

GB

*Maintenance, installation and service manual
AH - New condensing air heating unit*



Thermal Account for
Public Authorities

Tax deduction

Yield up to **108%**

For Indoor and Outdoor Use

NOx Class: **5**

VER. 01.2010

Dichiarazione di Conformità Statement of Compliance



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

Modello:	Unità di Riscaldamento Aria a Condensazione AH
Model:	AH Condensing Air Heating unit

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:

- **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
- **Direttiva ROHS II 2011/65/UE e ROHS III 2015/863/UE**
ROHS II 2011/65/UE and ROHS III 2015/863/UE Directives

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

- EN17082:2019
- EN60335-1
- EN60335-2-102
- EN60730-1
- EN 60068-2-1
- EN 60068-2-2
- EN55014-1
- EN55014-2
- EN61000-3-2
- EN61000-3-3

Organismo Notificato:

Notified body:
Kiwa Cermet Italia S.p.A
0476
PIN 0476DL4298

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
26/05/2020

Apen Group S.p.A.
Un Amministratore
Mariagiovanna Rigamonti



CODE

SERIAL NUMBER

cod. HG0310.05GB ed.D-2201

2

AH

INDEX

SECTION	1.	GENERAL CAUTIONS	4
SECTION	2.	SAFETY INSTRUCTIONS	4
	2.1	Fuel.....	4
	2.2	Gas Leaks	4
	2.3	Power Supply	5
	2.4	Use	5
	2.5	Air vents 5	
	2.6	Installation	6
	2.7	Maintenance	6
	2.8	Transport and handling.....	7
	2.9	Unpacking.....	8
	2.10	Dismantling and demolition	8
SECTION	3.	TECHNICAL FEATURES	9
	3.1	Main Components	9
	3.2	Technical Data	10
	3.3	Dimensions.....	14
	3.4	Air flow rate curves - Available pressure/Power consumption.....	18
	3.5	Noise	20
SECTION	4.	USER INSTRUCTIONS.....	22
	4.1	AH unit operation.....	22
	4.2	Smart Web.....	23
	4.3	Remote On/Off	25
	4.4	Pressure control	26
	4.5	WEB configuration.....	28
SECTION	5.	INSTALLATION INSTRUCTIONS.....	29
	5.1	General Installation Instructions	29
	5.2	Installation	29
	5.3	Electrical Connections	29
	5.4	Wiring to Power Supply	30
	5.5	Connections to the Flue.....	32
	5.6	Condensate drain	38
	5.7	Gas Connection.....	39
	5.8	Fire damper installation	40
SECTION	6.	SERVICING INSTRUCTIONS.....	41
	6.1	Operating cycle.....	41
	6.2	Interface Panel	41
	6.3	Reset	41
	6.4	Parameters of MASTER and SLAVE modulation PCBs.....	42
	6.5	Analysis of Lockouts - Faults.....	48
	6.6	Country Table - Gas Category	50
	6.7	Gas Settings Table	51
	6.8	Starting up for the first time	54
	6.9	Combustion Analysis	55
	6.10	Conversion to LPG	55
	6.11	Conversion to gas G25 - G25.1 - G25.3 - G27.....	56
	6.12	Conversion to gas G2.350.....	56
	6.13	Replacing the gas valve	56
	6.14	Replacing the modulation PCB.....	57
	6.15	Replacing the TER equipment.....	57
SECTION	7.	MAINTENANCE	58
SECTION	8.	LIST OF SPARE PARTS.....	60
	8.1	Parts for control panel	60
	8.2	Parts for the burner unit.....	61
	8.3	Other spare parts available	62

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 damage to things caused by incorrect installation, calibration and maintenance of the unit 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 air heating unit 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. Maintenance must be carried out with methods and timescales in compliance with the regulations in force in the country where the appliance is installed.

For Italy, the "technical service" tab of Apen Group website www.apengroup.com indicates several Technical Service Centres that the user can contact to have the first start-up, adjustment and maintenance of the product carried out, according to law 37/2007 (ex 46/90)

For more information, visit our website www.apengroup.com or contact Apen Group directly.

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 or unit, 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 unit burner is supplied with the same type of fuel for which it has been designed;
- 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;
- gas pipes and air distribution ducts for ducted units have been thoroughly cleaned;
- the fuel flow rate is suitable for the power required;
- 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. (See Par. 5.7 "Gas Connection")

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 or naked flames;
- immediately open doors and windows to create an air flow to vent the gas out of the room;
- close the gas valves;
- call for **qualified staff**;
- call the **Fire Brigade**.

2.3. Power supply

The unit 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 unit 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 unit with water or other fluids;
- do not place any object over the equipment;
- do not touch the moving parts of the unit.

Avoid contact with hot unit 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.

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;
- flush to the floor for gases with density higher 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 CO₂ 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. CO₂ 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.

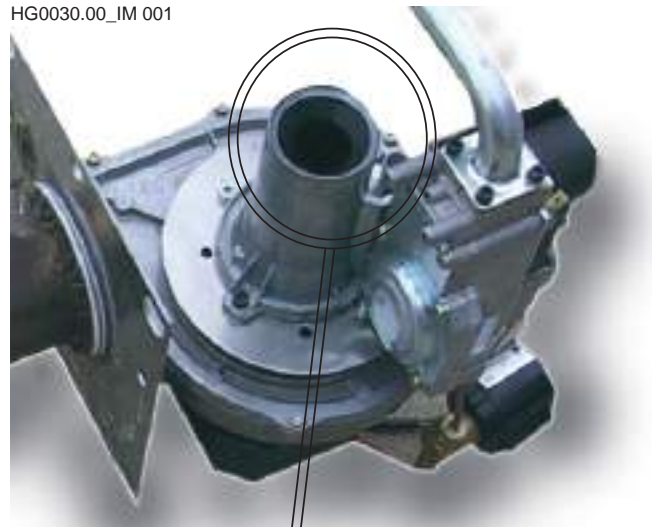
Do not obstruct the room air vents, the burner fan intake opening, any air ductwork and intake or dissipation grilles, avoiding in this way:

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

The unit, 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 machine.

The room where the unit-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.

HG0030.00_IM 001



DO NOT COVER IT WITH YOUR HAND OR OTHER OBJECTS!

2.6. Installation

The unit 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 unit 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 air heating unit is supplied with its own base or placed and properly fixed to a wooden pallet.

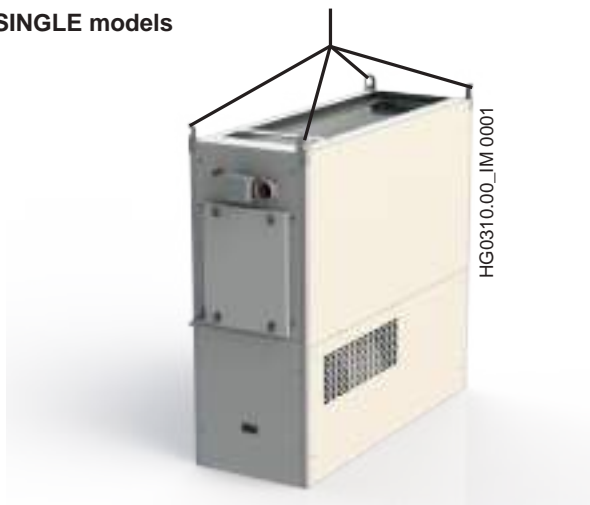
Unload the heater from the truck and move it to the site of installation by using means of transport suitable for the shape and for the weight of the load.

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 air heating unit.

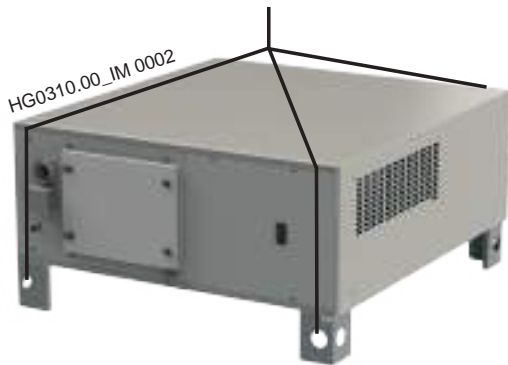
Based on their weight and dimensions, heaters can be lifted with lift trucks or wheel-mounted crane.

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

SINGLE models

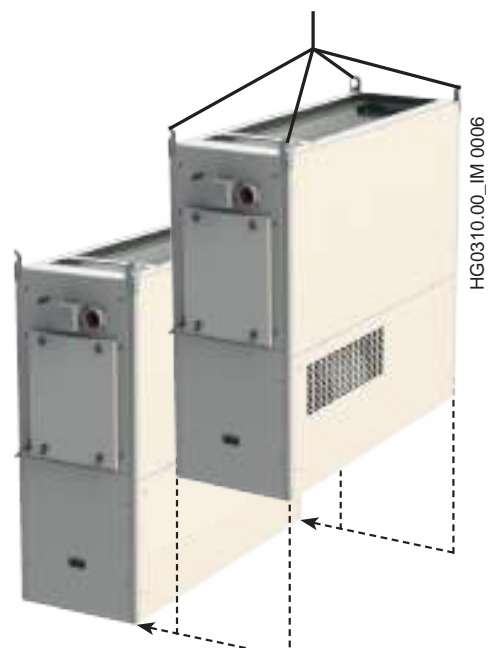
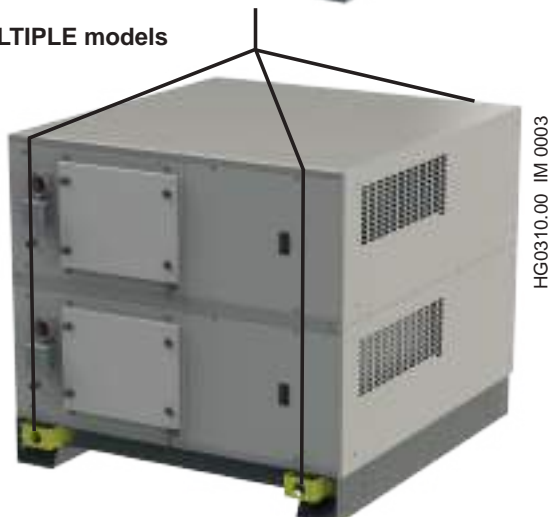


MULTIPLE models



In case of special applications, it is possible to assemble MULTIPLE models directly on site (request to be specified when ordering the machine), positioning one module at a time, as shown below.

MULTIPLE models



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 contains both pollutants (that can negatively affect the environment) and raw materials (that can be reused). IT is therefore necessary to subject WEEE to appropriate treatments, in order to remove and safely dispose of pollutants and to extract and recycle raw materials. IT is forbidden to dispose of WEEE as unsorted 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 heating 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 (Household 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 air heating units are designed for indoor air heating. AH units are available for low or high pressures, for indoor or outdoor installation and consist of:

- PCH module (heater with stainless steel condensing heat exchanger and premix burner)
- Centrifugal fans with permanent magnet electronic motor and inverter (800 W or 2000 W)
- Frame made of Magnelis® sheet (special surface treatment)
- Pre-painted, white sheet panelling
- Safety Devices and Controls
- Smart Web remote control

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 EN17082 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

Ventilation

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 the motors of the centrifugal fans used have the following features:

- 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.

Ventilation Operation

WINTER

During "Heating" operation (in winter), "MASTER" CPU PCB regulates ventilation by modulating the rotation speed on the basis of the heat output (parameter H16 = 2) and of the values set in parameters H12 and H13:

H12 = Y2 output minimum voltage = 6 (Default)

H13 = Y2 output maximum voltage = 10 (Default)

If the operation required is not of modulating type, but with constant air flow rate, parameters H12 and H13 must be equal (equal to the desired ventilation value).

SUMMER

During "Ventilation" operation (in summer), ventilation is fixed at constant speed, equal to the output of the voltage value set in parameter H18:

H18 = Y2 output fixed voltage = 8 (Default).

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 pre-painted containment panelling finishes and completes the machine externally.

Safety Devices and Controls

All AH air heating units are supplied as standard 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 Flue gas probe, modules and stops the burner operation before the safety thermostat activates;
- FLUE GAS Manual reset flue gas thermostat for protecting the PP individual or common flues.

3.2. Technical Data

There are two types of AH, both available for low or high pressures and defined as follows:

- A Single module;
- B Multiple modules.

A - Single module

The single-module air heating units comprise a single heat exchanger. This range includes AH034, AH065 and AH105 models, for low (800 W) or high (2000 W) pressures. The heat output ranges from 7.60 to 97.15 kW produced.

NOTES:

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

- (1) Max. condensation produced acquired from testing at 30%Qn.
- (2) Value referred to category H (G20).
- (3) Weighted value to EN1020:2009 ref. to cat. H (G20), referred to net calorific value (Hi, N.C.V).
- (4) Weighted value to EN1020:2009 ref. to cat. H (G20), referred to gross calorific value (Hs, G.C.V).
- (5) Reference air flow rate for the calculation of yields and season energy efficiencies and emissions, with constant air flow rate, listed in the table. Air flow rate calculated for a ΔT of 30 °C
- (6) If the burner housing heater kit is installed, add 105 W (230V) per module to the rated power value on the nameplate.

Model		AH034	AH065	AH105			
Type of equipment		B23P - C(11) ₃ - C13 - C33 - C43 - C53 - C63					
EC approval	PIN	0476DL4298					
NOx class [EN17082:2019]	Val	5					
Type of fuel		Gaseous					
Heater Performance							
		min	max	min	max	min	max
Furnace heat input (Hi)	kW	7.60	34.85	12.40	65.00	21.00	100.00
Useful heat output [P_{min} , P_{rated}]*	kW	8.13	33.56	13.40	62.93	22.77	97.15
Hi Efficiency (N.C.V.) [η_{pp} , η_{nom}]*	%	106.97	96.30	108.06	96.82	108.40	97.15
Hs efficiency (G.C.V.) [η_{pp} , η_{nom}]*	%	96.37	86.76	97.36	87.22	97.68	87.52
Flue losses with burner on (Hi)	%	0.6	3.7	0.2	3.2	0.2	2.8
Flue losses with burner off (Hi)	%	< 0.1		< 0.1		< 0.1	
Max. condensation ⁽¹⁾	l/h	0.9		2.1		2.7	
Flue gas emissions							
Carbon monoxide - CO - (0% of O ₂) ⁽²⁾	ppm	< 5		< 5		< 5	
Nitrogen oxide emissions - NOx* (0% of O ₂) (Hi) ⁽³⁾		51 mg/kWh - 29 ppm		45 mg/kWh - 25 ppm		40 mg/kWh - 23 ppm	
Nitrogen oxide emissions - NOx* (0% of O ₂) (Hs) ⁽⁴⁾		46 mg/kWh - 26 ppm		41 mg/kWh - 23 ppm		36 mg/kWh - 20 ppm	
Pressure available at the flue	Pa	90		120		120	
Electrical Characteristics							
Supply voltage	V	230V/1F+N - 50 Hz		400V/3F+N - 50 Hz			
Rated power - 0.8 kW MOTOR	kW	0.874		1.697		1.730	
Rated power - 2 kW MOTOR	kW	2.074		4.097		4.130	
Protection Rating	IP	IP X5D					
Operating Temperatures	°C	from -15°C to +40°C [for lower temperatures, a burner housing heating kit is required ⁽⁶⁾]					
Connections							
Ø gas connection		UNI/ISO 228/1-G 3/4"		UNI/ISO 228/1-G 3/4"		UNI/ISO 228/1-G 3/4"	
Intake/exhaust pipes Ø	mm	80/80		80/80		80/80	
Air flow rate							
Air flow rate (15°C) ⁽⁵⁾	m ³ /h	3210		6010		9280	
Available pressure - 0.8 kW MOTOR	Pa	190		380		See diagram "air flow rates - pressure drops"	
Available pressure - 2 kW MOTOR	Pa	560		740		190	
Number and type of fans		1 x DDMP 10/10		2 x DDMP 10/08		2 DDMP 10/10	
Air flow rate	m ³ /h	See diagram "air flow rates - pressure drops"					
Available Head Pressure	Pa	See diagram "air flow rates - pressure drops"					
Weight							
Net Weight	kg	190		220		280	

B - Multiple modules

The multiple-module air heating units consist of two or more heat exchangers; the number of burners and gas equipment is equal to 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, the three-module models, AH320, and the four-module models, AH420.

The heat output ranges from 35.54 to 388.60 kW produced.

NOTES:

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

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

(2) Value referred to category H (G20).

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

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

(5) Reference air flow rate for the calculation of yields and season energy efficiencies and emissions, with constant air flow rate, listed in the table. Air flow rate calculated for a ΔT of 30 °C

(6) If the burner housing heater kit is installed, add 105 W (230V) per module to the rated power value on the nameplate.

Model		AH160		AH210		AH320		AH420	
Type of equipment		B23P - C(11) ₃ - C13 - C33 - C43 - C53 - C63							
EC approval	PIN	0476DL4298							
NOx class [EN17082:2019]		5							
Type of fuel		Gaseous							
Heater Performance									
		min	max	min	max	min	max	min	max
Furnace heat input (Hi)	kW	16.40	164.00	21.00	200.00	21.00	300.00	21.00	400.00
Useful heat output [P_{min} , P_{rated}]*	kW	17.77	160.06	22.77	194.30	22.77	291.45	22.77	388.60
Hi Efficiency (N.C.V.) [η_{pH} , η_{nomH}]*	%	108.35	97.60	108.40	97.15	108.40	97.15	108.40	97.15
Hs efficiency (G.C.V.) [η_{pHs} , η_{nomHs}]*	%	97.62	87.93	97.68	87.52	97.68	87.52	97.68	87.52
Flue losses with burner on (Hi)	%	0.3	2.4	0.2	2.8	0.2	2.8	0.2	2.8
Flue losses with burner off (Hi)	%	< 0.1		< 0.1		< 0.1		< 0.1	
Max. condensation ⁽¹⁾	l/h	6.6		5.4		8.1		10.8	
Flue gas emissions									
Carbon monoxide - CO - (0% of O ₂) ⁽²⁾	ppm	< 5		< 5		< 5		< 5	
Nitrogen oxide emissions - NOx* (0% of O ₂) (Hi) ⁽³⁾		31 mg/kWh - 18 ppm		40 mg/kWh - 23 ppm		40 mg/kWh - 23 ppm		40 mg/kWh - 23 ppm	
Nitrogen oxide emissions - NOx* (0% of O ₂) (Hs) ⁽⁴⁾		28 mg/kWh - 16 ppm		36 mg/kWh - 20 ppm		36 mg/kWh - 20 ppm		36 mg/kWh - 20 ppm	
Pressure available at the flue	Pa	120		120		120		120	
Electrical Characteristics									
Supply voltage	V	400V/3F+N - 50 Hz							
Rated power - 0.8 kW MOTOR	kW	3.45		3.46		5.19		6.92	
Rated power - 2 kW MOTOR	kW	8.25		8.26		12.39		16.52	
Protection Rating	IP	IP X5D							
Operating Temperatures	°C	from -15°C to +40°C [for lower temperatures, a burner housing heating kit is required ⁽⁶⁾]							
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 228/1-4 x G 3/4"	
Intake/exhaust pipes Ø	mm	2 x 80/80		2 x 80/80		3 x 80/80		4 x 80/80	
Air flow rate									
Air flow rate (15°C) ⁽⁵⁾	m ³ /h	15300		18560		27840		37120	
Available pressure - 0.8 kW MOTOR	Pa	See diagram "air flow rates - pressure drops"							
Available pressure - 2 kW MOTOR	Pa	355		190		190		190	
Number and type of fans		4 x DDMP 10/10		4 x DDMP 10/10		6 DDMP 10/10		8 x DDMP 10/10	
Air flow rate	m ³ /h	See diagram "air flow rates - pressure drops"							
Available Head Pressure	Pa	See diagram "air flow rates - pressure drops"							
Weight									
Net Weight	kg	560		560		840		1120	

B - "R" Version Modules

Single-module AH air heating units have a useful heat efficiency, at a load equal to 100% of the nominal useful heat output, greater than or equal to 93+2LogPn.

For multiple-module AH air heating units, Apen Group has an "R" version, intended only for the Italian market, which complies with the requirement mentioned above, i.e. 93+2LogPn.

NOTES:

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

Model		AH160 - R		AH210 - R		AH320 - R		AH420 - R	
Type of equipment		B23P - C11 - C13 - C33 - C43 - C53 - C63							
EC approval	PIN	0476DL4298							
NOx class [EN17082:2019]		5							
Type of fuel		Gaseous							
		Heater Performance							
		min	max	min	max	min	max	min	max
Furnace heat input (Hi)	kW	16.40	152.00	21.00	180.00	21.00	270.00	21.00	360.00
Useful heat output [P_{min} , P_{rated}]*	kW	17.77	148.66	22.77	176.76	22.77	265.14	22.77	353.52
Hi Efficiency (N.C.V.) [η_{p^i} , η_{nom}]*	%	108.35	97.80	108.40	98.20	108.40	98.20	108.40	98.20
Hs efficiency (G.C.V.) [η_{p^h} , η_{nom}]*	%	97.62	88.12	97.68	88.48	97.68	88.48	97.68	88.48

REGULATION (EU) 2016/2281

Product Information in accordance with Annex 2 point 5 a)

Model: See table
 Warm air heaters B1 [yes/no]: No
 Warm air heaters C2 [yes/no]: No
 Warm air heaters C2 [yes/no]: No
 Type of fuel [gaseous/liquid/electricity]: Gaseous

NOTES:

- * Symbol in compliance with Reg.EU/2281/2016.
- (7) Reference maximum air flow rate for the calculation of yields and season energy efficiencies and emissions, with variable air flow rate, listed in the table. Air flow rate calculated for a ΔT of 30 °C
- (8) Reference minimum air flow rate for the calculation of yields and season energy efficiencies and emissions, with variable air flow rate, listed in the table.

Model	Capacity		Useful efficiency		Other elements					Consumption of Power supply		
	Rated heating capacity	Minimum capacity	Useful efficiency at rated heating capacity	Useful efficiency at minimum capacity	Casing loss factor	Ignition burner consumption	Emissions of nitrogen oxides	Output efficiency	Seasonal space heating energy efficiency	At rated heating capacity	At minimum capacity	In stand-by mode
	$P_{rated,h}$	P_{min}	η_{nom}	η_{pl}	F_{env}	P_{ign}	NO_x	$\eta_{s,flow}$	$\eta_{s,h}$	el_{max}	el_{min}	el_{sb}
	kW	kW	%	%	%	kW	mg/kWh ref.GCV	%	%	kW	kW	kW
AH034	33.6	8.1	86.7	96.3	5.0	0.0	46	96.3	91.2	0.074	0.011	0.005
AH065	62.9	13.4	87.2	97.3	5.0	0.0	41	96.6	92.4	0.097	0.015	0.005
AH105	97.2	22.8	87.5	97.6	5.0	0.0	36	96.4	92.5	0.130	0.020	0.005
AH160	160.1	17.8	87.9	97.6	5.0	0.0	28	97.5	93.6	0.246	0.020	0.010
AH210	194.3	22.8	87.5	97.6	5.0	0.0	36	97.4	93.5	0.260	0.020	0.010
AH320	291.5	22.8	87.5	97.6	5.0	0.0	36	97.7	93.8	0.390	0.020	0.015
AH420	388.6	22.8	87.5	97.6	5.0	0.0	36	97.9	94.0	0.520	0.020	0.020
AH160-R	148.7	17.8	88.1	97.6	5.0	0.0	28	97.6	93.7	0.246	0.020	0.010
AH210-R	176.8	22.8	88.4	97.6	5.0	0.0	36	97.6	93.8	0.260	0.020	0.010
AH320-R	265.1	22.8	88.4	97.6	5.0	0.0	36	97.9	94.1	0.390	0.020	0.015
AH420-R	353.5	22.8	88.4	97.6	5.0	0.0	36	98.1	94.3	0.520	0.020	0.020

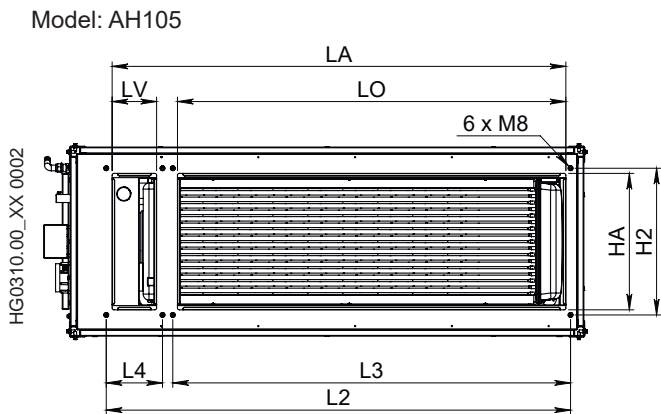
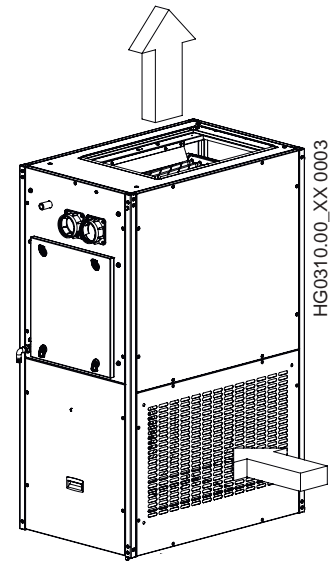
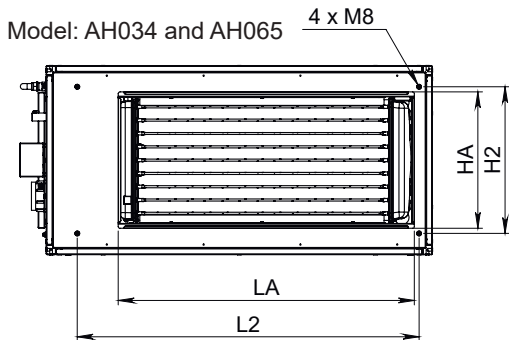
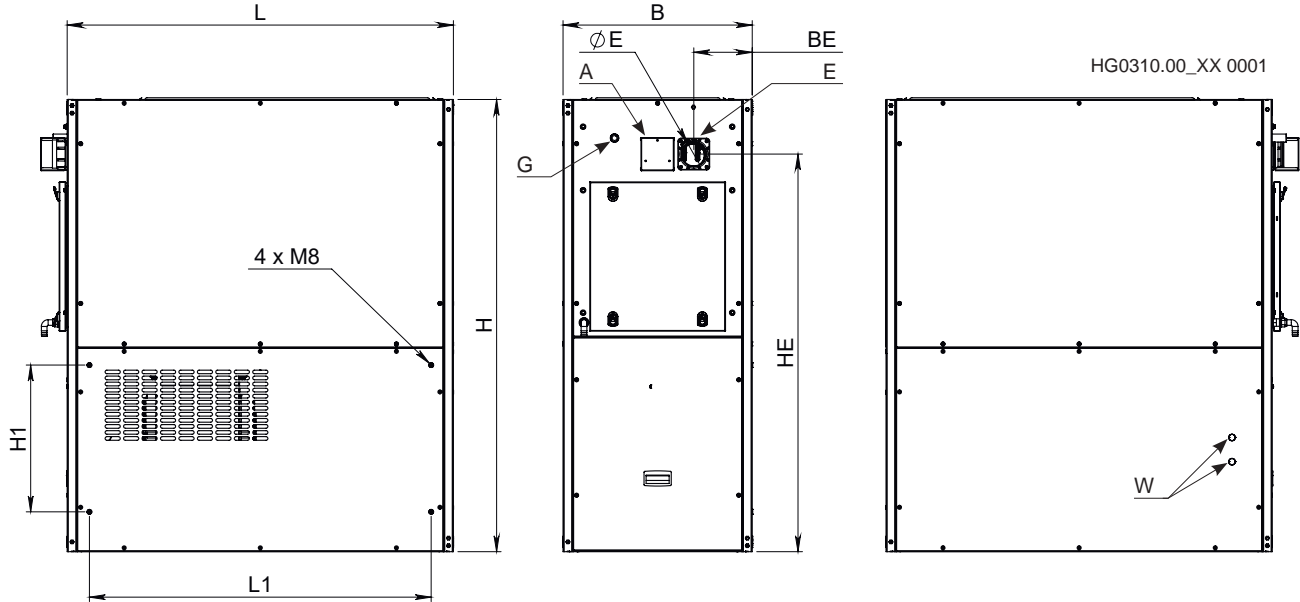
ErP table with Variable Air Flow Rates

Model		AH034	AH065	AH105	AH160	AH210	AH320	AH420
PCH module heater efficiency								
Seasonal space heating energy efficiency [Reg. EU/2281/2016] [$\eta_{s,h}$]*	%	90.4	91.6	91.7	93.2	93.1	93.6	93.8
Emission efficiency [Reg.EU/2281/2016] [$\eta_{s,flow}$]*	%	95.4	95.8	95.5	97.1	97.0	97.5	97.7
Air flow rate								
Maximum air flow rate (15°C) ⁽⁷⁾	m³/h	3210	6010	9280	15300	18560	27840	37120
Minimum air flow rate (15°C) ⁽⁸⁾	m³/h	2247	4207	6496	10710	12992	19488	25984

NOTE: The tables above refer to AH air heating units in indoor configuration and installed in the same heated space. In case of outdoor installation of AH air heating units, or in any case in a place other than the heated space, the seasonal energy efficiency values must be decreased by 5.0%.

3.3. Dimensions

Models: AH034, AH065 and AH105 - VERTICAL (- xxV0)



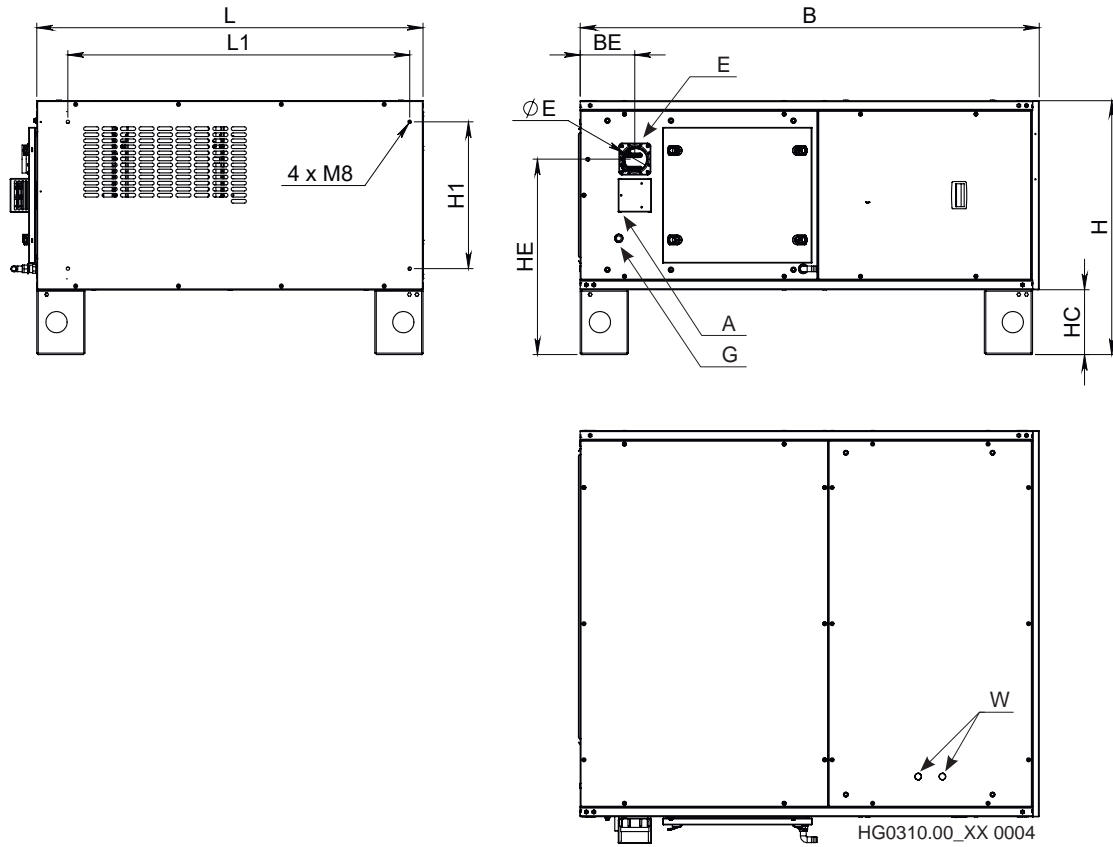
LEGEND:

- A Intake
- E Flue Outlet
- G Gas connection
- W Electrical connection

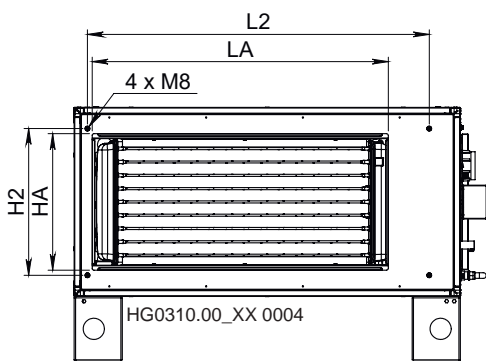
Model	Overall dimensions [mm]			Dimensions [mm]										Flue outlet [mm]		Gas	
	B	L	H	Intake		Delivery						BE	HE	ØE			
AH034	625	977	1495	L1	H1	L2	H2	LA	HA	L3	L4	LO	LV	193	1315	1 x 80	1 x G 3/4"
AH065	625	1277	1495	1130	485	1130	485	979	451	/	/	/	/	193	1315	1 x 80	1 x G 3/4"
AH105	625	1698	1580	1535	485	1535	485	1500	451	1315	186	1284	147	193	1400	1 x 80	1 x G 3/4"

AH-New condensing air heating unit

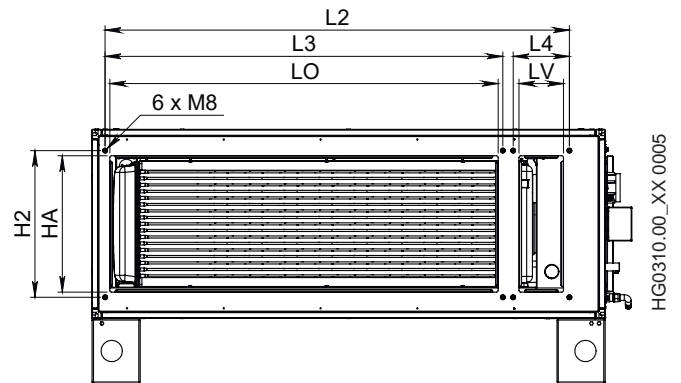
Models: AH034, AH065 and AH105 - HORIZONTAL (- xxH0)



Model: AH034 and AH065



Model: AH105



KEY:

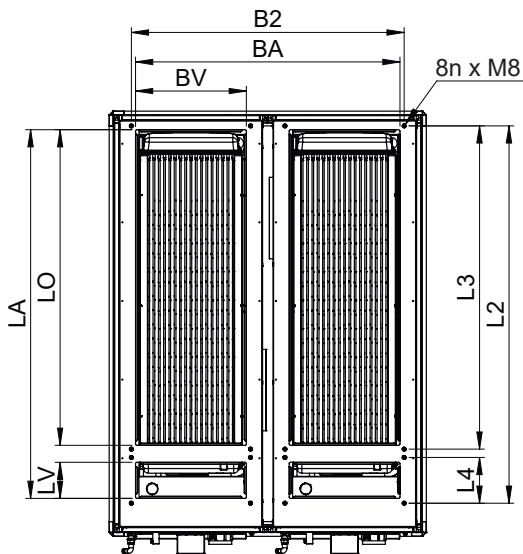
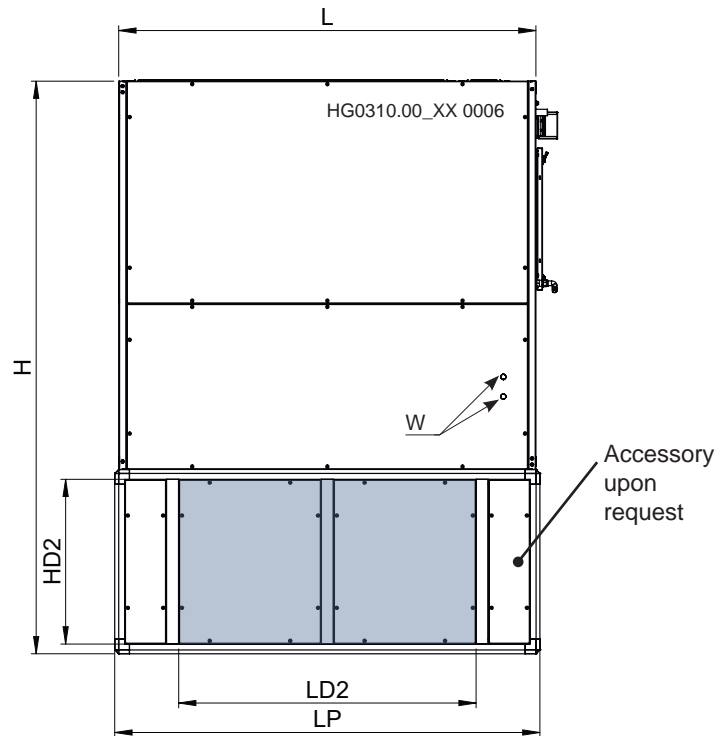
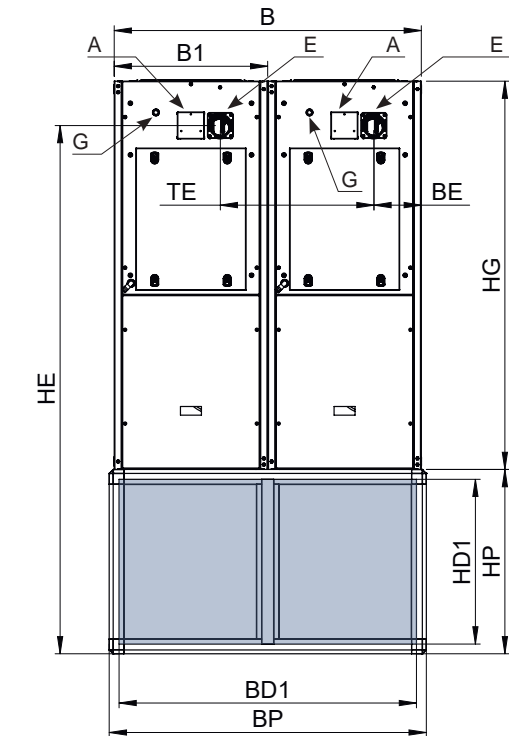
- A Intake
- E Flue Outlet
- G Gas connection
- W Electrical connection

Model	Overall dimensions [mm]				Dimensions [mm]										Flue outlet [mm]			Gas
	B	L	H	HC	Intake		Delivery						BE	HE	ØE			
	B	L	H	HC	L1	H1	L2	H2	LA	HA	L3	L4	LO	LV	BE	HE	ØE	
AH034	1520	977	840	215	830	485	830	485	679	451	/	/	/	/	180	646	1 x 80	1 x G 3/4"
AH065	1520	1277	840	215	1130	485	1130	485	979	451	/	/	/	/	180	646	1 x 80	1 x G 3/4"
AH105	1605	1698	840	215	1535	485	1535	485	1500	451	1315	186	1284	147	180	646	1 x 80	1 x G 3/4"

AH-New condensing air heating unit



Models: AH160, AH210, AH320 and AH420 - VERTICAL (- xxV0)



KEY:

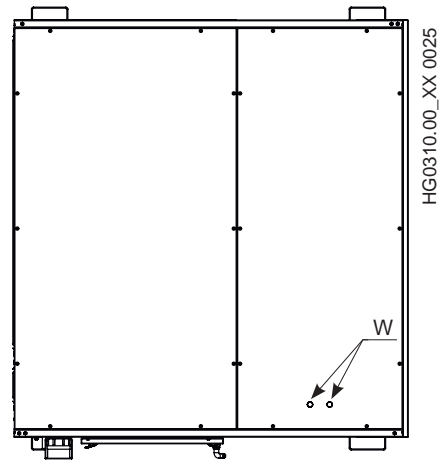
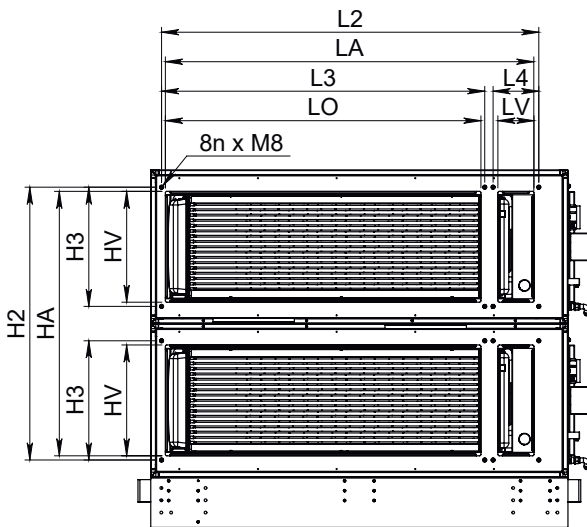
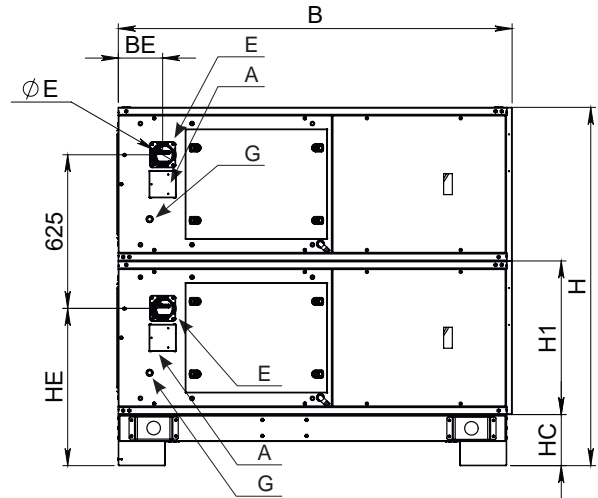
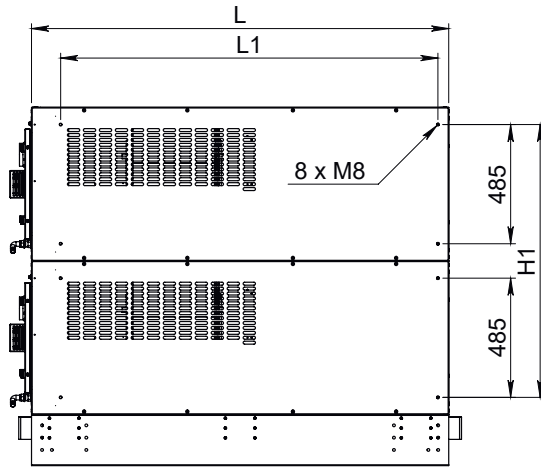
- A Intake
- E Flue Outlet
- G Gas connection
- W Electrical connection

Model	Modules	Overall dimensions [mm]				
		n	B	L	H	B1
AH160	2	1250	1698	2330	625	1580
AH210	2	1250	1698	2330	625	1580
AH320	3	1875	1698	2460	625	1580
AH420	4	2500	1698	2460	625	1580

Model	Modules	Flue outlet [mm]				Gas
		n	BE	HE	TE	
AH160	2	193	2150	625	n x 80	n x G 3/4"
AH210	2	193	2150	625	n x 80	n x G 3/4"
AH320	3	193	2280	625	n x 80	n x G 3/4"
AH420	4	193	2280	625	n x 80	n x G 3/4"

Model	Dimensions [mm]															
	Plenum		Intake				Delivery									
	BP	LP	HP	BD1	HD1	LD2	HD2	B2	L2	BA	LA	LO	BV	L3	L4	LV
AH160	1290	1730	750	1210	670	1210	670	1110	1535	1075	1500	1285	451	1315	186	147
AH210	1290	1730	750	1210	670	1210	670	1110	1535	1075	1500	1285	451	1315	186	147
AH320	1910	1730	880	1650	800	1650	800	1735	1535	1700	1500	1285	451	1315	186	147
AH420	2535	1730	880	1650	800	1650	800	2360	1535	2325	1500	1285	451	1315	186	147

AH-New condensing air heating unit



KEY:

- A Intake
- E Flue Outlet
- G Gas connection
- W Electrical connection

Model	Modules	Overall dimensions [mm]					
		n	B	L	H	H1	HC
AH160	2		1605	1698	1460	625	210
AH210	2		1605	1698	1460	625	210
AH320	3		1605	1698	2085	625	210
AH420	4		1605	1698	2710	625	210

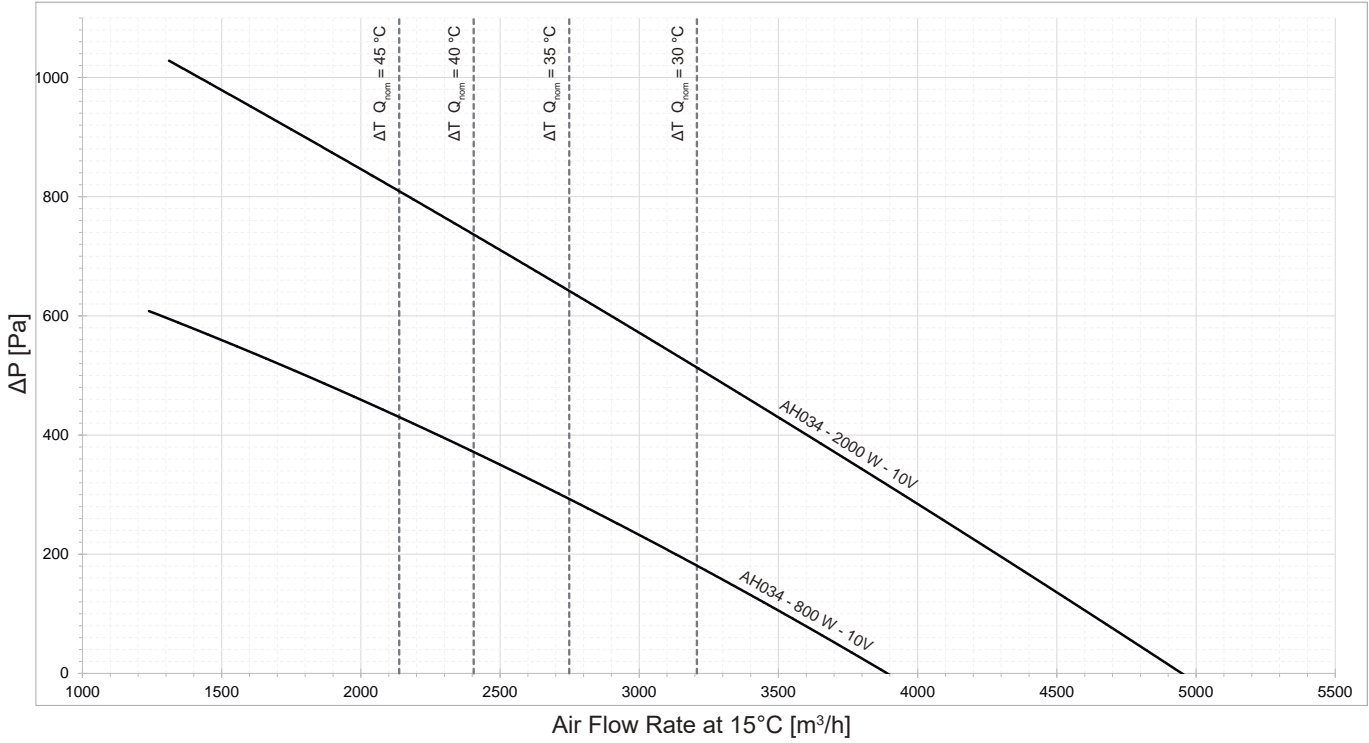
Model	Modules	Flue outlet [mm]			Gas	
		n	BE	HE		ØE
AH160	2		180	642	n x 80	n x G 3/4"
AH210	2		180	642	n x 80	n x G 3/4"
AH320	3		180	642	n x 80	n x G 3/4"
AH420	4		180	642	n x 80	n x G 3/4"

Model	Dimensions [mm]											
	Intake		Delivery									
	H1	L1	H2	L2	HA	LA	LO	H3	HV	L3	L4	LV
AH160	1110	1535	1110	1535	1075	1500	1285	485	451	1315	186	147
AH210	1110	1535	1110	1535	1075	1500	1285	485	451	1315	186	147
AH320	1735	1535	1735	1535	1700	1500	1285	485	451	1315	186	147
AH420	2360	1535	2360	1535	2325	1500	1285	485	451	1315	186	147

3.4. Air flow rate curves - Available pressure

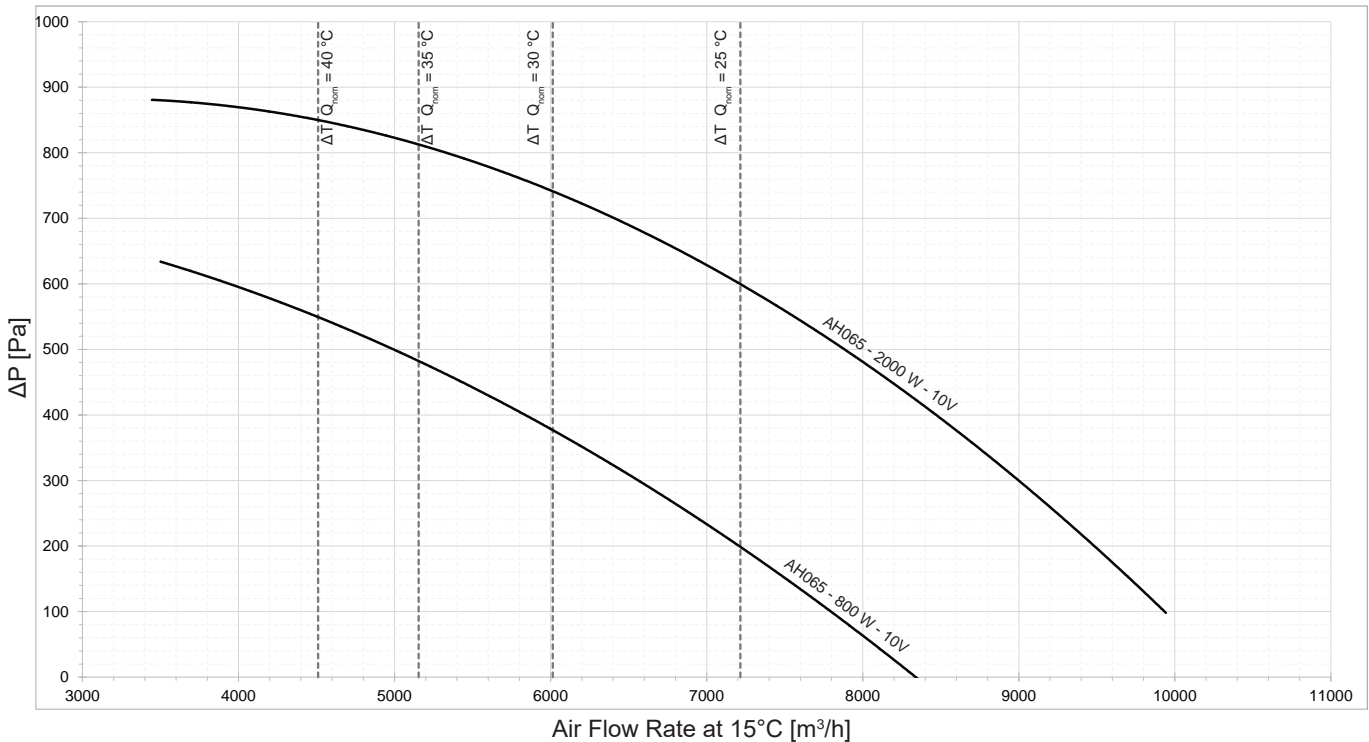
AH034 diagram

Air flow rate - Available Head Pressure [Q_{nom} - 10 V]



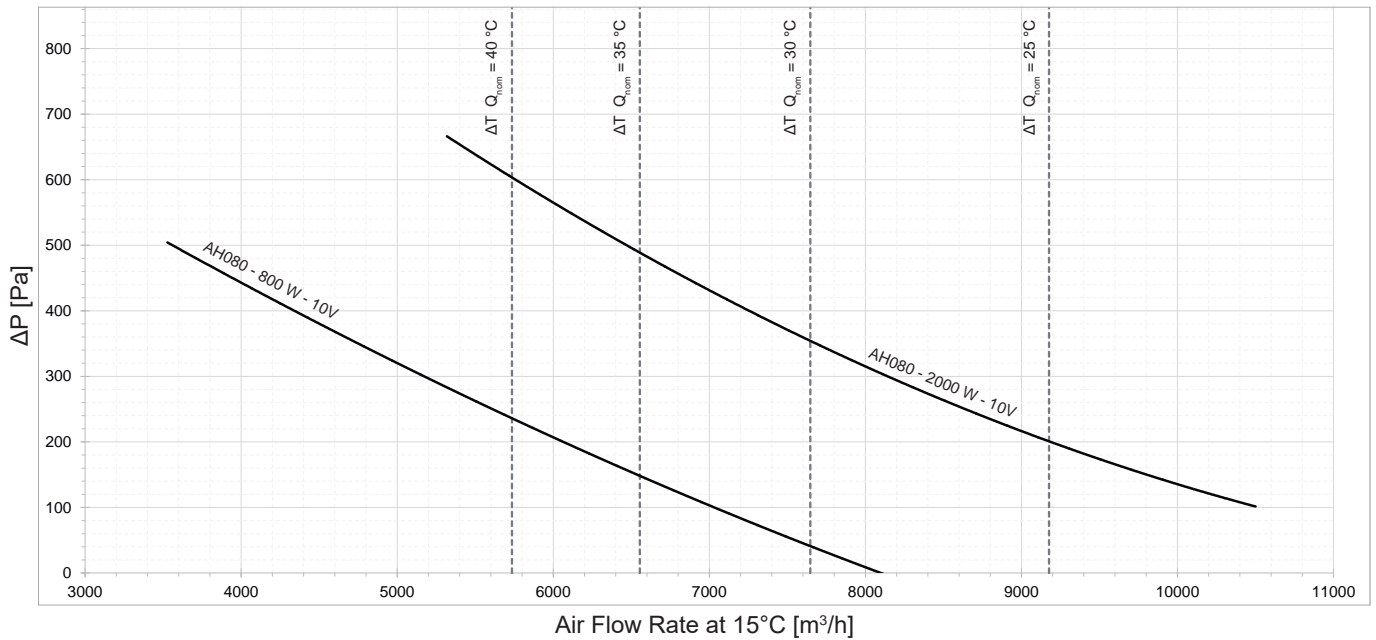
AH065 diagram

Air flow rate - Available Head Pressure [Q_{nom} - 10 V]



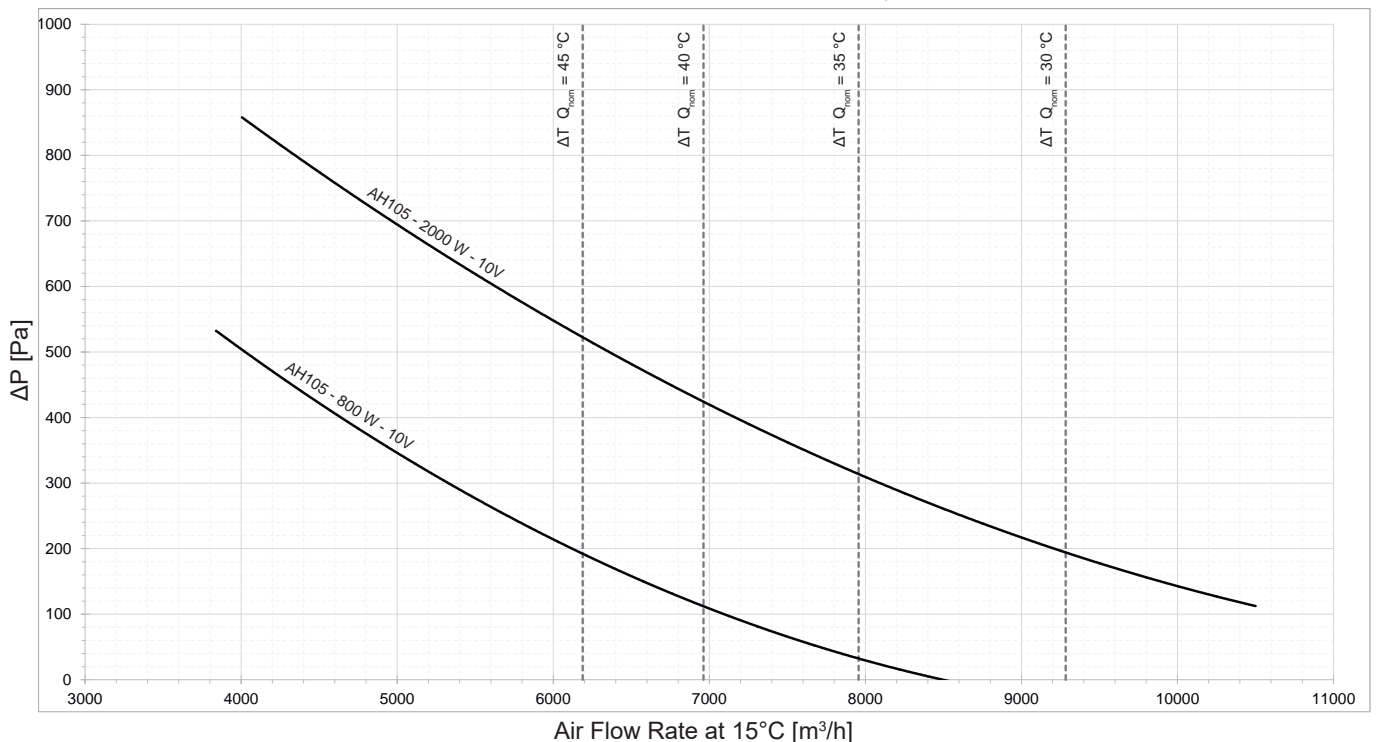
AH080 diagram (for AH160)

Air flow rate - Available Head Pressure [Q_{nom} - 10 V]



AH105 diagram

Air flow rate - Available Head Pressure [Q_{nom} - 10 V]



Air flow rates - Pressure drops of multiple models

For multiple modules (AH160, AH210, AH320 and AH420), with the same available pressure (ΔP), multiply air flow rates by the number of modules composing them, as indicated below:

AH160 = 2 x AH080 ; AH210 = 2 x AH105 ; AH320 = 3 x AH105 ; AH420 = 4 x AH105

Example:

AH105 (2000 W) → with $\Delta P = 300$ Pa; approx. 8100 m^3/h

AH210 (2000 W) → with $\Delta P = 300$ Pa; approx. 16200 m^3/h

3.5. Noise

HEATERS INSTALLED INDOOR

The following table shows sound pressure values, **Lp(A)**, issued by AH air heating units, of 0.8 kW (-01xx) and 2 kW (-02xx) versions, installed as follows:

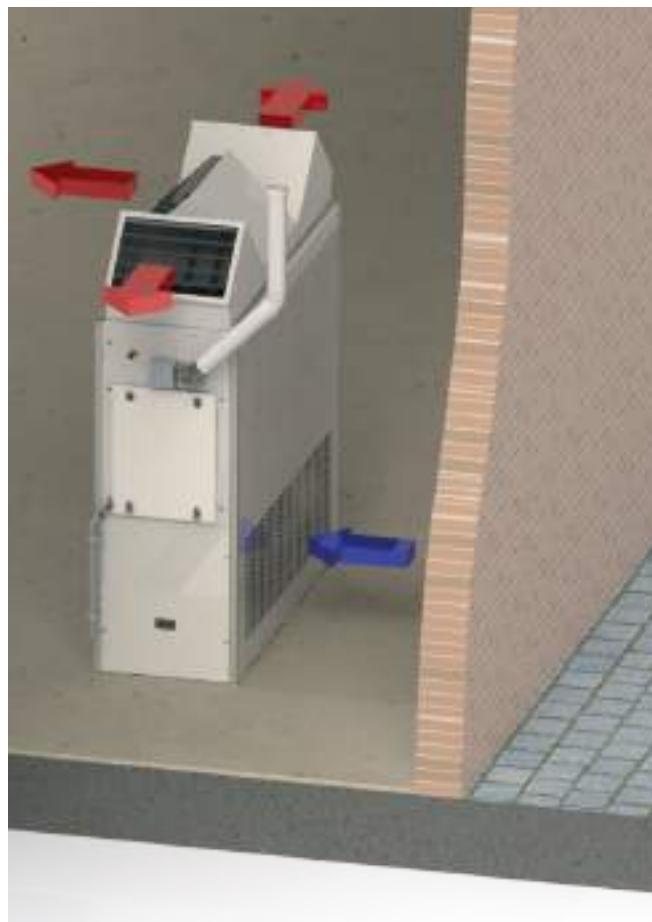
- standard distribution plenum;
- air intake turned towards a wall, without filters;
- indoor installation.

Sound pressure value refers to the non-ducted heater standard installation with the long side adjacent to a wall and direct delivery plenum to the room.

The estimated value only refers to the amount of sound directly produced by the heater under free field conditions at a distance of 6 metres.

Any sound source in a closed surrounding produces a sound level that is the sum of direct and diffuse sounds. Direct sound is the output from the source while diffuse sound depends on the acoustic characteristics of the installation room (size, average sound absorption, etc.). Obviously, the incidence of diffuse sound over direct sound is greater as the distance from sound source grows.

In AH air heating units for indoor installation, the noise generated on intake by centrifugal fans is the main component of noise produced by the heater, since only a protective grid is installed. The value on delivery is lower since exchanger, panelling and plenum help reducing it.



Heating units with NON-ducted delivery and intake										
MODEL	LpA - Sound Pressure Level [dB(A)] [Hz]								distance metres	Lp(A) dB(A)
	63	125	250	500	1000	2000	4000	8000		
AH034xx-01xx	12.9	42.4	47.7	40.6	42.4	41.9	37.0	27.3	6	51.0
AH034xx-02xx	15.8	41.0	56.0	46.4	48.1	46.8	42.4	34.5	6	57.7
AH065xx-01xx	18.8	44.0	59.0	49.4	51.1	49.8	45.4	37.5	6	60.7
AH065xx-02xx	32.6	54.3	61.9	58.3	56.3	56.1	51.5	43.6	6	65.5
AH105xx-01xx	25.0	37.9	45.1	44.5	47.2	49.1	44.2	35.5	6	53.7
AH105xx-02xx	26.5	41.2	60.1	52.4	54.4	53.7	49.7	42.9	6	62.7
AH160xx-01xx	28.1	41.0	48.2	47.6	50.3	52.2	47.3	38.6	6	56.7
AH160xx-02xx	21.9	47.1	62.1	52.5	54.2	52.9	48.5	40.6	6	63.7
AH210xx-01xx	28.1	41.0	48.2	47.6	50.3	52.2	47.3	38.6	6	56.7
AH210xx-02xx	29.6	55.1	59.6	52.7	57.1	57.2	53.9	47.0	6	64.4
AH320xx-01xx	29.8	42.7	49.9	49.3	52.0	53.9	49.0	40.3	6	58.4
AH320xx-02xx	31.3	56.8	61.3	54.4	58.8	58.9	55.6	48.7	6	66.1
AH420xx-01xx	31.1	44.0	51.2	50.6	53.3	55.2	50.3	41.6	6	59.7
AH420xx-02xx	32.6	58.1	62.6	55.7	60.1	60.2	56.9	50.0	6	67.4

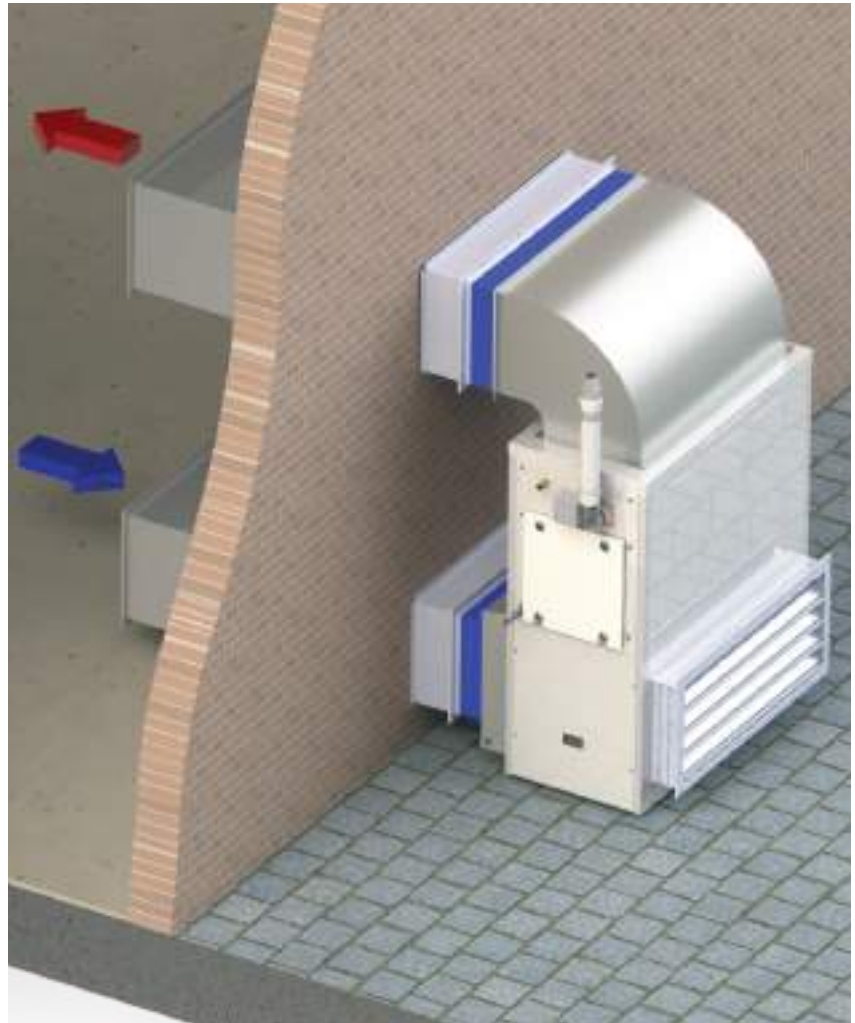
DUCTED HEATERS

The following table shows sound power values, **L_w(A)**, and sound pressure values, **L_p(A)**, issued by AH air heating units, of 0.8 kW (-01xx) and 2 kW (-02xx) versions.

The sound power and pressure values refer to heaters with ducted intake and delivery.

The values in the table refers to the energy emitted by the unit, **L_w(A)**, which passes through the heater panels.

For the values of fan noise in ducts for air intake and delivery, contact APEN GROUP Technical Support.



Heating units with ducted delivery and intake											
MODEL	L _w A - Sound Power Level [dB(A)] [Hz]								L _w (A)	distance	L _p (A)
	63	125	250	500	1000	2000	4000	8000	dB(A)	metres	dB(A)
AH034xx-01xx	24.5	54.5	56.5	45.8	43.8	37.5	27.7	17.9	59.0	6	35.5
AH034xx-02xx	27.4	53.1	64.8	51.6	49.5	42.4	33.1	25.1	65.4	6	41.9
AH065xx-01xx	30.4	56.1	67.8	54.6	52.5	45.4	36.1	28.1	68.4	6	44.9
AH065xx-02xx	44.2	66.4	70.7	63.5	57.7	51.7	42.2	34.2	72.8	6	49.3
AH105xx-01xx	36.6	50.0	53.9	49.7	48.6	44.7	34.9	26.1	57.4	6	33.8
AH105xx-02xx	38.1	53.3	68.9	57.6	55.8	49.3	40.4	33.5	69.6	6	46.0
AH160xx-01xx	39.6	53.0	56.9	52.7	51.6	47.7	37.9	29.1	60.4	6	36.9
AH160xx-02xx	33.4	59.1	70.8	57.6	55.5	48.4	39.1	31.1	71.4	6	47.9
AH210xx-01xx	39.6	53.0	56.9	52.7	51.6	47.7	37.9	29.1	60.4	6	36.9
AH210xx-02xx	41.1	67.1	68.3	57.8	58.4	52.7	44.5	37.5	71.3	6	47.7
AH320xx-01xx	41.4	54.8	58.7	54.5	53.4	49.5	39.7	30.9	62.2	6	38.6
AH320xx-02xx	42.9	68.9	70.1	59.6	60.2	54.5	46.3	39.3	73.1	6	49.5
AH420xx-01xx	42.6	56.0	59.9	55.7	54.6	50.7	40.9	32.1	63.4	6	39.9
AH420xx-02xx	44.1	70.1	71.3	60.8	61.4	55.7	47.5	40.5	74.3	6	50.7

4. USER'S INSTRUCTIONS

4.1. AH unit operation

Ventilation operating logic

WINTER - HEATING

During operation in "Heating" mode (in winter), CPU - MASTER PCB regulates ventilation by modulating the rotation speed on the basis of the heat output (parameter H16 = 2) and of the values set in parameters H12 and H13:

H12 = Y2 output minimum voltage (Default value 6)

H13 = Y2 output maximum voltage (Default value 10)

If the operation required is not of modulating type, but with constant air flow rate, parameters H12 and H13 must be equal.

SUMMER - VENTILATION

During operation in "Ventilation" mode (in summer), ventilation is fixed at constant speed, equal to the output of the voltage value set in parameter H18:

H18 = Y2 output fixed voltage (Default value 8).

CPU modulation PCB hardware configuration

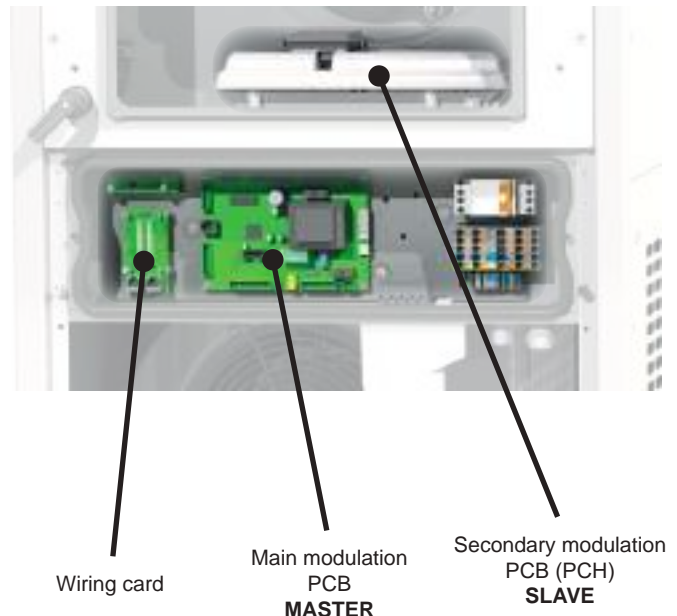
AH air heating units feature a CPU modulation PCB (inside each module composing them), and a wiring card that allows for a simple connection on the user's side and between the modules themselves.

An additional CPU modulation PCB is present inside the PCH module.

MASTER, SLAVE and WIRING cards

- "MASTER" card = Manages the adjustment of the entire AH unit.
- "SLAVE" card = Manages the burner modulation of the single PCH module referring to the "MASTER" card.
- WIRING CARD = user-side connections are made with the Smart Web remote control and connections between Master and Slave modules.

NOTE: All AH air heating units are supplied already configured and with all the settings required to operate them.



Modulation PCB



For AH units with single module (AH034, AH065 and AH105), the modulation PCB is parametrised as "MASTER" and the card inside the PCH as "SLAVE".

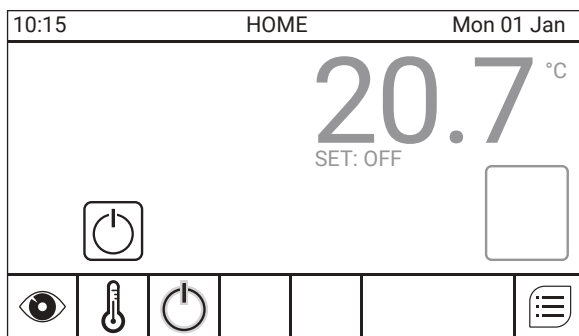
For AH units consisting of multiple modules (AH160, AH210, AH320 and AH42) the CPU modulation PCB (MASTER) is present only on the first module. The other modules have only one wiring card in addition to the SLAVE cards inside the PCH module.

4.2. 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 air heating unit to work to its best (except in case of particular installation and/or system conditions). If necessary, the final user only has to reconfigure some Setpoints and/or time ranges according to his/her needs.

Below is a brief description of some pages of the main menus. For the other functions, or for further information, refer to the manual enclosed with the chronothermostat.

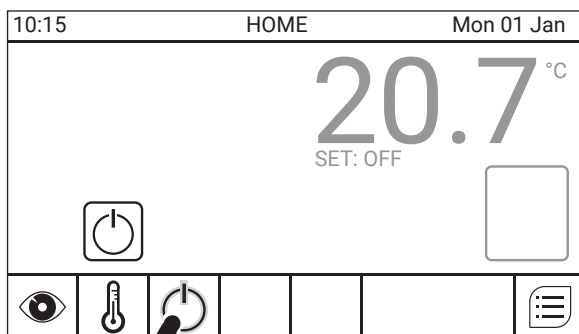
The Smart Web is set as "Hot Air Heater" system and the "HOME" page looks as follows:



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

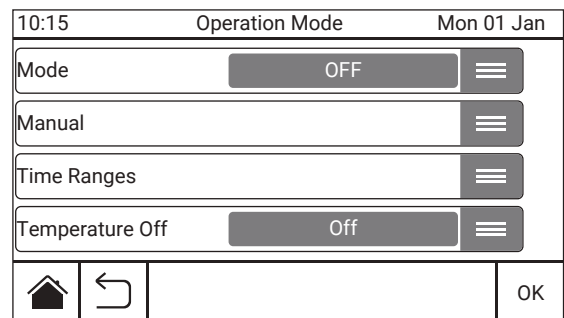
To switch on the system move the ON/OFF Priority switch to ON (Green icon).

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

4.1.2. OPERATION MODE

The "Operation Mode" default settings are the following:

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

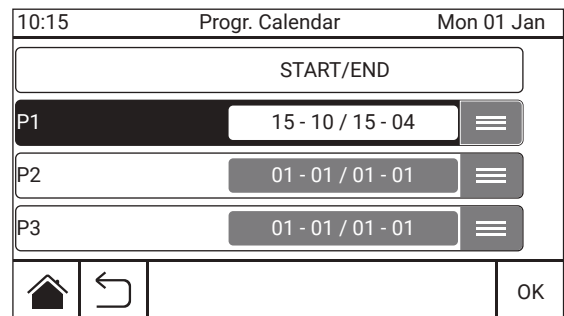


By setting a "Mode" other than "OFF" and the "Manual" or "Time Ranges" mode, the system activates with the calendar/time ranges settings and Setpoint indicated here below.

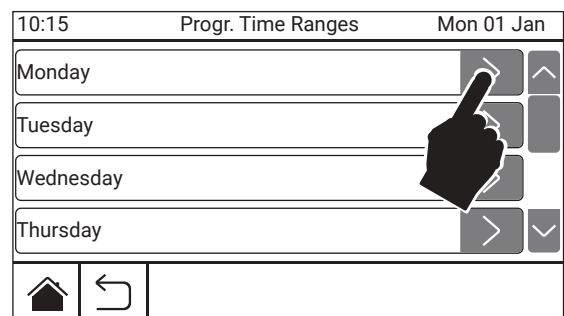
4.1.3. CALENDAR / TIME RANGES

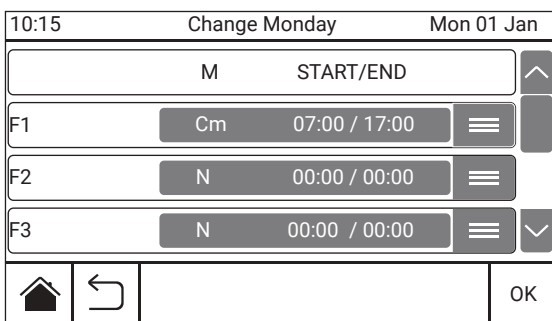
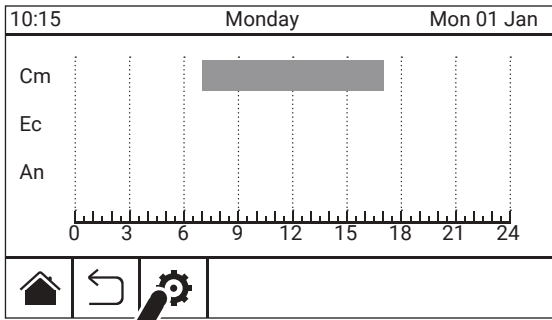
The calendar and time ranges default settings are the following:

- 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

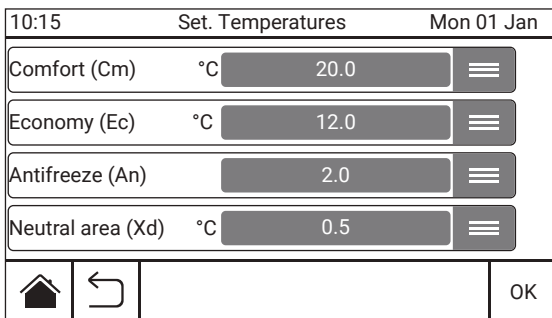




4.1.4. TEMPERATURE SETPOINT

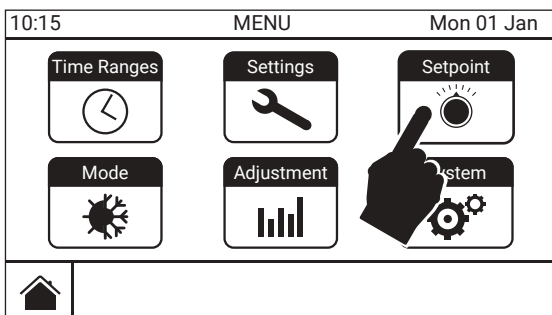
The temperature setpoints are the following:

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



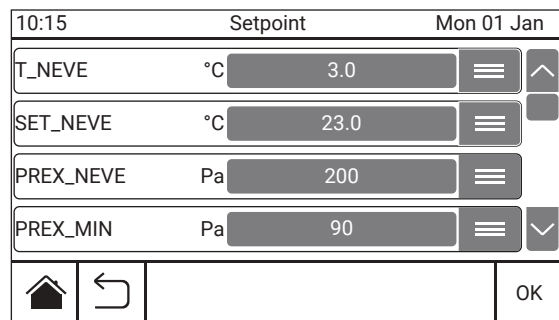
4.1.5. CONTROL SETPOINT

Inside the main "MENU" page it is possible to select the Setpoint adjustment sub-menu for the system.



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

- T_NEVE 3.0 °C (SNOW control) (Not Used)
- SET_NEVE 23.0 °C (SNOW control) (Not Used)
- PREX_NEVE 200 Pa (SNOW control) (Not Used)
- PREX_MIN 90 Pa (PRESSURE control) (Not Used)
- PREX_MAX 200 Pa (FILTERS control)
- PREX_MAX2 250 Pa (FILTERS control)
- SPEED_MIN 10 km/h (WIND control) (Not Used)
- SPEED_MAX 80 km/h (WIND control) (Not Used)



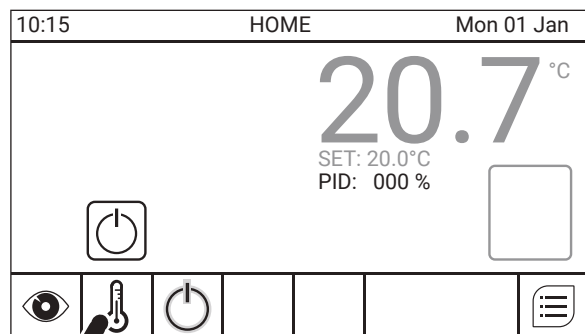
The different setpoints and their meaning are shown afterwards in the sections of the relating controls.

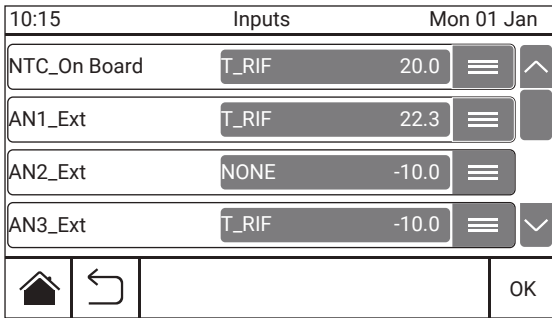
NOTE: Some of the above Setpoints refer to system types other than "Hot Air Heater" systems and, for this reason, they will not be considered.

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 such probe;
- Detect any reading error;
- Correct the probe reading value by means of an offset parameter.

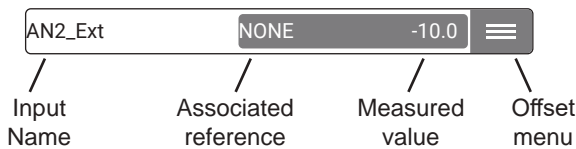




The inputs that may be displayed inside the menu are:

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

The menu comprises the following



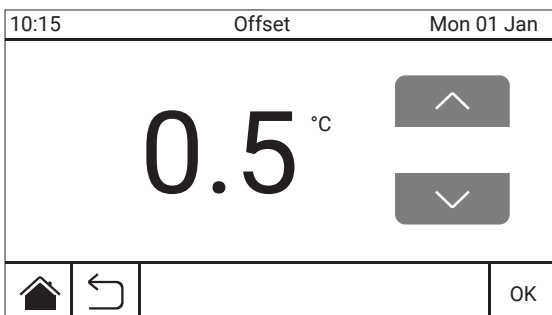
If the probe is not connected the "NONE" indication is displayed and next to it the "-10.0" value:



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



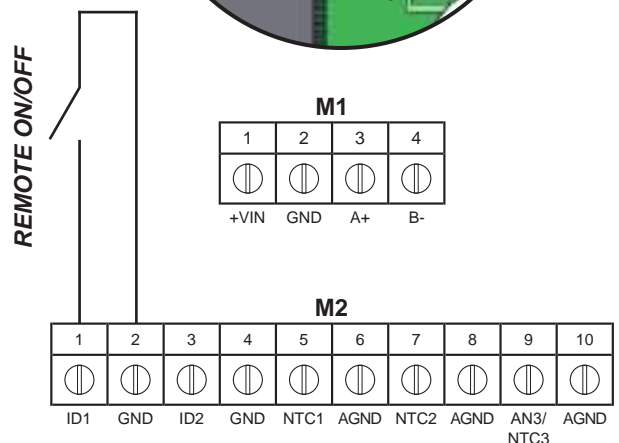
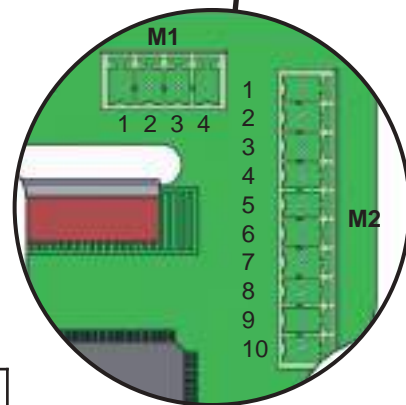
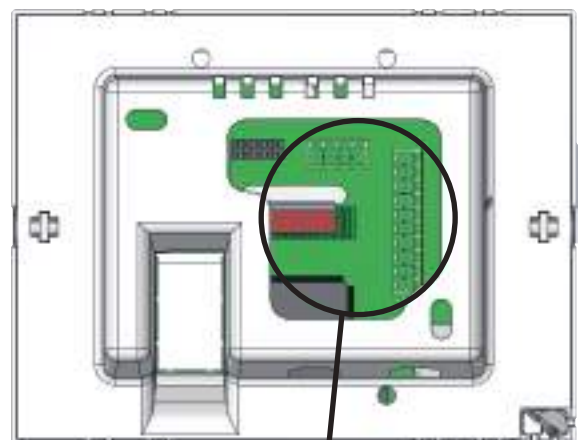
By pressing the ☰ key next to an input, it is possible to access the offset adjustment menu. This menu allows to correct the reading value for that specific probe and is represented by a page as the one below:



4.3. Remote On/Off (OPTIONAL)

Any priority ON/OFF contact can be remotely controlled from the Smart Web remote control, by connecting to terminals 1 (ID1) and 2 (GND) of the terminal board M2 of the chronothermostat and removing the existing jumper, as shown in the following wiring diagram. See HG0060.00 manual, paragraph 9. "Electrical Connections", supplied with the remote control. The ON/ OFF contact has priority with respect to the heat request of time ranges or manual mode, but not with respect to the snow function heat request, which is independent (optional, depending on the model).

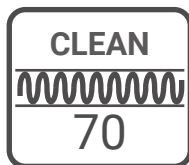
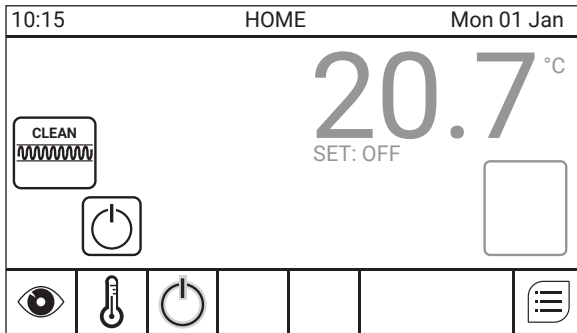
ELECTRICAL CONNECTION



4.4. Filter control (OPTIONAL)

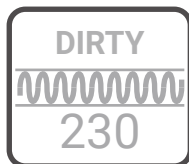
AH air heating units, if purchased with a side or lower optional intake filter kit, are equipped with a pressure sensor to constantly control the status of installed filters.

Depending on the configured Setpoints and on the pressure difference detected upstream or downstream of filters, the Smart Web will issue two different levels of alarms through an icon inside the HOME page, as indicated below:



NO ALARM - CLEAN (GREY)

The "CLEAN" symbol (grey) indicates that filters are clean and no maintenance operation is required. The system is working correctly and no Alarm has been triggered.



EARLY WARNING - DIRTY (YELLOW)

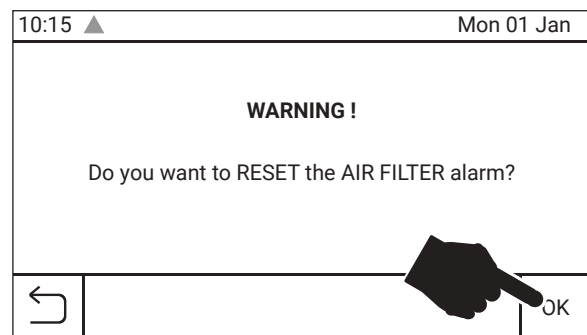
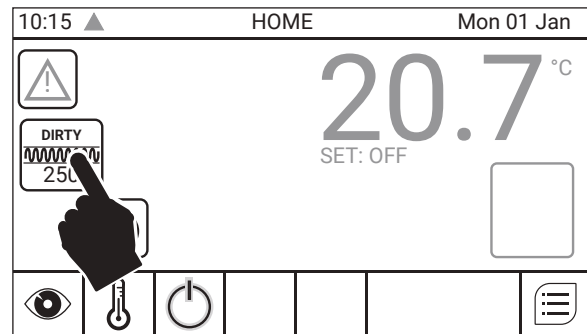
The "DIRTY" symbol (yellow) indicates that filters are starting to get dirty. Clean or replace filters as soon as possible to prevent the system from stopping.



FILTER ALARM - DIRTY (RED)

The "DIRTY" symbol (red) indicates that there is a FILTER ALARM in progress. IT is necessary to clean or replace filters as soon as possible, since they are excessively clogged. In case of FILTER ALARM, the system will set to OFF until initial conditions are restored.

To reset the FAULT in case of FILTER ALARM, directly press on the FILTERS icon displayed in the "HOME" page.

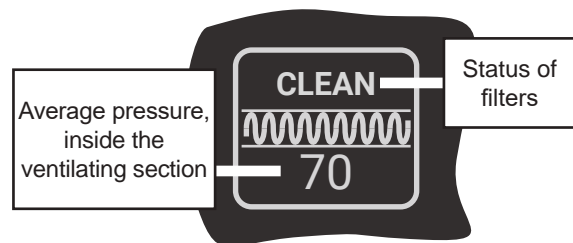


Filter Control operates with the following Setpoints (that can be displayed in the "Setpoint" menu):

Setpoint	Default	Description
PREX_MAX	200 Pa	LIMIT pressure value for EARLY WARNING activation
PREX_MAX2	250 Pa	LIMIT pressure value for FILTER ALARM FAULT activation

These setpoints may be modified in the "Setpoint" menu. Please refer to section 4.2 "Smart Web".

The "HOME" page will display an icon showing the average pressure value read by the AH unit and the relevant current status of filters:



ATTENTION: In case of AH air heating units consisting of two or more modules, the pressure value indicated inside the icon corresponds to the average value of the ventilating section.

Please find here below the Filter Control logic.

The function must be selected inside the “System type management” section and with the “Hot Air Heater” system type.

During heater operation, the detected pressure values, obtained by calculating the pressure difference upstream and downstream of filters, will be displayed inside the ventilating section.

Pressure value = “0” (fans stopped)
 Pressure value = “Variable” (fans operating)

EARLY WARNING - DIRTY (YELLOW)

When PREX_MAX value (200 Pa by default) is exceeded, the icon colour changes from GREY to YELLOW. The pressure value indicated is maintained fixed and the symbol remains YELLOW even when the unit is off. When this alarm occurs (when PREX_MAX value is exceeded), it reduces the heat input of the burner, and warns the user that the status of filters is no longer optimal and that something is obstructing the passage of air.

ATTENTION: Clean/replace filters or remove any obstructions as soon as possible to prevent the heat exchanger from being damaged, due to overheating, or the system from stopping.

Once the initial characteristics of filters and system have been restored, press on the FILTER icon (in the HOME page of the Smart Web) to reset the alarm, as previously explained. If the pressure conditions detected inside the ventilating section are again below the PREX_MAX alarm level, the icon colour turns GREY again.

FILTER ALARM - DIRTY (RED)

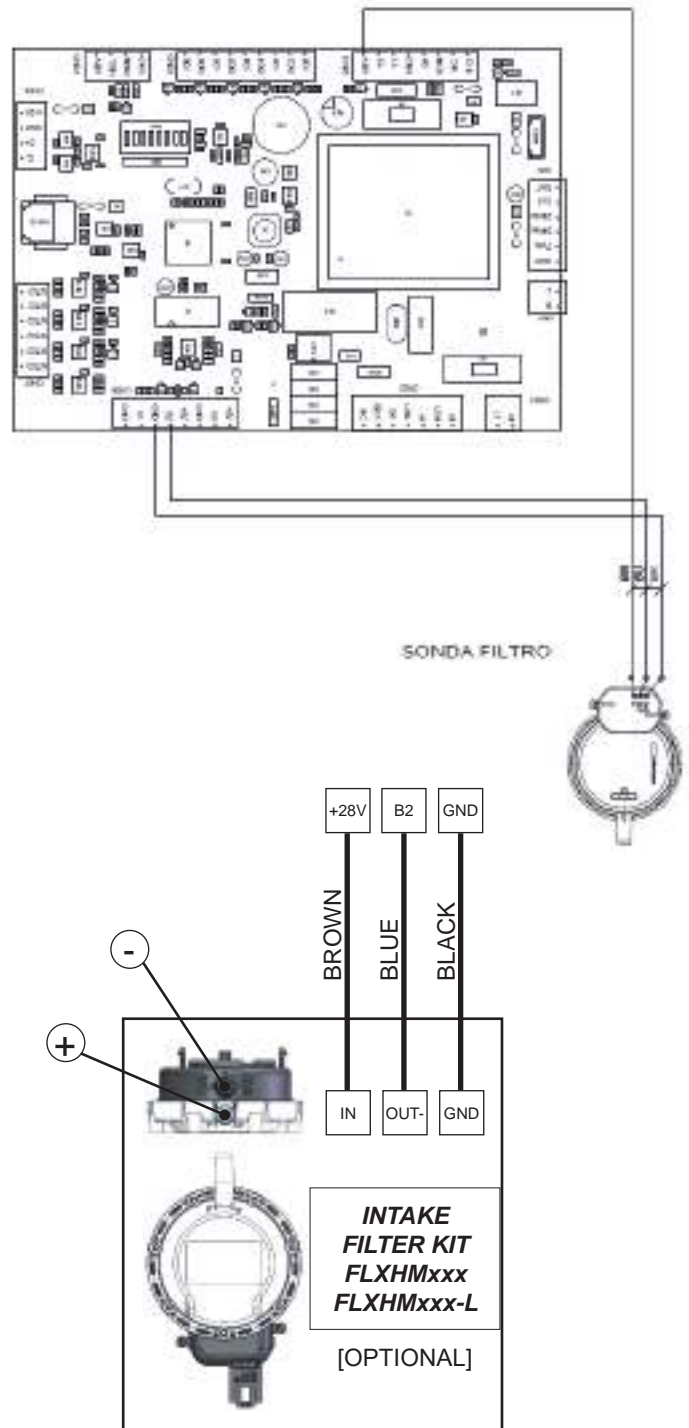
When PREX_MAX2 value (250 Pa by default) is exceeded, the icon colour changes from YELLOW to RED. The pressure value indicated is maintained fixed and the symbol remains RED even when the unit is off, with a warning triangle appearing next to it. When this alarm occurs (when PREX_MAX2 value is exceeded), it causes the equipment to SHUT DOWN, indicating that filters are completely clogged and must be cleaned or replaced.

ATTENTION: In case of active FILTER ALARM, the system will set to OFF until initial operating conditions are restored. Clean/replace filters or remove any obstructions as soon as possible.

Once the initial characteristics of filters and system have been restored, press on the FILTER icon (in the HOME page of the Smart Web) to reset the alarm, as previously explained.

ELECTRICAL CONNECTION

(Connection to be carried out only on “MASTER” module)



4.5. 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.

The screenshot shows the SMART WEB web interface. At the top, the title "SMART WEB" is centered. Below it, the current time and date are displayed: "13:44 - Mercoledì 03 Ottobre". On the left side, there is a vertical menu with several items, each preceded by a small asterisk: "HOME", "Fasce Orarie", "Impostazioni", "Regolazione", "Sistema", "Modo", "CPI Smart", "Ingressi", "Set-Point", "Ibrido", and "Info Dispositivo". The "HOME" item is highlighted in yellow. The main content area is divided into several sections. The first section is "Set-Point Temperatura", which contains a dropdown menu currently set to "OFF". Below this is the "Funzionamento" section, which includes a dropdown menu set to "OFF" and several other input fields. The "Ibrido" section follows, with several input fields. The "Sensore Spazio" section is at the bottom, also with several input fields. On the right side of the interface, there is a large digital display showing the temperature "21.5". Below the display is a button labeled "IMPIANTO ON".

5. INSTALLATION INSTRUCTIONS

Instructions for installing and setting the air heating unit 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 unit 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 air heating unit'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 air heating unit is supplied with water trap to drain the condensation. The water trap is an integral part of the equipment and is regarded as a safety component; therefore, replacing it with a different type, not approved by the unit's manufacturer, is prohibited.

The condensation must be drained in compliance with standards applicable in the country where the unit is installed.

THE air heating unit 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 aerodynamic 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 air handling unit to air 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 air heating unit control panels use a wiring card which allows an easy and safe connection of parts that are usually used in air heating systems.

The electrical connections and the accessories that may be combined with the unit are different, depending on the configuration of the AH unit itself, for:

- Single-Module Units (vertical or horizontal)
- Multiple-Module Units

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

5.4. Wiring to Power Supply

The power and protection connections of the electric line and the fire dampers must be made only on the "MASTER" module.

AH air heating units are supplied with a main plug, shown in the figure.

Wire power supply directly to the plug.

Single phase	230V+N	Wire phase L1 to pole 1, <u>jumper terminals 1-2-3</u> and wire neutral N to terminal 4
Three-phase	400V+N	Wire three phases L1, L2 and L3 to poles 1, 2 and 3, connect neutral N to terminal 4

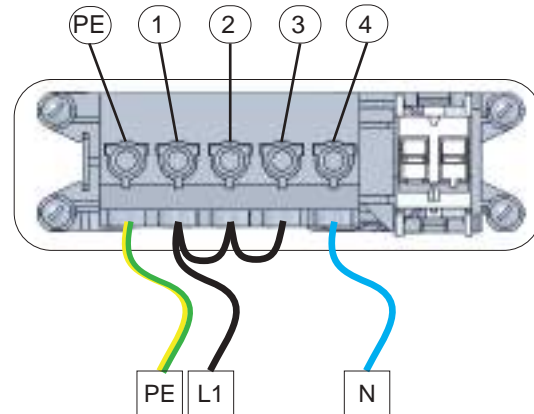


IMPORTANT: 400 Vac power supply with neutral. Do not mistake the neutral for the live wire.

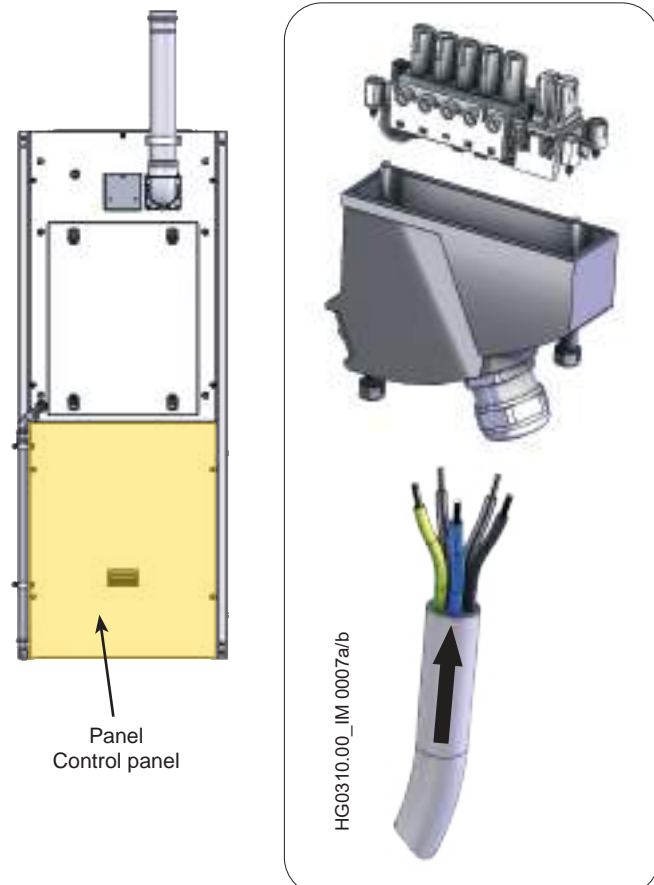
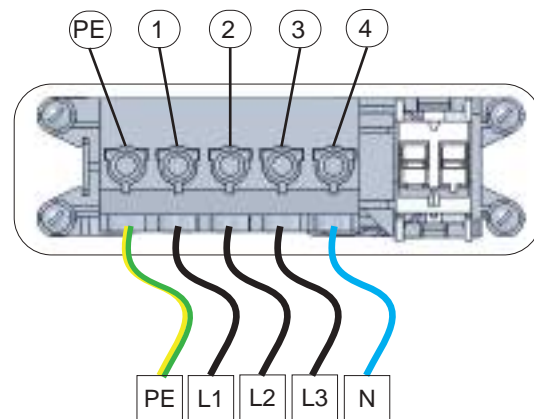
GROUND wire is mandatory. Connect it to the relevant PE terminal. The air heating unit must be correctly connected to an effective earthing system, fitted in compliance with current legislation.

NOTE: To access connecting terminals, remove the white front lower panel of the unit. When finished, reinstall the protection panel.

SINGLE-PHASE models: AH034



THREE-PHASE models: AH065; AH105; AH160; AH210; AH320; AH420



The electrical system and, more specifically, the cable section, must be suitable for the equipment maximum power consumption (see the "cable section" table).

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 before the control panel of the unit, within 3 metres and in visible position. This switch must include a protection (fuses or automatic) and must comply with existing regulations.

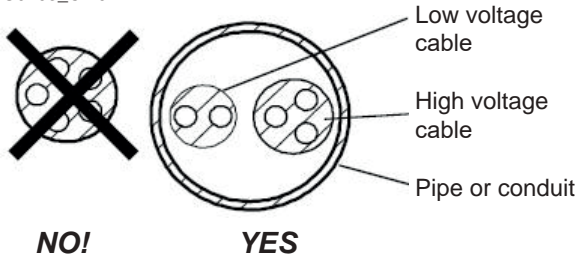
Fuse type, if used, must be rapid. If automatic switch are used, the characteristic curve for their triggering must be of type "K" or "D" or "C", with breaker current $I_d \geq 300mA$.

Automatic switches with "A" or "B" trigger curve are not allowed since they are not suitable for electrical motor protection. Residual-current device with $I_d=30mA$ are not suitable for being used with inverter. Residual-current devices must be of type "B".

CABLES

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

HG0103_C2 021



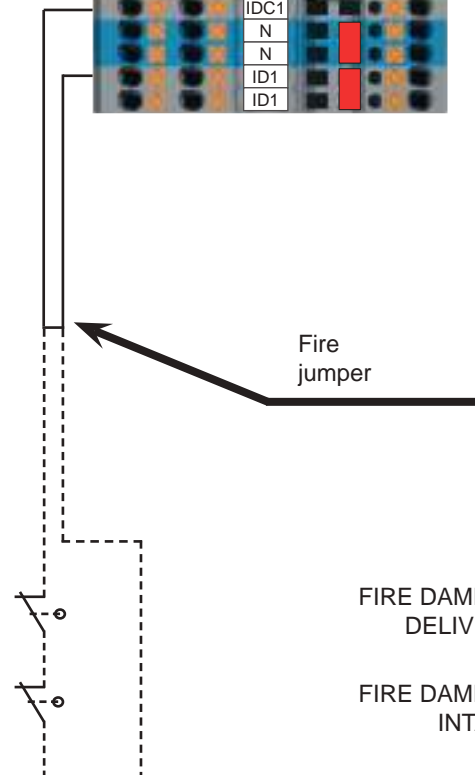
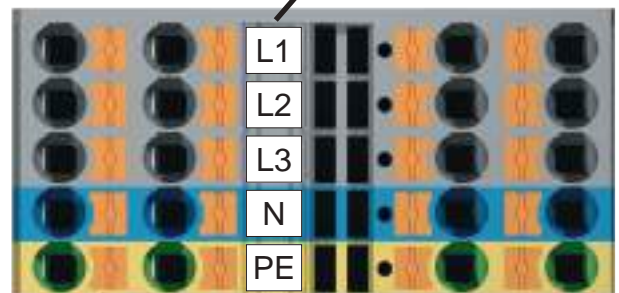
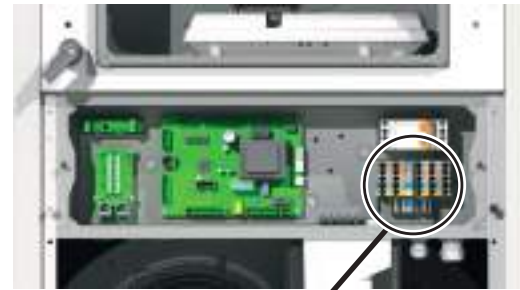
Use flexible, flame-retardant, double-coating cables for the wiring. The size of the cable section must be suitable for the unit power consumption and the distance between the unit and the connection point.

AH Model	Motor kW [kW]	Cable section [mm ²]	Safety trip [A]
AH034	1x0.8	3Gx4.0	10
AH034	1x2.0	3Gx4.0	10
AH065 - AH105	2x0.8	5Gx2.5	16
AH065 - AH105	2x2.0	5Gx2.5	16
AH160 - AH210	4x0.8	5Gx4.0	25
AH160 - AH210	4x2.0	5Gx4.0	25
AH320	6x0.8	5Gx10.0	40
AH320	6x2.0	5Gx10.0	40
AH420	8x2.0	5Gx10.0	40
AH420	8x2.0	5Gx10.0	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.

FIRE DAMPER ELECTRICAL CONNECTION



CONNECTION FIRE MICROSWITCH (OPTIONAL) (REMOVE THE JUMPER)

5.5. Connections to the Flue

The PCH heater module, contained inside the AH units, 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 chimney, which make up the flue outlet, must be installed with a slight inclination (1°- 3°) towards the heater, in order to prevent the build up of condensate in the chimney itself.

Common chimney

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 flue outlets, there are (OPTIONAL) KITS on the list "Common flue outlets" pre-sized in stainless steel 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

B23P type

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.

AH units can be supplied with (OPTIONAL) "independent flue outlet" chimneys as shown in the image below. For multiple models, AH160, AH210, AH320 and AH420, it is possible to request the (OPTIONAL) "multiple flue outlet" chimney as indicated in the following table:

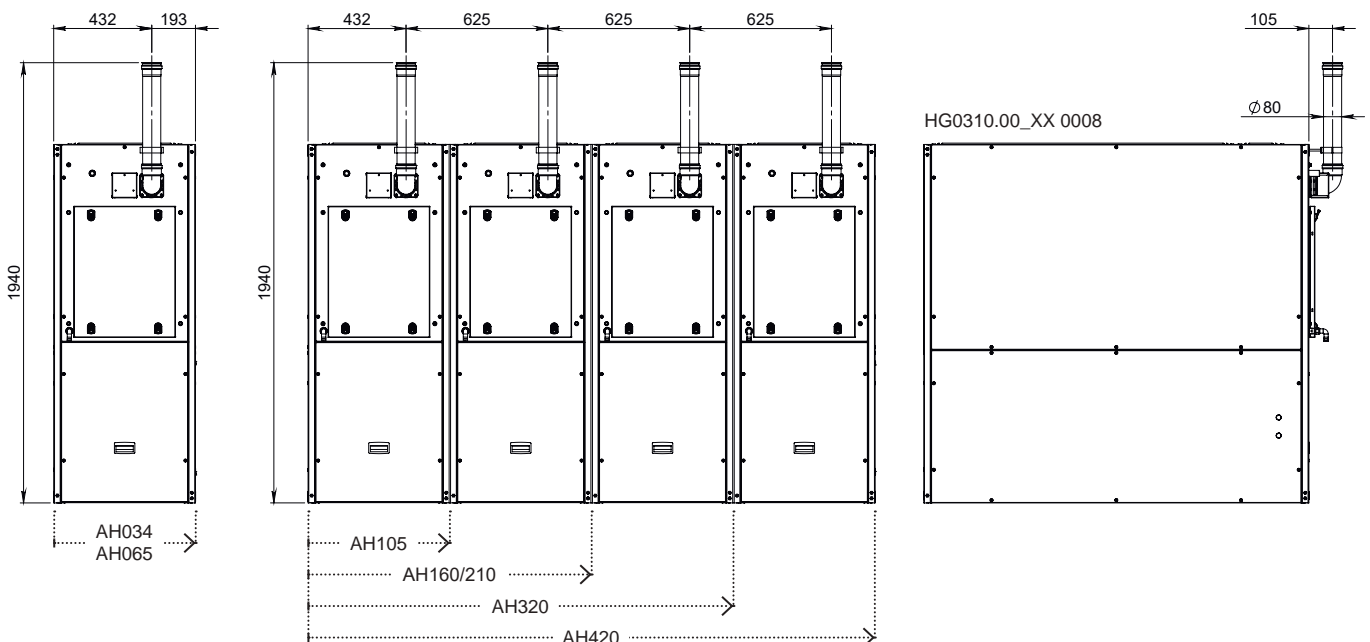
For AH VERTICAL Unitl (- xxV0)

Model	INDEPENDENT flue outlet kit (aluminium)	COMMON flue outlet kit (stainless steel)
	Code	Code
AH034xx - xxV0	G18165-105	Not available
AH065xx - xxV0	G18165-105	Not available
AH105xx - xxV0	G18165-105	Not available
AH160xx - xxV0	2 x G18165-105	G22175-210 (1 x Ø 200)
AH210xx - xxV0	2 x G18165-105	G22175-210 (1 x Ø 200)
AH320xx - xxV0	3 x G18165-105	G22175-320 (1 x Ø 200)
AH420xx - xxV0	4 x G18165-105	G22175-420 (1 x Ø 200)

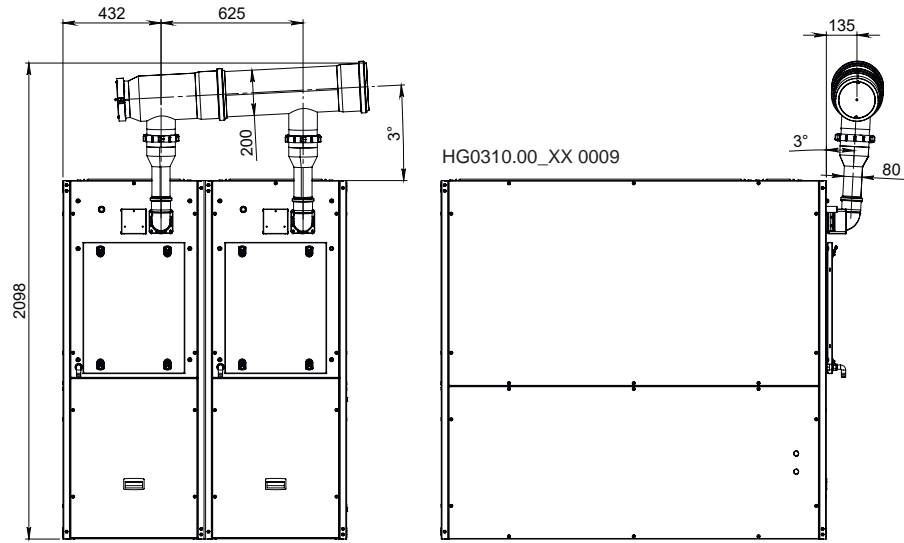
For AH HORIZONTAL Unit(- xxH0)

Model	INDEPENDENT flue outlet kit (aluminium)	COMMON flue outlet kit (stainless steel)
	Code	Code
AH034xx - xxH0	G18165-105	Not available
AH065xx - xxH0	G18165-105	Not available
AH105xx - xxH0	G18165-105	Not available
AH160xx - xxH0	G18165-210-P0	G22155-210-P0 (1 x Ø 200)
AH210xx - xxH0	G18165-210-P0	G22155-210-P0 (1 x Ø 200)
AH320xx - xxH0	G18165-320-P0	G22155-320-P0 (1 x Ø 200)
AH420xx - xxH0	-	G22155-420-P0 (1 x Ø 200)

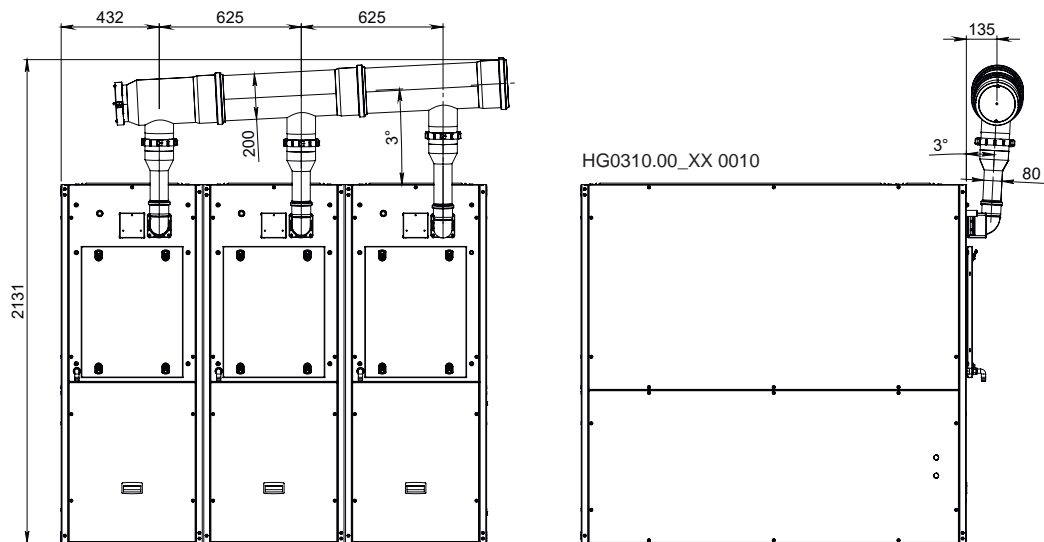
Model: AH034 / AH065 / AH105 / AH160 / AH210 / AH320 / AH420 (- xxV0) with INDEPENDENT flue outlet



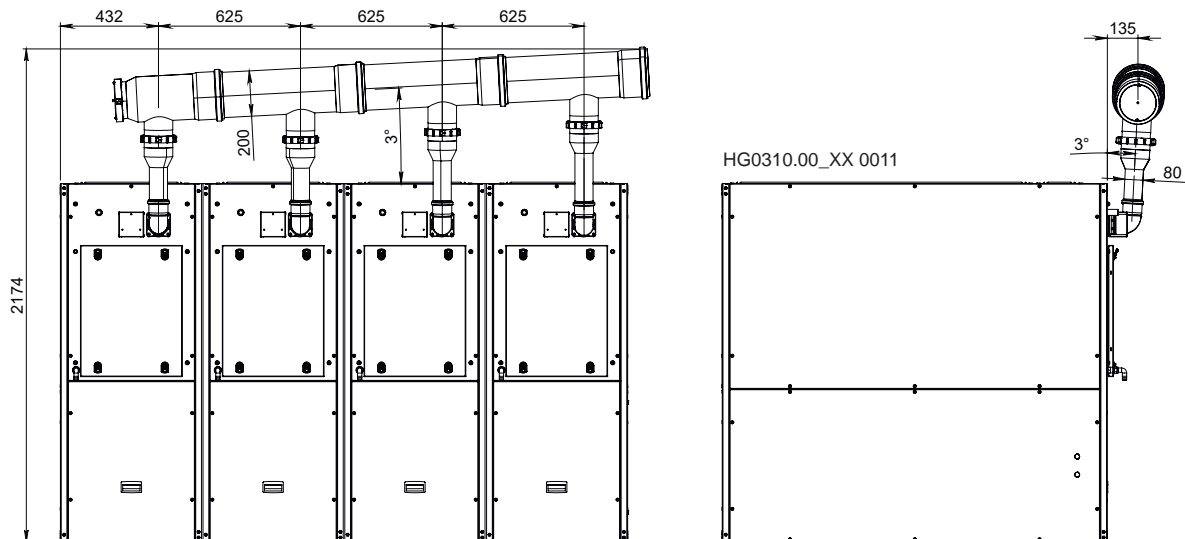
Model: AH160 / AH210 (- xxV0) with COMMON flue outlet



Model: AH320 (- xxV0) with COMMON flue outlet



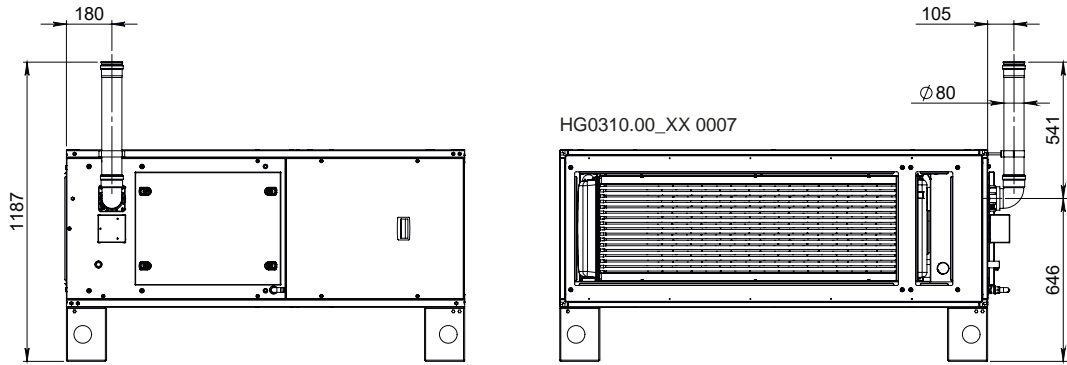
Model: AH420 (- xxV0) with COMMON flue outlet (A)



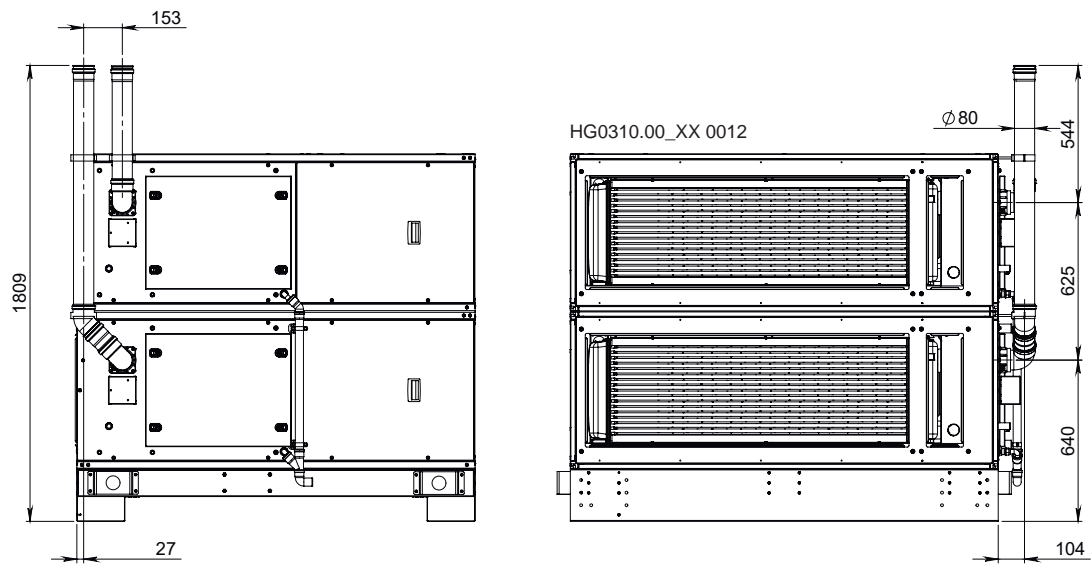
AH-New condensing air heating unit



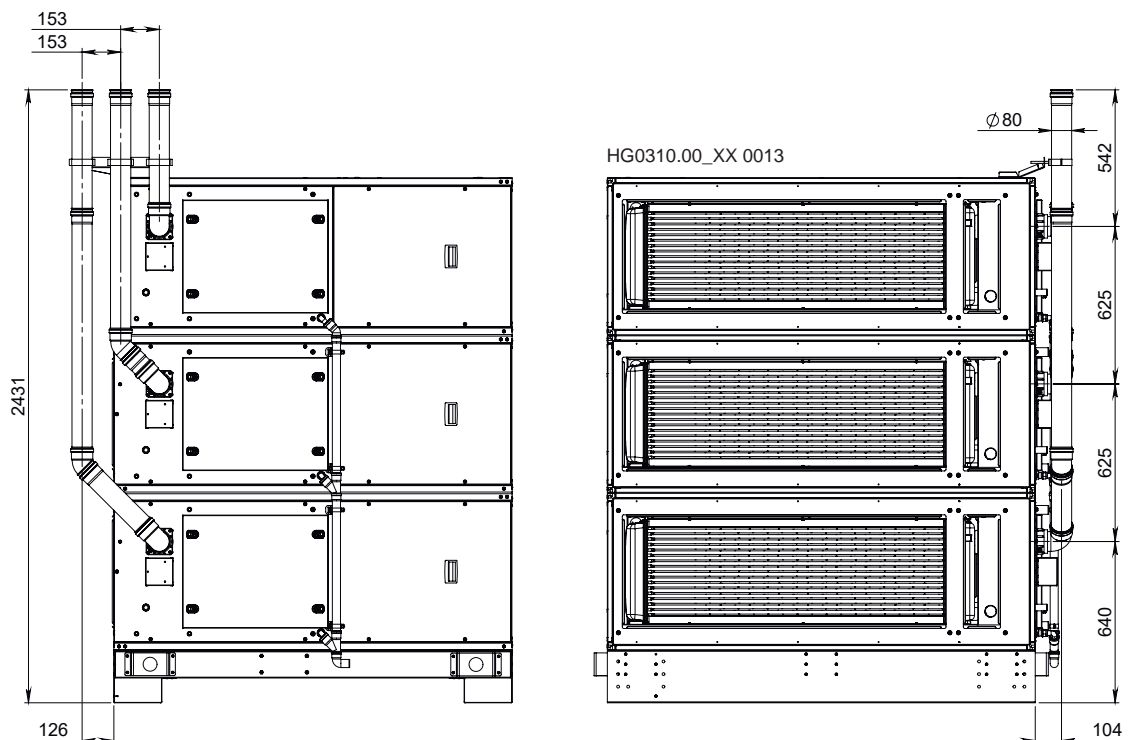
Model: AH034 / AH065 / AH105 (- xxH0) with INDEPENDENT flue outlet



Model: AH160 / AH210 (- xxH0) with INDEPENDENT flue outlet



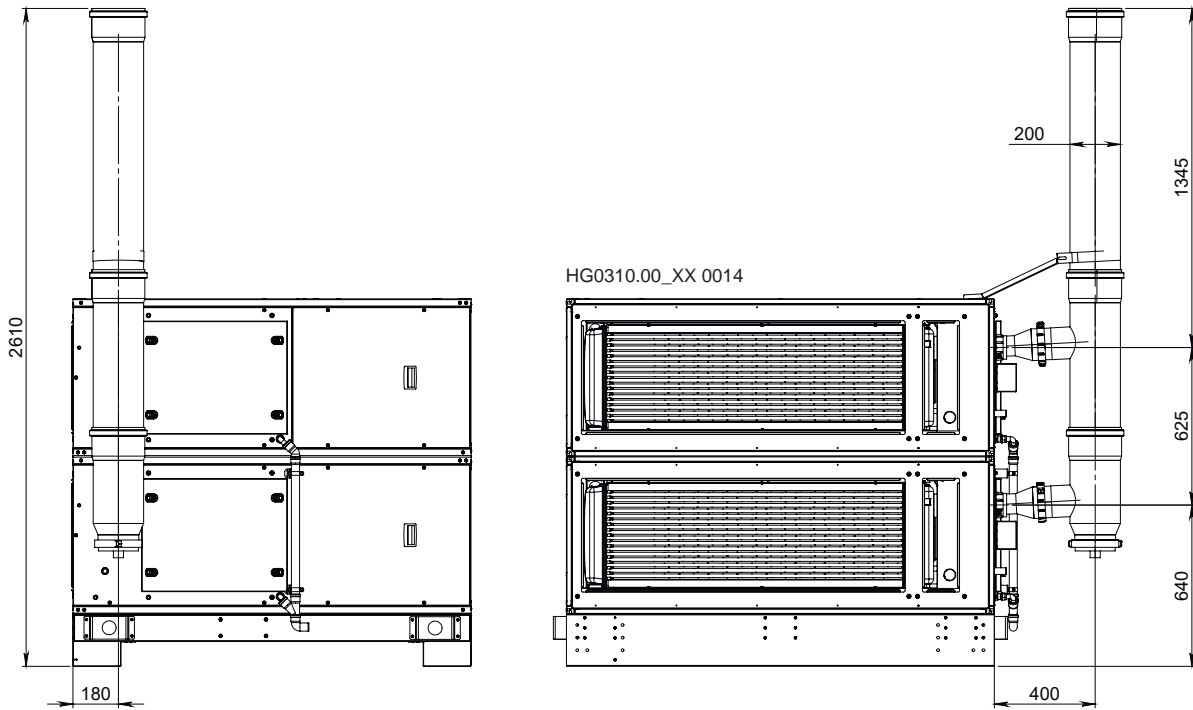
Model: AH320 (- xxH0) with INDEPENDENT flue outlet



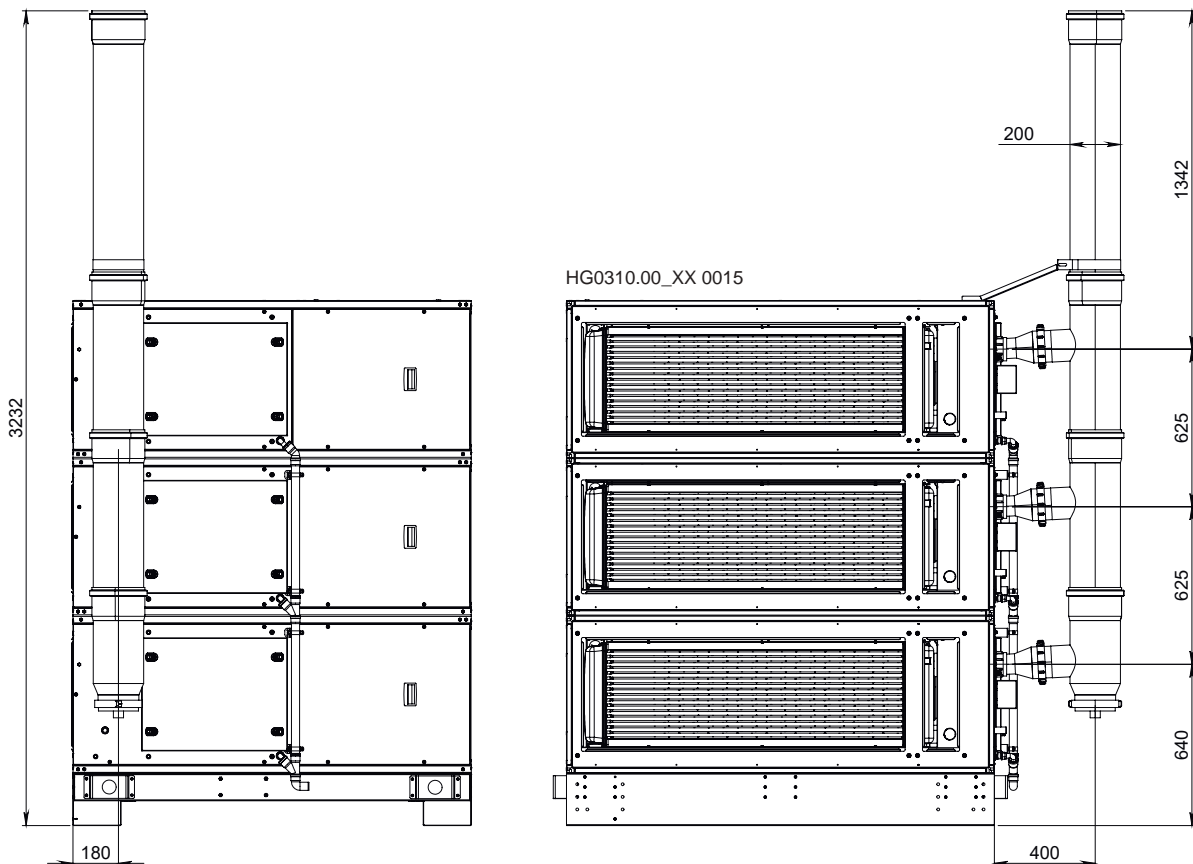
AH-New condensing air heating unit



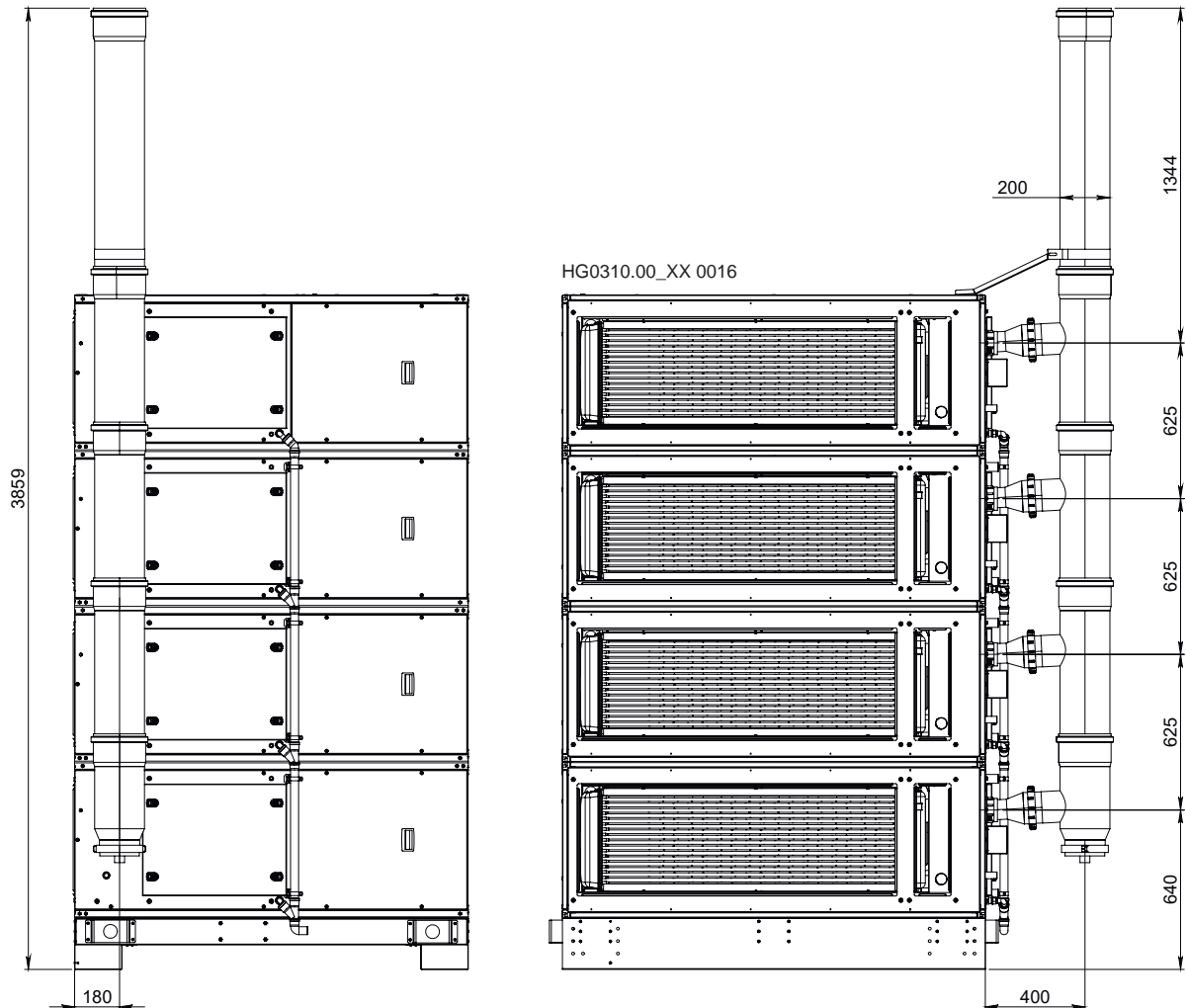
Model: AH160 / AH210 (- xxH0) with COMMON flue outlet





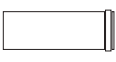
Model: AH320 (- xxH0) with COMMON flue outlet


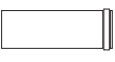


Model: AH420 (- xxH0) with COMMON flue outlet ^(B)



NOTES:

(A) Accessories included for HORIZONTAL Common Flue outlet - AH420 (- xxH0)		
 Ø200/250 mm concentric adapter	 90° Ø250 mm bend	 L 1000 mm Ø250 mm extension

(B) Accessories included for VERTICAL Common Flue outlet - AH420 (- xxV0)	
 Ø200/250 mm concentric adapter	 L 1000 mm Ø250 mm extension

TYPE OF GAS G20 - Cat. E-H															
TYPE OF MACHINE		AH034		AH065		AH105		AH160		AH210		AH320		AH420	
Output		min	max	min	max	min	max	min	max	min	max	min	max	min	max
FLUE GAS TEMPERATURE	[°C]	31	94	31	86	28	80	26	70	28	80	28	80	28	80
FLUE GAS MASS FLOW RATE (MAX.)	[kg/h]	57		107		165		270		330		495		660	

5.6. Condensate drain

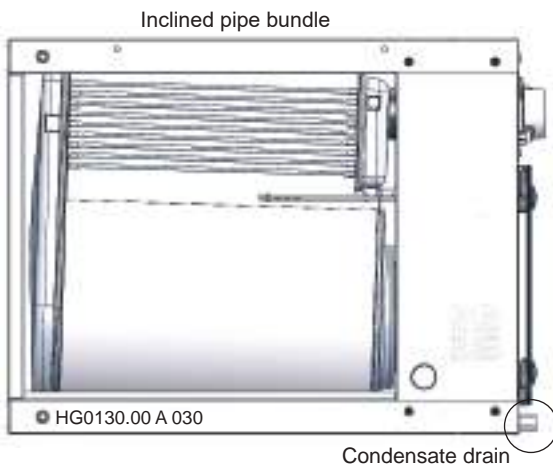
Special attention must be paid to the condensate drain; an incorrectly installed drain, in fact, could jeopardize the correct operation of the equipment. The factors to be taken into account are:

- 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.

An electrode fitted in the burner compartment internal trap checks and stops the burner operation before the water 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

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

According to the applications, two condensate neutraliser kits are available (code G14303 up to 120kW; code G05750 beyond).

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

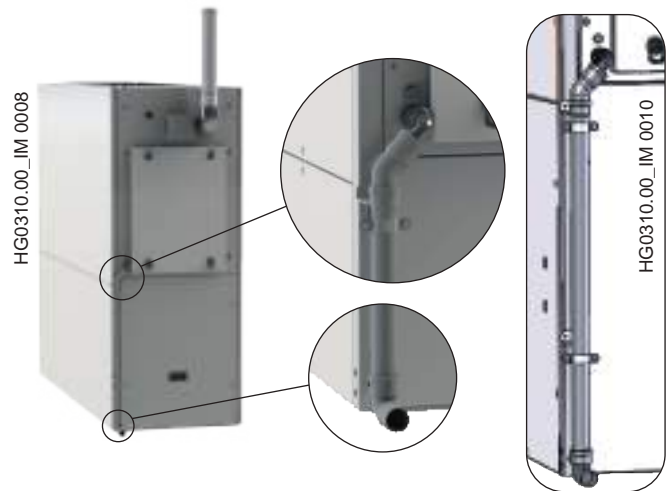
- free drainage;
- drainage in drain wells;
- drainage inside water traps.

AH air heating units are supplied with a condensate drain with open type connection (socket pipe) to prevent ice forming in the pipe from blocking correct condensate drain, with consequent accumulation of water in the heat exchanger.

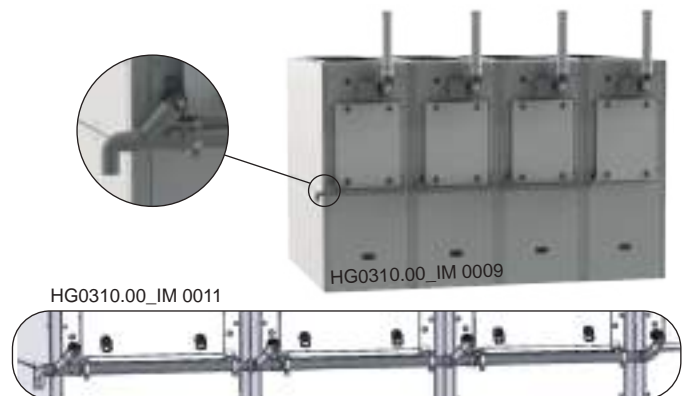
Multiple-module AH air heating units are equipped with a condensate drain of open, collective type, as shown below.

ATTENTION: Fill the condensate drain trap before the first start-up.

Model: AH034 / AH065 / AH105 VERTICAL



Model: AH160 / AH210 / AH320 / AH420 VERTICAL



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 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 or G05750).

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 modules are supplied complete with:

- dual gas valve;
- stabiliser and gas filter.

All 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;
- gas filter.

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.

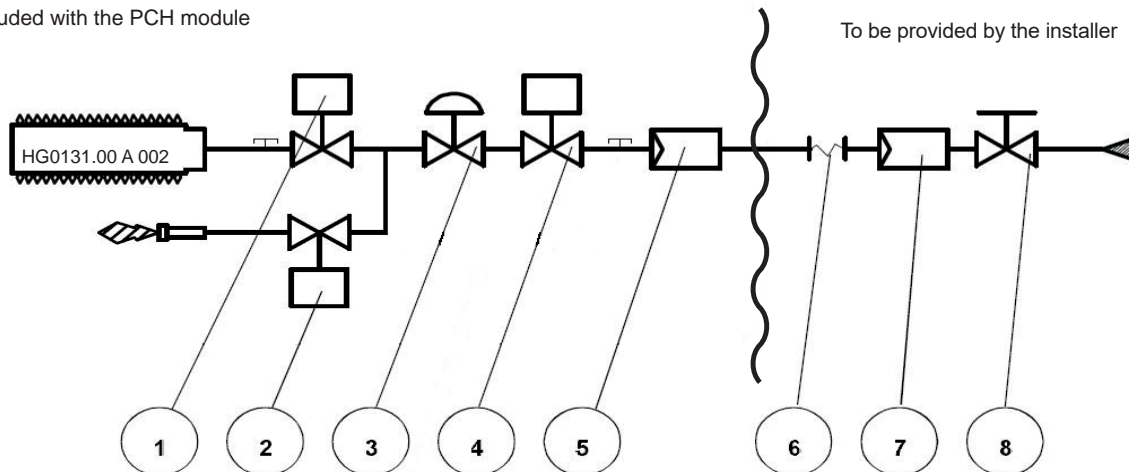
Avoid using threaded connections directly on the gas connection.

Current legislation allows a maximum pressure inside the rooms, or thermal stations, of 40 mbar; higher pressure values must be reduced before entering 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 |

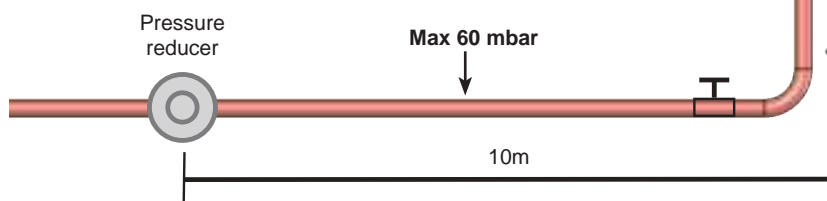
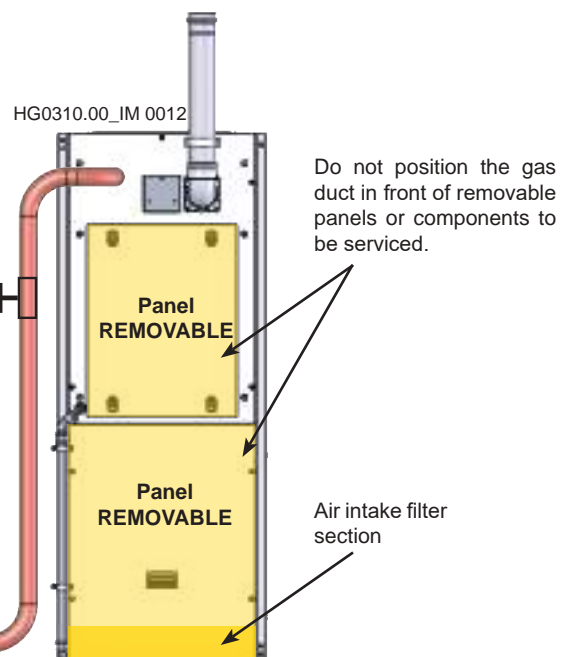
Included with the PCH module



During the installation, we recommend tightening the external gas supply pipe nut 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 unit, but leaving the gas filter.



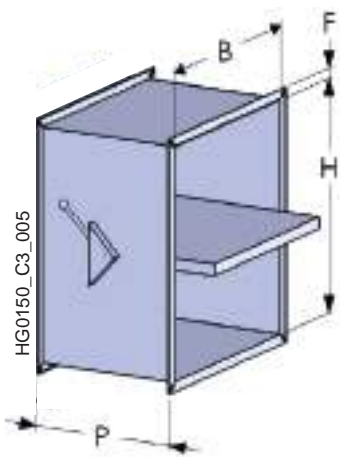
5.8. Fire damper installation

The fire damper is available as optional 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]	
AH034	Delivery and Intake	G23646	800	450	510	35
AH045	Delivery and Intake	G23666	1100	450	510	35
AH105	Delivery and Intake	G23686	1500	450	510	35
AH160	Delivery	G23726	1000	970	510	35
AH210	Horizontal Intake					
	Vertical Intake	G23756	1200	650	510	35
AH320	Delivery	G23736	1200	1170	510	35
	Horizontal Intake					
	Vertical Intake	G23766	1670	800	510	35
AH420	Delivery	G23746	1400	1370	510	35
	Horizontal Intake					
	Vertical Intake	G23776	1670	800	510	35

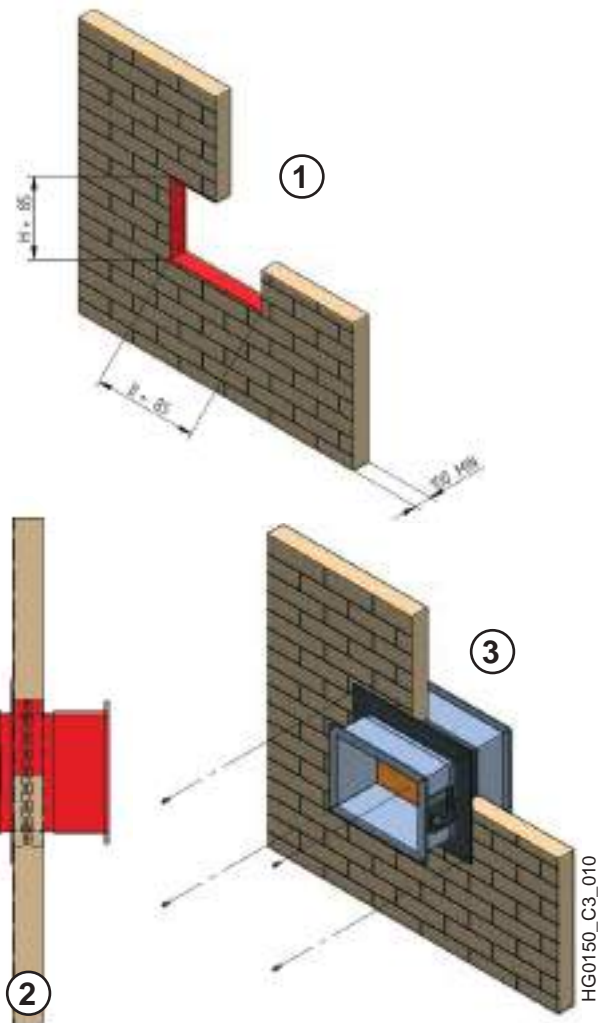


INSTALLATION OF FIRE DAMPER ON RIGID WALL

- 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.

cod. HG0310.05GB ed.D-2201



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 unit is disconnected from the structure, close or protect ductworks to prevent atmospheric elements from entering.



6. SERVICING INSTRUCTIONS

6.1. Operating Cycle

The operation of AH units is fully automatic; they are equipped with electronic equipment with self-check function 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:

- unit powered on and not locked out;
- Smart Web remote control set to the "heating" operation mode with 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 equipment will make other 4 ignition attempts; at the fifth attempt, if ignition is not successful, the heater will be locked out (Fault F10).

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 unit is switched off, the flue gas fan must continue to operate for approximately 90 seconds to clean the combustion chamber (combustion chamber post-cleaning phase) and cool it down.

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.

AH units are fitted as standard also with a multifunction LCD panel located inside the burner housing and used to control, configure and diagnose all operating parameters of the PCH equipment.

The multifunctional 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 operating mode of the PCH unit and any Faults.

It also allows the service centre to change the main operating parameters.

Changing parameters requires a password.

For further information on operation and management of the user interface panel, contact ApenGroup sales office.

6.3. Reset

The modulation PCB allows the operator to identify more than thirty different causes of lockouts. In case of lockout, the type of problem occurred is indicated with a code allowing for a precise management of the event.

To reset the fault and unlock the AH unit, just press the two arrow keys of the LDC panel simultaneously for at least 3 seconds or directly operate on the installed Smart Web.

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 6.5 "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. Parameters of MASTER and SLAVE modulation PCBs

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

- (1) parameters that could be modified with "001" Password via remote LCD control (even with modbus address ≠ 0).
- (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.

Main modulation PCB configuration: MASTER

Parameters of CPU-SMART PCB version 7.04.xx								
PARAMETER	AH034	AH065	AH105	AH160	AH210	AH320	AH420	DESCRIPTION
Control parameters								
d0	(2)	-		7				Flame modulation: 2=NTC1; 5=0÷10Vdc; 7=Modbus (SmartWeb in PID mode)
d1	(2)	-		8				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		60				Fan delay time ON (RL2): 0÷255
d4	(2)	sec		30				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				Continuous ventilation: 0= disabled; 1= enabled (fans always active); 2= enabled with delay par.d3 upon remote heat request - active in case of heat request
Burner parameters NOT USED								
b1	(2)	rpm		300				Motor RPM MINIMUM value (PWM1): 90÷999 (1=10 RPM)
b2	(2)	rpm		600				Motor RPM MAXIMUM value (PWM1): 90÷999 (1=10 RPM)
b3	(2)	rpm		400				Motor RPM START-UP value (PWM1): 90÷999 (1=10 RPM)
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: 0÷249
b14	(2)	pwm		45				Proportional factor value (kp_pwm) for PWM1 calculation: 0÷249
b15	(2)	sec		0				with d1=0 or 5: delay time ON flame control equipment (TER); with d1=2 (boiler): F85/F86 water flow delay alarm at start-up
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;

Main modulation PCB configuration: MASTER

Parameters of CPU-SMART PCB version 7.04.xx

PARAMETER	AH034	AH065	AH105	AH160	AH210	AH320	AH420	DESCRIPTION
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;
Limit NTC1 control (with D0=5 or 7)								
SEL	(2)	-		1				Modulation probe 1=NTC probe1; 3=NTC3 probe
S1	(2)	-		1				NTC1 probe enabling: 0=disabled; 1=enabled
ST1	(1)	°C		65				NTC1 setpoint: -10÷140
SP1	(2)	°C		5				SP1 hysteresis: 0÷10
XD1	(3)	%		20				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		75				Upper Temperature limit for fault F51 activation: 10÷95 autoreset if NTC1<TH1-15°C
S3	(2)	-		0				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
Fan and damper output control								
H11	(2)	-		2				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 pressostatic 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				Y2 output minimum voltage: 0÷10
H13	(1)	V		10				Y2 output maximum voltage: 0÷10
H14	(3)	%		80				PWM minimum value: 0÷100
H15	(3)	%		100				PWM maximum value: 0÷100
H16	(3)	-		2				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 pressostatic structures; 5= proportional NTC1 for checking Queen/Fan heaters (only output Y2)
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

Main modulation PCB configuration: MASTER

Parameters of CPU-SMART PCB version 7.04.xx

PARAMETER	AH034	AH065	AH105	AH160	AH210	AH320	AH420	DESCRIPTION
PRESSURE control								
S5	(2)	-		6				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 by the 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
PRESSURE control - PID parameters for ventilation of Manostatic structures - NOT USED								
kp	(3)	%		50				Proportional Gain
ki	(3)	%		15				Integral Gain
kd	(3)	%		20				Derivative Gain
li	(3)	%		50				Maximum limit of integral part

Secondary modulation PCB (PCH) configuration: **SLAVE**

Parameters of CPU-SMART PCB version 7.04.xx										
PARAMETER	AH034	AH065	AH105	AH160	AH210	AH320	AH420	DESCRIPTION		
Control parameters										
d0	(2)	-			5					Flame modulation: 2=NTC1; 5=0÷10Vdc; 7=Modbus (SmartWeb in PID mode)
d1	(2)	-			5					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			5					Fan delay time ON (RL2): 0÷255
d4	(2)	sec			10					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					Continuous ventilation: 0= disabled; 1= enabled (fans always active); 2= enabled with delay par.d3 upon remote heat request - active in Fault in case of heat request
Burner parameters										
b1	(2)	rpm	210	182	195	172	195	195	195	Motor RPM MINIMUM value (PWM1): 90÷999 (1=10 RPM)
b2	(2)	rpm	710	651	635	655	635	635	635	Motor RPM MAXIMUM value (PWM1): 90÷999 (1=10 RPM)
b3	(2)	rpm	300	340	240	355	240	240	240	Motor RPM START-UP value (PWM1): 90÷999 (1=10 RPM)
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				1				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: 0÷249
b14	(2)	pwm				45				Proportional factor value (kp_pwm) for PWM1 calculation: 0÷249
b15	(2)	sec	0	0	0	(*)	(*)	(*)	(*)	with d1=0 or 5: delay time ON flame control equipment (TER); with d1=2 (boiler): F85/F86 water flow delay alarm at start-up

NOTES:

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

Secondary modulation PCB (PCH) configuration: **SLAVE**

Parameters of CPU-SMART PCB version 7.04.xx

PARAMETER	AH034	AH065	AH105	AH160	AH210	AH320	AH420	DESCRIPTION	
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;	
b17	(2)	-		3				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 ^{(a)(b)(c)(d)}									
Qmin	(3)	kW	7.6	12.4	21.0	16.4	21.0	21.0	Minimum heat input (ref. Lower calorific value - Hi)
Qmax	(3)	kW	34.85	65.0	99.9	82.0	99.9	99.9	Maximum heat input (ref. Lower calorific value - Hi)
LCV	(3)	kW/m ³	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		75					NTC1 setpoint: -10÷140
SP1	(2)	°C		5					SP1 hysteresis: 0÷10
XD1	(3)	%		20					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		85					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		85					Upper temperature limit for F53 fault activation (auto-reset if NTC3<TH3): 0÷140
Control 0/10 Vdc - D0=5									
H51	(1)	-		1					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 1st. Module = 0.5; 2nd. Module = 1.5; 3rd. Module = 2.5; 4th. Module = 3.5.
H53	(1)	V		0.5					Voltage Delta with burner ignition ON 1st. Module = 0.5; 2nd. Module = 1.0; 3rd. Module = 1.5; 4th. Module = 1.5.
H54	(3)	sec		10					Lower input dwell time: 0÷255
H55	(3)	sec		10					Upper input dwell time: 0÷255
Fan and damper output control									
H11	(2)	-		0					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 pressostatic 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

NOTES:

- (a) Models AH105, AH160, AH210, AH320 and AH420 are not approved for operation with gas G2.350 (Poland)
- (b) For AH065 model, set Qmax = 57 (kW) for operation with gas G2.350 and G27 (Poland)
- (c) For AH105 model, set Qmax = 94 (kW) for operation with gas G25.1 (Hungary) and G27 (Poland)
- (d) For AH160 model, set Qmax = 75 (kW) for operation with gas G27 (Poland)

Secondary modulation PCB (PCH) configuration: **SLAVE**

Parameters of CPU-SMART PCB version 7.04.xx									
PARAMETER	AH034	AH065	AH105	AH160	AH210	AH320	AH420	DESCRIPTION	
H12	(1)	V		4				Y2 output minimum voltage: 0÷10	
H13	(1)	V		10				Y2 output maximum voltage: 0÷10	
H14	(3)	%		80				PWM minimum value: 0÷100	
H15	(3)	%		100				PWM maximum value: 0÷100	
H16	(3)	-		2				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 pressostatic structures; 5= proportional NTC1 for checking Queen/Fan heaters (only output Y2)	
H17	(3)	-		1				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	

Table of "Parameter b15 for multiple module machines"

PARAMETER	SLAVE 1	SLAVE 2	SLAVE 3	SLAVE 4	DESCRIPTION		
b15	(2)	sec	0	10	20	30	with d1=0 or 5: delay time ON flame control equipment (TER); with d1=2 (boiler): F85/F86 water flow delay alarm at start-up

Table of "Gas-type parameters"

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

6.5. Analysis of lockouts- faults

The CPU-SMART manages two types of lockouts:

- preventive, it warns the customer that the AH air heating unit requires maintenance;
- operational, it stops the AH air heating unit 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	UNLOCK
Lockout caused by Flame - Caused by the flame monitoring equipment (TER)			
F10	Failure to ignite flame after 4 attempts performed by the equipment.	<ul style="list-style-type: none"> • No gas • 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	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Poor gas mains pressure • Low CO₂ 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 STBi	<ul style="list-style-type: none"> • Excess air temperature due to lack of air circulation • Safety thermostat broken or not connected 	Manual reset
F21	Input ID1 open	• Fire damper activation	Manual reset
F22	Opening of safety thermostat STB at ignition	<ul style="list-style-type: none"> • Frost or temperature below -20°C • Safety thermostat broken or not connected 	
F35	Input ID5 open (NOT used)	• ID5 - IDC5 jumper missing	
F38	Input ID6 open	• Flue thermostat broken or not connected	Auto-reset
VAG lockout - flue gas fan			
F30	Flue gas fan speed (VAG) too low in start up phase	<ul style="list-style-type: none"> • 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
NTC probes broken or missing			

FAULT	DESCRIPTION	CAUSE	UNLOCK
F41	Probe NTC1 error, air intake temperature	No signal from probe or broken probe	Auto-reset
F43	Probe NTC3 error, flue gas temperature		
Over-temperature			
F51	The temperature of the air intake probe NTC1>TH1 (NOT used)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • No voltage during operation 	Auto resolve
F80	Pressure gauge error	<ul style="list-style-type: none"> • Pressure gauge at fault or not connected • Input signal at B2 is < 0.2 Vdc 	Auto-reset
F81	Pressure less than B2 setpoint	<ul style="list-style-type: none"> • Input signal at B2 is < ST5 setpoint 	Auto resolve
F82	Higher pressure at B2 setpoint	<ul style="list-style-type: none"> • Input signal at B2 is < ST5 setpoint + TH5 	Auto resolve
F99	CPU parameter programming error	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • RJ11 cable disconnected or faulty 	Auto resolve
...	CPU-SMART PCB communication error	<ul style="list-style-type: none"> • RJ11 cable disconnected or faulty 	Auto resolve

6.6. Country Table - Gas Category

Country	Category	Gas	Pressure	Gas	Pressure
AT, CH	I12H3B/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	I12ELL3B/P	G20/G25	20 mbar	G30/G31	50 mbar
DK, FI, GR, SE, NO, IT, CZ, EE, LT, SI, AL, MK, BG, HR, TR	I12H3B/P	G20	20 mbar	G30/G31	30 mbar
RO	I12L3B/P	G25	20 mbar	G30/G31	30 mbar
ES, GB, IE, PT, SK	I12H3P	G20	20 mbar	G31	37 mbar
FR	I12Esi3P	G20/G25	20/25 mbar	G31	37 mbar
LU	I12E3P	G20/G25	20 mbar	G31	37/50 mbar
NL	I12EK3B/P	G20/G25.3	20/25 mbar	G30/G31	30 mbar
HU	I12HS3B/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	I12ELwLs- 3B/P	G20/G27/G2.350	20/13 mbar	G30/G31	37 mbar
RU	I12H3B/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 EN17082, 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 xxx0 0 indicates that the equipment has been tested and set up for natural gas [G20];
- AH105MT-xxx1 1 indicates that the equipment has been tested and set up for LPG [G31];
- AH105NL-xxx2 2 indicates that the equipment has been tested and set up for 'L' [G25] or 'K' [G25.3] natural gas;
- AH105HU xxx3 3 indicates that the equipment has been tested and set up for natural gas [G25.1];
- AH105PL xxx4 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.

NOTE: The unit is supplied already set for natural gas [G20] and equipped with the kit for conversion to LPG. The kit for conversion to LPG is not supplied in countries where conversion is prohibited.

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

6.7. Gas Settings Table

TYPE OF GAS G20 - Cat. E-H															
TYPE OF MACHINE	AH034		AH065		AH105		AH160		AH210		AH320		AH420		
Output	min	max	min	max	min	max	min	max	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]	1 x 0.7		1 x 0.7		1 x 0.7		2 x 0.7		2 x 0.7		3 x 0.7		4 x 0.7	
GAS CONSUMPTION (15°C-1013mbar)	[m³/h]	0.80	3.69	1.31	6.88	2.22	10.58	1.74	17.36	2.22	21.16	2.22	31.74	2.22	42.32
CARBON DIOXIDE -CO ₂ CONTENT	[%]	8.7	9.1	8.7	9.1	8.5	9.1	8.7	9.1	8.5	9.1	8.5	9.1	8.5	9.1
FLUE GAS TEMPERATURE	[°C]	31	94	31	86	28	80	26	70	28	80	28	80	28	80
FLUE GAS MASS FLOW RATE (MAX.)	[kg/h]	57		107		165		270		330		495		660	
GAS ORIFICE PLATE	[mm]	1 x 6.2		1 x 10.3		1 x 15.8		2 x 9.8		2 x 15.8		3 x 15.8		4 x 15.8	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required		Not required		Not required		Not required		Not required	

* For Hungary, supply pressure is 25 mbar

TYPE OF GAS G25 - Cat. L-LL															
TYPE OF MACHINE	AH034		AH065		AH105		AH160		AH210		AH320		AH420		
Output	min	max	min	max	min	max	min	max	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]	1 x 0.7		1 x 0.7		1 x 0.7		2 x 0.7		2 x 0.7		3 x 0.7		4 x 0.7	
GAS CONSUMPTION (15°C-1013mbar)	[m³/h]	0.93	4.29	1.53	8.00	2.21	12.30	2.02	20.2	2.21	24.60	2.21	36.90	2.21	49.20
CARBON DIOXIDE -CO ₂ CONTENT	[%]	8.6	9	8.8	9.2	8.8	9	8.6	9.1	8.8	9	8.8	9	8.8	9
FLUE GAS TEMPERATURE	[°C]	31	94	31	86	28	80	26	70	28	80	28	80	28	80
GAS ORIFICE PLATE	[mm]	1 x 8.9		Not required		Not required		Not required		Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required		Not required		Not required		Not required		Not required	

* For Germany and Romania, supply pressure is 20 mbar

TYPE OF GAS G25.3 - Cat. K (Only Netherlands - from 01/01/2018)															
TYPE OF MACHINE	AH034		AH065		AH105		AH160		AH210		AH320		AH420		
Output	min	max	min	max	min	max	min	max	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]	1 x 0.7		1 x 0.7		1 x 0.7		2 x 0.7		2 x 0.7		3 x 0.7		4 x 0.7	
GAS CONSUMPTION (15°C-1013mbar)	[m³/h]	0.91	4.19	1.49	7.82	2.53	12.03	1.97	19.74	2.53	24.06	2.53	36.09	2.53	48.12
CARBON DIOXIDE -CO ₂ CONTENT	[%]	8.8	9	8.9	9.1	8.8	9.4	8.7	9.1	8.8	9.4	8.8	9.4	8.8	9.4
FLUE GAS TEMPERATURE	[°C]	31	94	31	86	28	80	26	70	28	80	28	80	28	80
GAS ORIFICE PLATE	[mm]	7.7		Not required		Not required		Not required		Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required		Not required		Not required		Not required		Not required	

TYPE OF GAS G2.350 - Cat. Ls (Only for PL-Poland)					
TYPE OF MACHINE		AH034		AH065 ⁽¹⁾	
Output		min	max	min	max
CATEGORY		according to the country of destination - see reference table			
SUPPLY PRESSURE	[mbar]	13 [min 10-max 16]			
PILOT NOZZLE Ø	[mm]	1 x 0.75		1 x 0.75	
GAS CONSUMPTION (15°C-1013mbar)	[m³/h]	1.13	5.17	1.84	9.63
CARBON DIOXIDE -CO ₂ CONTENT	[%]	8.4	9	8.4	8.8
FLUE GAS TEMPERATURE	[°C]	31	94	31	86
GAS ORIFICE PLATE	[mm]	Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		1 x 30.5	

⁽¹⁾ Maximum rated heat input 57.0 kW

NOTE: The minimum and maximum heat outputs of model AH065 are lower with respect to the operation with G20. Models AH105, AH160, AH210, AH320, AH420 are not suitable for operation 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		AH034		AH065		AH105 ⁽¹⁾		AH160		AH210 ⁽²⁾		AH320 ⁽³⁾		AH420 ⁽⁴⁾	
Output		min	max	min	max	min	max	min	max	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]	1 x 0.7		1 x 0.7		1 x 0.7		2 x 0.7		2 x 0.7		3 x 0.7		4 x 0.7	
GAS CONSUMPTION (15°C-1013mbar)	[m³/h]	0.93	4.29	1.52	7.99	2.21	12.29	2.01	20.2	2.21	24.58	2.21	36.87	2.21	49.16
CARBON DIOXIDE -CO ₂ CONTENT	[%]	9.1	9.6	9.3	9.7	9.4	9.6	9.8	10.3	9.4	9.6	9.4	9.6	9.4	9.6
FLUE GAS TEMPERATURE	[°C]	31	94	31	86	28	80	26	70	28	80	28	80	28	80
GAS ORIFICE PLATE	[mm]	1 x 8.9		Not required		Not required		Not required		Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required		Not required		Not required		Not required		Not required	

⁽¹⁾ Maximum rated heat input 94.0 kW
⁽²⁾ Maximum rated heat input 188.0 kW
⁽³⁾ Maximum rated heat input 282.0 kW
⁽⁴⁾ Maximum rated heat input 376.0 kW

TYPE OF GAS G27 - Cat. Lw [former GZ41.5] (Only for PL-Poland)															
TYPE OF MACHINE		AH034		AH065 ⁽¹⁾		AH105 ⁽²⁾		AH160 ⁽³⁾		AH210 ⁽⁴⁾		AH320 ⁽⁵⁾		AH320 ⁽⁶⁾	
Output		min	max	min	max	min	max	min	max	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]	1 x 0.7		1 x 0.7		1 x 0.7		2 x 0.7		2 x 0.7		3 x 0.7		4 x 0.7	
GAS CONSUMPTION (15°C-1013mbar)	[m³/h]	0.90	4.15	1.48	7.74	2.50	11.90	1.95	19.52	2.50	23.80	2.50	35.70	2.50	47.60
CARBON DIOXIDE -CO ₂ CONTENT	[%]	8.7	9.1	8.6	8.8	8.5	8.7	8.7	9.1	8.5	8.7	8.5	8.7	8.5	8.7
FLUE GAS TEMPERATURE	[°C]	31	94	31	77	28	74	26	67	28	74	28	74	28	74
GAS ORIFICE PLATE	[mm]	1 x 11.4		Not required		Not required		Not required		Not required		Not required		Not required	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required		1 x 30.5		Not required		Not required		Not required	

⁽¹⁾ Maximum rated heat input 57 kW
⁽²⁾ Maximum rated heat input 94 kW
⁽³⁾ Maximum rated heat input 150 kW
⁽⁴⁾ Maximum rated heat input 188 kW
⁽⁵⁾ Maximum rated heat input 282 kW
⁽⁶⁾ Maximum rated heat input 376 kW

TYPE OF GAS G30 - Cat. 3B-P															
TYPE OF MACHINE		AH034		AH065		AH105 ⁽¹⁾		AH160 ⁽²⁾		PCH210 ⁽³⁾		PCH320 ⁽⁴⁾		PCH420 ⁽⁵⁾	
Output		min	max	min	max	min	max	min	max	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]	1 x 0.51		1 x 0.51		1 x 0.51		2 x 0.51		2 x 0.51		3 x 0.51		4 x 0.51	
GAS CONSUMPTION (15°C-1013mbar)	[kg/h]	0.63	2.90	1.03	5.39	1.70	8.30	1.49	13.60	1.70	16.60	1.70	24.90	1.70	32.90
CARBON DIOXIDE -CO ₂ CONTENT	[%]	10.8	11.5	10.7	11.3	10.4	10.6	10.1	10.3	10.4	10.6	10.4	10.6	10.4	10.6
FLUE GAS TEMPERATURE	[°C]	31	94	31	86	28	80	26.5	70	28	80	28	80	28	80
GAS ORIFICE PLATE	[mm]	1 x 4.4		1 x 6.5		1 x 9.3		2 x 7.0		2 x 9.3		3 x 9.3		4 x 9.3	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required		Not required		Not required		Not required		Not required	
⁽¹⁾ Minimum rated heat input 24 kW ⁽²⁾ Minimum rated heat input 36 kW ⁽³⁾ Minimum rated heat input 48 kW ⁽⁴⁾ Minimum rated heat input 72 kW ⁽⁵⁾ Minimum rated heat input 96 kW															

TYPE OF GAS G31 - Cat. 3P															
TYPE OF MACHINE		AH034		PCH065		PCH105		AH160		AH210		AH320		AH420	
Output		min	max	min	max	min	max	min	max	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]	1 x 0.51		1 x 0.51		1 x 0.51		2 x 0.51		2 x 0.51		3 x 0.51		4 x 0.51	
GAS CONSUMPTION (15°C-1013mbar)	[kg/h]	0.62	2.85	1.01	5.31	1.47	8.18	1.34	13.4	1.47	16.36	1.47	24.54	1.47	32.72
CARBON DIOXIDE -CO ₂ CONTENT	[%]	9.2	9.7	9.4	9.6	9.5	9.8	9.3	9.6	9.5	9.8	9.5	9.8	9.5	9.8
FLUE GAS TEMPERATURE	[°C]	31	94	31	86	28	80	26.5	70	28	80	28	80	28	80
FLUE GAS MASS FLOW RATE (MAX.)	[kg/h]	45		84		130		214		260		390		520	
GAS ORIFICE PLATE	[mm]	1 x 4.4		1 x 6.5		1 x 9.3		2 x 7.0		2 x 9.3		3 x 9.3		4 x 9.3	
AIR ORIFICE PLATE	[mm]	Not required		Not required		Not required		Not required		Not required		Not required		Not required	

6.8. 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.

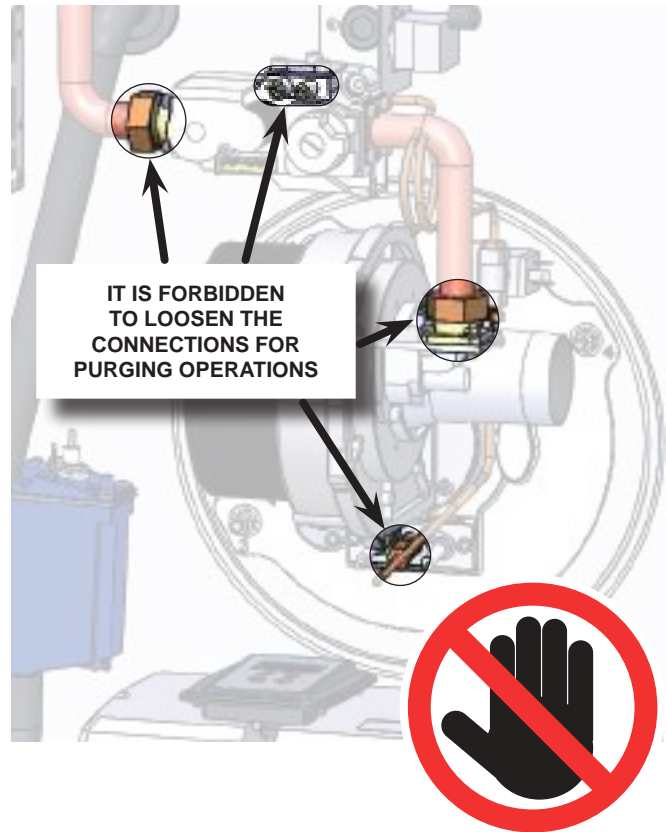
To turn on the heater, follow the instructions below:

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

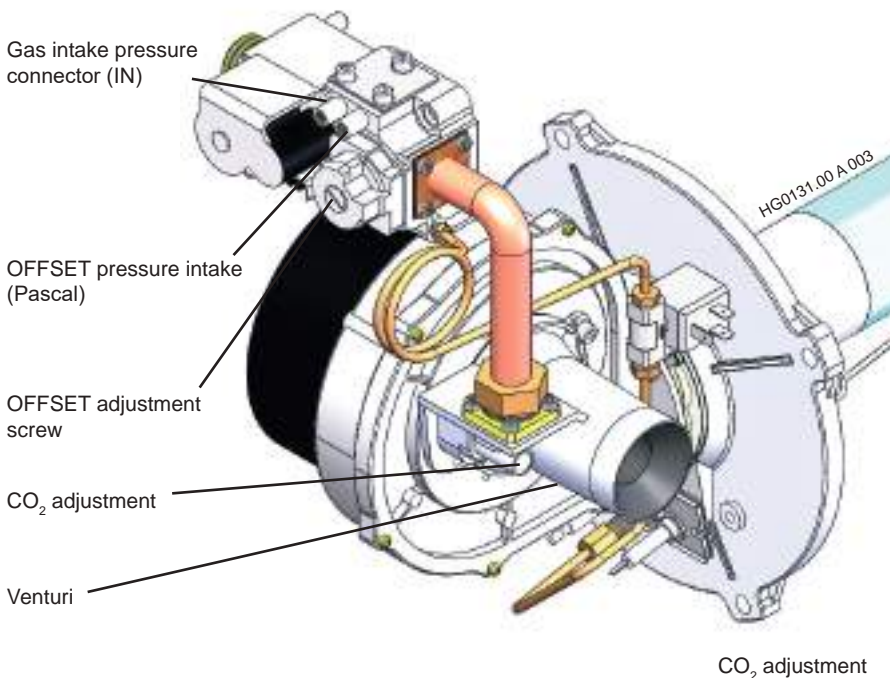
When ON appears on the LCD display, the heater starts the ignition cycle.

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.

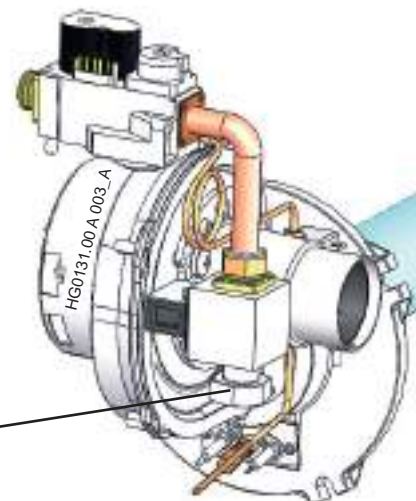
ATTENTION: IT IS FORBIDDEN to loosen the gas connections, the pressure connectors, the pilot burner duct, or any other gas connection point located inside the burner housing, to purge the air or inert gas that may be present inside the main feeding piping. The purging of air or inert gas from gas feeding lines must be carried out in accordance with current legislation.



For models: PCH020, PCH034, PCH045, PCH065, PCH080



For models: PCH105



6.9. Analysis of combustion

Wait until the heater is switched on. Check that the heater is running at maximum power by using one of the two methods below:

- 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.

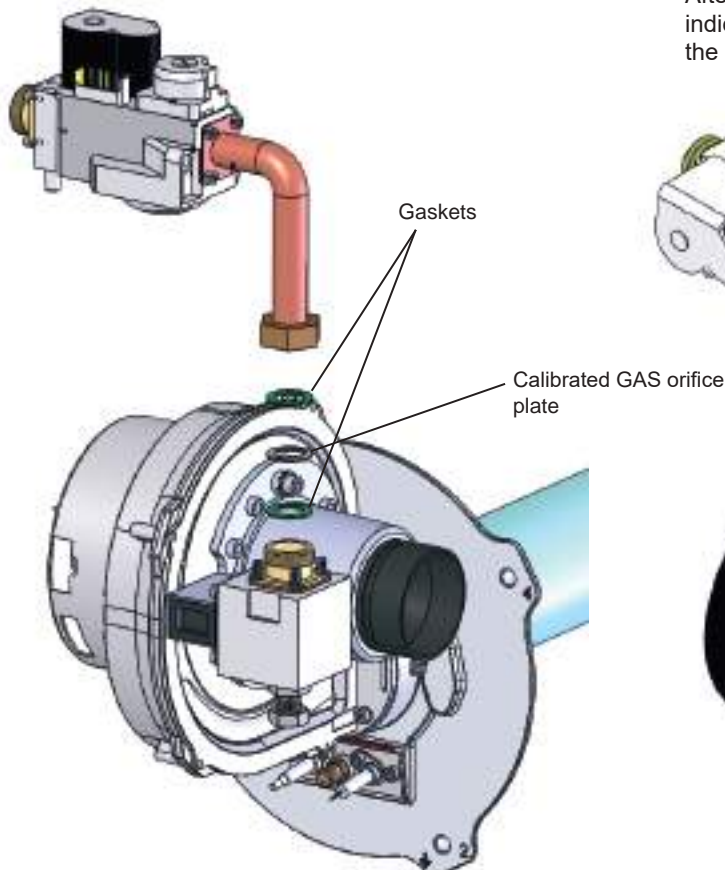
At maximum output, check again that the input pressure in the valve corresponds to the value required; adjust if necessary. Perform the combustion analysis to verify that the level of CO₂ corresponds to the figures in the tables in Paragraph 6.7 "GAS Settings Table"

If the measured value is different, turn the adjustment screw on the Venturi pipe. Loosening the screw will increase the CO₂ level, screwing it down will decrease the level.

Set the heater to minimum output, and verify that the level of CO₂ corresponds to the figures in the tables in Paragraph 6.7 "GAS Settings Table". If the values do not match, screw or loosen the offset screw respectively to increase or decrease the CO₂ 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 CO₂ as shown in the tables in Paragraph 4.6 "GAS connection".

For models: AH105, AH210, AH320, AH420



6.10. 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 with the kit for conversion to LPG, including:

- 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:

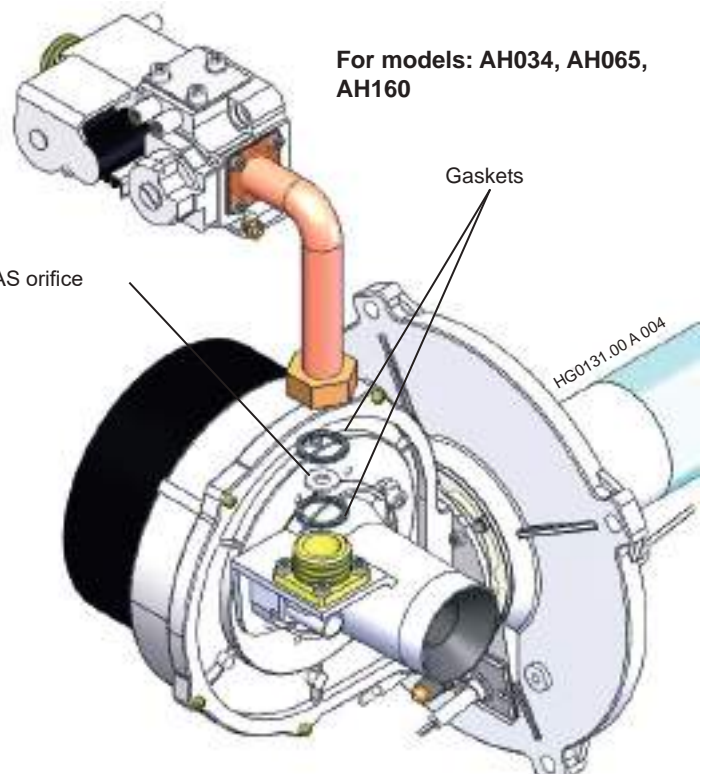
- disconnect from power supply;
- between the gas pipe and the Venturi, replace the gas orifice plate fitted (natural gas) with the one supplied with the kit (for LPG);
- replace the pilot nozzle (natural gas) with the one in the kit (LPG);
- restore power supply and set the heater up for ignition;
- 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 6.9 "Combustion Analysis";
- the level of CO₂ is within the limits indicated for the type of gas being used (Paragraph 6.7 "GAS Settings Table"). If a different value is detected, change it by turning the adjustment screw: screwing it down decreases the CO₂ 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 ...".

For models: AH034, AH065, AH160



6.11. 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 II2L3B/P [Netherlands up to 31/12/2017] and II2EK3B/P [Netherlands from 01/01/2018] the unit is supplied already set up and regulated for G25 or 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 6.7 "GAS Connection Tables"];
- check that the level of CO₂, 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 CO₂ in G25.1; for G25.1 minimum and maximum heat output in the PCH105 model 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.

6.12. 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 models PCH065: mounting a calibrated orifice plate on the air intake of the Venturi pipe [see Paragraph 6.7 "GAS Settings Table"].

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 Paragraph 6.7 "GAS Settings Table"];
- check that the level of CO₂, 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 PCH065, PCH130 and PCH132 are lower with respect to the operation with G20. Models PCH080, PCH105, PCH160, PCH162, PCH210, PCH212, PCH320, PCH420 are not suitable for operation with gas G2.350.

NOTE: The conversion kit is supplied on request

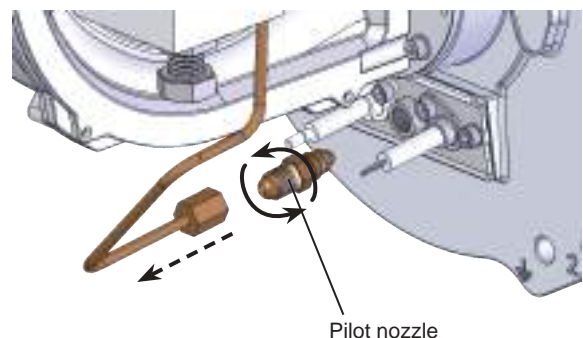
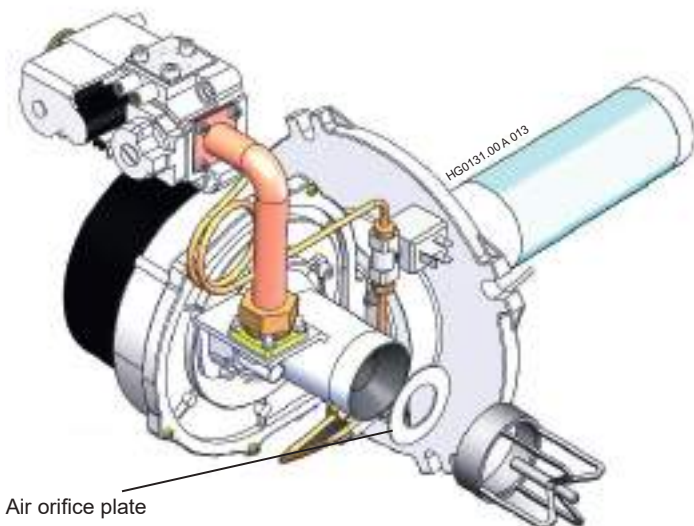
6.13. Replacing the Gas Valve

If the gas valve must be replaced, it is required to proceed with an inspection and possibly calibrate the CO₂ level through the adjustment 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 6.9 "Analysis of combustion".

It is recommended to always carry out the flue gas analysis after replacing the gas valve.



6.14. 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 6.4 "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).

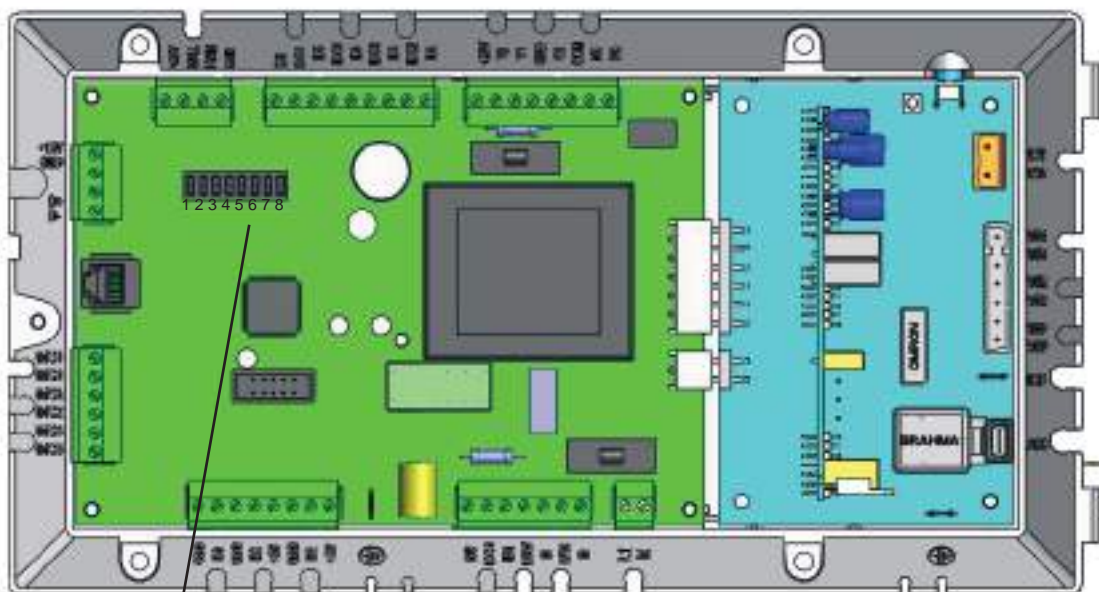
6.15. Replacing the TER equipment

In case of replacement of TER equipment, it is recommended to carry out the operation by disconnecting power supply to the machine.

Remove the connection terminals, unscrew the box fixing screws and extract the equipment.

Replace the equipment by repeating the operations in reverse order.

No hardware or programming adjustments are required.



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Switch per Smart Web

7. MAINTENANCE

To keep the heater efficient and guarantee a long lifetime of the same it is mandatory 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

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

Maintenance interval chart

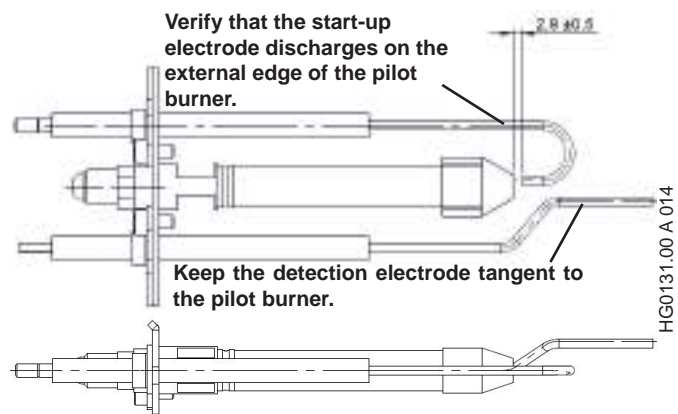
Maintenance	every year	Extraordinary
1) Electrodes and Pilot	●	
2) Flue gas/Air Terminals	●	
3) Venturi pipes	●	
4) Exchanger/Burner		●
5) Condensate collection trap	●	
6) Condensate neutralisation vessel	●	
7) Gas valve	●	
8) Flame Equipment	●	
9) Safety thermostat(s)	●	
10) Ionization current	●	
11)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

NOTE: Every time the burner or parts of it (e.g.: electrodes, pilot, peep-hole, flue fan) are removed, it is necessary to replace all the gaskets involved.

NOTE: Every time the condensate drain trap or parts of it (e.g.: electrodes) are cleaned, it is necessary to replace all the gaskets involved.

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

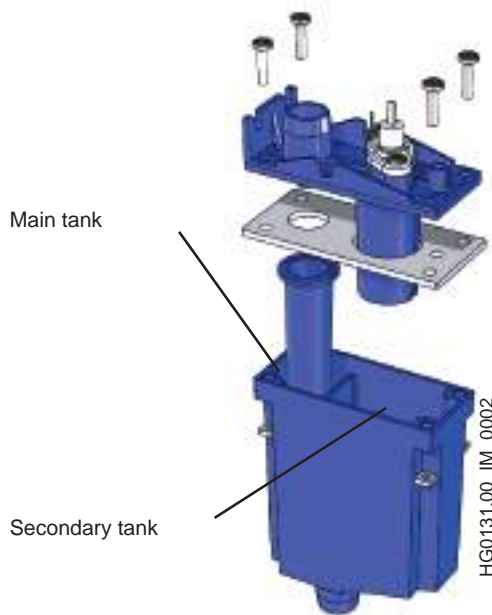
Good combustion in PCH heaters prevents dirt, which is normally caused by bad combustion. It is advisable, therefore, to not clean the exchanger and burner unless there are exceptional circumstances. An accumulation of dirt inside the exchanger could be revealed by a considerable variation in the gas 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.

NOTE: To ensure a correct sealing of gaskets, the nuts of burner flange must be tightened to a torque of 8 Nm (-0 / +1 Nm).

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. Should it become necessary to clean the condensate collection trap, all the gaskets inside it must be replaced.

6) Condensate neutralisation vessel

To check that the salts inside the vessel are still active, use litmus paper to check that the pH level of water flowing out of it is greater than 6. If the pH is lower, replace the calcium carbonate present in the vessel.

7) 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. Verification to be performed with the burner on at the maximum heat capacity.

8) Inspection of flame monitoring equipment

With the burner running, close the gas valve and verify that the machine is locked out, signalled on the LCD display of the CPU PCB on board the machine with F10. Reopen the gas valve, reset the lockout and wait for the burner to restart.

9) Inspection of the safety thermostat(s)

Operation to be performed with the AH unit operating and the burner ON.

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:

Operation to be performed with AH unit 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.

10) 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.

11) 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.

12) 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.

13) Inspection and cleaning of outdoor air intake plenum (if any)

Remove the rear access panel to the outdoor air intake plenum and remove any dirt accumulated inside the plenum itself.

14) Inspection and cleaning of outdoor air intake shutter (if any)

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

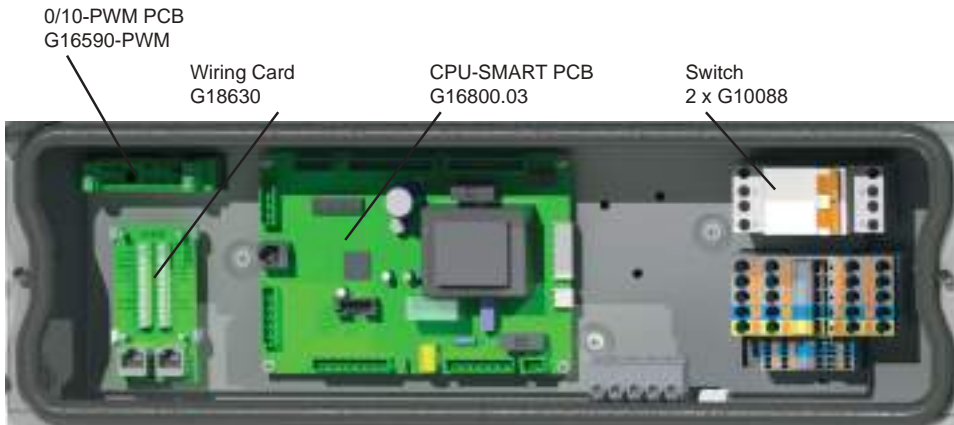
8.1. Parts for the control panel

Smart Web remote control
G27700

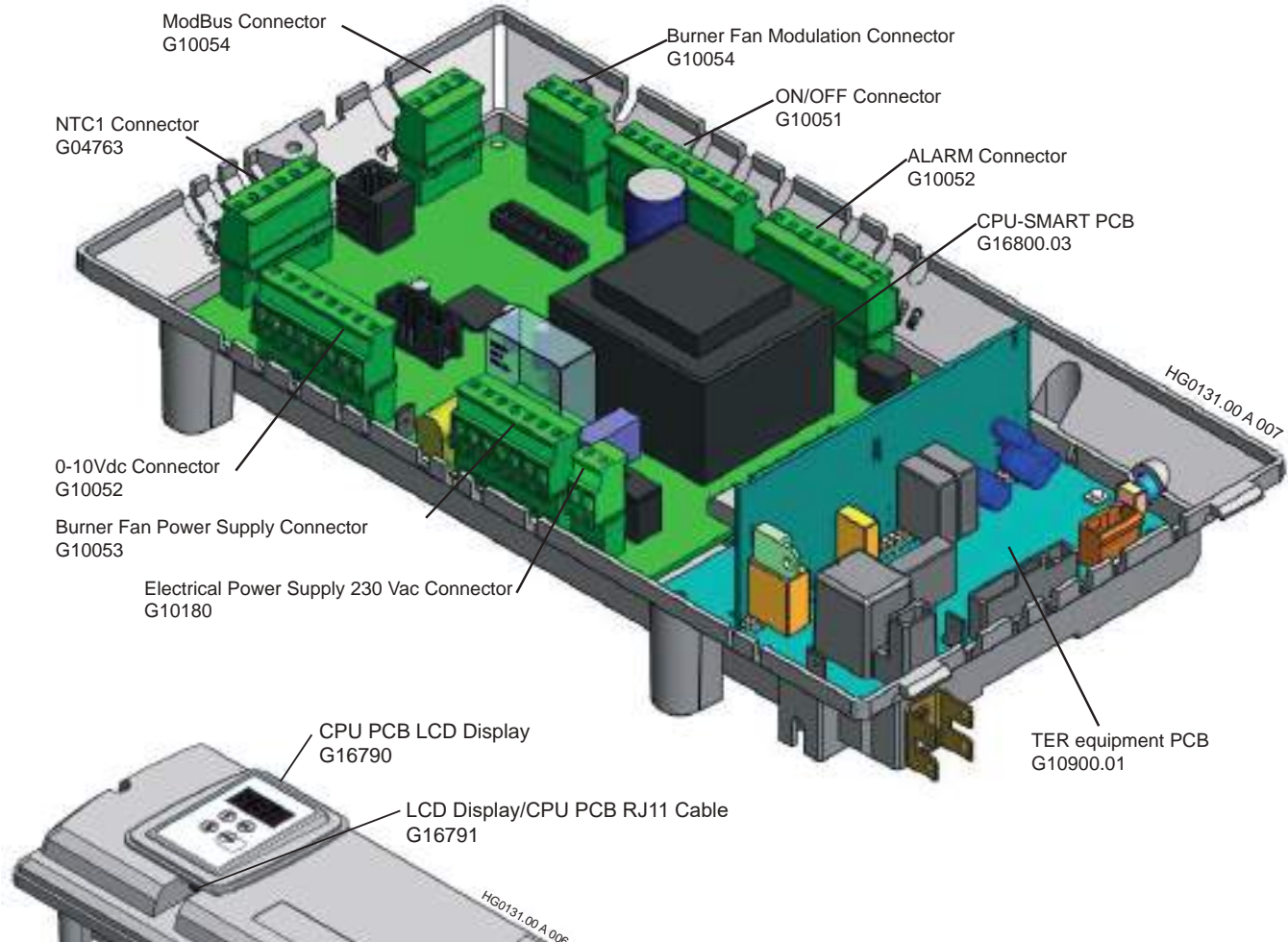


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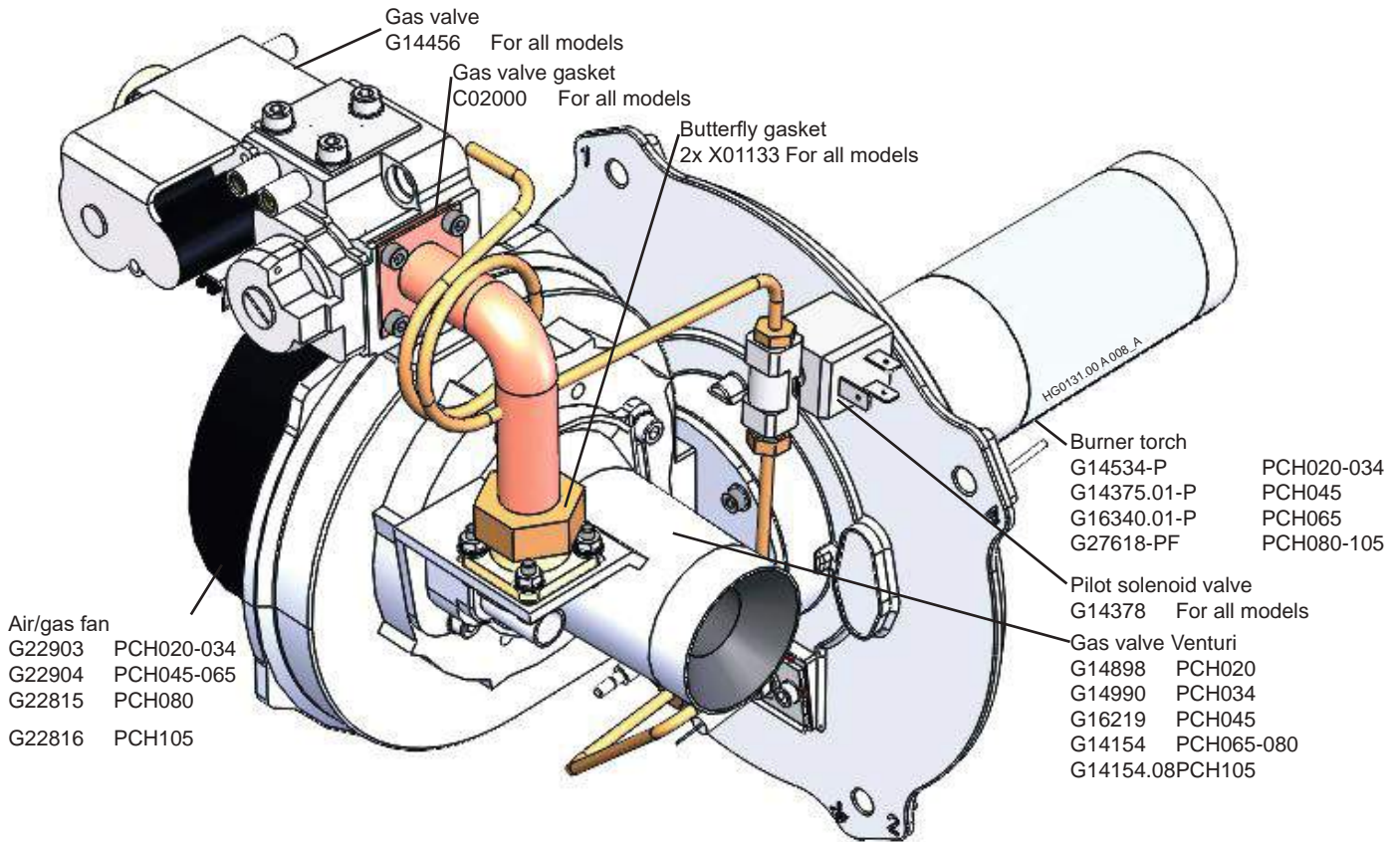
Main modulation PCB: MASTER



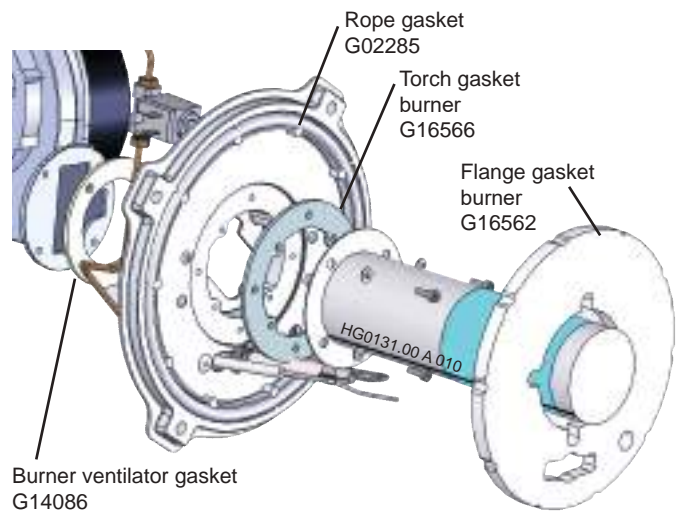
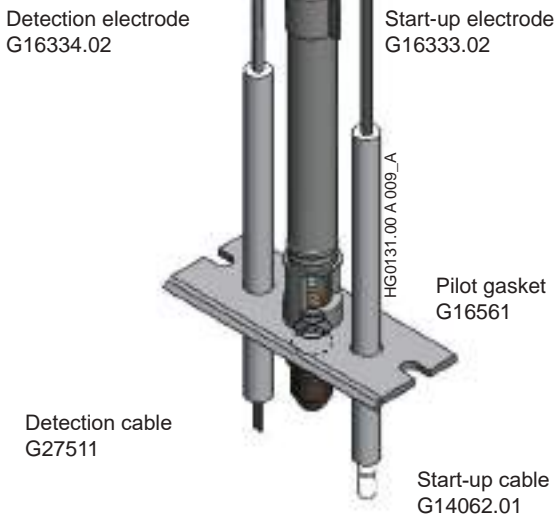
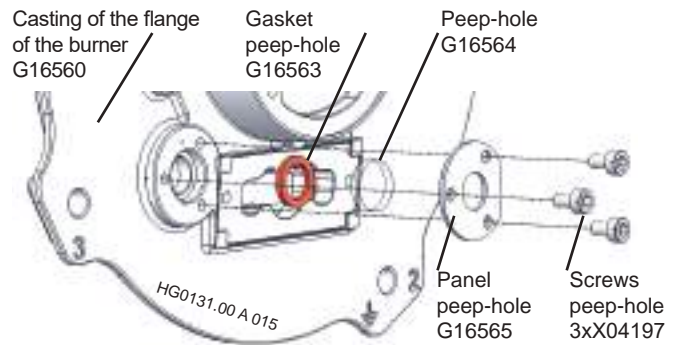
Secondary modulation PCB (PCH): SLAVE



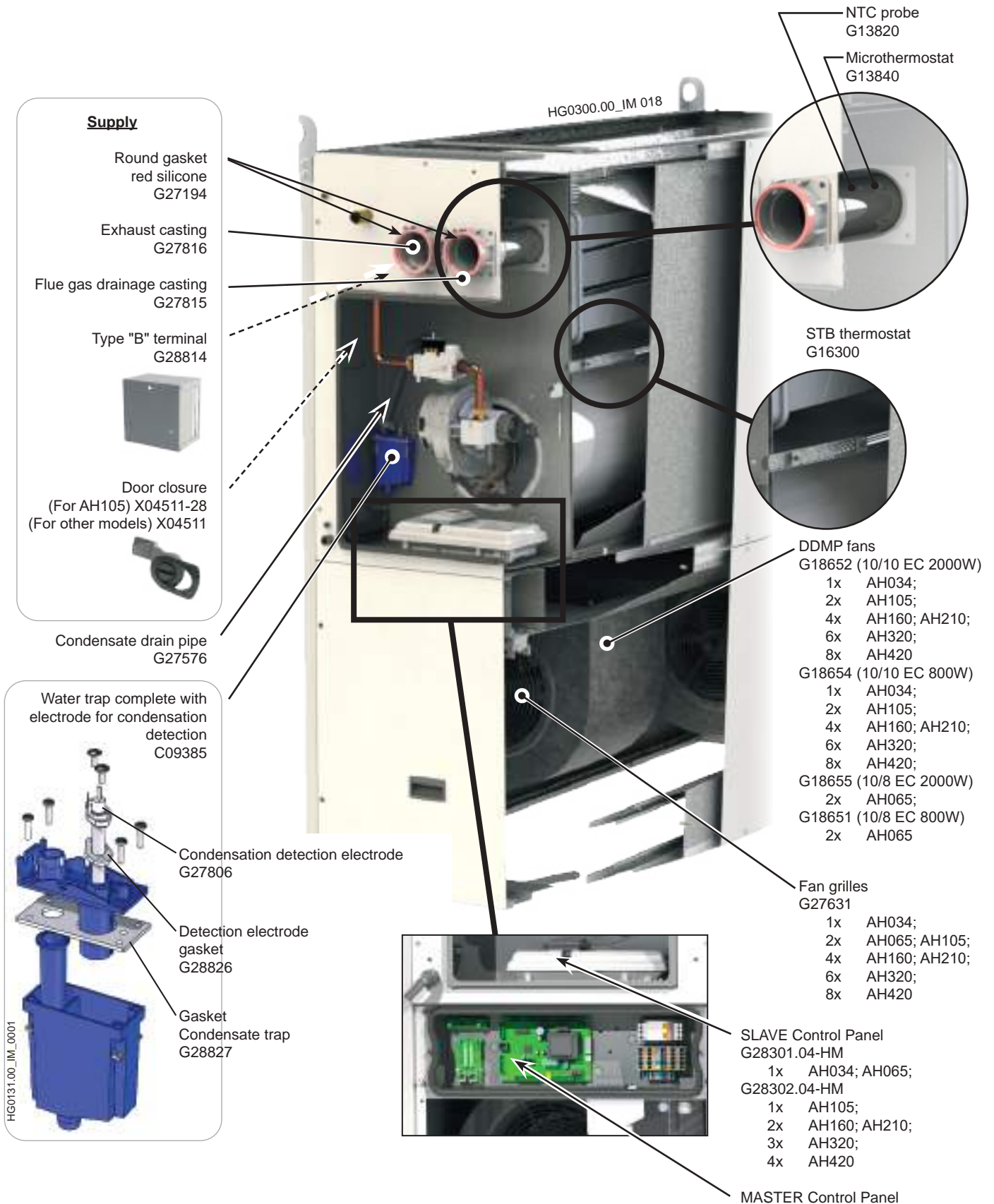
8.2. Parts for the burner unit



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



8.3. Other spare parts available





cod. HG0310.05GB ed.D-2201

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