

GB

Use, Installation and Maintenance Manual AH series condensing heating unit

Thermal Account for
Public Authorities

CPU with EEPROM
version .03

Tax deduction

Efficiency up to 108%

For Indoor and Outdoor Use

NOx Class: 5



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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: Model:	Unità di Riscaldamento Aria a Condensazione AH 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 | • EN 60068-2-2 |
| • EN60335-1 | • EN55014-1 |
| • EN60335-2-102 | • EN55014-2 |
| • EN60730-1 | • EN61000-3-2 |
| • EN 60068-2-1 | • EN61000-3-3 |

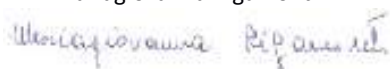
Organismo Notificato:

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

VER. 07.2022

UK Declaration of Conformity**APEN GROUP S.p.A.**

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With this document we declare that the unit:

Model:	AH Condensing Air Heating Unit
---------------	---------------------------------------

has been designed and manufactured in compliance with the prescriptions of the following Regulations:

- Regulation 2016/426 on gas appliances as brought into UK law and amended
- Electromagnetic Compatibility Regulations 2016
- Electrical Equipment (Safety) Regulations 2016
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
- ErP Regulation 2016/2281/UE

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

Notified body:

Kiwa UK
0558
PIN 0476DL4298

This declaration of conformity is issued under the sole responsibility of the manufacturer

Pessano con Bornago
11/11/2022

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

CODE

SERIAL NUMBER

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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 consultation 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 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. 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 hot 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 ignition, conversion from one family gas to another and maintenance 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 timing that comply with current and previous regulations in force in the country where the equipment is to be 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."



Always make an environmental impact assessment based on the power and sound pressure data listed in the technical data chapter and the noise emission limits according to the installation area of the unit, with reference to the Italian DPCM (Council of Ministers Presidential Decree) of 14/11/1997. An assessment must also be made if the unit is installed in the vicinity of workers, according to Italian legislative decree 81/2008 Art. 189 et seq.

2. SAFETY-RELATED WARNINGS

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



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

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

2.1. Fuel

Before starting the burner/heater, check that:

- the gas mains supply data are compatible with the data stated on the nameplate;
- the combustion air intake ducts (when fitted) and the flue gas pipes are only those specified by the manufacturer;
- the combustion air is supplied in such a way as to avoid even partial obstructions of the intake grille (caused by leaves etc.);
- the gas seal of the feeding system has been tested and approved in compliance with the applicable standards;
- the heater burner is supplied with the same type of fuel it has been designed for;
- the system 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 heaters have been thoroughly cleaned;
- the fuel flow rate is suitable for the power required by the heater;
- the fuel supply pressure is between the range specified on the nameplate.



Only gas-supplied burners can be used on heating units.



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

2.2. Gas Leaks

If you smell gas:

- do not operate electrical switches, the telephone or any other object or device that can cause sparks 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;
- switch off the power supply via a disconnecter outside the unit;
- call for **qualified staff**;
- call the **Fire Brigade**.



It is strictly prohibited to supply gas to the circuit with pressures higher than 60 mbar. Such pressures could cause the valve to break.

2.3. Power supply

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



Cautions:

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



It is compulsory to install a switch with a protection (fuses or automatic) upstream of the power cable, 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

"The appliance may be used by children of at least 8 years of age and by persons with reduced physical, sensory or mental capabilities, or lack of experience or the necessary knowledge, provided that they are supervised or have been instructed in the safe use of the appliance and understand the dangers involved. Children must not play with the device. Cleaning and maintenance intended to be carried out by the user must not be done by unsupervised children."

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 touch the hot parts of the heater, such as the flue gas duct. Such surfaces, generally located near the flame, overheat during operation and remain hot for some time after the burner has stopped.
- 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.

If the equipment is not used for a long 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 the equipment is no longer used, 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

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

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 heater.

The room where the heater-burner group is installed must be clean and deprived of volatile substances that can be drawn by the fan and obstruct burner inner hoses or combustion head. Dust itself can be a problem if it is left depositing on fan blades, thus reducing fan flow rate and making combustion polluting. Moreover dust can deposit on the back of flame stability disk in combustion head, degrading air-fuel mixing ratio.

2.6. Installation

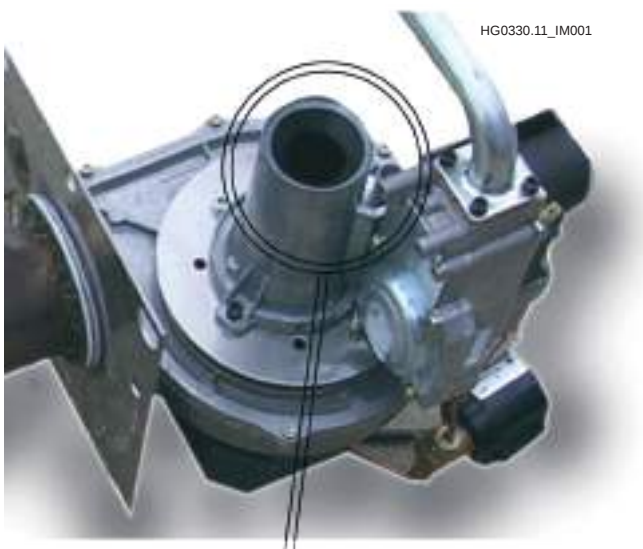
The unit must be used in the following conditions:

- 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 unit from the mains power supply using the switch located on the electrical system and/or on the shut-off devices. If the equipment is faulty and/or incorrectly operating, switch it off and do not attempt to repair it yourself, but contact our local Technical Service Centre.

Use only original spare parts for repairs. Failure to follow above instructions could compromise the unit safety and shall void the warranty.



DONOT COVER IT WITH YOUR HAND OR OTHER OBJECTS!

2.8. Transport and Handling

For vertical versions, the air heating unit is delivered fastened to a pallet. Horizontal versions have their own base. 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 heating unit. Based on their weight and dimensions, heaters can be lifted with lift trucks or wheel-mounted crane.



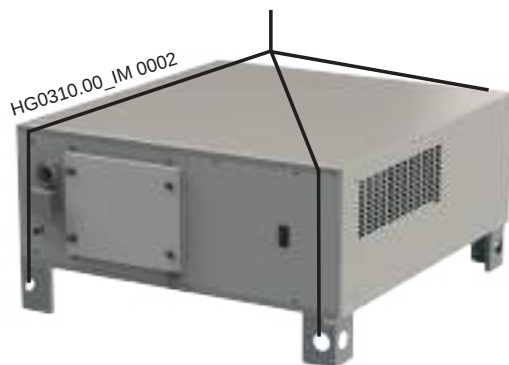
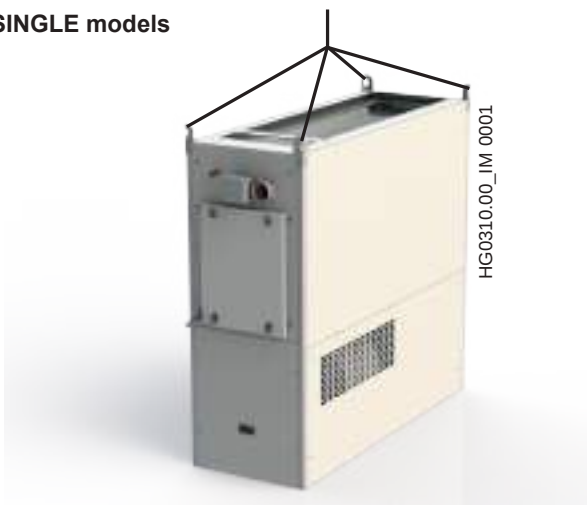
In the first case, use fork extensions as long as heater width.

MULTIPLE models

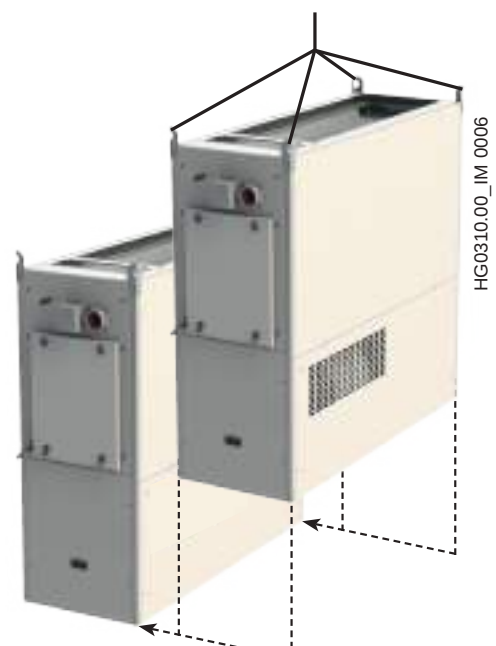
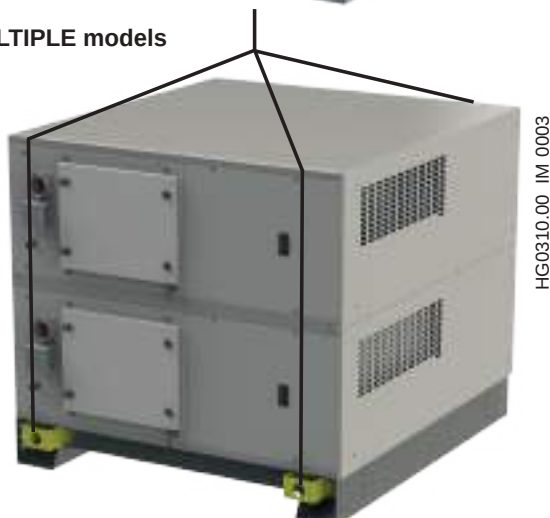


In case of special applications, it is possible to assemble MULTIPLE models directly on site (request to be specified when ordering the machine), positioning one module at a time, as shown below.

SINGLE models



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.



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-SPORT series air heating unit and relating accessories are considered "professional WEEE - waste electrical and electronic equipment". According to the legislation in force in Italy, professional WEEE must be sent to treatment plants suitable for these types of waste. Please contact the Apen Group for end-of-life products so as to obtain all the information necessary for their correct waste disposal, which is possible thanks to the Collective System (Union) to which the company is associated. Please remember that product disposal without complying with the mode described above is a violation liable to administrative and penal sanctions.

INFORMATION FOR DISPOSAL valid abroad (EU COUNTRIES except Italy).

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

3. TECHNICAL FEATURES

3.1. Main Components

AH 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 (stainless steel condensing heat exchanger with premix burner)
- Centrifugal fans with permanent magnet electronic motor and inverter
- Frame made of Magnelis® sheet (special surface treatment)
- Pre-painted, white sheet panelling
- Safety Devices and Controls
- Smart X 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 motors used, with direct drive to the fan, have the following characteristics:

Supply	230V - single-phase - 50 Hz
Manufacturing	Direct Drive
Protection rating	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.



Frame and body

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

Safety Devices and Controls

All heaters are supplied with the following thermostats:

- NTC Air probe, modules and stops the burner operation before the STB thermostat activates;
- STB Manual reset safety thermostat, inside the air flow, which switches off the burner immediately if the temperature is too high;
- NTC FLUE GAS 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.



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

3.2. Technical Data

There are 2 types of AH, both available for low or high pressures, as follows:

- A Single module;
- B Multiple modules.

A - Single module

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

NOTES:

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

- (1) With natural gas mixture with 20% hydrogen rated heat input decreased by 5%.
- (2) Max. condensation produced acquired from testing at 30%Qn.
- (3) Value referred to category H (G20).
- (4) Weighted value to EN17082:2019 ref. to cat. H (G20), referred to net calorific value (Hi, N.C.V.).
- (5) Weighted value to EN17082:2019 ref. to cat. H (G20), referred to gross calorific value (Hs, G.C.V.).
- (6) Reference air flow rate for the calculation of yields and season energy efficiencies and emissions, with constant air flow rate, listed in the table. Air flow rate calculated for a ΔT of 30 °C
- (7) 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		B23 - B23P - 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
Burner heat output (Hi) ⁽¹⁾	kW	7.60	34.85	12.40	65.00	21.00	100.00
Useful heat output [<i>P</i> _{min} , <i>P</i> _{rated}]*	kW	8.13	33.56	13.40	62.93	22.77	97.15
Hi Efficiency (N.C.V.) [<i>η</i> _{pl} , <i>η</i> _{nom}]*	%	106.97	96.30	108.06	96.82	108.40	97.15
Hs efficiency (G.C.V.) [<i>η</i> _{pl} , <i>η</i> _{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 ⁽²⁾	l/h	0.9		2.1		2.7	
		Flue gas emissions					
Carbon monoxide - CO - (0% of O ₂) ⁽³⁾	ppm	< 5		< 5		< 5	
Nitrogen oxide emissions - NOx* (0% of O ₂) (Hi) ⁽⁴⁾		51 mg/kWh - 29 ppm		45 mg/kWh - 25 ppm		40 mg/kWh - 23 ppm	
Nitrogen oxide emissions - NOx* (0% of O ₂) (Hs) ⁽⁵⁾		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) ⁽⁶⁾	m³/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	m³/h	See diagram "air flow rates - pressure drops"					
Available Head Pressure	Pa	See diagram "air flow rates - pressure drops"					
		Weight					
Net Weight	kg	172		187		280	

B - Multiple modules

The multiple-module AH 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) With natural gas mixture with 20% hydrogen rated heat input decreased by 5%.
- (2) Max. condensation produced acquired from testing at 30%Qn.
- (3) Value referred to category H (G20).
- (4) Weighted value to EN17082:2019 ref. to cat. H (G20), referred to net calorific value (Hi, N.C.V).
- (5) Weighted value to EN17082:2019 ref. to cat. H (G20), referred to gross calorific value (Hs, G.C.V).
- (6) Reference air flow rate for the calculation of yields and season energy efficiencies and emissions, with constant air flow rate, listed in the table. Air flow rate calculated for a ΔT of 30 °C
- (7) 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		B23 - B23P - 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
Burner heat output (Hi) ⁽¹⁾	kW	16.40	164.00	21.00	200.00	21.00	300.00	21.00	400.00
Useful heat output [<i>P_{min}</i> , <i>P_{rated}</i>]*	kW	17.77	160.06	22.77	194.30	22.77	291.45	22.77	388.60
Hi Efficiency (N.C.V.) [<i>η_{pl}</i> , <i>η_{nom}</i>]*	%	108.35	97.60	108.40	97.15	108.40	97.15	108.40	97.15
Hs efficiency (G.C.V.) [<i>η_{pl}</i> , <i>η_{nom}</i>]*	%	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 ⁽²⁾	l/h	6.6		5.4		8.1		10.8	
		Flue gas emissions							
Carbon monoxide - CO - (0% of O ₂) ⁽³⁾	ppm	< 5		< 5		< 5		< 5	
Nitrogen oxide emissions - NOx* (0% of O ₂) (Hi) ⁽⁴⁾		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) ⁽⁵⁾		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) ⁽⁶⁾	m³/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	m³/h	See diagram "air flow rates - pressure drops"							
Available Head Pressure	Pa	See diagram "air flow rates - pressure drops"							
		Weight							
Net Weight	kg	495		514		746		977	

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 $93+2\log P_n$.

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. $93+2\log P_n$.

NOTES:

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

Model		AH160 - R		AH210 - R		AH320 - R		AH420 - R	
Type of equipment		B23 - B23P - 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_{pl} , η_{nom}]*	%	108.35	97.80	108.40	98.20	108.40	98.20	108.40	98.20
Hs efficiency (G.C.V.) [η_{pl} , 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

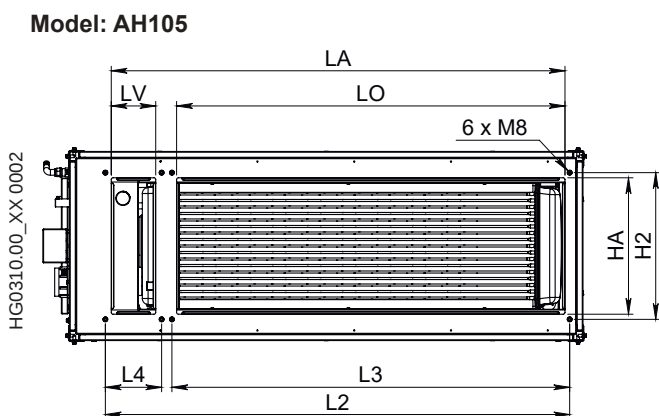
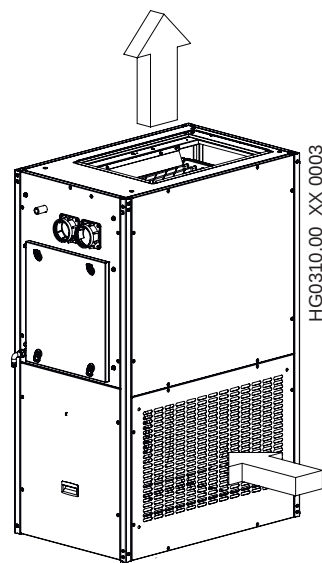
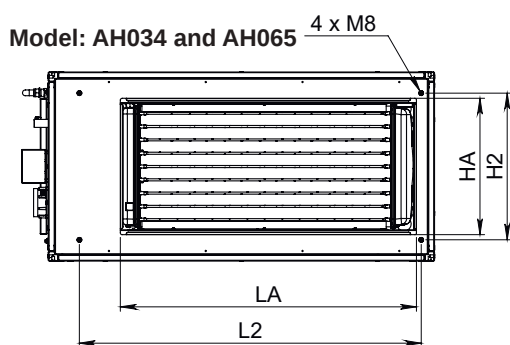
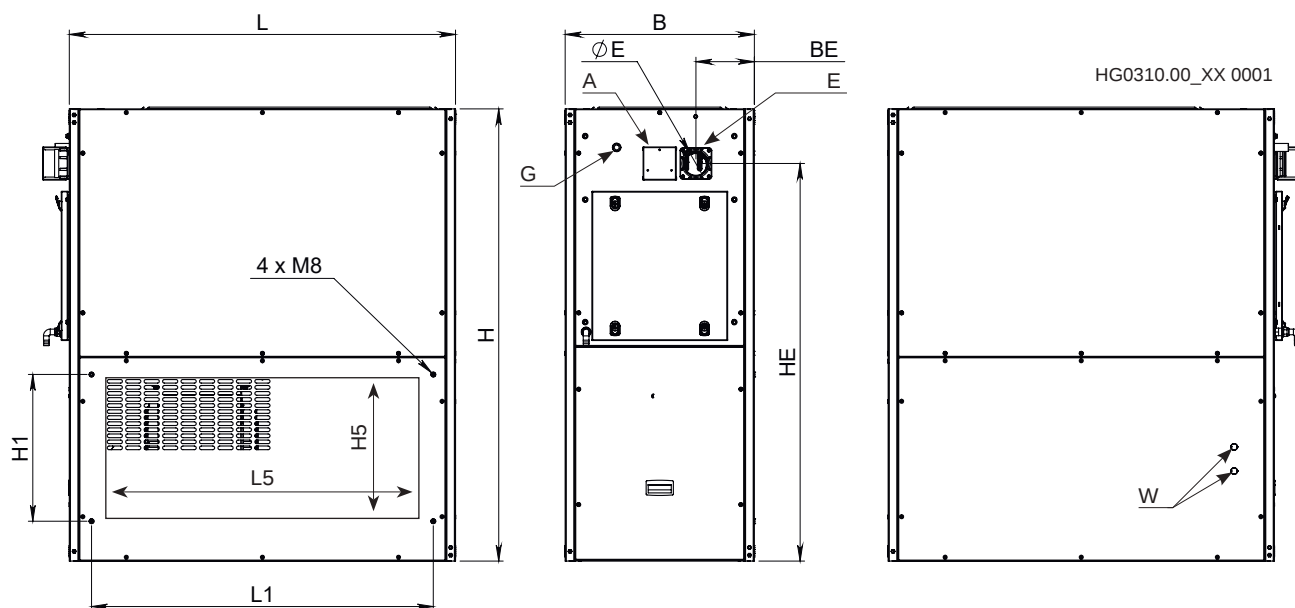
Model	AH034	AH065	AH105	AH160	AH210	AH320	AH420
PCH module heater efficiency							
Seasonal space heating energy efficiency [Reg. EU/2281/2016] $[\eta_{s,h}]^*$	%	90.4	91.6	91.7	93.2	93.1	93.6
Emission efficiency [Reg.EU/2281/2016] $[\eta_{s,flow}]^*$	%	95.4	95.8	95.5	97.1	97.0	97.5
Air flow rate		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



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)

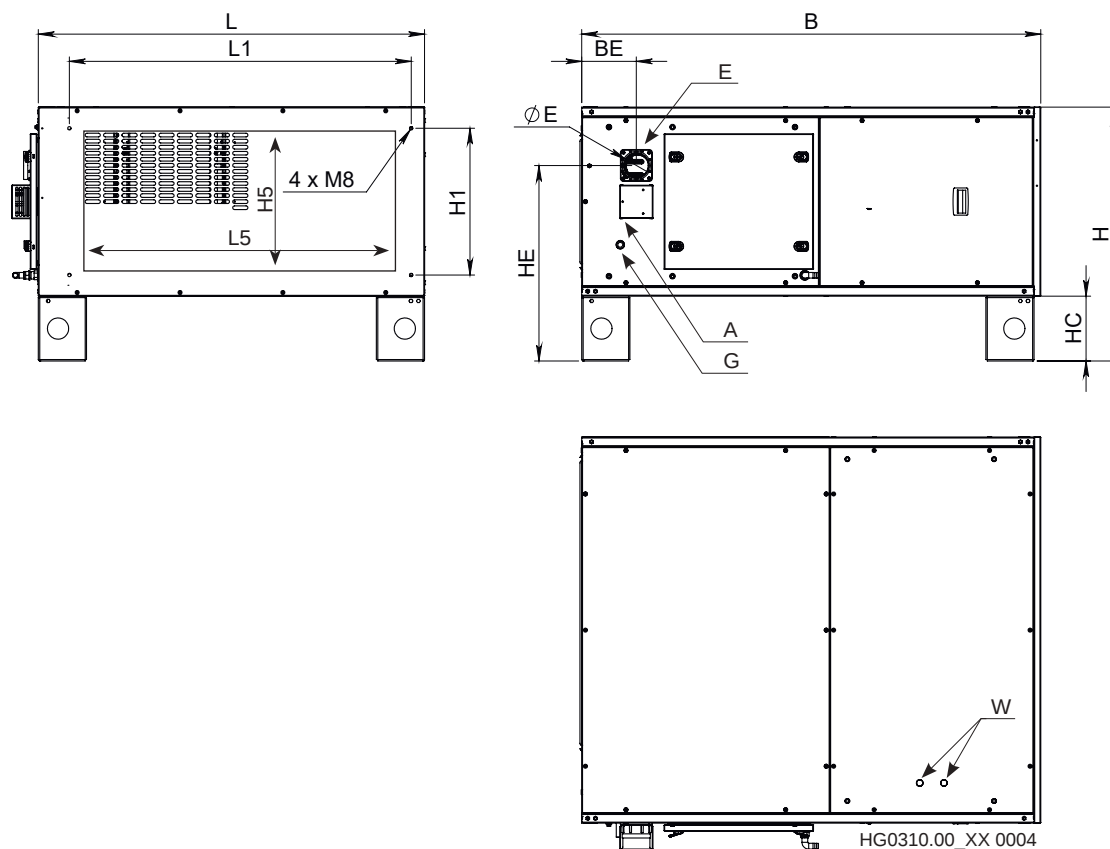


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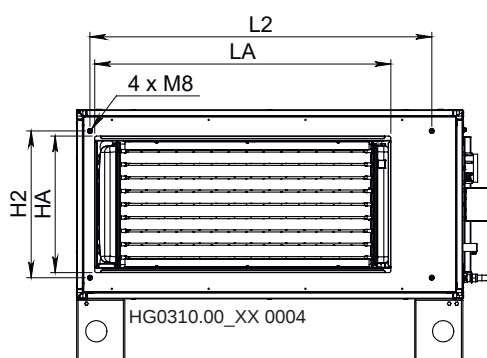
A Intake
E Flue Outlet
G Gas connection
W Electrical connection

Model	Overall dimensions [mm]			Dimensions [mm]												Flue outlet [mm]			Gas
	B	L	H	Intake				Delivery								BE	HE	ØE	
AH034	625	977	1495	L1	H1	L5	H5	L2	H2	LA	HA	L3	L4	LO	LV	193	1315	1 x 80	1 x G 3/4"
AH065	625	1277	1495	1130	485	1026	452	1130	485	973	433	/	/	/	/	193	1315	1 x 80	1 x G 3/4"
AH105	625	1698	1580	1535	485	1392	452	1535	485	1500	451	1315	186	1284	147	193	1400	1 x 80	1 x G 3/4"

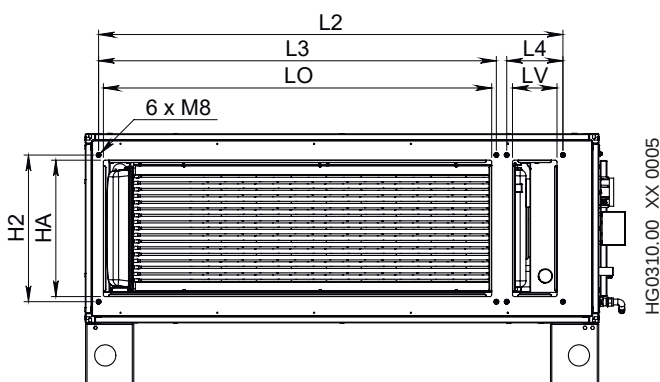
Models: AH034, AH065 and AH105 - HORIZONTAL (- xxH0)



Model: AH034 and AH065



Model: AH105

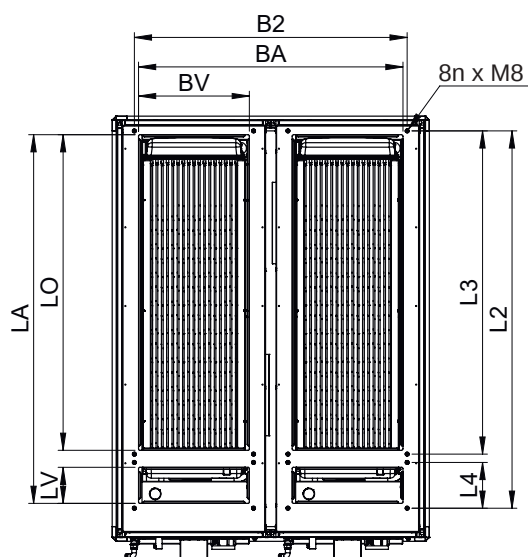
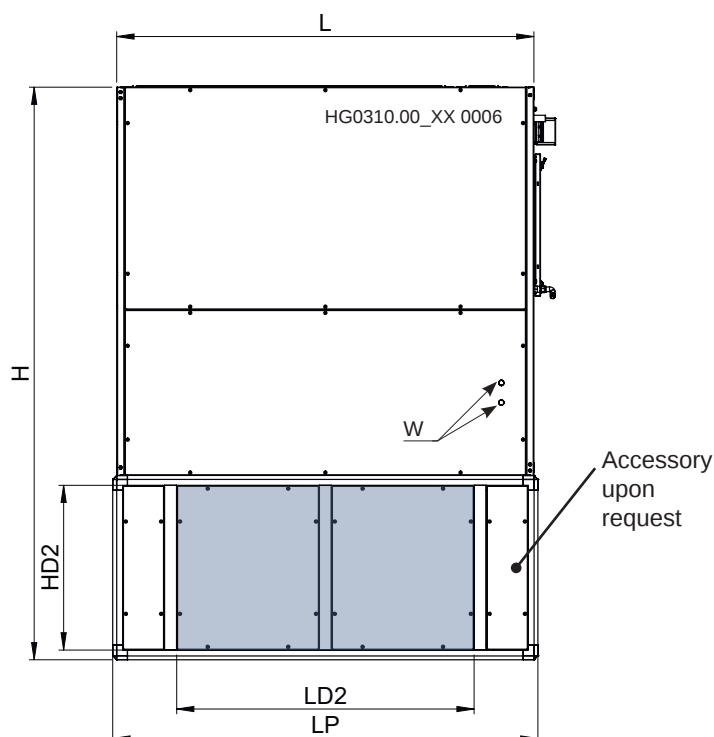
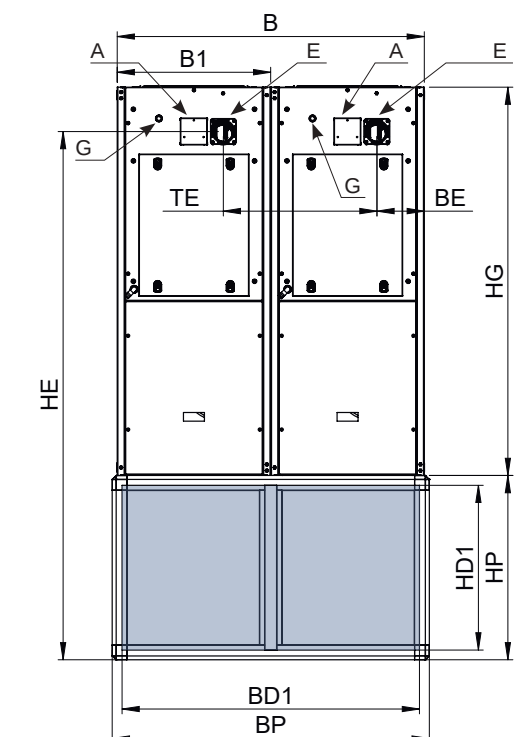


KEY:

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

Model	Overall dimensions [mm]				Dimensions [mm]												Flue outlet [mm]			Gas
					Intake				Delivery											
	B	L	H	HC	L1	H1	L5	H5	L2	H2	LA	HA	L3	L4	LO	LV	BE	HE	ØE	
AH034	1520	977	840	215	830	485	782	452	830	485	679	451	/	/	/	/	180	646	1 x 80	1 x G 3/4"
AH065	1520	1277	840	215	1130	485	1026	452	1130	485	973	433	/	/	/	/	180	646	1 x 80	1 x G 3/4"
AH105	1605	1698	840	215	1535	485	1480	452	1535	485	1500	451	1315	186	1284	147	180	646	1 x 80	1 x G 3/4"

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



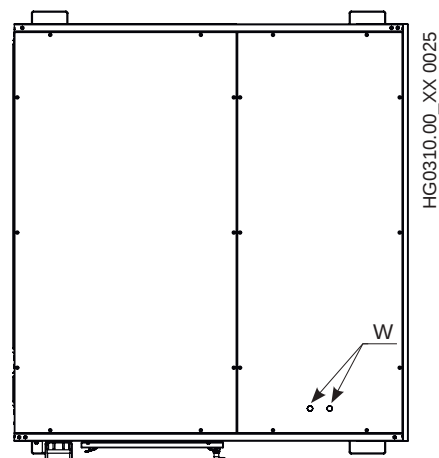
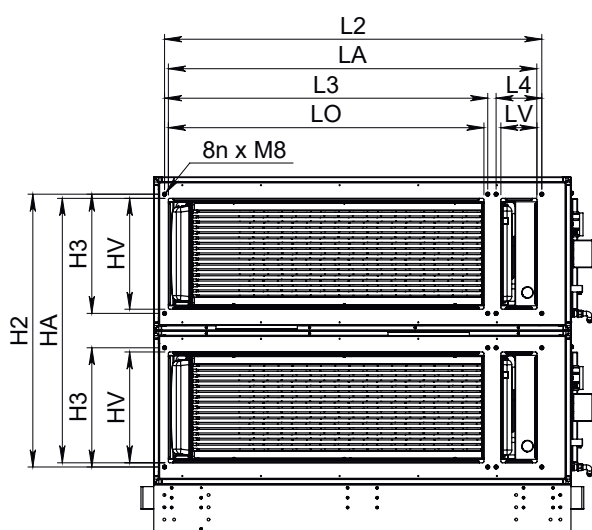
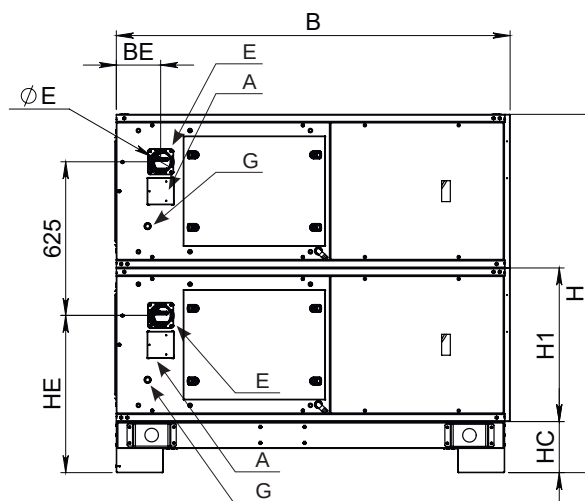
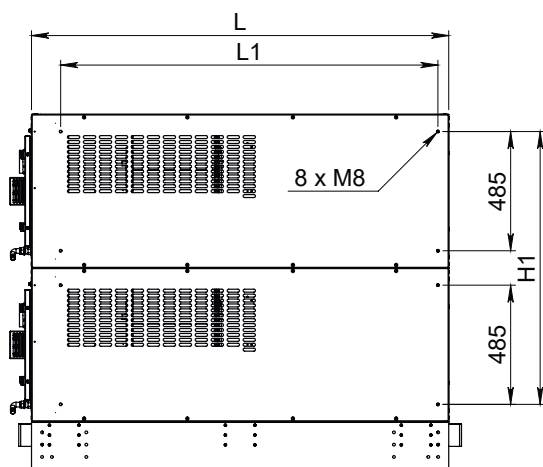
KEY:

A Intake
E Flue Outlet
G Gas connection
W Electrical connection

Model	Modules	Overall dimensions [mm]				
	n	B	L	H	B1	HG
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	ØE	
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



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

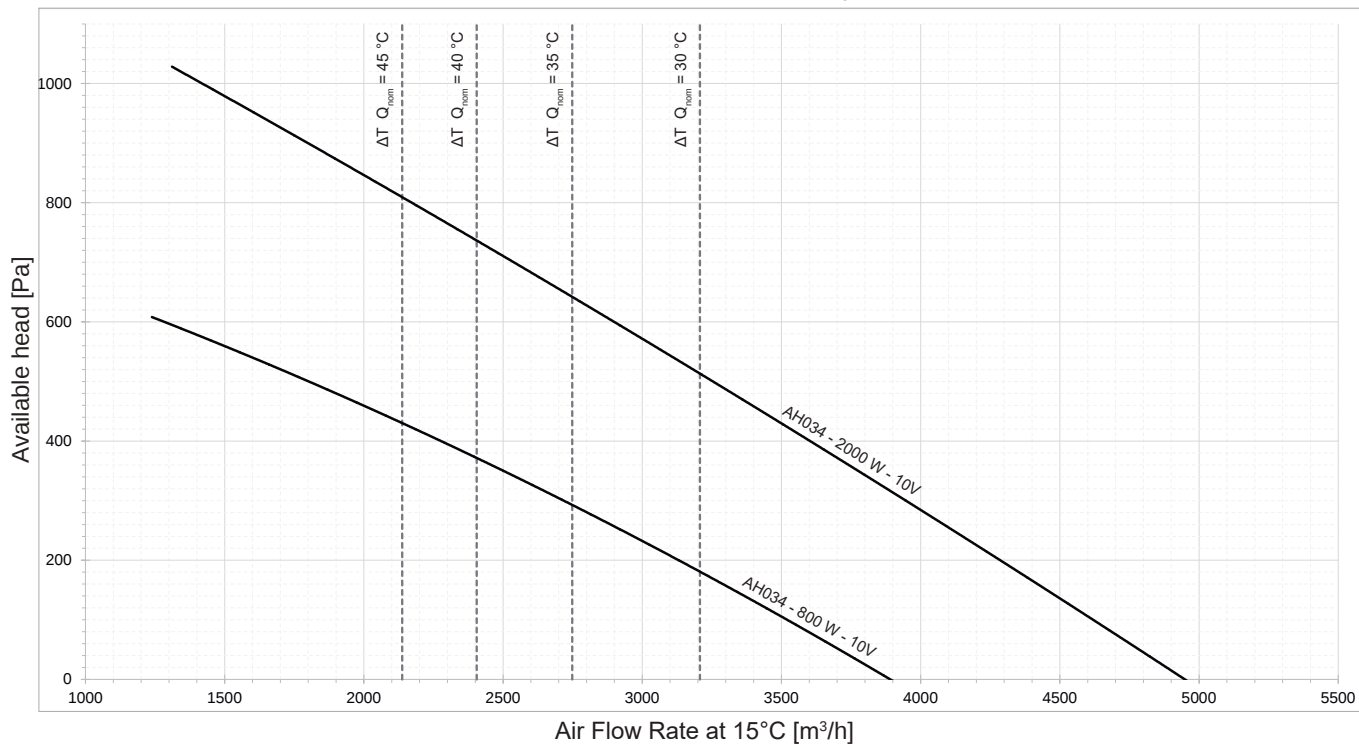
Model	Modules	Flue outlet [mm]			Gas
	n	BE	HE	ØE	
AH160	2	180	642	n x 80	n x G 3/4"
AH210	2	180	642	n x 80	n x G 3/4"
AH320	3	180	642	n x 80	n x G 3/4"
AH420	4	180	642	n x 80	n x G 3/4"

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

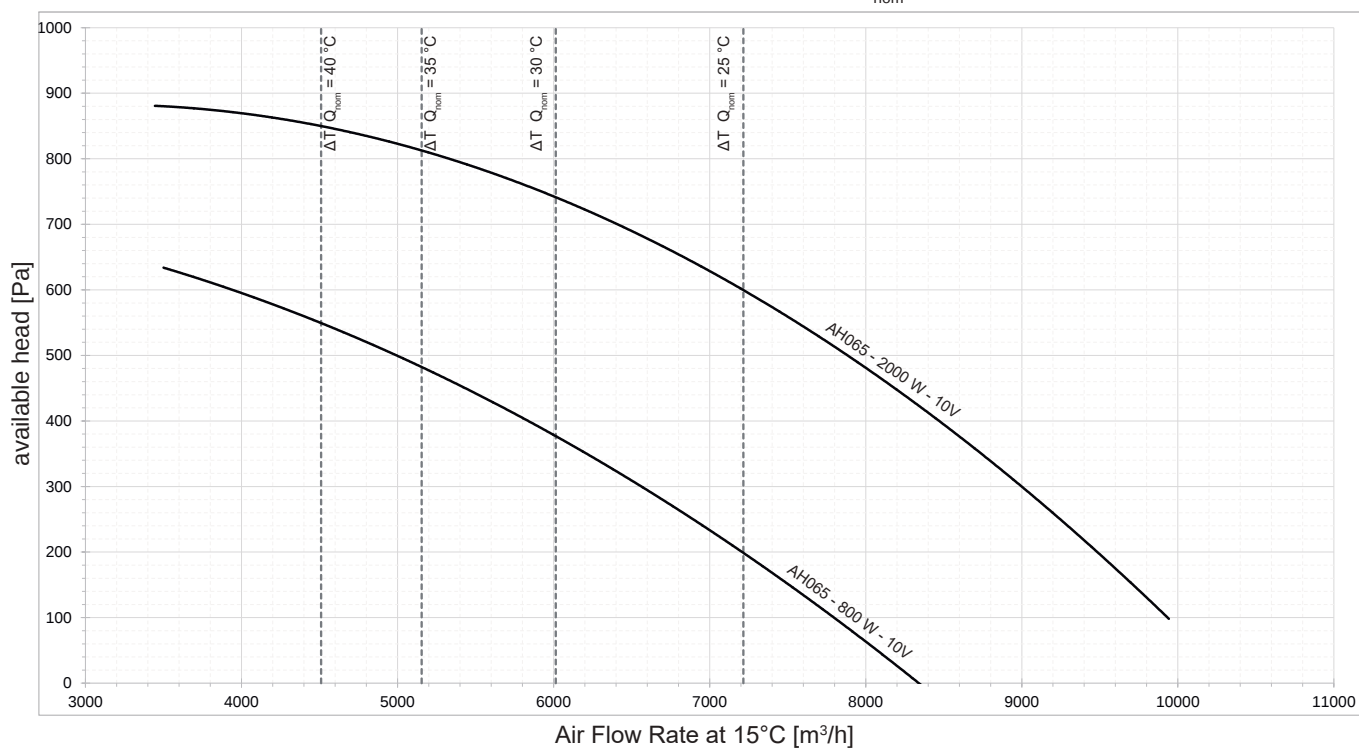
AH034 diagram

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



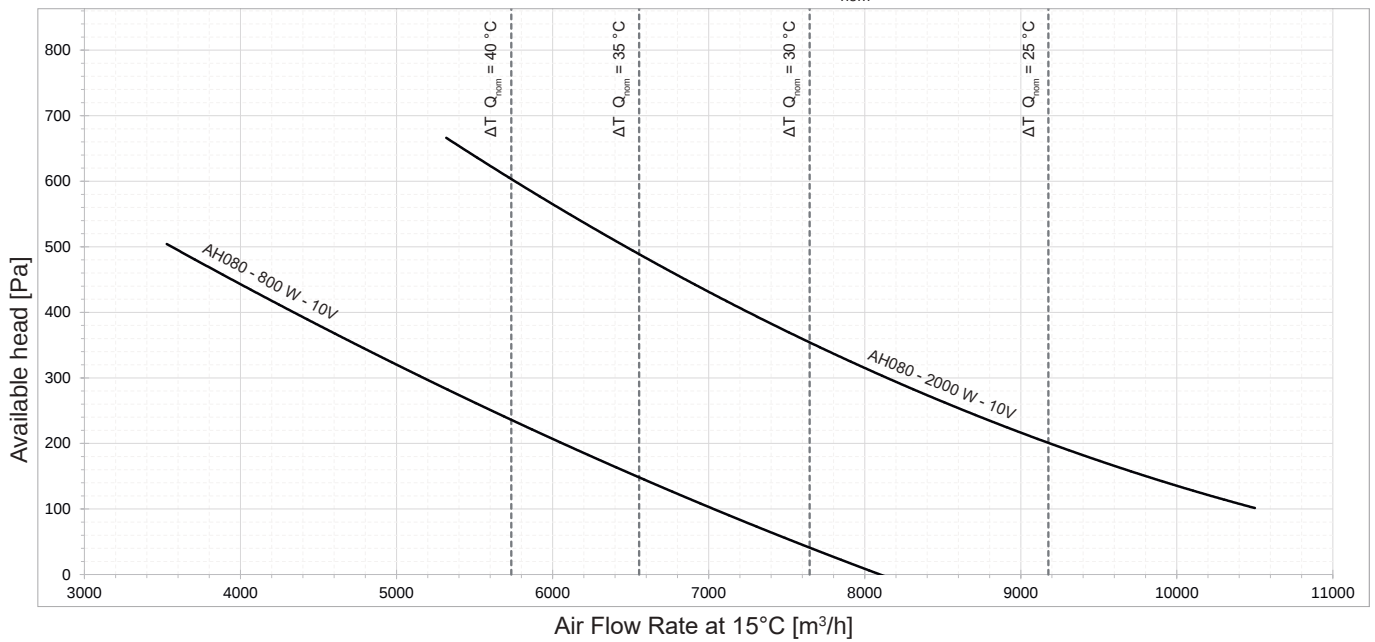
AH065 diagram

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



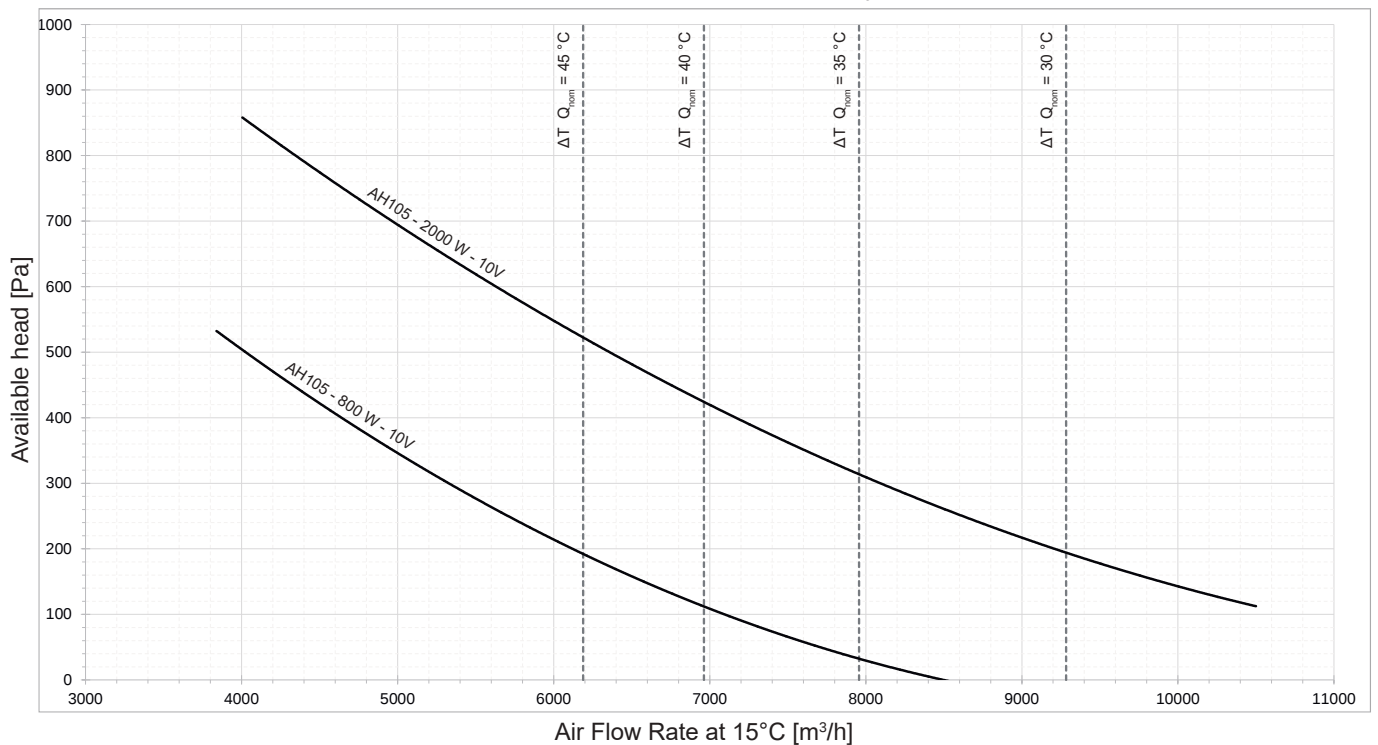
AH080 diagram (for AH160)

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 (Pa), 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 300 Pa; approx. 8100 m³/h
 AH210 (2000 W) → with 300 Pa; approx. 16200 m³/h

3.5. Noise

HEATERS INSTALLED INDOOR

The following table shows sound pressure values, $L_p(A)$, 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	Lp(A)
	63	125	250	500	1000	2000	4000	8000	metres	dB(A)
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

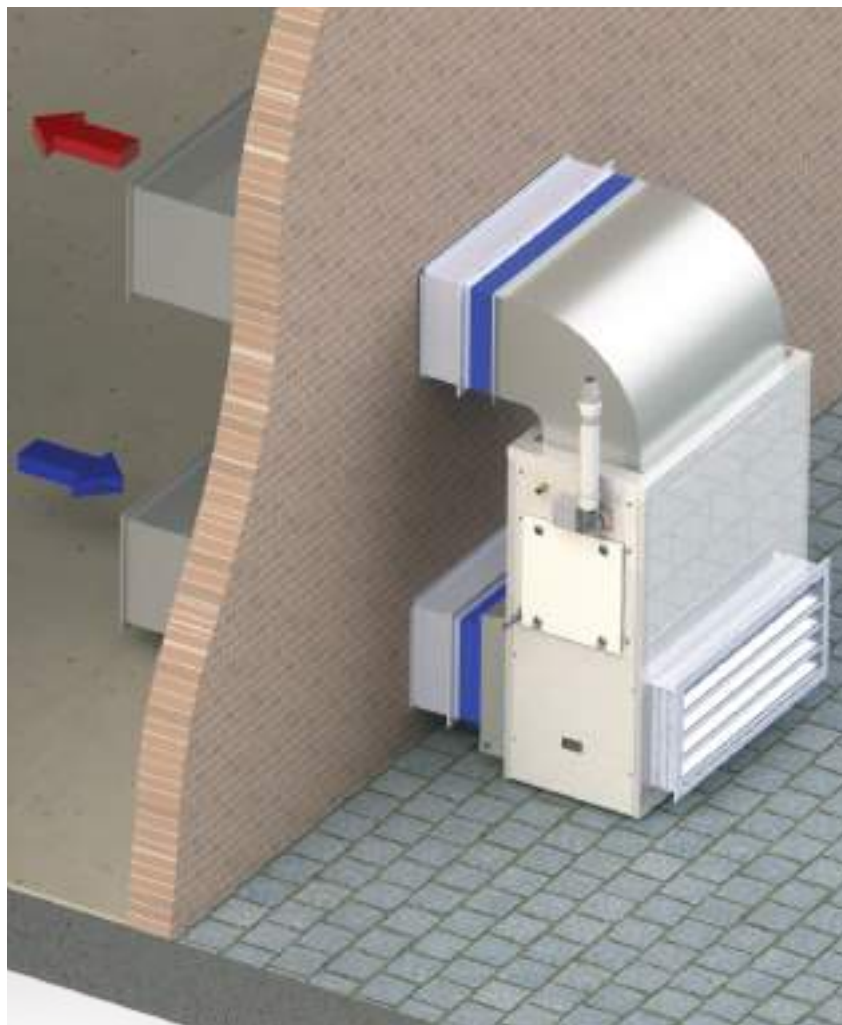
DUCTED HEATERS

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 and of the values set in parameters YL2 and YH2:

YL2 = Y2 output minimum voltage (Default value 6)

YH2 = Y2 output maximum voltage (Default value 10)

If the operation required is not of modulating type, but with constant air flow rate, parameters YL2 and YH2 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 YF2:

YF2 = 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.

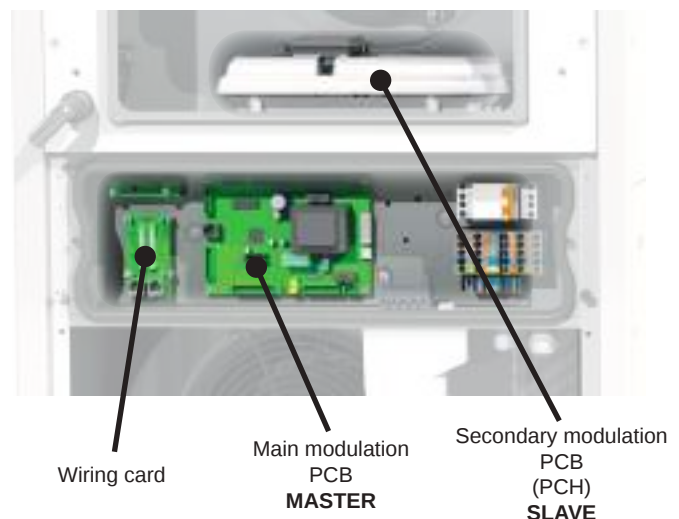
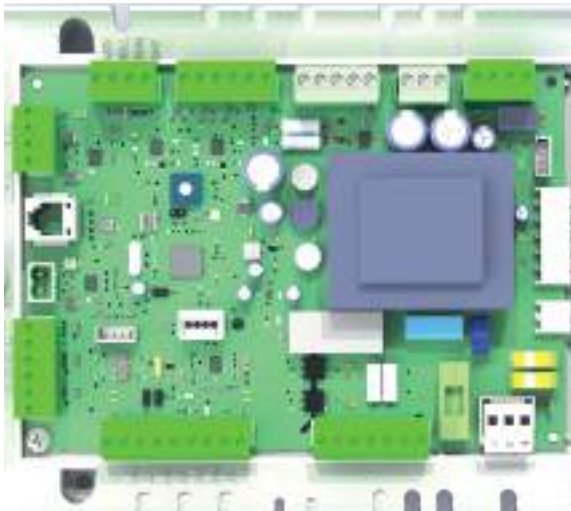
MASTER, SLAVE and WIRING cards

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



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

CPU modulation PCB



For AH units with single module (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 AH420) 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 X remote control

The Smart X remote control must be configured by the installer with the type of system and with all the parameters necessary for the air heating unit to work to its best. If necessary, the end user only has to reconfigure some Setpoints and/or time ranges according to his/her needs.



For these functions, or for further information, refer to the manual enclosed with the chronothermostat.

Some screens of functions and additional controls are shown below.

The Smart X will be set as "Hot Air Heaters" system, functions/ additional controls can be implemented inside the system type:

4.2.1. Remote On/Off (optional)

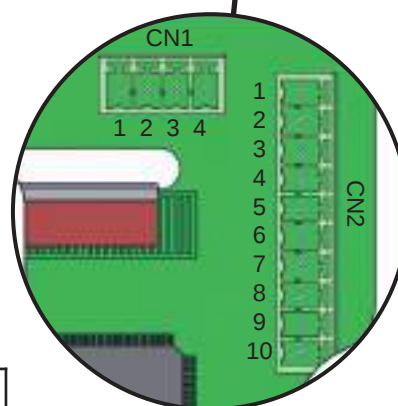
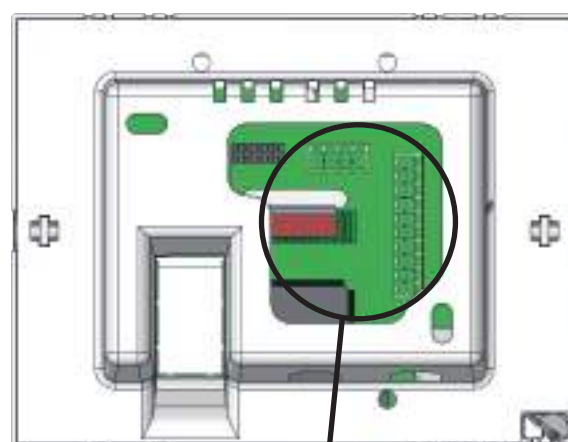
Any priority ON/OFF contact can be remotely controlled from the Smart X Web remote control, by connecting to terminals 1 (ID1) and 2 (GND) of the terminal board CN2 of the chronothermostat and removing the existing jumper, as shown in the following wiring diagram.

The remote ON/OFF contact has priority with respect to the time range heat request or the manual mode.



Smart X Easy

Smart X Web



CN1

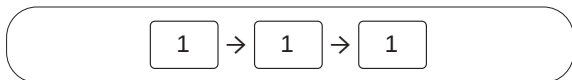
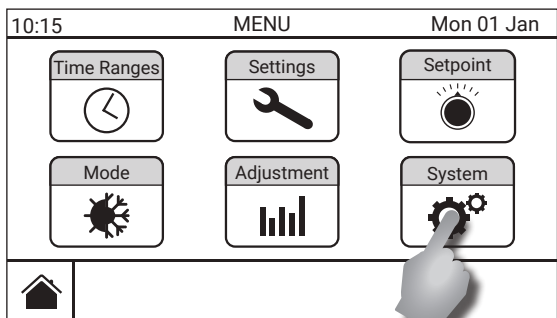
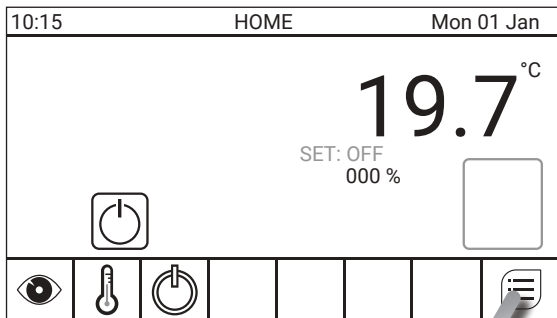
1	2	3	4
+VIN	GND	A+	B-

CN2

1	2	3	4	5	6	7	8	9	10
ID1	GND	ID2	GND	NTC1	AGND	NTC2	AGND	AN3/ NTC3	AGND

REMOTE ON/OFF

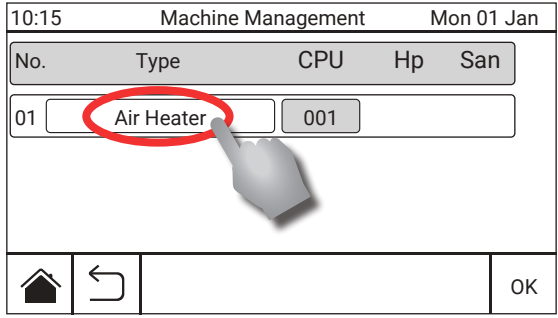
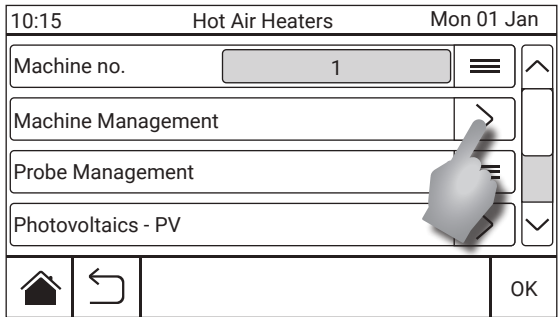
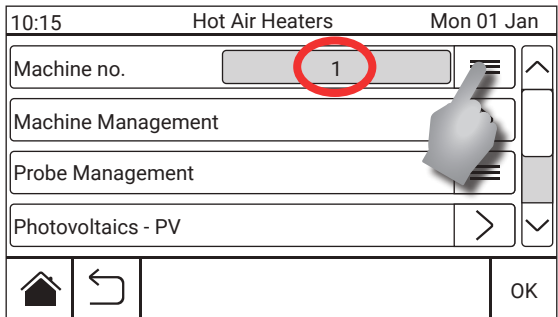
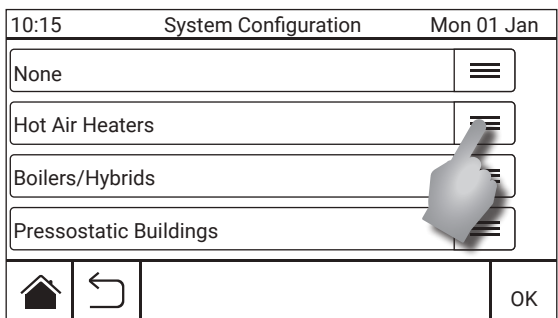
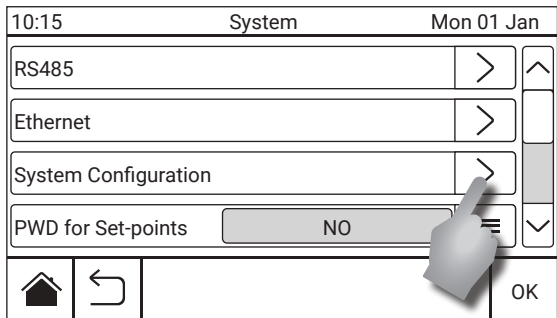
4.2.2. System Configuration



Press OK



IMPORTANT: Before quitting, confirm each selection and each screen with the “OK” button at the bottom right of the screen.



4.2.3. Continuous VENTILATION

The activation of VENTILATION control enables the operating logic as shown below:

10:15 Heater Management Mon 01 Jan

Slave No. 1

Probe Management

Ventilation NO

Pool NO

Home Back OK

Enter the Continuous Ventilation menu to display the screen that allows activating or deactivating the function

10:15 Continuous Ventilation Mon 01 Jan

NO

YES

Home Back OK

 **The CONTINUOUS VENTILATION control must be considered only if the Smart operating mode is set to HEATING, it is not valid for CONDITIONING or VENTILATION modes**

When the control is activated, the Smart sends the HEAT or AIR parameters to the CPU, according to the following logic:

Continuous Ventilation	Time Range Condition	Parameter sent
DISABLED	ACTIVATED	HEAT
	ACTIVATED + setpoint met	OFF
	Out of Range	OFF
ENABLED	ACTIVATED	HEAT
	ACTIVATED + setpoint met	AIR
	Out of Range	OFF

 **The CONTINUOUS VENTILATION control is activated only during the active time range for Heating mode. When the temperature setpoint is reached, the SMART does not send OFF, but AIR signal**

4.2.4. SILENT function

By activating the **SILENT** function, it is possible to manage fan operation by forcing a fixed preset speed using the key available in HOME (Virtual mode on SMART) or the physical switch connected to ID2 digital input (Remote ID2 mode, CN2 terminal board on the SMART).

By accessing the SILENT menu, it is possible to select the operating mode as follows:

10:15 Heater Management Mon 01 Jan

Probe Management

Ventilation NO

Pool NO

Silent NO

Home Back OK

By entering the SILENT menu, from the HEATER Management menu, the screen that allows activating or deactivating the control and to select whether to control SMART "virtually" (with a virtual key on the home screen) or physically (with remote contact connected to the ID2 input of the SMART) is displayed

10:15 Silent Mon 01 Jan

NO

YES - SMART

YES - ID2

Home Back OK

The SMART sends the "SILENT VENTILATION" command to the CPU PCBs connected, which will force the YFx output and thus the fan speeds to a preset value.

 **This command is sent only if the SMART is in HEATING mode. In the other modes (Conditioning and Ventilation), closing the ID2 contact or pressing the "FEATHER" symbol on SMART will have no effect.**

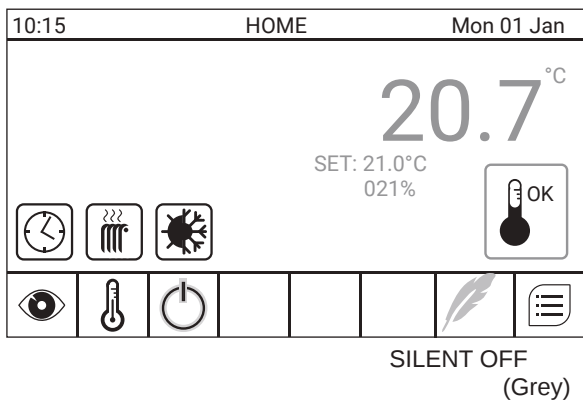
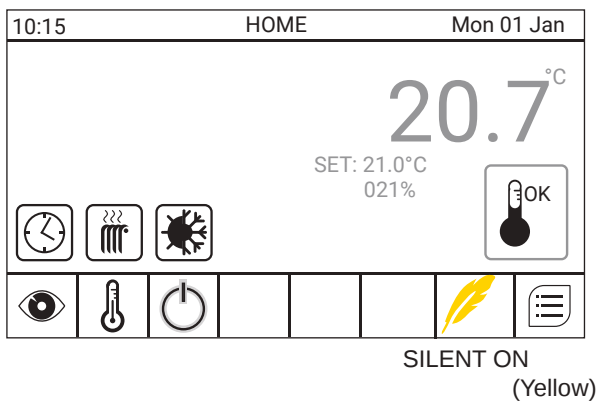
 **By activating the Silent Function as "remote ID2" mode, the ID2 input is automatically set as "SILENT". By deactivating the function, the input is automatically reset to "NONE"**

The two management alternatives, "Virtual on SMART" of "Physical" with ID2 digital input, are shown below

Virtual Mode

If the “VIRTUAL on SMART” mode is selected (YES-SMART), the “FEATHER” key is shown in HOME, allowing you to activate or deactivate the function

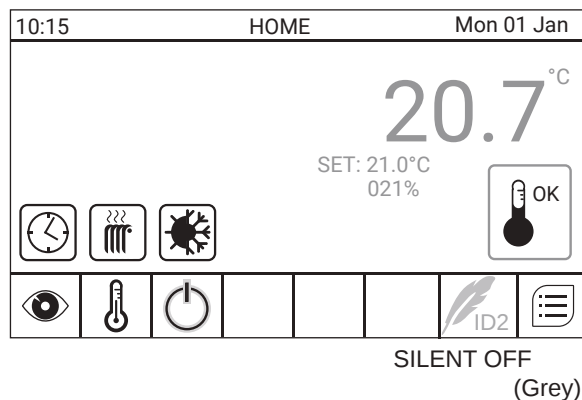
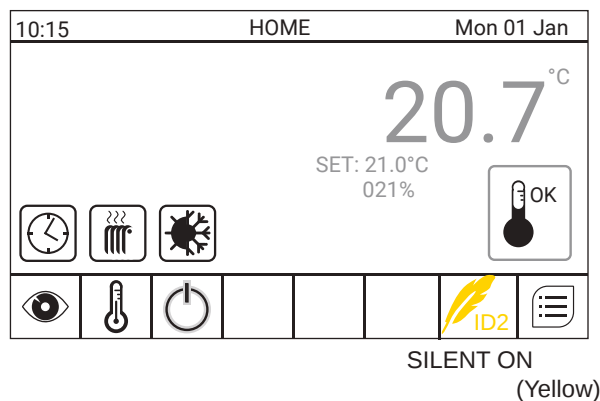
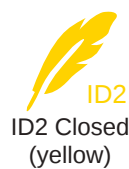
The “FEATHER” key changes its colour depending on the ON-OFF condition



Remote ID2 Mode

If the “REMOTE ID2” mode is selected (YES-ID2), the “ID2 FEATHER” key (not touch key) is shown in HOME, allowing you to activate or deactivate the function

The “ID2 FEATHER” key changes its colour depending on the ON-OFF condition



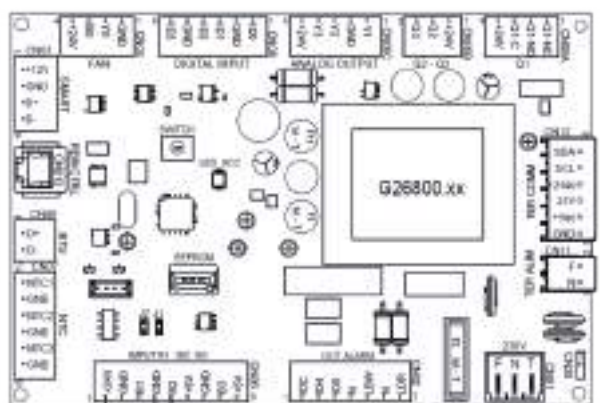
4.2.5. FILTER control (optional)

Air heating units, if purchased with an optional intake filter kit, are equipped with a pressure sensor to constantly control the status of installed filters.

It is used to check the air filter cleanliness, signalling any malfunctions.

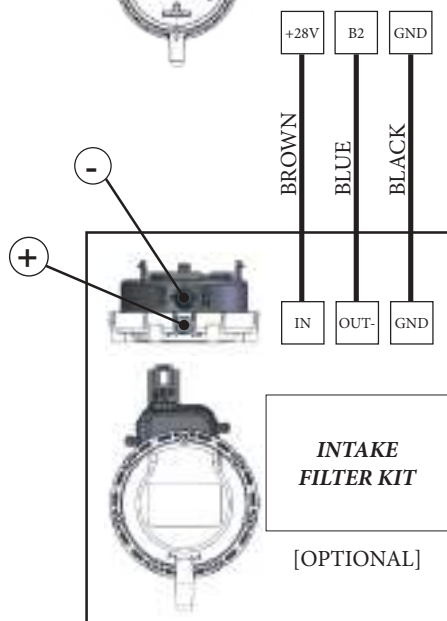
There are two types of alarms: the first is E71 with a preventive function, that signals that the filter is dirty but does not stop ventilation.

The second is E72, that signals that the filter is very dirty/clogged and stops the machine. It requires manual alarm reset.



HG0335 C2 0015

FILTER PROBE
OPTIONAL



4.2.6. POOL Control

By activating the POOL control, the Smart sends the POOL command to the CPU, with the logic described below.

10:15 Heater Management Mon 01 Jan	
Slave No.	1
Probe Management	>
Ventilation	YES
Pool	NO
OK	

By entering the POOL CONTROL menu from Heater Management menu, the screen that allows activating or deactivating the control and selecting the control temperature (default POOL ST3 setpoint=22) is displayed

10:15 POOL Control Mon 01 Jan	
NO	
YES	
SET_POOL_ST3	22
OK	

10:15 SET_ST3 Mon 01 Jan	
22	
OK	

To activate the POOL control, it is necessary that the following condition is met:

Continuous ventilation control **ACTIVE VENTILATION**

If the above condition is not met, the POOL function cannot be selected as follows:

10:15 Heater Management Mon 01 Jan	
Slave No.	1
Probe Management	>
Ventilation	NO
Pool	NO
OK	

4.3. WEB configuration

It is possible to configure the Smart X 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 X Web remotely the control must be connected to the network 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 Code HG0065.

SMART WEB

Set-Point Temperatura

28.0 °C

Funzionamento

Fasce Orarie

Ventilazione

Comfort

Ibrido

Generatore spento

ON/OFF

Destratificatori 73%

Free Cooling

Ventilazione

Pool

Qualità Aria 5

Silenzioso

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 for condensate drain. 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 heating unit to air ductwork.

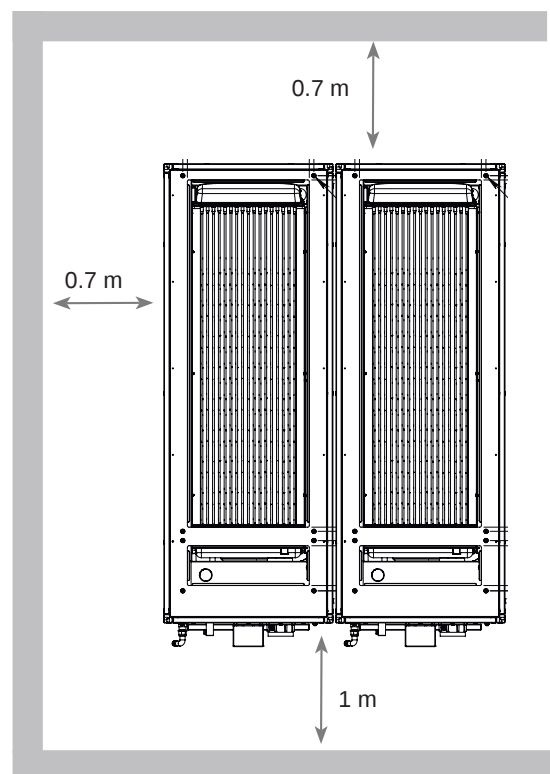
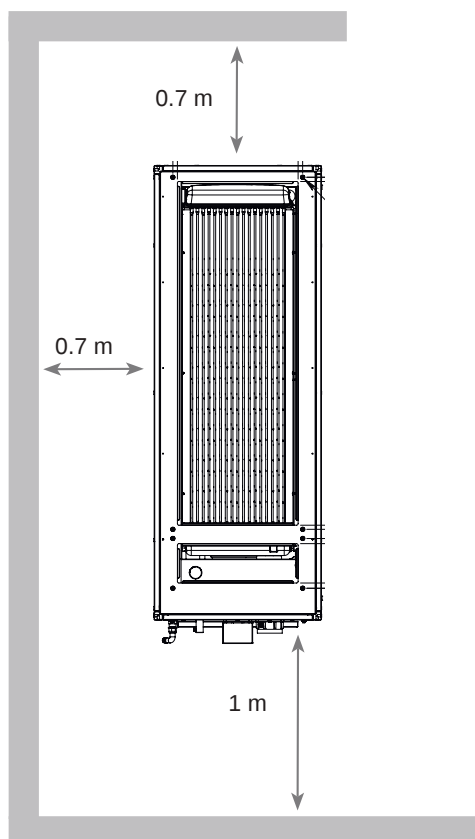
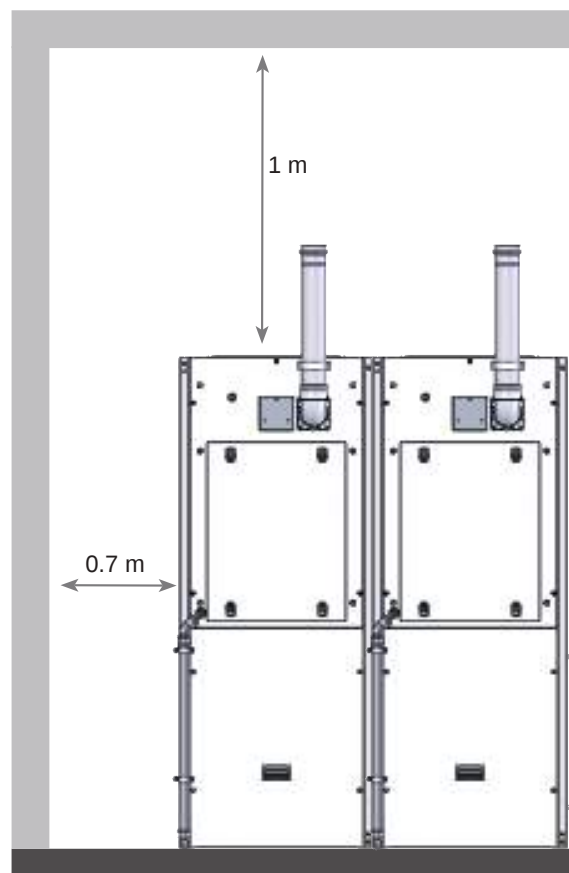
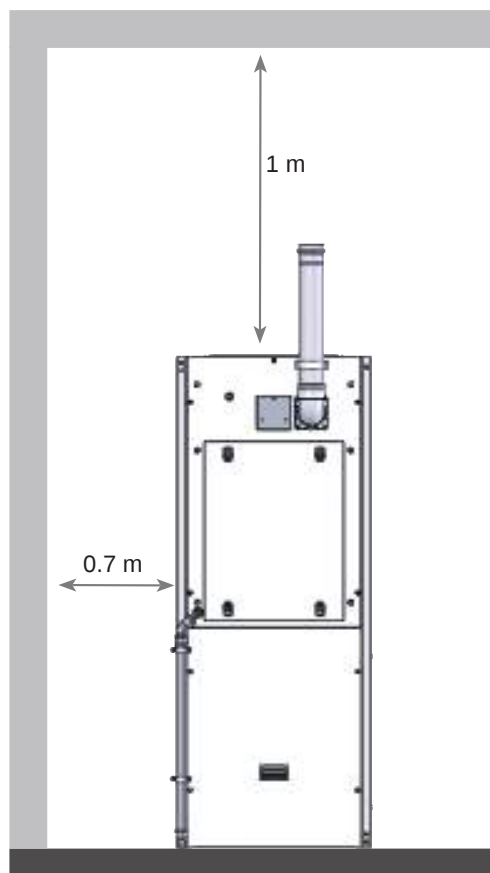


Special attention must be paid to the noise conditions required for the room, dimensioning and installing, where necessary, silencers in the ductwork.

Connecting Fuel Supply

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

5.2.1. Minimum distances to be observed



5.3. 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.

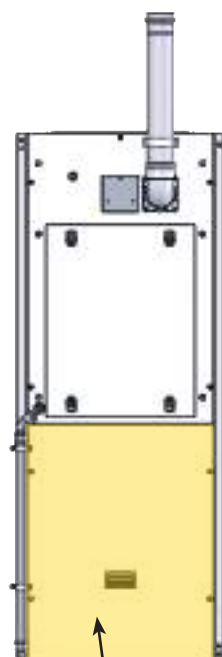
Wire power supply directly to the plug.

Single phase	230V+N	Wire phase L1 to pole 1, <u>jumper</u> terminals 1-2-3 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

! 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.

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

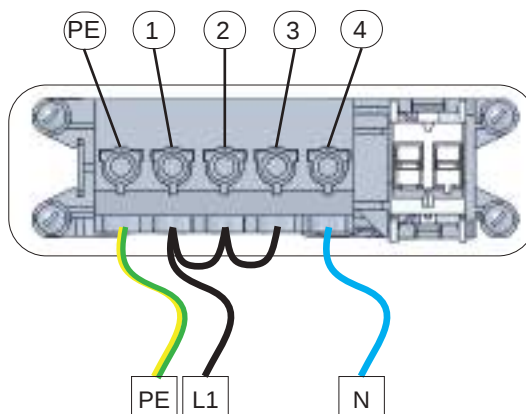


Panel Control panel

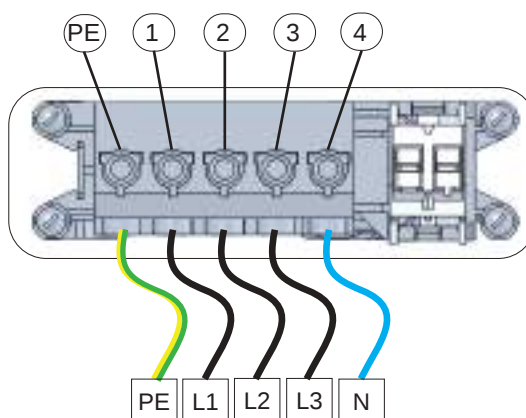


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SINGLE-PHASE models: AH034



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



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.

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.

! 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.

! GROUND wire is mandatory. Connect it to the relevant PE terminal.

ELECTRICAL PROTECTIONS



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 switches are used, the characteristic curve for their triggering must be of type "K" or "D" or "C", with breaker current $I_d \geq 300\text{mA}$.

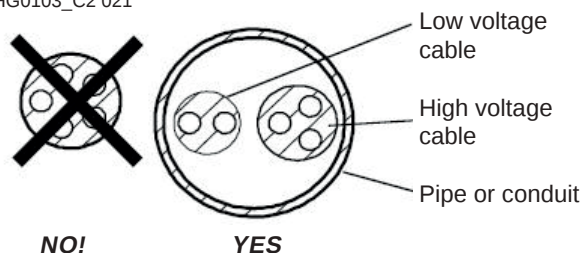


Automatic switches with "A" trigger curve are not allowed since they are not suitable for electrical motor protection. Residual-current devices with $I_d=30\text{mA}$ are not suitable for being used with inverter. Residual-current devices must be of type "B".

Cables

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

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Use flexible, flame-retardant, double-coating cables for the wiring.

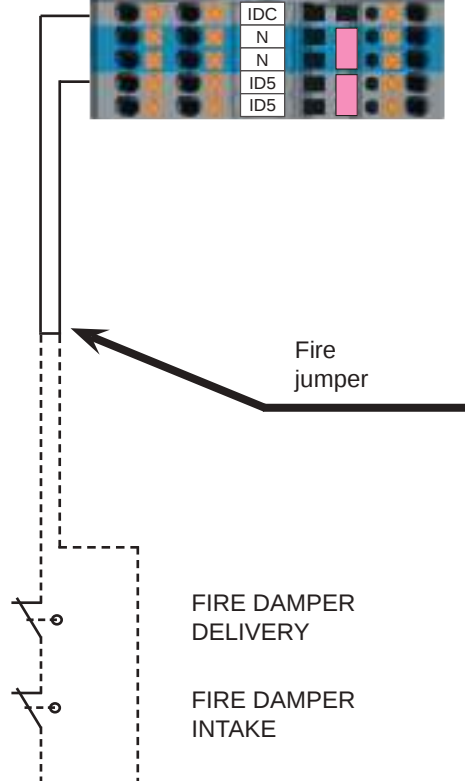
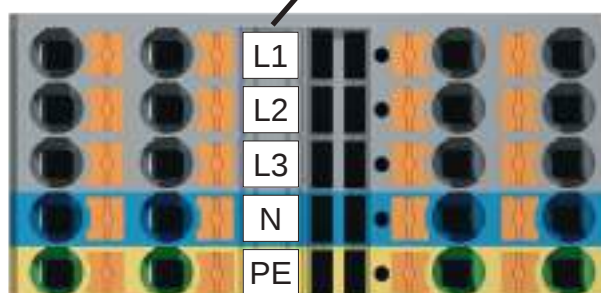
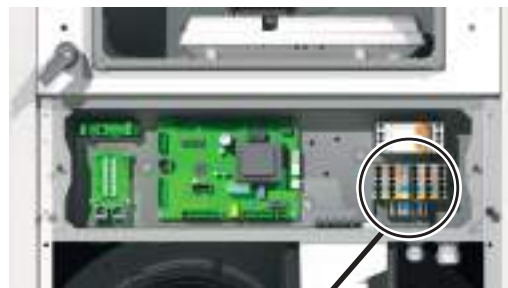
The size of the cable section must be suitable for the unit power consumption and the distance between the unit and the connection point.

AH Model	Motor kW [kW]	Cable section [mm²]	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	8x0.8	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.

5.3.1. FIRE DAMPER ELECTRICAL CONNECTION



**CONNECTION
FIRE
MICROSWITCH
(OPTIONAL)
(REMOVE THE JUMPER)**

5.4. Connections to the Flue

The PCH heater module, contained inside the AH, is fitted with a watertight combustion circuit and with the burner fan located upstream of the heat exchanger.

Connection to the flue, according to how the heater is installed, can be made as "C" type, with combustion air being drawn from outside, or as "B" type with combustion air being drawn from the heater installation site.

If the heater is installed outdoor, a "B" type installation is also a "C" type.

More specifically, the heater is certified for the following exhausts: B23P-C13-C33-C43-C53-C63; for more information on the flue types, please refer to current regulations.

For the flue, certified pipes and terminals must be used, taking into account that for PCH condensate modules the following materials must be used:

- aluminium
- stainless steel
- polypropylene (PP)

The pipes and terminal must be certified according to the Regulation for building products.

Sealed pipes must be used to prevent condensate from leaking from the pipes; the seal must be adequate to withstand flue gas temperature ranging between 25°C and 90°C.

The flue does not need to be insulated to prevent the formation of condensation in the pipe, as this will not affect the heater, which is fitted with a water trap. Insulate the pipe if required to protect the flue from accidental contact.

For the air intake, use:

- aluminium
- stainless steel
- polypropylene (PP)

certified according to the Regulation for building products.



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

Common exhausts

Where possible, it is always preferable to use independent exhausts; AH module exhausts are pressurised, therefore in this way it is possible to prevent incorrect sizing from causing a system malfunction.

If you wish to use common flue outlets, there are KITS on the price list "Common flue outlets" pre-sized in pp as indicated further below in this section.

If you do not wish to use said KITS, the common exhausts shall be sized by the designer including non-return valves at the outlet of each flue, before the connection with the common flue, preventing a module from discharging its own combustion gases inside another module.

Terminal configuration

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.



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.

On request (with additional charge) AH units can be supplied with “independent flue outlet” chimneys, as shown in the image below. For multiple models, AH160, AH210, AH240 and AH320, it is possible to request the “multiple flue outlet” chimney as indicated in the following table:

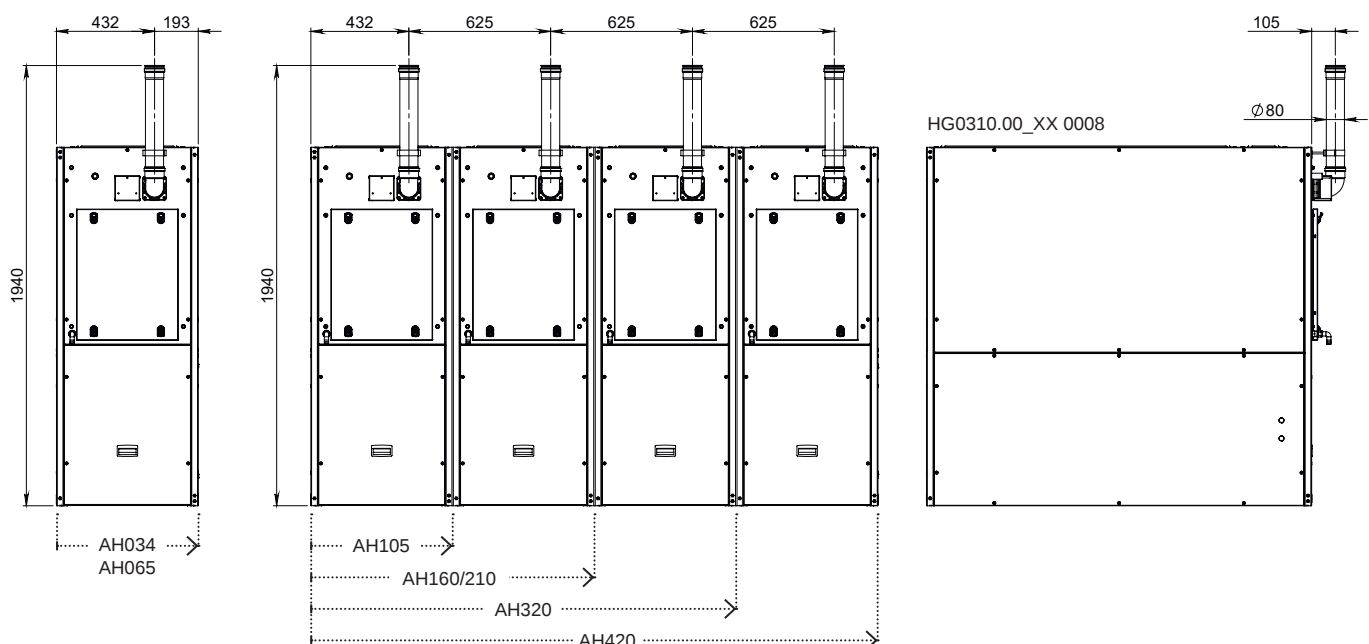
For VERTICAL AH Units (- xxV0)

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)

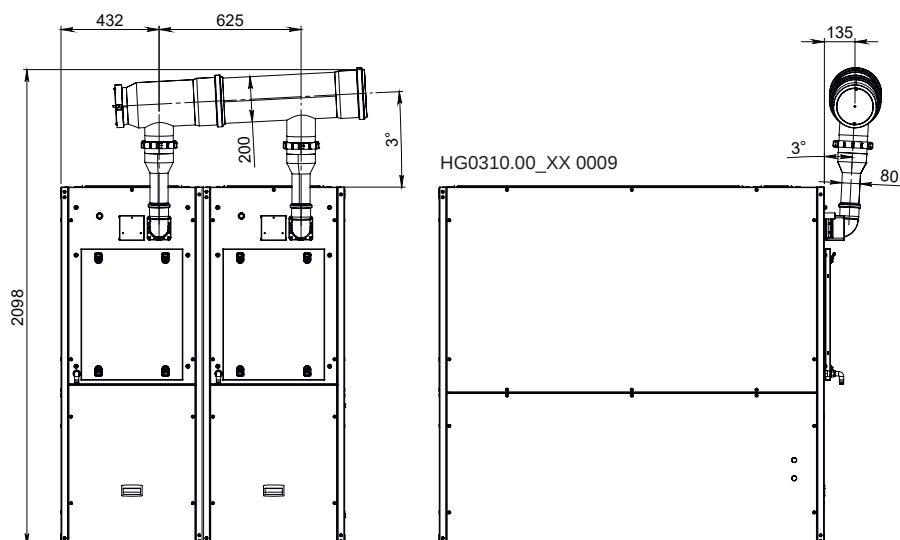
For HORIZONTAL AH Units (- xxH0)

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)

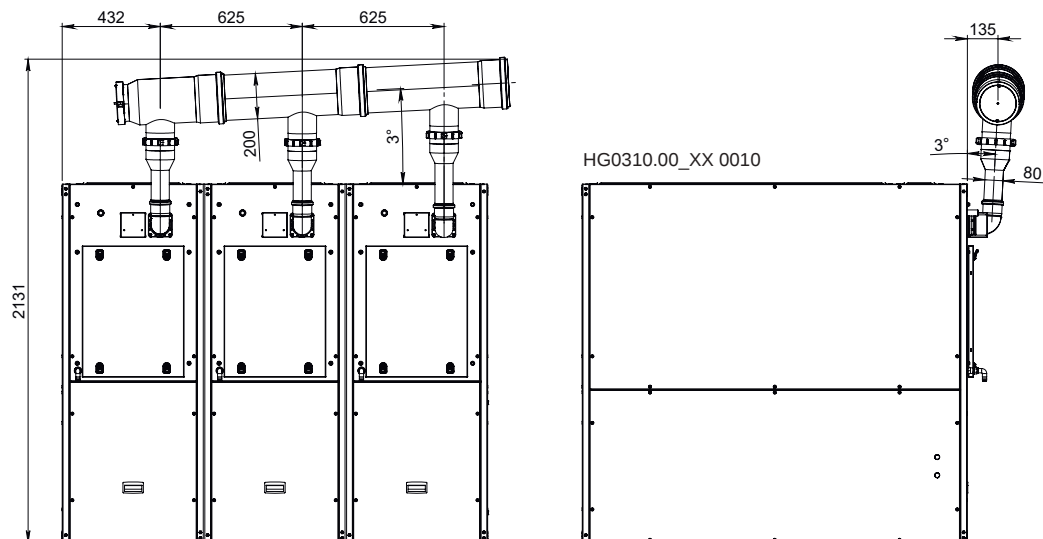
5.4.1. Model: AH034 / AH065 / AH105 / AH160 / AH210 / AH320 / AH420 (- xxV0) with INDEPENDENT flue outlet



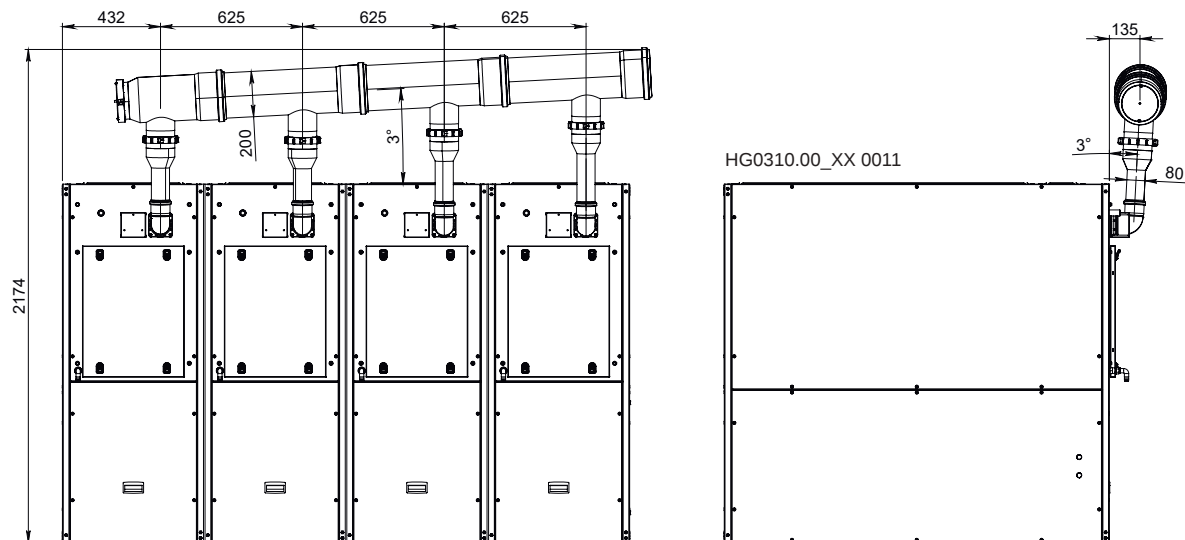
5.4.2. Model: AH160 / AH210 (- xxV0) with COMMON flue outlet



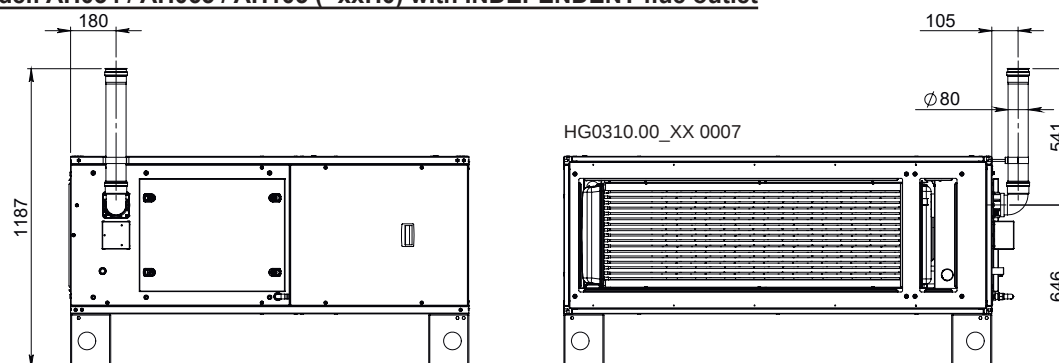
5.4.3. Model: AH320 (- xxV0) with COMMON flue outlet



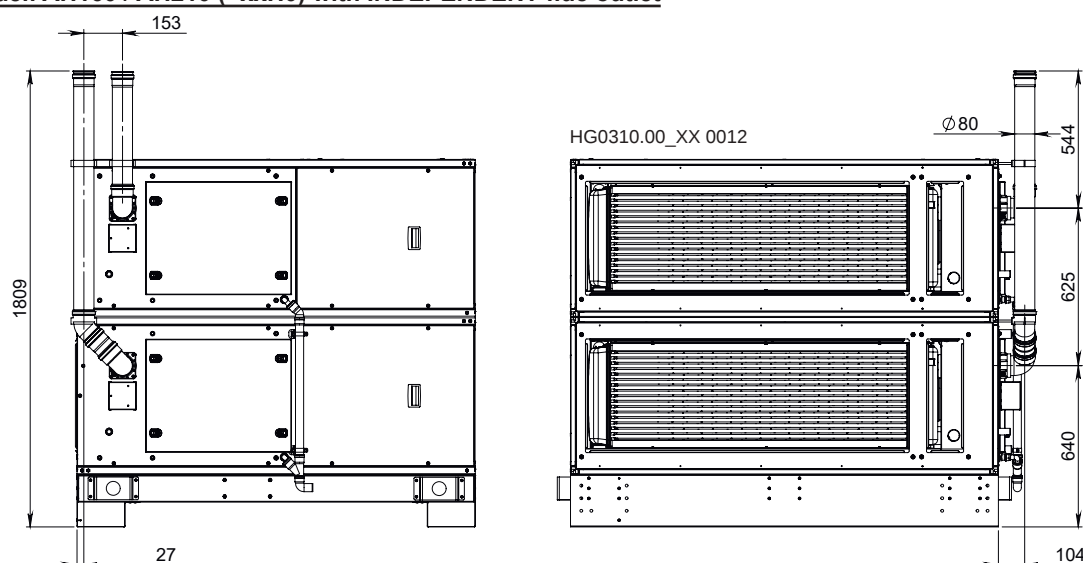
5.4.4. Model: AH420 (- xxV0) with COMMON flue outlet



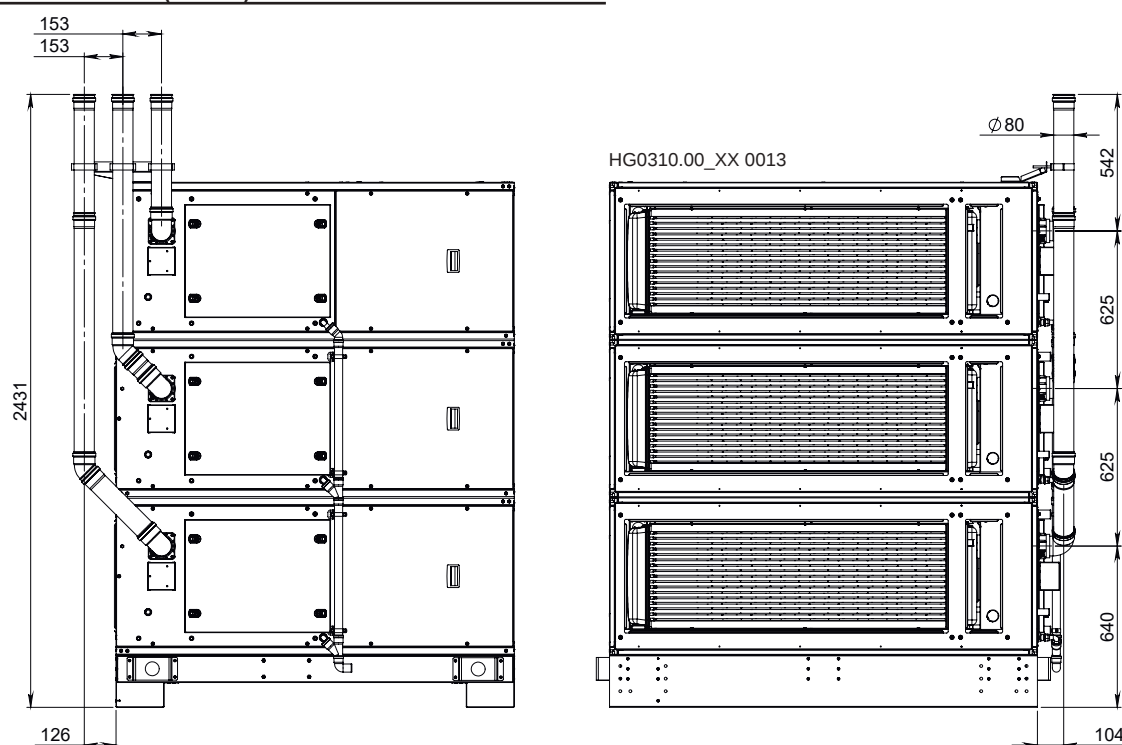
5.4.5. Model: AH034 / AH065 / AH105 (- xxH0) with INDEPENDENT flue outlet



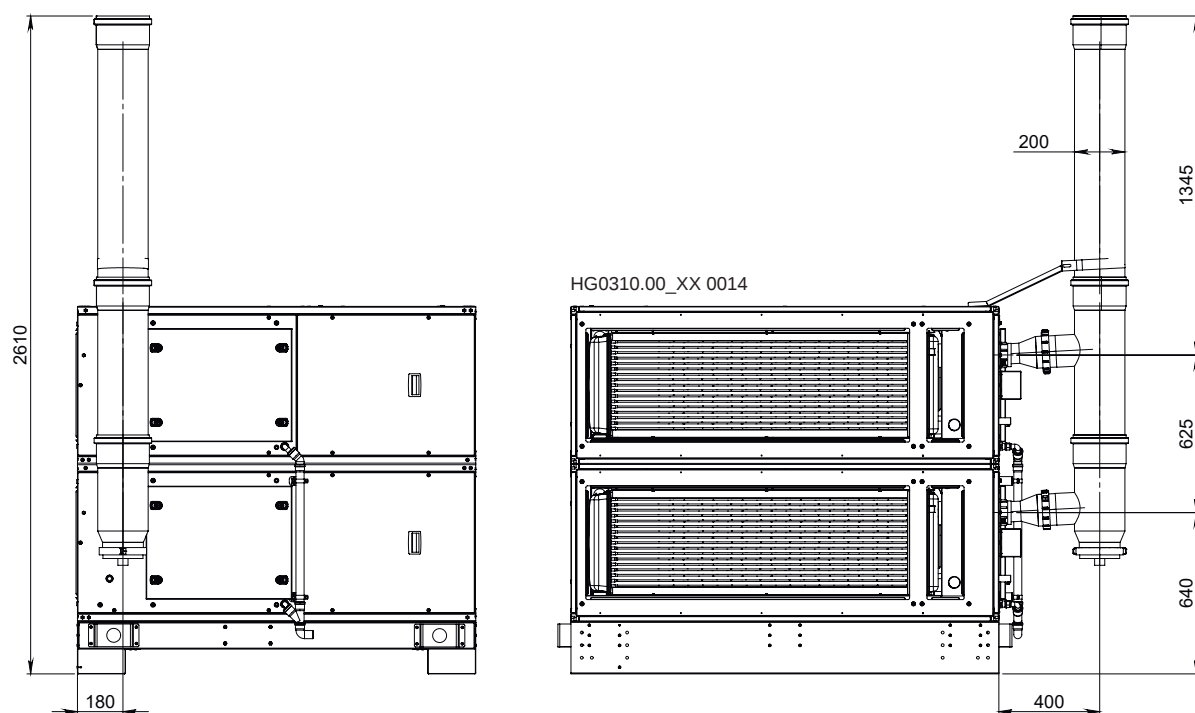
5.4.6. Model: AH160 / AH210 (- xxH0) with INDEPENDENT flue outlet



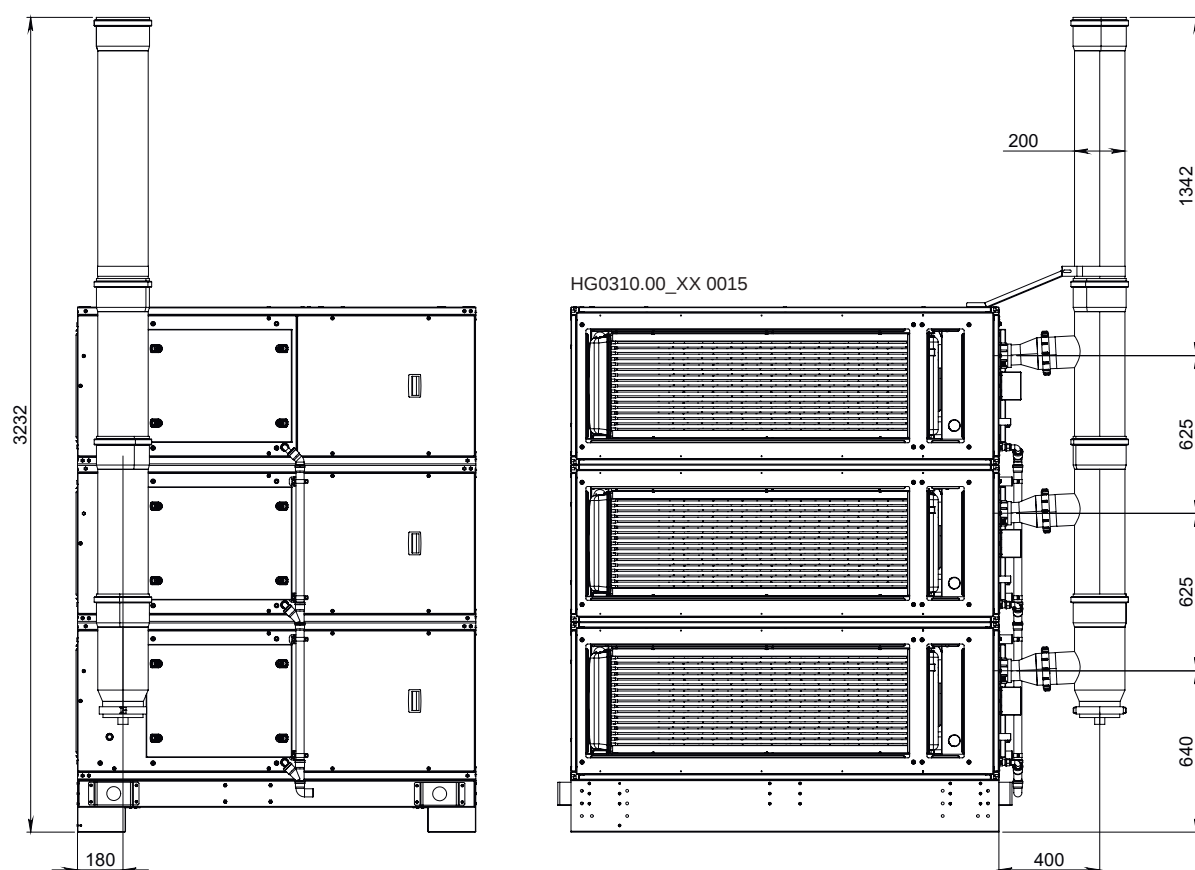
5.4.7. Model: AH320 (- xxH0) with INDEPENDENT flue outlet



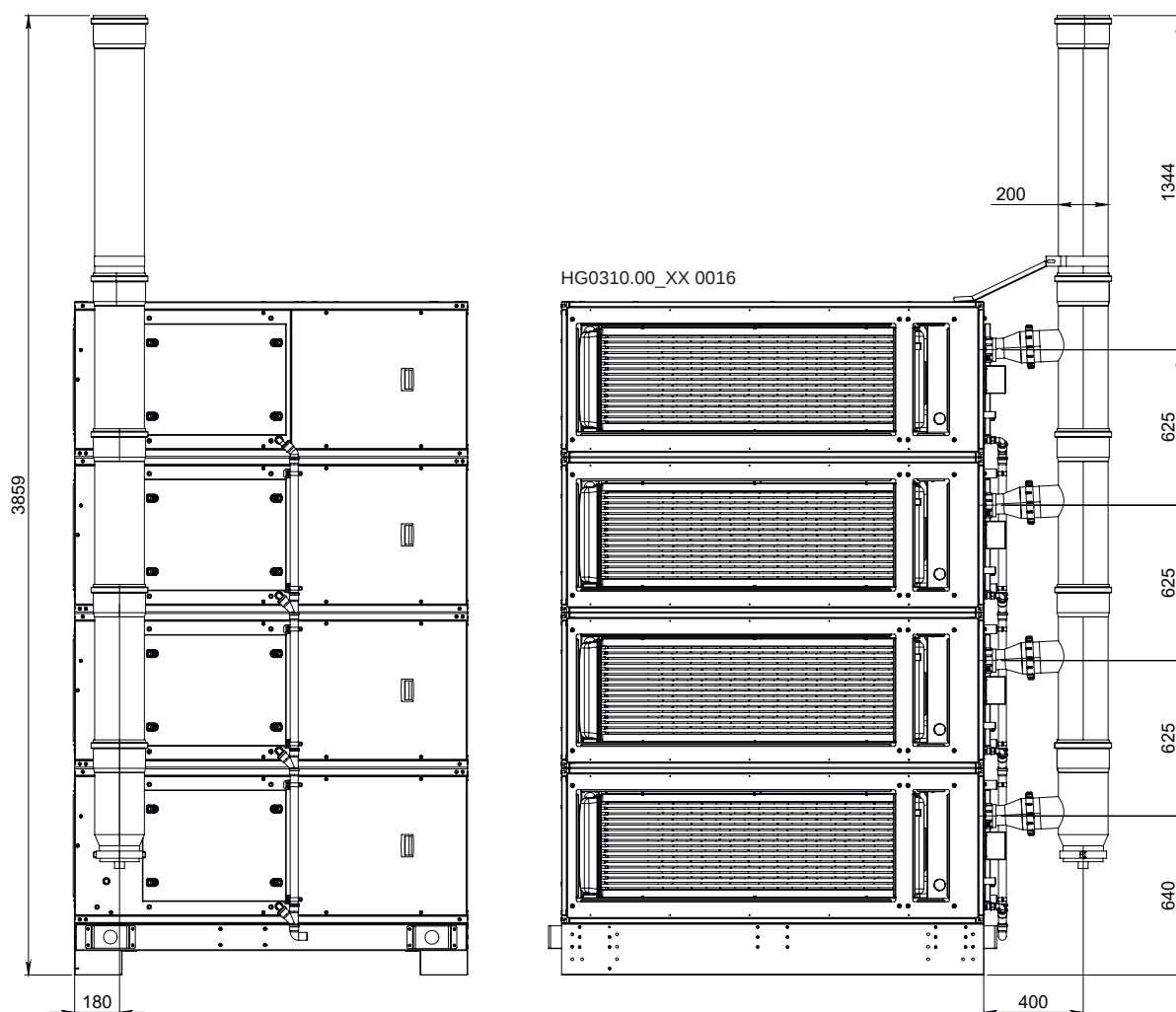
5.4.8. Model: AH160 / AH210 (- xxH0) with COMMON flue outlet



5.4.9. Model: AH320 (- xxH0) with COMMON flue outlet



5.4.10. Model: AH420 (- xxH0) with COMMON flue outlet



(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	

5.5. Condensate drain

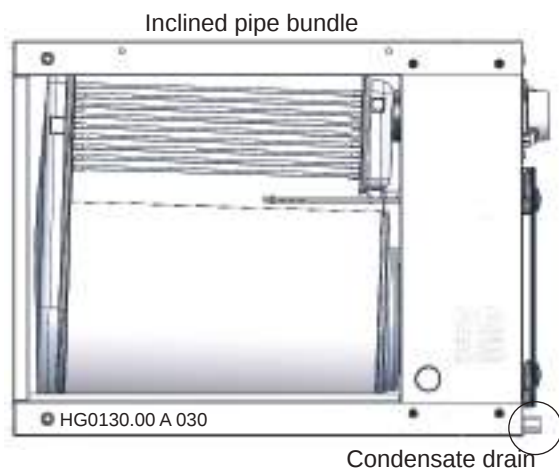
Special attention must be paid to the condensate drain; an incorrectly installed drain, in fact, could jeopardize the correct operation of the equipment. The factors to be taken into account are:

- 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 above).

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.

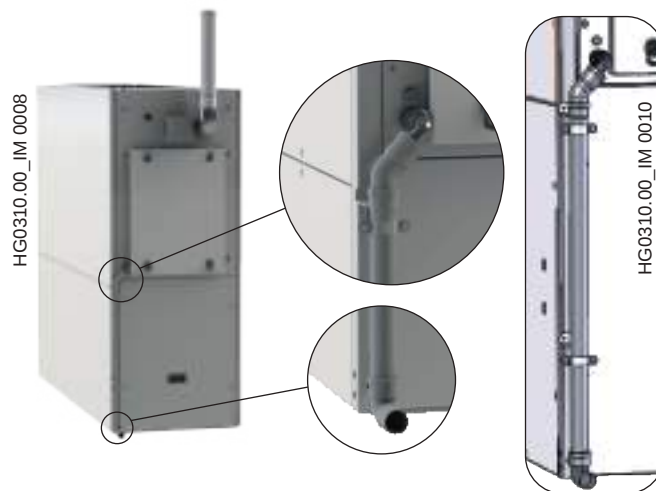
AH air heating units are supplied with a condensate drain with open type connection (socket pipe) to prevent ice forming in the pipe from blocking correct condensate drain, with consequent accumulation of water in the heat exchanger.

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

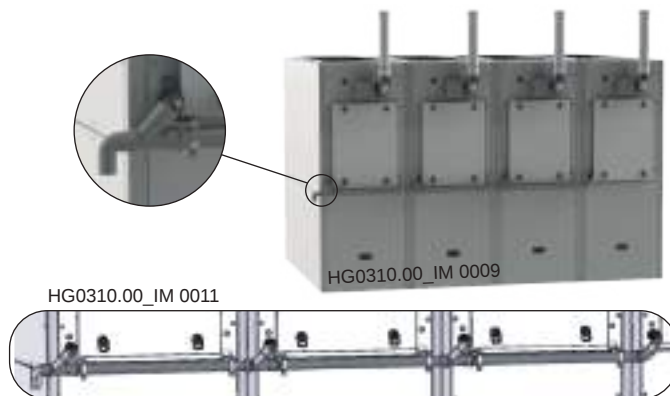


Fill the condensate drain trap before the first start-up.

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).



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

5.6. GAS Connection

Use the gas line connections only with CE certified components.

AH modules are supplied complete with:

- double coil 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.



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.

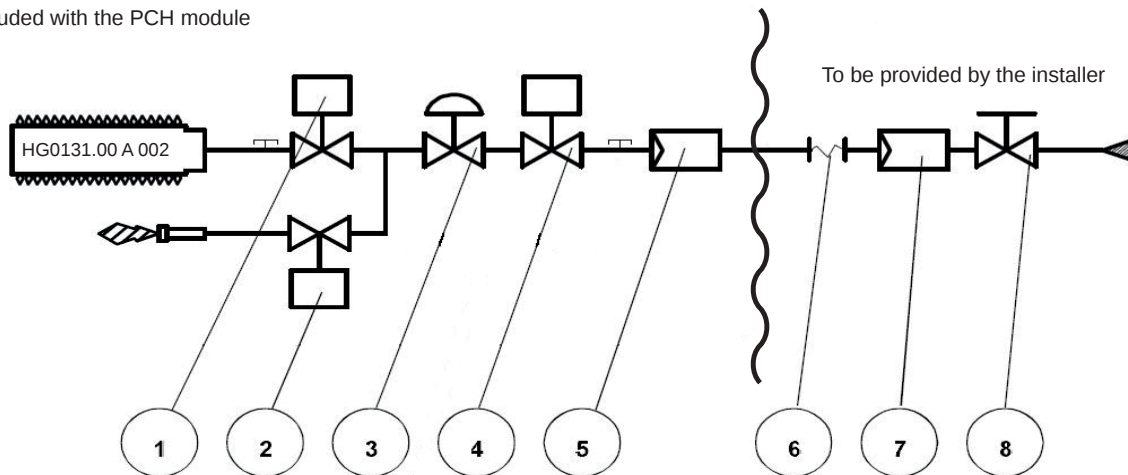
IMPORTANT: For proper maintenance, connect the AH module by means of a seal and swivel gasket. Avoid using threaded connections directly on the gas connection.

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

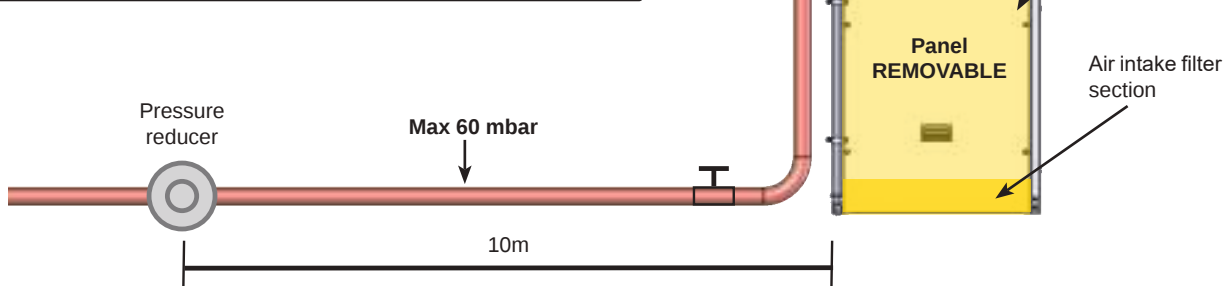


During the installation, we recommend tightening the external gas supply pipe nut without exceeding the tightening torques shown below:

- 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.



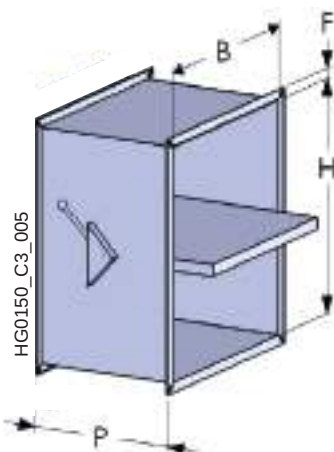
5.7. Fire damper installation

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

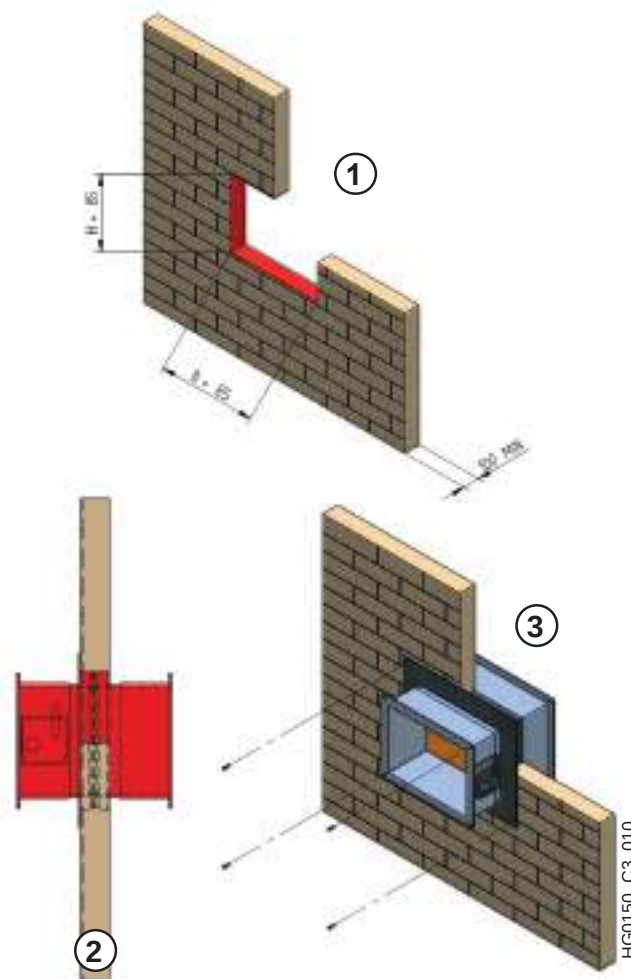
Model	Code		B	H	P	F
		shutter	[mm]	[mm]	[mm]	[mm]
AH034	Delivery and Intake	G23646	800	450	510	35
AH045	Delivery and Intake	G23666	1100	450	510	35
AH105	Delivery and Intake	G23686	1500	450	510	35
AH160 AH210	Delivery	G23726	1000	970	510	35
	Horizontal Intake					
	Vertical Intake	G23756	1200	650	510	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



5.7.1. 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.



5.7.2. 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.



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

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

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 air heating 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 X Web remote control.

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

- unit powered on and not locked out;
- Smart X 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 CPU board configuration.

If there is no flame during the ignition phase, the equipment will make other 4 ignition attempts; at the fourth attempt, if ignition is not successful, the heater will be locked out (Fault E10).

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.

 **Powering off the machine before completing the cooling cycle and/or with burner 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 PCB is connected to a Smart X 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 service 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 X Web.

Faults are classified according to the type of error; the list and meanings of all faults are shown in the FAULT table in Paragraph 6.6 "Analysis of lockouts - faults".

If the flame monitoring equipment has locked out (codes from E10 to E22), 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.



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 (E13). 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.



Should the safety thermostat (STB) be open before starting the start-up cycle (this could be caused, for example, by low temperatures), the flame MONITORING equipment will be kept in "stand-by" indicating lockout E22.

6.4. Parameters of MASTER and SLAVE modulation PCBs

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

The "LCD" column shows the parameters that could be modified with Password via remote LCD control (even with modbus address $\neq 0$). The "Smart" column shows the parameters that can only be modified with Smart X or via modbus with a second level Password, which can be requested to the manufacturer's Customer Service.

Main modulation PCB configuration: MASTER

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			AH034 - AH065 - AH105 - AH160 - AH210 - AH320 - AH420	DESCRIPTION
Smart	LCD	U.M.		
FUNC 00	Fnu P00		Equipment operation	
TER			0	0 = TER not present 1 = TER present
SMART			1	0 = Smart not present 1 = uses PID and ON/OFF of the SMART 2 = uses only ON/OFF command of the Smart
FR_C			0	Reserved - not used
PTH	P06		100	Maximum limit of PT%_OUT_BURNER OUTPUT
PTL	P07		12	Minimum limit of PT%_OUT_BURNER OUTPUT
REG 01	rGL R10		Air Delivery Channel Probe NTC Adjustment	
REG_01	R11		1	0 = disabled 1 = enabled
ST1	R12	°C	48	ST1 function setpoint
Xd1	R13	°C	5	ST1 hysteresis
Kp1		%	10	Proportional coefficient
Ki1		%	5	Integral coefficient
TH1	R16	°C	65	Fault temperature for ST1 (E51; Autoresolve with NTCx<ST1)
AC1			1	0 = modulation only 1 = modulation and ON/OFF
MOD1			0	0 = Reverse / Direct (changes according to the phase sent via modbus, heating, ventilation or conditioning) 1 = Reverse only (for heating) 2 = Direct only (for ventilation or conditioning)
ING1A			1	1 = NTC1
REG 02	rGL R20		FLUE GAS Temperature Probe NTC Adjustment (Not used on MASTER PCB)	
REG_02	R21		0	0 = disabled
REG 03	rGL R30		Temperature Maintenance Probe NTC Control (AIR + POOL)	
REG_03	R31		0	0 = disabled 2 = enabled by the SMART request
BR-03	R31	°C	0	0 = uses automatic mode 1 = forces mode as standard setting 2= Block modification par Reg_03 from SMART
ST3		°C	30	Function setpoint
SM3	R3A	°C	0	Setpoint in manual mode
Xd3		°C	5	ST3 hysteresis
Kp3		%	20	Proportional coefficient
Ki3		%	100	Integral coefficient
TH3		°C	70	Fault temperature for ST3 (E53; Autoresolve with NTCx<ST3)
ING3A			1	1 = NTC1
OUT3_A			0	0 = disabled
REG 04	rGL R40		Modulation from 0/10 Vdc Control (Not used on MASTER PCB)	
REG_04	R41		0	0 = disabled

Main modulation PCB configuration: MASTER

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			AH034 - AH065 - AH105 - AH160 - AH210 - AH320 - AH420	DESCRIPTION
Smart	LCD	U.M.		
REG 05	rGL R50		Air pressure adjustment (pressostatic units or ductwork)	
REG_05	R51		0	0 = disabled 1 = enabled for air pressure control 2 = enabled for variable flow rate systems
ST_Pair	R52	Pa	120	Setpoint for ductwork pressure
Kp_Pair		%	3	Proportional coefficient
Ki_Pair		%	12	Integral coefficient
Kd_Pair		%	6	Derivative coefficient
LI_Pair		%	100	Limit in percentage of integral value
ING_air_1			0	Analogue input enabled
REG 06			(Not used on AH UNITS)	
REG_06			0	0 = disabled
CTRL 01	CrL C10		(Not used on AH UNITS)	
CTRL_01	C11		0	0 = disabled
CTRL 02	CrL C20		(Not used on AH UNITS)	
CTRL_02	C21		0	0 = disabled
CTRL 03	CrL C30		Burner Compartment Antifreeze Control (Not used on MASTER PCB)	
CTRL_03	C31		0	0 = disabled
CTRL 04	CrL C40		No Voltage Control	
CTRL_04	C41		1	0 = disabled 1 = enabled
T4_V	C42	sec	45	Time in seconds of post-ventilation
CTRL 05	CrL C50		Remote Reset Control from Digital Input	
CTRL_05	C51		0	0 = disabled 1 = enabled
ING05	C52		0	Digital input enabled as RESET
CTRL 06	CrL C60		Remote alarm or flame presence signal control	
CTRL_06	C61		0	0 = disabled 1 = enabled as lockout signal 2 = enabled as flame signal
OUT06	C62		0	Digital output enabled
CTRL 07	CrL C70		Summer ventilation control from digital input	
CTRL_07	C71		0	0 = disabled 1 = enabled
ING07	C72		0	Digital input enabled
CTRL 08	CrL C80		Counter and reset control	
HOURS	C81		1	Burner operating hours counter
CYCLES	C82		1	Ignition cycles counter
FAULT			1	Fault counter
RESET	C84		0	1 = PCB fault reset
CTRL 09	CrL C90		AIR FILTER Control	
CTRL_09			0	0 = disabled 1 = enabled as ON/OFF pressure switch 2 = enabled as pressure transducer
ST_FLT			150	Preventive alarm setpoint (E71); value in Pa
TH_FLT			200	Triggering alarm setpoint (E72); value in Pa
ING FLT			6 (B2)	Analogue or digital inputs

Main modulation PCB configuration: MASTER

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			AH034 - AH065 - AH105 - AH160 - AH210 - AH320 - AH420	DESCRIPTION
Smart	LCD	U.M.		
FUNC_01	Fnu P10		Burner operation (Not used on MASTER PCB)	
FUNC_02			MASTER PCB Management (Blown air burner control)	
FN_02			1	0 = disabled 1 = enabled as Two-Stage or Modulating
DT2		%	0.1	Percentage delta for two-stage control
OUT2A			0	It defines the digital output for sending ON/OFF signal
OUT2B			0	It defines the digital output for sending HI/LOW signal
OUT2C			4 (Y3)	Analogue output enabled for sending PWM % signal
TSV2		sec	30	Burner modulation servomotor stroke time
FUNC_03	Fnu-P30		Ventilation Management Function (EC-AC Fans)	
FN_03	P31		1	0 = disabled 1 = proportional POT%_OUT enabled 2 = proportional enabled to PID%_PRESS, value of REG_04_05 3 = start and modulation with temperatures TIN3, TFN3 and TCD3 4 = proportionally enabled to analogue input ING3A
T_ON	P32	sec	60	Seconds of delay for fan start
T_OFF	P33	sec	150	Seconds of delay for fan stop
OUT3A			0	Digital output enabled for main fan
OUT3B			3 (Y2)	Analogue output enabled for main fan
ING3A			0	Reference analogue input
TIN3	P37	°C	35	Heating fan ON temperature
TFN3	P38	°C	65	Temperature for output linearisation
TCD3	P39	°C	20	Conditioning fan ON temperature
FUNC_04	Fnu-P40		Ventilation Function for PRESSOSTATIC Units (Not used)	
FN_04	P41		0	0 = disabled 1 = enabled for fan pressure control
OUT4A			0	Analogue output enabled for main fan
OUT4B			0	Analogue output enabled for recirculation shutter
OUT4C			0	Digital output enabled for switching from AIR (0) to HEAT (1)
SHUTT%			0	Opening % of recirculation shutter in maintenance phase
T_ON	P45	sec	60	Delay time for switching from Maintenance to Heating
T_OFF	P46	sec	120	Delay time for switching from Heating to Maintenance
FUNC_05	Fnu-P50		Inverter and Motor Control (Not used on AH UNITS)	
S5	P51		0	0 = disabled
FUNC_06			Destratifier Function	
FN06			0	0 = disabled 1 = destratifier action enabled
OUT06			0	Analogue or digital output for destratifier fans
FUNC_08	Fnu-P80		Damper Management Function	
FN08	P81		1	0 = disabled 1 = ON/OFF enabled 2 = modulation enabled
FSE08	P82		30	External damper opening percentage
OUT08A	P83		8 (LBW)	Analogue or digital output enabled for shutter
FUNC_10			(Not used on AH UNITS)	
FN_10			0	0 = disabled

Main modulation PCB configuration: MASTER

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			AH034 - AH065 - AH105 - AH160 - AH210 - AH320 - AH420	DESCRIPTION
Smart	LCD	U.M.		
	rtu		RS485 Serial Communication Configurations	
D_SL	SSL		0	0 = baud rate 19,200 - Even Parity
			NTC input configuration	
NTC1			1	0 = NTC1 input enabled 1 = NTC1 input disabled
NTC2			0	0 = NTC2 input enabled 1 = NTC2 input disabled
NTC3			0	0 = NTC3 input enabled 1 = NTC3 input disabled
			B0 Input Configurations	
B0			1	1 = enabled as analogue input
			B1 Input Configurations	
B1			0	0 = disabled
XA1			0	X-axis minimum value – minimum input voltage
XB1			9.99	X-axis maximum value – maximum input voltage
YA1			0	Y-axis minimum value – minimum magnitude value
YB1			9.99	Y-axis maximum value – maximum magnitude value
CV1			0.01	PRØ displaying coefficient; value displayed on Smart and used for controls
UM1			8	1=°C; 2=bar; 3=mbar; 4=Pa; 5=%; 6=l/h; 7=mc/h; 8= V
			B2 Input Configurations (Filter Control)	
B2			1	1 = enabled as analogue input
XA2			0.5	X-axis minimum value – minimum input voltage
XB2			4.5	X-axis maximum value – maximum input voltage
YA2			0	Y-axis minimum value – minimum magnitude value
YB2			9.99	Y-axis maximum value – maximum magnitude value
CV2			1	Coefficient for PRØ displaying; value displayed on Smart and used for controls
UM2			4	1=°C; 2=bar; 3=mbar; 4=Pa; 5=%; 6=l/h; 7=mc/h; 8= V
			B3 Input Configurations (Not used on AH UNITS)	
B3			0	0=disabled
			Digital Input Configurations	
ID1			0	0 = disabled 1 = N.C. input with manual reset (Fault with input Open) 2 = N.C. input with autoresolve (Fault with input Open) 3 = N.O. input with autoresolve (Fault with input Closed) 4 = N.O. input without alarm signalling
TD1			0	Alarm triggering or function enabling delay time
ID2			0	See par. ID1
TD2			0	Alarm triggering or function enabling delay time
ID3			2	See par. ID1
TD3			5	Alarm triggering or function enabling delay time

Main modulation PCB configuration: MASTER

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			AH034 - AH065 - AH105 - AH160 - AH210 - AH320 - AH420	DESCRIPTION
Smart	LCD	U.M.		
		Y0 Analogue Output Configuration (PWM)		
YM0			1	0 = direct (maximum calculation value (100%) = maximum output value) 1 = Reverse (maximum calculation value (100%) = minimum output value)
YL0			0	Minimum voltage (or PWM in %) output value
YH0			10	Maximum voltage (or PWM in %) output value
YF0			4	Fixed voltage or % output value (forced by program)
YT0			3	Voltage increase/decrease (or in %) every second
YN0			0	0 = linear output value between YLx and YHx 1 = output values limited to YLx and YHx (for values < YLx the output is YLx, for values > YHx the output is YHx)
		Y1 Analogue Output Configuration		
YM1			0	0 = direct (maximum calculation value (100%) = maximum output value) 1 = Reverse (maximum calculation value (100%) = minimum output value)
YL1			0	Minimum voltage (or PWM in %) output value
YH1			10	Maximum voltage (or PWM in %) output value
YF1			10	Fixed voltage or % output value (forced by program)
YT1			1	Voltage increase/decrease (or in %) every second
YN1			0	See par. YN0
		Y2 Analogue Output Configuration (EC ventilation output)		
YM2			0	0 = direct (maximum calculation value (100%) = maximum output value) 1 = Reverse (maximum calculation value (100%) = minimum output value)
YL2			6	Minimum voltage (or PWM in %) output value
YH2			10	Maximum voltage (or PWM in %) output value
YF2			8	Fixed voltage or % output value (forced by program)
YT2			1	Voltage increase/decrease (or in %) every second
YN2			0	See par. YN0
		Y3 Analogue Output Configuration (SLAVE PCH 0-10v voltage output)		
YM3			0	0 = direct (maximum calculation value (100%) = maximum output value) 1 = Reverse (maximum calculation value (100%) = minimum output value)
YL3			2	Minimum voltage (or PWM in %) output value
YH3			10	Maximum voltage (or PWM in %) output value
YF3			4	Fixed voltage or % output value (forced by program)
YT3			1	Voltage increase/decrease (or in %) every second
YN3			0	See par. YN0

Secondary modulation PCB (PCH) configuration: SLAVE

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			PCH	PCH	PCH	PCH	DESCRIPTION
Smart	LCD	U.M.	034	065	080	105	
FUNC 00	Fnu P00		Equipment operation				
TER			1				1 = TER present
SMART			0				0 = Smart not present
FR_C			0				Reserved - not used
PTH	P06		100				Maximum limit of PT%_OUT_BURNER OUTPUT
PTL	P07		0				Minimum limit of PT%_OUT_BURNER OUTPUT
FUNC 01	Fnu P10		Burner operation				
b1	P11	rpm	210	182	172	195	Motor RPM MIN value (Y0): 90÷999 (1=10 RPM)
b2	P12	rpm	710	651	655	635	Motor RPM MAX value (Y0): 90÷999 (1=10RPM)
b3	P13	rpm	300	340	355	240	Motor RPM START-UP value (Y0): 90÷999 (1=10RPM)
b4	P14		2				TACH signal divider
b5	P15	rpm	50				Error E3x; no. of revolutions x10 (50=500rpm): 0÷999
b6	P16	sec	20				Error E3x; error dwell time before fault F3x: 0÷999
b7	P17	sec	15				Pre-cleaning time with maximum output
b8	P18	sec	10				Flame stabilisation time (ignition)
b9	P19	%	45				Proportional factor value (kp_pwm) for PWM1 calculation
b10	P1A	%	20				Integral factor value (ki_pwm) for PWM1 calculation
b11	P1B	sec	90				Combustion chamber post-washing time
b12		sec	0				Flame monitoring equipment ON delay time (TER)
b13		kW	8	12	16	21	MIN heat input value
b14		kW	35	65	82	100	MAX heat input value
REG 01	rGL R10		Modulation Probe NTC Adjustment				
REG_01			1				1 = enabled
ST1	R12	°C	45				ST1 function setpoint
Xd1	R13	°C	5				ST1 hysteresis
Kp1		%	10				Proportional coefficient
Ki1		%	5				Integral coefficient
TH1	R16	°C	60				Fault temperature for ST1 (E51; Autoresolve with NTCx<ST1)
AC1			1				1 = modulation and ON/OFF
MOD1			1				1 = Reverse only (for heating)
ING1A			1				1 = NTC1
REG 02	rGL R20		FLUE GAS Temperature Probe NTC Adjustment				
REG_02			1				1 = enabled
ST2	R12	°C	75				ST2 function setpoint
Xd2	R13	°C	5				ST2 hysteresis
Kp2		%	25				Proportional coefficient
Ki2		%	10				Integral coefficient
TH2	R16	°C	85				Fault temperature for ST2 (E52; Autoresolve with NTCx<ST2)
AC2			1				1 = modulation and ON/OFF
MOD2			1				1 = Reverse only (for heating)
ING2A			2				2 = NTC2
REG 03	rGL R30		Probe NTC Control (Not used on SLAVE PCB)				
REG_03			0				0 = disabled
REG 04	rGL R40		Modulation from 0/10 Vdc Control				
REG_04	R41		2				2 = enabled as modulation and burner ON/OFF
V4_OFF	R42	V	0.5				Voltage value for burner OFF
V4_DIF	R43	V	0.5				Differential for burner ON
T4_ON	R44	sec	5				Signal dwell time for ON
T4_OFF	R45	sec	5				OFF signal dwell time
ING4A	R46		5(B1)				Defines the analogue input to be used for calculation

Secondary modulation PCB (PCH) configuration: SLAVE

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			PCH	PCH	PCH	PCH	DESCRIPTION
Smart	LCD	U.M.	034	065	080	105	
REG 05	rGL R50		Air Pressure Adjustment (Not used on SLAVE PCB)				
REG_05			0				0 = disabled
REG 06			(Not used on AH UNITS)				
REG_06			0				0 = disabled
CTRL 01	CrL C10		(Not used on AH UNITS)				
CTRL_01	C11		0				0 = disabled
CTRL 02	CrL C20		(Not used on AH UNITS)				
CTRL_02	C21		0				0 = disabled
CTRL 03	CrL C30		Burner Compartment Antifreeze Control				
CTRL_03	C31		0				0 = disabled
ST_Van	C32	°C	0				Burner compartment antifreeze setpoint
P3	C33	°C	2				Hysteresis on antifreeze setpoint
ING_Van	C34		3(NTC3)				Compartment temperature analogue input
OUT_Van	C35		8(LBW)				Digital output for resistance control
CTRL 04	CrL C40		No Voltage Control				
CTRL_04	C41		1				1 = enabled
T4_V	C42	sec	45				Time in seconds of post-ventilation
CTRL 05	CrL C50		Remote Reset Control from Digital Input				
CTRL_05	C51		0				0 = disabled
ING05	C52		9(ID1)				Digital input enabled as RESET
CTRL 06	CrL C60		Remote alarm or flame presence signal control				
CTRL_06	C61		1				1 = enabled as lockout signal
OUT06	C62		5 (Q1)				Digital output enabled
CTRL 07	CrL C70		Summer ventilation control from digital input				
CTRL_07	C71		0				0 = disabled
ING07	C72		0				Digital input enabled
CTRL 08	CrL C80		Counter and reset control				
HOURS	C81		1				Burner operating hours counter
CYCLES	C82		1				Ignition cycles counter
FAULT			1				Fault counter
RESET	C84		0				1 = PCB fault reset
CTRL 09			AIR FILTER Control (Not used on SLAVE PCB)				
CTRL_09			0				0 = disabled
FUNC 02	Fnu P20		MASTER PCB MANAGEMENT (Not used on SLAVE PCB)				
FN_02			0				0 = disabled
FUNC 03	Fnu-P30		Ventilation Management Function (EC-AC Fans) (Not used on SLAVE PCB)				
FN_03			0				0 = disabled
FUNC 04	Fnu-P40		Ventilation Function				
FN_04			0				0 = disabled
FUNC 05	Fnu-P50		(Not used on AH UNITS)				
S5			0				0 = disabled
FUNC 08	Fnu-P80		Damper Management Function				
FN08			0				0 = disabled
FUNC 10			(Not used on AH UNITS)				
FN_10			0				0 = disabled
	rtu		RS485 Serial Communication Configurations				
D_SL	SSL		0				0 = baud rate 19,200 - Even Parity

Secondary modulation PCB (PCH) configuration: SLAVE

Parameters of CPU G26800 PCB vers. 8.03.xx

Parameter Name			PCH 034	PCH 065	PCH 080	PCH 105	DESCRIPTION
Smart	LCD	U.M.					
			NTC input configuration				
NTC1			1			1 = NTC1 input disabled	
NTC2			1			1 = NTC2 input disabled	
NTC3			0			0 = NTC3 input enabled	
			B0 Input Configurations				
B0			1			1 = enabled as analogue input	
			B1 Input Configurations				
B1			1			1 = enabled as analogue input	
XA1			0			X-axis minimum value – minimum input voltage	
XB1			9.99			X-axis maximum value – maximum input voltage	
YA1			0			Y-axis minimum value – minimum magnitude value	
YB1			9.99			Y-axis maximum value – maximum magnitude value	
CV1			0.01			Coefficient for PRØ displaying; value displayed on Smart and used for controls	
UM1			8			1=°C; 2=bar; 3=mbar; 4=Pa; 5=%; 6=l/h; 7=mc/h; 8= V	
			B2 Input Configurations (Not used on SLAVE PCB)				
B2			0			0 = disabled	
			(Not used on AH UNITS)				
B3			0			0 = disabled	
			Digital Input Configurations				
ID1			4			0 = disabled 1 = N.C. input with manual reset (Fault with input Open) 2 = N.C. input with autoresolve (Fault with input Open) 3 = N.O. input with autoresolve (Fault with input Closed) 4 = N.O. input without alarm signalling	
TD1			0			Alarm triggering or function enabling delay time	
ID2			0			See par. ID1	
TD2			0			Alarm triggering or function enabling delay time	
ID3			0			See par. ID1	
TD3			0			Alarm triggering or function enabling delay time	
			Y0 Analogue Output Configuration (DO NOT CHANGE)				
YM0			1			1 = Reverse (maximum calculation value (100%) = minimum output value)	
YL0			0			Minimum voltage (or PWM in %) output value	
YH0			10			Maximum voltage (or PWM in %) output value	
YF0			4			Fixed voltage or % output value (forced by program)	
YT0			10			Voltage increase/decrease (or in %) every second	
YN0			0			0 = linear output value between YLx and YHx	
			Y1 Analogue Output Configuration (Not Used on SLAVE PCB)				
			Y2 Analogue Output Configuration (Not Used on SLAVE PCB)				
			Y3 Analogue Output Configuration (Not Used on SLAVE PCB)				

6.5. Analysis of lockouts- faults

The CPU-SMART manages two types of lockouts:

- preventive, it warns the customer that the AH heaters require maintenance;
- operational, it stops the AH 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.

CODE	DESCRIPTION	CAUSE	RESET
Flame Safety Alarms - Caused by the flame monitoring equipment (TER)			
E10	Failure to ignite the burner after 4 attempts performed by the equipment.	•No gas •Phase and neutral reversed; •Earth wire not connected; •Phase-Phase connection without neutral; •Ignition electrode failed or badly positioned; •Detection electrode failed or badly positioned; •Detection electrode that moves or disperses to the earthing system when hot; •Low CO2 value; •Gas supply pressure too high (>60mbar)	Manual
E11	Untimely (parasitic) flame. The equipment detects a flame presence signal with burner off	•Loss of insulation of TER equipment; •Loss of insulation of the detection cable or electrode	Manual
E12	Ignition failure; not visible. The count, displayed in the event log, indicates problems with ignition	Check the causes as indicated in fault E10	
E13	TER equipment does not accept the reset from CPU (max 5 reset attempts in 15 minutes)	Check the causes as indicated in fault E10. Disconnect and restore power supply	Manual
E14	Lack of communication between TER equipment and CPU for more than 60 seconds	•TER equipment or CPU PCB fault; •Connections on the STB thermostat to earth; •Capillary of the STB thermostat that discharges on the earth faston of the thermostat body	Autoresolve
E15	The flame monitoring equipment (TER) does not reach the "Running" status after 300 seconds from the heat request by the CPU	•Faulty TER equipment; •No gas or wrong burner adjustment; •Insufficient gas pressure; •Total or partial obstruction of the fume outlet	Manual or Autoreset (every 5')
E16	General lockout of the flame monitoring equipment (TER)	•Reports a safety burner switching off following uninterrupted operation >24h; •Faulty TER equipment	Manual or Autoreset (every 5')
E17	Internal fault of TER equipment, that does not accept reset command from CPU	Faulty TER equipment	Manual or Autoreset (every 5')
E18	Flame loss with TER equipment in running phase. The count, which can be displayed in the event log, indicates that the burner will turn off after flame stabilisation time or when the maximum Heat Input is reached	•Reduced gas flow rate on the line or excessive pipeline heat loss; •Incorrect burner setting (CO2 too low)	
Alarms for safety device activation			
E20	Activation of safety thermostat STB	•Excess air temperature due to lack of air circulation/ flow; •Safety thermostat broken or not connected	Manual
E22	STB safety thermostat activation in ignition phase	•Frost or temperature below -20°C; •Safety thermostat or flue gas thermostat broken or not connected	Autoresolve
E24	ID4 input alarm	•ID4 - ID5 (CN02) input open •no jumper	Autoresolve
E25	ID5 input alarm	•ID5 - IDC (CN02) input open •Fire damper activation	Autoresolve

CODE	DESCRIPTION	CAUSE	RESET
E30	No flue gas fan (VAG) start-up or speed too low in start-up phase	Flue gas fan (VAG) power supply interrupted; Flue gas fan (VAG) fault; CPU PCB fault. To check possible CPU failure, disconnect 4-wire connector (PWM) from flue gas fan (VAG) and check ABSENCE of voltage between GND-Y0 (HALL) and B0-Y0 contacts of terminal board CN03. The presence of voltage indicates a failure of the CPU PCB	Manual
E31	Flue gas fan speed (VAG) too high in stand-by phase	Check the causes as indicated in fault E30	Manual
E32	Flue gas fan speed (VAG), during operation, outside minimum and maximum set parameters	VAG electric cables interrupted, not connected or wrongly connected; Flue gas fan (VAG) fault	Manual or Autoreset (every 5')
Digital input alarms			
E38	ID£ input phase control alarm (MASTER)	- Absence of one or more 400v input phases - One or more 400v input phases reversed	Autoresolve
E38	ID3 input alarm (PCH)	Clogged condensate drain (ice or impurities) - clean siphon and/or exhaust duct; Condensate detection electrode grounded or faulty	Manual or Autoresolve
Alarms of analogue inputs and NTC probes			
E41	NTC1 probe error	No signal from NTC probe or faulty NTC probe	Autoresolve
E42	NTC2 probe error	No signal from NTC probe or faulty NTC probe	Autoresolve
E49	Pressure probe error, air or filters, faulty	No probe signal or faulty probe (Input signal B2 < 0.3 Vdc)	Autoresolve
Overtemperature Alarms			
E51	NTC1 probe temperature > TH1	Air flow rate insufficient; Cooling fan(s) inoperative; Wrong parameter TH1 adjustment	Autoresolve with NTC1 < ST1
E52	NTC2 probe temperature > TH2	Air flow rate insufficient; Cooling fan(s) inoperative; Wrong parameter TH2 adjustment	Autoresolve with NTC2 < ST2
Modbus communication alarms			
E60	Modbus Slave serial network communication error (CN04)	Modbus serial network disconnected; CPU PCB address wrong and/or not configured	Autoresolve
Voltage failure alarms			
E75	No voltage during operating cycle (excluding standby); fault is not visible on remote control but only counted	No voltage during operation	
E80	Pressure gauge error	Set par. CTRL_01=0	
E81	Pressure less than ST_H2O setpoint	Check the causes as indicated in fault E80	
E82	Pressure higher than TH_H2O limit	Check the causes as indicated in fault E80	
Parameter configuration error alarms			
E98	Input configuration error	No input enabling for functions or controls (e.g. no activation of NTC1 input combined with REG_01)	Autoresolve
E99	Function configuration error	No activation of compulsory functions for the product type (e.g. no activation of CTRL_04 for product type "PCH")	Autoresolve
E100 (CPU)	Eeprom access error	Eeprom missing or inserted in the opposite direction	Autoresolve
E101 (EPr)	Eeprom data error	Eeprom removed during operation or damaged	Autoresolve

6.6. Country Table - Gas Category

Country	Category	Gas	Pressure	Gas	Pressure	Gas	Pressure
AT, CH	I12H3B/P, I2HY20	G20	20 mbar	G20Y20	20 mbar	G30/G31	50 mbar
BE <70kW	I2E(S)B, I2EY20, I3P	G20/G25	20/25 mbar	G20Y20	20 mbar	G31	37 mbar
BE >70kW	I2E(R)B, I2EY20, I3P	G20/G25	20/25 mbar	G20Y20	20 mbar	G31	37 mbar
DE	I12ELL3B/P, I2EY20	G20/G25	20 mbar	G20Y20	20 mbar	G30/G31	50 mbar
DK, FI, GR, SE, NO, IT, CZ, EE, LT, SI, AL, MK, BG, HR, TR, RU	I12H3B/P, I2HY20	G20	20 mbar	G20Y20	20 mbar	G30/G31	30 mbar
RO	I12H3B/P, I2HY20	G20	20 mbar	G20Y20	20 mbar	G30/G31	30 mbar
	I12L3B/P	G25	20 mbar			G30/G31	30 mbar
ES, GB, IE, PT, SK	I12H3P, I2HY20	G20	20 mbar	G20Y20	20 mbar	G31	37 mbar
FR	I12Esi3P, I2EY20	G20/G25	20/25 mbar	G20Y20	20 mbar	G31	37 mbar
LU	I12E3P, I2EY20	G20/G25	20 mbar	G20Y20	20 mbar	G31	37/50 mbar
NL	I12EK3B/P, I2EY20	G20/G25.3	20/25 mbar	G20Y20	20 mbar	G30/G31	30 mbar
HU	I12HS3B/P, I2HY20	G20/G25.1	25 mbar	G20Y20	25 mbar	G30/G31	30 mbar
CY, MT	I3B/P					G30/G31	30 mbar
LV*	I12H3B/P, I2HY20	G20	20 mbar	G20Y20	20 mbar	G30/G31	30 mbar
IS	I3P					G31	37 mbar
PL	I12ELwLs3B/P, I2EY20	G20/G27/ G2.350	20/20/13 mbar	G20Y20	20 mbar	G30/G31	37 mbar

(*) Gas Category in accordance with the declaration of the Member State pursuant to Art. 4, paragraph 1 of Regulation (EU) 2016/426 (ref. Official Journal EU 2018/C 206/01)

(G20Y20) The suffix "Y20" means that the equipment is suitable for operation with natural gas and a natural gas mixture with 20% hydrogen.

The following information is clearly printed on the heater 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.



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.



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	[%] ±0.2	8.8	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
OXYGEN	[%] ±0.4	5.3	4.7	5.3	4.7	5.3	4.7	5.3	4.7	5.3	4.7	5.3	4.7	5.3	4.7
AIR EXCESS		1.34	1.29	1.34	1.29	1.34	1.29	1.34	1.29	1.34	1.29	1.34	1.29	1.34	1.29
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	8.9	8.8	9.2	8.8	9	8.6	9.1	8.8	9	8.8	9	8.8	9
OXYGEN	[%] ±0.4	5.3	4.6	4.9	4.2	4.9	4.6	5.3	4.4	4.9	4.6	4.9	4.6	4.9	4.6
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	
* 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
OXYGEN	[%] ±0.4	4.9	4.6	4.7	4.4	4.9	3.8	5.1	4.4	4.9	3.8	4.9	3.8	4.9	3.8
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
OXYGEN		5.4	4.3	5.4	4.6
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
OXYGEN	[%] ±0.4	6.6	5.8	6.3	5.7	6.2	5.8	5.5	4.7	6.2	5.8	6.2	5.8	6.2	5.8
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

⁽³⁾ Maximum rated heat input 282.0 kW

⁽²⁾ Maximum rated heat input 188.0 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⁾		AH420 ⁽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
OXYGEN	[%] ±0.4	5.0	4.2	5.2	4.8	5.3	5.0	5.0	4.2	5.3	5.0	5.3	5.0	5.3	5.0
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

⁽⁴⁾ Maximum rated heat input 188 kW

⁽²⁾ Maximum rated heat input 94 kW

⁽⁵⁾ Maximum rated heat input 282 kW

⁽³⁾ Maximum rated heat input 150 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] - 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]	0.63	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
OXYGEN	[%] ±0.4	4.8	3.8	5.0	4.1	5.4	5.1	5.9	5.6	5.4	5.1	5.4	5.1	5.4	5.1
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
OXYGEN	[%] ±0.4	6.9	6.1	6.6	6.3	6.4	6.0	6.7	6.3	6.4	6.0	6.4	6.0	6.4	6.0
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. First start-up

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

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

To turn on the heater, follow the instructions below:

- Check that the display shows RDY; if OFF is displayed instead, work on the control Smart X Web to set the device to ON;
- Check that the An1 value is higher than the Von = R42+R43 value on the LCD screen.

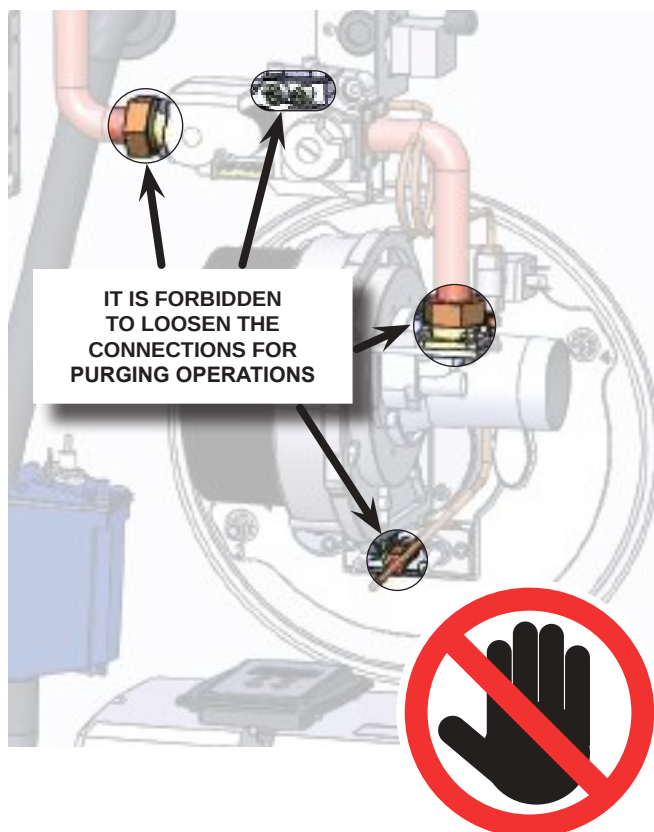
When HEA appears on the LCD display, the heater starts the ignition cycle.



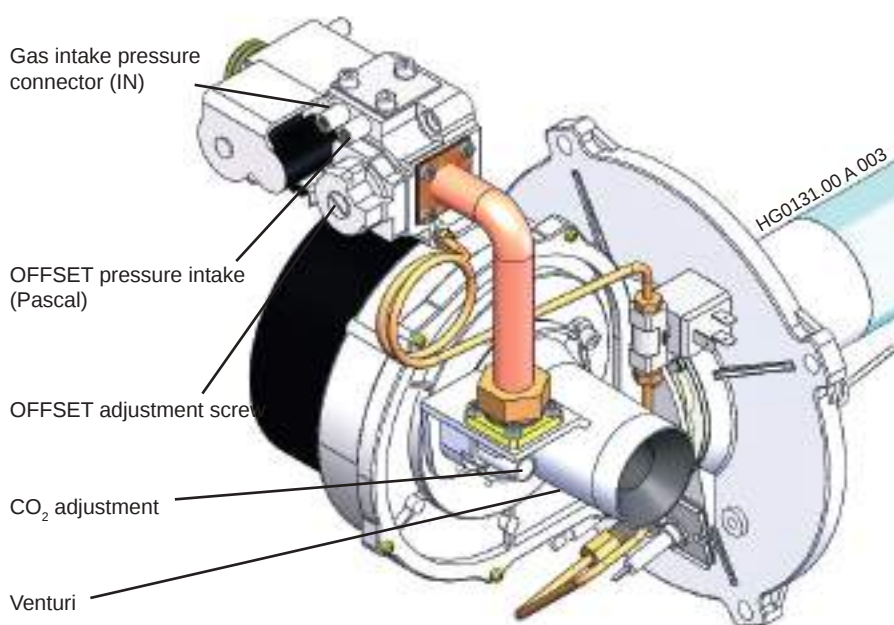
Frequently, when turned on for the first time, the pilot burner cannot ignite because there is air in the gas pipe. This will lock out the equipment. You will need to reset the equipment and repeat the operation until it ignites.



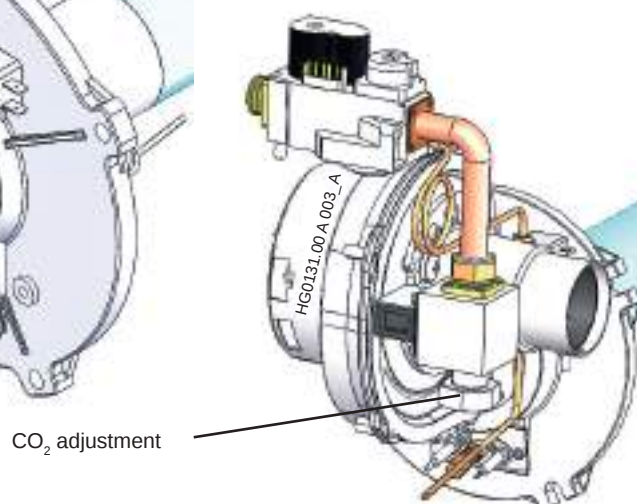
IT IS FORBIDDEN to loosen the gas connections, the pressure connectors, the pilot burner duct, or any other gas connection point located inside the burner housing, to purge the air or inert gas that may be present inside the main feeding piping. The purging of air or inert gas from gas feeding lines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



For models: AH034, AH065, AH160



For models: AH105, AH210, AH320, AH420



6.9. Analysis of combustion

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

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

At maximum output, check again that the input pressure in the valve corresponds to the value required; adjust if necessary.

Perform the combustion analysis to verify that the level of CO₂ corresponds to the figures in the tables in Paragraph 6.7 "GAS Settings".

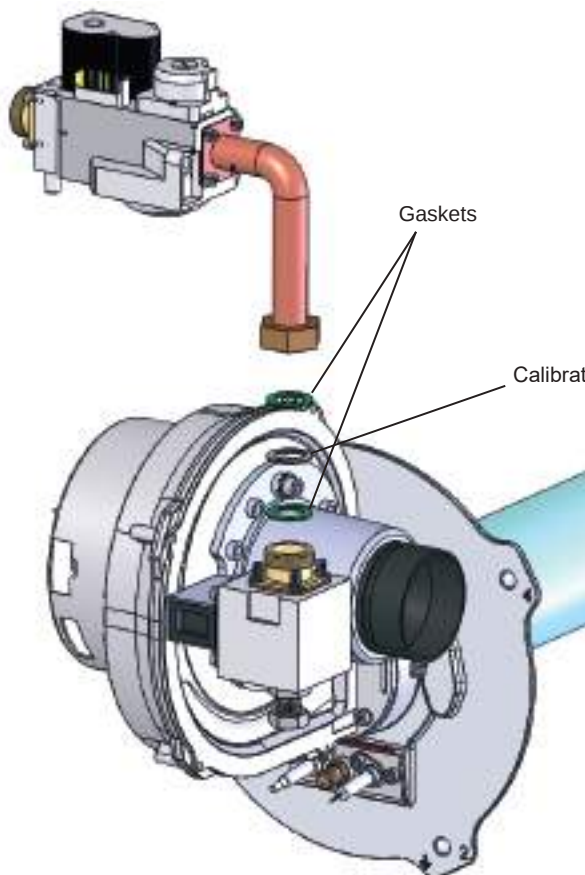
If the measured value is different, turn the adjustment screw on the Venturi pipe. Loosening the screw will increase the CO₂ level, screwing it down will decrease the level.

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". If the values do not match, screw or loosen the offset screw respectively to increase or decrease the CO₂ level and repeat the procedure.



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 6.7 "GAS Settings Tables".

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 equipped with the kit for conversion to LPG, which comprises:

- calibrated gas orifice plate;
- pilot nozzle;
- adhesive plate "Equipment converted...".

The kit is not supplied in countries where conversion is prohibited.

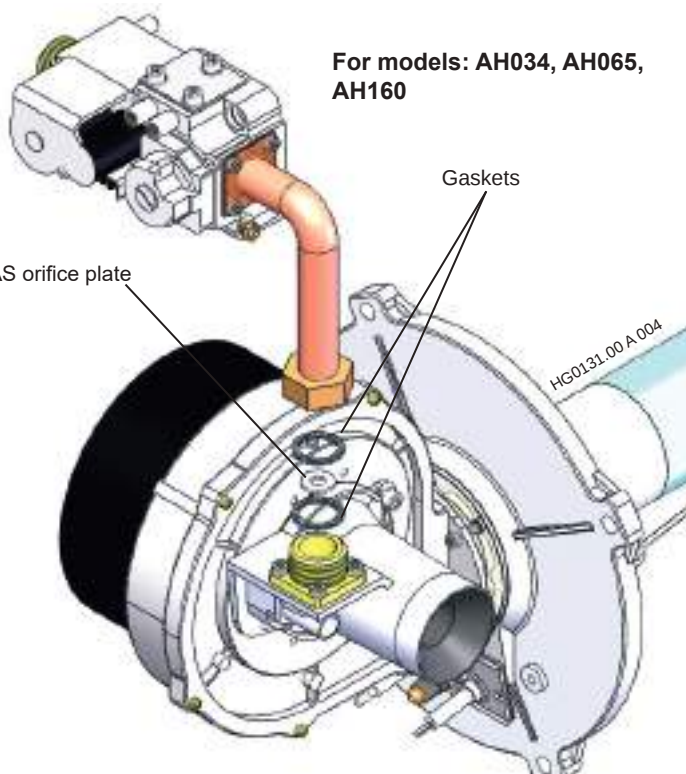
To convert the unit, follow these instructions:

- disconnect from power supply;
- between the gas pipe and the Venturi, replace the gas orifice plate fitted (natural gas) with the one supplied with the kit (for LPG);
- replace the pilot nozzle (natural gas) with the one in the kit (LPG);
- restore power supply and set the heater up for ignition;
- while the start-up electrode is sparking, make sure there are no gas leaks.

When the burner is lit and working at maximum capacity, verify that:

- the valve intake pressure corresponds to the value required for the type of gas that you are using;
 - the combustion analysis procedure is performed as described in Paragraph 6.09 "Combustion Analysis";
 - the level of CO₂ is within the limits indicated for the type of gas being used (tables in Paragraph 6.7 "GAS Settings"). 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 II2EK3B/P [Netherlands from 01/01/2018] the unit is supplied already set up and regulated for G25.3.

For category I2E countries, where conversion from G20 to G25 is not permitted [Belgium], the unit is supplied set for operation with G20 gas.

Conversion from one type of gas to another can only be performed by authorised service centres.

Conversion to G25 and/or G25.1, G25.3, G27 where possible, consists in:

- insertion of orifice plate (according to the gas type and the equipment model)

After the conversion, relight the burner and:

- check that the intake pressure to the gas valve corresponds to the level required for the type of gas [see tables in Paragraph 6.7 "Gas settings 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".



Always pay close attention to the level of CO₂ in G25.1; for G25.1 minimum and maximum heat output in the AH105, AH210 and AH420 models will always be lower than when used with G20.



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 ...".



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

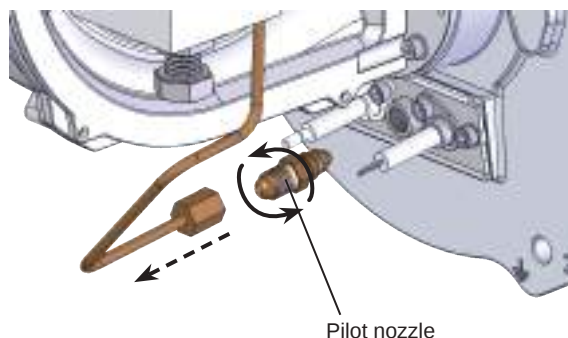
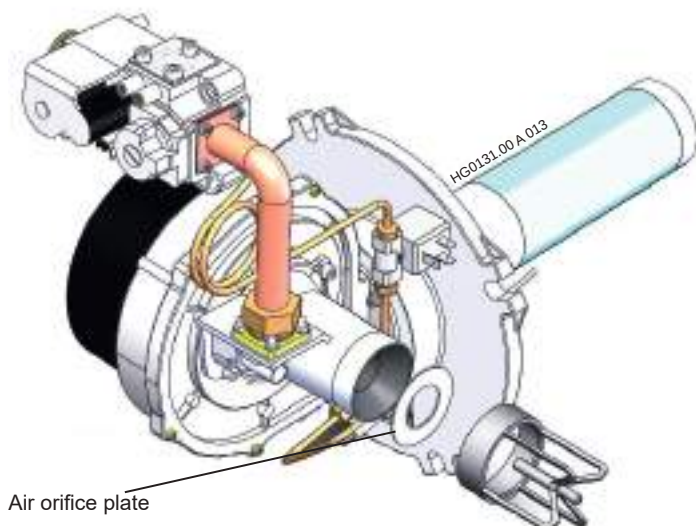
6.13. Replacing the Gas Valve

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 6.09 "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 modulation PCB, it is required to carry out some essential operations, described below.

1. Disconnect voltage to the module
2. Disconnect all terminals from the CPU PCB
3. Remove and store the EEPROM memory card
4. Disconnect the TER safety PCB
5. Remove and replace the CPU modulation PCB
6. Position the new CPU PCB, insert the previously stored EEPROM memory card

(The EEPROM card contains all the configured parameters, by inserting it into the new CPU, it is not necessary to reprogram the parameters)

7. Reconnect the TER safety PCB and all terminals respecting the original positions.

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.

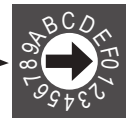
Remove the connection terminals, unscrew the box fixing screws and extract the equipment.

Replace the equipment by repeating the operations in reverse order.

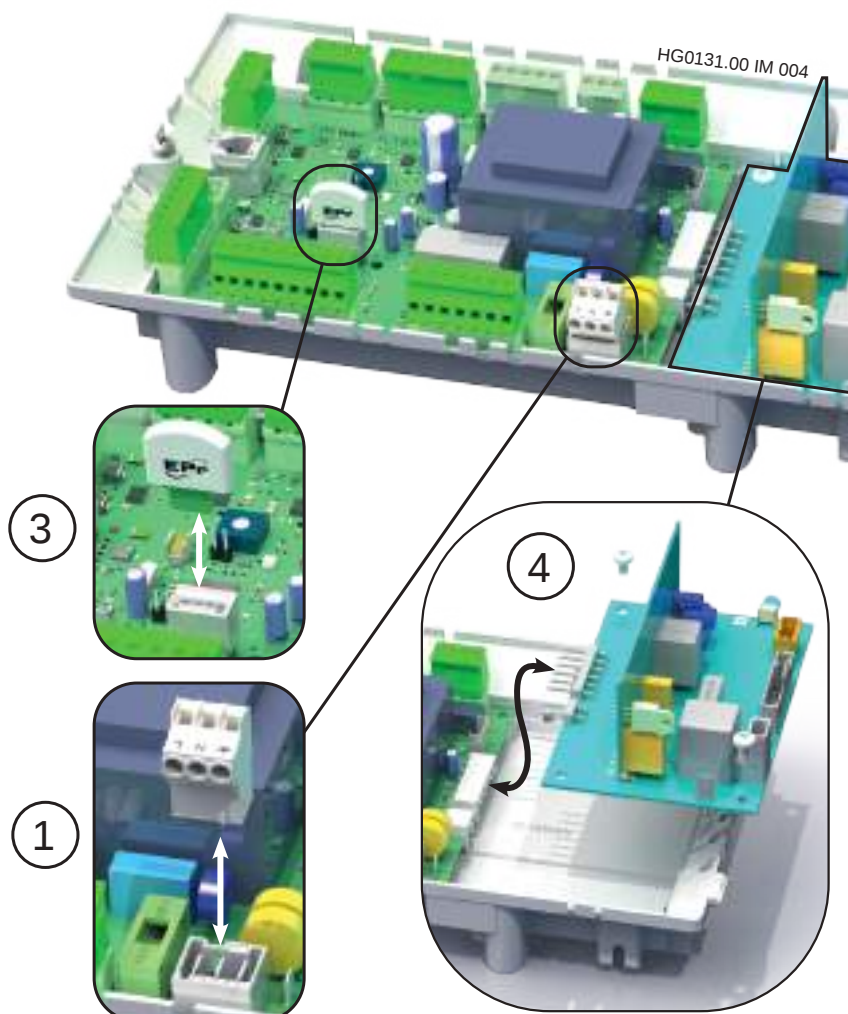
No hardware or programming adjustments are required.

Check the hardware configuration of the PCB

Modify the address of the PCB with the switch selector, copying that of the PCB that was just replaced.



Switch for CPU PCB address



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



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 1 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	●	



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.

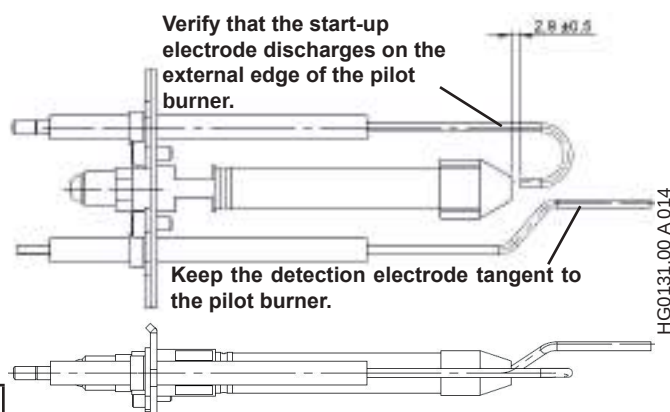


Every time the condensate drain trap or parts of it (e.g.: electrodes) are cleaned, it is necessary to replace all the gaskets involved

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

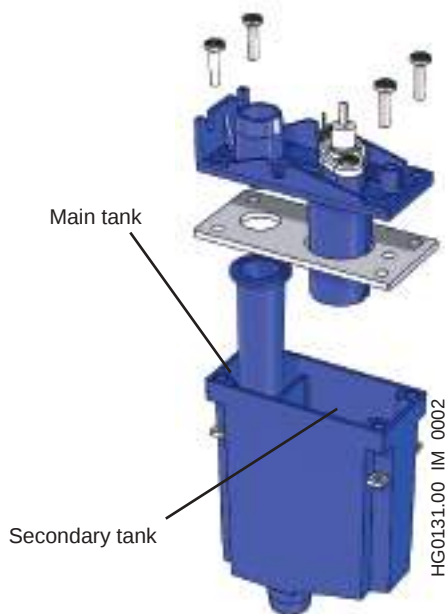
Good combustion in PCH heaters prevents dirt, which is normally caused by bad combustion. It is advisable, therefore, to not clean the exchanger and burner unless there are exceptional circumstances. An accumulation of dirt inside the exchanger could be revealed by a considerable variation in the gas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



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 EF10. 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 [24 V], remove the fast-on from the safety thermostat, wait for the E20 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 [24 V], remove the fast-on from the safety thermostat, start the ignition cycle and wait for the E22 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

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

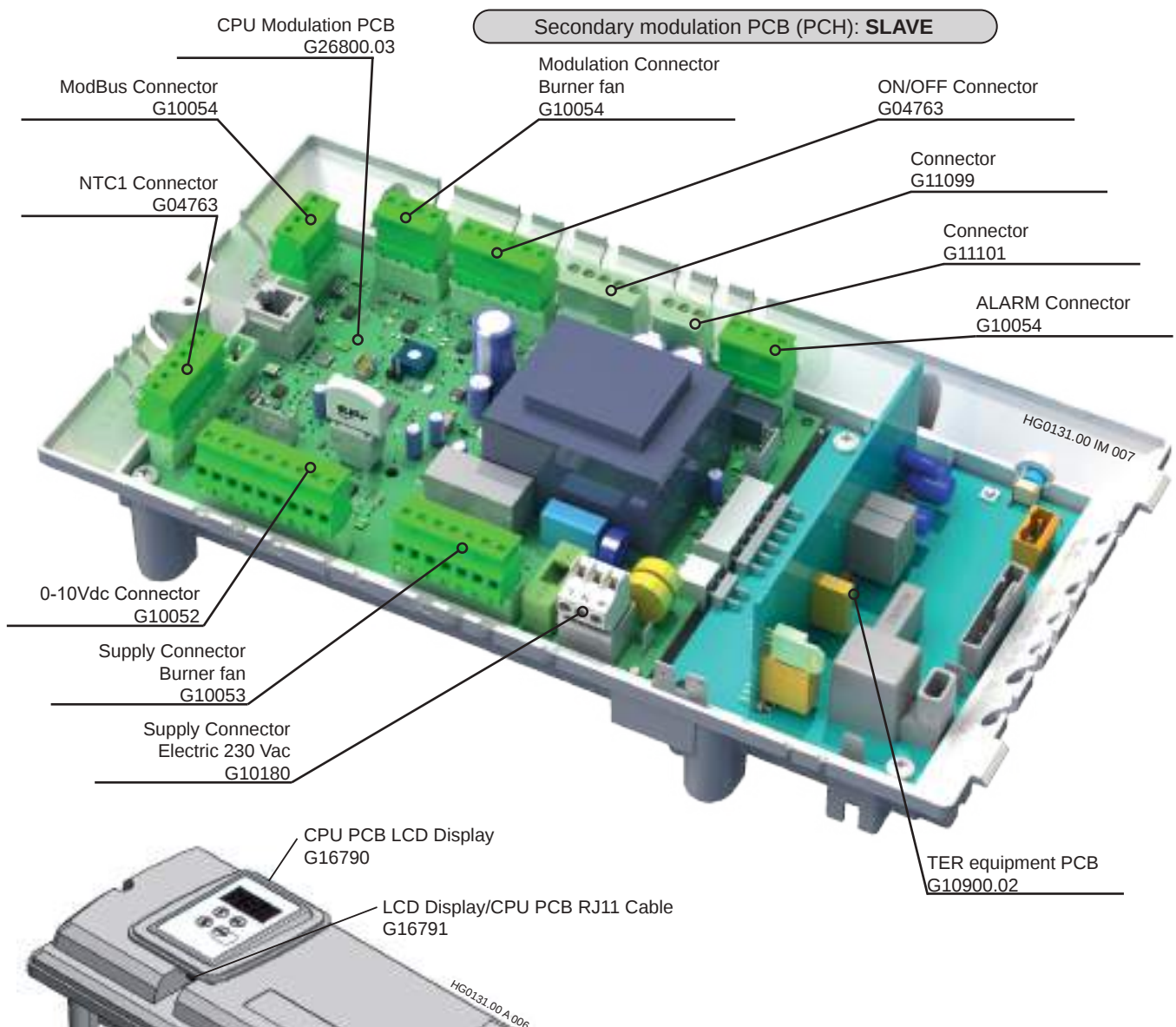
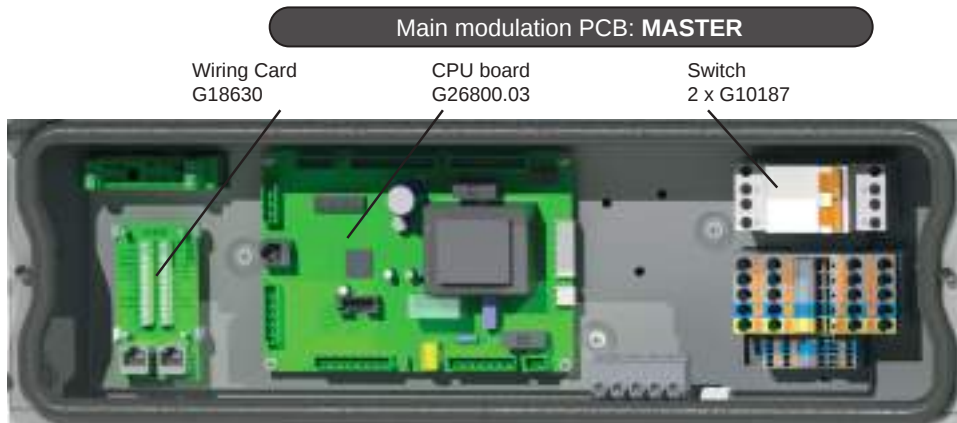
14) Inspection and cleaning of the outdoor air intake shutter

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

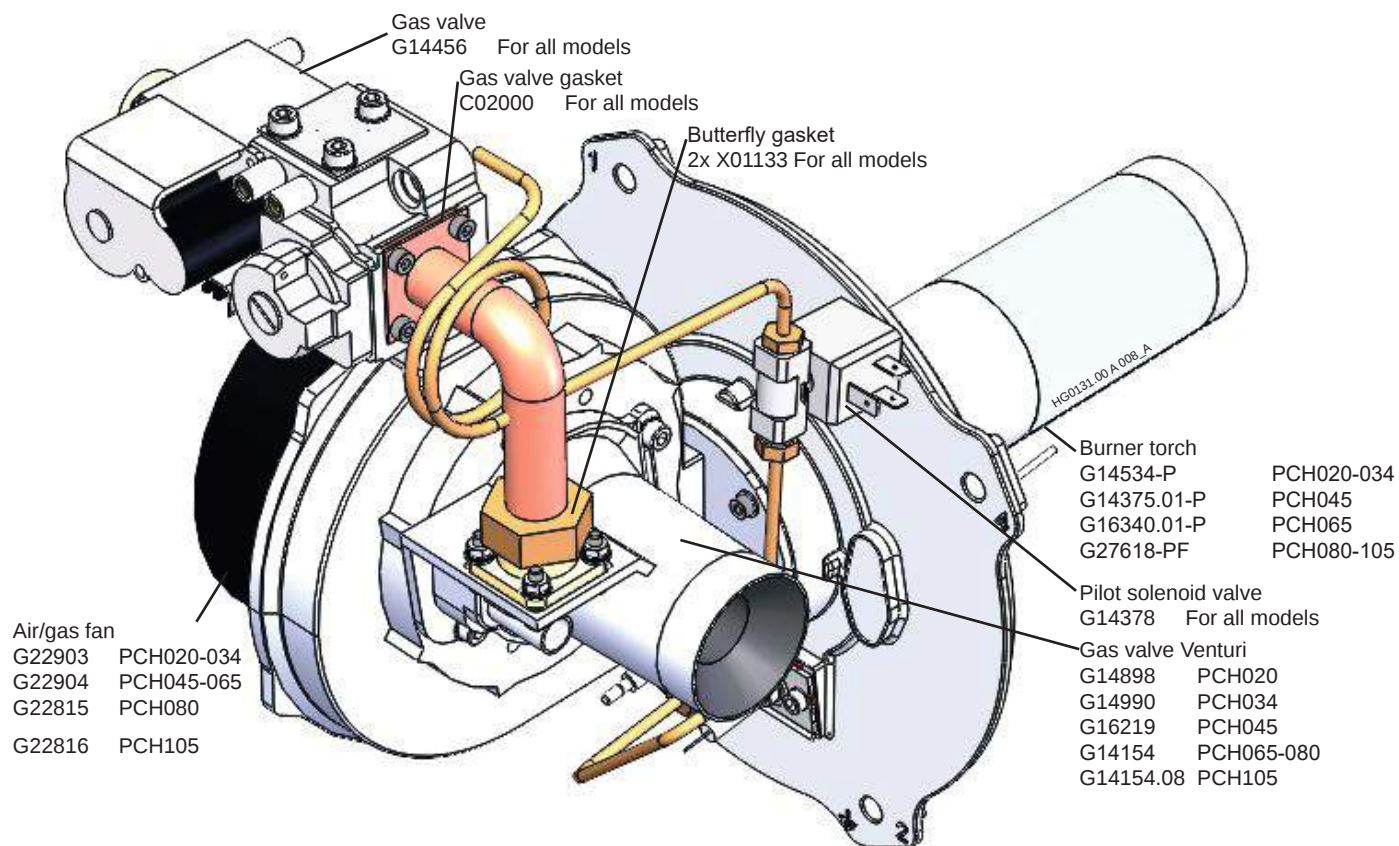
8. LIST OF SPARE PARTS

8.1. Parts for the control panel

Smart X Web remote control
G29907.03



8.2. Parts for the burner unit



Pilot flame unit
G28030.01
G28030.01-1

G20.
LPG.

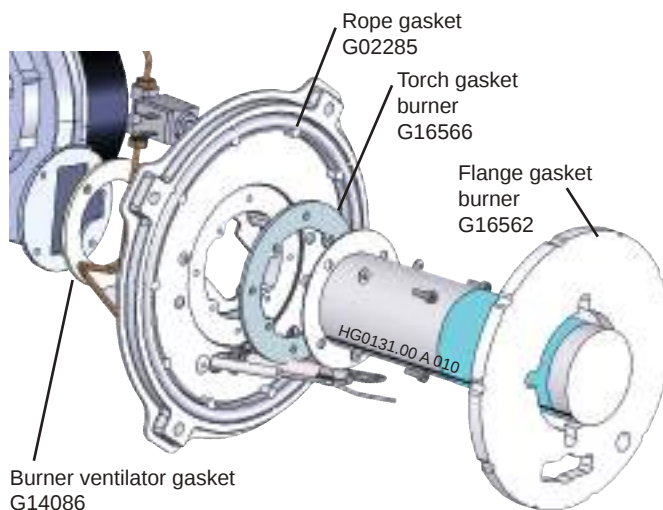
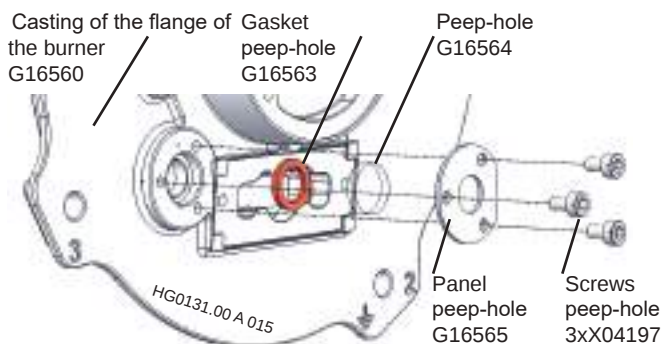
Detection electrode
G16334.02

Start-up electrode
G16333.02

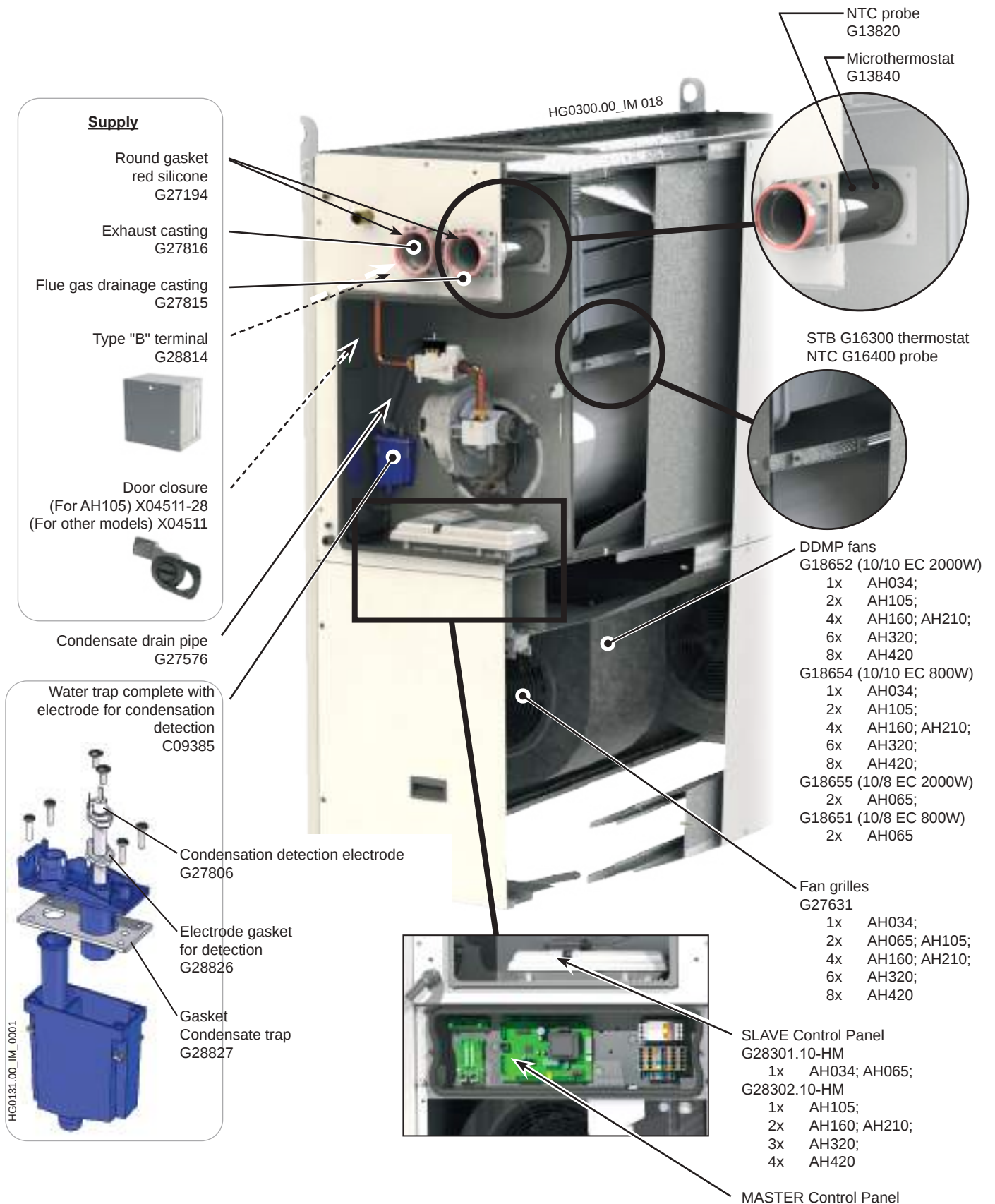
Pilot gasket
G16561

Detection cable
G27511

Start-up cable
G14062.01



8.3. Other spare parts available



Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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