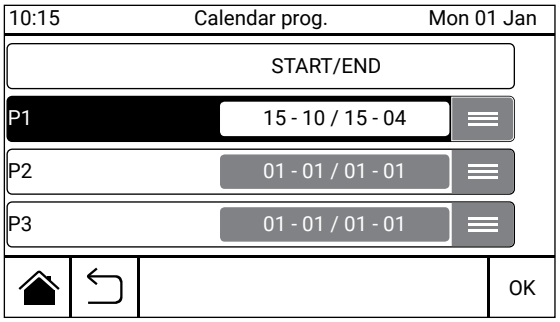


By setting a “Mode” other than “OFF” and the “Manual” or “Time Ranges” mode, the system activates with the calendar/time ranges settings and Setpoint indicated here below.

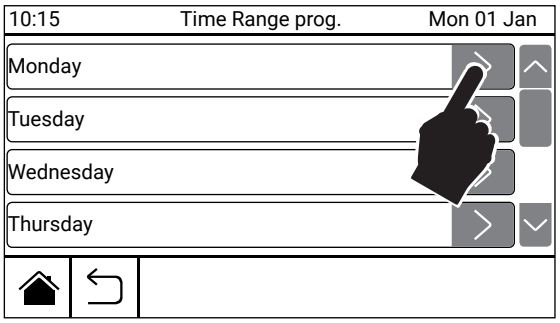
4.1.3. CALENDAR / TIME RANGES

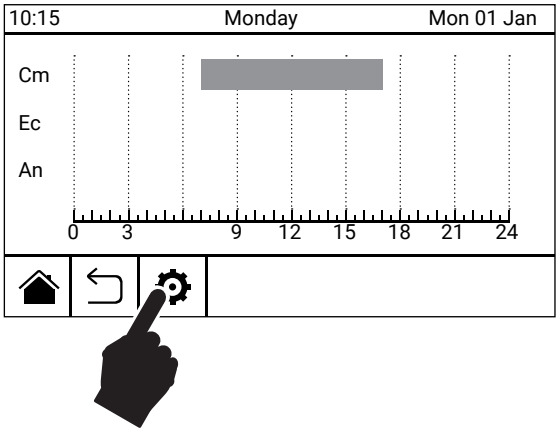
The calendar and time ranges default settings are the following:

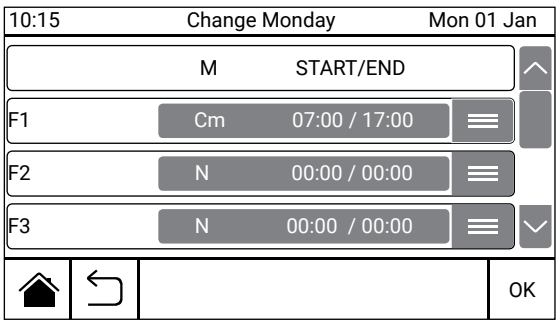
- Calendar - P1 enabled from 15-10 up to 15-04



- Time Ranges - From Monday through Friday enabled in "Comfort" from h 07.00 until h 17.00



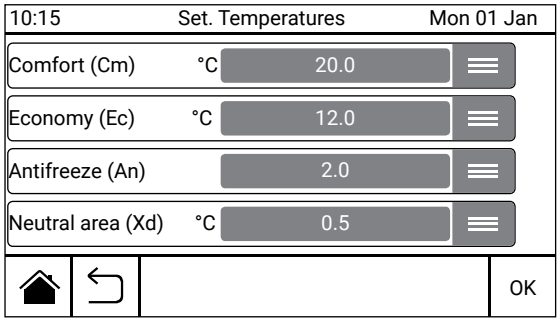




4.1.4. TEMPERATURE SETPOINT

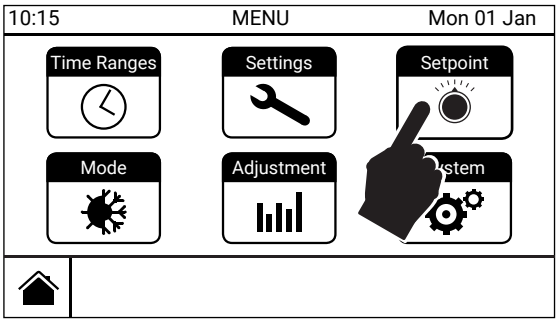
The temperature setpoints are the following:

- Comfort (Cm) 20.0° C
- Economy (Ec) 12.0° C
- Antifreeze (An) 2.0° C
- Neutral Area (Xd) 0.5° C



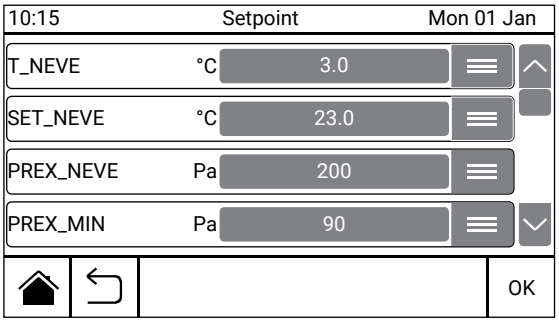
4.1.5. CONTROL SETPOINT

Inside the main "MENU" page it is possible to select the Setpoint adjustment submenu for the Pressure Static sport structures.



The setpoints default settings of the different controls are the following:

- T_NEVE 3.0 °C (SNOW control)
- SET_NEVE 23.0 °C (SNOW control)
- PREX_NEVE 200 Pa (SNOW control)
- PREX_MIN 90 Pa (PRESSURE control)
- PREX_MAX 200 Pa (PRESSURE control)
- PREX_MAX2 250 Pa (PRESSURE control)
- SPEED_MIN 10 Km/h (WIND control)
- SPEED_MAX 80 Km/h (WIND control)

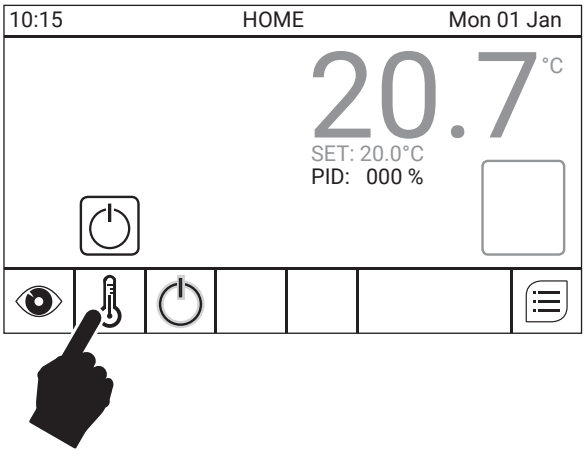


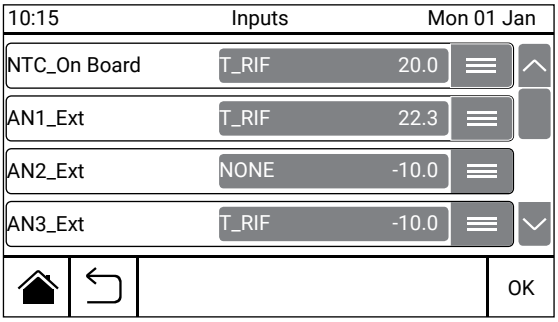
The different set-points and their meaning are shown afterwards in the sections of the relating controls.

4.1.6. INPUT MENU

By entering this menu by pushing the key, it is possible to (for all inputs):

- Display the temperatures “measured” by the probes connected
- Display to which input a certain probe is connected and what reference has been associated to which probe
- Detect any reading error
- Correct the probe reading value by means of an offset parameter.

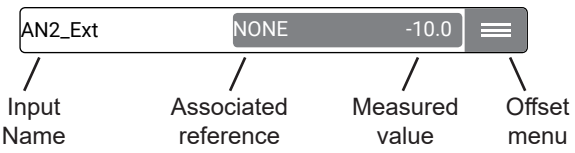




The inputs that may be displayed inside the menu are:

- NTC_On Board
- AN1_Ext
- AN2_Ext
- AN3_Ext
- ID1_Ext
- ID2_Ext

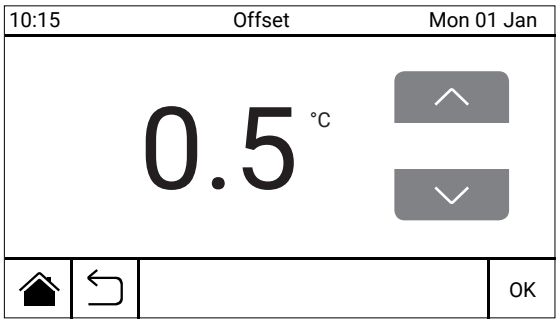
The menu comprises the following



If the probe is not connected the “NONE” indication is displayed and next to it the “-10.0” value:

If there is a probe reading error or incorrect probe connection/ configuration, the following condition is present:

By pressing the key next to an input, it is possible to access the offset adjustment menu. This menu allows to correct the reading value for that specific probe and is represented by a page as the one below:

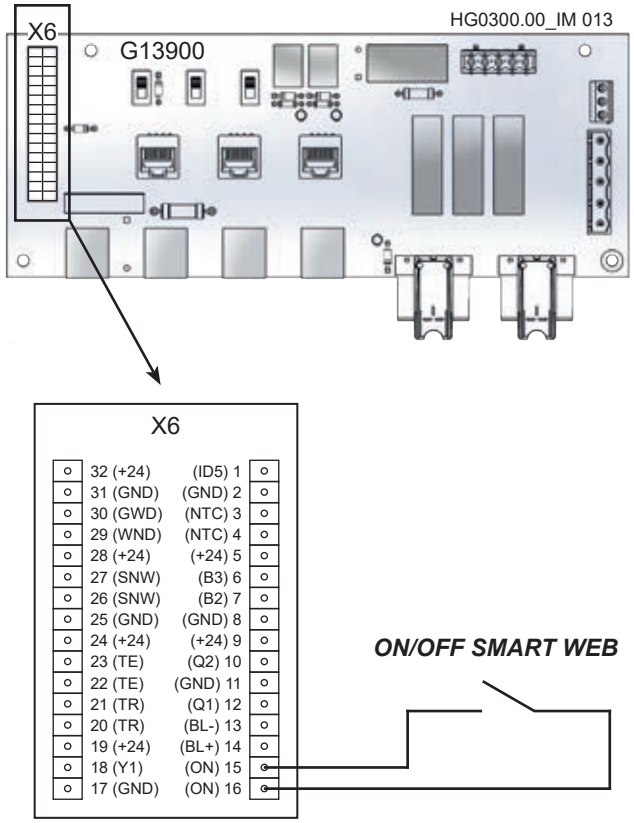


4.2. Remote On/Off (OPTIONAL)

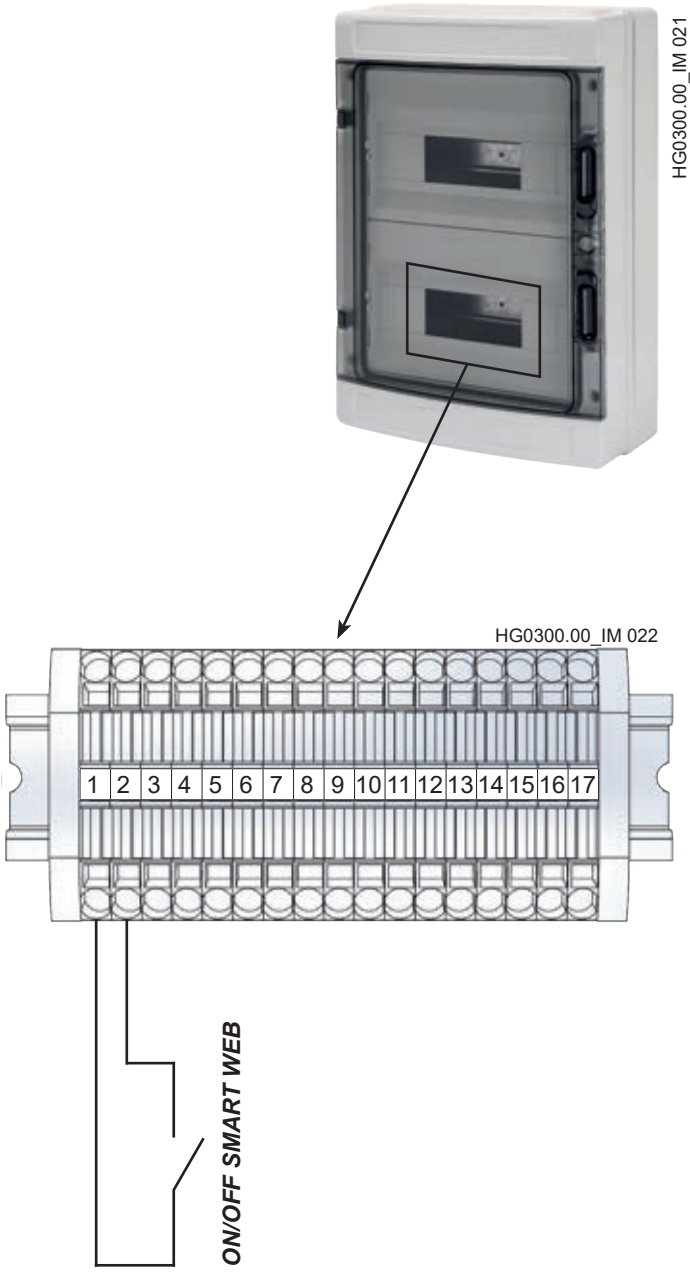
Any On/Off priority control may be remotely controlled from the heater by connecting to terminals 15 / 16 of terminal board X6 of the G13900 wiring card, eliminating the existing jumper, as shown in the following wiring diagram.
The remote On/Off contact has priority with respect to the time range heat request or the manual mode, but not with respect to a snow function heat request, which is independent.

ELECTRICAL CONNECTION

(Only for model AH105)



(For all the other models)



4.3. Pressure control (STANDARD in "P" versions)

The **AH-P** heaters are equipped with a pressure sensor for keeping the pressure inside the air dome at a preset constant level. Depending on the preset setpoint and the pressure measured in the air dome, the heater adjusts the fan speed and the opening of the recirculation shutter to keep the pressure at the desired constant level, as shown here below:

- In "**Mode = Heating**" the fans rotate at at fixed speed set in parameter H18 (default = 8V). This parameter may be modified from 6V to 10V, depending on the system's specifications and the heater adjusts the pressure by adjusting the intake recirculation shutter.
- In "**Mode = Maintenance**" (heating OFF) the intake recirculation shutter is completely closed and the heater adjust the internal pressure by modulating the fan speed through the parameters H12 (min speed) and H13 (max speed) set by default respectively to 2V and 10V.

NOTE: We discourage the modification of parameters H12 and H13 since they have been set to allow the heater an ideal modulation and operation.

ATTENTION: If the AH heater comprises two or more modules, the parameter H18 in question is the one on the CPU PCB of the "MASTER" module. To identify the "MASTER" module see Section 6.16 "Replacing the wiring card".

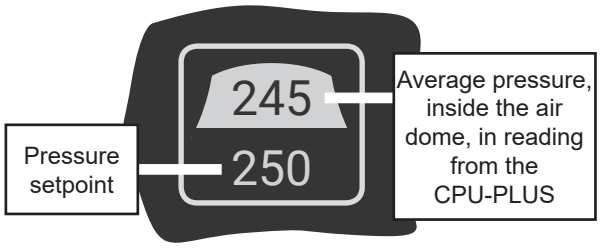
Pressure Control may be set to "**MAN**" (MANUAL operation) or to "**AUTO**" (AUTOMATIC operation - ONLY IF combined to Wind Control).

Setpoints that may be set for Pressure Control:

Setpoint	Default	Description
PREX_MIN	90 Pa	Minimum value of the automatic pressure range (with wind control); Manual setpoint 1
PREX_MAX	200 Pa	Maximum value of the automatic pressure range (with wind control); Manual setpoint 2
PREX_MAX2	250 Pa	Manual setpoint 3
PREX_NEVE	200 Pa	Setpoint value sent in snow conditions (with snow control)

These setpoints may be modified in the "Set-Point" menu. Please refer to section 4.1 "Smart Web".

In the "HOME" page there is an icon that indicates the average pressure value read by the AH heater and the setpoint pressure value sent in that moment:



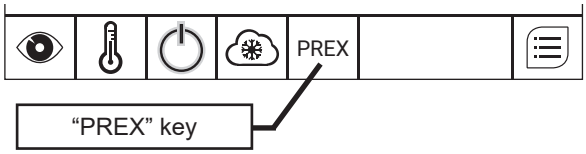
ATTENTION: Pressure control is a priority and ALWAYS ACTIVE even when the heating system is "OFF", and/or the ID1 contact is open.

Please find here below the Pressure Control logic.

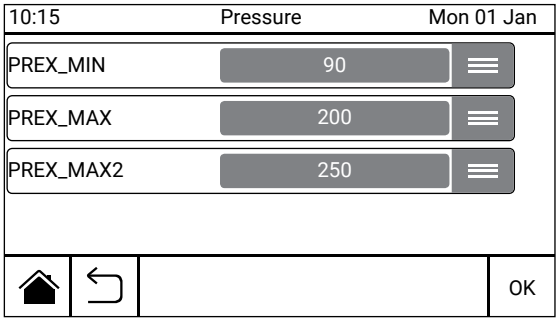
MANUAL OPERATION ("MAN")

It is possible to choose manually one of the 3 setpoints (PREX_MIN; PREX_MAX; PREX_MAX2) selectable from the "PREX" menu, to send to the CPU-SMART PCB, as indicated below:

Press the "PREX" key inside the bottom line of the "HOME" page:



Press this key to access the quick setpoint selection menu, as follows:



After choosing one of the 3 setpoints and pressing the "OK" key, the pressure control is managed with said setpoint as FORCED and always FIXED until it is deactivated.
In the "HOME" page the "PREX" key and the "Pressure Control" icon (showing the selected setpoint) are highlighted in yellow, as shown further below.

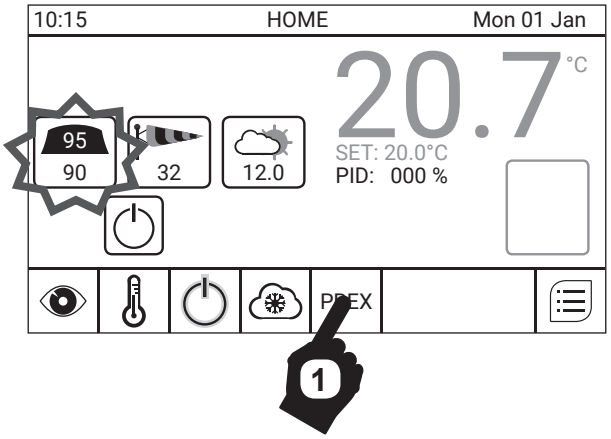
To deactivate the FORCED setpoint just press again, only once, the "PREX" key without entering the menu. The "Pressure Control" icon and "PREX" key now are "grey" again.

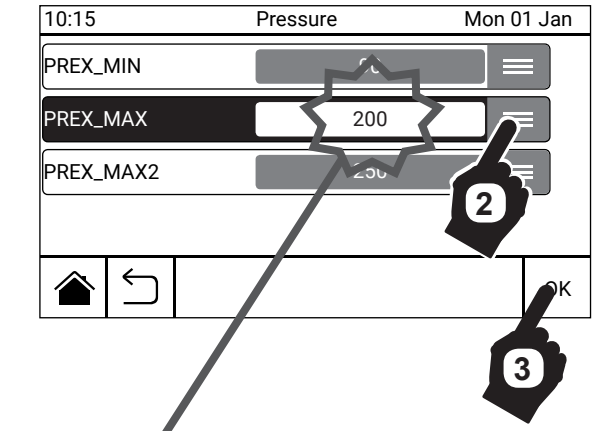
AUTOMATIC OPERATION ("AUTO") (ONLY IF combined with Wind Control)

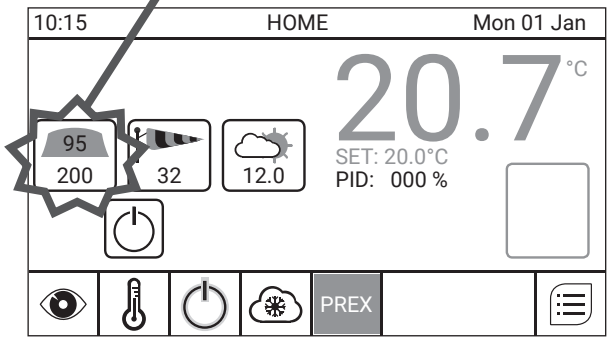
The pressure setpoint sent to the CPU-SMART PCB modulates automatically between the values of the two setpoints PREX_MIN (minimum value) and PREX_MAX (maximum value), depending on the wind speed measured by the wind gauge.
Even when the pressure control is set to "AUTO" it is still possible to force manually one of the 3 pressure setpoints to send, as for the “MAN” operation, shown in the images below.

NOTE: If there is snow (both manually or automatically forced, with rain control) the pressure setpoint goes to the PREX_NEVE preset value.

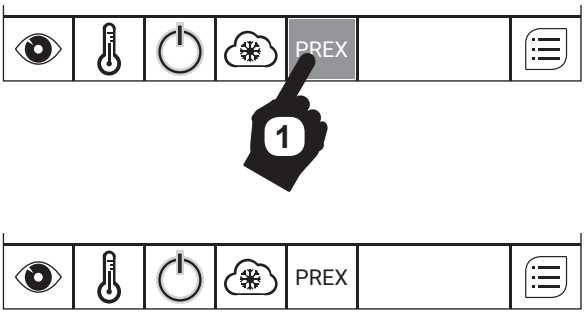
Activation of FORCED setpoint







Deactivation of FORCED setpoint



4.4. Wind control (OPTIONAL in "P" versions)

The function of Wind Control (if present) is modulating automatically the pressure setpoint value, depending on the wind conditions. It comprises a wind gauge (connected to AN3 input, in 0/10V configuration) for detecting wind presence and intensity (speed expressed in km/h).

If the Wind Control is purchased together with the heater, it is already configured and operating as soon as it is connected. Otherwise in order to activate the function you must configure input AN3 as 0/10V (Section 4.6 "AN3 input configuration") and set said control to "YES" in the "System Configuration > Sport Structures" menu.

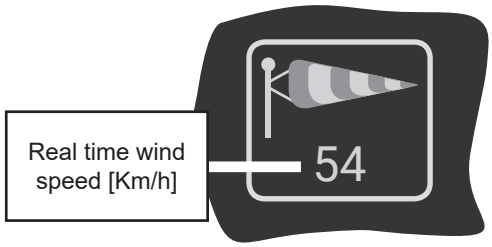
NOTE: In the "Wind Control" function there are only two options "NOT" and "YES" (Not active/Active) and it may be managed only as an "AUTOMATIC" control. It is not possible to force or manage the function in manual mode (MAN).

Setpoints that may be set for Wind Control:

Setpoint	Default	Description
SPEED_MIN	10 Km/h	Wind minimum speed value considered in the pressure curve
SPEED_MAX	80 Km/h	Wind maximum speed value considered in the pressure curve

These setpoints may be modified in the "Set-Point" menu. Please refer to section 4.1 "Smart Web".

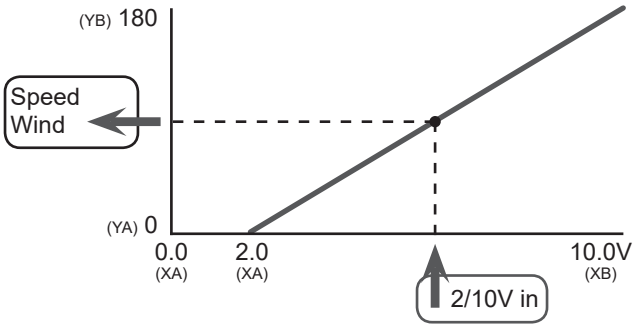
The "HOME" page displays an icon with the wind speed instantaneous value (expressed in km/h).



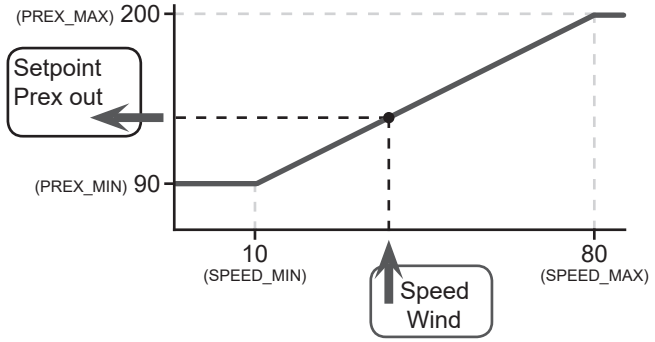
Please find here below the Wind Control logic.

ACTIVE OPERATION ("YES")

Wind control includes reading and parametrising a wind speed value sent by a wind gauge, in a range between 2 and 10V and 0 and 180 km/h (these values may change depending on the wind gauge being used). The input parametrisation is as follows:



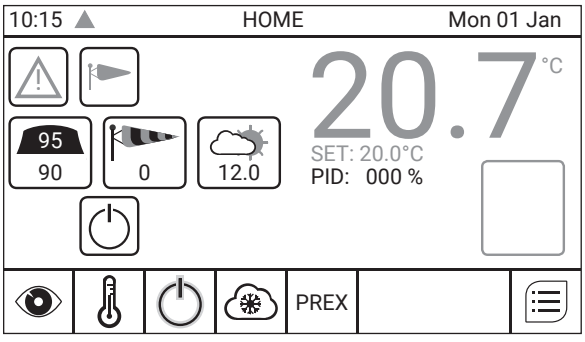
When there is wind the AN3 input value (wind speed value) modifies in a linear manner the pressure setpoint value sent (included between PREX_MIN and PREX_MAX), as shown here below:



The "**Set-Point Prex out**" value is sent to the CPU PCB that manges individually the setpoint achievement.

IMPORTANT: The pressure value sent is always between the range from PREX_MIN to PREX_MAX (in this example between 90 and 200 Pa) and between SPEED_MIN and SPEED_MAX.

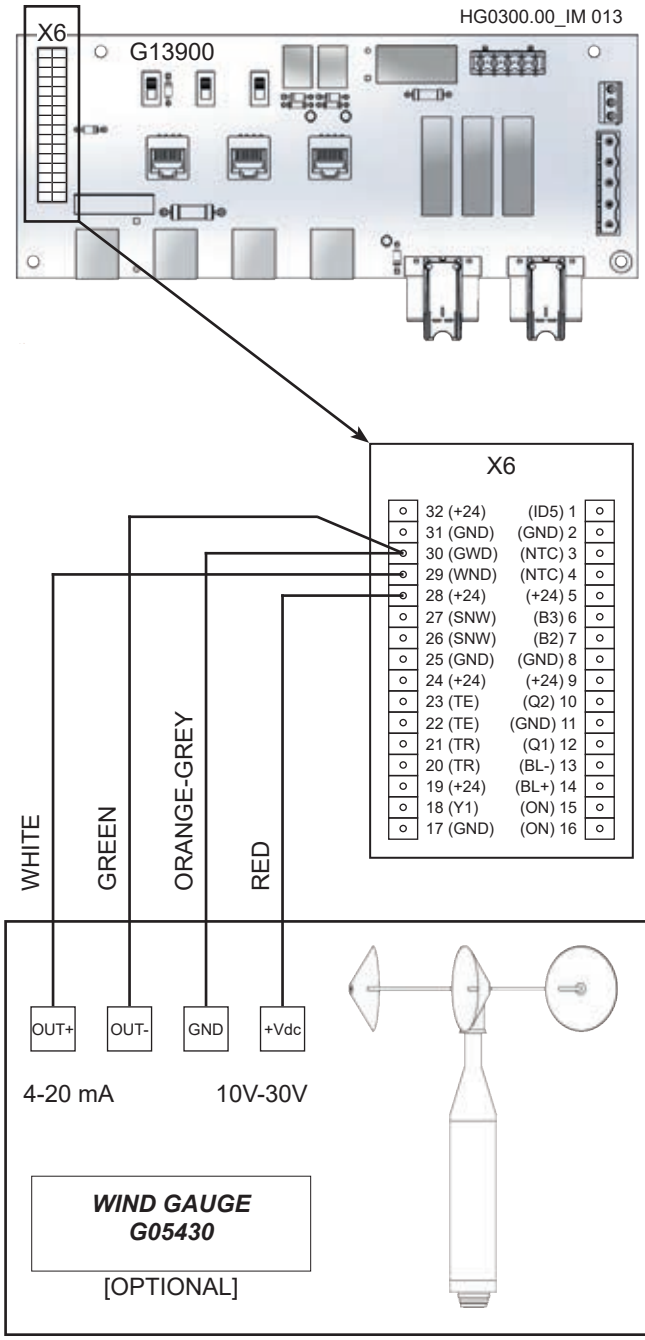
If the wind gauge is not connected or operates incorrectly, the Smart reads an input value of V or in any case less than 1V. In this case the "HOME" page displays an alarm icon, as follows:



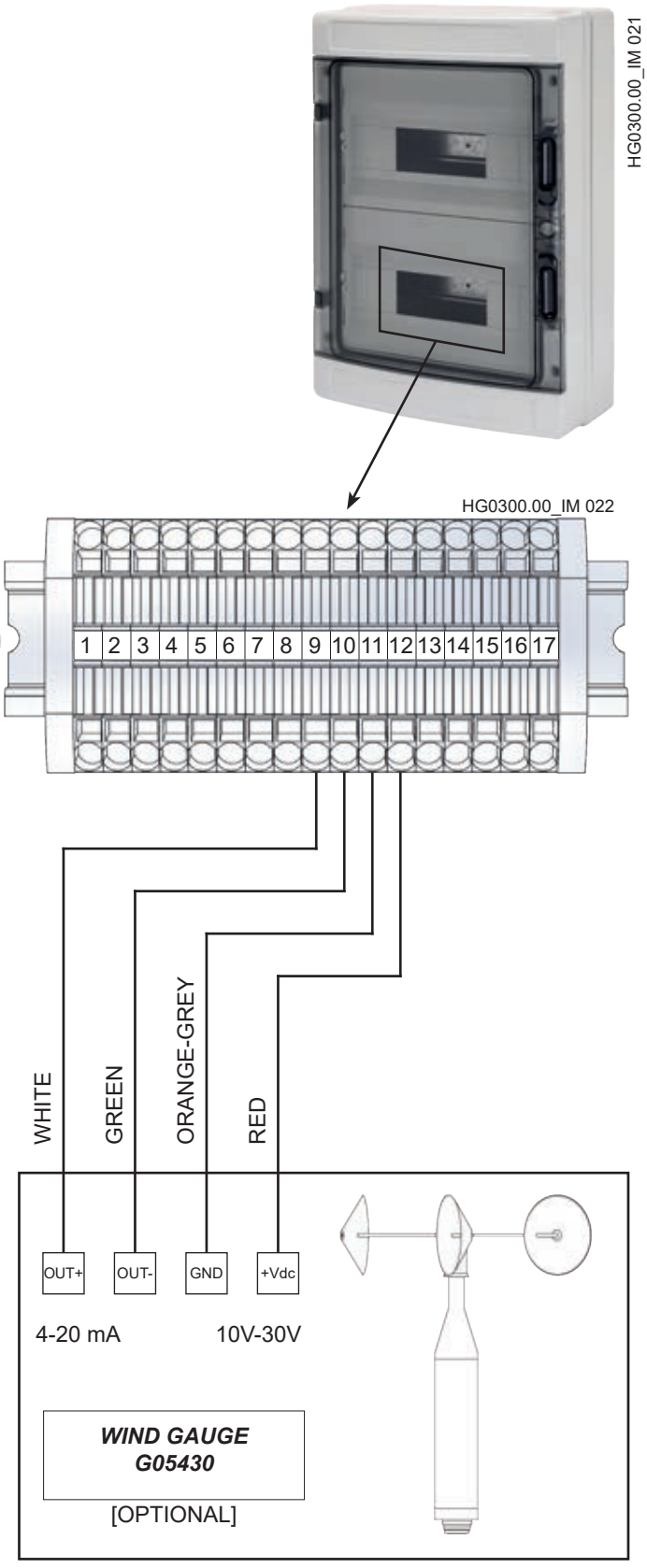
NOTE: The wind speed reading has an output buffer so as to avoid a continuous variation of the sent setpoint in the event that the wind is slightly unstable.

ELECTRICAL CONNECTION

(Only for model AH105)



(For all the other models)



4.5. Snow control (OPTIONAL in "P" versions)

The function of Snow Control (if present) is to force, if it snows, the internal pressure and temperature values, which are preset and different. It comprises a rain sensor (WET) (connected to input ID2) and an external temperature probe (connected to input AN2) for detecting the presence of rain and assess the possibility that it might be snow.

Snow Control may be set to "**MAN**" (MANUAL) or to "**AUTO**" (AUTOMATIC - ONLY IF external sensor and probe ARE PRESENT).

If the Snow Control is purchased together with the heater, it is already set and operating as soon as you connect it. Otherwise to activate the function you must set this control to “MAN” or “AUTO” in the“System Configuration > Sport Structures” menu and set inputs AN2=T_EXT and ID2=RAIN, in the “Probe management” menu.

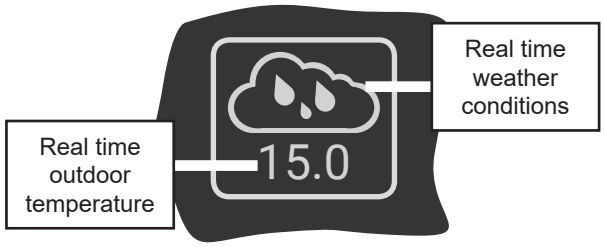
NOTE: The activation of the “Snow Control” function in “AUTO” (automatic) mode configures automatically inputs AN2=T_EXT and ID2=RAIN, and "locks" them. To modify AN2 and ID2 deactivate the “AUTO” Snow Control.

Setpoints that may be set for Snow Control:

Setpoint	Default	Description
T_NEVE	3.0 °C	Snow hazard limit temperature (only in “AUTO” configuration)
SET_NEVE	23.0 °C	Heating setpoint temperature if it snows
PREX_NEVE	200 Pa	Pressure setpoint value if it snows

These setpoints may be modified in“Set-Point” menu, please refer to Section 4.1 "Smart Web".

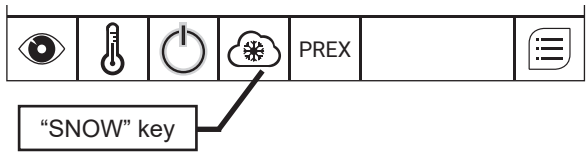
An icon displayed on the "HOME" page shows the current weather condition and the external temperature value:



Please find here below the Snow Control logic.

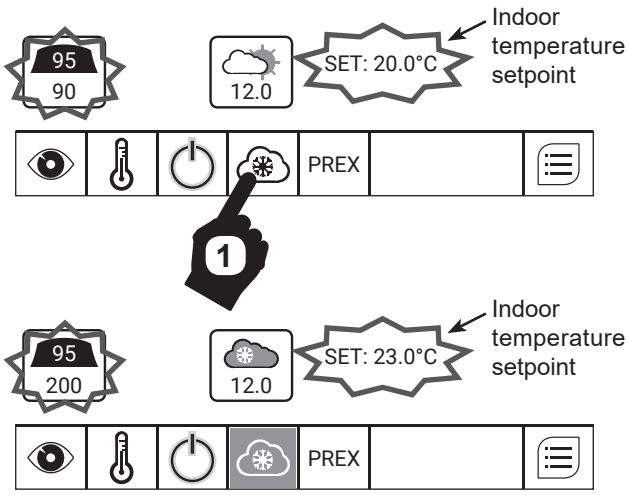
MANUAL OPERATION ("MAN")

It is possible to force manually the snow presence condition and its operation by pressing the “SNOW” key on the bottom line of the “HOME” page. The Smart activates the heating to the “SET_NEVE” setpoint and takes the pressure to the “PREX_NEVE” setpoint value.



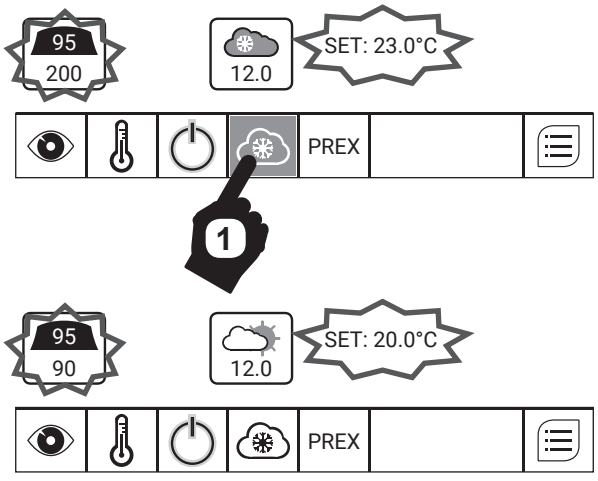
Press this key to activate the FORCED and always FIXED operation, simulating snow presence.
In the “HOME” page the “SNOW” key and the “Snow Control” icon (showing a snowflake) are highlighted in yellow, as shown here below.

FORCED Snow Manual Activation



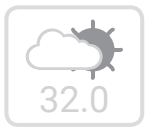
To deactivate the manual function just press the “SNOW” key again. The “Snow Control” icon and “SNOW” key now are “grey” again.

FORCED Snow Manual Deactivation



AUTOMATIC OPERATION ("AUTO") (ONLY IF external sensor and probe ARE PRESENT)

If it rains, the sensor located outside closes the ID2 contact and the rain icon is shown on the Smart display. If when it rains (thus closed ID2 contact) the external temperature probe (connected to input AN2) measures a temperature below the "T_NEVE" reference limit, the Smart indicates that it is possible it will rain, activates heating to "SET_NEVE" setpoint and takes the pressure value to the PREX_NEVE" setpoint.
Even when the snow control is set to "AUTO" it is still possible to force manually the snow condition, as for the "MAN" operation, shown before.

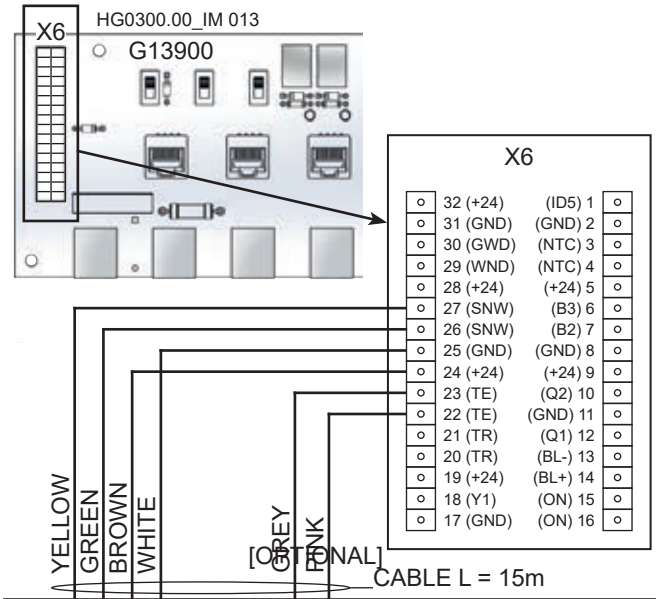
NO RAIN OR SNOW	
ID2	**AN2**
Open	> T_NEVE
	

RAIN	
ID2	**AN2**
Closed	> T_NEVE

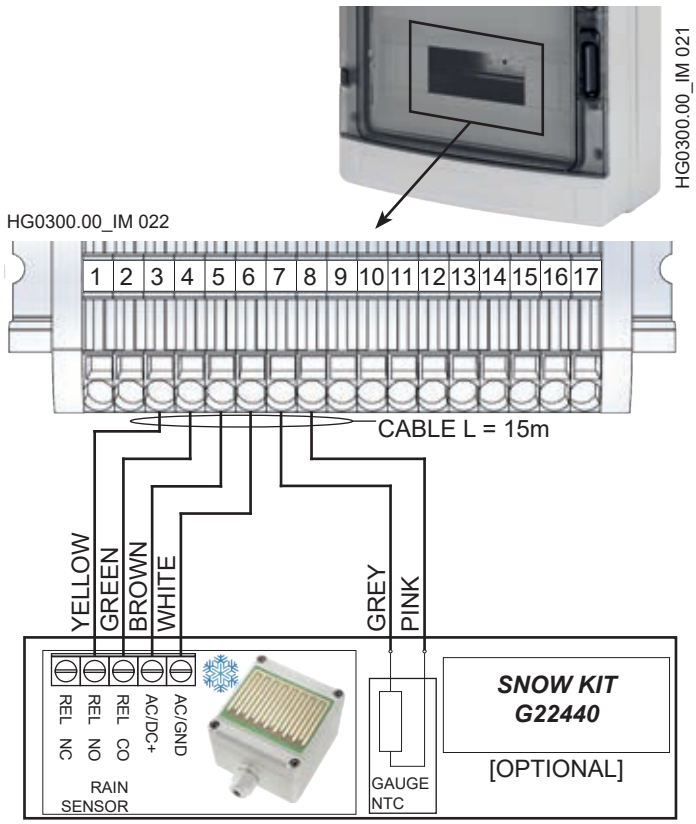
SNOW	
ID2	**AN2**
Closed	< T_NEVE

ELECTRICAL CONNECTION

(Only for model AH105)



(For all the other models)

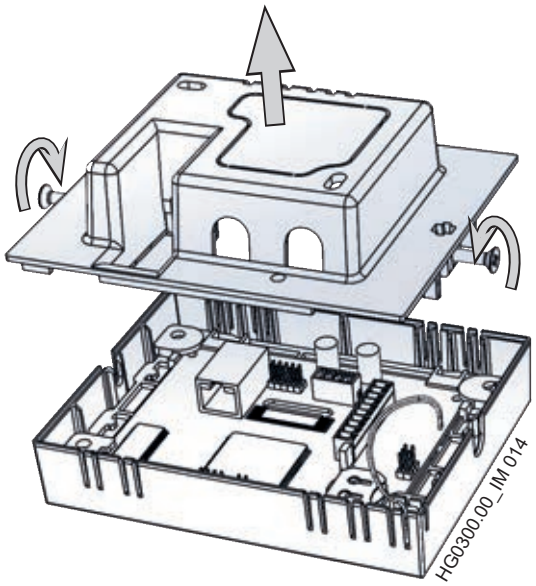


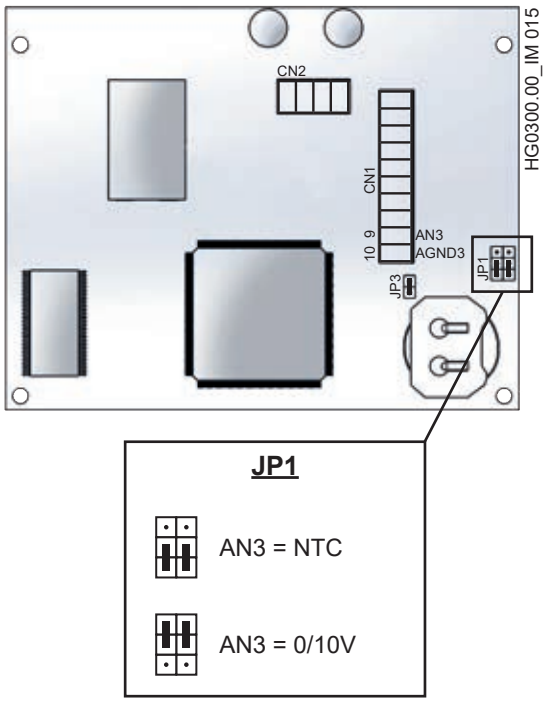
4.6. AN3 input configuration

The AN3 input is supplied already preset. In order to modify the AN3 input configuration from NTC to 0/10V (or vice versa) please proceed as follows:

- Undo the side screws and remove the chronothermostat rear cover.
- Move the jumpers indicated in the picture in the desired position ("0/10V" or "NTC").
- Place the rear cover back in its position and tighten the side screws.

NOTE: in parallel to terminals AN3/AGND3 (9 and 10) there is a 500Ω resistance, necessary for transforming the 4-20mA signal of the wind gauge in a 2-10V signal.

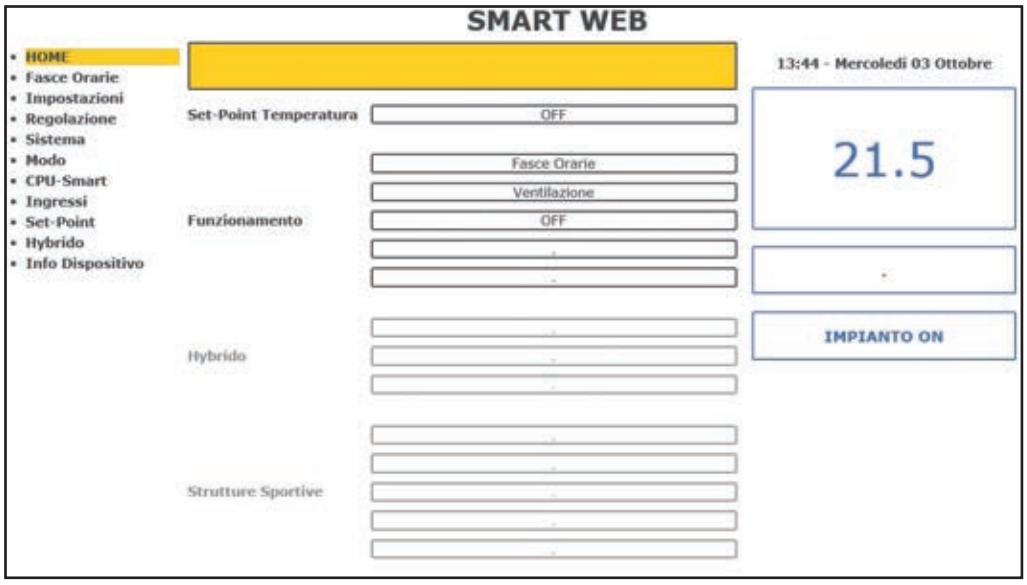




4.7. WEB configuration

It is possible to configure the Smart Web remote control so as to manage it entirely through a PC (or other device) connected to a private local network (Intranet). In order to use the Smart Web remotely the network control must be connected with an Ethernet cable of the direct RJ45 type.

For more information regarding the chronothermostat settings and configuration, please refer to the manual enclosed with the product.



5. INSTALLATION INSTRUCTIONS

Instructions for installing and setting the heater are intended for suitably qualified personnel only. We recommend the installer to read safety warnings.

5.1. General installation instructions

The person in charge of the system project or a competent person shall establish where to install the heater, taking into account technical needs and existing Standards and Regulations of the place where the machine is to be installed; usually, specific authorisations must be obtained (i.e.: urban, architectonic and fire-prevention plans, plans to reduce environmental pollution,etc.). Therefore, before installing the heater, check that all authorisations are available or have them issued.
Install the heater on a flat surface that can firmly and safely bear the weight. Minimum safety distance for correct air circulation shall be kept all around the unit. This will also ease maintenance and control operations.
In any case, and in full compliance with the rules in force in the country of installation, it is recommended to **leave at least one metre clearance around the unit**, to perform all the necessary actions of ordinary and extraordinary maintenance.
Fuel and power supplies shall be easily accessible.
All the heater's connecting and assembling operations must be performed only by qualified staff that is skilled for the operations required to start it.

Condensate drain
The heater is supplied completed with water trap to drain the condensation. The water trap is an integral part of the heater and is regarded as a safety component; therefore, replacing it with a different type, not approved by the heater's manufacturer is prohibited.
The condensation must be drained in compliance with standards applicable in the country where the heater is installed.

THE heater shall not be modified in any part without the manufacturer's written authorisation.

5.2. Installation

Connecting Air Ductwork
Ducts for air delivery and intake shall be sized based on aeraulic performance of the unit (shown in "TECHNICAL DATA" section of this Manual).
A vibration damping joint should be installed on air delivery duct so as to prevent vibration transmission from the heater to ductwork.

Special attention must be paid to the noise conditions required for the room, dimensioning and installing, where necessary, silencers in the ductwork.

Connecting Fuel Supply
Fuel connection shall be performed by qualified personnel only. Follow instructions in this Instruction Manual and comply with existing regulations.

5.3. Electrical Connections

All AH warm air heater control panels use a wiring card (G13900) which allows an easy and safe connection of parts that are usually used in warm air heating systems such as:
- Remote On/Off
- Wind gauge
- Snow sensor
- Pressure gauge
- Ethernet network

The electrical connections and the accessories that may be combined with the heater are different, depending on the configuration of the AH heater itself, for:
- Tensostatic Sport Structures
- Pressure static Sport Structures

Please refer to Section 4. "USER INSTRUCTIONS" and related subsections contained in this manual.

5.4. Wiring to Power Supply

Warm air heaters come with a main switch shown in the figure. Wire power supply directly to that switch.

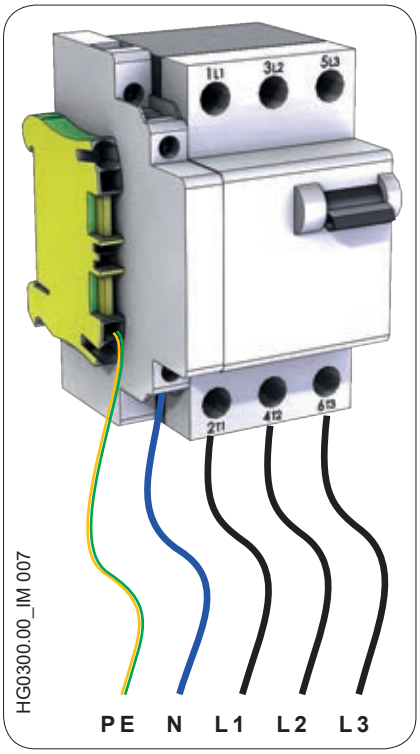
Three-phase	400V+N	Wire three phases to L1, L2, and L3 terminals and Neutral to N terminal

IMPORTANT: 400 Vac power supply with neutral. Do not mistake the neutral for the live wire.

GROUND wire is mandatory. Connect it to relevant terminal. The heater must be correctly connected to an effective earthing system, fitted in compliance with current legislation.

NOTE: In order to access terminals, unscrew white cover on the upper part of the switch. When finished, reinstall protection cover.

The electrical system and, more specifically, the cable section, must be suitable for the equipment maximum power consumption (see table to the side).
Keep power cables away from heat sources.



IMPORTANT: Powering off the unit before completing the cooling cycle and with machine set to ON is strictly prohibited. Failure to follow these instructions shall invalidate the warranty and cause early deterioration of the heat exchanger.

NOTE: GROUND wire is mandatory. Connect it to relevant PE terminal.

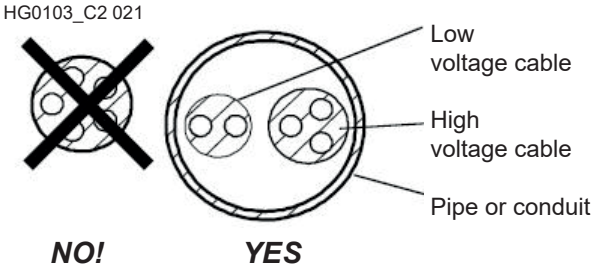
Electrical Protections

IMPORTANT: A main switch must be installed upstream of the control panel of the heater. This switch must include a protection (fuses or automatic) and must comply with existing regulations.

Fuse type, if used, must be rapid. If automatic switch are used, the characteristic curve for their triggering must be of type "**K**" or "**D**" or "**C**", with breaker current *Id ≥ 300mA*.
Automatic switches with "**A**" or "**B**" trigger curve are not allowed since they are not suitable for electrical motor protection. Residual-current device with *Id=30mA* are not suitable for being used with inverter. Residual-current devices must be type "**B**".

CABLES

High voltage (230 V / 400 V) and very low voltage cables can be housed in the same conduit by using double-insulated cables.



Use flexible, flame-retardant, double-coating cables for the wiring. The size of the cable section must be suitable for the equipment power consumption and the distance between the heater and the connection point.

AH model	Motor kW [kW]	Cable section [mm²]	Safety trip [A]
AH105xx-T	2x0.8	4x2.5	16
AH105xx-P	2x2.0	4x2.5	16
AH160xx-T	4x0.8	4x4.0	25
AH160xx-P	4x2.0	4x4.0	25
AH210xx-T	4x2.0	4x4.0	25
AH210xx-P	4x2.0	4x4.0	25
AH240xx-T	6x0.8	4x10.0	40
AH240xx-P	6x2.0	4x10.0	40
AH320xx-T	6x2.0	4x10.0	40
Ah320xx-P	6x2.0	4x10.0	40

Notes: determine cable section in compliance with EN60204-1 and IEC60364-5-2/20001 specifications; PVC insulation; room temperature 30°C; surface temperature <70°C; length below 20m. Add ground cable to the number of cables.

5.5. Connections to the Flue

The PCH heater module, contained inside the AH, is fitted with a watertight combustion circuit and with the burner fan located upstream of the heat exchanger.
Connection to the flue, according to how the heater is installed, can be made as "C" type, with combustion air being drawn from outside, or as "B" type with combustion air being drawn from the heater installation site.
If the heater is installed outdoor, a "B" type installation is also a "C" type.
More specifically, the heater is certified for the following exhausts: B23P-C13-C33-C43-C53-C63; for more information on the flue types, please refer to current regulations.

For the flue, certified pipes and terminals must be used, taking into account that for PCH condensate modules the following materials must be used:
- aluminium
- stainless steel
- polypropylene (PP)

The pipes and terminal must be certified according to the Regulation for building products.
Sealed pipes must be used to prevent condensate from leaking from the pipes; the seal must be adequate to withstand flue gas temperature ranging between 25°C and 90°C.
The flue does not need to be insulated to prevent the formation of condensation in the pipe, as this will not affect the heater, which is fitted with a water trap. Insulate the pipe if required to protect the flue from accidental contact.
For the air intake, use:
- aluminium
- stainless steel
- polypropylene (PP)

certified according to the Regulation for building products

IMPORTANT: The horizontal sections of flue must be installed with a slightly incline (1°- 3°) towards the heater, in order to prevent the build up of condensation in the exhaust.

Common exhausts
Where possible, it is always preferable to use independent exhausts; AH module exhausts are pressurised, therefore in this way it is possible to prevent incorrect sizing from causing a system malfunction.
If you wish to use common exhausts, there are (OPTIONAL) KITs on the price list “Common exhausts” pre-sized in pp as indicated further below in this section.
If you do not wish to use said KITs, the common exhausts shall be sized by the designer including non-return valves at the outlet of each flue, before the connection with the common flue, preventing a module from discharging its own combustion gases inside another module.

Terminal configuration
Type B23P
Open combustion circuit: gases produced by the combustion are discharged outside, on a wall or on the roof, and the combustion air is directly drawn from the site where the equipment is installed. In this case, installation standards require the provision of suitable vents on the walls.

NOTE: It is compulsory to fit on the combustion air intake an IP20 safety mesh to prevent solids entering the combustion air intake with a diameter higher than 12mm. The mesh size must be greater than 8mm.

Type C13
Sealed combustion circuit (type "C") connected to a horizontal terminal on the wall by means of its own ducts.

Type C33
Sealed combustion circuit (type "C") connected to a vertically installed terminal (on the roof) by means of its own ducts.

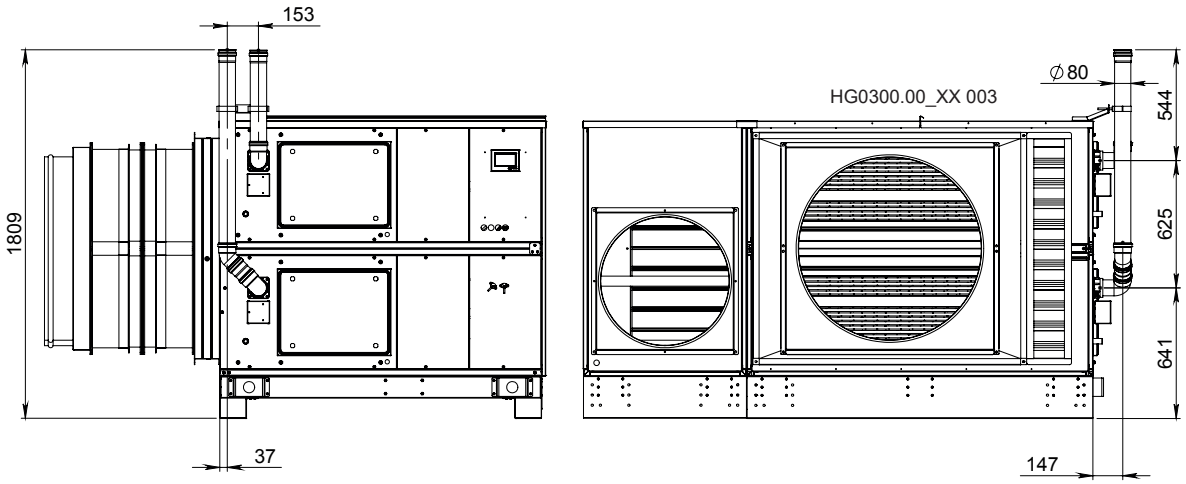
Type C53
Sealed combustion circuit (type "C") connected by means of its own separate ducts to two terminals which can end up in areas with different pressure (such as a duct connected to the roof and a second one connected to the wall).

Type C63
Sealed combustion circuit (type "C") connected to an approved and separately sold combustion air supply and combustion products exhaust system.

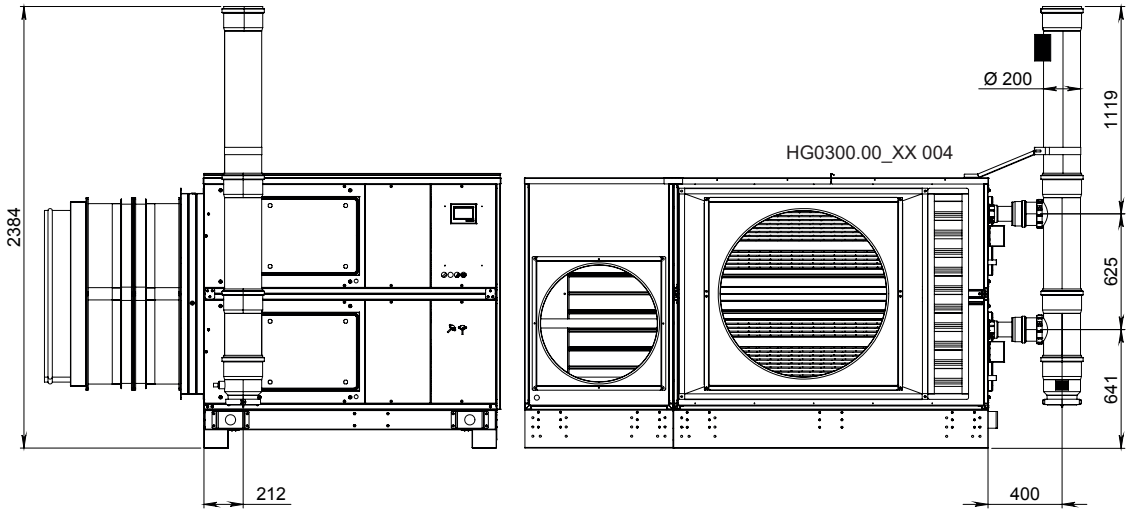
The AH heaters are supplied with “independent exhaust” flue discharge chimney as standard equipment, as shown in the image below. For multiple models, AH160, AH210, AH240 and AH320, it is possible to request the “multiple exhaust” chimney as OPTIONAL (with additional charge) as indicated in the following table:

Model	INDEPENDENT flue outlet kit	COMMON flue outlet kit
	Code	Code
AH105	standard equipment (1 x Ø 80)	Not available
AH160	standard equipment (2 x Ø 80)	G22155-210-P0 (1 x Ø 200)
AH210	standard equipment (2 x Ø 80)	G22155-210-P0 (1 x Ø 200)
AH240	standard equipment (3 x Ø 80)	G22155-320-P0 (1 x Ø 200)
AH320	standard equipment (3 x Ø 80)	G22155-320-P0 (1 x Ø 200)

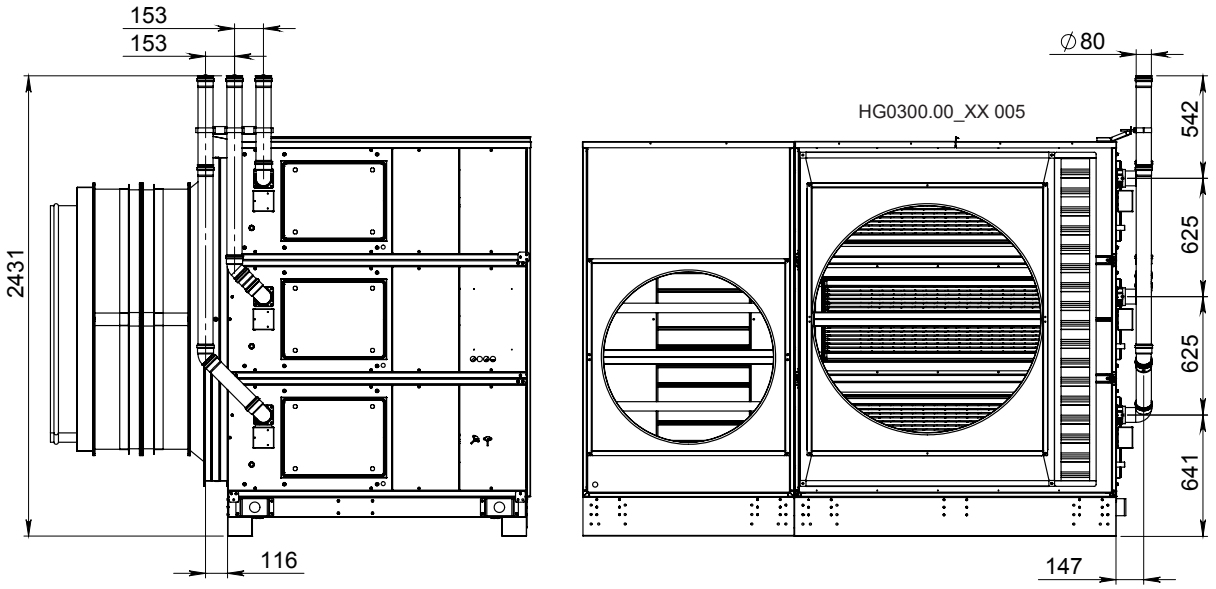
Model: AH160 / AH210 with INDEPENDENT flue outlet



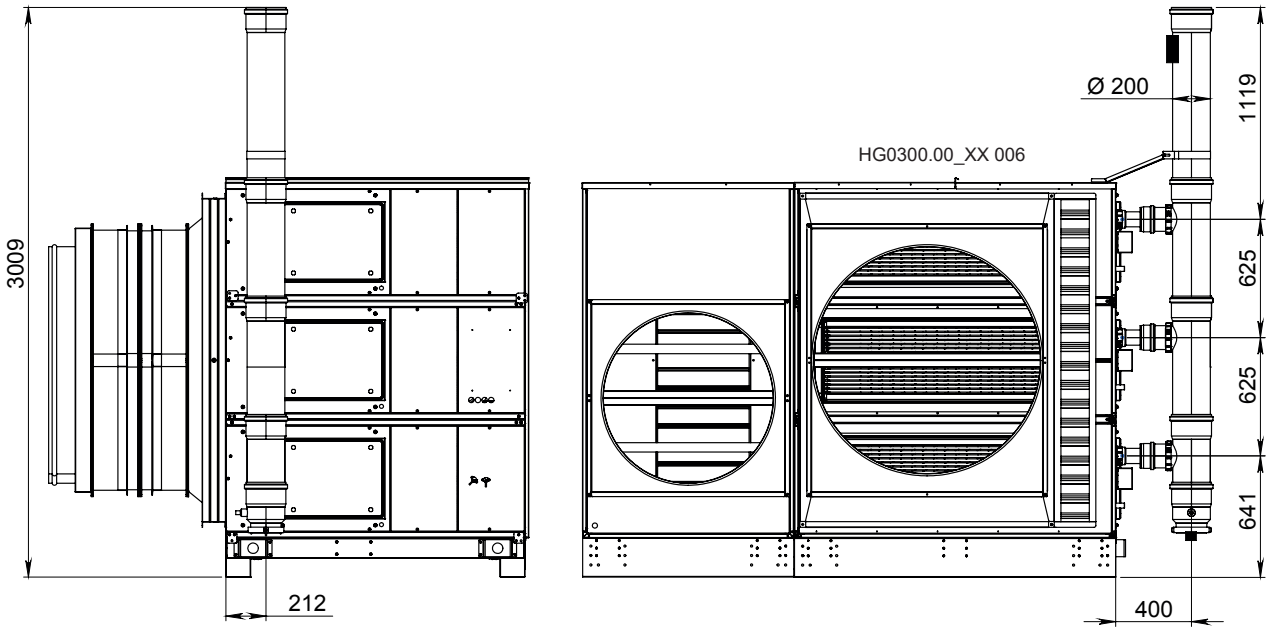
Model: AH160 / AH210 with COMMON flue outlet



Model: AH240 / AH320 with INDEPENDENT flue outlet



Model: AH240 / AH320 with COMMON flue outlet



5.6. Condensate drain

Special attention must be paid to the condensate drain; an incorrectly installed drain, in fact, could jeopardize the correct operation of the equipment. The factors to be taken into account are:

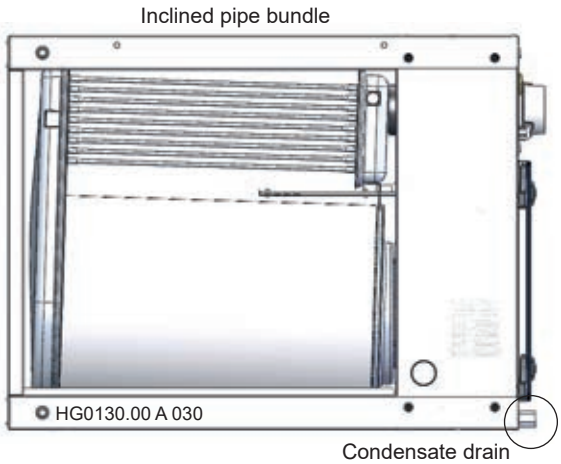
- risk of condensation build-up inside the heat exchanger;
- risk of condensation water freezing in the pipes;
- risk of flue gas discharged from the condensate drain.

Build up of condensation in the heat exchanger

During normal operation, condensate must not be allowed to accumulate within the heat exchanger.

A sensor fitted in the PCH heater internal trap checks and stops the burner operation before the condensate reaches a potentially dangerous level inside the flue gas collection hood.

When positioning the unit on the floor, it is essential to make sure that the heater, and therefore the heat exchanger, are perfectly level to maintain the typical incline of the tube bundle.



Connection to the condensate drain

The AH modules are supplied with a condensate drain on the module outer panel.

According to the applications, APEN GROUP can supply a condensate neutraliser kit (code G14303).

According to the type of installation, the module can drain the condensate in the following ways:

- free drainage;
- drainage in drain wells;
- drainage inside water traps.

Heaters AH160/210/240/320 are supplied with a number of condensate drains matching the number of single modules comprising them.

Precautions

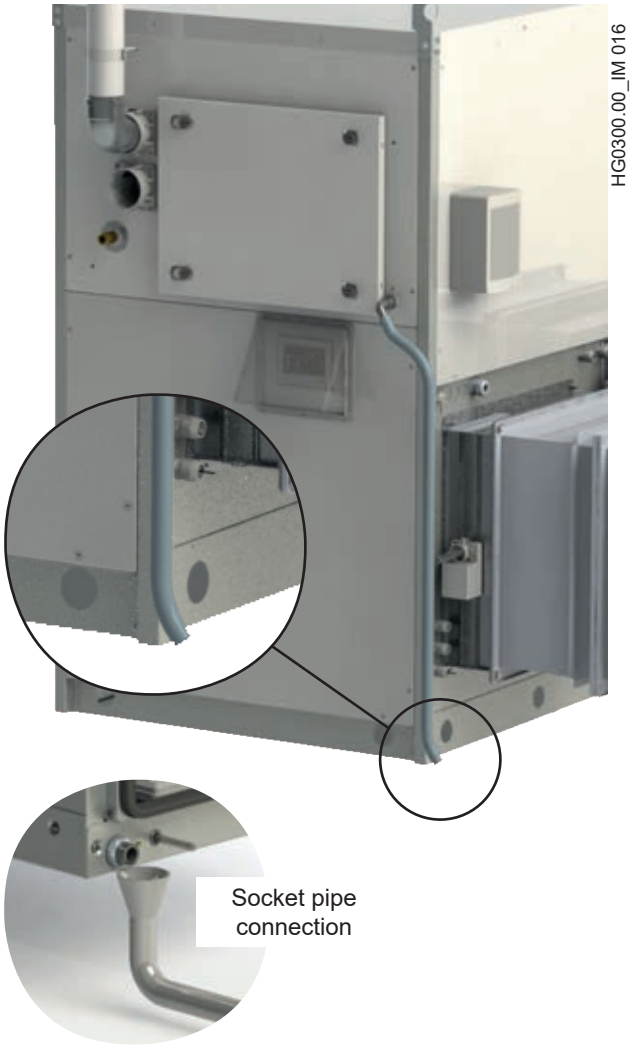
Materials to be used for the condensation drainage system:
aluminium, stainless steel, silicone or Viton pipe or EPDM for hot pipes that allow the flue gas to go through;
for cold pipes (water pipes), PVC and any materials suitable for hot pipes.
Do not use copper or galvanised iron pipes.

Free drainage

If the unit is installed outdoors, unless the temperatures never drops below freezing, the water could be drained directly outside, without any connections to other pipes. It is essential to check that the condensate flows away from the unit.

If the drainage needs to be ducted, it is necessary to install an open type connection (socket pipe), similar to the one in picture below, to prevent ice forming in the pipe from blocking condensate drainage, resulting in water accumulation in the exchanger.

If the drain pipe is installed in an outdoor site, it may need to be heated by means of a heating cable.



Drainage into water courses

Condensate drain may be through water channels and/ or collected and treated with basic solutions (condensate neutralisation kit, cod. G14303).

ATTENTION: Not all countries allow the types of condensation drains described here. Please refer to the requirements specified by local legislation.

5.7. GAS Connection

Use the gas line connections only with CE certified components.

AH-P and AH-T are supplied with:
- dual gas valve;
- stabiliser and gas filter.

Al components are fitted inside the burner housing.
To complete the installation, as required by the current regulations, the following components must be fitted:
- anti-vibration joint;
- gas valve.

NOTE: AN EN126 certified gas filter with filtration level lower than or equal to 50 microns must be used, with no pressure stabiliser, with great capacity, since the filter supplied as standard, upstream of the gas valve, has a limited surface.

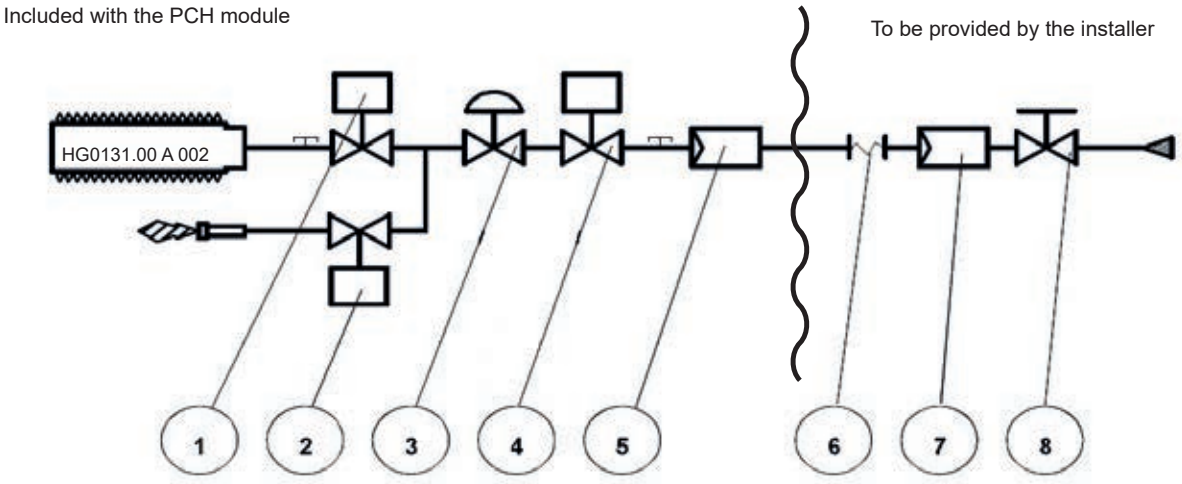
IMPORTANT: For proper maintenance, connect the AH module by means of a seal and swivel gasket.

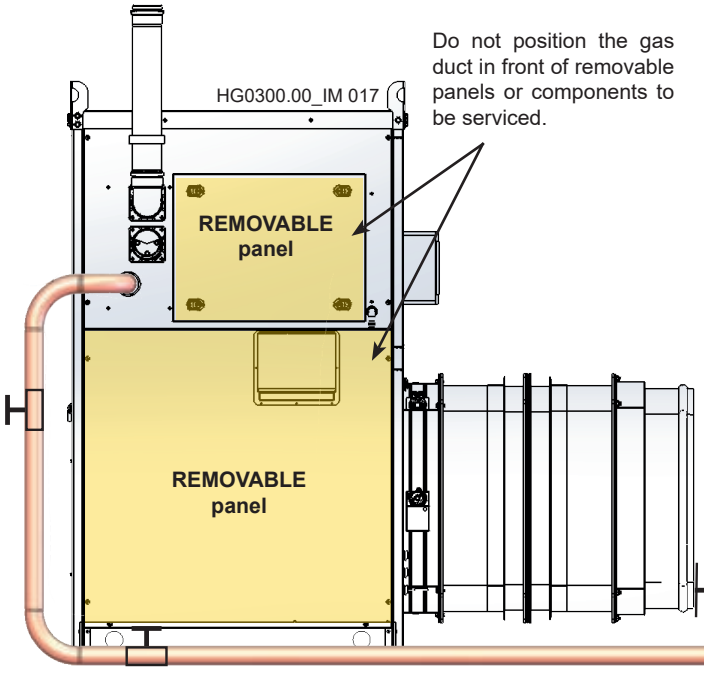
Avoid using threaded connections directly on the gas connection.

Current legislation allows a maximum pressure inside the rooms, or thermal stations, of 40 mbar; higher pressure values must be reduced upstream of the boiler room or the site where the AH module is installed.

KEY

1 Main burner gas solenoid valve
2 Pilot burner gas solenoid valve
3 Pressure stabiliser
4 Safety gas solenoid valve
5 Gas filter (small section)
6 Anti-vibration joint
7 Gas filter (large section)
8 Gas valve



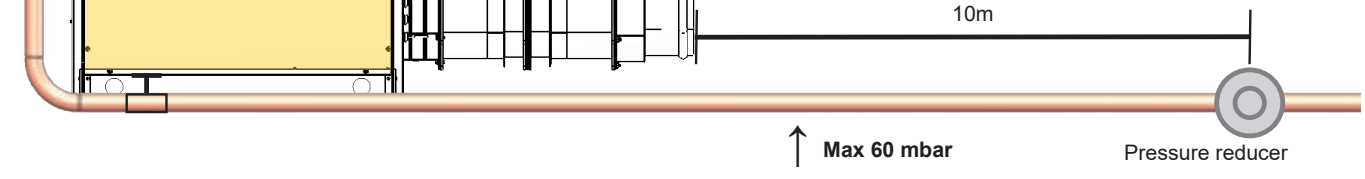


Do not position the gas duct in front of removable panels or components to be serviced.

During the installation, we recommend to tighten the external gas supply pipe without exceeding the tightening torques shown below:

- Ø 3/4":	**150 Nm;**
- Ø 1":	**200 Nm;**
- Ø 1 1/2":	**300 Nm.**

It is strictly prohibited to supply gas to the circuit with pressure higher than 60 mbar. Such pressures could cause the valve to break. If pressure is higher than 60mbar, a pressure reducer must be installed at a distance of at least 10 m and no pressure stabiliser must be fitted between the pressure reducer and the heater, but leaving the gas filter.



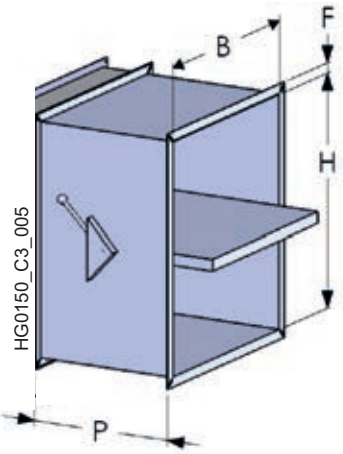
5.8. Fire damper installation

The fire damper is installed as standard equipment both at intake and delivery.
Fire dampers consist of a galvanised iron sheet frame, the compartmentalisation and sealing blade and the blade closing device.
All dampers have the following specifications:

- reaction to fire EI120S
- thermal cut-out with fuse set on 72°C;
- microswitch, IP55, supplied as a standard and installed on damper
- supplied dampers are certified.

Fire damper kit

Model	Code		B	H	P	F
	shutter		[mm]	[mm]	[mm]	[mm]
AH105	*Delivery*	*G10624-CE*	650	650	510	35
	Intake	*G10721-CE*	500	500	510	35
AH160 AH210	*Delivery*	*G12140-CE*	1000	970	510	35
	Intake	*G10624-CE*	650	650	510	35
AH240 AH320	*Delivery*	*G12150-CE*	1200	1370	510	35
	Intake	*G12140-CE*	1000	970	510	35



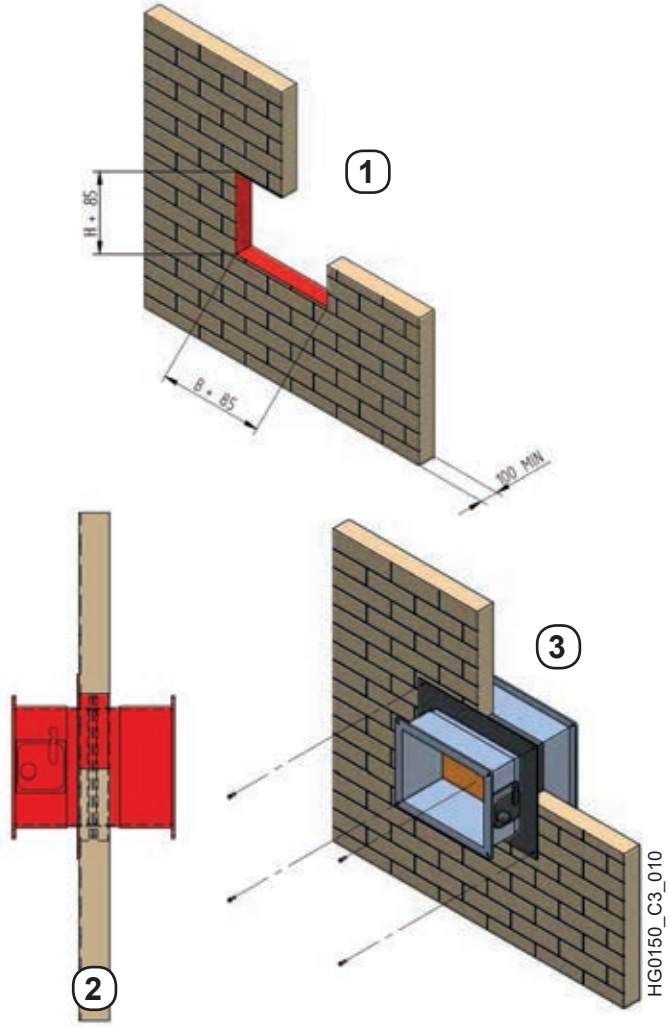
INSTALLATION OF FIRE DAMPER ON RIGID WALL

(1) Prepare in the wall an opening with both base and height increased by 85 mm with respect to the nominal dimensions of the damper; for walls made of concrete blocks or bricks it is recommended to provide a strengthening beam above the opening;

(2) Insert the damper in the opening so that the fixing flange rests on the wall surface;

(3) Fasten the damper to the wall through the holes present in the fixing flange using self-tapping screws or screw anchors with 6 mm diameter.

For further information, refer to the manual supplied with the dampers.



USE OF FIRE DAMPER

To activate the damper rotate the control lever counter-clockwise.
To release the damper press the button highlighted in the figure.

IMPORTANT: Pay attention to the direction of rotation of the lever: in case of vigorous rotation in the wrong direction the closing device may break.

IMPORTANT: After installation, check that there are no obstacles for the correct blade rotation.

IMPORTANT: When the heater is disconnected from the structure close or protect the ductwork from weather agents.

HG0150_C3_011

6. SERVICING INSTRUCTIONS

6.1. Operating Cycle

The AH-T and AH-P heaters operation is fully automatic; they are equipped with electronic equipment with self check facility that manages all the burner control and monitoring operations, with a microprocessor based electronic PCB that controls the heat output regulation and with an interface PCB for connecting and managing the accessories to the Smart Web remote control.

The boiler is switched on when the following two conditions are met:

- the heater is powered on and has not been locked out;
- chronothermostat set to the “heating” operation mode and the necessary conditions for starting.

In these conditions the burner fan starts immediately, pre-washing the combustion chamber for a set time. After the pre-wash time, the ignition phase will begin: the equipment opens the solenoid valve EV1 and in parallel the solenoid valve EVP that supplies the pilot burner. After detecting the pilot flame, the equipment opens the main gas valve EV2 supplying the main burner.
After the operation overlapping time of the two burners (pilot and main) has elapsed, the modulation PCB cuts off the solenoid valve EVP supply and turns the pilot burner off.
Flame detection is carried out by a single electrode for both the pilot burner and the main burner.
The ignition program turns the burner on at an intermediate heat output, which corresponds to approx. 30% of the maximum output. Once the flame stabilising time has expired, the burner will start to modulate its heat output according to the supply air temperature.
If there is no flame during the ignition phase, the heater will make other 4 ignition attempts; at the fifth attempt, if ignition is not successful, the heater will be locked out.

Once the heat request is over the modulation PCB will turn off the burner; the fan will continue to ventilate the combustion chamber, after the wash, for a set time.

Switching off the power supply IS prohibited, except for emergencies because, when the heater is switched off, the fume fan will continue to operate for approximately 90 second to clean the combustion chamber (combustion chamber post-cleaning phase).
Failure to perform the post-cooling operations on the exchanger will cause:

- a shorter lifetime of the exchanger and the guarantee will be null and void;
- the safety thermostat to operate and the associated requirement to manually reset the heater.

IMPORTANT: Powering off the unit before completing the cooling cycle and with machine set to ON is strictly prohibited. Failure to follow these instructions shall invalidate the warranty and cause early deterioration of the heat exchanger.

6.2. Interface Panel

The CPU-SMART PCB is connected to a Smart Web where it is possible to display and modify all the parameters.
The service centre requiring to work on such parameters must enter the relevant level password.

The AH heater is fitted as standard also with a multifunction LCD panel located inside the burner housing, and is used to control, configure and diagnose all operating parameters of the equipment.
The instrument panel is fitted with a red 3-digit LCD display and with four function keys: ↑ , ↓ , ESC and ENTER; the display allows the user to display the heater operating mode and its Faults.
It also allows the service centre to change the main operating parameters.
Changing parameters requires a password.

Viewing the machine status
The machine status is shown on the display by the following wordings:

rdy the machine is on without burner flame, it is waiting for the ON control and/or the heat demand from the thermostat;

On the machine is on with burner flame or is in the ignition phase;

OFF the machine is turned off by the control on the LCD. Any heat demands will be ignored. To light the burner, the LCD must show the wording "operation ON”;

Fxx fault detected.

During normal operation, the display will show the wording **On** if the burner is on; **rdy** when the boiler is being switched off or the room temperature has been reached.

Air **EST** (summer) **operation has been selected by mistake under the FUN menu; set FUN to ON or OFF;**

Axx **AH module address.** The display will show, alternating it with the operation in progress, the address assigned to the module.

In the event of communication problems between CPU-SMART PCB and LCD panel, the word **CPU** will flash on the display if the problem is caused by the CPU; three flashing dots will be displayed if the problem is caused by the display PCB. If needs be, check that the display and the PCB are correctly connected and that the small cable RJ11 is securely held in the connector.

Navigating the menu
The menu has three levels. The first is accessible without entering a password, the second and third require entering second and third level passwords to change the parameters.

Use the arrows to scroll the menus (or parameters): ↑ (up arrow) and ↓ (down arrow). Press ENTER to select the menu (or the parameter). Change the parameter with the arrows and confirm the change by pressing ENTER.
To exit the parameter or menu, press ESC. If you exit the programming function, after about 10 minutes the program will exit the menu and go back to the "machine status" display.
To change the parameter, press the arrow keys: pressing ↑ (up arrow) increases the parameter by 1, pressing ↓ (down arrow) reduces it by 1. When the arrow keys are pressed for at least three seconds, the parameter scrolling speed is increased.
To confirm a change in parameters, press ENTER for at least 3 seconds. A change in the parameter is indicate by the display flashing.

All submenus can be scrolled (from the bottom to the top), and they start over when the end of the menu is reached.

First level menus
The following menus are available on the first level:

Machine status	provides indications on the PCH operation (rdy, ON, OFF, Fxx);
FUN	from this menu it is possible to select the operation ON, OFF or EST (do not select EST);
REG	this menu allows to force the burner to the minimum or the maximum for combustion tests; it automatically returns to the previous position at the end of the preset time (10 minutes);
TIN	provides indications on the value of the 0/10 Vdc signal to the PCH input;
PRA	not used;
ABI	from this menu it is possible to enter the PWD to access and modify the second and third level menus.
PRT	it provides indications on the heat input in kW
CON	it provides indications on gas consumption in m^3/h

Second and third level menus
The second and third level menus are reserved to the Service Centre and said parameters can be modified only by entering a password, which can be requested to the manufacturer's Service Centre. For more detail, see Paragraph 7.3 "Programming with a LCD panel".

Entering the password
- From the initial screen (ON/OFF/rdy/FXX) use the ↑ (up arrow) and ↓ (down arrow) keys to reach the ABI function; hold down the ENTER key for 3 seconds;
- Set the password inside the ABI menu and confirm it with ENTER; hold it down for approximately 3 seconds (the flashing display will confirm that the parameter has been stored);
- Press ESC and, by using the ↑ and ↓ arrow keys, return to the initial screen (ON/OFF/rdy/FXX); press ENTER for 3 seconds;
- Use the ↑ and ↓ arrow keys to reach the desired menu item (Flt, I/O, SET, PAR);
- Press ENTER to access the function;
- Use the ↑ and ↓ arrow keys to select the parameters to be displayed and edited;
- Press ENTER to display the parameter value;
- Use the ↑ and ↓ arrow keys to edit the value (only SET and PAR);
- Press ENTER to confirm the change made;
- To exit the parameter and the menu, press ESC until the initial screen is displayed (ON/OFF/rdy/FXX).

Setpoint Menu
For the meaning and the default values please refer to the table CPU-SMART PCB PARAMETERS in Paragraph 6.5 "Modulation PCB parameters".

H51	0/10 Vdc setting mode;
H52	OFF value on the 0/10 Vdc signal;
H53	ON value on the 0/10 Vdc signal;
ST1	Delivery air modulation temperature;
ST2	Not used;
H43	Not used;
H44	Not used;
H45	Not used;
ST5	It is the pressure setpoint value sent from the Smart Web to the CPU (B2);
ST6	Not used.

I/O menu - Inputs outputs
From **I/O** menu it is possible to display the values measured by the sensors:

NTC1	Air delivery temperature;
NTC2	Not used;
NTC3	Flue gas temperature;
An1	0/10 V - input voltage;
PRH	Pressure value inside the air dome;
FLH	Not used;
rPu	no. of FAN revolutions;
PU2	Not used;
uSA	Not used;
IOn	Ionisation current; from 0 to 100 for currents 0 to 2 microAmperes, 100 above 2 microAmperes.

Enter the second password to access the third level and, besides the previous menus, it is also possible to modify the PAR and FLT menus.
The technical service centres will need this password which must be requested to Apen Group.

PAR menu - Parameters
The **Par** submenu allows the access to "b" and "d" parameters:

from b1 to b15	burner parameters;
from d0 to d9	operation configuration.

For the meaning and the default values, please refer to the table CPU-SMART PCB PARAMETERS in Paragraph 6.5 "Modulation PCB parameters".
Besides "b" and "d" parameters, the following parameters can be changed:

S1	Modulation probe enabling;
SP1	ST1 hysteresis (only if the probe is used as temperature limit);
tH1	Maximum temperature of the modulation probe, switches the burner off regardless of the other conditions set;
S2	Not used;
P2	Not used;
S5	Pressure probe enabling;
S6	Not used;
P6	Not used;
H11	Fan and damper analogue output enabling;
H12	Y2 output minimum voltage.

H13 Y2 output maximum voltage.

H18 Y2 output fixed voltage.

H41 Not used.

FIt Menu (Fault)
It displays the fault event log; use the arrow keys to scroll the list of error codes and press **ENTER** to view how many times a certain fault has activated after the last reset.
The first visible value, **rst**, is used to reset the fault event log; this operation must not be performed by the user but by the service centre. The reset operation can be carried out by changing the parameter to 1 and confirming it by pressing and holding **ENTER** for at least 3 seconds. After the reset, **rst** returns to 0.

6.3. Reset

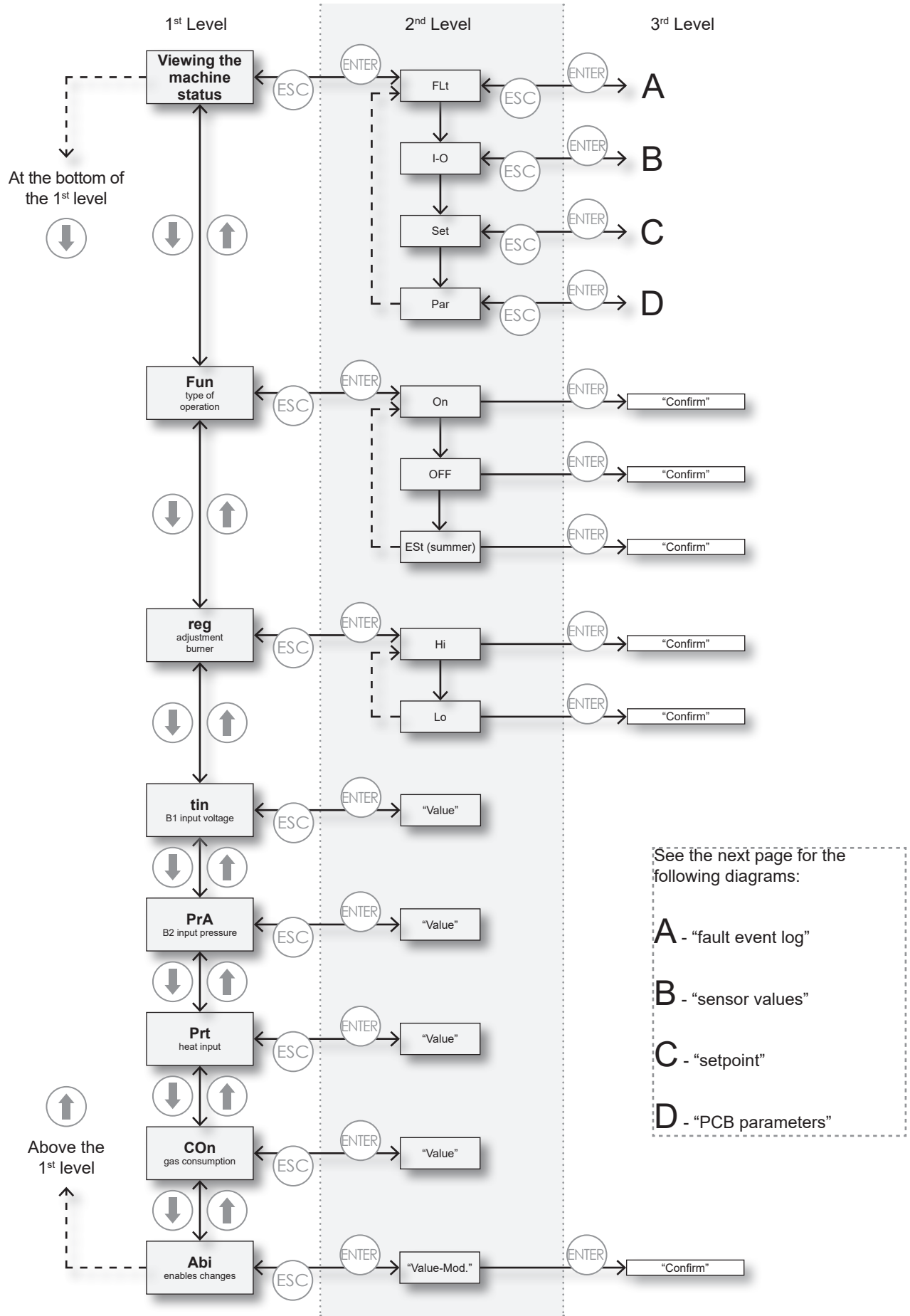
The modulation PCB allows the operator to identify more than thirty different causes of lockouts. In the event of a lockout a specific fault code is displayed which allows to manage the problem accordingly.
To reset the fault and unlock the heater, simply press simultaneously the LDC panel arrow keys for at least 3 seconds or operate directly on the Smart Web installed.
Lockouts may be remotely controlled by using:

- the digital input ID4-IDC4 - button N.O.;
- the Smart Web.

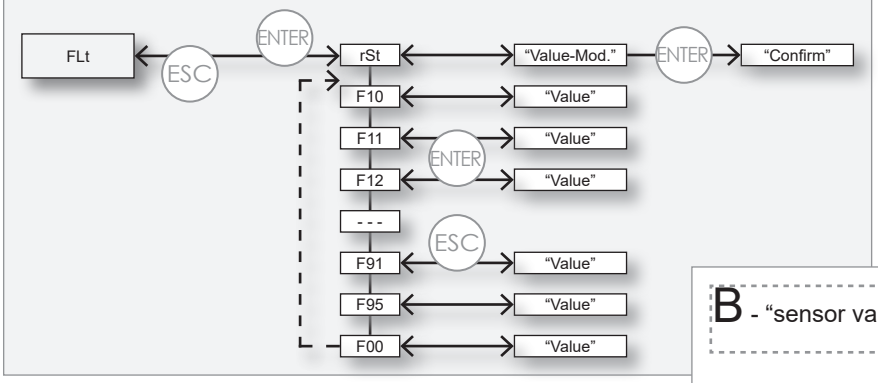
Faults are classified according to the type of error; the list and meanings of all faults are shown in the FAULT table in Paragraph 6.6 "Analysis of Lockouts - Faults".
If the flame monitoring equipment has locked out (codes from F10 to F20), it can be reset by using the button on the equipment itself. This lockout is shown by a LED that lights up on the equipment.

ATTENTION: The flame monitoring equipment memorises the number of manual resets that are performed during its lifetime. In case of five resets performed in a period of 15 minutes, without a flame being ignited and detected, the equipment will go into a "timed" lockout (F13). In this case, it is required to wait another 15 minutes before resetting it again. Press the reset button on the equipment to immediately reset this lockout condition.

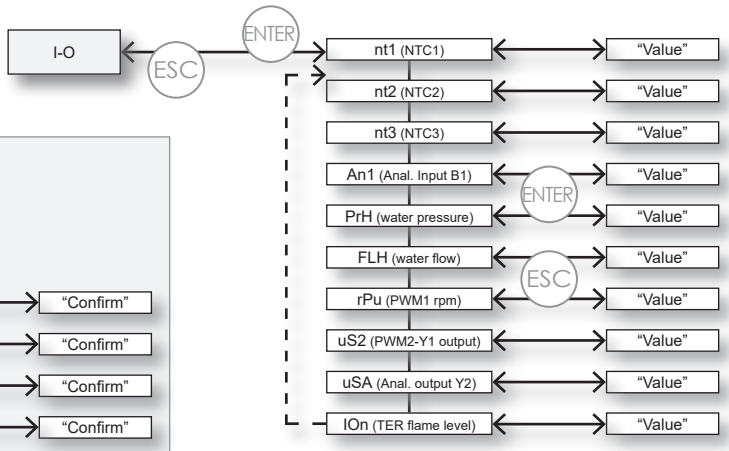
6.4. Navigation map of LCD display menu



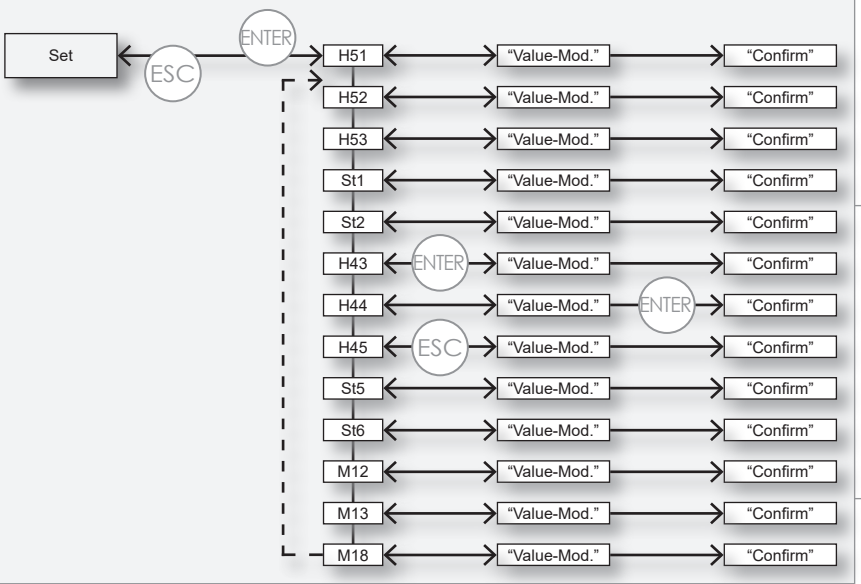
A - “fault event log”



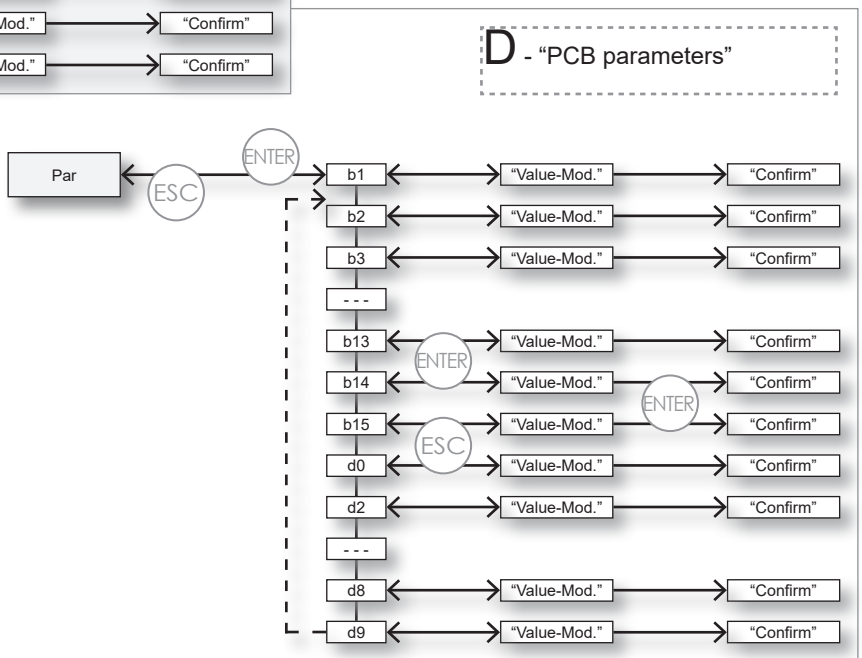
B - “sensor values”



C - “setpoint”



D - “PCB parameters”



Key:

"Value" = value which cannot be modified, read-only value

“Value-Mod.” = Value which can be modified, write value

6.5. Modulation PCB Parameters

All values of the parameters of the CPU-SMART PCB are shown for all AH heater models.

- (1) parameters that could be modified with "001 Password via remote LCD control (even with modbus ≠ 0 address).
- (2) parameters that could be modified with a second level Password which can be requested to the manufacturer's Service Centre (even with modbus ≠ 0 address).
- (3) parameters that could be modified only with a Smart Web or via modbus.

Parameters of CPU-SMART PCB version 7.03.xx									
PARAMETER			TENSO			PRESSURE			DESCRIPTION
			AH105	AH160 AH240	AH210 AH320	AH105	AH160 AH240	AH210 AH320	
Control parameters									
d0	(2)	-	7						Flame modulation: 2=NTC1; 5=0÷10Vdc; 7=Modbus (SmartWeb in PID mode)
d1	(2)	-	0						Type of equipment: 0=heater; 2=boiler; 5=PCH; 8=PKA/E; 10=Queen; 12=Fan heater
d2	(2)	-	0						Remote lockout signal output (Q1): 0=disabled; 1=enabled
d3	(2)	sec	30			20			Fan delay time ON (RL2): 0÷255
d4	(2)	sec	24						Fan delay time OFF (RL2): 0÷255 (1=5sec. 60=300 sec.)
d5	(2)	-	0						Flue gas T control enabling (NTC3): 0=disabled; 1=enabled NOT USED
d6	(2)	sec	5						Interval between switching off and on (Off timer): 0÷255
d7	(2)	-	0						1= Fault reset counter; 2= Burner hour-meter reset
d8	(2)	-	0						Boiler antifreeze enabling (NTC1): 0=disabled; 1=enabled NOT USED
d9	(2)	-	0						Dampers enabling: 0=disabled; Do Not Change
d10	(2)	-	0	2		1			Continuous ventilation: 0= disabled; 1= enabled (fans always on); 2= enabled with delay par.d3 from remote heat request - active in fault during a heat request
Burner parameters									
b1	(2)	rpm	195	172	195	195	172	195	Motor RPM MINIMUM value (PWM1): 90÷999 (1=10 RPM)
b2	(2)	rpm	635	655	635	635	655	635	Motor RPM MAXIMUM value (PWM1): 90÷999 (1=10RPM)
b3	(2)	rpm	240	355	240	240	355	240	Motor RPM START-UP value (PWM1): 90÷999 (1=10RPM)
b4	(2)	-	2						HALL signal divider: 2÷3
b5	(2)	rpm	50						Error F3x; no. of revolutions x10 (50=500rpm): 0÷300
b6	(2)	sec	20						Error F3x; error dwell time before fault F3x: 0÷255
b7	(2)	sec	20						Pre-cleaning time with maximum output: 0÷255. DO NOT CHANGE THE PRESET VALUE.
b8	(2)	sec	10						Flame stabilisation time (ignition): 0÷255
b9	(2)	sec	90						Combustion chamber post-cleaning time (FAN ON): 0÷255
b10	(2)	%	5						Motor rpm % increase for each b11 seconds: 1÷100
b11	(2)	sec	2						Time interval for motor rpm increase: 1÷100
b12	(2)	%	30						Antifreeze mode FAN motor modulation % value: 30÷100
b13	(2)	pwm	65						Integral factor value (ki_pwm) for PWM1 calculation - (exA36):0÷249
b14	(2)	pem	45						Proportional factor value (kp_pwm) for PWM1 calculation - (exA37):0÷249
b15	(2)	sec	0	(*)	(*)	0	(*)	(*)	with d1=0 or 5: delay time ON flame monitoring equipment (TER); with d1=2 (boiler): water flow alarm delay F85/F86 at ignition
b16	(2)	-	0						ID5 - Blower fan control: 0=input disabled; 1=enabled with N.C. input required; 2=enabled with N.O. input required; 3= enabled with N.C. input required with auto-reset;

NOTE:

(*) Please refer to table of "Parameter b15 for multiple module machines" here below

Parameters of CPU-SMART PCB version 7.03.xx

PARAMETER			TENSO			PRESSURE			DESCRIPTION
			AH105	AH160 AH240	AH210 AH320	AH105	AH160 AH240	AH210 AH320	
b17	(2)	-	0						ID6 - Blower fan control: 0=input disabled; 1=enabled with N.C. input required; 2=enabled with N.O. input required; 3= enabled with N.C. input required with auto-reset;
Heat input and fuel instantaneous consumption calculation parameters									
Qmin	(3)	kW	21.0	16.4	21.0	21.0	16.4	21.0	Minimum heat input (ref. Lower calorific value - Hi)
Qmax	(3)	kW	99.9	82.0	99.9	99.9	82.0	99.9	Maximum heat input (ref. Lower calorific value - Hi)
PCI	(3)	kW/m³	see table of "Gas-type parameters" here below						Lower calorific value (Hi)
Limit NTC1 control (with D0=5 or 7)									
SEL	(2)	-	3						Modulation probe 1=NTC probe1; 3=NTC3 probe
S1	(2)	-	0						NTC1 probe enabling: 0=disabled; 1=enabled
ST1	(1)	°C	85						NTC1 setpoint: -10÷140
SP1	(2)	°C	5						SP1 hysteresis: 0÷10
XD1	(3)	%	5						Proportional band from 4 to 100
TN1	(3)	sec	100						Integral coefficient: 1÷255
AC1	(3)	-	1						0=only modulation; 1= modulation and ON/OFF
TH1	(2)	°C	95						Upper Temperature limit for fault F51 activation: 10÷95 autoreset if NTC1<TH1-15°C
S3	(2)	-	1						NTC3 probe enabling: 0=disabled; 1=enabled
TH3	(2)	°C	95						Upper temperature limit for F53 fault activation (auto-reset if NTC3<TH3): 0÷140
Control 0/10 Vdc - D0=5 - NOT USED									
H51	(1)	-	0						Active only with D0=5 (0/10V) 0=modulation only; 1=modulation and ON/OFF
H52	(1)	V	0.5						OFF voltage, burner switching off if H51=1: 0÷10 1°Module = 0.5; 2°Module = 1.5; 3°Module = 2.5; 4°Module = 3.5.
H53	(1)	V	0.5						Voltage Delta with burner ignition ON 1°Module = 0.5; 2°Module = 1.0; 3°Module = 1.5; 4°Module = 1.5.
H54	(3)	sec	5						Lower input dwell time: 0÷255
H55	(3)	sec	5						Upper input dwell time: 0÷255
Fan and damper output control									
H11	(2)	-	2			4			0=output disabled; 1=analogue output Y1 enabled (PWM); 2=analogue output Y2 enabled (0÷10Vdc); 3=outputs Y1 (PWM) and Y2 (0÷10Vdc) enabled; 4=outputs Y1 (PWM) and Y2 (0÷10Vdc) enabled for pressure static structures; 5=analogue output Y2 (0÷10Vdc) enabled for operating mode d1=10/12; 6=outputs Y1 (PWM) and Y2 (0÷10Vdc) enabled for boiler summer ventilation with EC fan heater
H12	(1)	V	6			2			Y2 output minimum voltage: 0÷10
H13	(1)	V	10						Y2 output maximum voltage: 0÷10
H14	(3)	%	0						PWM minimum value: 0÷100
H15	(3)	%	100						PWM maximum value: 0÷100
H16	(3)	-	2			4			0, 1=not used; 2=blower modulation proportional to FAN (do not change); 3=blower modulation proportional to B1 input (0-10V); 4 proportional to B2 input for pressure check in pressure static structures; 5= proportional NTC1 for checking Queen/Fan heaters (only output Y2)

Parameters of CPU-SMART PCB version 7.03.xx

PARAMETER			TENSO			PRESSURE			DESCRIPTION
			AH105	AH160 AH240	AH210 AH320	AH105	AH160 AH240	AH210 AH320	
H17	(3)	-	0						0=PWM (Y1) or 0/10V (Y2) output according to "direct" logic; 1=PWM (Y1) or 0/10V (Y2) output according to "reverse" logic; 2= PWM (Y1) "reverse" and 0/10V (Y2) "direct" output; 3= PWM (Y1) "direct" and 0/10V (Y2) "reverse" output
H18	(1)	-	8						Y2 output fixed voltage
H19	(3)	-	32						Reading of NTC1 to which the minimum value of Y2 output corresponds - NOT USED
H20	(3)	-	65						Reading of NTC1 to which the maximum value of Y2 output corresponds - NOT USED
NTC2 control - NOT USED									
S2	(2)	-	0						0=NTC2 disabled; 1=NTC2 enabled; 2=blower output activation for compartment heating function (only with d1=5)
ST2	(1)	°C	5						NTC2 setpoint: -10÷90
P2	(2)	°C	2						ST2 hysteresis: 0÷40
XD2	(3)	-	40						Neutral area, proportional modulation band divided by 100: 4 ÷100
TN2	(3)	sec	5						Integration time: 1÷255
ANTIFREEZE control - active with D8=1 - NOT USED									
STA	(3)	°C	2						Antifreeze setpoint: -10÷+20
PA	(3)	°C	1						Antifreeze setpoint hysteresis: 0÷10
FLUE GAS TEMPERATURE control - active with D5=1 - NOT USED									
H41	(2)	°C	5						Flue gas temperature (NTC3); neutral band from 1÷50
H42	(3)	sec	10						Run time for flue gas control cycle (15=30 seconds): 0÷255
H43	(1)	°C	100						Flue gas temperature at maximum capacity (Tmax with PT%=100): 0÷140
H44	(1)	°C	75						Flue gas temperature at medium capacity (Tmed with PT%=50): 0÷140
H45	(1)	°C	50						Flue gas temperature at minimum capacity (Tmin with PT%=0): 0÷140
H46	(3)	-	0						Flue gas temperature operation: 0=modulation only - 1=burner OFF
PRESSURE control									
S5	(2)	-	6			5			Pressure probe B2 output enabling: 0=disabled; 1=enabled as ON/OFF input; 2=enabled as analogue input without F83 fault auto-reset; 3=enabled as analogue input with F83 fault auto-reset; 4=enabled as air pressure control analogue input without F80 auto-reset; 5=enabled as air pressure control analogue input with F80 fault auto-reset; 6=enabled read only (no Fault) for pressure control via Modbus
ST5	(1)	mbar	1.2						B2 setpoint: 0÷9.99 (setpoint sent from Smart Web)
P5	(2)	mbar	0.5						ST5 hysteresis: 0÷9.99
XA5	(3)	V	0.5						B2 pressure probe signal input minimum voltage: 0÷9.99
XB5	(3)	V	4.5						B2 pressure probe signal input maximum voltage: 0÷9.99
YA5	(3)	bar	0						Pressure matching the B2 probe input minimum voltage
YB5	(3)	bar	9.99						Pressure matching the B2 probe input maximum voltage
TH5	(3)	V	9.99						Upper pressure limit for fault F82 activation: 0÷9.99
Hydraulic circuit WATER FLOW control - NOT USED									
S6	(2)	-	0						Flow sensor B3 output enabling: 0=disabled 1=enabled as ON/OFF input without F85 fault autoreset 2=enabled as ON/OFF input with F85 fault autoreset 3=enabled as pulsed input without F85 and F86 fault autoreset 4=enabled as pulsed input with F85 and F86 fault autoreset

Parameters of CPU-SMART PCB version 7.03.xx

PARAMETER			TENSO			PRESSURE			DESCRIPTION
			AH105	AH160 AH240	AH210 AH320	AH105	AH160 AH240	AH210 AH320	
ST6	(1)	From l/h	10						Flowmeter setpoint - in l/h (x10)
P6	(2)	-	5						ST6 hysteresis: - in l/h (x10)
XA6	(3)	Hz	5						B3 pressure probe signal input minimum frequency: 0÷999
XB6	(3)	Hz	14						B3 pressure probe signal input maximum frequency: 0÷999
YA6	(3)	l/h	229						Flow rate matching the B3 probe inlet minimum frequency
YB6	(3)	l/h	29						Flow rate matching the B3 probe inlet maximum frequency
TR6	(3)	sec	250						Fault F85/F86 indication time delay (1=1second): 0÷250. During the ignition stage, the b15 value is used.
PRESSURE control - PID parameters for ventilation of Pressure static structures									
kp	(3)	%	25						Proportional Gain
ki	(3)	%	10						Integral Gain
kd	(3)	%	5						Derivative Gain
Ii	(3)	%	100						Maximum limit of integral part

DO NOT CHANGE THESE VALUES

Table of "Parameter b15 for multiple module machines"

PARAMETER			SLAVE 1	SLAVE2	SLAVE 3	DESCRIPTION
b15	(2)	sec	0	10	20	with d1=0 or 5: delay time ON flame monitoring equipment (TER); with d1=2 (boiler): water flow alarm delay F85/F86 at ignition

Table of "Gas-type parameters"

PARAMETER			G20	G25	G25.3	G25.1	G27	G2.350	G30 G31	DESCRIPTION
PCI	(3)	kW/m³	9.45	8.13	8.31	8.14	7.75	6.75	12.4	Lower calorific value (Hi)

6.6. Analysis of lockouts- faults

The CPU-SMART manages two types of lockouts:
- preventive, it warns the customer that the AH heaters require maintenance;
- operational, it stops the AH heater for safety reasons or to ensure its correct operation.

Some operational faults require manual reset; others reset themselves when the problem that caused them is solved.
Below is a complete list of faults, possible causes and possible solutions.

FAULT	DESCRIPTION	CAUSE	RELEASE
Lockout caused by Flame - Caused by the flame monitoring equipment (TER)			
F10	Failure to ignite flame after 4 attempts performed by the equipment.	• Live and neutral reversed • Earth wire not connected • Phase-phase connection without neutral • Start-up electrode failed or badly positioned • Detection electrode failed or badly positioned • Detection electrode that moves or disperses to the earthing system when hot • Condensation detection electrode defective or earthed	Manual reset
F11	Untimely flame (detection when for the flame monitoring equipment there should not be a flame)		
F12	Ignition failure; not visible. The count, displayed in the history, indicates whether the heater has had problems with ignition.		Auto-reset
F13	The TER equipment does not accept the reset command from CPU-SMART	• TER has finished its 5 reset attempts in the period of 15 minutes.	Wait for 15 minutes or use the equipment reset device
F14	Lack of communication between TER equipment and CPU for more than 60 seconds	• TER equipment or CPU-SMART PCB broken • Connections on the STB thermostat to earth • Capillary of the STB thermostat that discharges on the earth faston of the thermostat body	Auto-reset
F15	The CPU-SMART PCB sent the ignition signal to the TER equipment which, after 300 seconds and with no lockout, has not communicated its correct operation status.	• Blocked safety thermostat at start up	Check contact closing
		• Poor gas mains pressure • Low CO_2 value • Faulty TER equipment	Manual reset, auto-reset after 5 minutes
F16	Generic equipment lockout	• It indicates that if the heat request has remained active for more than 24 consecutive hours, the TER equipment has performed a control cycle switching temporarily to stand-by mode	Manual reset, auto-reset after 5 minutes
F17	Internal malfunction of TER equipment that does not accept reset command from CPU-SMART	• Faulty TER equipment	Manual reset, auto-reset after 5 minutes
Lockouts caused by temperature (safety lockouts)			
F20	Activation of safety thermostat STB or flue gas thermostat	• Excess air temperature due to lack of air circulation • Safety thermostat or flue gas thermostat broken or not connected	Manual reset
F21	Input ID1 open	• Fire damper activation	Manual reset
F22	Opening of safety thermostat STB or flue gas thermostat at ignition	• Frost or temperature below -20°C • Safety thermostat or flue gas thermostat broken or not connected	
F35	Input ID5 open (NOT used)	• ID5 - IDC5 jumper missing	
F38	DDMP fan fault - ID6 input	• DDMP fan fault	
VAG lockout - flue gas fan			
F30	Flue gas fan speed (VAG) too low in start up phase	• Burner fan broken. • VAG electric cables interrupted, not connected or wrongly connected	Manual reset
F31	Flue gas fan speed (VAG) too high in stand-by phase		
F32	Flue gas fan speed (VAG), during operation, outside minimum and maximum set parameters		Manual reset, auto-reset after 5 minutes

FAULT	DESCRIPTION	CAUSE	RELEASE
		NTC probes broken or missing	
F41	Probe NTC1 error, air intake temperature	No signal from probe or broken probe	Auto-reset
F43	Probe NTC3 error, fumes temperature		
		Over-temperature	
F51	The temperature of the air intake probe NTC1>TH1 (NOT used)	• Check the TH1 parameter - air intake set point. • Cooling fan(s) inoperative • Air flow rate insufficient	Auto-reset when NTC1< TH1-15
F53	NTC3 > TH3	• Check the TH3 parameter - flue gas temperature setpoint. • Cooling fan(s) inoperative • Air flow rate insufficient	Auto-reset when NTC3< TH3
		Check ModBus communication	
F60	Communication error between CPU-SMART PCB and Modbus network, Smart Web	• ModBus network is disconnected. • The address of the PCB is wrong and/or not configured in the ModBus network.	Auto resolve
		No voltage	
F75	No voltage during operation cycle (excluding stand-by); the fault is not visible on remote control but only counted.	• No voltage during operation	Auto resolve
F80	Pressure gauge error	• Pressure gauge at fault or not connected • Input signal at B2 is < 0.2 Vdc	Auto-reset
F81	Pressure less than B2 setpoint	• Input signal at B2 is < ST5 setpoint	Auto resolve
F82	Higher pressure at B2 setpoint	• Input signal at B2 is < ST5 setpoint + TH5	Auto resolve
F99	CPU parameter programming error	• S1=0 with SEL=1 and D0=2 • S3=0 with SEL=3 and D0=2 • D2≠0 and D9=1 • D10=1 with D8=1	Auto resolve
		Internal malfunction of CPU-SMART PCB	
F00	Internal malfunction of CPU-SMART PCB	• One or more parameters of the CPU PCB have a value outside of the expected range.	Perform a manual reset of the PCB by interrupting the power supply
CPU	CPU-SMART PCB communication error	• RJ11 cable disconnected or faulty	Auto resolve
...	CPU-SMART PCB communication error	• RJ11 cable disconnected or faulty	Auto resolve

6.7. Country Table - Gas Category

Country	Category	Gas	Pressure	Gas	Pressure
AT, CH	II2H3B/P	G20	20 mbar	G30/G31	50 mbar
BE <70kW	I2E(S)B, I3P	G20/G25	20/25 mbar	G31	37 mbar
BE >70kW	I2E(R)B, I3P	G20/G25	20/25 mbar	G31	37 mbar
DE	II2ELL3B/P	G20/G25	20 mbar	G30/G31	50 mbar
DK, FI, GR, SE, NO, IT, CZ, EE, LT, SI, AL, MK, BG, RO, HR, TR	II2H3B/P	G20	20 mbar	G30/G31	30 mbar
ES, GB, IE, PT, SK	II2H3P	G20	20 mbar	G31	37 mbar
FR	II2Esi3P	G20/G25	20/25 mbar	G31	37 mbar
LU	II2E3P	G20/G25	20 mbar	G31	37/50 mbar
NL	II2EK3B/P	G20/G25.3	20/25 mbar	G30/G31	30 mbar
HU	II2HS3B/P	G20/G25.1	25 mbar	G30/G31	30 mbar
CY, MT	I3B/P			G30/G31	30 mbar
LV	I2H	G20	20 mbar		
IS	I3P			G31	37 mbar
PL	II2ELwLs3B/P	G20/G27/G2.350	20/13 mbar	G30/G31	37 mbar
RU	II2H3B/P	G20	20 mbar	G30/G31	30 mbar

The following information is clearly printed on the equipment packaging: country of destination, gas category and equipment code. The code allows finding out the factory settings.

NOTE: In compliance with standards EN1020, EN 437 and ISO3166, GB refers to the United Kingdom.

Codes with no extension:

- AH105IT — if there is no extension, it means that the equipment has been tested and set to run with natural gas [G20].

Codes with extension:

The fourth letter indicates the type of gas the equipment has been set up for:

- AH105FR-xxx**0** — 0 indicates that the equipment has been tested and set up for natural gas [G20];
- AH105MT-xxx**1** — 1 indicates that the equipment has been tested and set up for LPG [G31];
- AH105NL-xxx**2** — 2 indicates that the equipment has been tested and set up for 'L' natural gas [G25], or ‘K’ [G25.3];
- AH105HU-xxx**3** — 3 indicates that the equipment has been tested and set up for natural gas [G25.1];
- AH105PL-xxx**4** — 4 indicates that the equipment has been tested and set up for gas [G2.350].

Another adhesive label, located near the fuel connection of the equipment, specifically indicates the type of gas and the supply pressure for which the equipment has been set up and tested.

Suitable for the G+ Gas [Only for the Netherlands]
“The appliance was configured for the appliance category K (I2K) and is suitable for the use of G and G+ distribution gases according to the specifications as included in the NTA 8837:2012 Annex D with a Wobbe index of 43.46 – 45.3 MJ/m3 (dry, 0 °C, upper value) or 41.23 – 42.98 (dry, 15 °C, lower value).
This appliance can moreover be converted and/or be calibrated for the appliance category E (I2E). This therefore implies that the appliance “is suitable for G+ gas and H gas or is demonstrably suitable for G+ gas and can demonstrably be made suitable for H gas” within the meaning of the “Dutch Decree of 10 May 2016 regarding amendment of the Dutch Gas Appliances Decree and the Dutch Commodities (Administrative Fines) Act in connection with the changing composition of gas in the Netherlands as well as technical amendment of some other decrees”.

6.8. Gas Settings Table

TYPE OF GAS G20 - Cat. E-H							
TYPE OF MACHINE		PCH065		PCH080		PCH105	
Output		min	max	min	max	min	max
CATEGORY		according to the country of destination - see reference table					
SUPPLY PRESSURE	[mbar]	20 [min 17-max 25] *					
PILOT NOZZLE Ø	[mm]	0.7					
GAS CONSUMPTION (15°C-1013mbar)	[m^3/h]	1.31	6.88	1.74	8.68	2.22	10.58
CARBON DIOXIDE -CO_2 CONTENT	[%]	8.7	9.1	8.7	9.1	8.5	9.1
FLUE GAS TEMPERATURE	[°C]	31	86	26	70	28	80
FLUE GAS MASS FLOW RATE (MAX.)	[kg/h]	107		135		165	
GAS ORIFICE PLATE	[mm]	11		12.2		15.8	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required	
* For Hungary, supply pressure is 25 mbar							

TYPE OF GAS G25 - Cat. LL							
TYPE OF MACHINE		PCH065		PCH080		PCH105	
Output		min	max	min	max	min	max
CATEGORY		according to the country of destination - see reference table					
SUPPLY PRESSURE	[mbar]	25 [min 17-max 30] *					
PILOT NOZZLE Ø	[mm]	0.7					
GAS CONSUMPTION (15°C-1013mbar)	[m^3/h]	1.53	8.00	2.02	10.1	2.21	12.30
CARBON DIOXIDE -CO_2 CONTENT	[%]	8.8	9.2	8.6	9.1	8.8	9
FLUE GAS TEMPERATURE	[°C]	31	86	26	70	28	80
GAS ORIFICE PLATE	[mm]	Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required	
* For Germany, supply pressure is 20 mbar							

TYPE OF GAS G25.3 - Cat. K (Only the Netherlands)							
TYPE OF MACHINE		PCH065		PCH080		PCH105	
Output		min	max	min	max	min	max
CATEGORY		according to the country of destination - see reference table					
SUPPLY PRESSURE	[mbar]	25 [min 20-max 30] *					
PILOT NOZZLE Ø	[mm]	0.7					
GAS CONSUMPTION (15°C-1013mbar)	[m^3/h]	1.49	7.82	1.97	9.87	2.53	12.03
CARBON DIOXIDE -CO_2 CONTENT	[%]	8.9	9.1	8.7	9.1	8.8	9.4
FLUE GAS TEMPERATURE	[°C]	31	86	26	70	28	80
GAS ORIFICE PLATE	[mm]	Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required	
* For Germany, supply pressure is 20 mbar							

NOTE: (for both "Tensostatic" or "Pressure static" models)
For AH105 gas consumption and mass flow rates are the same as the PCH105.
For AH160 gas consumption and mass flow rates are twice the PCH080.
For AH210 gas consumption and mass flow rates are twice the PCH105.
For AH240 gas consumption and mass flow rates are three times higher than the PCH065.
For AH320 gas consumption and mass flow rates are three times higher than the PCH105.

TYPE OF GAS G2.350 - Cat. Ls (Only for PL-Poland)			
TYPE OF MACHINE		PCH065*	
Output		min	max
CATEGORY		according to the country of destination - see reference table	
SUPPLY PRESSURE	[mbar]	13 [min 10-max 16]	
PILOT NOZZLE Ø	[mm]	0.75	
GAS CONSUMPTION (15°C-1013mbar)	[m^3/h]	1.84	9.63
CARBON DIOXIDE -CO_2 CONTENT	[%]	7.3	7.9
FLUE GAS TEMPERATURE	[°C]	31	86
GAS ORIFICE PLATE	[mm]	Not required	
AIR ORIFICE PLATE	[mm]	30.5	
* Maximum nominal heat output 57.0 kW			

NOTE: The minimum and maximum heat outputs of models PCH065, PCH130 and PCH132 are lower with respect to the operation with G20. Models PCH080, PCH105 are not suitable to operate with gas G2.350.
The conversion kit for G2.350 is only supplied on request.

TYPE OF GAS G25.1 - Cat. S (Only for HU-Hungary)							
TYPE OF MACHINE		PCH065		PCH080		PCH105*	
Output		min	max	min	max	min	max
CATEGORY		according to the country of destination - see reference table					
SUPPLY PRESSURE	[mbar]	25 [min 20-max 33]					
PILOT NOZZLE Ø	[mm]	0.70					
GAS CONSUMPTION (15°C-1013mbar)	[m^3/h]	1.52	7.99	2.01	10.1	2.21	12.29
CARBON DIOXIDE -CO_2 CONTENT	[%]	9.3	9.7	9.8	10.3	9.4	9.6
FLUE GAS TEMPERATURE	[°C]	31	86	26	70	28	80
GAS ORIFICE PLATE	[mm]	Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required	
* Maximum nominal heat output 94.0 kW							

TYPE OF GAS G27 - Cat. Lw [former GZ41.5] (Only for PL-Poland)							
TYPE OF MACHINE		PCH065*		PCH080**		PCH105***	
Output		min	max	min	max	min	max
CATEGORY		according to the country of destination - see reference table					
SUPPLY PRESSURE	[mbar]	20 [min 16-max 23]					
PILOT NOZZLE Ø	[mm]	0.70					
GAS CONSUMPTION (15°C-1013mbar)	[m^3/h]	1.48	7.74	1.95	9.76	2.50	11.90
CARBON DIOXIDE -CO_2 CONTENT	[%]	8.6	8.8	8.7	9.1	8.5	8.7
FLUE GAS TEMPERATURE	[°C]	31	77	26	67	28	74
GAS ORIFICE PLATE	[mm]	Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		30.5		Not required	
* Maximum rated heat output 57 kW ** Maximum rated heat output 75 kW *** Maximum rated heat output 94 kW							

TYPE OF GAS G30 - Cat. 3B-P							
TYPE OF MACHINE		PCH065		PCH080*		PCH105**	
Output		min	max	min	max	min	max
CATEGORY		according to the country of destination - see reference table					
SUPPLY PRESSURE	[mbar]	30 [min 25-max 35] - 50 [min 42.5-max 57.5]					
PILOT NOZZLE Ø	[mm]	0.51					
GAS CONSUMPTION (15°C-1013mbar)	[kg/h]	1.03	5.39	1.49	6.80	1.70	8.30
CARBON DIOXIDE -CO_2 CONTENT	[%]	10.7	11.3	10.1	10.3	10.4	10.6
FLUE GAS TEMPERATURE	[°C]	31	86	26.5	70	28	80
GAS ORIFICE PLATE	[mm]	6.5		7.0		9.3	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required	
* Minimum rated heat output 18 kW ** Minimum rated heat output 24 kW							

TYPE OF GAS G31 - Cat. 3P							
TYPE OF MACHINE		PCH065		PCH080		PCH105	
Output		min	max	min	max	min	max
CATEGORY		according to the country of destination - see reference table					
SUPPLY PRESSURE	[mbar]	30 [min 25-max 35] - 37 [min 25-max 45] - 50 [min 42.5-max 57.5]					
PILOT NOZZLE Ø	[mm]	0.51					
GAS CONSUMPTION (15°C-1013mbar)	[kg/h]	1.01	5.31	1.34	6.70	1.47	8.18
CARBON DIOXIDE -CO_2 CONTENT	[%]	9.4	9.6	9.3	9.6	9.5	9.8
FLUE GAS TEMPERATURE	[°C]	31	86	26.5	70	28	80
FLUE GAS MASS FLOW RATE (MAX.)	[kg/h]	84		107		130	
GAS ORIFICE PLATE	[mm]	6.5		7.0		9.3	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required	

NOTE: (for both “Tensostatic” or “Pressure static” models)
For AH105 gas consumption and mass flow rates are the same as the PCH105.
For AH160 gas consumption and mass flow rates are twice the PCH080.
For AH210 gas consumption and mass flow rates are twice the PCH105.
For AH240 gas consumption and mass flow rates are three times higher than the PCH065.
For AH320 gas consumption and mass flow rates are three times higher than the PCH105.

6.9. Starting up for the first time

The PCH heater module is supplied already set up and tested for the gas specified on the nameplate. Before turning on the PCH module check the following:

- make sure the gas being supplied matches the gas for which the PCH has been set up;
- check, with the pressure intake "IN" on the gas valve, that the valve input pressure corresponds to that required for the type of gas being used;
- check that electrical connections correspond to those indicated in this manual or other wiring diagrams enclosed with the unit;
- check that efficient earthing connections have been completed, carried out as specified by current safety regulations;
- power on the heater with the general switch located on the unit and insert the power plug inside the PCH compartment.

To turn on the heater, follow the instructions below:

- Check that the display shows RDY; if OFF is displayed instead, work on the control Smart Web to set the device to ON**;**
- Check that the Tin value is higher than the Von value on the LCD display.

When ON appears on the LCD display, the heater starts the ignition cycle.

NOTE: Frequently, when turned on for the first time, the pilot burner cannot ignite because there is air in the gas pipe. This will lock out the equipment. You will need to reset the equipment and repeat the operation until it ignites.

6.10. Analysis of combustion

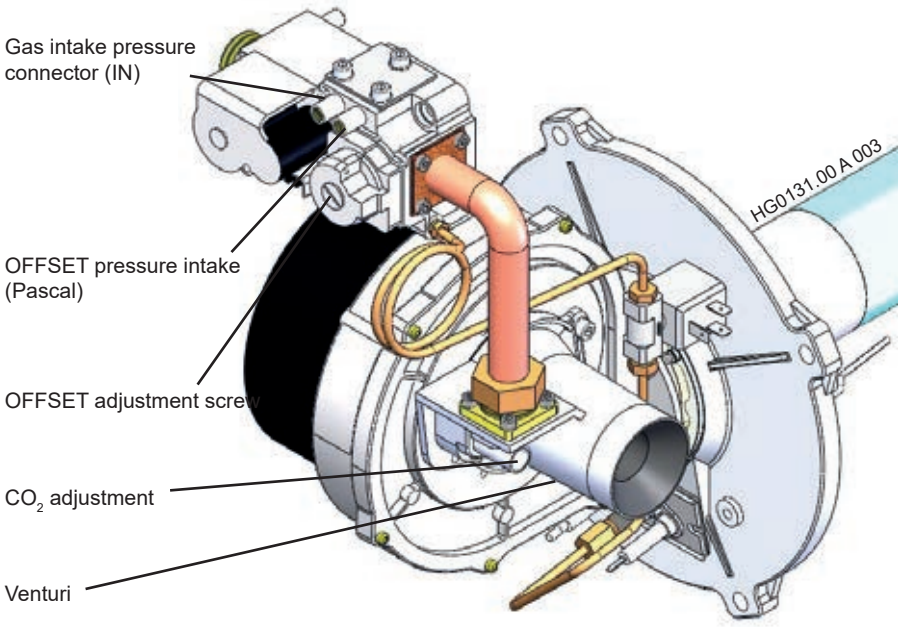
Wait until the heater is switched on and reaches the maximum output:

- check that Tin input signal is equal to 10 V;
- from the LCD display, access the REG menu, then use the Hi and Lo controls to force operation at maximum or minimum output.

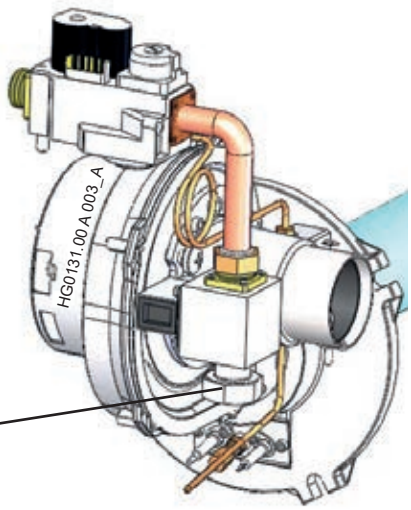
At maximum output, check again that the input pressure in the valve corresponds to the value required; adjust if necessary.
Perform the combustion analysis to verify that the level of CO_2 corresponds to the figures in the tables in Paragraph 4.6 "GAS Connection".
If the measured value is different, turn the adjustment screw on the Venturi pipe. Loosening the screw will increase the CO_2 level, screwing it down will decrease the level.
Set the heater to minimum output, and verify that the level of CO_2 corresponds to the figures in the tables in Paragraph 4.6 "GAS Connection". If the values do not match, screw or loosen the offset screw respectively to increase or decrease the CO_2 level and repeat the procedure.

NOTE: The heater directly supplied to function with LPG is set up for G31 gas. If the unit runs on G30 instead, it is necessary to verify and possibly adjust settings for CO_2 as shown in the tables in Paragraph 4.6 "GAS connection".

For models: AH160, AH240



For models: AH105, AH210, AH320



6.11. Conversion to LPG

Conversion is strictly prohibited in some countries, such as Belgium, which do not allow the double gas category.

The unit is supplied already set for natural gas and equipped with the kit for conversion to LPG, which comprises:
- calibrated gas orifice plate;
- pilot nozzle;
- adhesive plate "Equipment converted...".

The kit is not supplied in countries where conversion is prohibited.
To convert the unit, follow these instructions:
- disconnect from power supply;
- between the gas pipe and the Venturi, replace the gas orifice plate fitted (natural gas) with the one supplied with the kit (for LPG);
- replace the pilot nozzle (natural gas) with the one in the kit (LPG);
- restore power supply and set the heater up for ignition;
- while the start-up electrode is sparking, make sure there are no gas leaks.

When the burner is lit and working at maximum capacity, verify that:
- the valve intake pressure corresponds to the value required for the type of gas that you are using;
- the combustion analysis procedure is performed as described in Paragraph 4.8 "Combustion Analysis";
- the level of CO_2 is within the limits indicated for the type of gas being used (tables in Paragraph 4.6 "GAS connection"). If a different value is detected, change it by turning the adjustment screw: screwing it down decreases the CO_2 level, loosening it increases the level.
- that the gas valve Venturi pipe connector does not leak.

After converting and regulating the unit, replace the nameplate indicating "Equipment regulated for natural gas" with the one in the kit that indicates "Equipment converted ...".

6.12. Conversion to gas G25 - G25.1 - G25.3 - G27

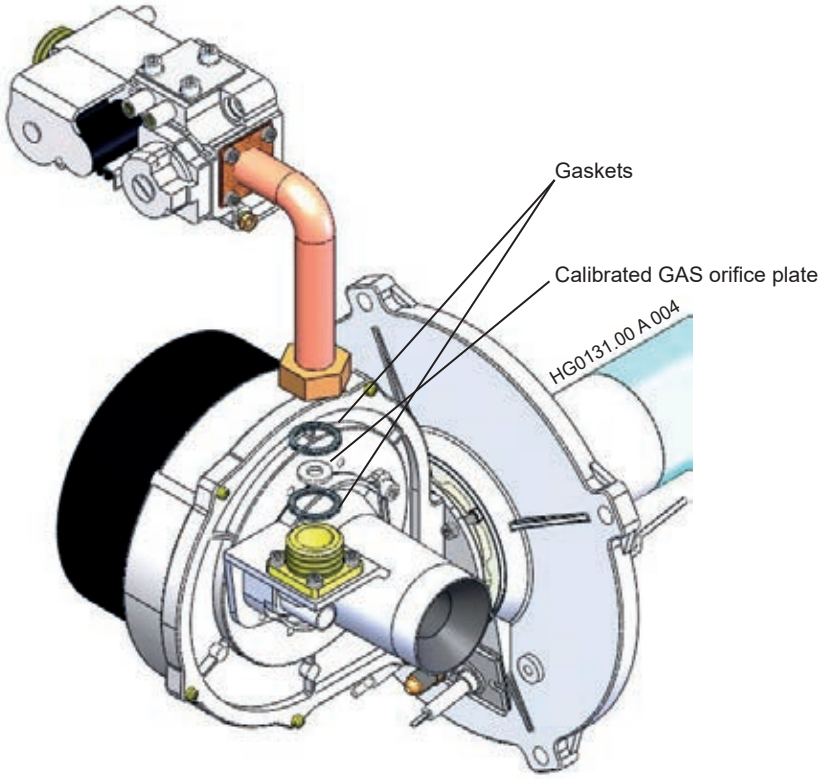
Conversion for gasses from G20 to G25 or G25.1 or G25.3 or G27 is allowed only in countries of category II2ELL3B/P [Germany], II2Esi3P [France], II2E3P [Luxembourg] and category II2HS3B/P [Hungary] and category II2ELwLs3B/P [Poland]. For countries in category II2EK3B/P [Netherlands from 01/01/2018] the unit is supplied already set up and regulated for G25.3.
For category I2E countries, where conversion from G20 to G25 is not permitted [Belgium], the unit is supplied set for operation with G20 gas.
Conversion from one type of gas to another can only be performed by authorised service centres.
Conversion to G25 and/or G25.1, G25.3, G27 where possible, consists in:
- insertion of orifice plate (according to the gas type and the equipment model)

After the conversion, relight the burner and:
- check that the intake pressure to the gas valve corresponds to the level required for the type of gas [see tables in Paragraph 7.2 "GAS Connection Tables"];
- check that the level of CO_2, at maximum and minimum heat output, is between the values indicated for the type of gas. If the value is different, change it by turning the adjustment screw on the Venturi pipe: screwing it down decreases the value, loosening it increases the value.

Stick the nameplate "Equipment converted for gas G25...." in place of the one that says "Equipment set up for .....".

NOTE: Always pay close attention to the level of CO_2 in G25.1; for G25.1 minimum and maximum heat output in the AH105, AH210 and AH420 models will always be lower than when used with G20.

NOTE: The conversion kit to G25 , G25.1 and G27 is only supplied on request. The conversion kit to G25 is included in the standard supply for France, Germany and Luxembourg.



6.13. Conversion to gas G2.350

Conversion is allowed only for Poland.
Conversion from one type of gas to another can only be performed by authorised service centres.
Conversion to G2.350 consists in:

- for all models: pilot nozzle replacement.
- only for model PCH065: mounting a calibrated orifice plate on the air intake of the Venturi pipe [see tables in Paragraph 5.8 "GAS connection"].

After the conversion, relight the burner and:

- check that the intake pressure to the gas valve corresponds to the level required for the type of gas [see tables in Paragraph 5.8 "GAS Connection"];
- check that the level of CO_2, at maximum and minimum heat output, is between the values indicated for the type of gas. If the value is different, change it by turning the adjustment screw on the Venturi pipe: screwing it down decreases the value, loosening it increases the value.

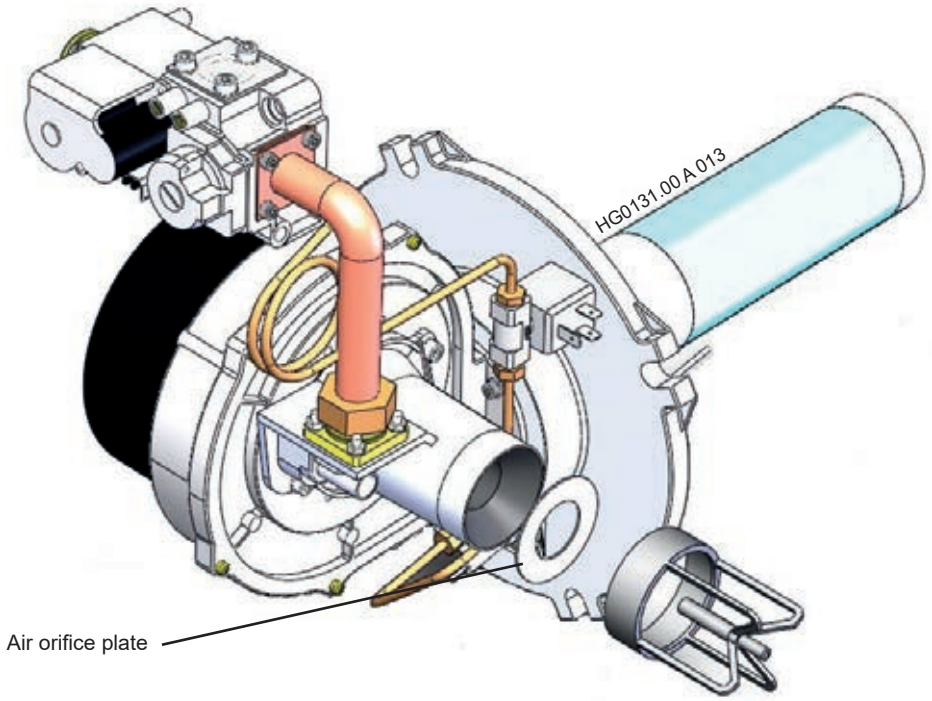
Stick the nameplate "Equipment converted for gas G2.350...." in place of the one that says "Equipment set up for .....".

NOTE: The minimum and maximum heat outputs of models AH130, AH240 will be lower compared to their operation with G20. Models AH080, AH105, AH160, AH210, AH320, AH420 and AH420 are not suitable for operation with gas G2.350.

NOTE: The conversion kit is supplied on request

6.14. Replacing the Gas Valve

If the gas valve must be replaced, it is required to proceed with an inspection and possibly calibrate the CO_2 level through the adjustments on the Venturi pipe.
It is advisable not to calibrate the offset: the valve calibration is performed by the manufacturer.
If necessary, carry out the combustion analysis procedure as described in Paragraph 5.10 "Analysis of combustion".
It is recommended to always carry out the flue gas analysis after replacing the gas valve.



6.15. Replacing the modulation PCB

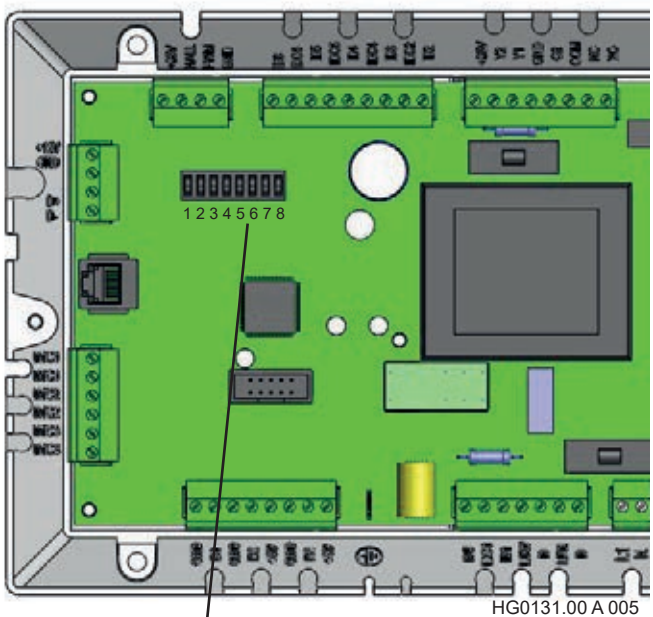
When replacing the CPU-SMART PCB, it is necessary to check and if necessary modify the setting of some parameters through the Smart Web or LCD command.
Every AH heater has a list of pre-programmed default values. It is advisable to update the list at every change performed on site in order to be able to reprogram a spare PCB if needed.

Check the hardware configuration of the PCB
Modify the address of the PCB with the switches, copying the exact configuration of the PCB that was just replaced.

Programming the parameters
If the CPU PCB is to be replaced, all the parameters mentioned in the table in paragraph 6.5 "Modulation PCB parameters" must be necessarily reprogrammed, except the parameters marked as "NOT USED".

Programming the parameters - Operating mode
Parameters can be modified from the LCD display on the machine or, alternatively, from Smart Web.

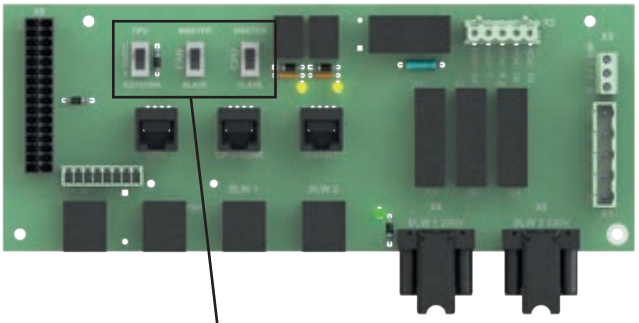
The Smart Web can be used to access all parameters [see tables on previous pages]; parameters have passwords, which are issued by the APEN GROUP assistance service.
Please refer to the Smart Web manual for instructions for the procedure for access and modification of functional parameters.
Please remember that all changes to parameters must be done ONLY with the burner OFF (with display showing rdy or Off).



6.16. Replacing the wiring card

When replacing the wiring card, it is required to carry out a few checks and set a few switches.
In every AH heater there is a wiring card with different settings depending on how many modules comprise the heater.

Check the hardware configuration of the PCB
If the AH heater consists of only one module (AH105) the board must have three switches in the position indicated in Figure (A).
If the AH heater consists of two or more modules the board must have three switches in the position indicated in Figure (B) for the "MASTER" module and in the position indicated in Figure (C) for the other "SLAVE" modules.



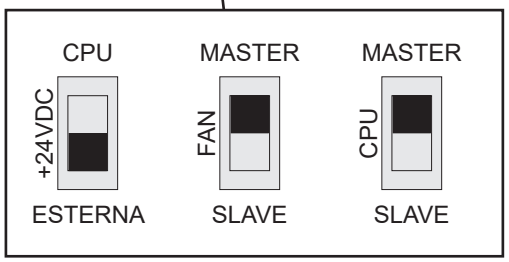


Figure A
MASTER module

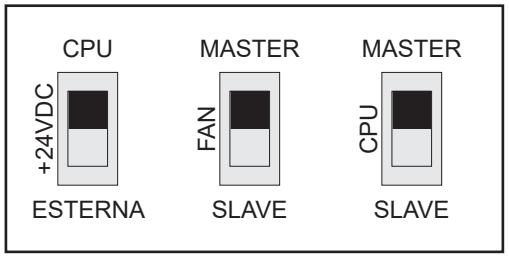


Figure B
MASTER module

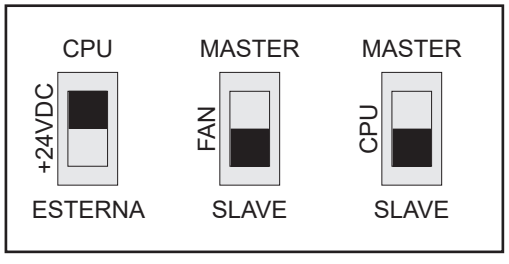


Figure C
SLAVE module

7. MAINTENANCE

To keep the heater efficient and guarantee a long lifetime of the same, it is advisable to run some inspections at regular intervals:

1) check the status of start-up and detection electrodes and pilot flame;
2) check the status of flue exhaust and air intake ducts and terminals;
3) check the status of the Venturi pipe;
4) check and if necessary clean the exchanger and burner;
5) check and clean the water trap;
6) check the intake pressure at the gas valve;
7) check the operation of flame monitoring equipment;
8) check the safety thermostat(s);
9) check the ionization current.
10) Inspection and cleaning of the fan compartment
11) Inspection and cleaning of the air fan protection grilles
12) Inspection and cleaning of outdoor air intake plenum
13) Inspection and cleaning of the outdoor air intake shutter

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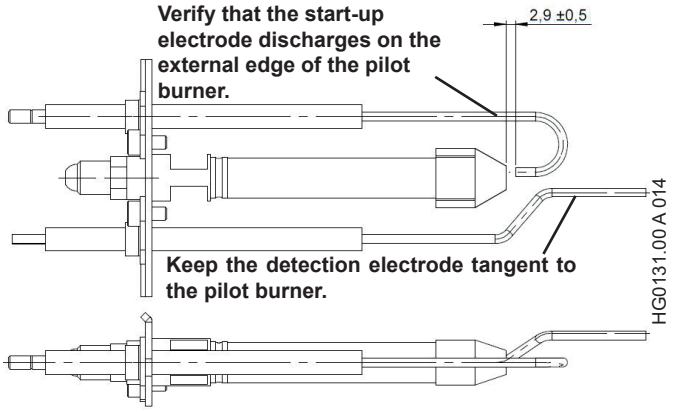
NOTE: Operations at points 1, 2, 3, 4 and 5 must be performed after disconnecting the heater from the electrical mains and closed the gas supply. Operations at point 6, 7, 8 and 9 must be done with the heater on.

Maintenance interval chart

Maintenance	every year	Extraordinary
1) Electrodes and Pilot	●	
2) Flue gas/Air Terminals	●	
3) Venturi pipes	●	
4) Exchanger/Burner		●
5) Condensate collection trap	●	
6) Gas valve	●	
7) Flame Equipment	●	
8) Safety thermostat(s)	●	
9) Ionization current	●	
10) Fan compartment	●	
11) Air fan grille	●	
12) Air intake plenum	●	
13) Air intake shutter	●	

1) Inspection of electrodes
Dismantle the complete pilot flame and use a jet of compressed air to clean the mesh and nozzle. Check the integrity of the ceramic and use sandpaper to remove any oxidation on the metal parts of the electrodes. Check the correct position of the electrodes (see drawing below). It is important that the detection electrode is tangent to the head of the pilot and not inside it. The start-up electrode must discharge onto the mesh of the pilot burner.
Every time you clean and check the starting/detection and the pilot flame electrodes it is necessary to replace all the gaskets between the burner and the pilot flame.



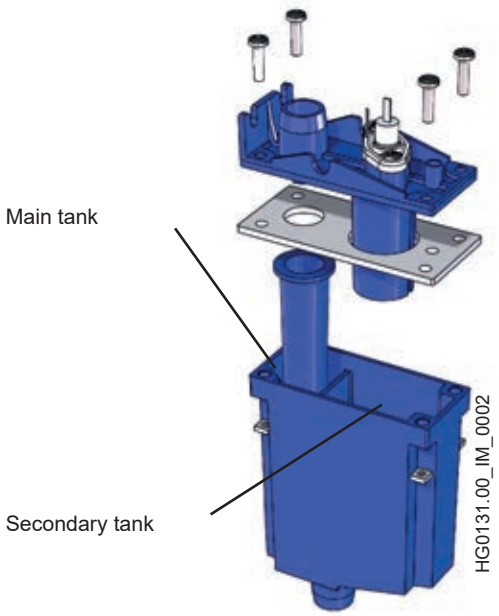
2) Inspection of flue gas exhaust and air intake ducts
Visually inspect where possible or use specific tools to check the status of the ducts.
Remove dust that forms on the air intake terminal.

3) Inspection and cleaning of the Venturi pipe
Remove any dirt at the mouth of the Venturi pipe with a brush, and be careful to not let it fall inside the piece.

4) Inspection and cleaning of the exchanger and burner
Good combustion in PCH heaters prevents dirt, which is normally caused by bad combustion. It is advisable, therefore, to not clean the exchanger and burner unless there are exceptional circumstances. An accumulation of dirt inside the exchanger could be revealed by a considerable variation in the gas capacity that is not caused by improper functioning of the gas valve.
Should it become necessary to clean the burner and/or exchanger, all the gaskets between the burner and the exchanger must be replaced.

5) Inspection and cleaning of the water trap
Clean the trap every year, and check the connections. Make sure there are no traces of metallic residue. If metallic residue has formed, increase the number of inspections.
Remove the cover retaining screws and clean the internal part of the trap (it is possible to clean the trap under running water) by checking that all ducts are free. Check the seal conditions. Check the integrity of the detection electrode and use sandpaper to remove any oxidation on the metal part.

Fill in the main tank with clean water and close the cover. Reconnect the trap to the condensate drain system.



6) Inspection of intake gas pressure
Check that the intake pressure at the valve corresponds to the value required for the type of gas that you are using.
This verification must be done with the heater on at the maximum heat capacity.

7) Inspection of flame monitoring equipment
With the heater running, close the gas tap and verify that the machine is locked out, signalled on the LCD display of the CPU PCB on the machine with F10. Reopen the gas tap, reset the lockout and wait for the heater to restart.

8) Inspection of the safety thermostat(s)
This procedure must be done with the heater on and the burner lit. Open the thermostat series with an insulated tool [230 V], remove the fast-on from the safety thermostat, wait for the F20 block signal to appear on the LCD display on the CPU PCB on the machine. Close again the thermostat series, then reset the lockout.
As an alternative:
This operation must be carried out with the heater OFF.
Disconnect the thermostat series with an insulated tool [230 V], remove the fast-on from the safety thermostat, start the ignition cycle and wait for the F22 block signal to appear on the LCD display on the CPU PCB on the machine. Close the thermostat series and check the fault reset.

9) Inspection of the ionization current
This procedure can be done directly from the LCD display by entering into the I/O menu. The IOn parameter indicates the value of the ionization current, and the reading is as follows:
- 100, indicates that the value is more than 2 microAmperes, which is plenty for the equipment to function;
- from 0 to 100, indicates a value from 0 to 2 microAmperes; for example, 35 corresponds to 0.7 microAmperes, which is the minimum threshold detectable for the flame monitoring equipment.

The value of the ionisation current must not be below 2 microAmperes. Lower values indicate: the detection electrode in a bad position, a rusted electrode or one about to stop functioning.

10) Inspection and cleaning of the fan compartment
Remove the rear access panel to the fan compartment and clean any dirt accumulated inside the compartment itself.

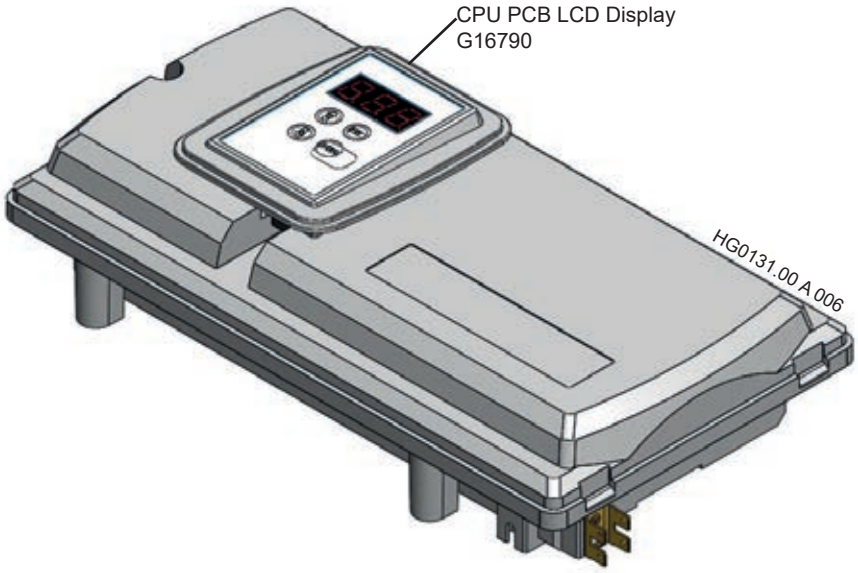
11) Inspection and cleaning of the air fan protection grilles
Remove the rear access panel to the fan compartment and clean any deposits around the fan intake protection grilles to allow the air to flow well.

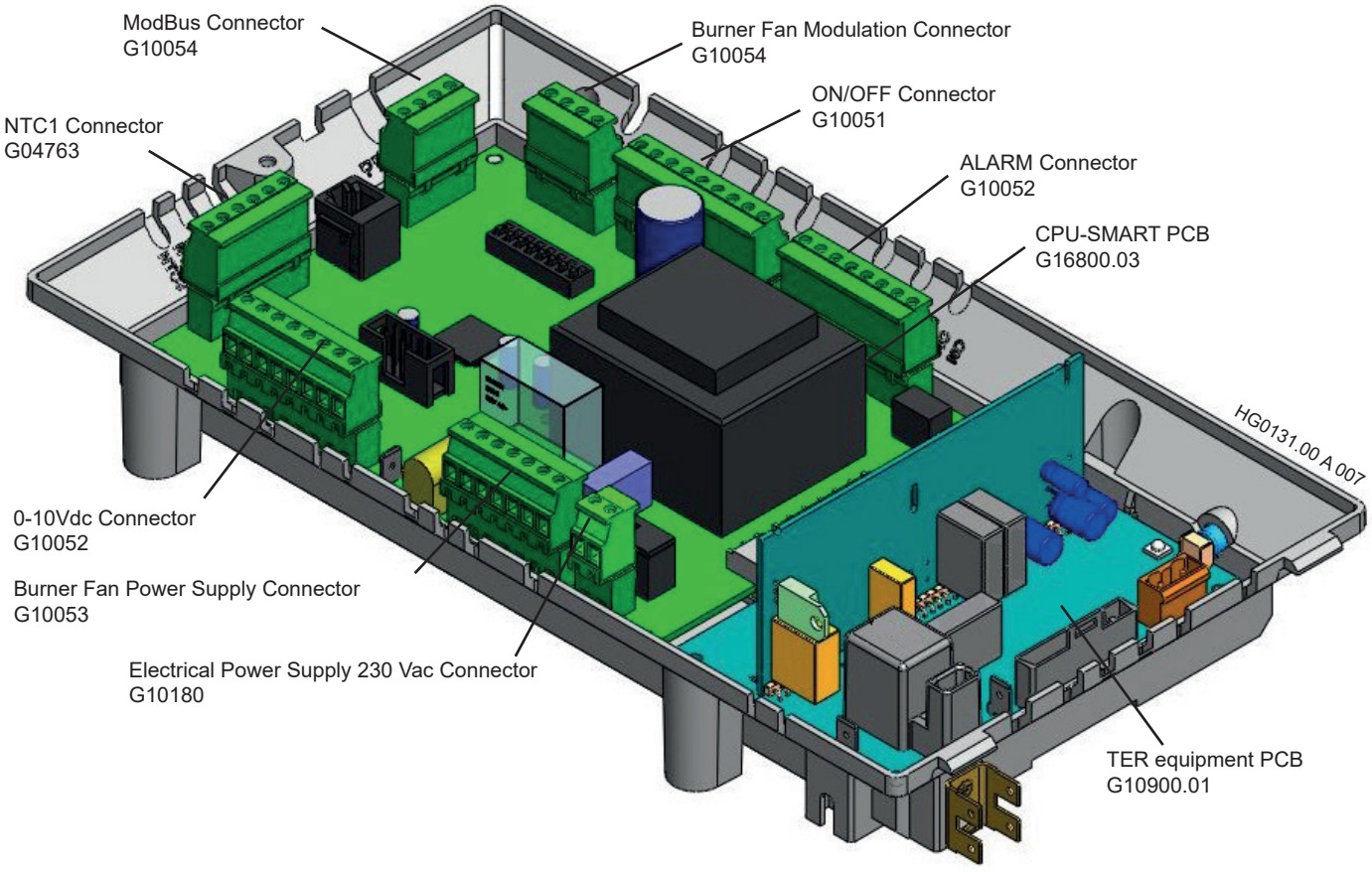
12) Inspection and cleaning of outdoor air intake plenum
Remove the rear access panel to the outdoor air intake plenum and remove any dirt accumulated inside the plenum itself.

13) Inspection and cleaning of the outdoor air intake shutter
Use a brush to remove any deposit around the outdoor air intake shutter protection mesh and around the shutter itself to allow the air to flow well.

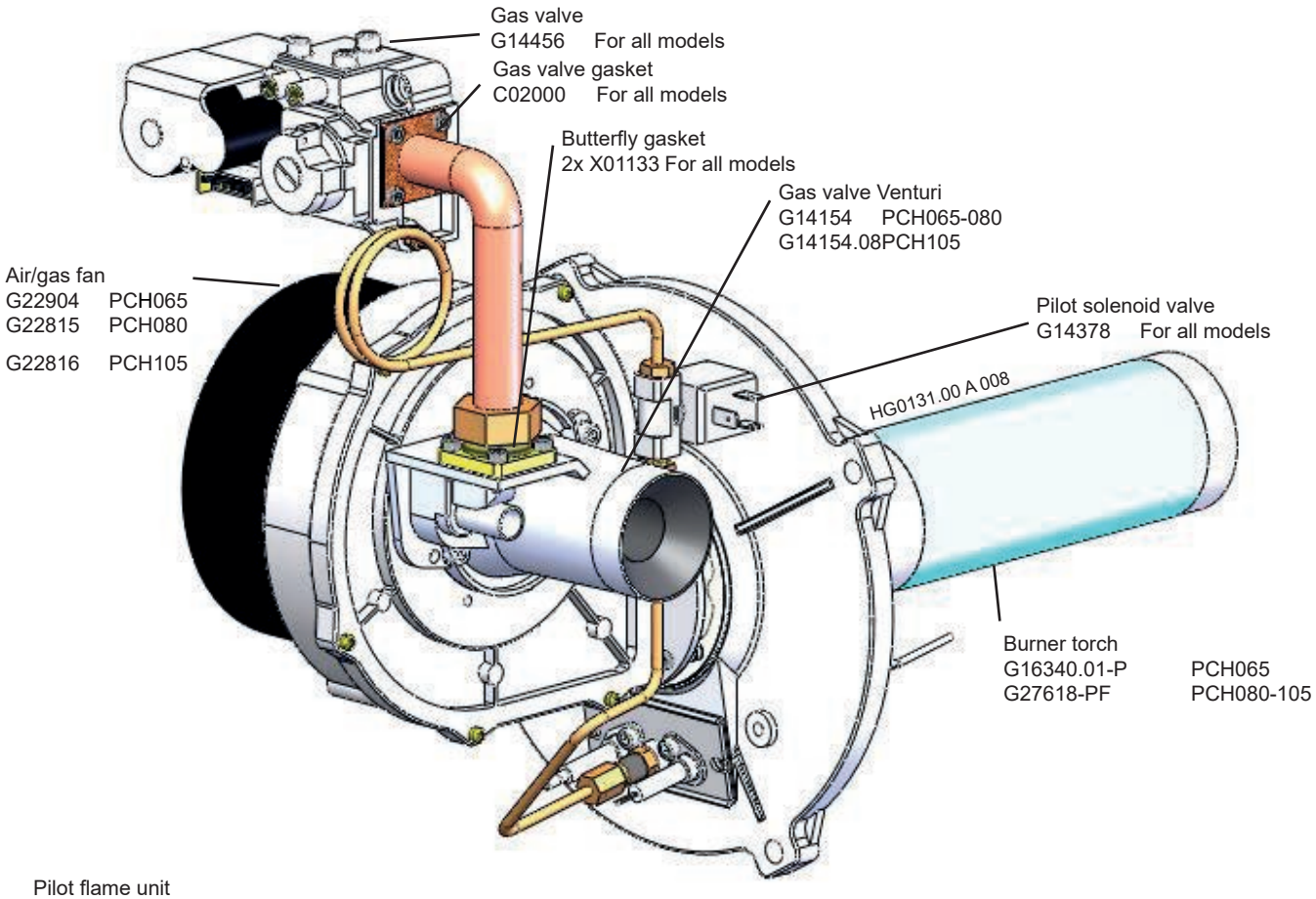
8. LIST OF SPARE PARTS

8.1. Parts for the electrical panel

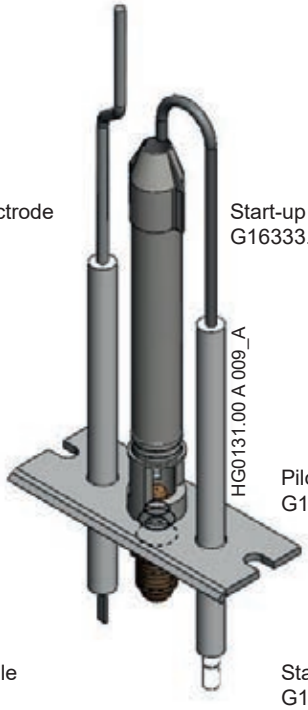


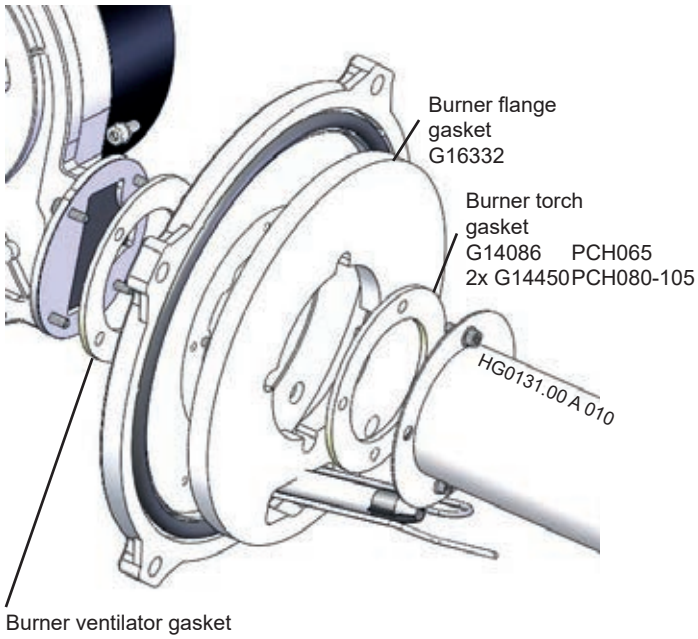


8.2. Parts for the burner unit

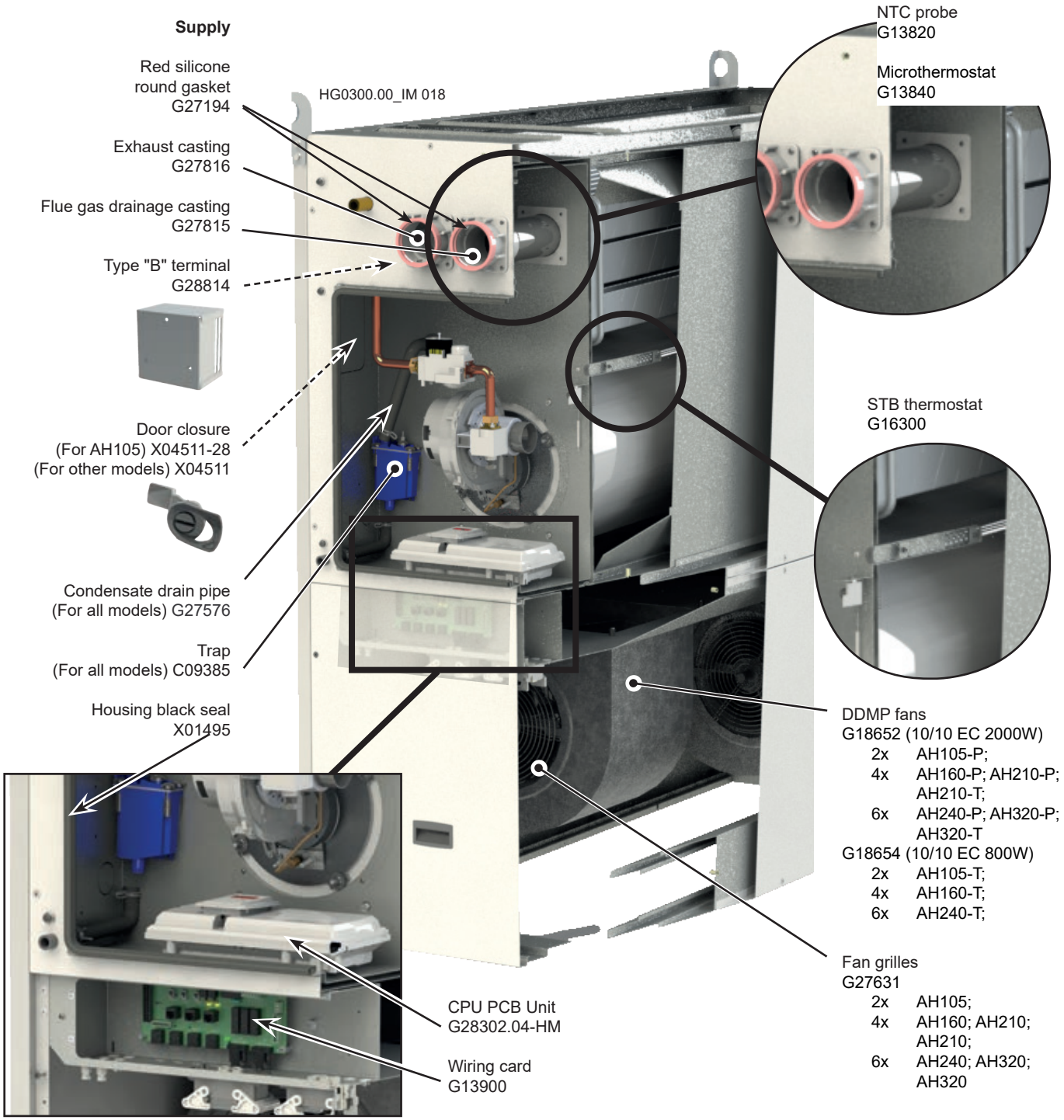


Pilot flame unit
G28030.01 G20.
G28030.01-1 LPG.





8.3. Other spare parts available



Smart Web remote control
G23700-AHP

HG0300.00_IM 019

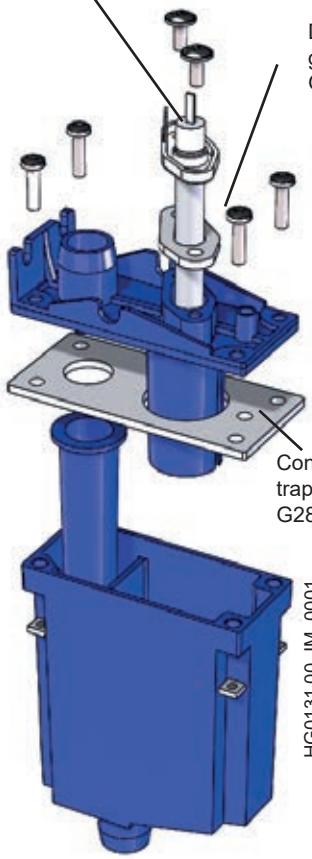
Air intake temperature probe
G17675

HG0300.00_IM 020

Condensation detection electrode
G27806

Detection electrode
gasket
G28826

Condensate
trap gasket
G28827



HG0131.00_IM_0001

Water trap complete with
condensation detection electrode
C09385

Notes

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