GB

PK series floor standing warm air heater use, installation and maintenance manual

Capacities from 100 to 550 kW

Efficiency up to 101%

Reduction of thermal stratification

For Indoor and Outdoor Use

CPU with EEPROM version .03

ErP 2021 Compliant EU/2016/2281

CE UKCA

VER. 01.2020

Dichiarazione di Conformità
Statement of Compliance

APEN GROUP S.p.A.
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Tel +39.02.9596931 r.a.
Fax +39.02.95742758
Internet: http://www.apengroup.com

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

Modello: ***Model:***	**Generatore a basamento PK PKA-N, PKA-K, PKA-R, PKE-N, PKE-K, PKE-R** ***Floor Standing Heater PK PKA-N, PKA-K, PKA-R, PKE-N, PKE-K, PKE-R***

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/UE**
  Gas Appliance Regulation 2016/426/UE
- **Direttiva Bassa Tensione 2014/35/UE**
  Low Voltage Directive 2014/35/UE
- **Direttiva Compatibilità Elettromagnetica 2014/30/UE**
  Electromagnetic Compatibility Directive 2014/30/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

Valido solo per gli accoppiamenti generatore-bruciatore indicati dal costruttore (vedere manuale)
Valid only for the heater-burner matching specified by the manufacturer (see manual)

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

- **EN17082:2020**
- **2017/C 229/01**
- **EN60335-1**
- **EN60335-2-102**

Organismo Notificato:
Notified body:
Kiwa Cermet Italia S.p.A
0476
PIN 0476CT2224
Nr. KIP-17155/G

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, 13/11/2024

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

CODE

SERIAL NUMBER

VER. 05.2023

UK Declaration of Conformity

APEN GROUP S.p.A.
20042 Pessano con Bornago (MI)
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Tel +39.02.9596931 r.a.
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Internet: http://www.apengroup.com

With this document we declare that the unit:

Model:	***Floor Standing Heater PK PKA-N, PKA-K, PKA-R, PKE-N, PKE-K, PKE-R***

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:

- **EN17082:2020**
- **2017/C 229/01**
- **EN60335-1**
- **EN60335-2-102**

Notified body:
Kiwa UK
0558
PIN 0476CT2224

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

Pessano con Bornago
10/05/2023

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

CODE SERIAL NUMBER

TABLE OF CONTENTS

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

"First 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

The heater must be matched to a suitable burner, using the fuel chosen for the equipment.
The burner shall use the type of fuel it is set for, which is specified on the equipment plate and in technical specifications in burner's Manual.
In case of a gas burner, the pressure of the gas supplying the burner and the combustion head must be within the range of values indicated in the manual.

On K and R series condensing heaters, only gas burners can be used.

Before starting the burner/heater, check that:

- the gas mains supply data are compatible with the data stated on the nameplate;
- the combustion air is supplied in such a way as to avoid even partial obstructions of the intake grille;
- the gas seal of the feeding system has been tested and approved in compliance with the applicable standards;
- the heater burner is supplied with the same type of fuel it has been designed for;
- the 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.

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 disconnector outside the unit;
- call for **qualified staff**;
- call the **Fire Brigade.**

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 CO_2 with the burner working at maximum output rate and the room ventilated only through the air vents for the burner and then measure again with the door closed.
$C0_2$ value must be the same under both conditions. If in the same room there are several burners or aspirators that can work together, measure with all the equipment working at the same time.
Do not obstruct the room air vents, the burner fan intake opening, any air ductwork and intake or dissipation grilles, avoiding in this way:
- stagnation in the room of any toxic and/or explosive mixture;
- smouldering combustion: dangerous, expensive, pollutant.

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

2.6. 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.

2.7. Transport and Handling

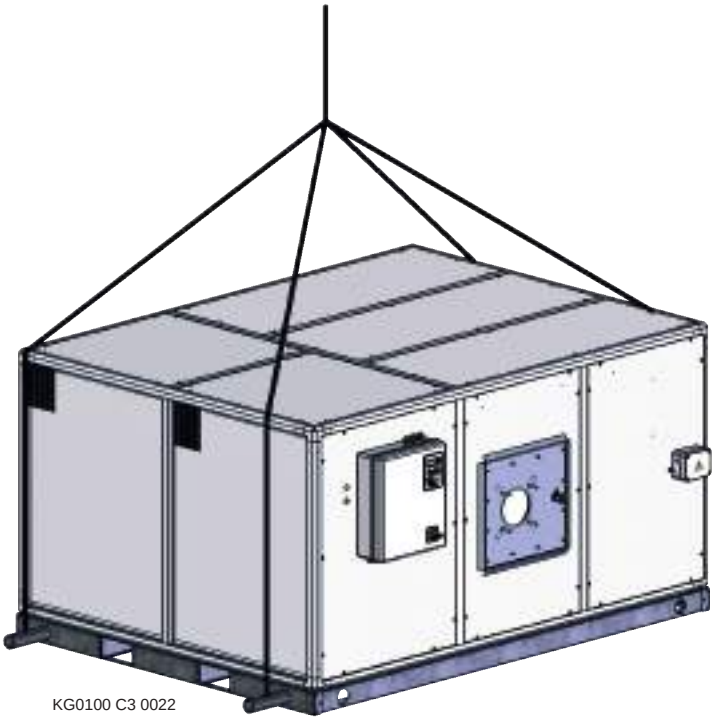
Vertical heaters are delivered fastened to a pallet. Horizontal heaters have their own base.
Unload the heater from the truck and move it to the site of installation by using means of transport suitable for the shape and for the weight of the load.
Any lifting and transport operations must be carried 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 exchanger.
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.

KG0100 C3 0020

If a crane is to be used, insert in holes in heater base rods with a suitable lifting resistance and install protections to prevent crane ropes from damaging heater body.
Once the equipment is moved to the correct position, the unpacking operation can be started.

KG0100 C3 0021



KG0100 C3 0022

2.8. 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.

2.9. 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.

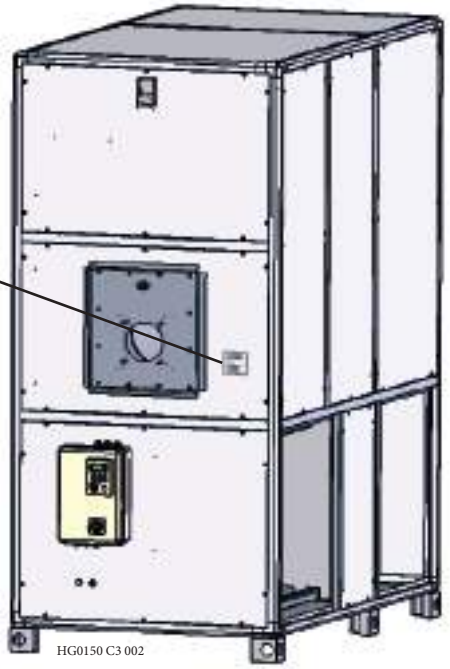
All materials recovered will be processed and disposed of according to what provided for by the laws in force in the country of use and/or according to the standards indicated in the safety sheets of the chemicals.

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

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

2.10. How to Identify the Heater

PK warm air heaters can be identified using their nameplate, stuck on the front of the unit.
The nameplate shows all the data needed for identifying the heater model.
When contacting your local Service Centre, please note the heater model and serial number indicated on the plate and use them to identify the machine you purchased.



Heater Code:

PK	E	190	R	-	2	H	W

Heater

Version:
A (indoor);
E (outdoor).

Capacity

Series:
Standard non-condensing N series
ERP2021 condensing K series
ERP2021 condensing R series and η>90+2LogPn (Italy)

Available head pressure: (values are indicative in the technical data tables)
1 - medium head pressure
2 - high head pressure

Installation:
H - Horizontal
0 - Vertical

Control panel implemented for accessory management

3. TECHNICAL FEATURES

3.1. Main Components

Warm air heaters are designed for indoor air heating.
Warm air heaters include:
- stainless steel heat exchanger
- frame and body
- centrifugal fan and electrical motor
- control panel and settings
- safety devices and controls

Stainless steel heat exchanger

The innovative design and large surface of the combustion chamber and heat exchanger pipes ensure optimum efficiency and durability.
Combustion chamber and flue gas collectors are completely made of AISI 441 stainless steel with low carbon content, as well as the surfaces in contact with flue gases (tube bundle) in order to ensure a high resistance to corrosion.
Tube bundle design is patented.

Characteristics of steel types used

The following table shows naming correspondence of the steel types used to manufacture our exchangers:

USA -AISI	EN - No.	Composition
AISI 441	1.4509	X2 CrTiNb 18

Heater's heat exchanger can work also under conditions that lead to condensation (if equipped with the necessary accessories) only if the relevant burner is supplied with gaseous fuel.

Frame and body

The frame consists of solid anodised aluminium bars. The frame is assembled with demountable parts allowing, in special cases such as door crossing, to disassemble and reassemble the heater completely.
Body panels are formed by:
- on the exchanger side: double-layered panels with inner galvanized steel sheet, high-density glass fibre insulation, external painted galvanized steel sheet, all riveted to allow an easy and safe removal of the panel during maintenance.
- on the fan side: painted galvanized steel sheet with inner layer for thermal and sound isolation, securely fastened to steel panel.

All panels feature a gasket for a perfect sealing against air leaks.

Centrifugal Fan

Standard centrifugal fans installed (AT and ADH models) are made of galvanised steel sheet with forward curved blades and low noise of operation.
Fans are fixed on hermetic ball bearings which are self-aligned and assembled inside rubber dampers.
Fans for square duct are used: driven by means of fixed diameter pulleys and belts, three-phase motor.
No lubrication is required on standard fans. For special fans, check specific requirements.

Operating Temperatures:
- belt drive -20°C +45°C

The following fans are available on demand:
- backward curved blades
- plug fan, directly driven by the motor and controlled through inverter
- fans for temperatures lower than -20°C

Electrical Motor

All motors used have the following features:
- Supply 400Vac - Three-phase - 50 Hz
- Structure B3 - with terminal board above
- Protection rating IP55
- Isolation level cl.F
- Efficiency IE3

For more model-related information on motors, see further in this Manual.
If required, motors with the following characteristics can be supplied:
- various supply voltages, electrical features and physical shapes;
- motors for low temperatures (below -30°C)
- motors with class H isolation
- tropicalised motors
- motors with internal heat protection, thermostat, or PT100 or PTC probe.

Control Panel and Settings

Standard control panel includes:
- oven-varnished metal box
- quadripolar switch-disconnector, padlockable, with door lock
- protection from overheat and short circuit for each motor
- fuse-protected wiring board to control heater, safety devices and burner.
- for motors with power equal to 5.5 kW it is supplied with soft starter.

The standard panel allows room temperature setting. The setting depends on the burner installed. The following types are available:
- two stages, high/low flame
- modulating.

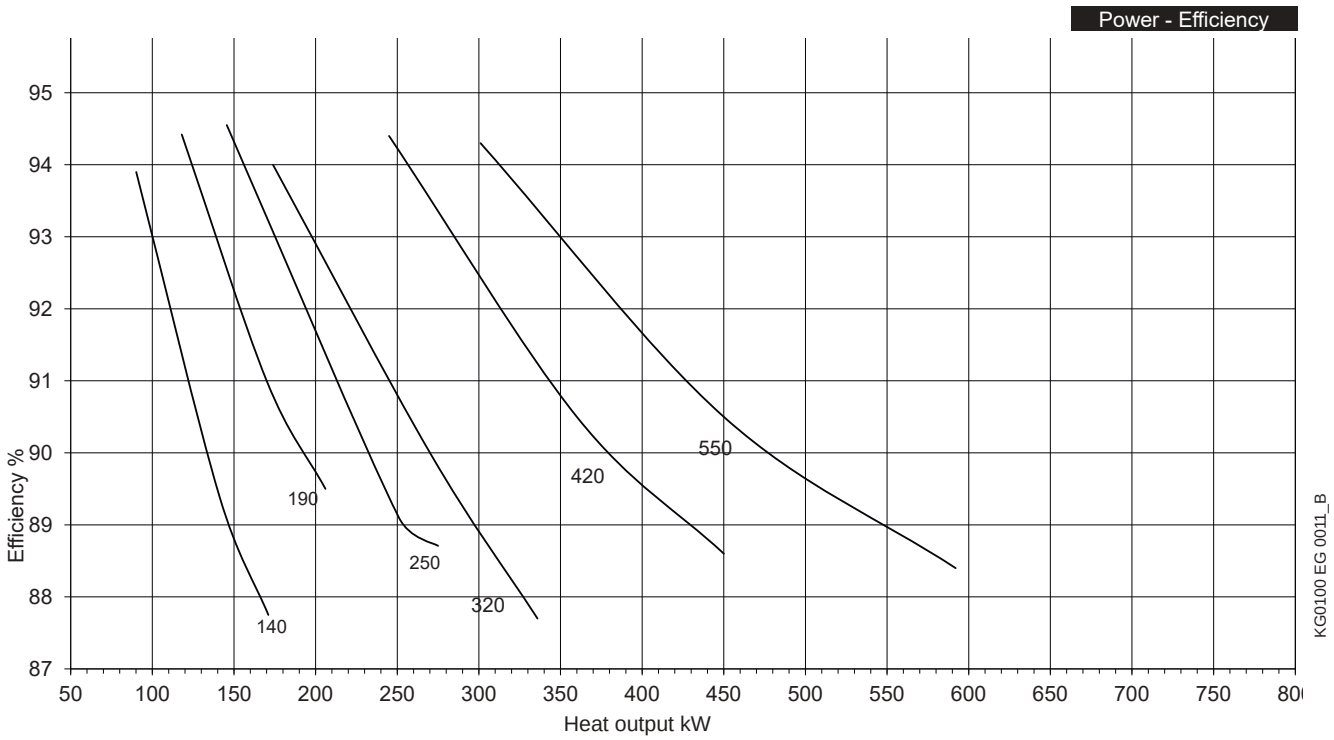
Safety Devices and Controls

All heaters are supplied with:
- STB manual reset safety thermostat, inside the air flow, which switches off the burner immediately if the temperature is high.
- NTC probe in the delivery duct, modulates and/or stops the burner operation before the safety thermostat activates.

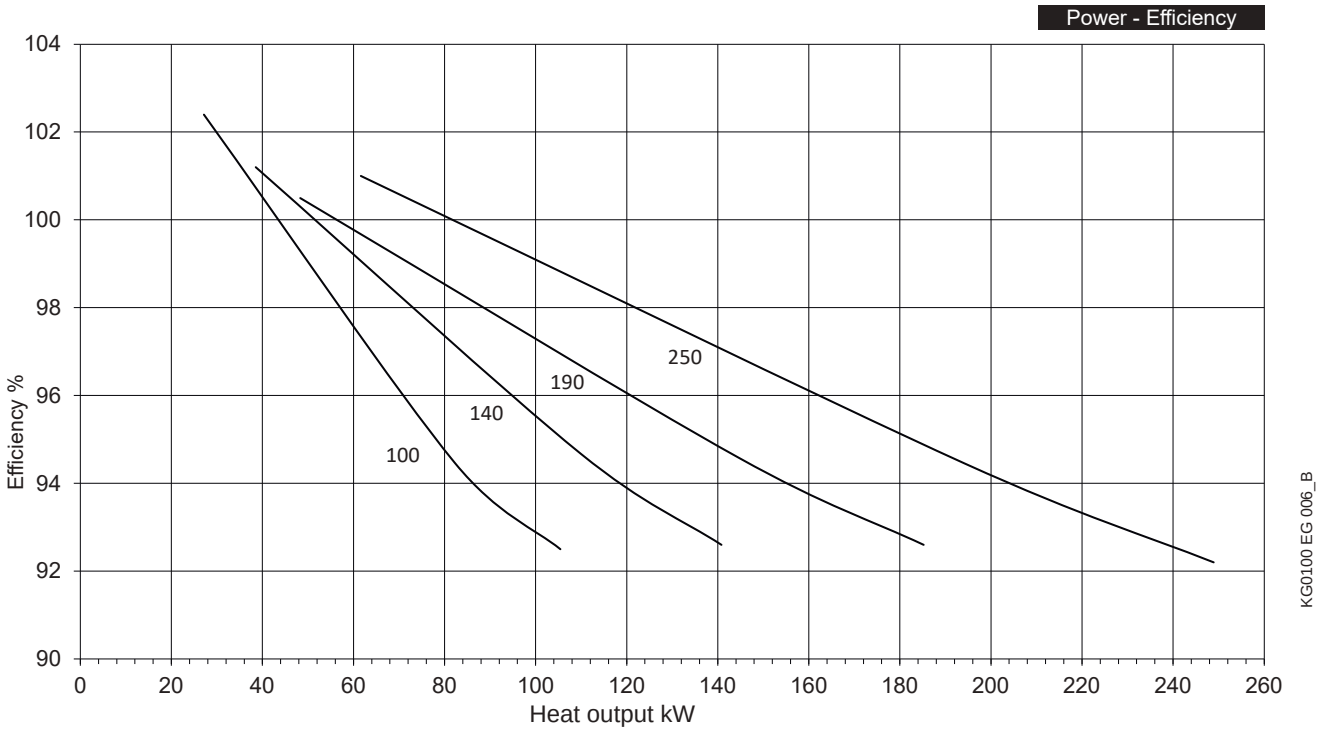
3.2. Choosing the Heater

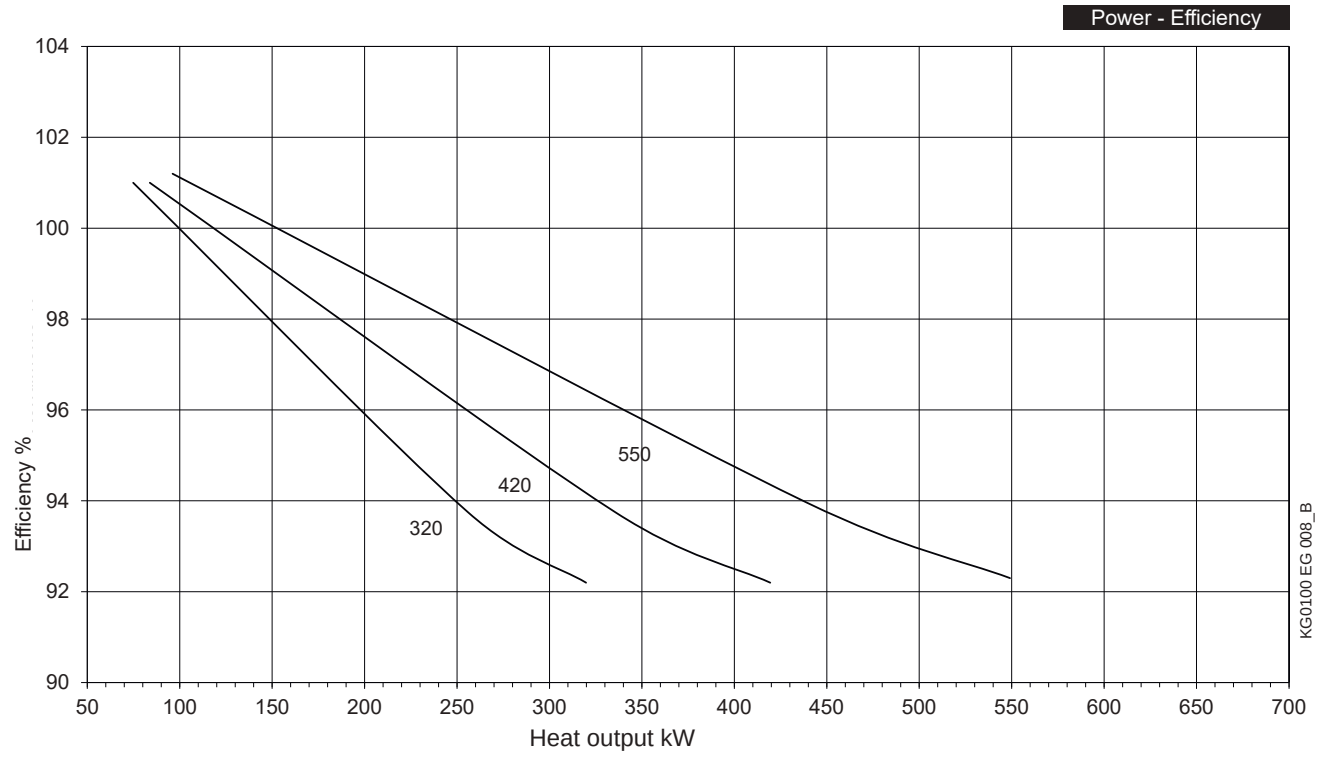
Heaters are available in condensing versions (K and R series respectively) and in non-condensing version (N series). The R series meets the performance requirements of the regional resolutions of Lombardy, Emilia Romagna, and Piedmont, and the requirements of the Italian Ministerial Decree of 26/06/2015 as amended and supplemented for replacements. At European level, a matching with low NOx burners is required in order to comply with the imposed regulatory limitations.
Heaters are supplied with heat exchanger, fan unit and control panel to be installed indoor or in a sheltered position (PKA). Those for outdoor installation (PKE) are supplied with heat exchanger, fan unit, control panel and burner casing to be positioned outdoor.
A work field has been tested and approved for each heater. This field allows the heater to be used at different power and efficiency levels based on effective output power. When choosing a heater model, the following criteria have to be taken into account: its use, service type (season or all year long), matching burner type (two stages or modulating).

3.2.1. Diagrams of output heat/efficiency ratio of PK-N heaters

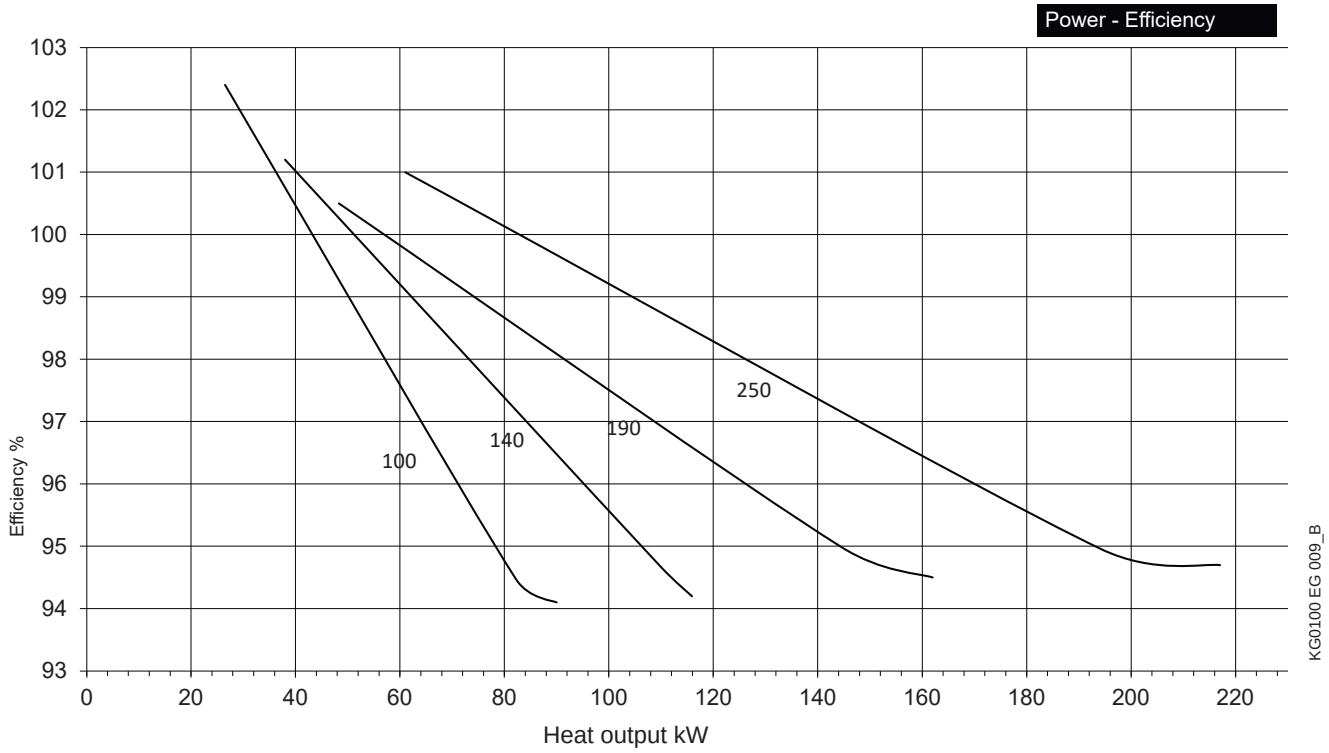


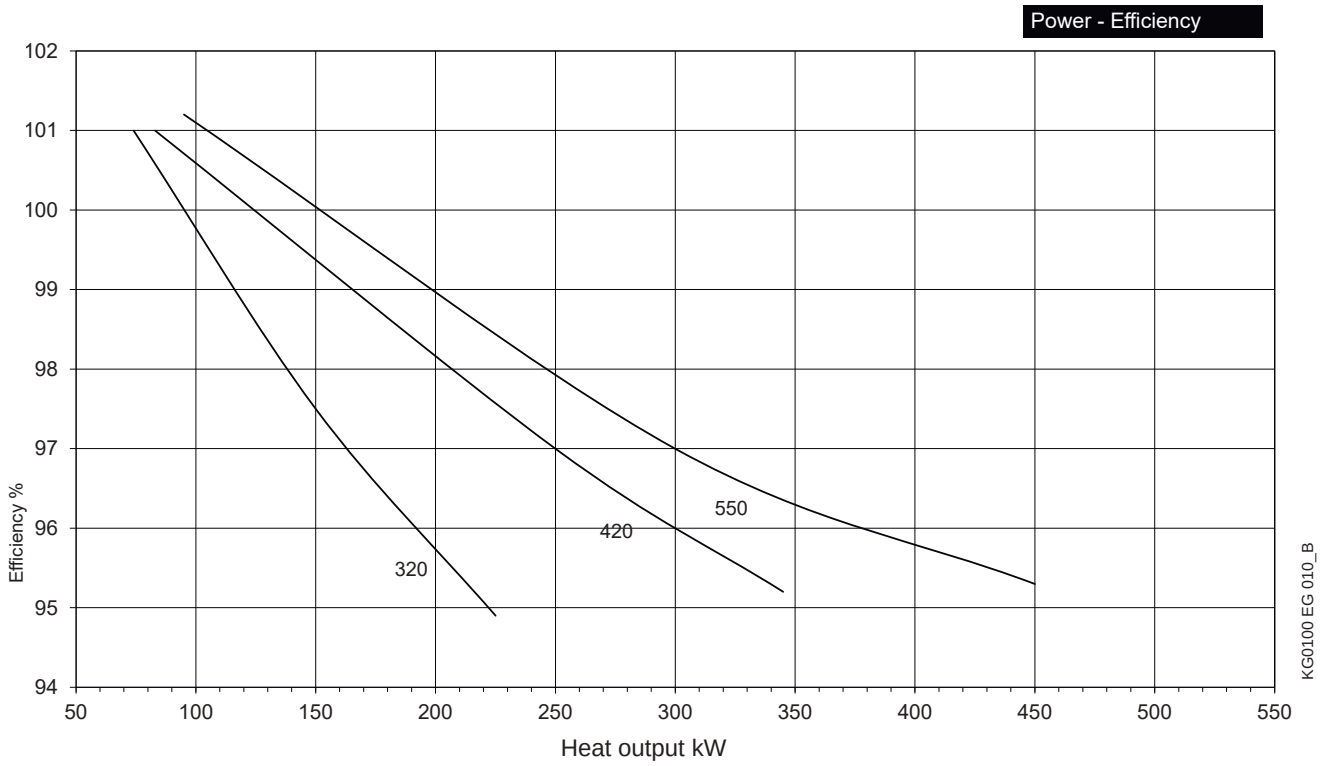
3.2.2. Diagrams of output heat/efficiency ratio of PK-K heaters





3.2.3. Diagrams of output heat/efficiency ratio of PK-R heaters





3.3. Technical Data

3.3.1. Heat input and efficiency data of PK-N heaters

Model			PKA140N		PKA190N		PKA250N		PKA320N		PKA420N		PKA550N	
Type of appliance			B23											
EC approval			0476CT2224											
NOx Class EN 17082	NO_x		CLASS 5**											
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	P_{min}; $P_{ated,h}$	kW	96.0	195.0	115	230.0	154.0	310.0	185.0	380.0	260	508	320	670
Useful Heat Output		kW	90.2	171.0	108.1	205.9	145.0	275.0	173.9	335.9	245	450	301	592
Combustion Efficiency (Hi)	η_{pl}; η_{nom}	%	94.0	87.7	94.0	89.5	94.0	88.7	94.0	87.7	94.4	88.6	94.3	88.4
Combustion Efficiency (Hs)		%	84.7	79.0	84.7	80.6	84.7	79.9	84.7	79.0	85.0	79.8	85.0	79.6
Seasonal heating energy efficiency	$\eta_{s,h}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual											
Output efficiency	$\eta_{s,flow}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual											
Chimney loss - Burner ON (Hi)		%	6.0	12.3	6.0	10.5	6.0	12.3	6.0	12.3	5.6	11.4	5.7	11.6
Chimney loss - Burner OFF		%	< 0.1		<0,1		<0,1		< 0.1		< 0.1		< 0.1	
Casing losses *	F_{env}	%	1.26		1.16		1.17		1.02		1.03		0.97	
Combustion Chamber pressure		Pa	13	50	10	40	10	50	15	60	28	120	21	110
Combustion Chamber volume		m^3	0.37		0.52		0.76		1.06		1.55		1.79	

* Heat loss of the casing must be considered only when heater is installed outdoor or in a thermal station. If the heater is installed into a building, heat is irradiated inside, so losses are zero.

** With CLASS 3 GAS BURNERS according to EN676

3.3.2. Heat input and efficiency data of PK-K condensing heaters

Model			PKA100K		PKA140K		PKA190K		PKA250K	
Type of appliance			B23							
EC approval			0476CT2224							
NOx Class EN 17082	NO_x		CLASS 5**							
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	P_{min}; $P_{ated,h}$	kW	26.5	114	38.0	152.0	48.0	200.0	61.0	270.0
Useful Heat Output		kW	27.1	105.4	38.5	140.8	48.3	182.2	61.6	248.9
Combustion Efficiency (Hi)	η_{pl}; η_{nom}	%	102.4	92.5	101.2	92.6	100.5	92.6	101.0	92.2
Combustion Efficiency (Hs)		%	92.3	83.3	91.2	83.4	90.5	83.4	91.0	83.1
Seasonal heating energy efficiency	$\eta_{s,h}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual							
Output efficiency	$\eta_{s,flow}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual							
Chimney loss - Burner ON (Hi)		%		7.5		7.4		7.4		7.8
Chimney loss - Burner OFF		%	< 0.1		< 0.1		<0,1		< 0.1	
Casing losses *	F_{env}	%	1.81		1.26		1.16		1.17	
Combustion Chamber pressure		Pa	14	100	15	140	15	130	19	175
Combustion Chamber volume		m^3	0.24		0.37		0.52		0.76	

Model			PKA320K		PKA420K		PKA550K	
Type of appliance			B23					
EC approval			0476CT2224					
NOx Class EN 17082	NO_x		CLASS 5**					
			MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	P_{min}; $P_{ated,h}$	kW	74.0	347.0	83.0	455.0	95.0	595.0
Useful Heat Output		kW	74.8	319.8	83.8	419.4	96.1	549.1
Combustion Efficiency (Hi)	η_{pl}; η_{nom}	%	101.0	92.2	101.0	92.2	101.2	92.3
Combustion Efficiency (Hs)		%	91.0	83.1	91.0	83.1	91.2	83.2
Seasonal heating energy efficiency	$\eta_{s,h}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual					
Output efficiency	$\eta_{s,flow}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual					
Chimney loss - Burner ON (Hi)		%		8.7		7.8		7.7
Chimney loss - Burner OFF		%	< 0.1		< 0.1		< 0.1	
Casing losses *	F_{env}	%	1.02		1.03		0.97	
Combustion Chamber pressure		Pa	15	225	30	275	40	365
Combustion Chamber volume		m^3	1.06		1.55		1.79	

* Heat loss of the casing must be considered only when heater is installed outdoor or in a thermal station. If the heater is installed into a building, heat is irradiated inside, so losses are zero

** With CLASS 3 GAS BURNERS according to EN676

3.3.3. Heat input and efficiency data of PK-R condensing heaters

Model			PKA100R		PKA140R		PKA190R		PKA250R	
Type of appliance			B23							
EC approval			0476CT2224							
NOx Class EN 17082	NO_x		CLASS 5**							
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	P_{min}; $P_{ated,h}$	kW	26.5	90.0	38.0	115.9	48.0	162.0	61.0	217.0
Useful Heat Output		kW	27.1	84.8	38.5	113.4	48.3	150.6	61.6	205.5
Combustion Efficiency (Hi)	η_{pl}; η_{nom}	%	102.4	94.1	101.2	94.2	100.5	94.5	101.0	94.7
Combustion Efficiency (Hs)		%	92.3	84.8	91.2	84.9	90.5	85.1	91.0	85.3
Seasonal heating energy efficiency	$\eta_{s,h}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual							
Output efficiency	$\eta_{s,flow}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual							
Chimney loss - Burner ON (Hi)		%		7.5		7.4		7.4		7.8
Chimney loss - Burner OFF		%	< 0.1		< 0.1		<0,1		< 0.1	
Casing losses *	F_{env}	%	1.81		1.26		1.16		1.17	
Combustion Chamber pressure		Pa	14	100	15	140	15	130	19	175
Combustion Chamber volume		m^3	0.24		0.37		0.52		0.76	

Model			PKA320R		PKA420R		PKA550R	
Type of appliance			B23					
EC approval			0476CT2224					
NOx Class EN 17082	NO_x		CLASS 5**					
			MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	P_{min}; $P_{ated,h}$	kW	74.0	275.0	83.0	345.0	95.0	450.0
Useful Heat Output		kW	74.8	256.5	83.8	325.8	96.1	430.1
Combustion Efficiency (Hi)	η_{pl}; η_{nom}	%	101.0	94.9	101.0	95.2	101.2	95.3
Combustion Efficiency (Hs)		%	91.0	85.5	91.0	85.8	91.2	85.9
Seasonal heating energy efficiency	$\eta_{s,h}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual					
Output efficiency	$\eta_{s,flow}$	%	According to the selected burner: see the “Attachment to the user-installation manual” code KG0270.xx supplied with this manual					
Chimney loss - Burner ON (Hi)		%		7.7		7.8		7.7
Chimney loss - Burner OFF		%	< 0.1		< 0.1		< 0.1	
Casing losses *	F_{env}	%	1.03		1.03		0.97	
Combustion Chamber pressure		Pa	23	225	30	275	40	365
Combustion Chamber volume		m^3	1.06		1.55		1.79	

***** Heat loss of the casing must be considered only when heater is installed outdoor or in a thermal station. If the heater is installed into a building, heat is irradiated inside, so losses are zero

** With CLASS 3 GAS BURNERS according to EN676

3.3.4. Air flow rate technical data, head pressure and installed power supply

Model		PKA100		PKA140		PKA190	
Version		10W	20W	10W	20W	10W	20W
Air Flow Rate - 15°C	m³/h	7300		10500		14000	
Available head*	Pa	150	270	140	280	150	230
Heat drop Min and Max*	K	28.3 - 38.0		23.8 - 45.2		23.4 - 40.8	
Power supply	V	400T+N		400T+N		400T+N	
Frequency	Hz	50					
Motor Max. capacity **	kW	1.5	2.2	3.0	4.0	3.0	4.0
Max. Absorbed power***	kW	1.91	2.72	3.63	4.73	3.63	4.73
Protection Rating	IP	PKA Series = IP20, PKE Series = IP24; PKA Control Panel = IP44, PKE = IP54					
Running temperature	°C	from -20°C to + 40°C (check running temperature of matching burner)					

Model		PKA250		PKA320		PKA420		PKA550	
Version		10W	20W	10W	20W	10W	20W	10W	20W
Air Flow Rate - 15°C	m³/h	18000		23000		30000		40000	
Available head*	Pa	130	250	210	320	180	270	180	280
Heat drop Min and Max*	K	22.4 - 42.4 9.5 - 38.4 (Series K)		21.1 - 40.5 9.0 - 38.6 (Series K)		22.3 - 40.9 7.8 - 38.8 (Series K)		21.0 - 41.0 6.7 - 38.0 (Series K)	
Power supply	V	400T+N		400T+N		400T+N		400T+N	
Frequency	Hz	50							
Motor Max. capacity **	kW	2x2.2	2x3.0	2x3.0	2x4.0	2x5.5	2x5.5	2x4.0	2x5.5
Max. Absorbed power***	kW	5.43	7.26	7.26	9.46	12.8	12.8	9.46	12.8
Protection Rating	IP	PKA Series = IP20, PKE Series = IP24; PKA Control Panel = IP44, PKE = IP54							
Running temperature	°C	from -20°C to + 40°C (check running temperature of matching burner)							

* Chimney losses at minimum power for PK-K and PK-R heaters are zero because the efficiency, calculated on LVC (Low Calorific Value of natural gas) exceeds 100%.

** Minimum heat drop is referred to minimum heat input, while maximum heat drop refers to maximum heat input

*** Max. capacity refers to the maximum power delivered by the motor; as for the heater, the power actually delivered by the motor depends on the fan working position with respect to the air distribution system's drops (system drops)

**** Maximum absorbed power refers to the maximum power delivered by the motor considering the supplied motor efficiency (efficiency IE3); the power absorbed by the matching burner must be add to the value indicated in the table.

3.4. Noise

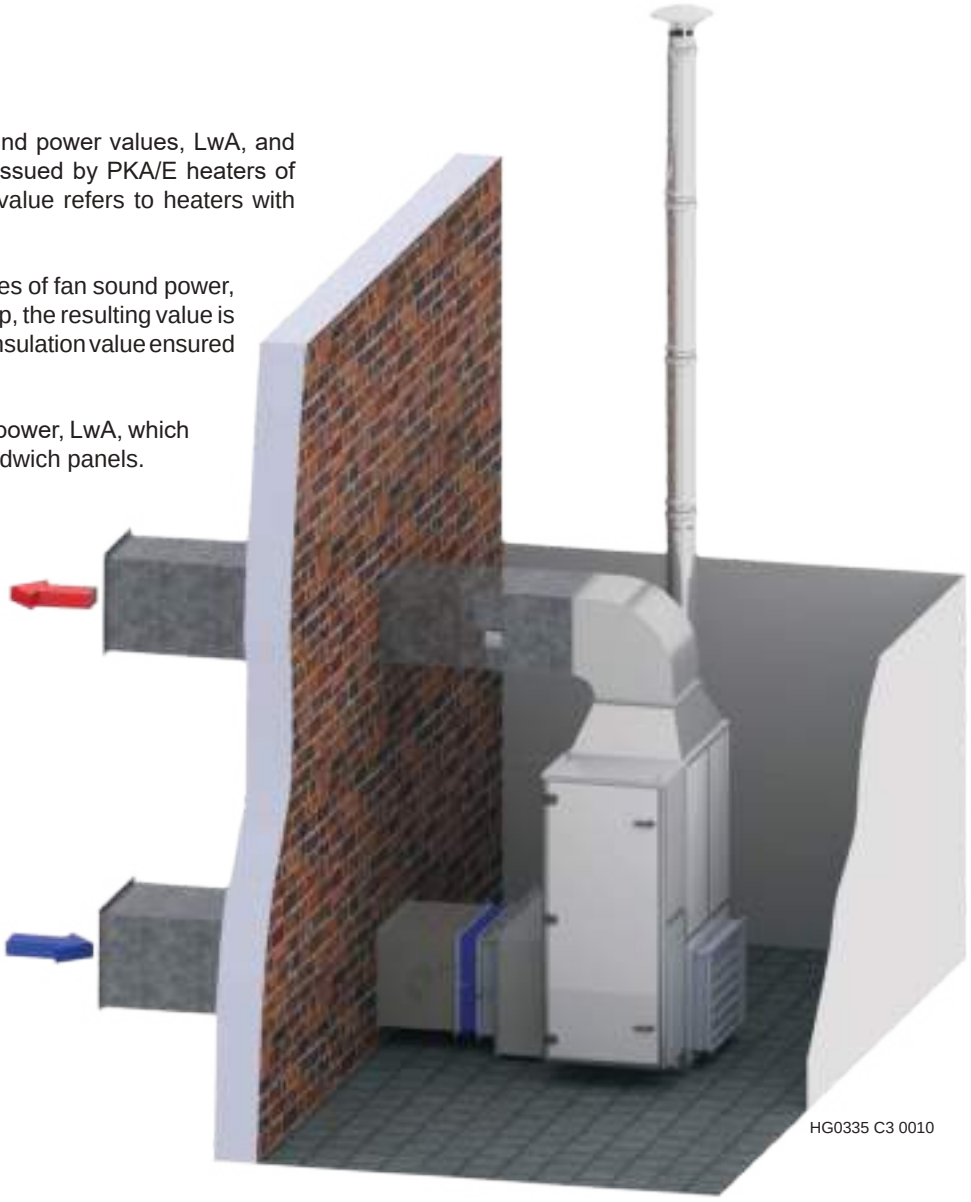
DUCTED HEATERS

The following table shows sound power values, LwA, and sound pressure values, LpA, issued by PKA/E heaters of 10W and 20W versions. The value refers to heaters with ducted intake and delivery.

For these applications the values of fan sound power, intake and delivery are added up, the resulting value is properly reduced by the sound insulation value ensured by sandwich panels.

The values in the table refer to power, LwA, which passes through the heater sandwich panels.

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



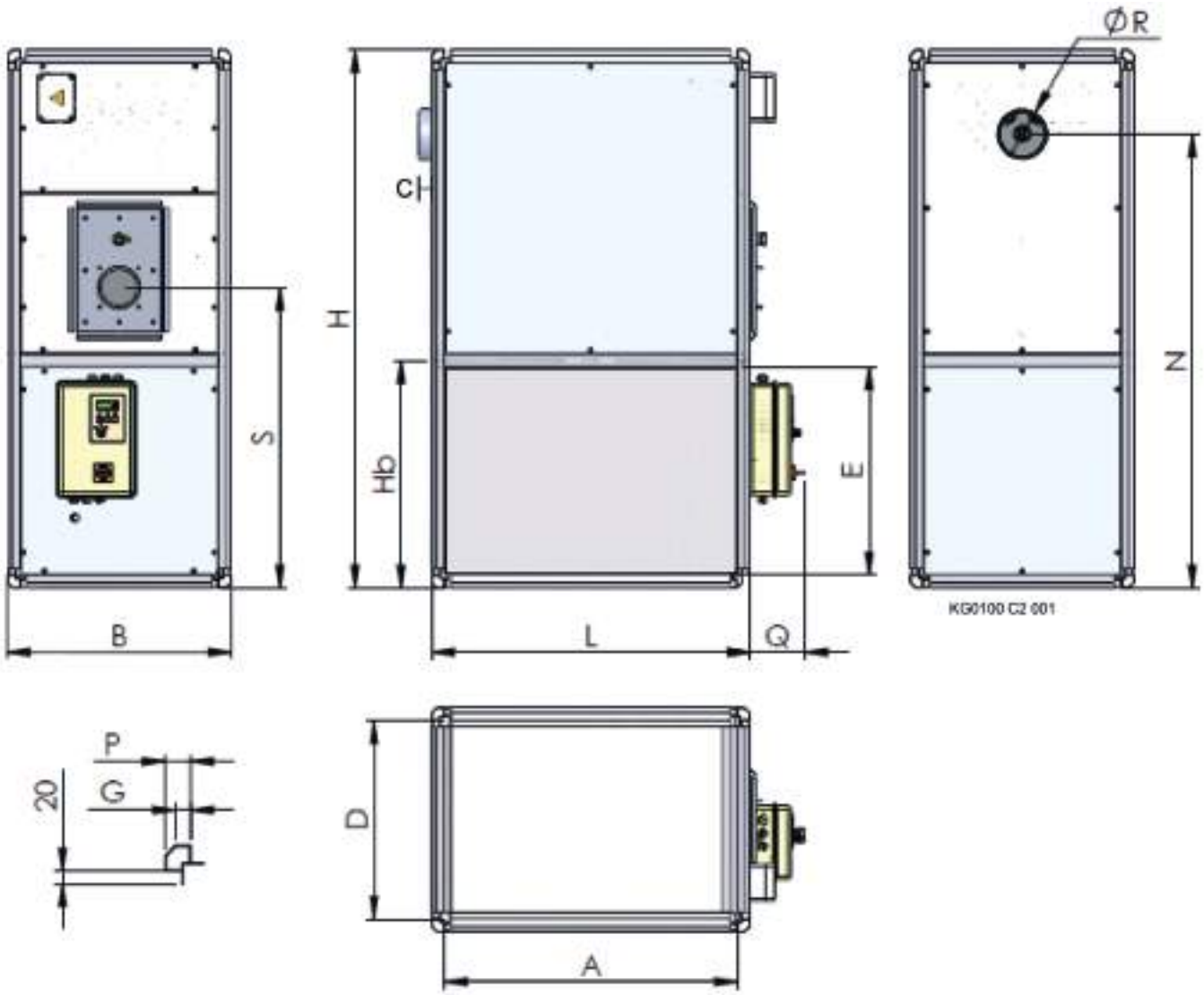
HG0335 C3 0010

Noise level is the same in N series, R series and K series heaters.

MODEL	LwA - Sound Power Level [dB(A)]								LwA	distance	LpA
	63	125	250	500	1000	2000	4000	8000	dB(A)	metres	dB(A)
PK100-10W	47.4	61.9	61.4	60.6	58.8	54.0	46.3	37.7	67.2	4	44.1
PK100-20W	48.4	62.9	62.4	61.6	59.8	55.0	47.2	38.7	68.2	4	45.1
PK140-10W	48.8	63.3	62.8	62.0	60.2	55.4	47.7	39.2	68.6	4	45.5
PK140-20W	50.0	64.5	64.0	63.2	61.4	56.6	48.9	40.3	69.8	4	46.7
PK190-10W	51.6	66.1	65.6	64.8	63.0	58.2	50.5	41.9	71.4	6	44.8
PK190-20W	53.0	67.5	67.0	65.9	64.4	59.6	51.9	43.3	72.7	6	46.1
PK250-10W	49.9	64.4	63.9	63.1	61.3	56.5	48.3	40.2	69.6	6	43.1
PK250-20W	52.4	66.9	66.4	65.7	63.8	59.0	51.3	42.7	72.2	6	45.6
PK320-10W	54.3	68.8	68.3	67.6	65.7	61.0	53.2	44.6	74.1	6	47.5
PK320-20W	55.4	69.9	69.4	68.7	66.8	62.0	54.3	45.7	75.2	6	48.6
PK420-10W	58.9	73.4	72.9	72.2	70.3	65.5	57.8	49.2	78.7	10	47.7
PK420-20W	59.9	74.4	73.9	73.2	71.3	66.5	58.8	50.2	79.7	10	48.7
PK550-10W	58.3	68.0	64.2	63.5	57.6	53.9	46.1	37.1	71.0	10	40.0
PK550-20W	64.7	68.2	64.3	64.5	58.1	53.8	46.5	37.7	72.0	10	41.0

3.5. Dimensions of PK Indoor Vertical Heater

INDOOR VERTICAL HEATER



Model	Overall dimensions				Intake		Delivery		Profile		Chimney			Burner		Weight
	L	B	H	Hb	A	E	A	D	P	G	N	Ø R	C	S	Ø T	kg.
PKA100	1100	800	2020		1020	800	1020	720	40	25	1760	180	46	1190	190	(251*)
PKA140	1330	920	2080		1250	800	1250	840	40	25	1800	180	78	1155	190	320 (326*)
PKA190	1460	1060	2230		1380	800	1380	980	40	25	1960	250	109	1190	190	382 (390*)
PKA250	1750	1140	2330		1670	800	1670	1060	40	25	2020	250	112	1180	190	506 (517*)
PKA320	1960	1140	2330		1880	800	1880	1060	40	25	2040	250	122	1180	230	574 (587*)
PKA420	2170	1340	2800	1000	2070	900	2070	1240	50	30	2480	300	132	1440	230	902 (919*)
PKA550	2600	1340	3170	1290	2500	1190	2500	1240	50	30	2800	300	92	1930	230	1148 (1170*)

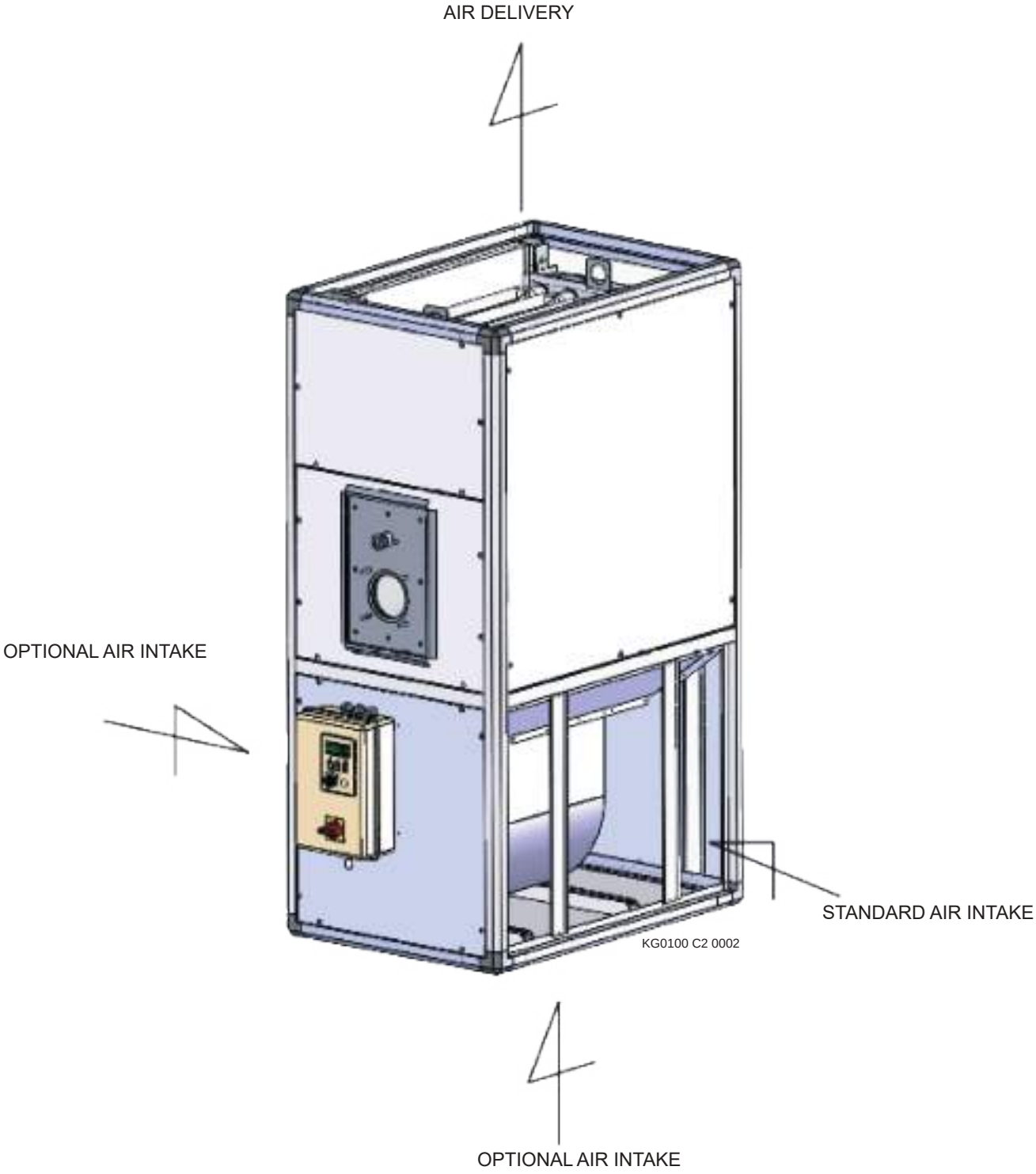
KG0100 ET 004

*** weights of K and R series heaters**

Integrated Models
All PK vertical heaters, up to 320 included, are supplied as a single unit.

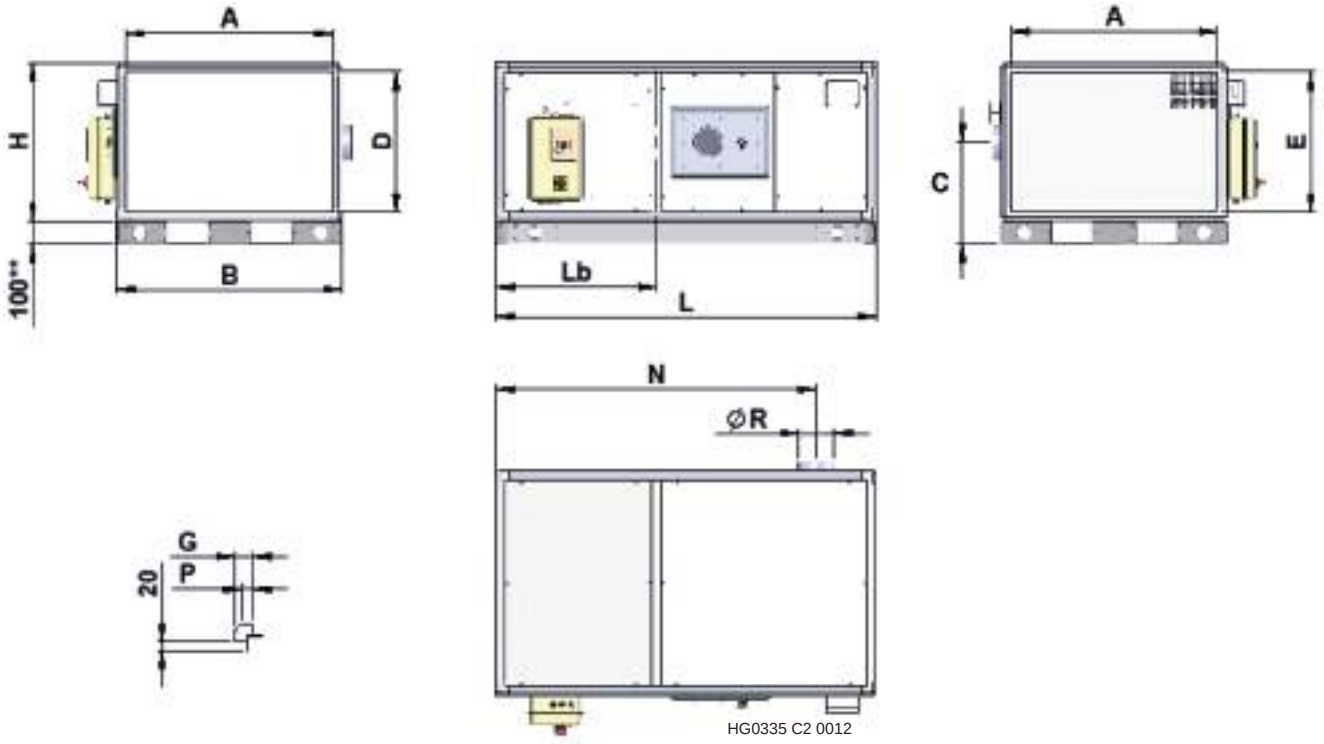
Three-Assembly Models
From 420 model onward, heaters are split in two assemblies: fan and exchanger. The first two assemblies, fan and exchanger, are to be installed one on top of the other without any fixing. Fan assembly includes slots for sliding the two parts into place. Use the supplied polarised connector for the electrical connection between exchanger (thermostats) and control panel.

Air intake and delivery
Standard air intake is on the right side of the heater (seen from the burner).
The grid can be moved to left side by the installer or, on request, Apen Group.
Intake can also be moved to the bottom side of the unit on request.



3.6. Dimensions of PK Indoor Horizontal Heater

INDOOR HORIZONTAL HEATERS (Series N, K and R)



Model	Overall dimensions				Intake		Delivery		Profile		Chimney			Burner		Weight
	B	H	L	Lb	A	E	A	D	P	G	N	Ø R	C	S	Ø T	kg
PKA100	1100	800	2020		1020	720	1020	720	40	25	1760	180	46	1190	190	(266*)
PKA140	1330	920	2080		1250	840	1250	840	40	25	1800	180	78	1155	190	344 (350*)
PKA190	1460	1060	2230		1380	980	1380	980	40	25	1960	250	109	1190	190	412 (420*)
PKA250	1750	1140	2330		1670	800	1670	1060	40	25	2020	250	112	1180	190	551 (562*)
PKA320	1960	1140	2330		1880	1060	1880	1060	40	25	2040	250	122	1180	230	636 (649*)
PKA420	2170	1340	2800	1000	2070	1240	2070	1240	50	30	2480	300	132	1440	230	977 (994*)
PKA550	2600	1340	3170	1290	2500	1240	2500	1240	50	30	2800	300	92	1930	230	1230 (1252*)

KG0100 ET 005

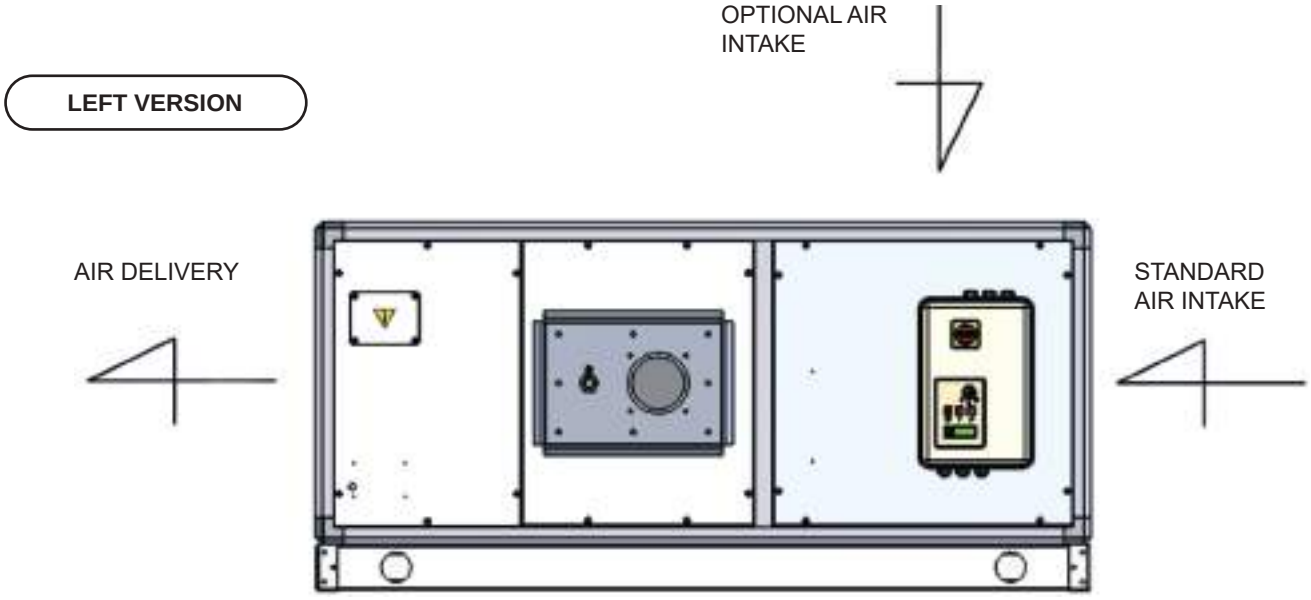
*weights of K and R series heaters

Integrated Models
All PKA horizontal heaters, up to 320 included, are supplied as a single unit.

Two-Assembly Models
From 420 model onward, heaters are split in two assemblies: fan and exchanger. These two assemblies are to be installed one next to the other and fixed with the profile and the screws provided. Fan assembly includes slots for sliding the two parts into place.
Use the supplied polarised connector for the electrical connection between exchanger (thermostats) and control panel.
Heaters are supplied on a galvanized base, prepared for lifting with lift truck or crane.

Air Intake
Standard air intake is on the back of the heater.
Intake can also be moved to the top side of the unit on request.
For horizontal heaters, you must specify air flow direction: rightward or leftward (always referred to burner).

LEFT VERSION



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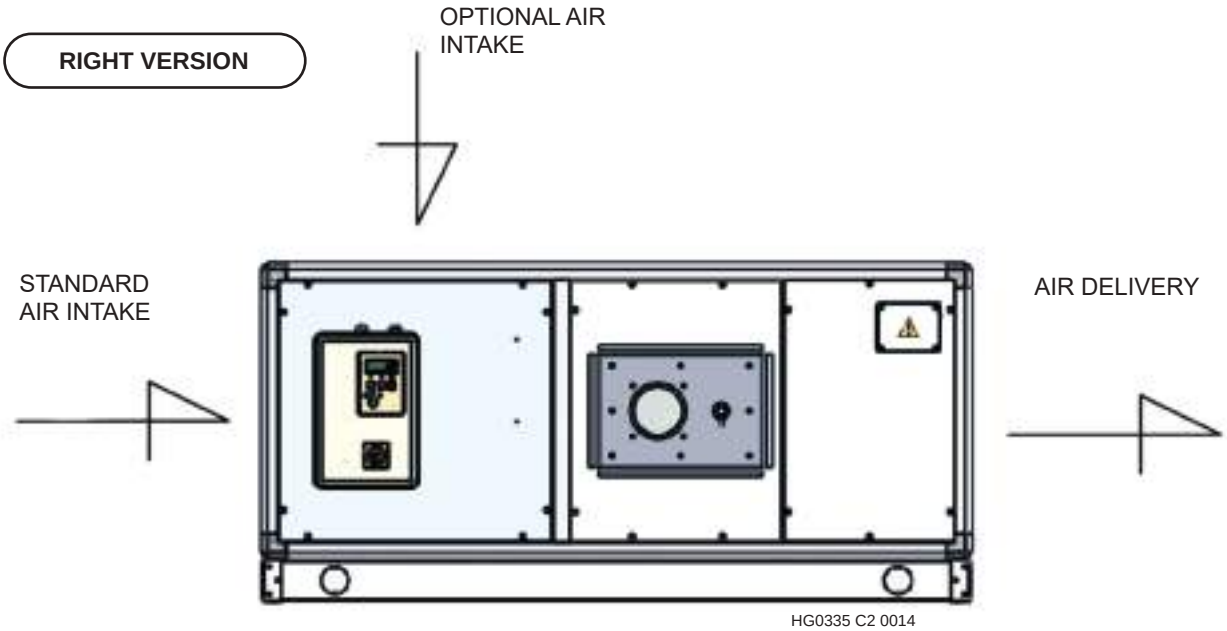
RIGHT VERSION



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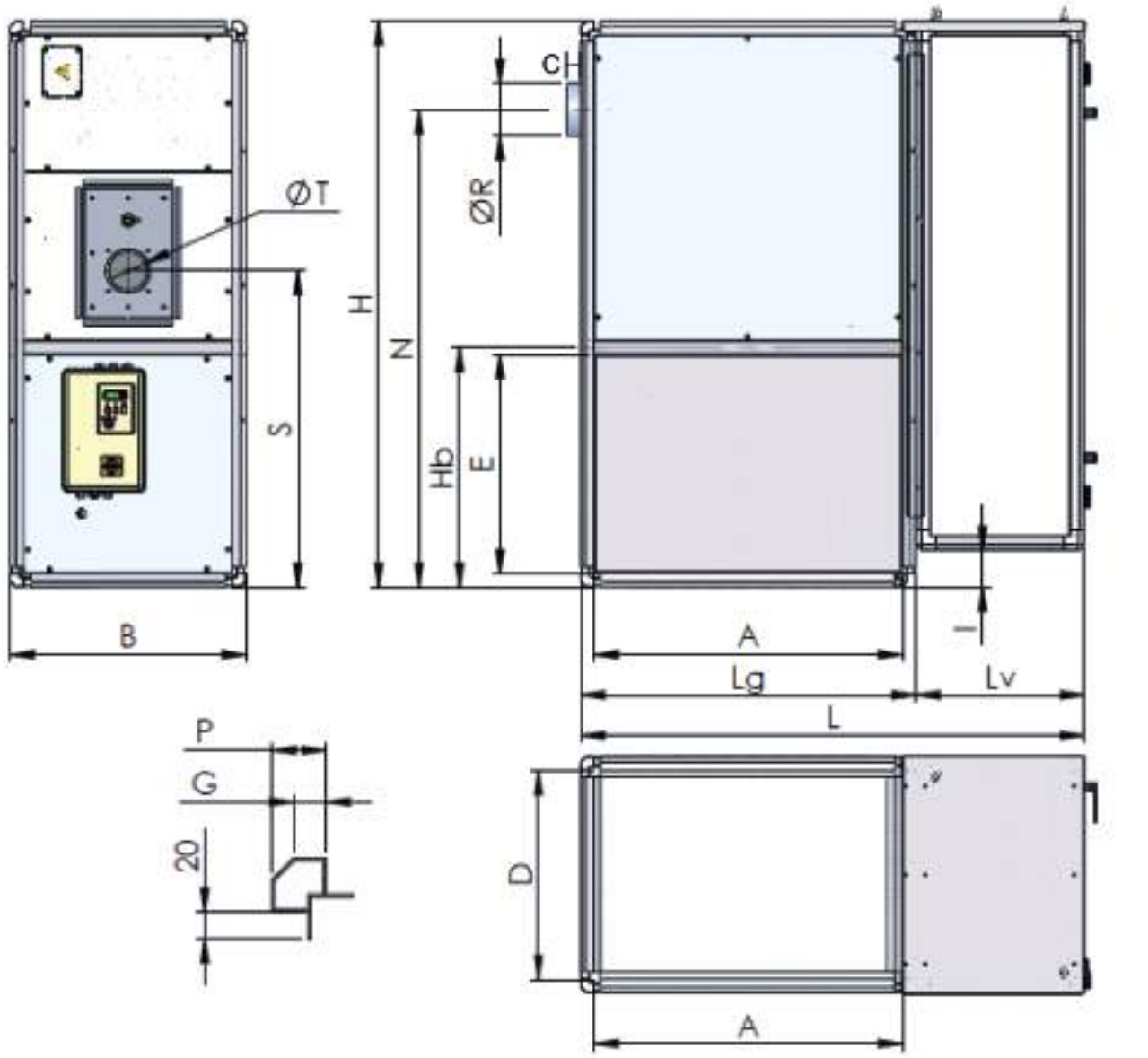
3.7. Dimensions of PK Outdoor Vertical Heater

OUTDOOR VERTICAL HEATER



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Model	Overall dimensions				Intake		Delivery		Profile		Chimney			Burner		Burner Casing			Weight
	L	B	H	Hb	A	E	A	D	P	G	N	ØR	C	S	ØT	LG	LV	I	kg
PKE100	1600	800	2020	-	1020	800	1020	720	40	25	1760	180	46	1190	190	1100	500	150	(297*)
PKE140	1930	920	2080	-	1250	800	1250	840	40	25	1800	180	78	1155	190	1330	600	60	378 (384*)
PKE190	2190	1060	2230	-	1380	800	1380	980	40	25	1960	250	109	1190	190	1460	730	150	460 (468*)
PKE250	2550	1140	2330	-	1670	800	1670	1060	40	25	2020	250	112	1180	190	1750	800	100	592 (603*)
PKE320	2760	1140	2330	-	1880	800	1880	1060	40	25	2040	250	122	1180	230	1960	800	100	660 (673*)
PKE420	3020	1340	2800	1000	2070	900	2070	1240	50	25	2480	300	132	1440	230	2170	850	200	1010 (1027*)
PKE550	3600	1340	3170	1290	2500	1190	2500	1240	50	25	2800	300	92	1930	230	2600	1000	220	1285 (1307*)

KG0100 ET 006

*weights of K and R series heaters

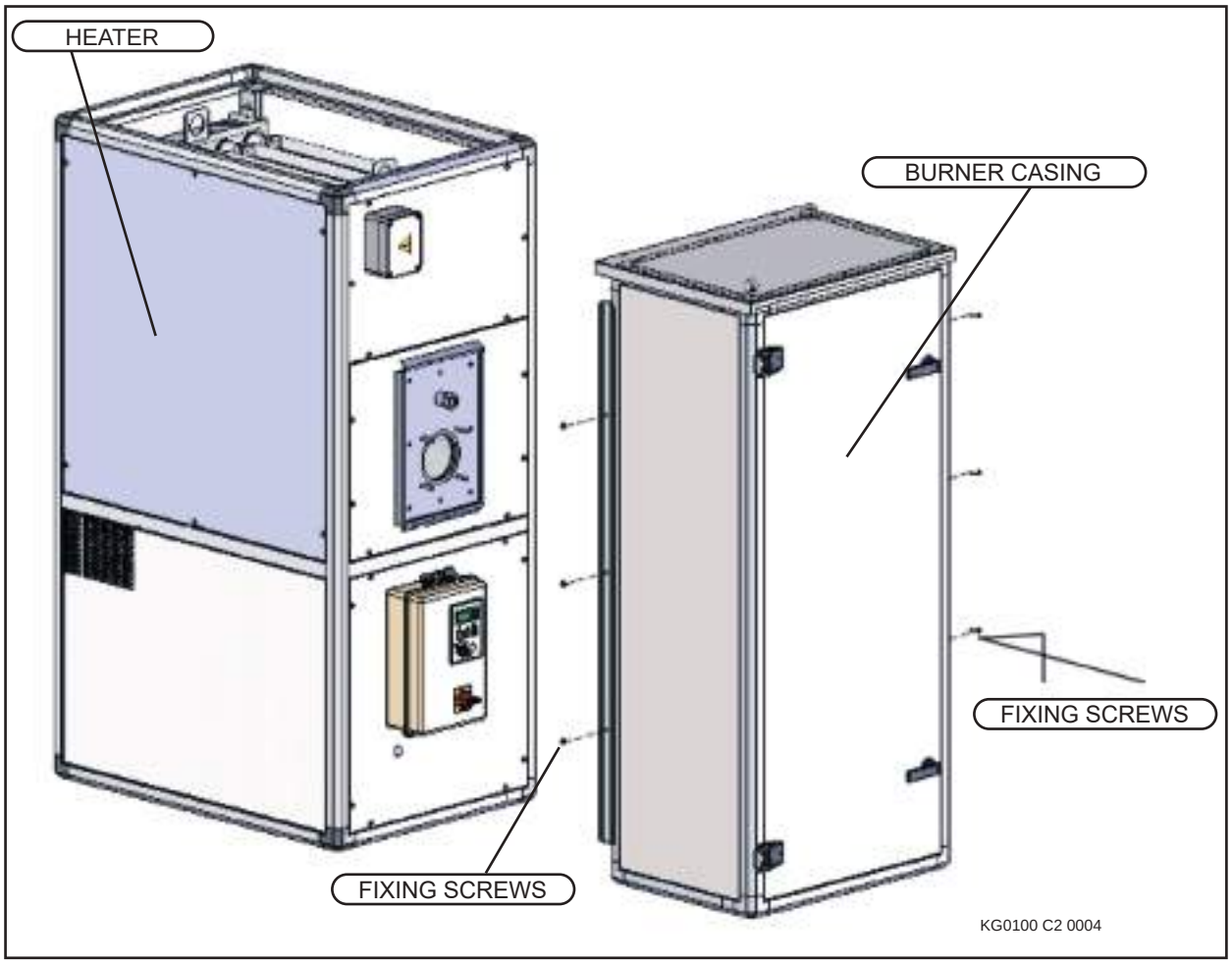
Integrated Models
All PKE vertical heaters, up to 320 included, are supplied as a single unit with assembled burner casing.

Three-Assembly Models
From 420 model onward, heaters are split in three assemblies: fan, exchanger, and burner casing. The first two assemblies are to be installed one on top of the other without any fixing. Fan assembly includes slots for sliding le two parts into place.
To install burner casing onto the heater, do the following:
lay transparent silicone on the edges of burner casing
lift the burner casing, resting it against the heater and matching aluminium bars.
fix the support, on the casing, to the heater bars using the supplied screws.

Then fill any gaps in joint areas with silicone, in order to protect all internal parts (control panel, burner,etc.) from water.

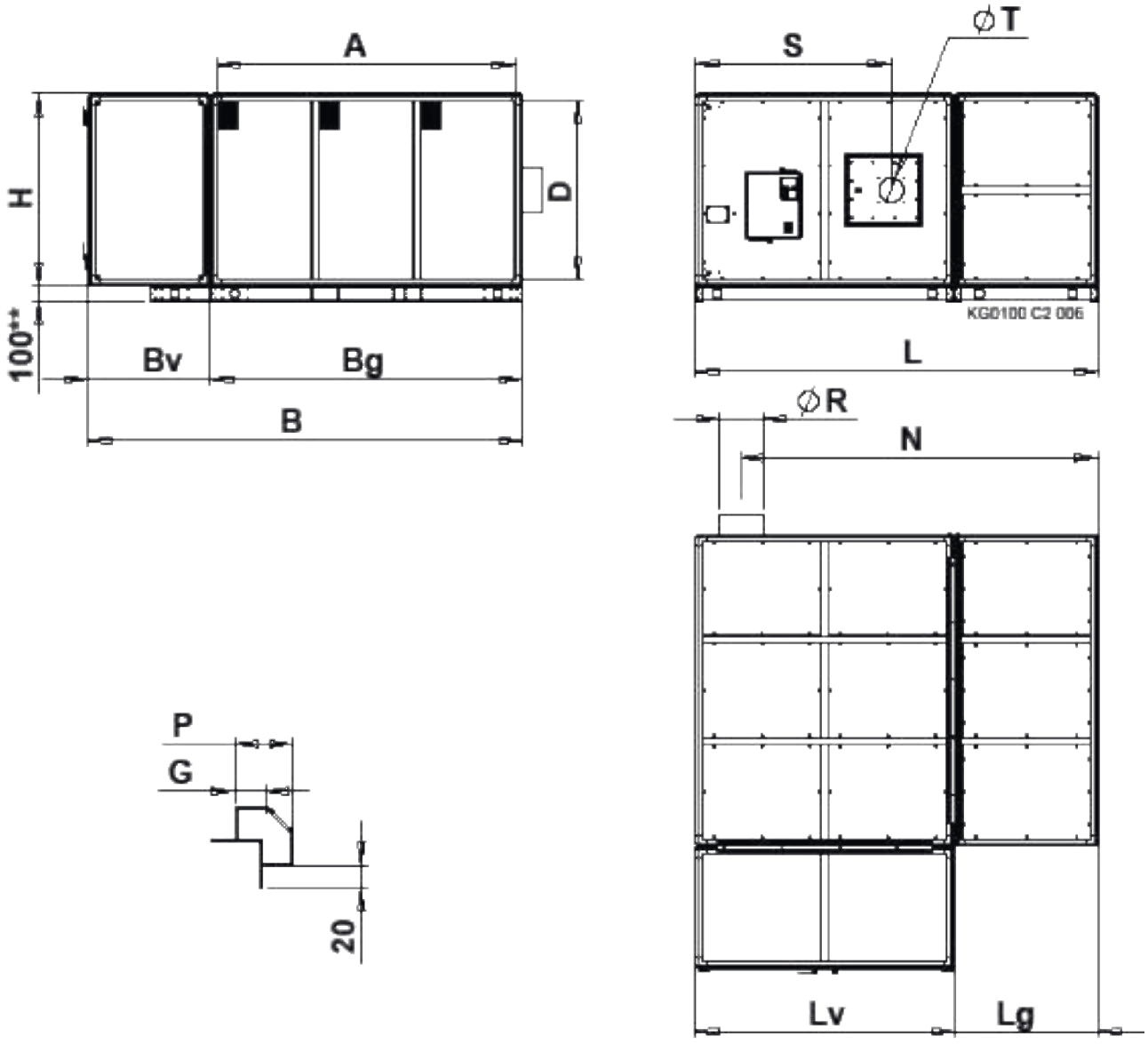
USE the supplied polarised connector for the electrical connection between exchanger (thermostats) and control panel.

Air Intake
Standard air intake is on the right side of the heater (seen from the burner).
The grid can be moved to left side by the installer or Apen Group (on demand).
Intake can also be moved to the bottom and/or back side of the unit on request.



3.8. Dimensions of PK Outdoor Horizontal Heater

OUTDOOR HORIZONTAL HEATER



Type	Overall dimensions			Intake		Delivery		Profile		Chimney			Burner		Burner Casing				Weight
	B	H	L	A	D	A	D	P	G	N	ØR	C	S	ØT	Bg	Bv	Lg	Lv	kg
PKE100	1600	800	2020	1020	720	1020	720	40	25	1760	180	46	1190	135	1100	500	-	2020	(312*)
PKE140	1930	920	2080	1250	840	1250	840	40	25	1800	180	78	1155	190	1330	600	-	2080	402 (408*)
PKE190	2190	1060	2230	1380	980	1380	980	40	25	1960	250	109	1190	190	1460	730	-	2230	490 (498*)
PKE250	2550	1140	2330	1670	1060	1670	1060	40	25	2020	250	112	1180	190	1750	800	-	2330	637 (648*)
PKE320	2760	1140	2330	1880	1060	1880	1060	40	25	2040	250	122	1180	230	1960	800	-	2330	722 (735*)
PKE420	3020	1340	2800	2070	1240	2070	1240	50	30	2480	300	132	1440	230	2170	850	1000	1800	1080 (1097*)
PKE550	3600	1340	3170	2500	1240	2500	1240	50	30	2800	300	92	1980	230	2600	1000	1290	1880	1370 (1392*)

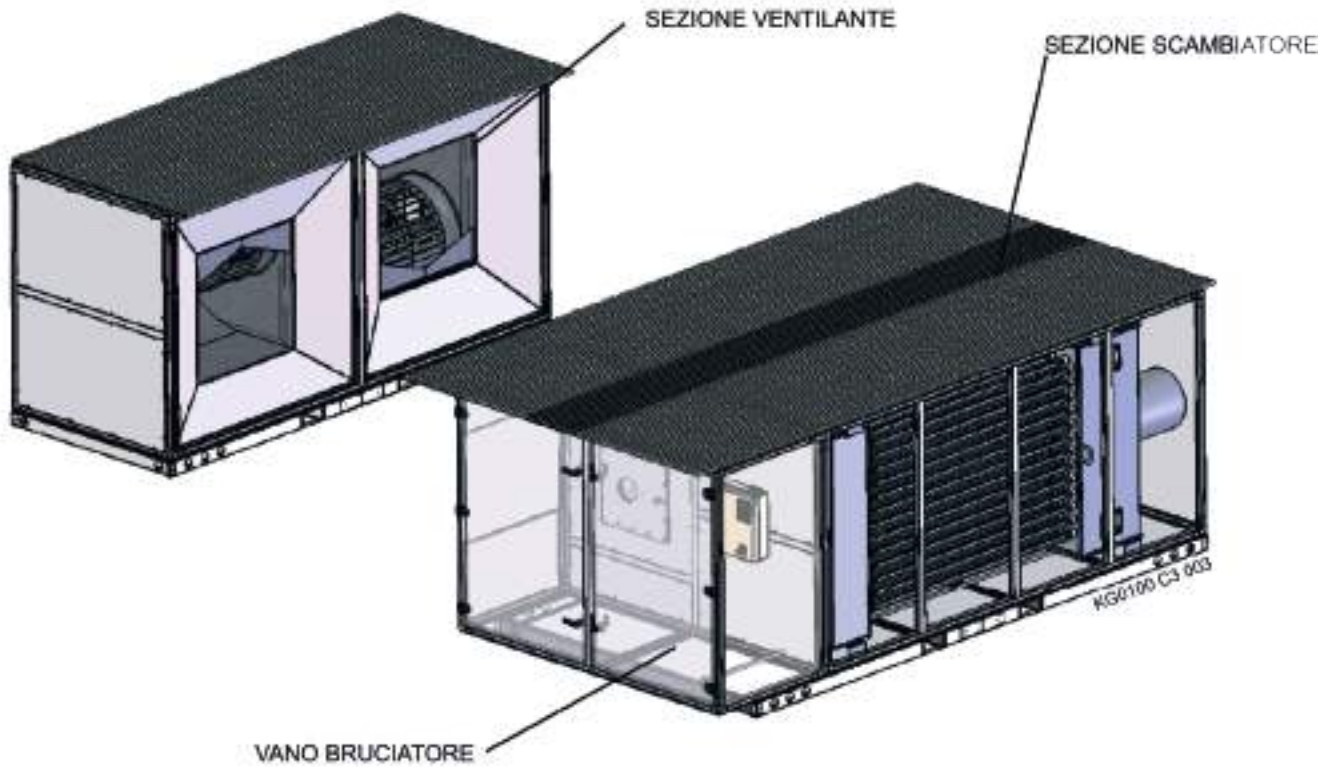
KG0100 ET 007

*weights of K and R series heaters

Integrated Models
All PKE horizontal heaters for outdoor installation, up to 320 included, are supplied as a single unit with assembled burner casing.

Two-Assembly Models
From 420 model onward, heaters are split in two assemblies: fan and exchanger, and burner casing is assembled. These two assemblies are to be installed one next to the other and fixed with the profile and the screws provided. Fan assembly includes slots for sliding the two parts into place.
After installation, fix the corrugated aluminium roofs supplied separately.
In these models the control panel is in the burner casing and thus on the exchanger section; on the fan section there is a polarised connector for the electrical connection between exchanger (control panel) and fan motors.
Heaters are supplied on a galvanized base, prepared for lifting with lift truck or crane.

Air Intake
Standard air intake is on the back of the heater (seen from the burner).
Intake can also be moved to the top side of the unit on request.
For horizontal heaters, you must specify air flow direction: rightward or leftward (always referred to burner).



4. USER'S INSTRUCTIONS

4.1. Operation

PK heater operation is fully automatic; it is equipped with a heater control PCB that manages all the burner control operations and with a microprocessor based electronic PCB that controls the heat output regulation.

PK heaters are fitted as standard with a multifunction LCD panel located on the front of the control panel, which is used to control, configure and diagnose all operating parameters of the equipment.

The panel is fitted with a red 3-digit LCD display and with four function keys: ↑ , ↓ , ESC and ENTER; the display allows the user to display the heater operating mode and its Faults.
It also allows the service centre to change the main operating parameters.
Changing parameters is protected by a password.

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

rdy	OFF FROM SUPERVISOR Unit off and waiting for ON command from the supervisor (Smart X) or the room temperature control system
Sty	REMOTE OFF Unit turned off by ID0/GND remote digital input
rOF	Temperature control OFF condition
OFF	OFF FROM LCD PANEL Unit turned off from LCD control on board of the machine
Exx	OFF FROM ALARM Unit turned off from Exx alarm. (e.g. "E10") **Any heat demands will be ignored**
HEA	UNIT RUNNING (Heating)
Air	UNIT RUNNING (Ventilation)
COO	UNIT RUNNING (Conditioning)*
SAn	UNIT RUNNING (Domestic)*

(*only in the PRESENCE of SMART X)

During normal operation, the following text will appear on the display:

HEA	when the burner is on
rdy or **Sty**	when switching off
rOF	if the delivery temperature control has been met
Air	if in ventilation
Axx	**PK heater address;** If the heater has an address other than Ø, the display will show, alternating it with the operation in progress, the address assigned to the heater. (e.g. "A01")

LCD

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4.2. Accessories

Ambient temperature adjustment
The PK heaters are supplied without a remote control and/or room thermostat as they can operate with different remote controls, some of which are supplied by APEN GROUP as accessories, others are commercially available.
Operating modes:

- ordinary thermostat, or chronothermostat, with a clean contact to be connected to the PCB ID0/GND terminals;
- Smart X Web code G29700, Smart X Easy G29500

Instructions on how to operate the accessories can be found in manuals supplied with the accessories.

Operation with ordinary remote control (optional)
The Customer must install a chronothermostat or a room thermostat with a voltage free contact, between terminals ID0/GND; the contact will open when the heater is switched on and close when it is switched off. Lockout and reset signalling is done by means of a multifunctional LCD panel placed on the machine.

Operation with Smart X WEB G29700 / Smart X EASY G29500 chronothermostat (optional)
Remote controls of SMART X series (WEB or EASY) operate as a chronothermostat and can be used as a monitoring device for a single zone system at the same temperature, where up to 15 heaters can be installed simultaneously, controlled by a single control.
Being a single zone system, only one ambient temperature and one calendar can be set for the entire zone being monitored.
The chronothermostat is equipped with an easy to read 4.3" touchscreen TFT colour display (480x272 pixels resolution), where all the parameters of the connected heaters can be read and set up; it also allows users to remotely control up to 3 external temperature probes (besides the onboard one) and to manage the heaters in auto or manual mode, to check the burner operation, to plan a weekly, annual calendar and to control the daily time ranges.
Smart X WEB allows the complete management of all the system functions, including heater reset, directly from a PC.
For operating instructions and installation diagrams, please refer to the manual of Smart X WEB/EASY HG0060 "SMART X WEB / SMART X EASY CHRONOTHERMOSTAT. HG0065 Use, Installation and Programming Manual".

Safety thermostat
A safety thermostat with manual reset is installed on the PK heaters; the breakage of the sensitive element corresponds to a safety intervention.
The thermostat intervention causes the burner stop through the control PCB.
The lockout of the equipment, caused by the safety thermostat triggering, is indicated on the LCD display of the CPU PCB on the machine with E38.

Ambient temperature setting
Connecting a room thermostat (chronothermostat) or an ON/OFF switch is compulsory.
If a thermostat supplied by third parties is installed, the ambient temperature must be programmed on the thermostat.

Lockouts Exx
Codes and possible causes of lockouts are listed later the manual.

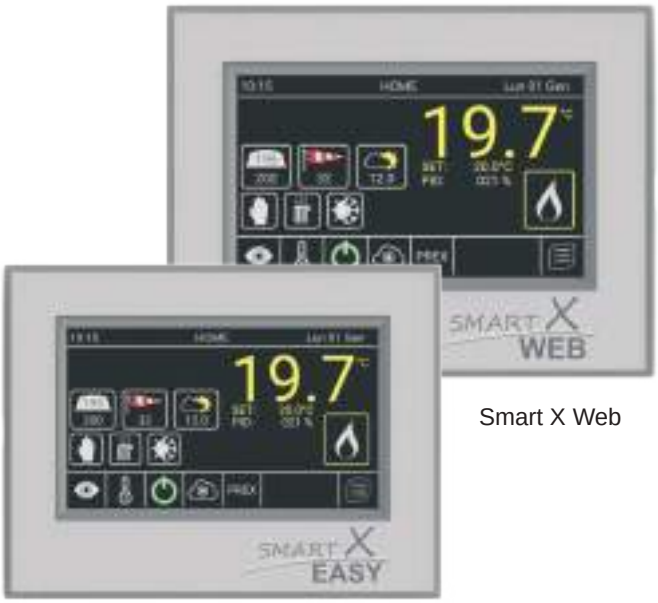
4.3. SMART X remote control

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:

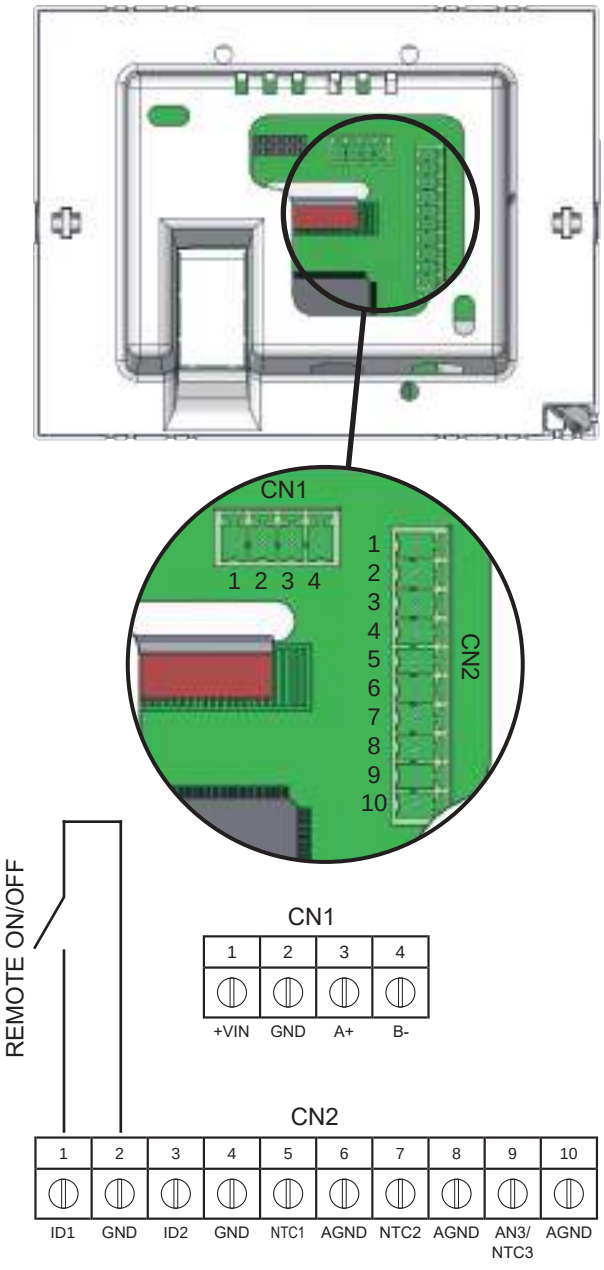


Smart X Web

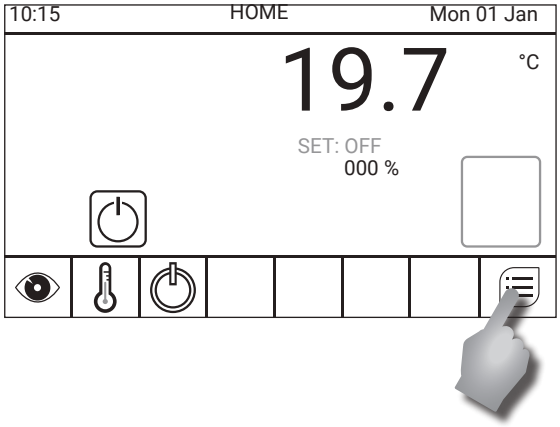
Smart X Easy

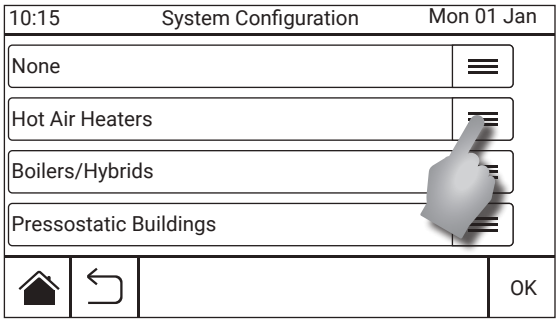
4.3.1. Remote On/Off (optional)

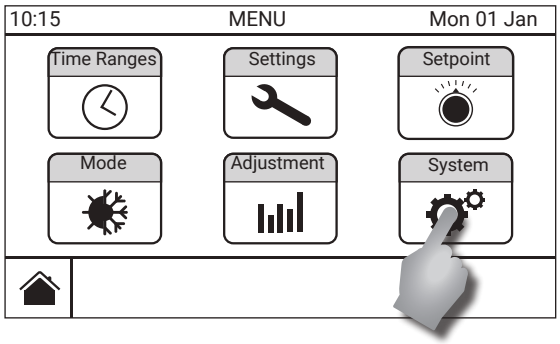
Any priority ON/OFF contact can be remotely controlled from the Smart X Web remote control, by connecting to terminals 1 (ID1) and 2 (GND) of the terminal board CN2 of the chronothermostat and removing the existing jumper, as shown in the following wiring diagram.
The remote ON/OFF contact has priority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

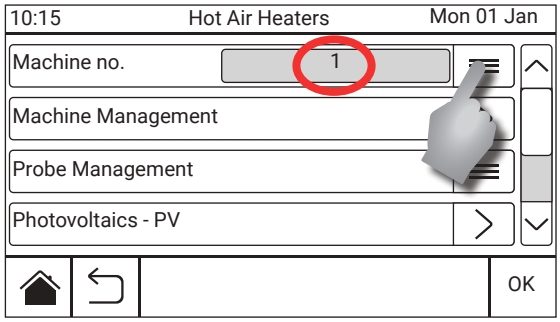


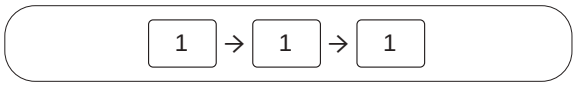
4.3.2. System Configuration



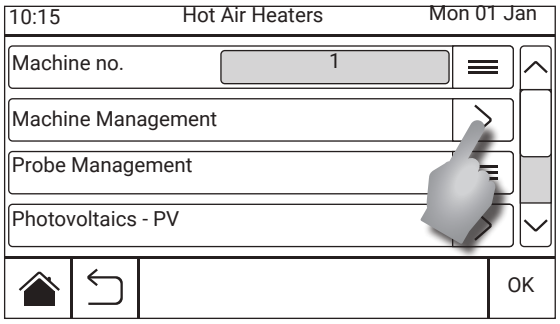




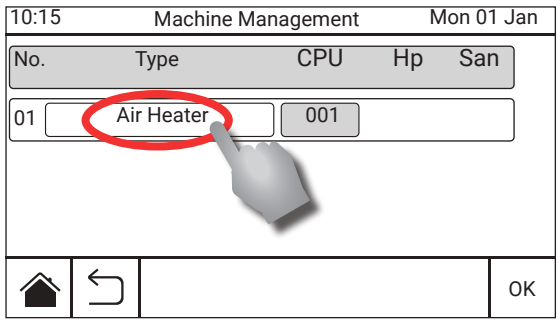


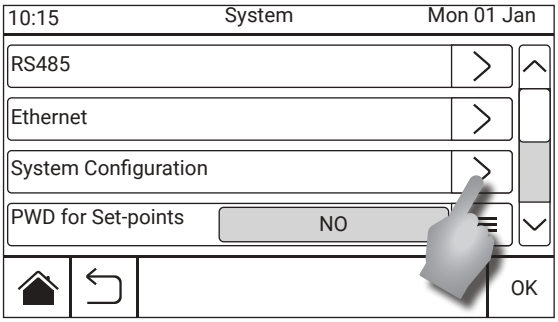


Press OK



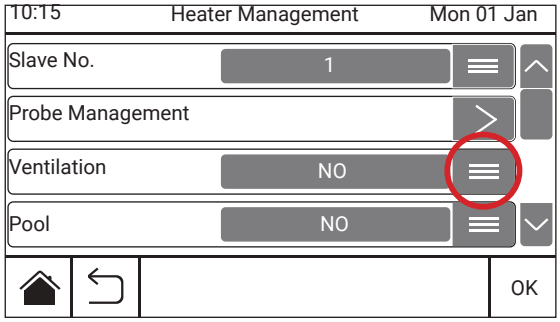
IMPORTANT: Before quitting, confirm each selection and each screen with the "OK" button at the bottom right of the screen.



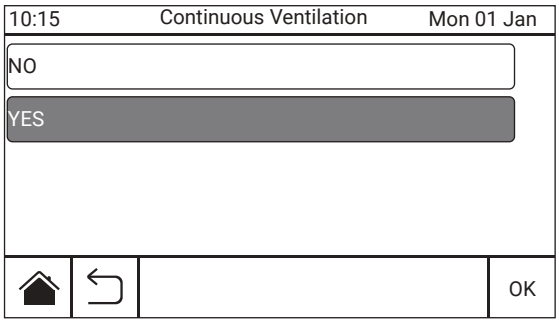


4.3.3. Continuous VENTILATION

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



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



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

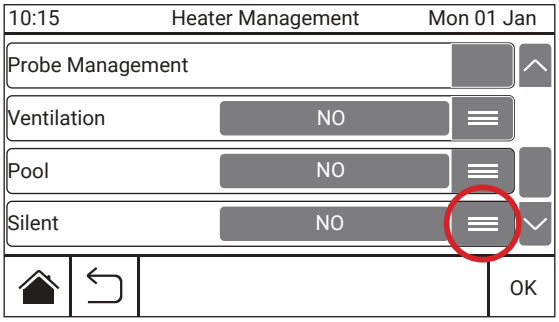
When the control is activated, the Smart sends the HEAT or AIR parameters to the CPU, according to the following logic:

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

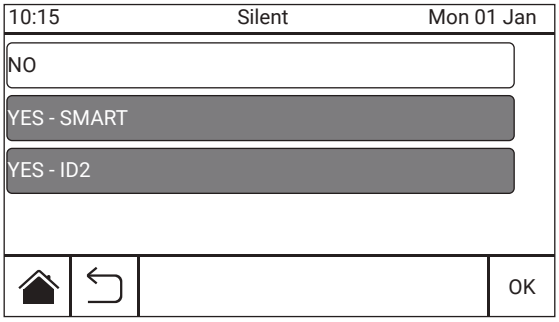
The CONTINUOUS VENTILATION control is activated only during the active time range for Heating mode. When the temperature setpoint is reached, the SMART does not send OFF, but AIR signal

4.3.4. 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:



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



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

Function ON
(yellow)

Function OFF
(grey)

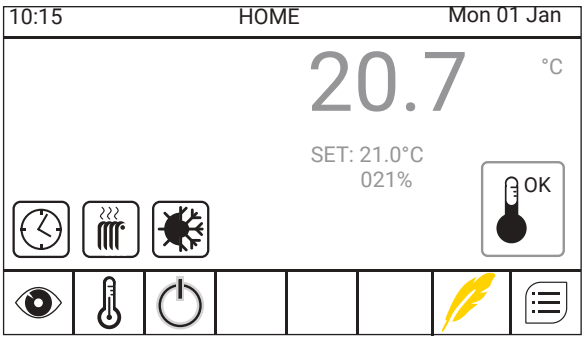
Remote ID2 Mode

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

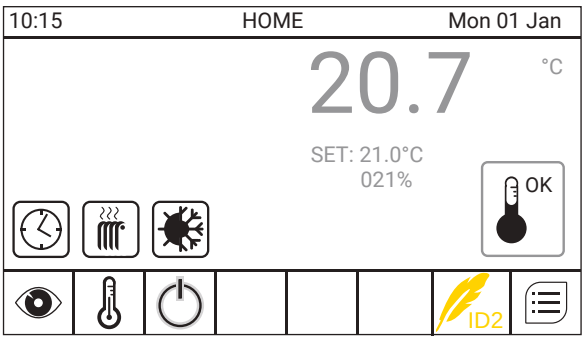
The “ID2 FEATHER” key changes its colour depending on the ON-OFF condition

ID2 Closed
(yellow)

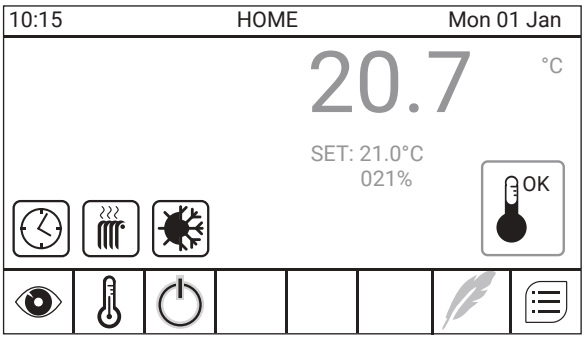
ID2 Open
(grey)



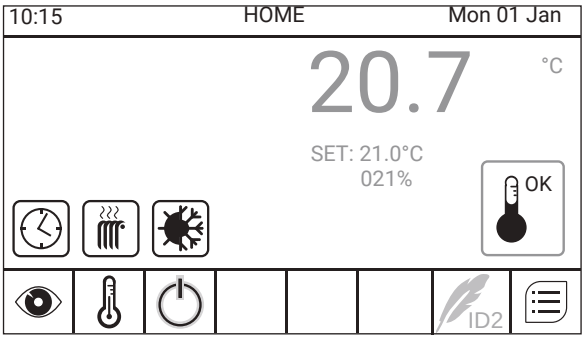
SILENT ON
(Yellow)



SILENT ON
(Yellow)



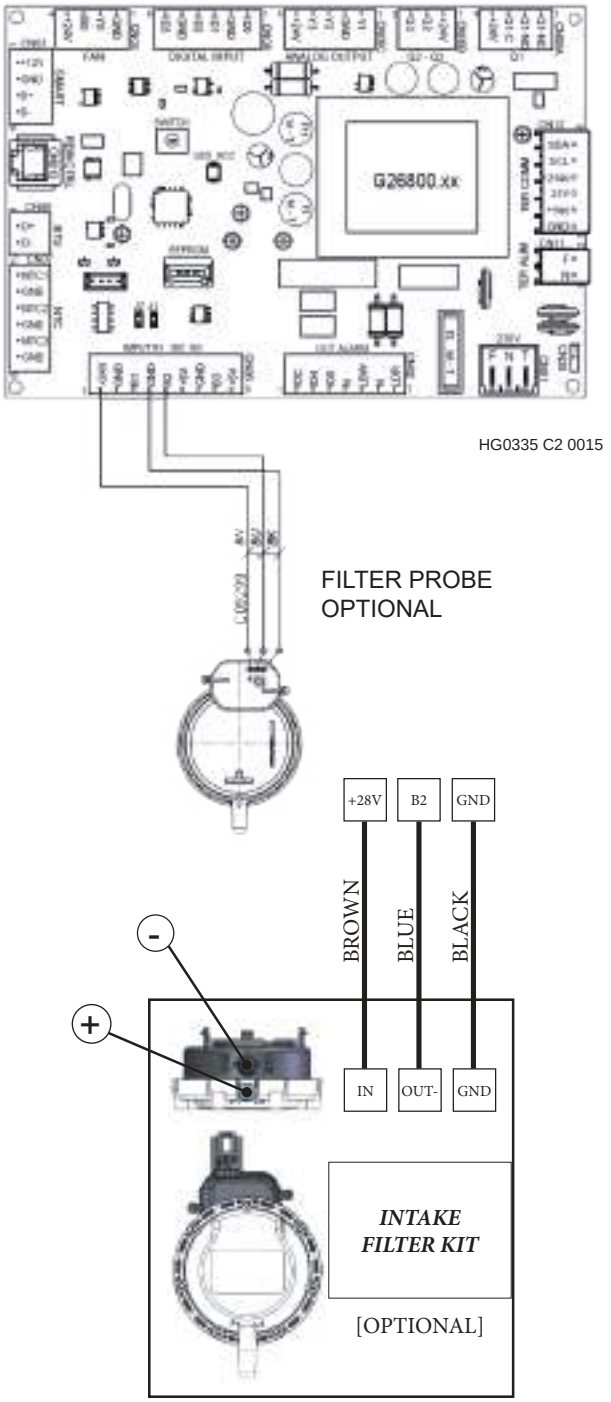
SILENT OFF
(Grey)



SILENT OFF
(Grey)

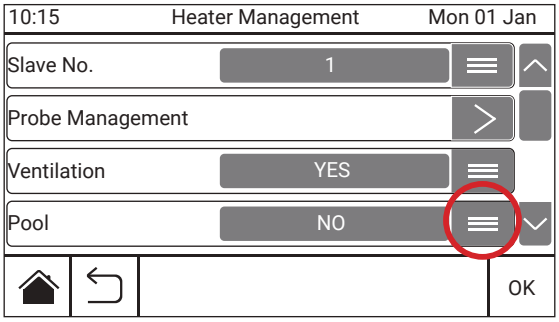
4.3.5. FILTER control (optional)

PK heaters, 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.

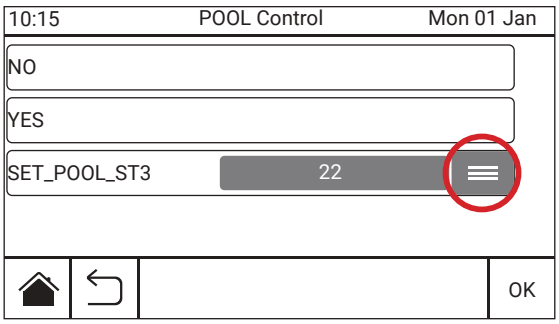


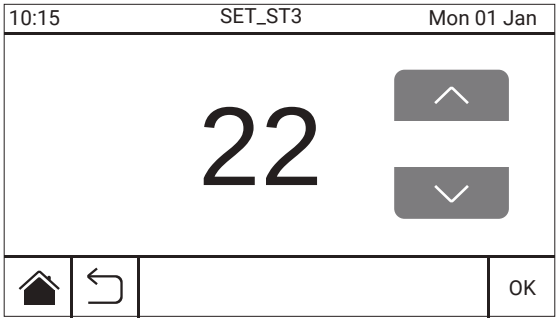
4.3.6. POOL Control

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



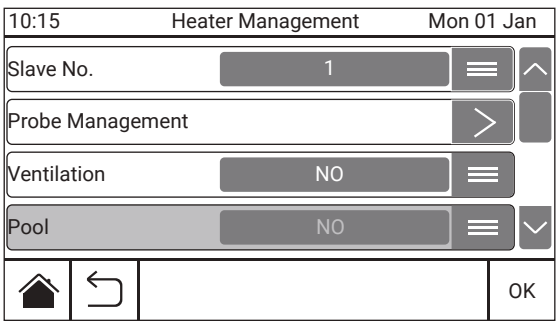
By entering the POOL CONTROL menu from Heater Management menu, the screen that allows activating or deactivating the control and selecting the control temperature (default POOL ST3 setpoint=22) is displayed





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:

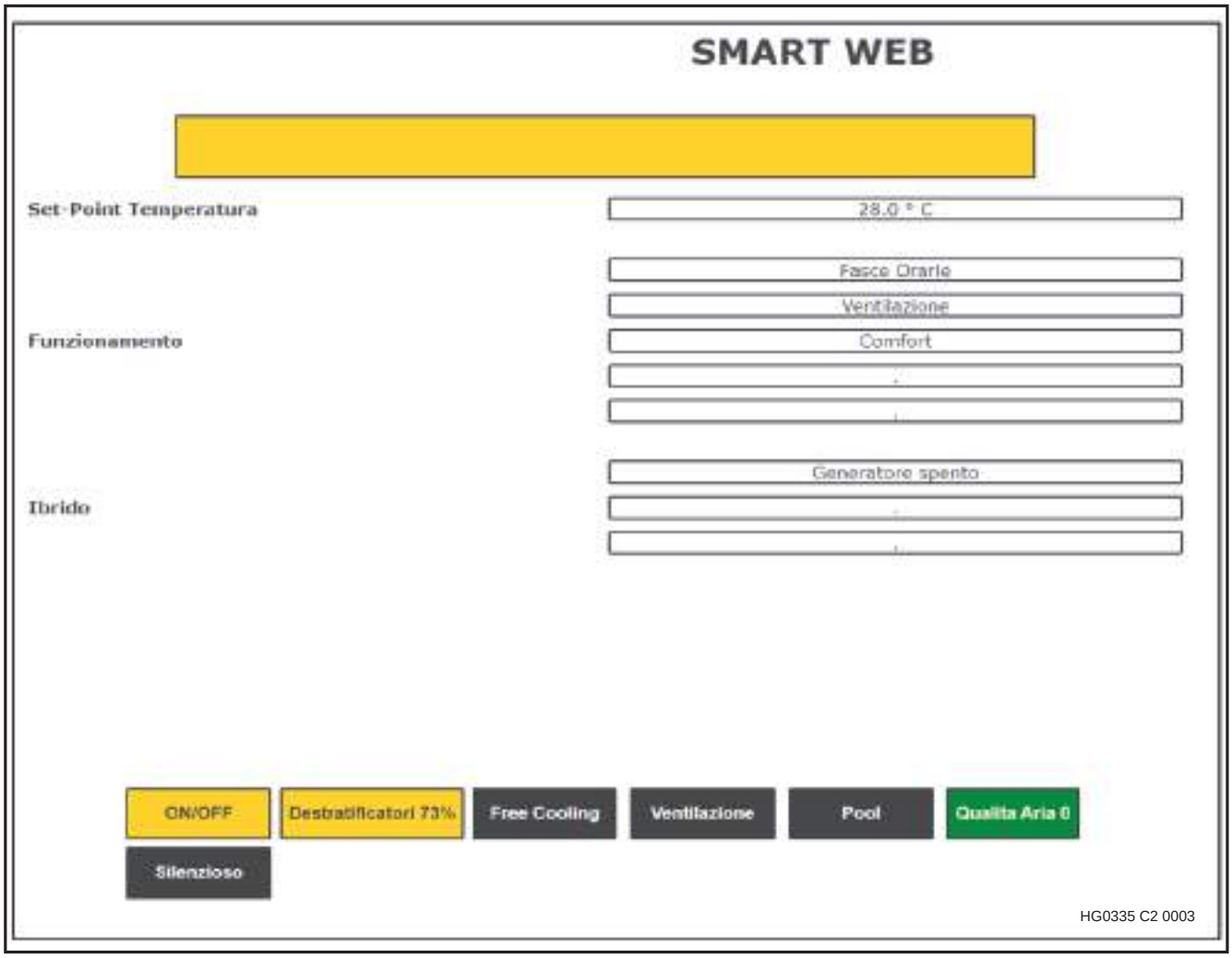


HG0335_C3_0007 HG0335_C3_0006

4.4. 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.



5. INSTRUCTIONS FOR THE INSTALLER

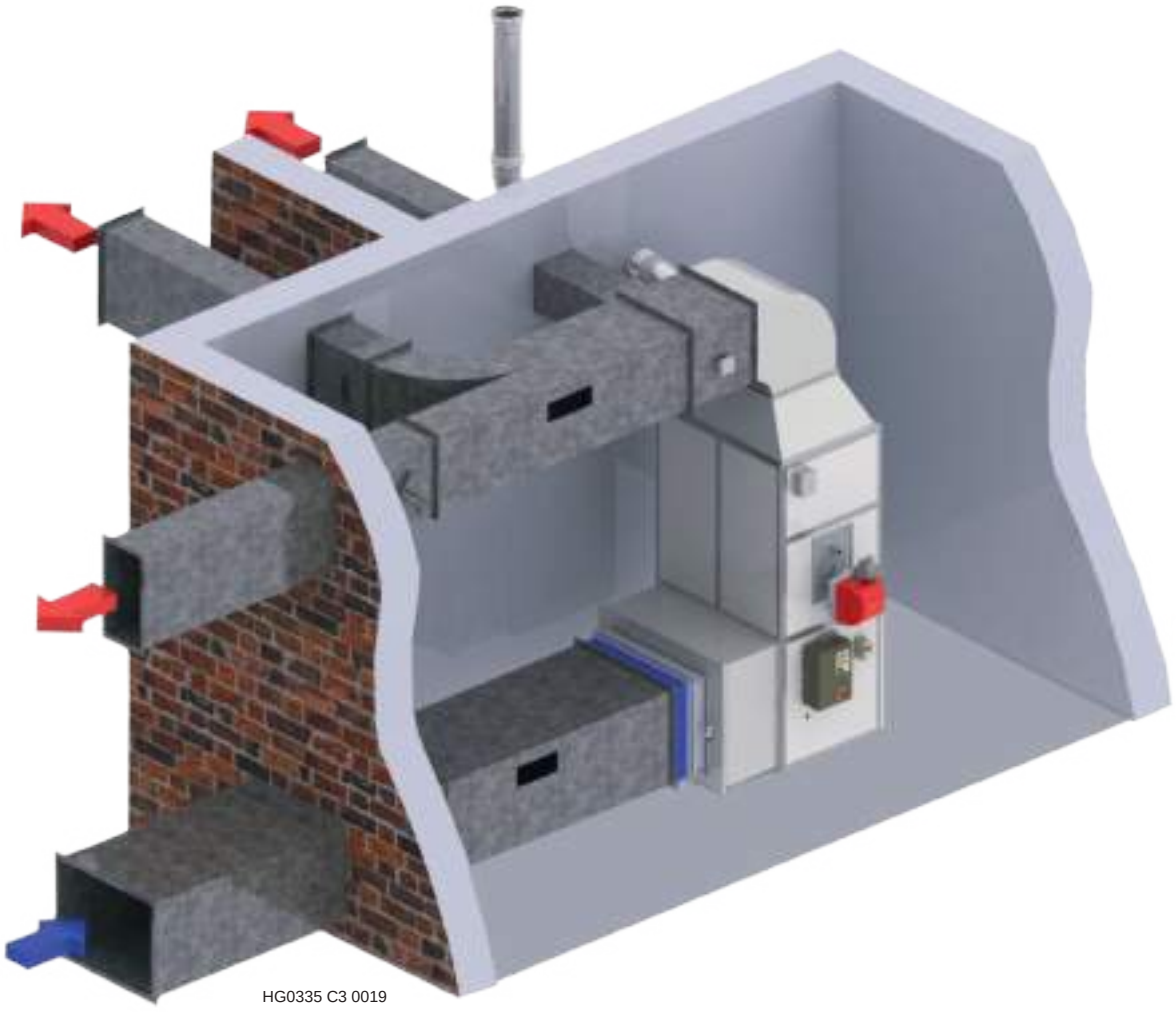
5.1. Where to Install the Heater

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

Fuel and power supplies shall be easily accessible.
All the heater's connecting and assembling operations must be performed only by qualified staff that is skilled for the operations required to start it.

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.

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



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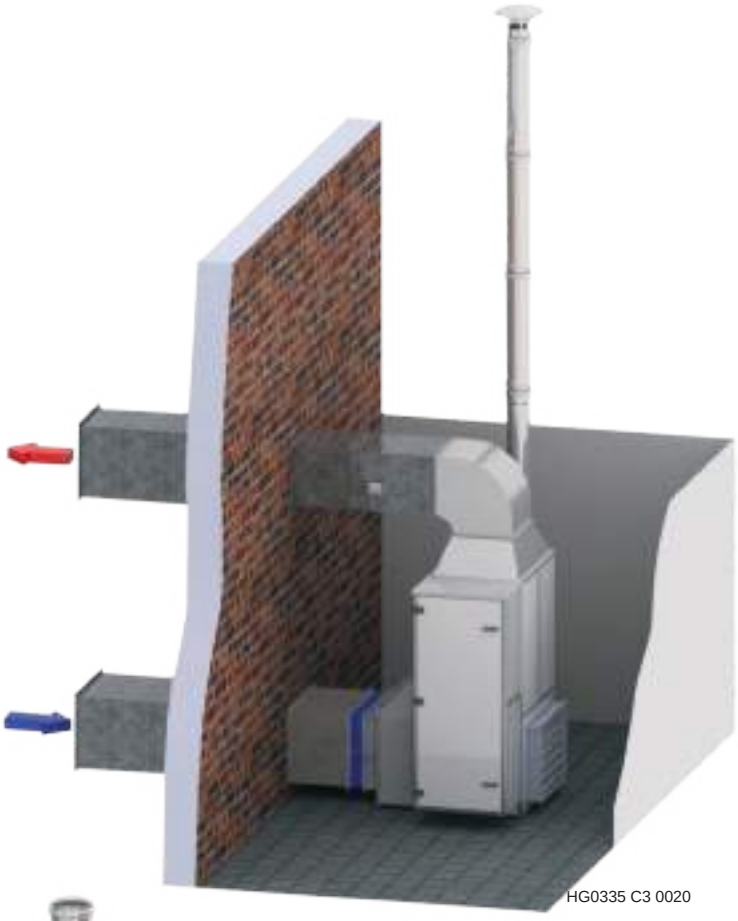
Connecting Air Ductwork
Ducts for air delivery and intake shall be sized based on aeraulic performance of the unit (shown in "TECHNICAL DATA" section of this Manual).
A vibration damping joint should be installed on air delivery duct so as to prevent vibration transmission from the heater to ductwork
Special attention must be paid to the noise conditions required for the room, dimensioning and installing, where necessary, silencers in the ductwork.
When air intake is from outdoor, rain deflectors are required.

Connecting Fuel Supply
Fuel connection shall be performed by qualified personnel only. Follow instructions in User Manual of the burner installed on the heater and comply with existing regulations


HG0335 C3 0020


HG0335 C3 0021

5.2. Wiring to Power Supply

5.2.1. Electrical Protection

Warm air heaters come with a main switch with door lock (IG) shown in the figure.
Wire power supply directly to that switch.
All PK series heaters are provided with 400V+N three-phase power supply. Wiring must be carried out as follows:

Three-phase	400V+N	Wire three phases to T1, T2, and T3 terminals and Neutral to N terminal

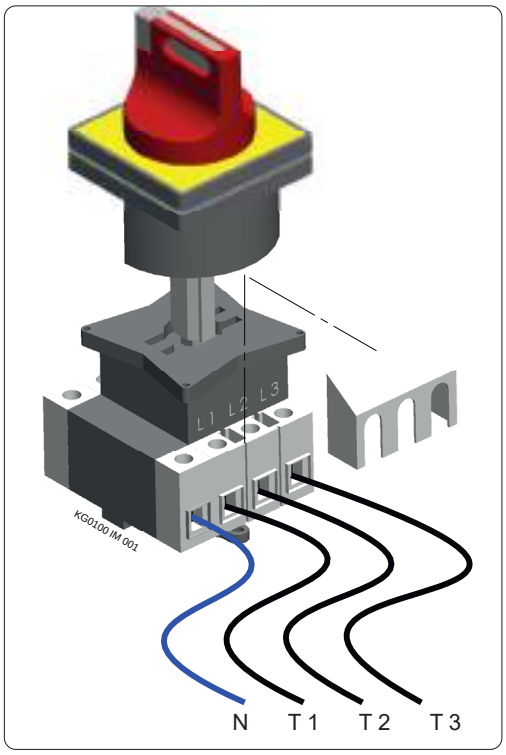
Ground wire is mandatory. Connect it to relevant terminal or screw.

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

A residual-current circuit breaker must be installed before the control panel of the heater. This circuit breaker must include an automatic protection in compliance with existing regulations.

The use of switches with characteristic curve for their triggering of type "**K**" or "**D**" or "**C**" is mandatory.
With the **INVERTER**, a **0.30mA** automatic residual-current circuit breaker with type class **"B"** is recommended

Automatic circuit breakers with "**A**" trigger curve are not allowed since they are not suitable for electrical motor protection.



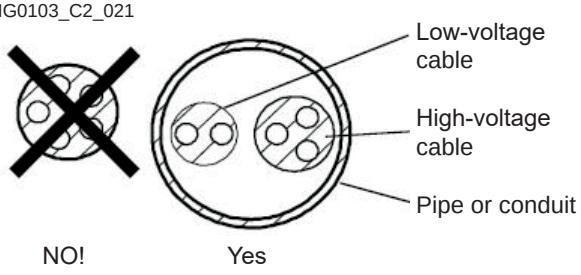
5.2.2. Cables

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

PK Model	Code Motor	Motor kW	Rated Current In	Cable section mm²	A protection
100-10W	G01430-IE3	1.5	5.1	5Gx1.5	10
100-20W	G01490-IE3	2.2	6.9	5Gx1.5	10
140-10W; 190-10W	G01260-IE3	3.0	8.7	5Gx2.5	16
140-20W; 190-20W	G00137-IE3	4.0	9.8	5Gx2.5	16
250-10W	G01490-IE3	2x2.2	12.0	5Gx2.5	25
250-20W; 320-10W	G01181-IE3	2x3.0	16.0	5Gx4.0	25
320-20W;	G00137-IE3	2x4.0	19.8	5Gx4.0	25
420-10W; 420-20W	G01181-IE3	2x5.5	23.8	5Gx6.0	40
550-10W;	G00137-IE3	2x4.0	20.2	5Gx6.0	25
550-20W;	G01181-IE3	2x5.5	24.2	5Gx6.0	40

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. Rated current: current absorbed by gas or oil burner.

HG0103_C2_021



CHECKS
All APEN GROUP heaters undergo electrical tests. Safety devices are tested as well, and if two fans are installed, they are checked to verify they are phased.
At first start up, the following checks are mandatory:

- fan rotation direction; if two fans are installed, both have to be checked.
- actual absorption of each motor; it must be lower than rated absorption: see absorption values of each motor in "Technical Data" section.
- adjustment of trigger threshold of thermal relay based on the absorption measured; increase value by 10% over measured value. Never exceed motor rated value.

5.3. Electrical connection of accessories

All PK warm air heater control panels use a modulation board and a wiring board which allow an easy and safe connection of parts that are usually used in warm air heating systems such as:

- Fire damper and discharge shutter, if installed
- Room thermostat, timer and burner.

Fire Damper

Wire microswitch (NC contact with activated damper) to terminals IDC and ID5 of CN02 connector on the heater modulation PCB.
If microswitch triggers, the board triggers error E25 and stops the burner, while the fan keeps working to cool down the exchanger. Heat in excess will be dispersed through a discharge shutter for a time preset in the modulation board.

Discharge Shutter

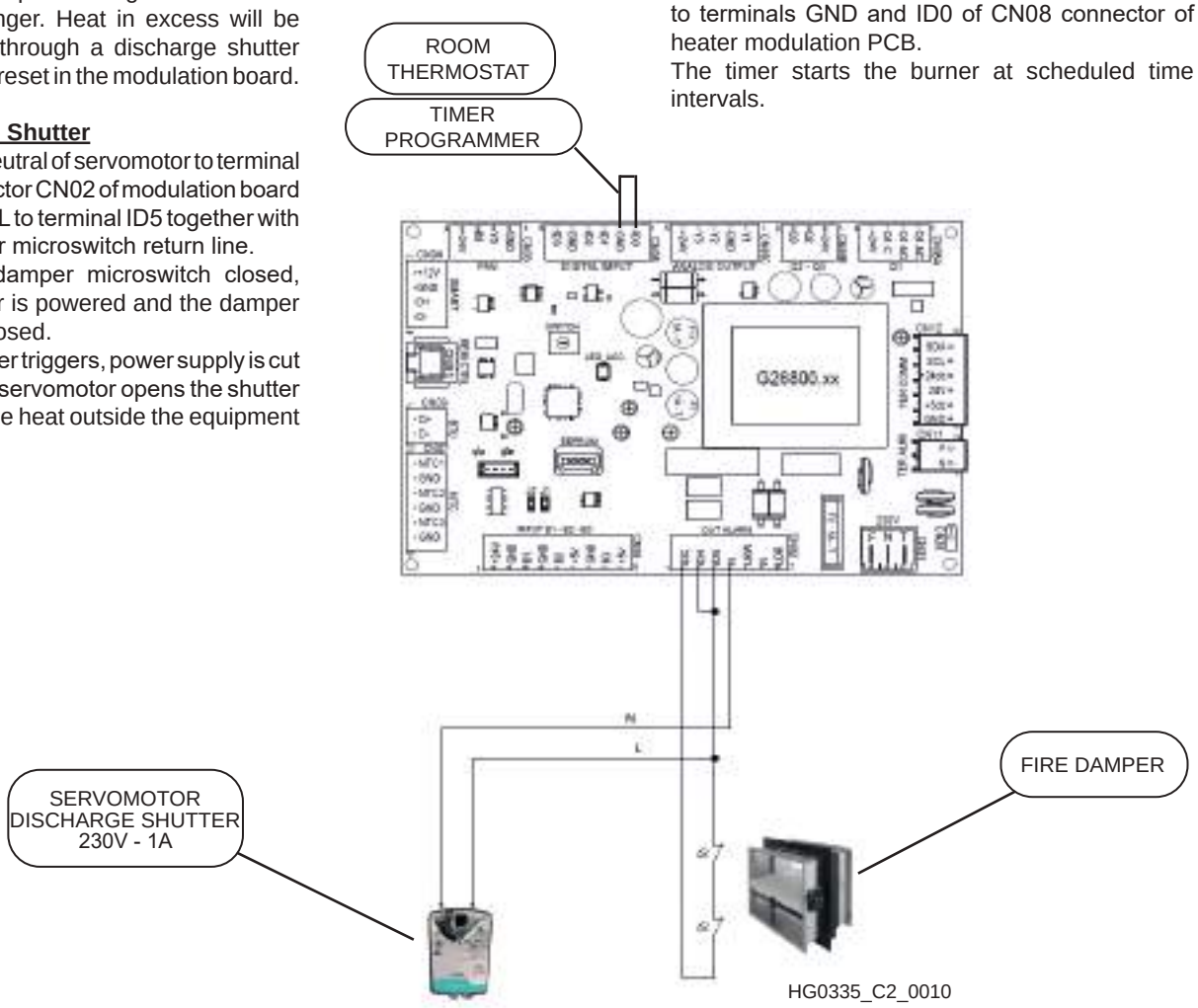
Connect neutral of servomotor to terminal N of connector CN02 of modulation board and phase L to terminal ID5 together with fire damper microswitch return line.
With fire damper microswitch closed, servomotor is powered and the damper remains closed.
If fire damper triggers, power supply is cut off and the servomotor opens the shutter to discharge heat outside the equipment

Room Thermostat

Wire room thermostat to terminals GND and ID0 of CN08 connector on the heater modulation PCB. This thermostat starts the burner only when room temperature lowers under set value.

Timer

Wire timer contact in series with room thermostat to terminals GND and ID0 of CN08 connector of heater modulation PCB.
The timer starts the burner at scheduled time intervals.



HG0335_C2_0010

If no fire damper is installed, create a jumper on terminals IDC - ID4 - ID5 of connector CN02.

In case of special configurations (with accessories) refer to the dedicated technical sheet and wiring diagram

The burner only operates if terminals ID0 and GND are closed, modulation board connector CN08. Connection of a room thermostat or Smart X is mandatory.

5.4. Wiring the Burner

A specific connector on burner control board is dedicated to connecting the burner.
The connector shows standard numbering for modulating and two-stage burners. You only need to wire the burner to the connector respecting numbering.

Three-phase Burner

On control panels of models from PK 250 onward, an automatic switch is installed that controls 3-phase burner power supply. 3-phase burners always have two supplies:

- 400V three-phase for electrical motor
- 230V single-phase for the control section.

With 3-phase motors, remember to verify that rotation sense of burner motor is correct. Installed switch has the following characteristics:

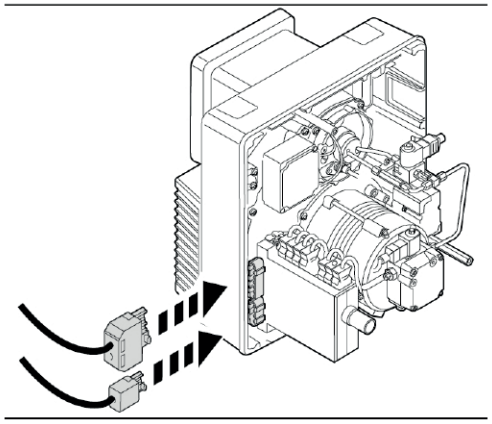
Magnetic protection 6.3 A **Tripping current 78 A** **Breaking capacity 100 kVA**

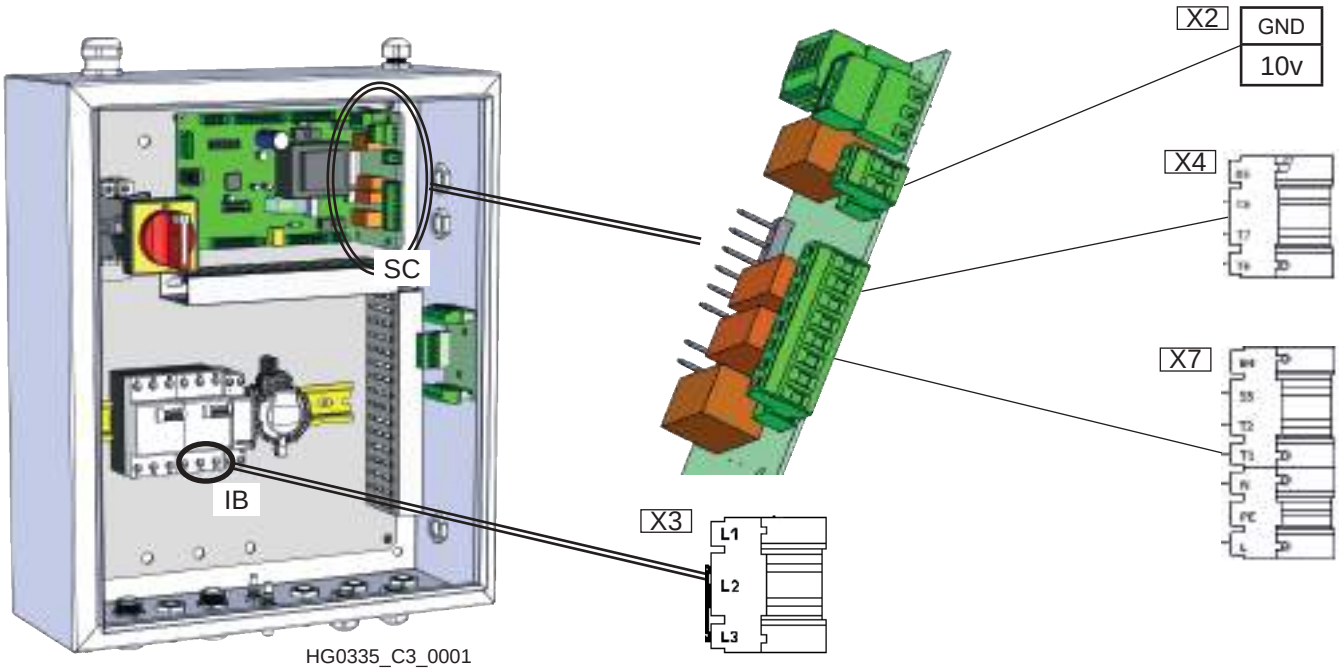
Single-phase burner

For single-phase burners which are separately powered:

- take a phase from the IB burner switch and bring it on the burner terminal board, with the other IB switch phases released;
- take the neutral from the control panel main switch.

Legend of Burner Plug		
X7	7-pole plug for burner connection	
	L1	line supply (230V)
	T	ground
	N	neutral
	T1-T2	series of thermostats
	S3	lock signal
X4	4-pole plug for high/low flame connection	
	T6-T7-T8	high/low flame thermostat.
X3	3-pole plug for 3-phase burner	
	L1-L2-L3	3-phase burner terminal board
X2	Burner modulation plug	
	0-10v	Burner modulation
SC	Burner wiring board	
IB	3-phase burner switch	

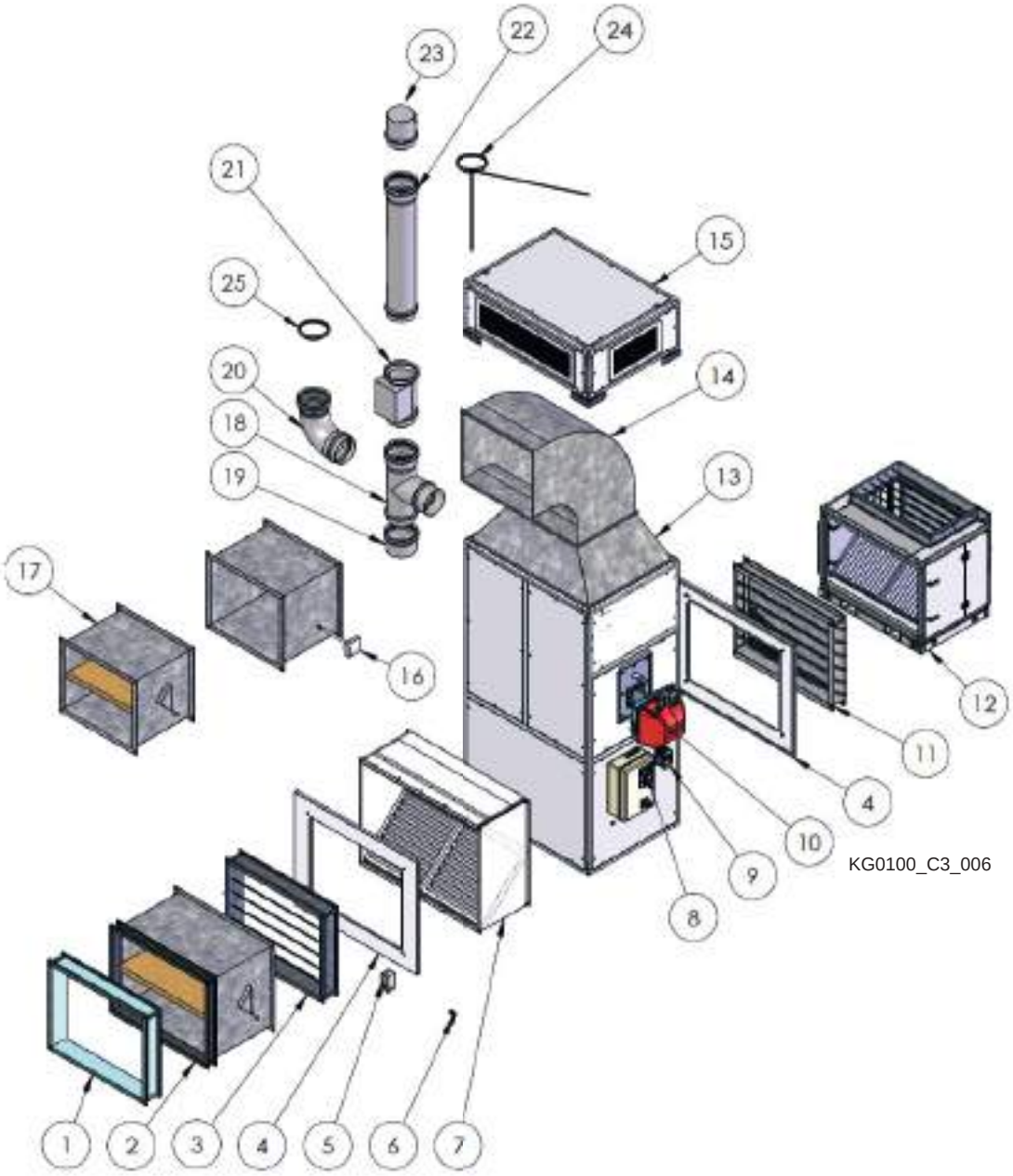




HG0335_C3_0001

5.5. Optional accessories

APEN GROUP has provided a set of accessories to facilitate the installation of heaters indoor, in thermal stations or outdoor.



KEY

1. Vibration damping joint
2. Fire Damper
3. Regulation shutter on intake
4. Shutter joint kit
5. Shutter servomotor
6. Manual control for shutter
7. Filter group
8. Controller for two-stage burner
9. Inverter for air flow rate/pressure regulation
10. Burner
11. Rain Deflector
12. Mixing box
13. Duct adapter joint
14. Duct bend
15. Air distribution plenum
16. Duct temperature sensor
17. Delivery fire shutter
18. Chimney Tee 90°
19. Manifold for chimney condensate
20. Chimney bend 90°
21. Flue exhaust module
22. Straight chimney pipe 1 metre
23. Chimney terminal (tapered)
24. Kit of tie rods for securing the chimney to the heater
25. Ring for chimney assembly
26. Room temperature sensor (not specified)
27. Regulation shutter on delivery (not specified)

5.5.1. Air Filter

An air filter can be installed directly on heater frame, if required, following the instructions in the paragraph below. For horizontal heaters up to 250, an adapter kit is available to adapt intake section to filter section. For models from 320, a specific horizontal filter is provided.

Filter code includes the adapters for the heater section, where necessary.

The air filters quoted in price list are sized to allow air intake from one side only. For intake on both sides and/or different from standard, contact APEN GROUP Customer Support for the correct sizing.

The standard filter supplied is made of a corrugated synthetic fibre filtering cell, class ISO Coarse 50% according to ISO 16890, has a class 1 (one) reaction to fire, can be used for all year long service up to a max. temperature of 80°C, corresponding to class G3 (EN779).

The following filters are available on demand:
- class ISO Coarse 55% according to ISO 16890, corresponding to class G4
- made of corrugated wire mesh filtering cell, class ISO Coarse 30% according to ISO 16890, corresponding to class G1.

You can regenerate filters by cleaning them as follows:
- dry dust: scroll, suck or blow with compressed air the filter, or wash it with an air jet;
- greasy dust: plunge the filter in lukewarm water and mild detergent (do not brush nor twist filter pads).

Filter loss (ΔP) is referred to a clean filter. Deduct this loss from heater static pressure. A dirty filter can reach a loss of 400 Pa, thus compromising heater efficiency.

To clean the filter disassemble it by removing the fixing screws.

Before this operation, make sure the heater is powered off and disconnected from mains.

Model	Dimensions			Δ P
	AF [mm]	HF [mm]	BF [mm]	Pa
100	1070	850	420	35
140	1300	850	420	33
190	1430	850	420	75
250	1720	850	420	76
320	1930	850	420	81
420	2170	1000	630	57
550	2600	1290	630	53
320-xHA	1960	1140	510	57
420-xHA	2170	1340	630	57
550-xHA	2600	1340	630	63

*For horizontal models, HF does not include the fixed value (100 mm) of feet.

KG0100.ET.012

Installing the Filters

Two filter construction models are available. See model and type in the figures on the side.

For filter unit with aluminium frame (models 420÷550), use the brackets supplied to fix the filter to the heater frame.

Then fill gaps with silicone. This is especially required if the heater is installed outdoor.

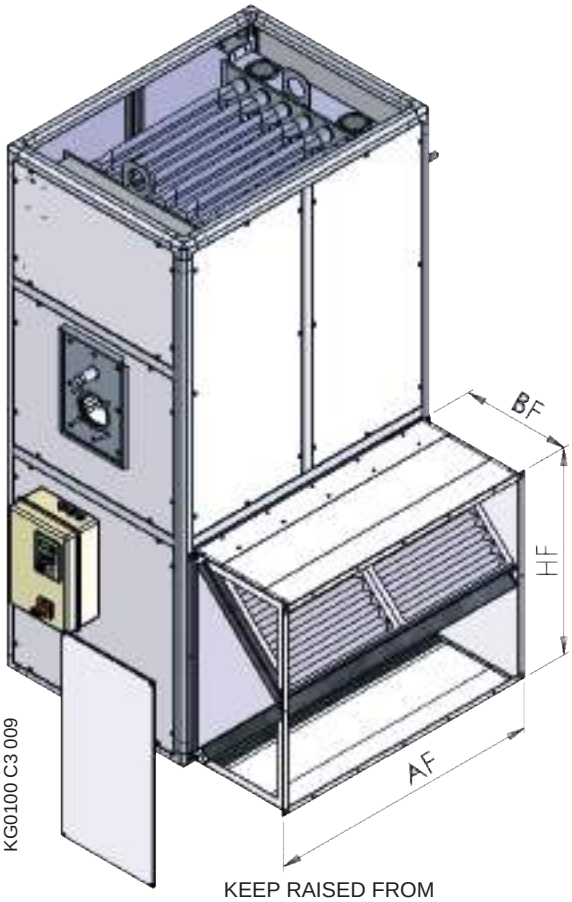
Code of spare filters

The table below shows filter codes, cell thickness and codes and number.

Filters are the same for any versions. They only differ according to heater size

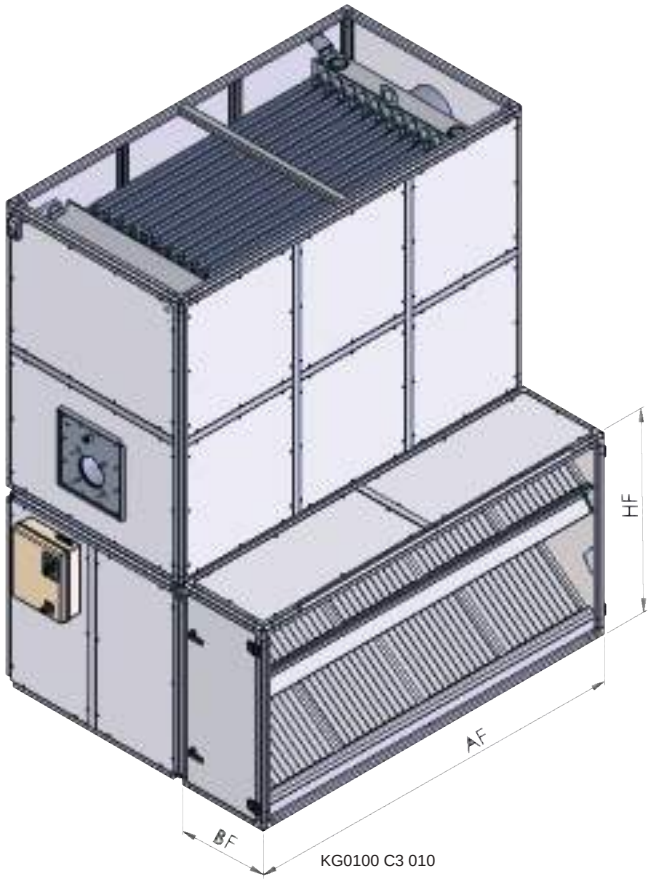
Filter code	thickness mm	cell code	No.	cell code	No.
FLXPKA100NA FLXPKA100NA-H	48	G01952	4		
FLXPKA140NA FLXPKA140NA-H	48	G01950	4		
FLXPKA190NA FLXPKA190NA-H	48	G01950	4		
FLXPKA250NA FLXPKA250NA-H	48	G01952	4	G01950	2
FLXPKA320NA FLXPKA320NA-H	48	G01950	6		
FLXPKA420NA	96	G04005	8		
FLXPKA420NA-H	96	G04005	12		
FLXPKA550NA FLXPKA550NA-H	96	G07209	12		

MODELS 100÷250 and 320-V



KEEP RAISED FROM FLOOR

MODELS 420÷550 and 320-H



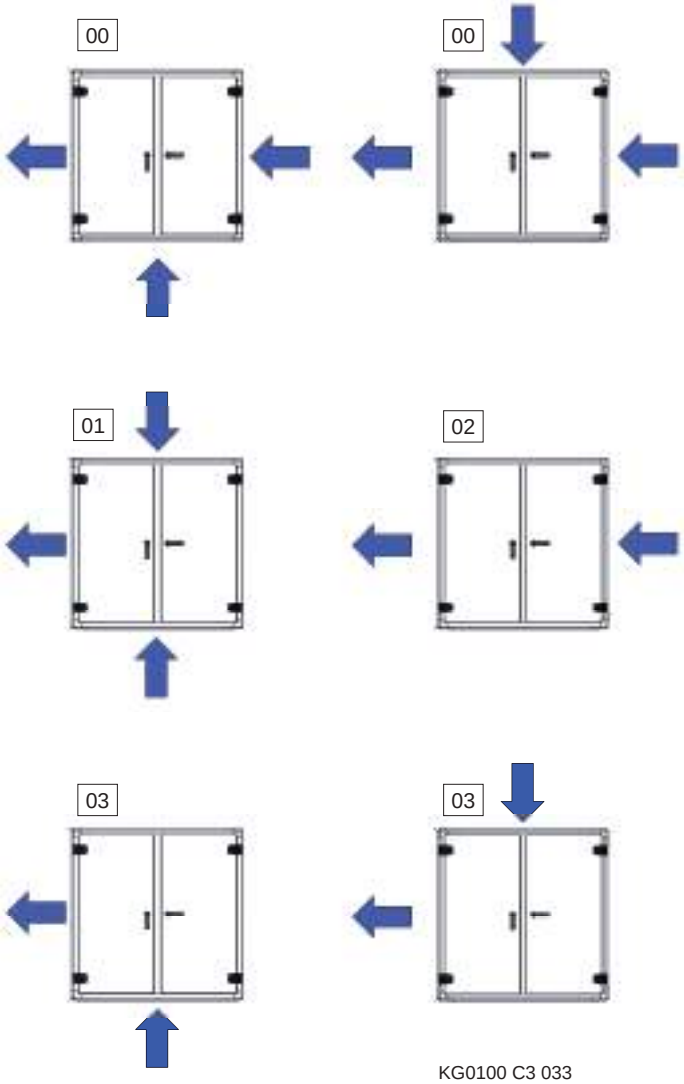
5.5.2. Mixing Box

Apen Group provides a mixing box accessory that includes the following components:
Aluminium frame;
Prepainted, insulated sheet panelling;
Air filter G3 or G4 (upon request);

G3 - class ISO Coarse 50% according to ISO 16890
G4 - class ISO Coarse 55% according to ISO 16890

Mixing box can include the following components:
- motor-assisted regulation shutters;
- rain deflector;
- manual controls or servocontrols for shutters;
- controls for servocontrols;

Shutters, rain deflectors and servocontrols must be purchased if needed. Their order codes are the same both for PKA and PKE. No mounting kits are required for their installation.
Boxes dimensions, either horizontal or vertical, are the same.



KG0100 C3 033

Mixing box code is the following:

M550-G3HE-00

M: mixing box code;
550: it is the size of the heater to which it is matched;
G3: it indicates filter efficiency, G3 or G4 as an alternative;
H: horizontal installation. It includes feet;
"V" vertical installation (without feet);
E: outdoor equipment (roofed);
"I" indoor installation.
00: it indicates the layout of air inlet openings;

Available layout are the following:
00: standard, two openings at 90° (bottom and back or top and back)
01: openings on top and bottom
02: one opening on the back only
03: one opening on top or bottom only.

Model	Overall dimensions		
	L	B	H
M100	1100	880	
M140	1330	920	
M190	1460	1060	
M250	1750	1140	
M320	1960	1140	
M420	2170	1240	
M550	2600	1340	

KG0100 C3 032

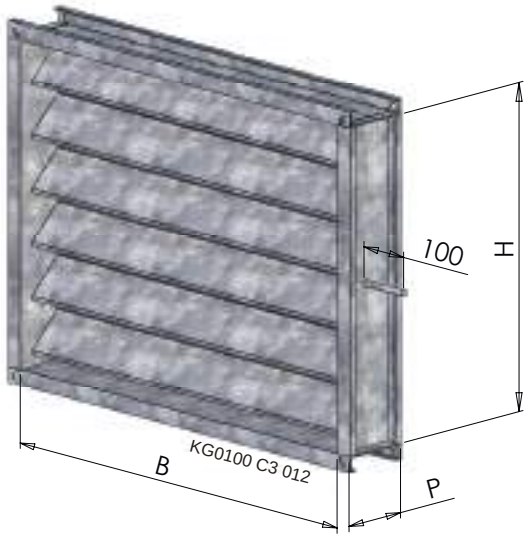
5.5.3. Air adjustment shutter

The air shutter is fixed to the filter or the heater by means of an adapter kit; all shutters feature a control which can be motorised and which allows the application of a manual control or, as an alternative, of a motor-assisted control with servomotor; both manual and motor-assisted controls are to be separately requested.

PK Model	Code	B	H	P	Fv*	Fh**
		[mm]	[mm]	[mm]	[mm]	[mm]
100	*G09914*	800	610	130	35	30
140	*G09924*	1000	610	130	35	30
190	*G09934*	1200	710	130	35	30
250	*G09944*	1400	710	130	35	30
320	*G09954*	1500	810	130	35	30
420	*G09964*	1500	810	130	35	30
550	*G09974*	1970	810	130	35	30

KG0100 ET 017 - AIR REGULATION SHUTTERS

Fv*: Vertical flange size
Fh*: Horizontal flange size



5.5.4. Servocontrols for air shutters

The supplied air shutter is of motorised type, without control. Kits are available to make the following controls:

- manual control;
- servomotor for ON/OFF control (230V);
- servomotor for modulating control 0-10 Vdc (24V).

ON-OFF
for ON-OFF model, air division can be performed with the mechanical limit switches on the servomotor.
MODULATING
for MODULATING model, air division is performed by changing a parameter on the CPU control board.

Modulating servomotors require 24V supply while ON/OFF servomotors need 230V supply.

SERVOMOTOR: this picture is for reference only. Brand and model of supplied device can change without notice.

HG0335_C2_0005

MANUAL CONTROL

HG0335_C2_0004

PK Model	Code	Description
100-140	*G09300*	Manual control for shutters (pitch 100 mm)
	G01112	Modulation servomotor 0-10Vdc - 24V supply - 4 Nm
	G01162	ON-OFF servomotor - 230V supply - 4 Nm
190-320	*G09300*	Manual control for shutters (pitch 100 mm)
	G09980	Modulation servomotor 0-10Vdc - 24V supply - 8 Nm
	G07208	ON-OFF servomotor - 230V supply - 8 Nm
420-550	*G09300*	Manual control for shutters (pitch 150 mm)
	G09980	Modulation servomotor 0-10Vdc - 24V supply - 18 Nm
	G07208	ON-OFF servomotor - 230V supply - 18 Nm

5.5.5. Fire damper kit

Apen Group provides two installation places for fire dampers: on intake and on delivery.
Dampers differ only for dimensions.
Dampers on intake have the same size as air regulation shutter. They are installed directly on this shutter or, if this is not installed, on the filter/heater by means of adapting kits.
Dampers on delivery are slightly smaller, the same size as the straight pipe+bend assembly (see further in this Manual).
All dampers have the following specifications:

- - reaction to fire REI120
- - galvanized sheet body (500 mm deep)
- - 48 mm plasterboard shutter
- - thermal cut-out with fuse set on 72°C;
- - microswitch, IP55, supplied as a standard and installed on damper
- Dampers are CE-marked and supplied with a certificate.

Damper higher than 500 mm have a blade that, when open (in horizontal position), projects beyond the damper size on both sides. Basically, the shutter projects 50 mm, on both sides, for 600 mm high dampers,100 mm for 700 mm high dampers and 150 mm, on both sides, for 800 mm dampers. Fire dampers higher than 500 mm are sold together with a duct which compensates and protects the blade projection on one side in order to prevent rotation problems in case of matching with regulation shutters. The duct is not to be ordered separately, but is included in the codes indicated in the adjacent tables.

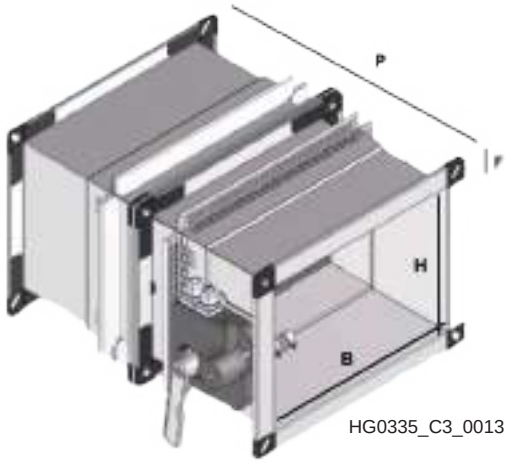
The fire damper too requires an adapter kit to be directly mounted on heater frame or on air filter.

ON INTAKE

PK Model	Code	B	H	P	F
100	*G09916*	800	600	500	35
140	*G09926*	1000	600	500	35
190	*G09936*	1200	700	500	35
250	*G09946*	1400	700	500	35
320	*G09956*	1500	800	500	35
420	*G09956*	1500	800	500	35
550	*G09974-T*	1970	800	500	35

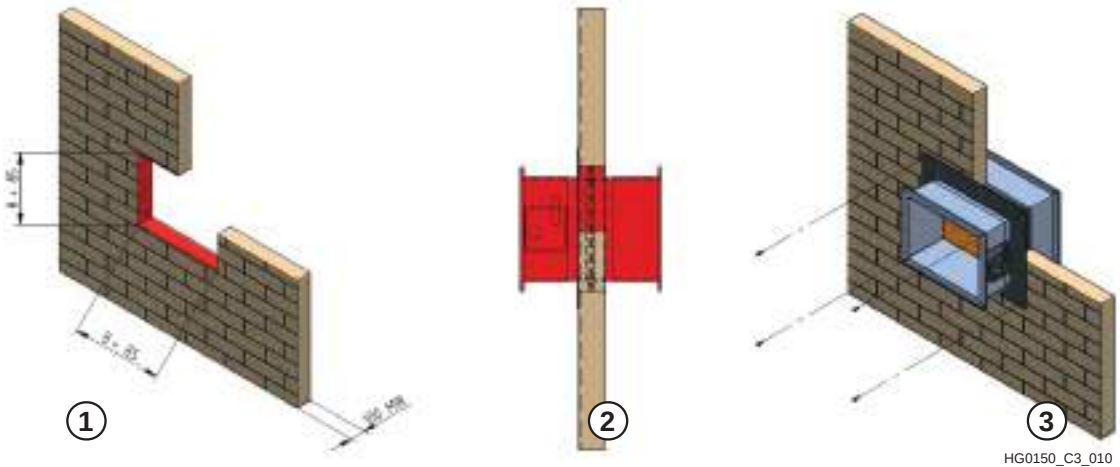
ON DELIVERY

PK Model	Code	B	H	P	F
100	*G09906*	600	500	500	35
140	*G09916*	800	600	500	35
190	*G09926*	1000	600	500	35
250	*G09936*	1200	700	500	35
320	*G09946*	1400	700	500	35
420	*G09956*	1500	800	500	35
550	*G09974-T*	1970	800	500	35



HG0335_C3_0013

INSTALLATION OF FIRE DAMPER ON RIGID WALL



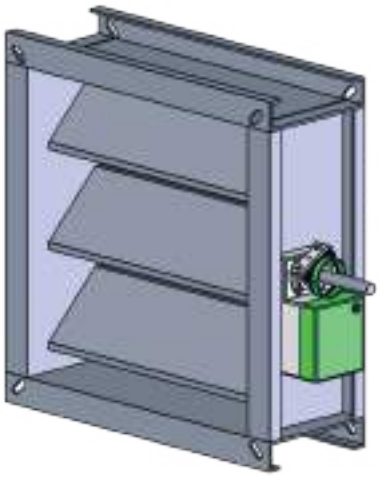
HG0150_C3_010

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

5.5.6. Discharge shutter G06500-230

Apen Group provides a motor-assisted discharge shutter kit with return spring. Its code is: G06500-230.
Dimensions of discharge shutter are 300x300 mm. Shutter blades are supplied with gaskets to prevent air leaks during operation.
Discharge shutter is mandatory when the heater is installed in a dedicated room or in a thermal station.
Wire the servomotor to the connector CN2 of the wiring card (see page 39 of this Manual).
How it works: when fire damper microswitch is closed and the shutter is open, the servomotor is powered and discharge shutter is closed. When fire damper triggers, its microswitch opens, powers down the servomotor, and the spring mechanism opens the discharge shutter.



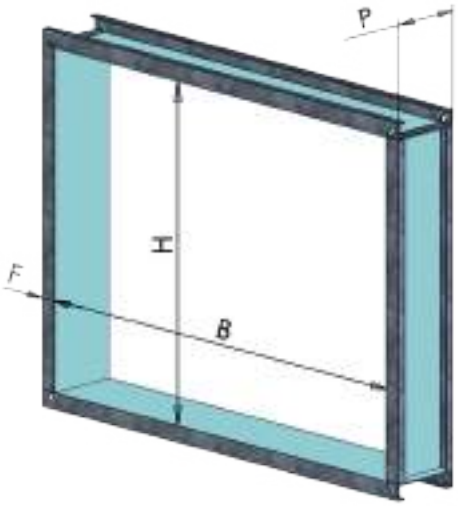
HG0335_C3_0014

5.5.7. Vibration damping joint

When correctly assembled on intake or delivery assemblies, the vibration damping joint reduces vibrations on air delivery pipes, thus avoiding their propagation and consequent noise. These joints are made of neoprene and metal and have a galvanized steel framework. They can endure temperatures of 100°C max. and their fire rating is M2.

PK Model	Code	B	H	P	F
	Shutter	[mm]	[mm]	[mm]	[mm]
100	*G09917*	810	610	150	30
140	*G09927*	1010	610	150	30
190	*G09937*	1210	710	150	30
250	*G09947*	1410	710	150	30
320	*G09957*	1510	810	150	30
420	*G09967*	1510	810	150	30
550	*G09977*	1980	810	150	30

KG0100.ET.015 - VIBRATION DAMPING JOINTS



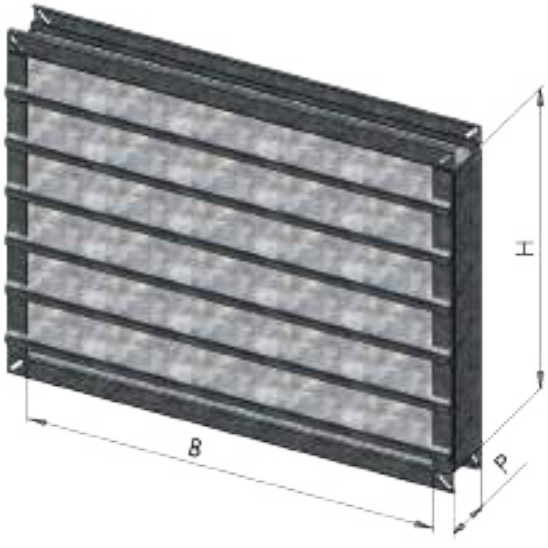
HG0335_C3_0015

5.5.8. Rain Deflector

If intake air is drawn from outdoor, a rain deflector is available. It also includes a net to prevent animal intrusion. Mounting to the heater frame is done, as with adjustment shutters, by means of an adapter kit. It is possible to install the adjustment shutter between the adapter kit and the rain deflector.

PK Model	Code	B	H	P	F
100	G09915	800	610	105	40
140	G09925	1000	610	105	40
190	G09935	1200	710	105	40
250	G09945	1400	710	105	40
320	G09955	1500	810	105	40
420	G09965	1500	810	105	40
550	G09975	1970	810	105	40

KG0100 ET 018 - RAIN DEFLECTORS



HG0335_C3_0016

5.5.9. Inverter

The inverter has the following advantages:
- In installations where air distribution ducts are made of textiles (or similar), it limits the initial splash effect and guarantees longer life to ducts.
- It balances motor breakaway starting current
- It helps reduce belt wear and extend the life of motor and fan bearings.

If double polarity motors and/or inverter are used, it is mandatory to install a two-stage or modulating burner with flame mode control depending on fan speed.

With standard motors, minimum speed must be higher than 25 Hz to guarantee cooling down motor coil. If this threshold is too high, special motors are available and can be requested to APEN GROUP Technical Support. The main switch protecting the heater with on-board inverter must have a residual current to the ground of 0.3A (300 milliampere). Switches with residual current of 0.03A (30 milliampere) are not suitable.

HG0335_C2_0001

5.5.10. Motors with thermal protection

This kind of motors have a thermostat in their coil to measure the temperature in the coil itself. If the set temperature is exceeded, the thermostat opens up. THIS additional protection is required for the system in some European countries.
For 3-phase motors this protection is optional and must be expressly requested.

HG0335_C3_0017

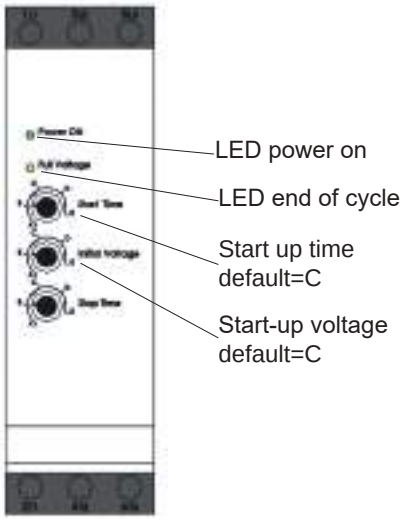
5.5.11. Soft starter

APEN supplies soft starters as a standard for motors with an output equal or higher than 5.5 kW.

Soft starter has the following advantages:
- In installations where air distribution ducts are made of textiles (or similar), it limits the initial splash effect and guarantees longer life to ducts.
- It balances motor breakaway starting current
- It helps reduce belt wear and extend the life of motor and fan bearings.

A soft starter for 3-phase motors with capacity below 5.5 kW is also available.

G04700-06	soft starter for motors up to 2.2 kW
G04700-09	soft starter for motors up to 4.0 kW



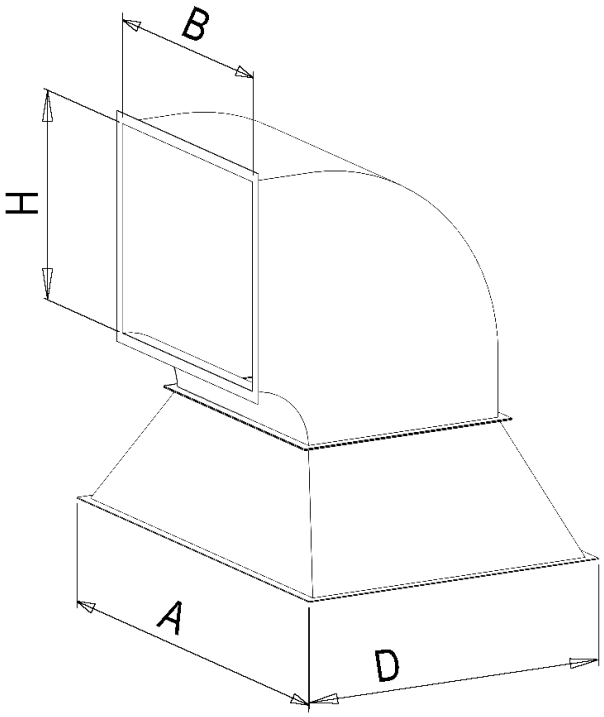
HG0335_C3_0018

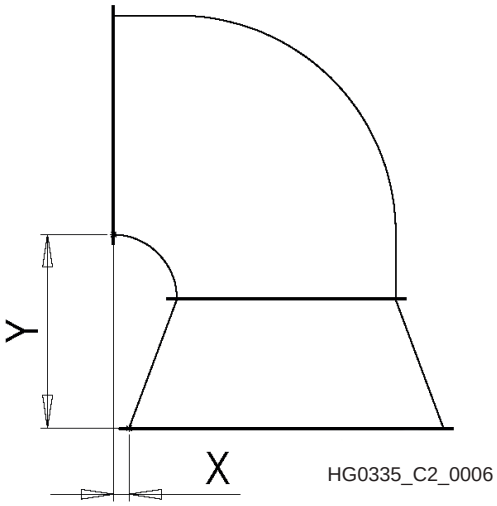
5.5.12. Accessories for air delivery

Duct bend

In case of ducting, the installer must built the fitting/bend for the relevant ducts.
Please find below the indications to build the fitting between PKA and PKE heaters in order to use our shutters on delivery.
Sizing is referred to an air speed in ducts ranging from 8÷9 m/s.
Shapes and dimensions can obviously differ from those stated.
Values in the table are referred to inner dimensions.

APEN GROUP can supply, if requested, a straight pipe + bend kit correctly dimensioned for heaters and fire dampers. Components are made of non-insulated galvanized sheet. Flange size is 30 mm.





HG0335_C2_0006

PK Model	Code	Heater		Duct		Flange	Height	Distance
		A	D	B	H	F	X	Y
100	G09918	1020	720	610	510	30	45	450
140	G09928	1250	840	810	610	30	30	550
190	G09938	1380	980	1010	610	30	15	600
250	G09948	1670	1060	1210	710	30	20	600
320	G09958	1880	1060	1410	710	30	20	700
420	G09968	2070	1240	1510	810	30	30	750
550	G05278	2500	1240	1980	810	30	30	750

KG0100 ET 020 - DUCT BENDS

5.5.13. Air distribution plenum

Air distribution plenum is to be installed when air is directly blown in the room. It is laid directly on the heater and does not require any fixing. Our plenums have two ranks of louvres and are suitable for use in industrial and commercial buildings. Louvres deliver high volumes of air and guarantee long blows and low pressure drops. Louvres are made of galvanised steel for other models. Louvre pitch ranges from 25 to 50 mm.
Standard plenums blow air on three sides (two short and one long). If required, custom plenums can be supplied, blowing air on two long and one short side.

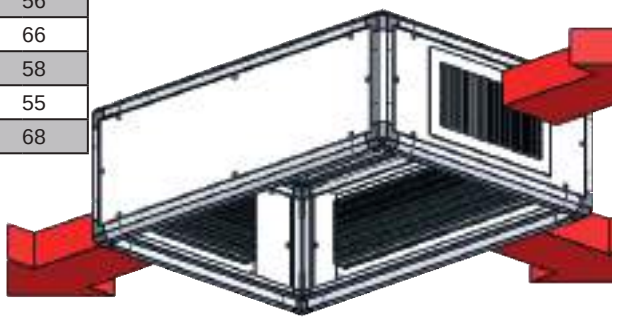
In tables below, the following data are shown:

Code: the code used to order the plenum.
Short side: the number and size of louvres located on the short side.
Long side: the number and size of louvres located on the long side.

H: total height of plenum. The height and width dimensions are the same as those of corresponding heater.
VK: blown air speed when louvre slat deflection is 0° (zero). If deflection is 22°, increase VK value by 16%, if deflection is 45°, increase VK value by 30%. Deflection means the horizontal angle of blown air.
Blow distance: the distance in metres the air is blown to. This value is referred to a residual speed of 0.3 m/s. With deflection angle of 22°, multiply blow distance by 0.70. For angles of 45°, multiply by 0.52.
ΔP: pressure drop of the plenum referred to the output speed VK (slats deflected by 0°).

STANDARD VERSION - 2 SHORT SIDES - 1 LONG SIDE

PLENUM Code	Short Side		Long Side		H	VK	Blow distance	ΔP
	No.	Louvre size	No.	Louvre size	mm	m/s	m	Pa
PLXPKA100NA	2	400x200	1	800x200	380	9.5	26	60
PLXPKA140NA	2	500x300	1	800x300	480	7.7	21	38
PLXPKA190NA	2	600x300	1	800x300	480	9.2	25	56
PLXPKA250NA	2	600x300	2	600x300	480	9.9	27	66
PLXPKA320NA	2	800x300	2	800x300	480	9.3	25	58
PLXPKA420NA	2	800x400	2	1000x400	630	9.1	25	55
PLXPKA550NA	2	1000x400	3	600x400	630	10	27	68

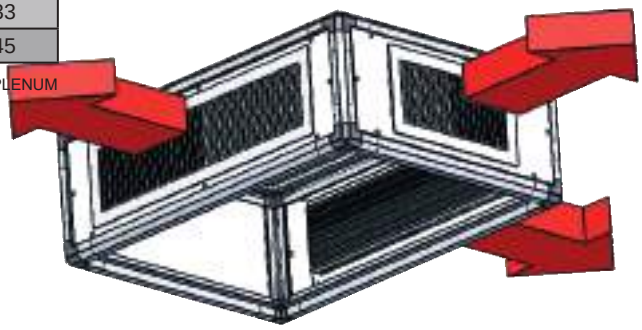


HG0335_C2_0007

CUSTOM VERSION - 1 SHORT SIDE - 2 LONG SIDES

PLENUM Code	Short Side		Long Side		H	VK	Blow distance	ΔP
	No.	Size Op.	No.	Size Op.	mm	m/s	m	Pa
PLXPKA100NA-1	1	400x200	2	800x200	380	7.5	21	36
PLXPKA140NA-1	1	500x300	2	800x300	480	6.5	18	26
PLXPKA190NA-1	1	600x300	2	800x300	480	8.3	23	45
PLXPKA250NA-1	1	600x300	4	600x300	480	7.9	22	40
PLXPKA320NA-1	1	800x300	4	800x300	480	7.5	21	36
PLXPKA420NA-1	1	800x400	4	1000x400	630	7.2	20	33
PLXPKA550NA-1	1	1000x400	4	600x400	630	8.3	23	45

KG0100 ET 022 - PLENUM



HG0335_C2_0007

5.5.14. Accessories for the Chimney

Components supplied for flue system are made of stainless steel AISI316L. They are single walled and suitable for indoor or outdoor installation.
If required, double-walled stainless steel chimneys can be supplied.
Components have male/female rotating facing. Clamps are only required for chimneys longer than 2 metres. Silicone rubber seals are supplied.

Running temperature with dry/wet operation and negative pressure is 600°C. In case of wet operation under pressure, the temperature is 200°C.
Chimneys are suitable for working either under pressure or negative pressure. Maximum pressure allowed is 1,000 Pa.
Flue sampling element is 300 mm long and it includes a thermometer.

Straight chimney pipe (1 metre)		
PK Model	**Code**	**Ø [mm]**
100÷140	G10852-180	180
190÷320	G10852-250	250
420÷550	G10852-300	300

Windproof tapered cover		
PK Model	**Code**	**Ø [mm]**
100÷140	G10858-180	180
190÷320	G10858-250	250
420÷550	G10858-300	300

Fastening ring		
PK Model	**Code**	**Ø [mm]**
100÷140	G10855-180	180
190÷320	G10855-250	250
420÷550	G10855-300	300

Flue exhaust module		
PK Model	**Code**	**Ø [mm]**
100÷140	G13857-180	180
190÷320	G13857-250	250
420÷550	G13857-300	300

90° bend		
PK Model	**Code**	**Ø [mm]**
100÷140	G10854-180	180
190÷320	G10854-250	250
420÷550	G10854-300	300

Tee joint		
PK Model	**Code**	**Ø [mm]**
100÷140	G10850-180	180
190÷320	G10850-250	250
420÷550	G10850-300	300

Condensate drain		
PK Model	**Code**	**Ø [mm]**
100÷140	G10851-180	180
190÷320	G10851-250	250
420÷550	G10851-300	300

KG0100_C3_111

All components are certified in compliance with EN 1856-1 and EN1856-2 standards. They are identified by an ID plate showing their features. Below are some *examples*:

0694-CPR-52976	1856-2	T600	N1	D	V2	L50050	O50
0694-CPR-52977	1856-1	T200	P1	W	V2	L50050	O70

Certificate no.

Number of the Standard

Temperature level:
T80/T100/T120/T140/T160/T200/
T250/T300/T400/T450/T600

Pressure level:
N=Negative,P=Positive, H=High Pressure,
1 and 2 indicate the allowed loss,
1 is the most restrictive value

Condensate Resistance Class:
D=for dry use,
W= for wet use

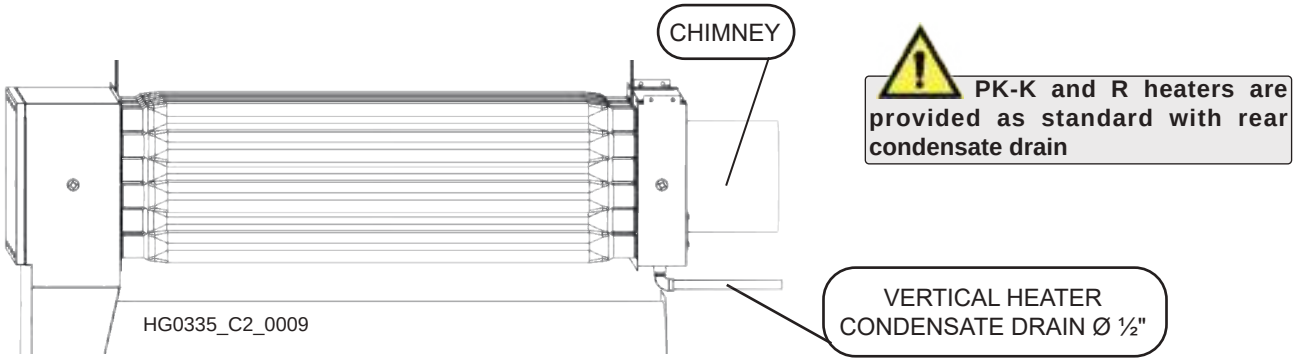
Corrosion resistance class:
V1 - gaseous fuels, natural gas, LPG, and manufactured gas with nitrogen ≤50 mg/m³;
V2 - liquid fuels, natural gas, LPG and manufactured gas >50 mg/m³;
V3 - solid fuels, natural gas, LPG and manufactured gas with nitrogen >50 mg/m³, fuel oil with sulphur >0.2%
Vm - resistance category without test, only with minimum thickness of material

Material and thickness:
If STAINLESS AISI316 steel 0.5 mm thick is used, category is L50050
i.e. L50=STAINLESS AISI316, 050=0.4mm thick

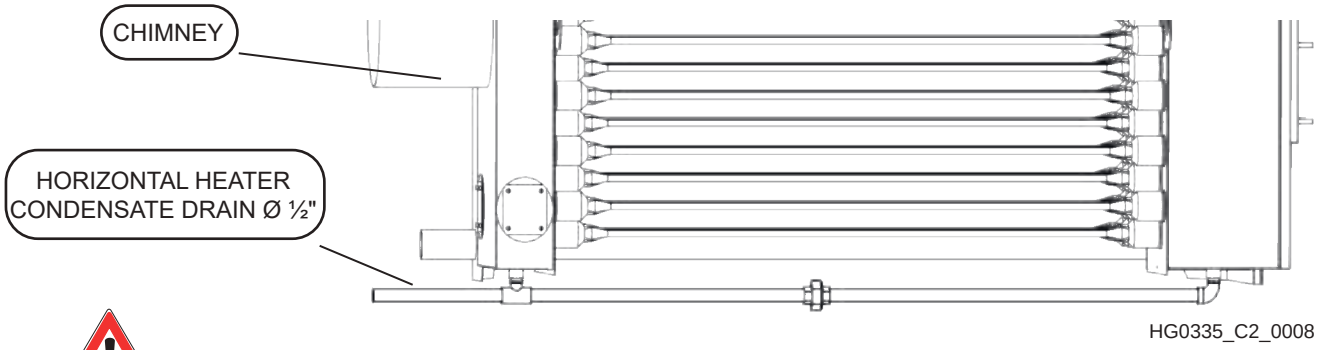
Inner resistance to fire (G=Yes, O=No) and distance (e.g. 50=50mm) from combustible materials

5.5.15. Accessories for Condensate Handling

If a heater with modulating and/or two-stage burner is installed, high air flow rates and low heat drop can result in condensate production. It is necessary to drain this condensate from the exchanger using a suitable system.
All condensing PKA/E heaters include a kit for condensate drain. For horizontal heaters, air flow direction (rightward or leftward) must be specified at order to install fittings in the correct position.
No condensate should form into front manifold because the gaskets installed are not waterproof. In order to avoid this, burner heat input should be adjusted to a value at least equal to heater minimum heat input (see table with technical data).
If condensation is not drained from the exchanger, it could seriously damage it. The warranty of the exchanger does not cover damages caused by condensate.
The picture below shows some examples of horizontal and vertical installation. In both cases, it is better to install the heater with a slight inclination towards condensate drain in order to ease its discharge. Standard installation of condensate drain has its outlet on chimney side.
Condensate drains must not be changed or blocked.
Materials to be used for condensate drain
Any plastics should be avoided for condensate drain system since flue gas temperature is too high. Suitable materials are stainless steel and aluminium (only outside the heater). Galvanized steel is not recommended since it can be corroded by acid condensate.
Codes of KITS installed as standard on condensing heaters are as follows:
G00740-xxx-H (horizontal)
G00740-xxx-H (vertical)
Replace xxx with heater size code.



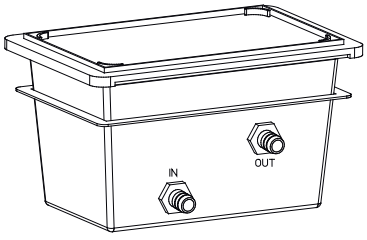
PK-K and R heaters are provided as standard with rear condensate drain



DRAINING USING A SIPHON If the heater is installed indoor and a condensate drain system is provided, the siphon must mandatorily be smoke proof. Fill manually the siphon with water at first start-up

ACID CONDENSATE TREATMENT KIT
Apen has acid condensate treatment kits:
- G14303 Condensate neutraliser kit up to 120Kw
- G05750 Condensate neutraliser kit up to 1500Kw

For version "N" if an oil burner is matched, it is mandatory to prevent any condensate.



6. SERVICING INSTRUCTIONS

6.1. Operating Cycle

The PK heaters operation is fully automatic; they are equipped with electronic equipment with self check facility that manages all the burner control and monitoring operations and with a microprocessor based electronic PCB that controls the heat output regulation.

The heat demand depends on SMART parameter setting of the heater PCB:

- SMART = 0: SMART not present and modulation with NTC1<ST1;
- SMART = 1: uses PID and ON/OFF of the SMART;
- SMART = 2: uses only ON/OFF command of the SMART.

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

- the heater is powered on and has not been locked out;
- the contact is closed on ID0-GND terminals of the heater PCB.

In these conditions the burner starts; after a time (parameter T_on on CPU, default 60sec) the fan(s) will start.
The heater will be switched off when the ID0-GND contact opens on the terminal board; disconnecting the power supply is prohibited, except for emergencies because, when the heater is switched off, the fan will continue to work for approximately 180 seconds to cool the combustion chamber.
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 trigger and the associated requirement to manually reset the heater.

If, during the cooling cycle, there is a new demand for heat, the modulation PCB will wait for the cooling fans to shut down and then reset the counters and start a new cycle.

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

6.2. Interface Panel

PK heaters are fitted as standard with a multifunction LCD panel located on the front of the control panel, which is used to control, configure and diagnose all operating parameters of the equipment.
This panel cannot be remotely controlled.

The panel is fitted with a red 3-digit LCD display and with four function keys: ↑ , ↓ , ESC and ENTER; the display allows the user to display the heater operating mode and its Faults. It also allows the service centre to change the main operating parameters.
Changing parameters requires a password.

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

6.2.1. Navigating the menu

The menu has three levels. The first and the second are accessible without entering a password, the third requires entering
writing-level passwords to change the parameters.
Also with modbus address other than Ø, all parameters can be viewed and/or edited through the remote control.
Use the ↑ (up arrow) and ↓ (down arrow) buttons to scroll through the menus. To select the menu, or select the parameter, press ENTER. The parameter can be changed using the arrows: pressing ↑ (up arrow) increases the parameter by 1, pressing ↓ (down arrow) reduces it by 1. When the arrow keys are pressed for at least three seconds, the parameter scrolling speed is increased. To confirm a change in parameters, press ENTER. A change in the parameter is indicate by the display flashing. To exit the parameter or menu, press ESC. If you exit the programming function, after about 10 minutes the program will exit the menu and go back to the “machine status” display. All submenus can be scrolled from the bottom to the top, and they start over when the end of the menu is reached.

First level menus
The following information is available on the first level:

Machine status	Provides information on unit operation (rdy/Sty/ OFF/HEA/Air/COO/SAn)
Axx	Shows the address assigned to the CPU OCB of the unit (1 to 15); it is displayed alternating with "Machine Status" (e.g., "A01" = address 1)
Exx	In case of an alarm in progress, shows the error code (e.g. "E10")

Second level menu
The following menus are available on the second level:

Fun	Allows to choose the type of operation: Aut or OFF
rEg	Allows to force the burner at minimum or maximum output in order to perform combustion tests;
dEG	Allows to activate the system deaeration cycle; the cycle involves circulator ON 20" - circulator OFF 5", until exit from the menu
inP	Allows to display the status of inputs
Out	Allows to display the status of outputs
PAr	Allows to display and edit (after entering the password) parameters of adjustments, functions and controls

6.2.2. Operation - Fun Menu

Allows to select the type of operation of the CPU PCB, between AUT (automatic) and OFF (off).

OFF	Has priority also over external controls (Smart X type)
Aut	Corresponds to ON, the system sets itself up to receive inputs from the remote control (Smart X), adjustments, or external controls

6.2.3. Input - InP Menu

Allows to display the value and/or status of analogue and digital inputs. For the meaning and the default values, please refer to the table CPU PCB Parameters of Paragraph 5.6 "Modulation PCB Parameters".

nt1	“Value” for NTC1 probe temperature (modulation)
nt2	“Value” for NTC2 probe temperature (not used)
nt3	“Value” for NTC1 probe temperature (not used)
An0	“Value” for Number of flue gas fan revolutions (Premix)
An1	“Value" for Analogue input voltage B1 (0-10V)
An2	“Value" for Analogue input voltage B2 (0-10V)
An3	"Value" for Analogue input B3 (not used)
id0	Open/closed status of "OPn/CLS" Id0 digital input (remove ON/OFF)
id1	Open/closed status of "OPn/CLS" Id1 digital input (Remote Reset)
id2	Open/closed status of "OPn/CLS" Id2 digital input (Summer ventilation)
id3	Open/closed status of "OPn/CLS" Id3 digital input
id4	Open/closed status of "OPn/CLS" 230 Vac Id4 input (1=contact closed; 0=alarm E24 in progress)
id5	Open/closed status of "OPn/CLS" 230 Vac Id5 input (1=contact closed; 0=alarm E25 in progress)

6.2.4. Output - Out Menu

Allows to display the value and/or status of analogue and digital outputs. For the meaning and the default values, please refer to the table CPU PCB Parameters of Paragraph 5.6 "Modulation PCB Parameters".

y0	"Value" of PWM (%) for flue gas fan (premix)
y1	"Value" for Y1 output (PWM %)
y2	“Value” for Y2 output (0-10 Vdc) - EC fan(s)
y3	“Value” for Y3 output (0-10 Vdc)
ion	"Value" (%) of flame detection signal (100: value >2mA)
U1	Open/closed status of "OPn/CLS" Q1 output (Lockout signal)
U2	Open/closed status of "OPn/CLS" Q2 output
U3	Open/closed status of "OPn/CLS" Q3 output
rL1	Open/closed status of "OPn/CLS" RL1 relay (0=circulator/fan OFF; 1=circulator/fan ON)

6.2.5. Parameters - PAr Menu

Allows to display, and edit, the value of the main parameters of the CPU PCB. For the meaning and the default values, please refer to the table CPU PCB Parameters of Paragraph 5.6 "Modulation PCB Parameters".
By entering the menu, it is possible to display parameter values inside the relevant submenus

rGL	(adjustments parameters)
CrL	(controls parameters)
Fnu	(functions parameters)
rtU	(modbus serial parameters)

In order to change the value of the parameters, the password must be entered in the Abi submenu.

Entering the password

- From the home screen (rdy/Sty/OFF/HEA/Air/COO/SAn/EXX) press ENTER then use the ↑ (up arrow) and ↓ (down arrow) arrows to go to the PAR item; use the ↑ (up arrow) and ↓ (down arrow) arrows to go to the ABI item and press ENTER;
- Set the password inside the ABI menu and confirm it with ENTER (the flashing display will confirm that the parameter has been stored);
- Press ESC to return to the PAR menu
- Move with the ↑ and ↓ arrows to scroll within the PAR menu to the desired submenu item (rGL, CrL, Fnu, rtU);
- Press ENTER to access the submenu;
- Use the ↑ and ↓ arrow keys to select the parameters to be displayed and edited;
- Press ENTER to display the parameter value;
- Use the ↑ and ↓ arrows to edit the value;
- Press ENTER to confirm the change made;
- To exit the parameter and the menu, press ESC until the home screen is displayed.

6.3. Reset

The modulation PCB allows the operator to identify more than 30 different causes of lockouts. This allows a precise diagnostics managing each event very accurately.
To reset a lockout, press both ↑ and ↓ arrows simultaneously for a few seconds.
It is possible to operate the lockout reset remotely using one of the following solutions:

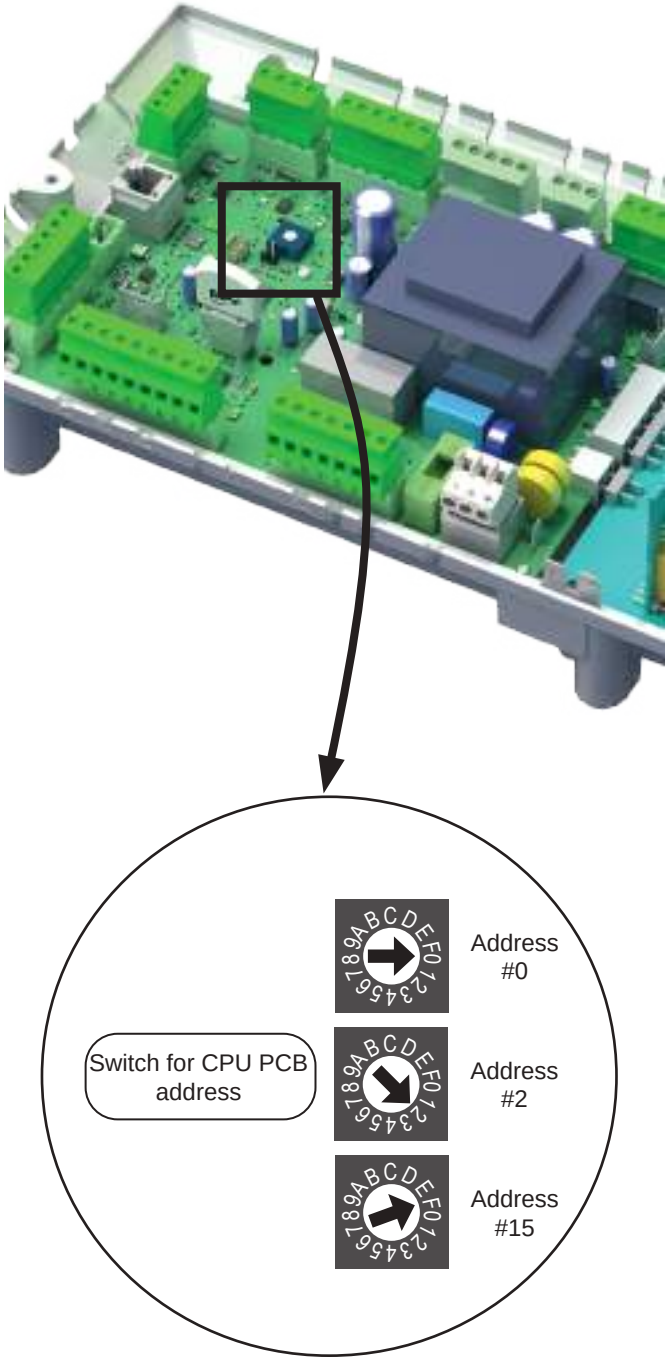
- the Smart X Web control;
- the ModBus protocol, if implemented by the manufacturer.

The lockout codes and their cause are shown in the ERRORS table in Paragraph 6.7 “Analysis of Lockouts - Exx”.

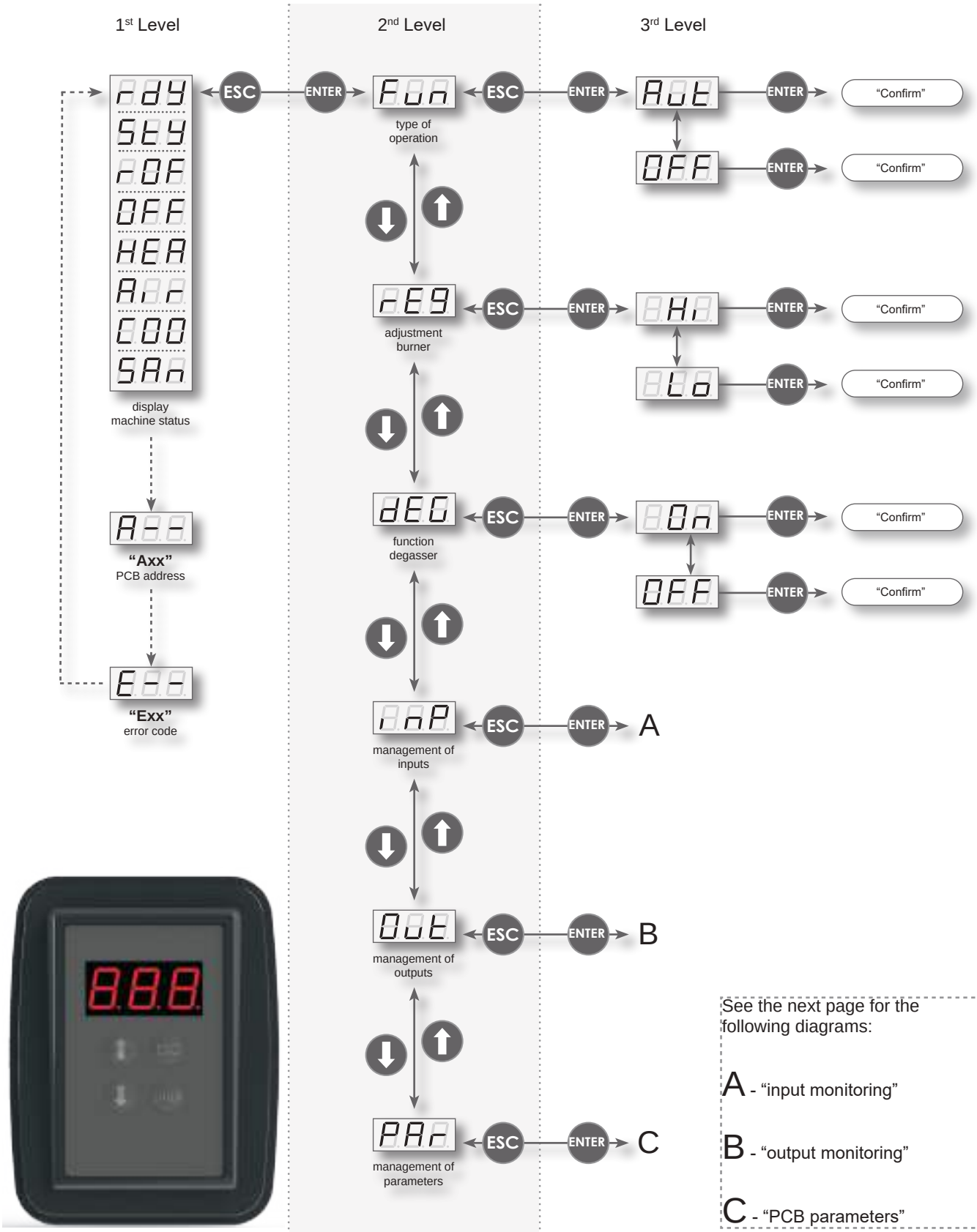
6.4. Smart X Web connection

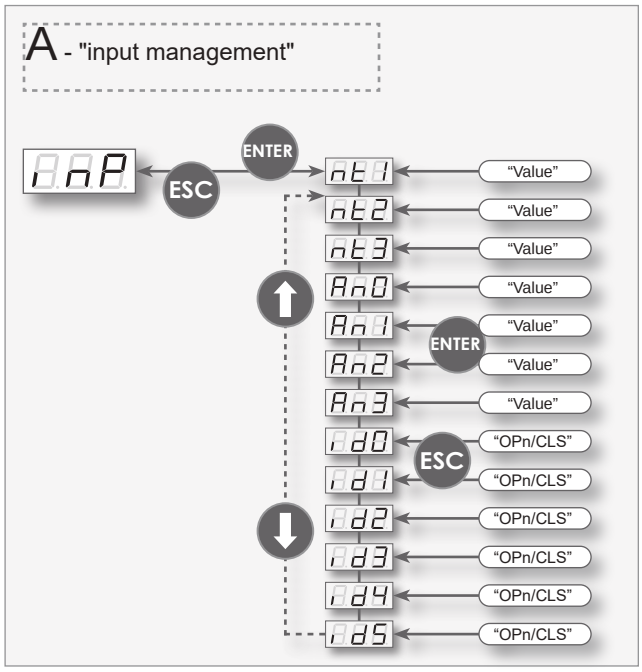
Use the connector provided to connect the Smart X Web. Connect the power supply, making sure polarity is correct.
Connect the RS485 network to its terminals, making sure polarity is correct.
For multiple heaters, connect terminals D+ and D-, making sure polarity is correct; the network can be made both as a serial and star network.

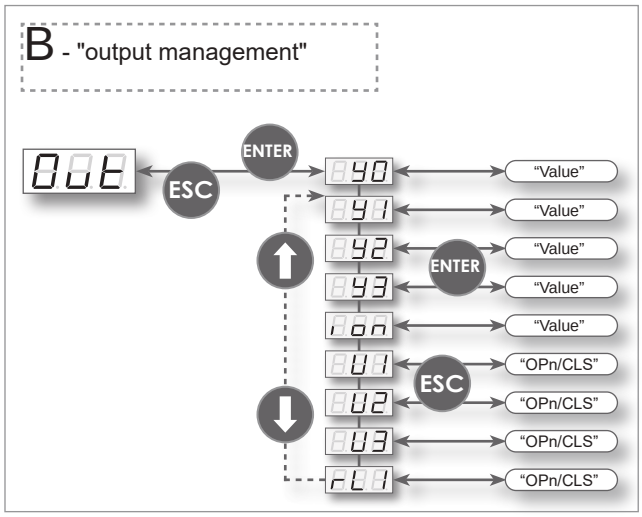
The correct address for each PCB must then be set up. Addresses must start from 1 to N without interruptions in the numbering sequence. The address of each PCB, if different from zero, is displayed on the LCD as “Axx”, where xx is the address. To program the Smart X Web, please read the operating manual supplied with the accessory Code HG0065.

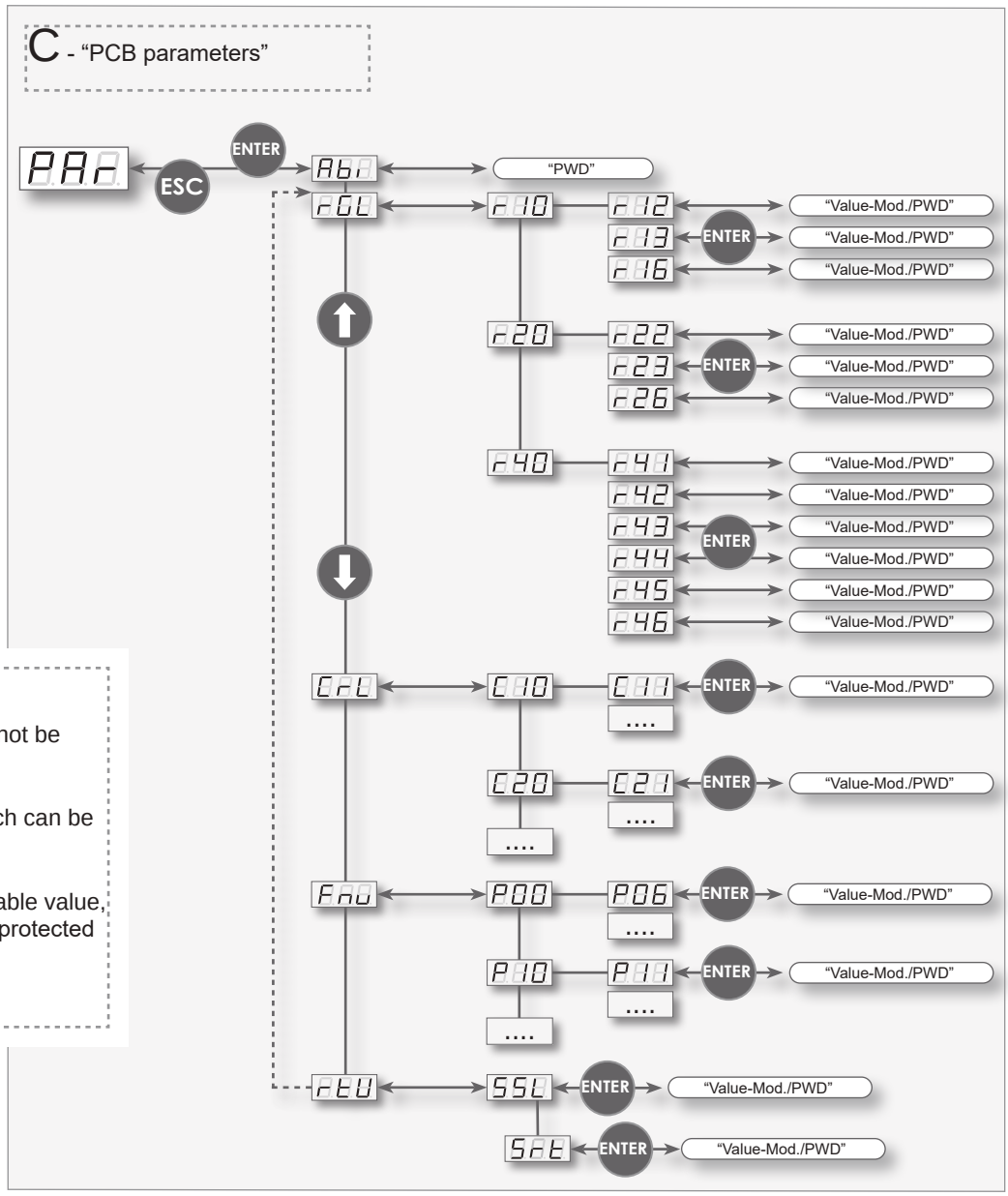


6.5. Navigation map of LCD display menu CPUE G26800









Key:

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

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

"Value-Mod./PWD" = Editable value, value in writing. Password-protected

"PWD" = Password entry

6.6. Modulation PCB Parameters

All values of the parameters of the CPU PCB are shown for all PK heater models.
The “LCD” column shows the parameters that could be modified with Password via remote LCD control (even with modbus address ≠ 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.

Parameters of G26800.03 CPU PCB version 8.03.xx				
Parameter Name			PK HEATER	
Smart	LCD	U.M.		DESCRIPTION
FUNC 00	**Fnu P00**		**Equipment operation**	
TER			0	*TER presence*
SMART			0	*SMART presence* *0 = Smart not present* *1 = uses PID and ON/OFF of the SMART* *2 = uses only ON/OFF command of the Smart*
PTH	P06		100	*Maximum limit of PT%_OUT_BURNER OUTPUT, modulating models only*
PTL	P07		0	*Minimum limit of PT%_OUT_BURNER OUTPUT, modulating models only*
FUNC 01	**Fnu P10**		**Burner parameters - NOT USED**	
REG 01	**rGL R10**		**HEAT EXCHANGER Temperature Probe NTC Control**	
REG_01	R11		1	*1 = enabled*
ST1	R12	°C	55	*ST1 function setpoint*
Xd1	R13	°C	5	*ST1 hysteresis*
Kp1		%	20	*Proportional coefficient*
Ki1		%	100	*Integral coefficient*
TH1	R16	°C	65	*Alarm temperature for ST1 for fault E51; Autoresolve with NTC1<ST1*
AC1			1	*0 = modulation only* *1 = modulation and ON/OFF*
MOD1			0	*0 = Reverse and/or 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 (NTC1)	*Defines the analogue input to be used for calculation* *1 = NTC1* *2 = NTC2* *3 = NTC3*
REG 02	**rGL R20**		**DELIVERY DUCT Temperature Probe NTC Control**	
REG_02	R11		0	*1 = enabled*
ST2	R12	°C	55	*ST2 function setpoint*
Xd2	R13	°C	5	*ST1 hysteresis*
Kp2		%	20	*Proportional coefficient*
Ki2		%	100	*Integral coefficient*
TH2	R16	°C	65	*Alarm temperature for ST2 for fault E52; Autoresolve with NTC2<ST2*
AC2			1	*0 = modulation only* *1 = modulation and ON/OFF*
MOD2			0	*0 = Reverse and/or 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)*
ING2A			0	*Defines the analogue input to be used for calculation* *1 = NTC1* *2 = NTC2* *3 = NTC3*

Parameters of G26800.03 CPU PCB version 8.03.xx

Parameter Name			PK HEATER	
Smart	LCD	U.M.		DESCRIPTION
REG 03	**rGL R30**		**Temperature Maintenance Probe NTC Control (AIR+POOL)**	
REG_03	R31		0	*0 = disabled* *1= enabled by SMART through DOMESTIC WATER request; not active in heating and/or conditioning mode* *2= enabled by the SMART "AIR+POOL" request*
BR_03	R38		0	*0 = uses automatic mode (par. REG_03)* *1= Forces mode as standard setting* *2= blocks change of par.REG_03 from SMART X*
ST3	R32	°C	30	*Setpoint (it is changed by SMART)*
SM3	R3A		50	*Setpoint in manual mode (BR_03=1)*
Xd3	R33	°C	5	*ST3 adjustment hysteresis (burner OFF)*
Kp3		%	20	*Proportional coefficient*
Ki3		%	100	*Integral coefficient*
TH3	R36	°C	65	*Alarm temperature for ST3 for fault E53; Autoresolve with NTCx<ST3*
ING3A			1 (NTC1)	*Defines the analogue input to be used for calculation* *1 = NTC1* *2 = NTC2* *3 = NTC3*
OUT_A			0	*Digital output not used*
REG 04	**rGL R40**		**Modulation Adjustment from 0/10 Vdc Control - NOT USED**	
REG_04	R41		0	*0 = disabled*
REG 05	**rGL R50**		**Air Pressure Adjustment (for pressostatic units or ductwork)**	
REG_05	R51		0	*0 = disabled* *1= enables REG_05 air pressure control for Pressostatic Buildings*
ST_Pair	R52		0	*Setpoint for ductwork pressure in Pa*
Kp_Pair			0	*Proportional coefficient*
Ki_Pair			0	*Integral coefficient*
Kd_Pair			0	*Derivative coefficient*
LI_Pair			0	*Limit in percentage of integral value*
ING_air_1			0	*Defines the analogue input to be used for calculation*
REG 06	**rGL R60**		**Air Quality Adjustment - NOT USED**	
REG_06			0	*0 = disabled*
REG 07	**rGL R70**		**Dry System Adjustment - NOT USED**	
REG_07			0	*0 = disabled*
CTRL 01	**CrL C10**		**Water Pressure Control - NOT USED**	
CTRL_01	C11		0	*0 = disabled*
CTRL 02	**CrL C20**		**Water Antifreeze Control - NOT USED**	
CTRL_02	C21		0	*0 = disabled*
CTRL 03	**CrL C30**		**Burner Compartment Antifreeze Control**	
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

Parameters of G26800.03 CPU PCB version 8.03.xx

Parameter Name			PK HEATER	
Smart	LCD	U.M.		DESCRIPTION
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	*Reset control* *1 = PCB fault reset*
CTRL 09	**CrL C90**		**AIR FILTER Control**	
CTRL_09	C91		0	*0 = disabled* *1 = enabled as ON/OFF pressure switch* *2 = enabled as pressure transducer*
ST_FLT			150	*First activation setpoint, E71 alarm*
TH_FLT			200	*Second activation setpoint, E72 alarm*
ING_FLT			6 (B2)	*Analogue B2 or digital ID3 inputs*
FUNC 02	**Fnu P20**		**BLOWN AIR BURNER Management**	
FN_02			1	*0 = disabled* *1 = Two-Stage or Modulating Adjustment*
DT2		%	0.1	*Percentage delta for two-stage control*
OUT2A			5 (Q1)	*It defines the digital output for sending ON/OFF signal*
OUT2B			6 (Q2)	*It defines the digital output for sending HI/LOW signal*
OUT2C			1 (Y0)	*It defines the analogue output 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	180	*Seconds of delay for fan stop*
OUT3A			8 (LBW)	*Digital output for main fan*
OUT3B			3 (Y2)	*Analogue output 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**	
FN_04	P41		0	*0 = disabled* *1 = enabled for fan pressure control*
OUT4A			0	*Analogue output for main fan*
OUT4B			0	*Analogue output for recirculation shutter*
OUT4C			0	*Digital output for changing operation from AIR (0) to Heat (1)*
SHUTT%			0	*CLOSING % of recirculation shutter in maintenance phase*
T_ON	P46	sec	0	*Delay time for switching from Maintenance to Heating*
T_OFF	P47	sec	0	*Delay time for switching from Heating to Maintenance*

Parameters of G26800.03 CPU PCB version 8.03.xx

Parameter Name			PK HEATER	
Smart	LCD	U.M.		DESCRIPTION
FUNC 05	**Fnu P50**		**Inverter and motor control management function (thermal protection)**	
S5	P51		0	*0 = disabled* *1 = enabled with autoreset for E85/E86* *2 = enabled without autoreset for E85/E86*
ST5	P52		300	*Live setpoint for alarm*
P5			10	*ST5 hysteresis*
ING5			7(B3)	*Analogue AN0-3 or digital ID1-3 input*
OUT5A			0	*(Digital) output*
OUT5B			0	*(Analogue) output*
OUT5C			0	*(Digital) output*
TF5		sec	5	*Delay in seconds for alarm*
TI5		sec	5	*Delay in seconds for thermal triggering alarm*
TOFF_5	P59	sec	180	*Switch-off delay in OFF phase*
ANT5	P5A		1	*Anti-lock function enabling*
FUNC 08	**Fnu P80**		**Outdoor Damper Management Function**	
FN_08	P81		0	*0 = disabled* *1 = enables outdoor air and/or exhaust damper (ON/OFF)* *2 = enables mixture, outdoor and exhaust damper (modulating)*
FSER08	P82		30	*External damper opening percentage*
OUT08A	P83		0	*Analogue or digital output for external damper*
FUNC 09	**Fnu-P90**		**Extractor and free cooling function - NOT AVAILABLE**	
FN_09			**0**	*0 = disabled*
	rtu		**RS485 Serial Communication Configurations**	
D_SL	SSL		0	slave serial baud rate (SMART X) *0 = baud rate 19,200 - Even Parity*
			NTC input configuration	
NTC1			1	Activates or deactivates NTC1 input (heat exchanger air delivery)
NTC2			0	Activates or deactivates NTC2 input (Duct air delivery)
NTC3			0	Activates or deactivates NTC3 input
			B0 Input Configurations	
B0			1	*0 = disabled* *1=enabled as analogue input*
			B1 Input Configurations (0 - 10V)	
B1			0	*0 = disabled* *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			1	*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 (Filter control)	
B2			1	*0 = disabled* *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*

Parameters of G26800.03 CPU PCB version 8.03.xx

Parameter Name			PK HEATER	
Smart	LCD	U.M.		DESCRIPTION
				B3 Input Configurations (Motor Alarm Control)
B3			1	*0 = disabled* *1 = enabled*
XA3			5	*X-axis minimum value – minimum input voltage*
XB3			0	*X-axis maximum value – maximum input voltage*
YA3			5	*Y-axis minimum value – minimum magnitude value **
YB3			0	*Y-axis maximum value – maximum magnitude value*
CV3			0.01	*Coefficient for PRØ displaying; value displayed on Smart and used for controls*
UM3			8	*1=°C; 2=bar; 3=mbar; 4=Pa; 5=%; 6=l/h; 7=mc/h; 8= V*
				Digital Input Configurations
ID1			2	*0 = disabled* *1 = N.C input (Fault with input Open) with manual reset* *2 = N.C input (Fault with input Open) with Autoresolve* *3 = N.O. input (Fault with input Closed) with Autoresolve* *4 = enabled as N.O. (to enable functions, without Faults)*
TD1			20	*Alarm triggering or function enabling delay time*
ID2			2	*See ID1 - NC BURNER ALARM control*
TD2			5	*Alarm triggering or function enabling delay time*
ID3			2	*See ID1 - STB THERMOSTAT ALARM control*
TD3			3	*Alarm triggering or function enabling delay time*
				Y0 Analogue Output Configuration (Burner modulation PWM signal)
YM0			1	*0 = Direct: the maximum calculation value (100%) corresponds to the maximum output value* *1 = Reverse: the maximum calculation value (100%) corresponds to the minimum output value*
YL0			0	*Minimum voltage (or PWM in %) output value*
YH0			10	*Maximum voltage (or PWM in %) output value*
YF0			0	*Fixed voltage or % output value (forced by program)*
YT0			1	*Voltage increase/decrease (or in %) every second**
YN0			0	*Output Linearisation Mode* *0 = linear output value between YL0 and YH0* *1 = output with values limited to YL0 and YH0 (for request values below YL0 the output will be YL0, for request values above YH0 the output will be YH0)*
				Y1 Analogue Output Configuration (Outdoor Intake Shutter)
YM1			0	*0 = Direct: the maximum calculation value (100%) corresponds to the maximum output value* *1 = Reverse: the maximum calculation value (100%) corresponds to the minimum output value*
YL1			1	*Minimum voltage (or PWM in %) output value*
YH1			9	*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	*Output Linearisation Mode* *0 = linear output value between YL1 and YH1* *1 = output with values limited to YL1 and YH1 (for request values below YL1 the output will be YL1, for request values above YH1 the output will be YH1)*

Parameters of G26800.03 CPU PCB version 8.03.xx

Parameter Name			PK HEATER	
Smart	LCD	U.M.		DESCRIPTION
			Y2 Analogue Output Configuration (EC ventilation)	
YM2			0	*0 = Direct: the maximum calculation value (100%) corresponds to the maximum output value* *1 = Reverse: the maximum calculation value (100%) corresponds to the 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			0,4	*Voltage increase/decrease (or in %) every second**
YN2			0	*Output Linearisation Mode* *0 = linear output value between YL2 and YH2* *1 = output with values limited to YL2 and YH2 (for request values below YL2 the output will be YL2, for request values above YH2 the output will be YH2)*
			Y3 Analogue Output Configuration	
YM3			0	*0 = Direct: the maximum calculation value (100%) corresponds to the maximum output value* *1 = Reverse: the maximum calculation value (100%) corresponds to the minimum output value*
YL3			0	*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	*Output Linearisation Mode* *0 = linear output value between YL3 and YH3* *1 = output with values limited to YL3 and YH3 (for request values below YL3 the output will be YL3, for request values above YH3 the output will be YH3)*

6.7. Analysis of lockouts- Faults

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

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

Alarms for safety device activation			
E24	ID4 input alarm	ID4 - ID5 (CN02) input open - No jumper	Autoresolve
E25	ID5 input alarm	ID5 - IDC (CN02) input open - No jumper •FIRE DAMPER intervention	Autoresolve
Digital input alarms			
E36	ID1 input alarm Thermal relay triggering	High Motor Consumption	Autoresolve
E37	ID2 input alarm	Blown air burner alarm. Requires manual reset of the external burner	Autoresolve
E38	ID3 input alarm	Safety thermostat (STB) triggering alarm. • Excess air temperature due to reduced air flow • Safety thermostat broken or not connected • Requires manual reset of the thermostat	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	Air Pressure Probe Error	No signal from FILTER Probe or Faulty Probe	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; •The address of the CPU PCB is wrong and/or not configured	Autoresolve
Alarms for no voltage or dirty filters			
E71	Dirty air filter, preventive warning	Filters with initial signs of clogging. It does not stop the burner operating cycle. Clean or replace filters as soon as possible to prevent the system from stopping	Autoresolve
E72	Dirty air filter, lockout alarm	Dirty filters. It stops the burner operating cycle. Clean and/or replace the filters	Manual
E75	No voltage during operation cycle (excluding stand-by);	No voltage during operation	
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

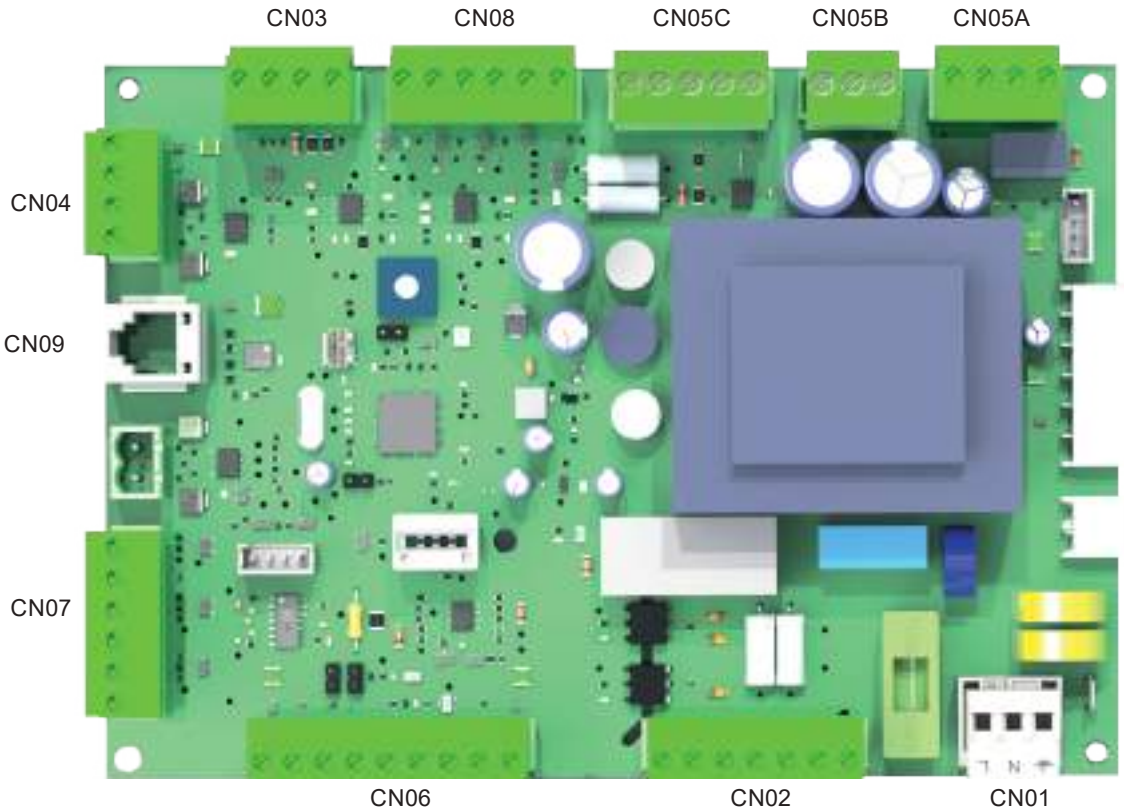
6.8. CPU electrical connections

The use of a CPU modulation electronic board simplifies the wiring diagram of all models.
The board includes the following connectors:

Connector	Function
CN01	Power supply input
CN02	Connector reserved for connection of fire damper(s) and control of fan motor(s)
CN03	Connector reserved for the burner PWM connection
CN04	Connector reserved for SMART X connection
CN05A/B	Connector reserved for burner control connection
CN05C	Connector reserved for the connection of fire damper and inverter controls
CN06	Connector reserved for inverter alarm, pressure probe and filter probe connection
CN07	Connector reserved for air intake probe connection
CN08	Connector reserved for burner alarm and STB triggering
CN09	RJ11 connector reserved for multifunction LCD panel connection

All heaters have the same components. Data listed in the following tables are referred to standard products.

In case of special configurations (with accessories) refer to the dedicated technical sheet and wiring diagram.



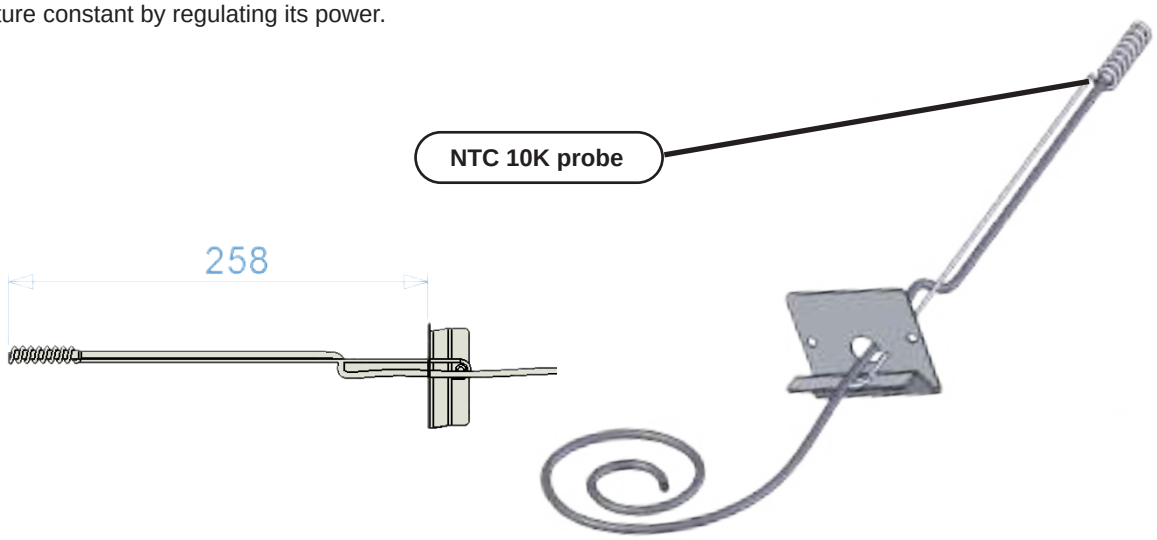
6.8.1. STB thermostat connection

All PK series heaters (N, K and R) are certified and feature the STB thermostat.

- **STB**: The STB (or Limit) thermostat, (safety thermostat with manual reset) stops the burner if the exchanger reaches an excessive temperature. If STB thermostat triggers, it has to be manually reset. This thermostat cuts the power to the burner by controlling STB relay of burner wiring board. Furthermore, by opening contact ID3 on the modulation board, alarm E38 is displayed on the LCD.

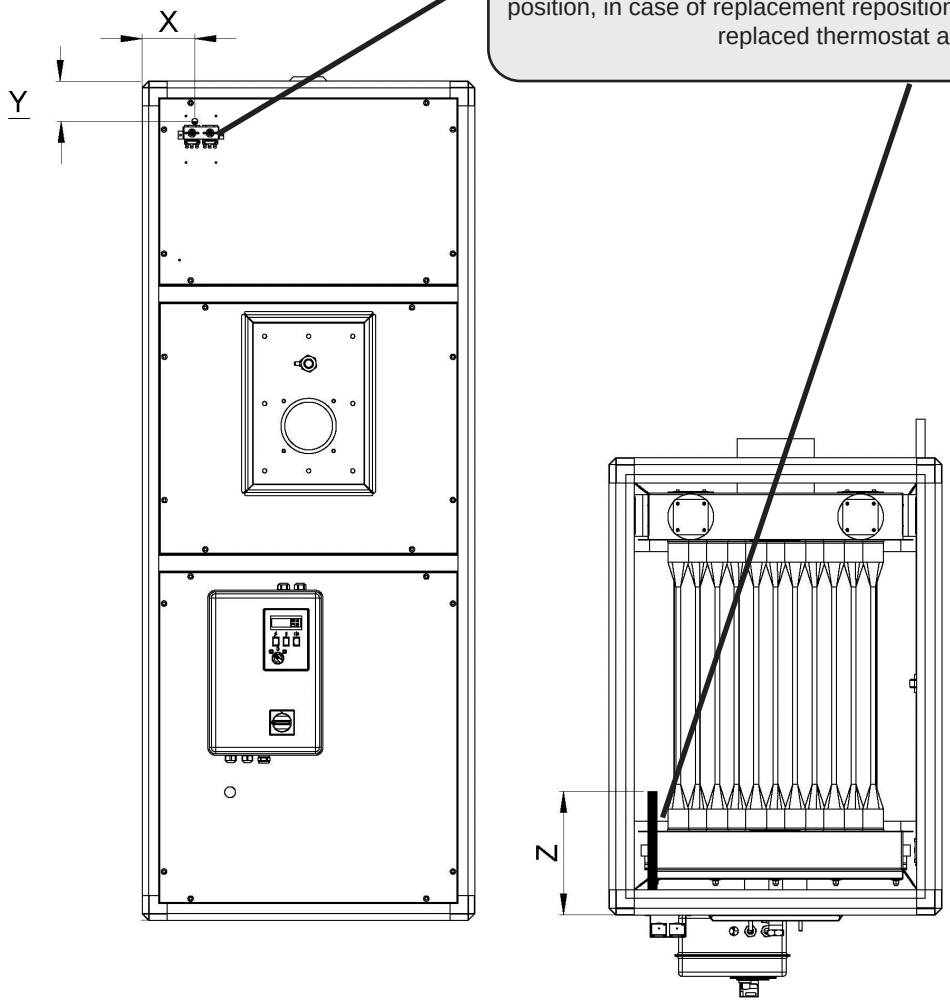
6.8.2. Heat exchanger NTC 10K delivery temperature probe

On all heaters, there is an NTC probe, positioned next to the STB thermostat, designed to keep the heater air delivery temperature constant by regulating its power.



6.8.3. Thermostat and Delivery Probe Position

STB and NTC 10K HEAT EXCHANGER PROBE Positioning
The **STB** Thermostat and the **HEAT EXCHANGER** probe have a specific position, in case of replacement reposition using the same holes as the replaced thermostat and probe.



NTC PROBE POSITION

PK Model	Probe	X	Y	Z
100/120	G16401	95	85	258
140				
190				
250				
320				
420		105	95	
550				

STB THERMOSTAT POSITION

PK Model	Thermostat	X	Y	Z
100/120	G12450	85	135	350
140				
190				
250				
320				
420		95	145	
550				

6.9. Burner Matching

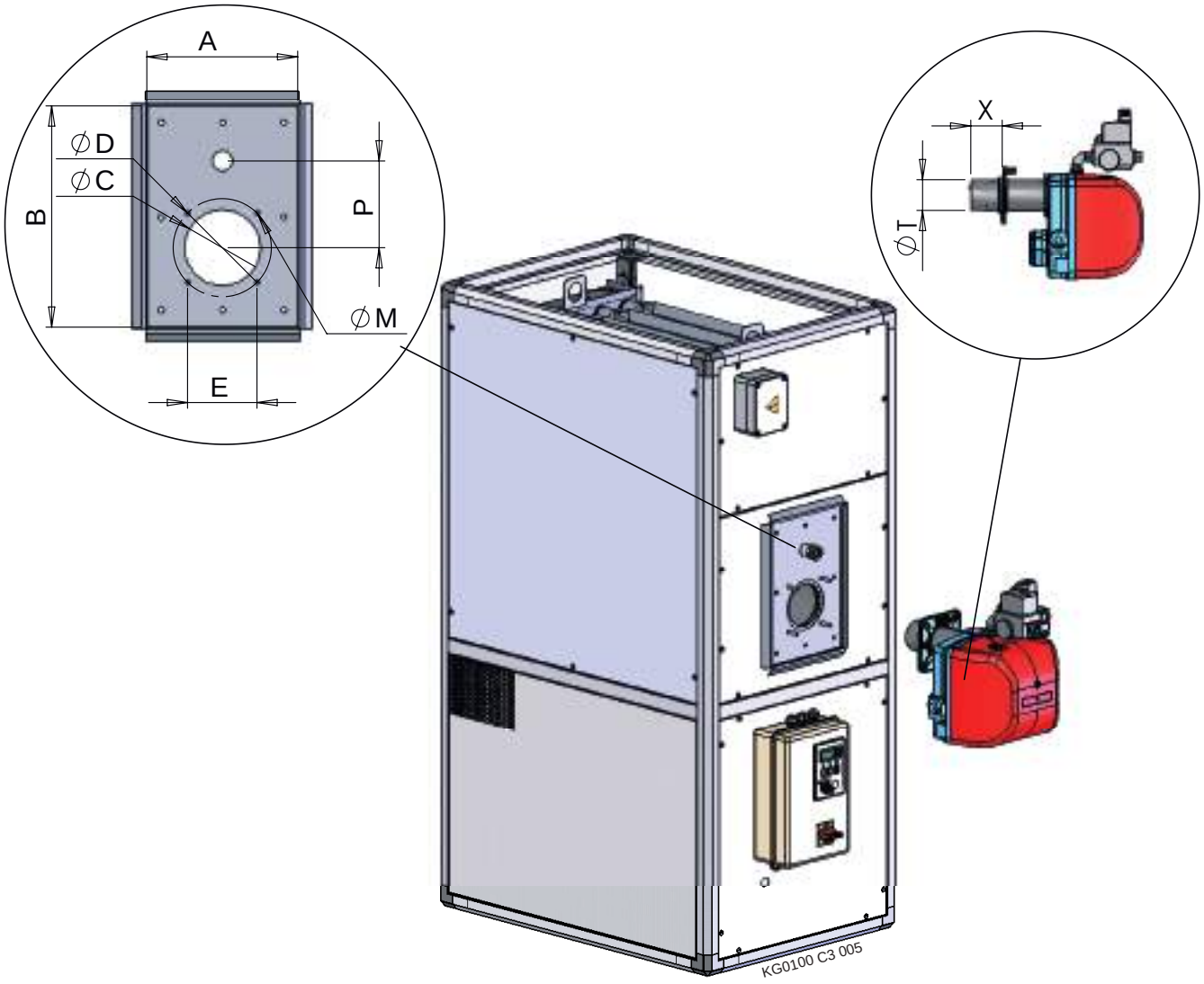
The burner nosepiece must penetrate for a length not exceeding min and max values of “X”.

Shorter nosepieces could damage the exchanger and void the guarantee.

The value of “ØT” indicates the maximum nosepiece diameter for a specific heater model. If the nosepiece of the matched burner is larger, the heat exchanger will have to be changed at an extra cost.

Contact Apen Group Customer Service if you need to use a low NOx rate burner with flue gas recirculation outside the combustion head.
Standard heaters supplied include standard burner plates sized as shown in the table below. If standard burner plate is not suitable for the burner to be installed, a plate with custom holes can be ordered (specify burner brand and model).

If the hole of the gasket on the back of the burner plate is not wide enough for the assembly, it can be cut to the size required by the installer.



Type	X		ØT	P	A	B	ØC	ØD	ØM	E
PK Model	min [mm]	max [mm]	max [mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
100	150	220	135	150	270	382	133	170	M8	120
140	270	350	190	175	414	454	140	175	M8	124
190-250	270	350	190	175	414	454	160	223	M8	158
320	270	350	230	230	464	484	160	223	M8	158
420-550	270	350	230	230	464	484	190	269	M8	190

KG0100 ET 011

6.10. Gas burners

PK heaters must be matched to gas burners certified by a CE mark under the Gas Appliances Regulation 2016/426/EU. Heaters can work either with natural gas, G20, G25, and G25.1, or with L.P.G., G30, and G31 gas.
PK heaters are designed, manufactured and tested to match the burners produced by main burner manufacturers on the market. The detailed list of burner models that can be matched according to the heater size is given in the following paragraph.

First start up shall be executed exclusively by authorized service centres complying with relevant laws existing in the Country where the unit is installed.
The first start-up also includes a combustion analysis, which is compulsory.

Table of PK-N model gas flow rates in the heater work range

TYPE OF GAS G20 - Cat. E-H							
TYPE OF MACHINE		140	190	250	320	420	550
		max	max	max	max	max	max
SUPPLY PRESSURE	[mbar]	according to the burner					
GAS CONSUMPTION (0°C-1013mbar)	[Nm³/h]	19.6	23.1	31.1	38.1	51.0	67.2
CARBON DIOXIDE -CO_2 CONTENT*	[%]	9.3	9.3	9.3	9.3	9.3	9.3
FLUE GAS TEMPERATURE	[°C]	273	230	270	285	270	270
FLUE GAS MASS FLOW RATE	[kg/h]	305.4	360.2	485.5	595.1	795.5	1049.2

Table PK-K model gas flow rates in the heater work range

TYPE OF GAS G20 - Cat. E-H								
TYPE OF MACHINE		100	140	190	250	320	420	550
		max	max	max	max	max	max	max
SUPPLY PRESSURE	[mbar]	according to the burner						
GAS CONSUMPTION (0°C-1013mbar)	[Nm³/h]	11.4	15.2	20.1	27.1	34.8	45.6	59.7
CARBON DIOXIDE -CO_2 CONTENT*	[%]	9.3	9.3	9.3	9.3	9.3	9.3	9.3
FLUE GAS TEMPERATURE	[°C]	183	179	178	192	184	186	187
FLUE GAS MASS FLOW RATE	[kg/h]	178.5	238.0	313.2	422.8	543.4	712.5	931.8

Table of PK-R model gas flow rates in the heater work range

TYPE OF GAS G20 - Cat. E-H								
TYPE OF MACHINE		100	140	190	250	320	420	550
		max	max	max	max	max	max	max
SUPPLY PRESSURE	[mbar]	according to the burner						
GAS CONSUMPTION (0°C-1013mbar)	[Nm³/h]	9.0	12.2	16.2	21.8	27.6	34.6	45.1
CARBON DIOXIDE -CO_2 CONTENT*	[%]	9.3	9.3	9.3	9.3	9.3	9.3	9.3
FLUE GAS TEMPERATURE	[°C]	151	146	142	135	130	125	125
FLUE GAS MASS FLOW RATE	[kg/h]	140.9	191.1	253.7	339.8	430.7	540.3	704.7

6.11. Burner matching tables

Burner matching has been performed according to the following criteria:
- burners in class 3 for NOx, with emissions of less than 80 mg/kWh;
- if PK heaters are to be installed outdoor or in a place different from the served one;
- compliance with ErP2021 requirements;
- compliance with ηs seasonal efficiency calculated according to standard EN 17082:2017 that implements the ERP regulation 2281/2016/EU.

The tables are shown in the "Attachment to the user-installation manual" code KG0270.xx supplied with this manual

7. MAINTENANCE

7.1. Controls at First Start Up

During first start-up, the following items need to be checked:

 **Electrical Controls**
Supply voltage
Fan rotation direction
Motor absorption and air flow rate

 **Combustion Control**
Length of burner nosepiece
Fuel capacity of the burner
Combustion parameters

 **Safety thermostat controls**
Check of safety thermostat (STB) triggering
Microswitch for fire dampers (if installed)
Room thermostat control (SMART X WEB)

Electrical Controls

Before powering the unit on, make sure actual voltage matches the rated voltage specified.
In 3-phase units it is mandatory to check fan rotation direction.
If the heater has two fans, check both rotate in the required direction.
Verify each motor's absorption with a suitable amperometric analyser.
The motor absorption table contains the absorption values of each motor.
An absorption value lower (<15%) than max value means that the air flow rate is lower than rated one. To restore the rated air flow rate, it is necessary to:

- increase the fan speed by changing one of the two pulleys.
- eliminate any leaks in the air distribution system.

A higher absorption than rated value means that aeraulic circuit resistance is lower than expected. To restore rated value, local pressure drops should be created to reduce electrical absorption by the motors.

Combustion control

We recommend checking that burner nosepiece is suitable for use (see paragraph 6.9)
A fuel capacity check must be performed:

- at the meter, in case of a gas burner;
- by comparing nozzle capacity/pressure with values in specific tables, in case of a gas oil burner.

When fuel capacity cannot be measured, adjust the burner by checking combustion parameters.
Reference values are included in tables of Paragraph 6.10.
CO2 values shown above can surely be improved without producing unburned products. However, a high quantity of excess air should be maintained in order to balance possible working variations over time.
To define the heat input refer to tables of Paragraph 6.10. If combustion efficiency is known and CO2 content is similar to that mentioned in tables of Paragraph 6.10, the diagrams of Paragraphs 3.2.1, 3.2.2 and 3.2.3 can be used reading the useful heat output in correspondence to the efficiency.

Checks on Safety Controls

All heaters and their safety devices have been electrically tested before delivery. However, their correct operation depends on how they are actually wired and installed.
when first starting the appliance, the following checks must be performed:

- Safety thermostat

The STB safety thermostat triggering is signalled by Fault E38 on the LCD screen.

- Fire Damper

If fire dampers are installed on the system, you need to check that the damper closure actually stops the burner. Damper triggering is signalled by Fault E25 on the LCD screen.

- Room Thermostat

Make sure that the SMART X turns off only the burner, not the fan. The fan stops after a time preset by the modulation board.

- Burner plate nuts

After a few hours of burner operation and the consequent drying of the relevant gaskets, check that burner plate nuts are correctly tightened to 20Nm.

7.2. Routine Maintenance

Perform routine maintenance operations using the following schedule:

Belts	after 8 hours from first start-up. Then, every 60 days.
Electrical Motor	check electrical absorption - every 90 days
Fan	check cleaning - every 90 days
Combustion Analysis	once per season
Safety thermostat	at the beginning of each season
Fire Damper	at the beginning of each season
Cleaning the Exchanger	every 5 years with gas burner
	every 3 years with fuel oil burners
Cleaning the siphon and vessel	every year

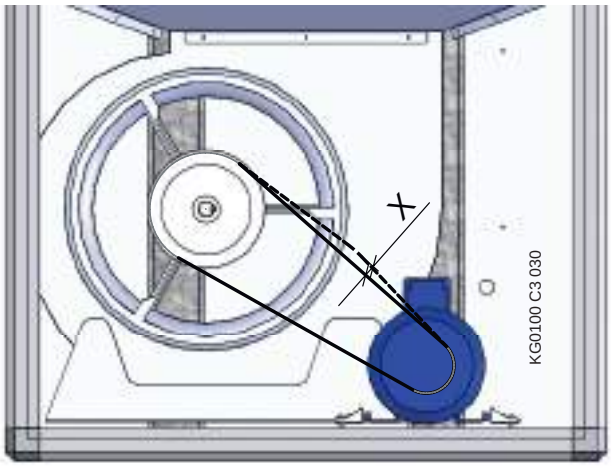
Checking Transmission Belts

About 7÷8 hours after first start up, check tension and state of belts between motor and fan. If belts are loose, stretch them.

To check correct belt tensioning, verify that in the central area between the two pulleys, belt oscillation does not exceed 20÷30mm.

To tension belts and align pulleys, adjust belt tensioner screws. Turn clockwise to tighten and counter-clockwise to loose.

During the tensioning operation, verify if pulleys are aligned using a straight rod long enough to join the pulleys and check the alignment.



Checking the exchanger

Correct operation and long life of the exchanger depend on its design but also on proper maintenance.

the following checks must be performed at regular intervals:

- check of burner combustion;
- check of safety device operation;
- visual inspection of the exchanger,
- check that heat exchanger is clean.

Check burner combustion values

Check at least once a year burner combustion values.

Parameters to check are CO2 content, flue gas temperature and CO value. Note these values at first start up and at every subsequent maintenance check. If significant changes occur, investigate on the causes.

For fuel oil and LPG burners, also smoke density must be analysed. The test should return a value below 2 on Bacharach scale. An increase in smoke density value would require cleaning the exchanger.

Checking Safety Device Status

Check every year that safety devices are working properly.

For the procedures to follow, see “Checks on Safety Controls” above.

Visual inspection of the exchanger

Inspect every year the exchanger to make sure no component is overheated and/or damaged.

If you see any overheated areas, investigate on possible causes:

- insufficient or badly distributed ventilation;
- dirty air filters;
- partially closed dampers;
- burner capacity higher than exchanger specifications.

If any of the exchanger parts is damaged, it should be repaired and the cause of the damage removed.

Cleaning the Exchanger

It is hard to specify the period after which the exchanger must be cleaned.

A safe method to determine exchanger cleaning degree is to note the pressure value in the combustion chamber at first start up, after completing all burner settings. Near the peep-hole, a tapping point is available to make this measure.

The resulting value already includes pressure drops in the chimney, if any.

Repeat this measure every year during combustion check and compare the result with the initial value: if they differ by more than 35%, the exchanger is to be cleaned.

Generally, if natural gas burners are installed, cleaning is not required for 5-6 years. If burners are fuelled with fuel oil and/or LPG, the cleaning should occur every 3 years.

Inspection and cleaning of the trap and condensate collection tray

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.

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.

Fill the trap with clean water and reconnect the trap to the condensate drain system.

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

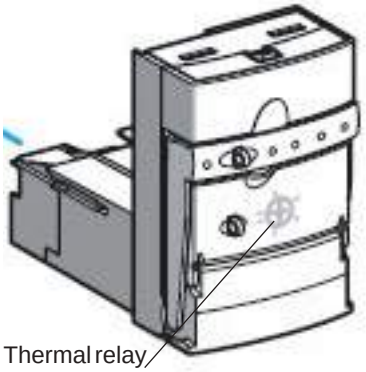
7.3. List of spare parts

7.3.1. Parts for the control panel

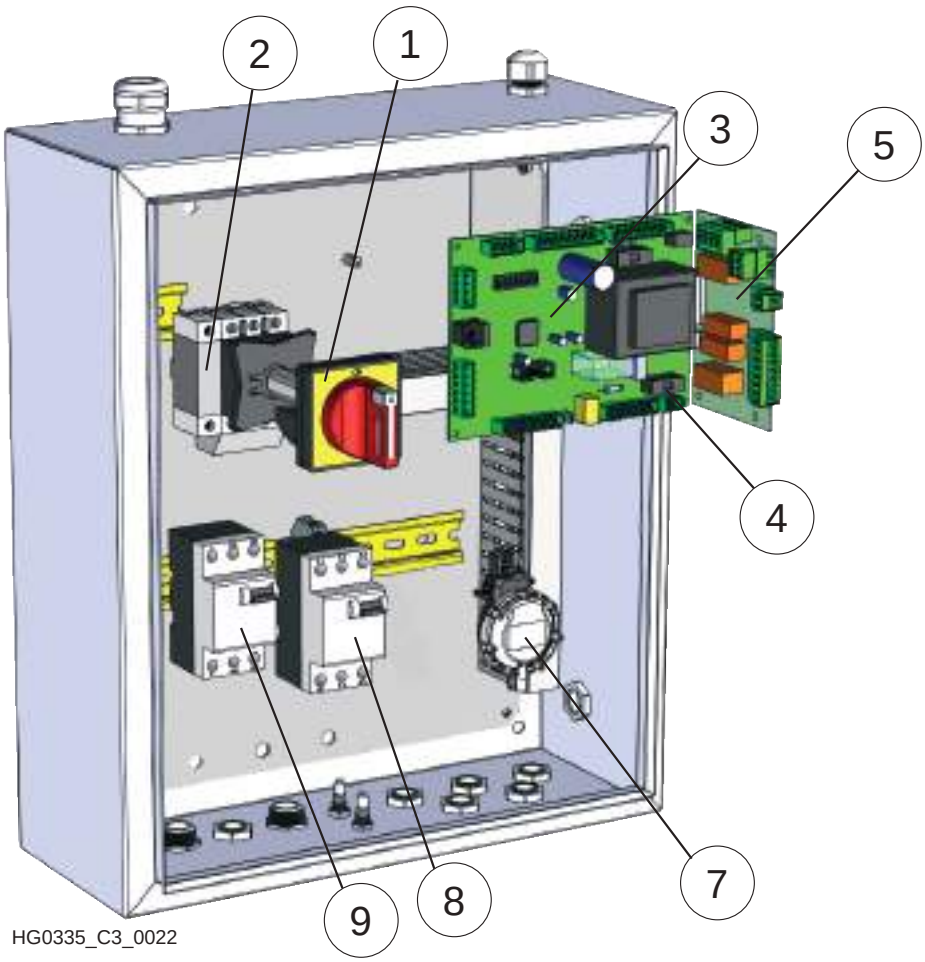
TABLE OF CONTROL PANEL COMPONENTS

POS.	Description	Code	Regulation	Use
1	Main switch with door lock	G10067	32A	Model 3, 7.5 kW
		G10068	63A	Models 11, 15 kW
2	Neutral Disconnector	G10074	20/40A	Models 3, 7.5 kW
		G10075	63/80A	Models 11, 15 kW
3	Modulation Board	G26800.03		All models
4	Board fuse	G03605	5A	All models
5	Burner PCB	G12940		All models
6	LCD panel	G16890		All models
7	Filter Probe	G12680		All models
8	Burner 3P automatic switch	G10078	6.3A	All models
9	Inverter 3P automatic switch	G10197	5.5 kW	Motor model from 3 to 5.5 kW
		G10198	7.5-11 kW	Motor model from 7.5 to 11 kW
		G10175	15 kW	15 kW motor model
10	Soft starter	G02801	3-4 kW	Motor model from 3 to 4 kW on request
		G18034	5.5 kW	5.5 kW motor model
		G18035	7.5-11 kW	Motor model from 7.5 to 11 kW
		G18043	15 kW	15 kW motor model
11	Thermal protection	G02216	1.2-5 A	Motor model up to 1.5 kW
		G02217	3-12 A	Motor model from 2.2 to 5.5 kW
		G02218	4.5-18 A	7.5 kW motor model
		G02219	8-32 A	Motor model from 11 to 15 kW
12	Remote control switch	G02215	3-5.5 kW	Motor model from 3 to 5.5 kW
		G02225	7.5-15 kW	Motor model from 7.5 to 15 kW

Motor kW		Current **In** 400V-50Hz	Number of rpm	Thermal Relay	
G02325-IE3	1.1	2.6	1440	G02216	1.2-5A
G01430-IE3	1.5	3.6	1440		
G01490-IE3	3.0	4.5	1450	G02217	3-12A
G01260-IE3	3.0	6.4	1450		
G00137-IE3	4.0	8.0	1450		
G01261-IE3	5.5	10.6	1460		
G01022-IE3	7.5	14.1	1460	G02218	4.5-18A
G07371-IE3	9.2	17.1	1460	G02219	8-32A
G00837-IE3	11.0	20.4	1465		
G01973-IE3	15.0	27.3	1465		

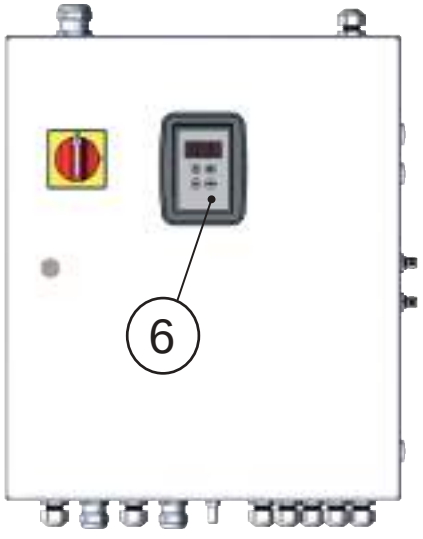


START-UP CONTROL PANEL WITH INVERTER

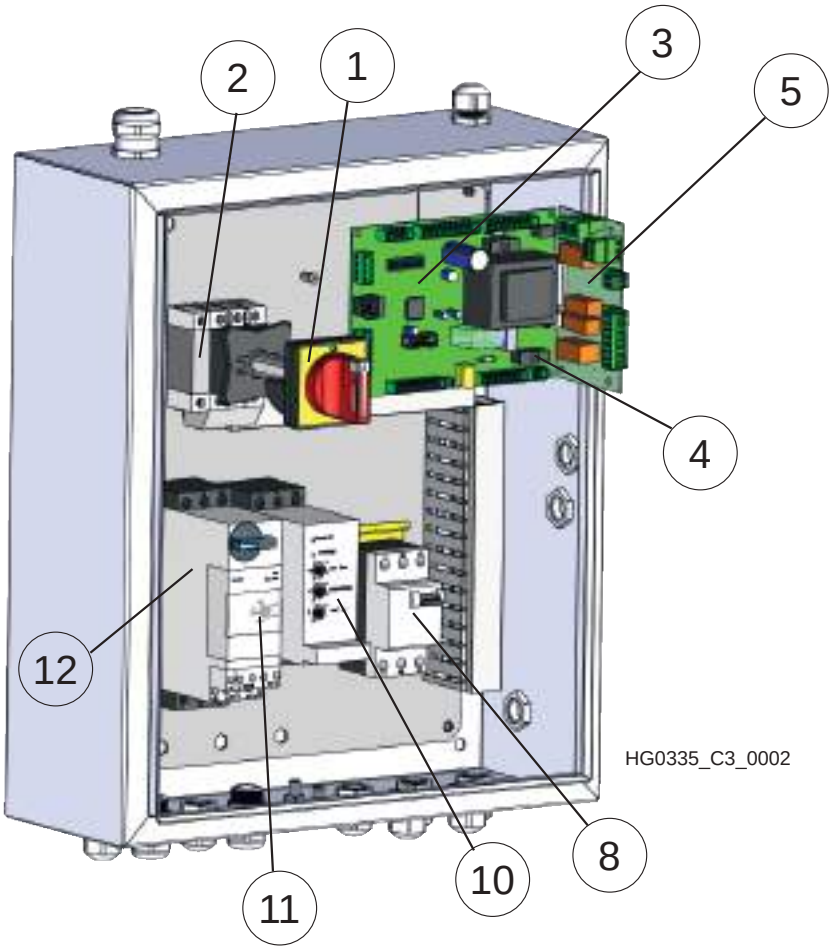


HG0335_C3_0022

START-UP CONTROL PANEL WITHOUT INVERTER



HG0335_C3_0004

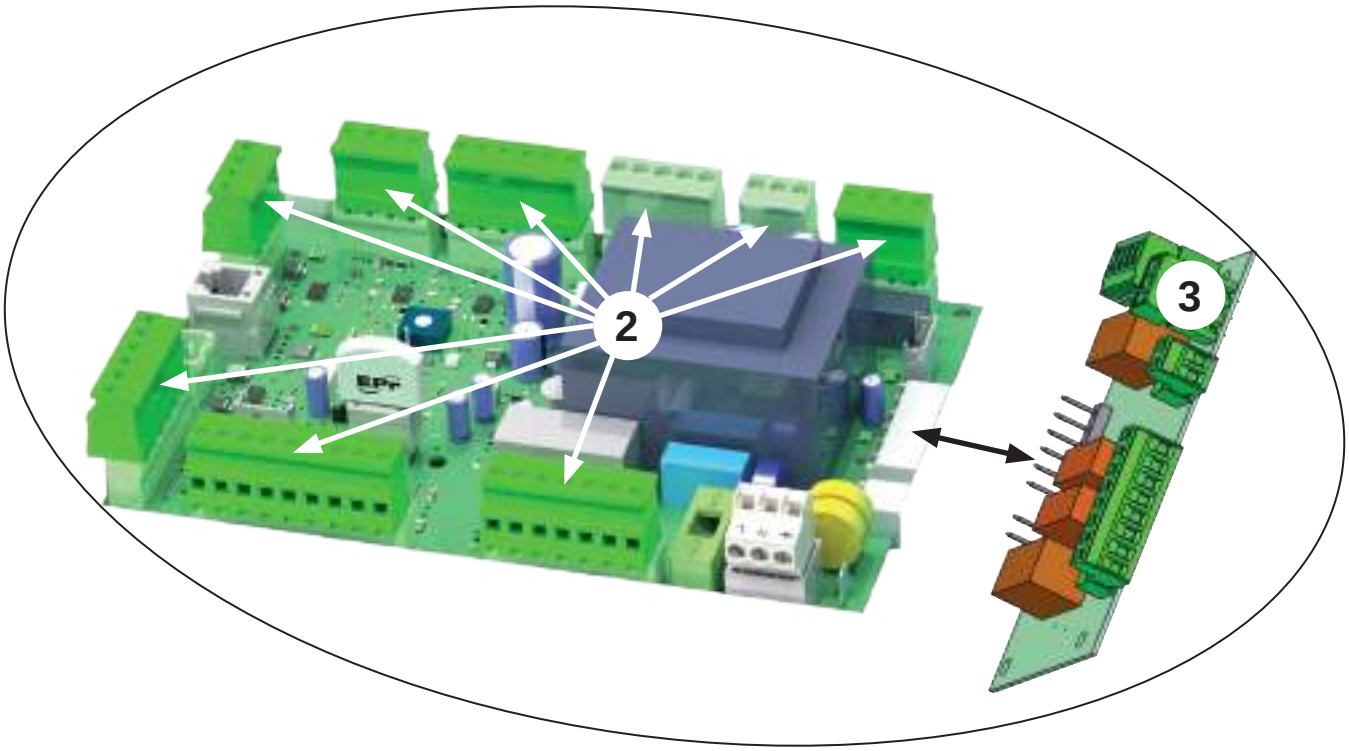


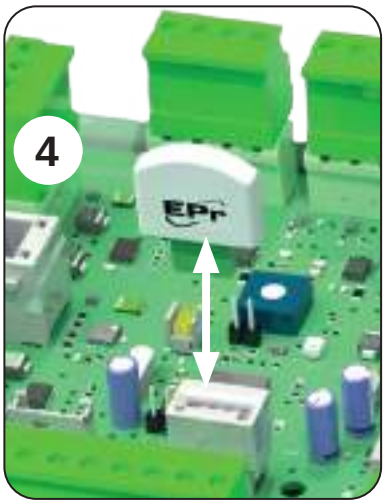
HG0335_C3_0002

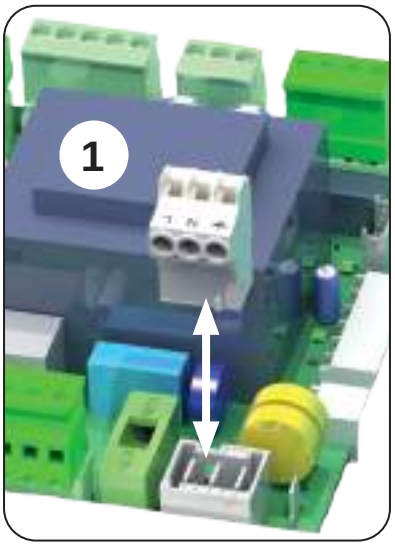
7.3.2. CPU modulation PCB replacement

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. Disconnect the burner connection PCB
4. Remove and store the EEPROM memory card
5. Remove and replace the CPU modulation PCB
6. Reposition the new CPU PCB, insert the previously stored EEPROM memory card (point 4). The EEPROM card contains all the configured parameters, by inserting it into the new CPU, it is not necessary to reprogram the parameters.

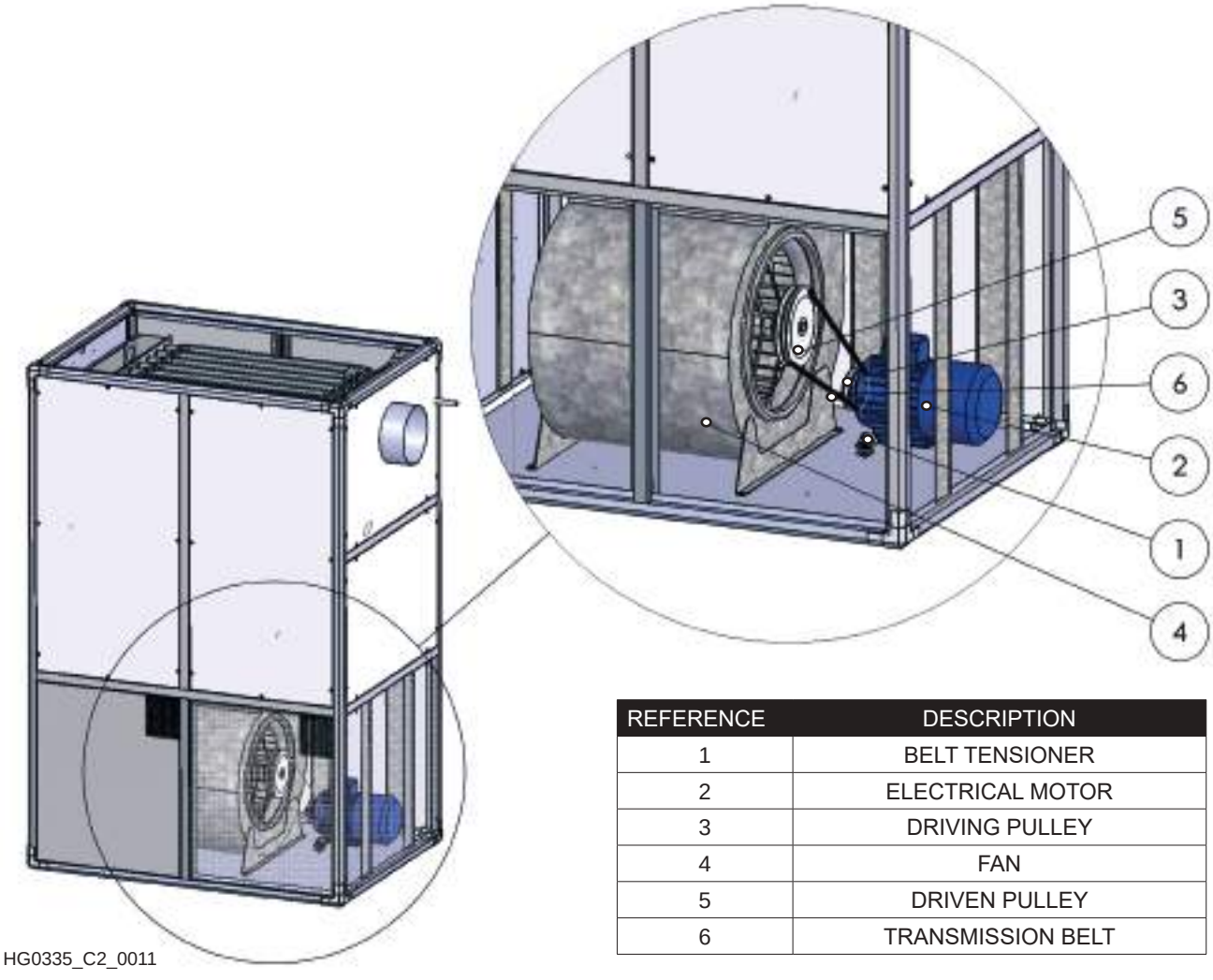






7.3.3. Ventilation Spare Parts

Heater Model	Fan code	No.	Driven pulley		Electrical Motor code	Driving pulley		Belt	
			pulley	shell		pulley	shell	code	No.
100-10W	G02324	1	G07318	G07406	G01430-IE3	G00393	G00525	G00613	2
100-20W			G07356		G01490-IE3		G00392		
140-10W	G01440	1	G01619	G07406	G01260-IE3	G00419	G00392	G00582	2
140-20W			G07356		G00137-IE3				
190-10W	G04133	1	G01809	G07406	G01260-IE3	G00393	G00392	G00509	2
190-20W			G07318		G00137-IE3				
250-10W	G01440	2	G01619	G07406	G01490-IE3	G00393	G00392	X01843	4
250-20W			G00708		G01260-IE3				
320-10W	G04133	2	G01619	G07406	G01260-IE3	G00393	G00392	G07089	4
320-20W			G07318		G00137-IE3				
420-10W	G04133	2	G01809	G07406	G01181-IE3	G00419	G00864	G01953	4
420-20W			G01619						
550-10W	G00865	2	G00866	G01957	G00137-IE3	G00393	G00392	G00868	4
550-20W					G01181-IE3	G00419	G00864		

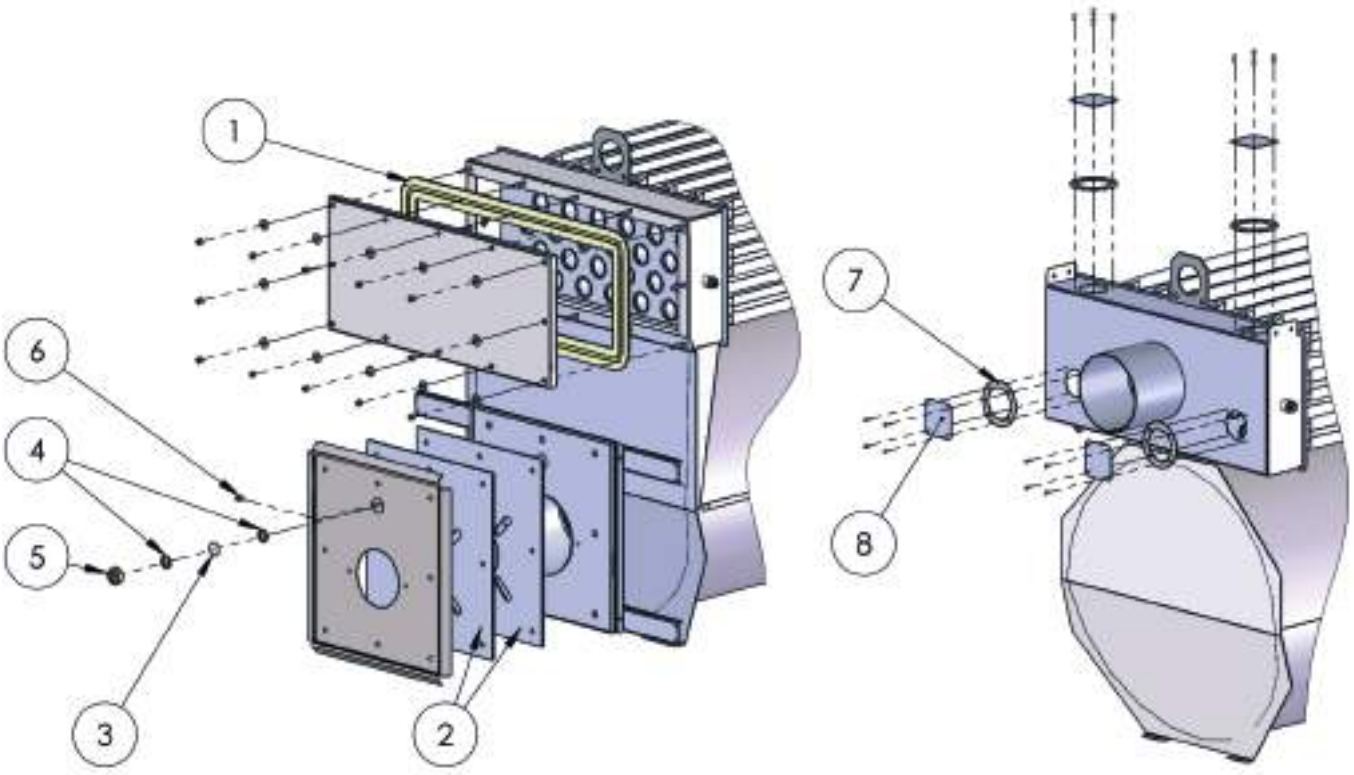


HG0335_C2_0011

REFERENCE	DESCRIPTION
1	BELT TENSIONER
2	ELECTRICAL MOTOR
3	DRIVING PULLEY
4	FAN
5	DRIVEN PULLEY
6	TRANSMISSION BELT

7.3.4. Exchanger Spare Parts

POS	Description	Code	Use
1	Flue system gasket	X01415	Any heaters, any models; in metres
2	Burner plate gasket* *NOTE: Enlarge the hole according to the burner head diameter	G01190	Model 100
		G07819	From model 140 to model 190 included
		G08119	From model 250 to model 550 included
3	Flame peep-hole	G02317	Any heaters, any models
4	Peep-hole gasket	X00397	Any heaters, any models
5	Peep-hole locknut	X01822	Any heaters, any models
6	Combustion chamber pressure inlet	C00060	Any heaters, any models
7	Flue inspection gasket	G14242	Any heaters, any models
8	Flue inspection panel	G11142.08	Any heaters, any models



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7.3.5. Thermostat Spare Parts

POS.	Description	Code	Use
1	STB safety thermostat	G12450	All heater models
2	Probe bulb support spring	G28118	All heater models
3	Probe holder panel	G18605	All heater models
4	NTC 10K probe	G16401	All heater models

Notes

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