

**EN**

***Use, Installation and Maintenance Manual  
PK series FLOOR STANDING WARM AIR HEATER with NEW CPU***



**NEW VERSION  
CPU G26800**



**Capacities from 100 to 550 kW**

**Efficiency up to 101%**

**Reduction of  
Thermal Stratification**

**For Indoor and Outdoor Use**



TRANSLATION OF ORIGINAL Manual

# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



VER. 01.2020

## Dichiarazione di Conformità Statement of Compliance



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Il presente documento dichiara che la macchina:

*With this document we declare that the unit:*

<b>Modello:</b> <b>Model:</b>	<b>Generatore a basamento PK PKA-N, PKA-K, PKA-R, PKE-N, PKE-K, PKE-R</b> <b>Floor Standing Heater PK PKA-N, PKA-K, PKA-R, PKE-N, PKE-K, PKE-R</b>
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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

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  
29/03/2022

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

CODE

SERIAL NUMBER

# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



VER. 05.2023

## UK Declaration of Conformity



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*With this document we declare that the unit:*

<b>Model:</b>	<b>Floor Standing Heater PK PKA-N, PKA-K, PKA-R, PKE-N, PKE-K, PKE-R</b>
---------------	--

*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

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## 1. GENERAL CAUTIONS

This manual is an integral part of the product and must always accompany it.

Should the equipment be sold or passed on to someone else, always make sure that this manual is supplied with the equipment for future reference by the new owner and/or installer.

The manufacturer shall not be held civilly or criminally responsible for injuries to people or animals or damages to things caused by incorrect installation, calibration and maintenance or by failure to follow the instructions contained in this manual or by operations carried out by unqualified staff.

This product must be used only for the applications for which it was designed or approved. Any other use must be regarded as hazardous.

During the installation, operation and maintenance of the equipment described in this manual, the user must always strictly follow the instructions given in all the chapters of this use and instruction manual.

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

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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](http://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 web site [www.apengroup.com](http://www.apengroup.com) or contact Apen Group directly.

The warranty conditions are specified on the warranty certificate supplied with this equipment.

## 2. SAFETY-RELATED WARNINGS

The following symbol is used in this manual to attract machine operators' attention.



**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.

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**Fuel oil burners can be used only for N series non-condensing heaters. For K and R series condensing heaters use only gas burners.**

---

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 unit is correctly sized to match required flow rate, indicated in the manual, and includes all safety and control devices required by the law;
- the inside of the gas pipes and air distribution ducts for ducted heaters 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;
- 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.

---

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

---

## 2.4. Use

Do not allow children or inexperienced people to use any electrically powered equipment.

The following instructions must be followed:

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

Avoid contact with hot heater surfaces. Such surfaces, generally located near the flame, overheat during operation and remain hot for some time after the burner has stopped.

If the equipment is not to be used for a certain period of time, open the main electrical switch of the thermal station and close the manual valve on the duct which brings the fuel to the burner. If, instead, the equipment is not to be used any more, perform the following operations:

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

## 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<sub>2</sub> 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. CO<sub>2</sub> 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 boiler from the mains power supply using the switch located on the electrical system and/or on the shut-out 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.

All repairs must be carried out by using genuine spare parts. Failure to comply with the above instructions could compromise the safety of the equipment and invalidate the warranty.

## 2.7. 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.



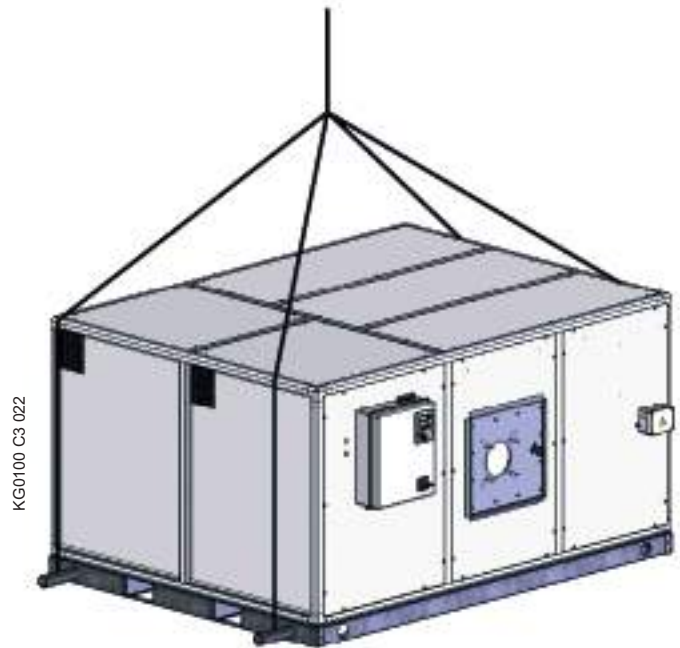
Based on their weight and dimensions, heaters can be lifted with lift trucks or wheel-mounted crane.



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

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.



## 2.8. Packaging

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.



## 2.9. Unpacking

The unpacking operation must be carried out by using suitable tools or safety devices where required. Recovered packaging materials must be separated and disposed of according to applicable regulations in the country of use.

While unpacking the unit, check that the unit and all its parts have not been damaged during transport and match the order. If damages have occurred or parts are found to be missing, immediately contact the supplier.

The manufacturer is not liable for any damages occurred during transport, handling and unloading.

### Packing material disposal

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

## 2.10. Dismantling and demolition

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

### Disposal of end-of-life products



This equipment is marked in compliance with European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). This Directive defines the rules for collecting and recycling waste equipments throughout the entire territory of the European Union.

WEEE contains both pollutants (that can negatively affect the environment) and raw materials (that can be reused). IT is therefore necessary to subject WEEE to appropriate treatments, in order to remove and safely dispose of pollutants and to extract and recycle raw materials. IT is forbidden to dispose of WEEE as unsorted waste. These operations facilitate recovery and recycling of the materials, thus reducing the environmental impact.

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

### INFORMATION FOR DISPOSAL valid in ITALY (Legislative Decree 49/2014)

The PK series warm air heaters 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.

# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



## 2.11. 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 required by Service Centre, **read the heater model and serial number on the nameplate**, which identify your unit.

Heater Code



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## GENERATORE DI ARIA CALDA A CONDENSAZIONE

MODELLO	PKA190K 250W	Rev.00
DESTINAZIONE	IT	
CATEGORIA	II 2H 30/4	
Matricola / Serial Number	523PS00002	
Cod. PIN / PIN code	0476CT2224	
PORTATA TERMICA Q <sub>th</sub>	48.88	200.00 kW (kW)
POTENZA NOMINALE P <sub>th</sub>	48.39	188.20 kW
PRESSIONE POCOLARE	130	Pa

### CIRCUITO ARIA

PORTATA ARIA m³/h	14.000
PRESSIONE ARIA Pa	238

CLASSE PROTEZIONE	IP20
CLASSE NOX	E
TEMPER. AMBIENTE °C	20.0 40.0
TIPO CIRCUITO FUMI	Forzata
TIPO SCARICO FUMI	800

### ALIMENTAZIONE GAS

TIPO DI GAS	G20 Metano	G30 Butano	G31 Propano
PRESSIONE GAS	20 - mbar	28 - 30 mbar	28 - 30 mbar
PORTATA GAS	21.16 m³/h	16.59 kg/h	16.25 kg/h
	5.07	3.98	3.90

### ALIMENTAZ. ELETTRICA

TENSIONE	400V 3F + Neutro
FREQUENZA	50 Hz

Made in Italy

PK	A	250	R	-	2	H	W
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Heater \_\_\_\_\_

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

Capacity \_\_\_\_\_

Series: \_\_\_\_\_  
 Standard non-condensing N series  
 Condensing K series  
 Condensing R series

Available Head Pressure (values are shown in tables with technical features):  
 1 - Medium Head Pressure;  
 2 - High Head Pressure.

Installation: \_\_\_\_\_  
 H - Horizontal  
 O - Vertical

Control panel implemented for accessory management \_\_\_\_\_

## 3. TECHNICAL FEATURES

### 3.1. Main Components

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
AISI 310 *	1,4845	X8 CrNi 25-21
AISI 304 *	1,4301	X5 CrNi 18-10

\* Exchangers built with different materials, such as AISI 310 or 304, can be taken into account for special applications.

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: riveted double-layered panels with inner galvanized steel sheet, high-density glass fibre insulation, external painted galvanized steel sheet.
  - 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 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:

A-	direct drive	-20°C	+40°C
B-	belt drive	-20°C	+85°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, except those with direct drive to the fan, have the following characteristics:

- 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 or greater than 5.5 kW it is supplied with soft starter.

The setting depends on the burner installed. The following types are available:

- high/low flame
- modulating.

#### **Safety Devices and Controls**

All heaters are supplied with the following thermostats:

- STB Manual reset safety thermostat, inside the air flow, which switches off the burner immediately if the temperature is high.
- NTC NTC probe modulates and/or stops the burner operation before the safety thermostat activates.

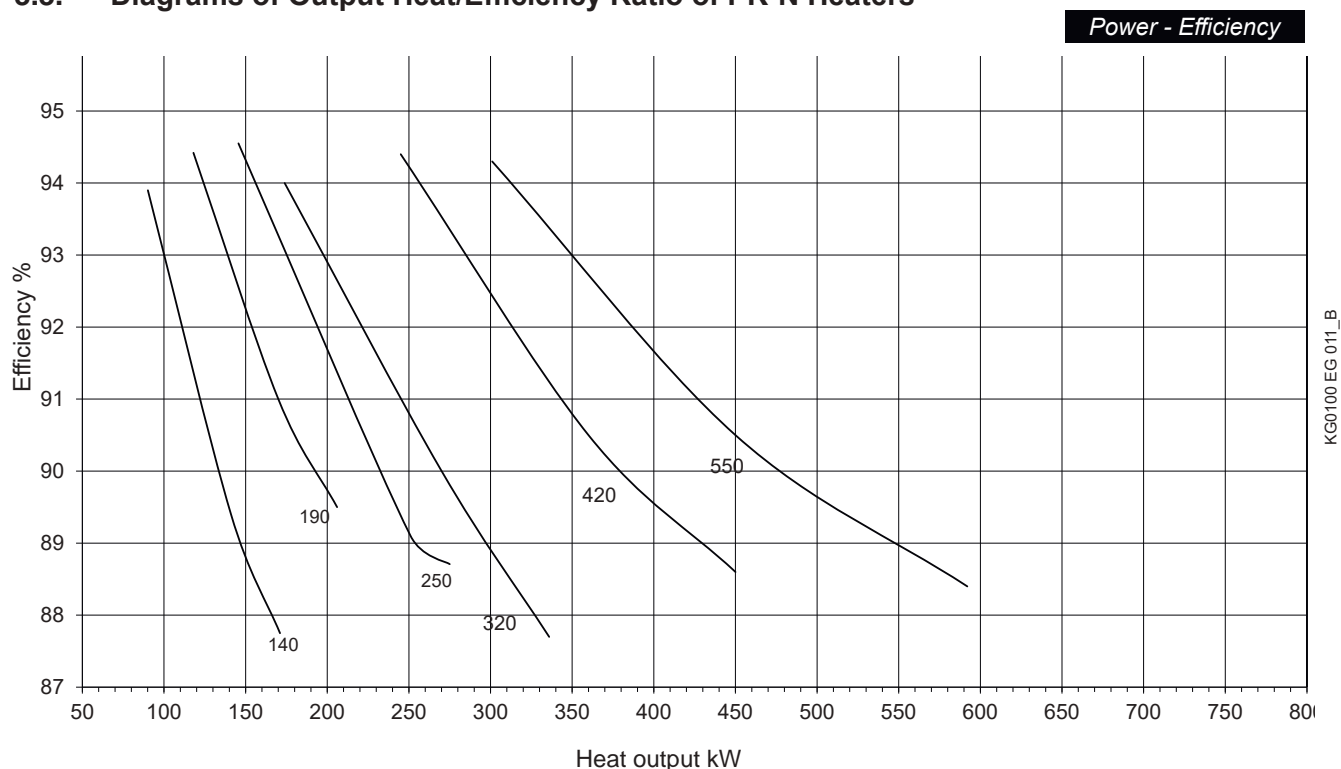
## 3.2. Choosing the Heater

Heaters are available in condensing versions (K and R series respectively) and in non-condensing version (N series). R series meets the efficiency requests of the regional resolutions of Lombardy, Emilia Romagna and Piedmont; at European level, a matching with low NOx burners is required in order to comply with the imposed regulatory limitations.

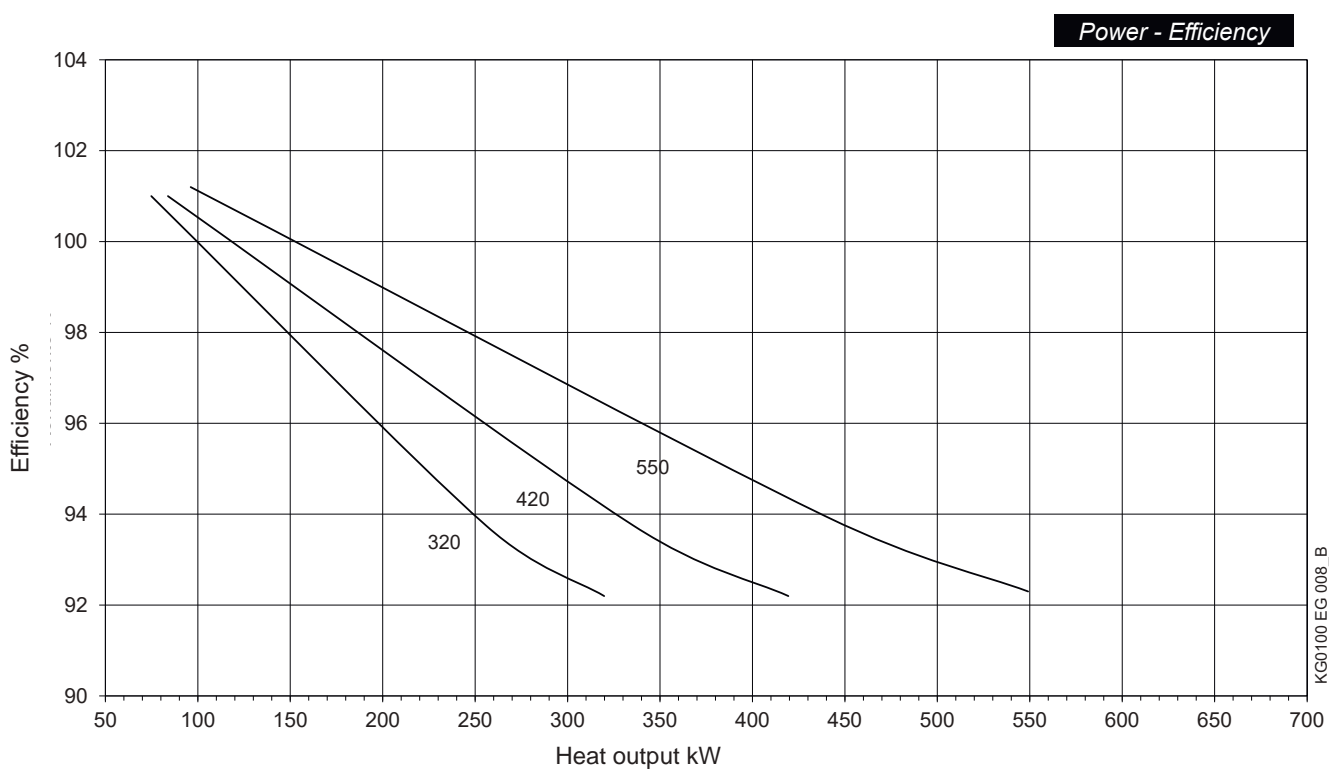
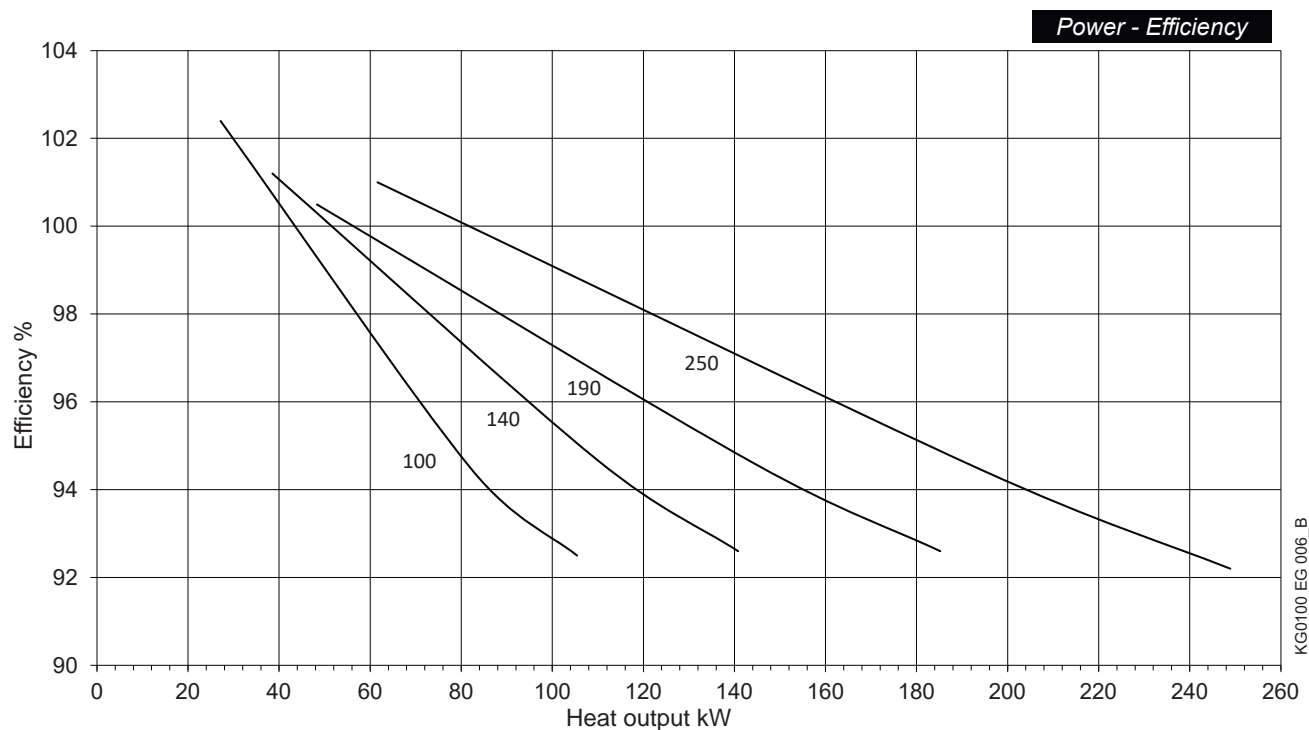
Heaters for indoor installation (**PKA**) are supplied with exchanger, fan unit and control panel to be installed indoor or in a sheltered position; those for outdoor installation (**PKE**) are supplied with exchanger, fan unit, control panel and burner casing to be positioned outdoor.

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 (heating, process plant, or other), service type (season or all year long), matching burner type (two stages or modulating).

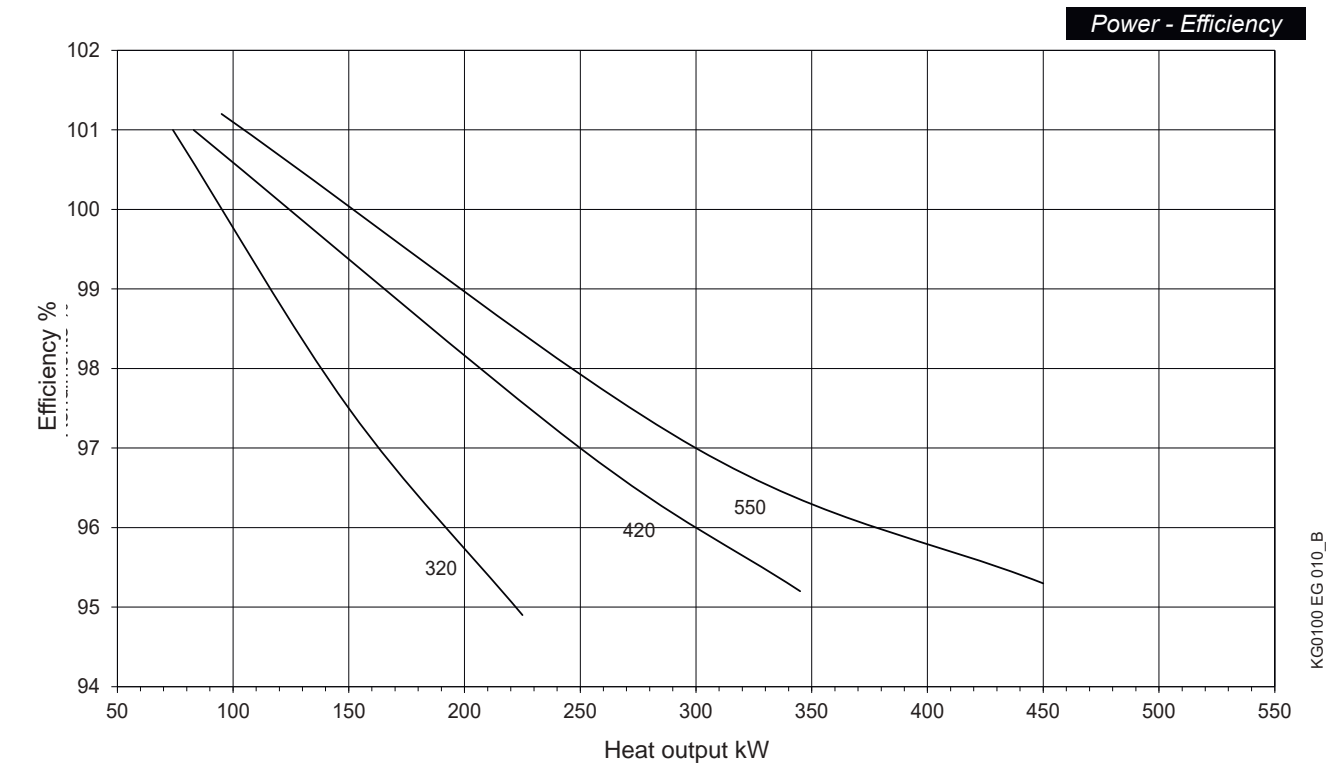
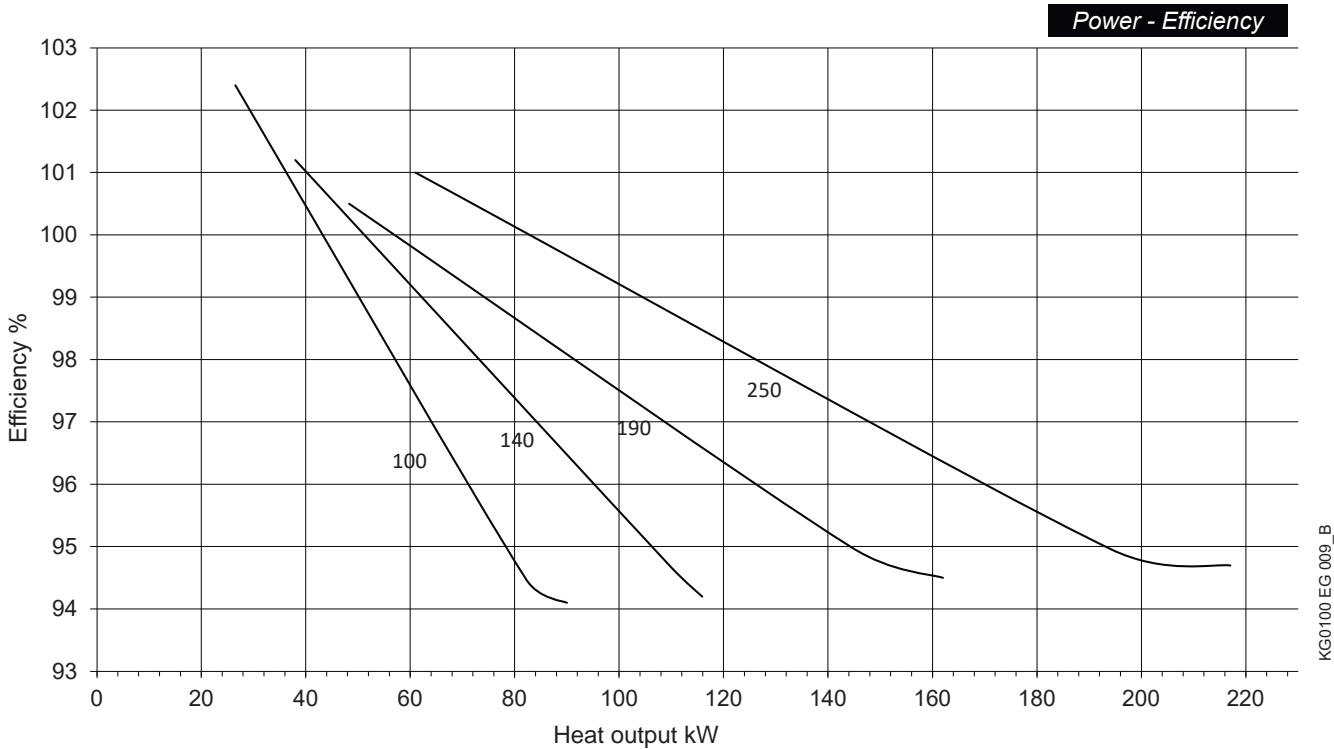
## 3.3. Diagrams of Output Heat/Efficiency Ratio of PK-N Heaters



## 3.4. Diagrams of Output Heat/Efficiency Ratio of PK-K Heaters



3.5. Diagrams of Output Heat/Efficiency Ratio of PK-R Heaters





# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



## 3.6. Technical Data

Technical data table for PKA, PKE Series N. Technical data for PKA-N and PKE-N models are the same.

### Heat Input and Efficiency Data

Model			PKA140N		PKA190N		PKA250N		PKA320N		PKA420N		PKA550N	
Type of appliance			B23											
EC approval			0476CT2224											
NOx Class EN 17082	NO <sub>x</sub>		CLASS 5**											
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	P <sub>min</sub> ; P <sub>rated,h</sub>	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 <sub>pl</sub> ; η <sub>nom</sub>	%	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	η <sub>s,h</sub>	%	According to the chosen burner: see table in Par. 6.9											
Output efficiency	η <sub>s,flow</sub>	%	According to the chosen burner: see table in Par. 6.9											
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 <sub>env</sub>	%	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		m³	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

# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



Technical data table for PKA, PKE Series K. Technical data for PKA-K and PKE-K models are the same.

## Heat Input and Efficiency Data

Model			PKA100K		PKA140K		PKA190K		PKA250K	
Type of appliance			B23							
EC approval			0476CT2224							
NOx Class EN 17082	NO <sub>x</sub>		CLASS 5**							
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	$\frac{P_{min}}{P_{ated,h}}$	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)	$\frac{\eta_{pl}}{\eta_{nom}}$	%	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 chosen burner: see table in Par. 6.9							
Output efficiency	$\eta_{s,flow}$	%	According to the chosen burner: see table in Par. 6.9							
Chimney loss - Burner ON (Hi)		%	<div></div>	7.5	<div></div>	7.4	<div></div>	7.4	<div></div>	7.8
Chimney loss - Burner OFF		%	< 0.1		< 0.1		<0,1		< 0.1	
Casing losses *	F <sub>env</sub>	%	1.81		1.26		1.16		1.17	
Combustion Chamber pressure		Pa	14	100	15	140	15	130	19	175
Combustion Chamber volume		m³	0.24		0.37		0.52		0.76	

Model			PKA320K		PKA420K		PKA550K	
Type of appliance			B23					
EC approval			0476CT2224					
NOx Class EN 17082	NO <sub>x</sub>		CLASS 5**					
			MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	$\frac{P_{min}}{P_{rated,h}}$	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)	$\frac{\eta_{pl}}{\eta_{nom}}$	%	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 chosen burner: see table in Par. 6.9					
Output efficiency	$\eta_{s,flow}$	%	According to the chosen burner: see table in Par. 6.9					
Chimney loss - Burner ON (Hi)		%	<div></div>	8.7	<div></div>	7.8	<div></div>	7.7
Chimney loss - Burner OFF		%	< 0.1		< 0.1		< 0.1	
Casing losses *	F <sub>env</sub>	%	1.02		1.03		0.97	
Combustion Chamber pressure		Pa	15	225	30	275	40	365
Combustion Chamber volume		m³	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





# Floor Standing Warm Air Heater PK series




User, Installation and Maintenance Manual



Technical data table for PKA, PKE Series R. Technical data for PKA-R and PKE-R models are the same.

## Heat Input and Efficiency Data

Model			PKA100R		PKA140R		PKA190R		PKA250R	
Type of appliance			B23							
EC approval			0476CT2224							
NOx Class EN 17082	NO <sub>x</sub>		CLASS 5**							
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	$\frac{P_{min}}{P_{rated,h}}$	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)	$\frac{\eta_{pl}}{\eta_{nom}}$	%	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 chosen burner: see table in Par. 6.9							
Output efficiency	$\eta_{s,flow}$	%	According to the chosen burner: see table in Par. 6.9							
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 <sub>env</sub>	%	1.81		1.26		1.16		1.17	
Combustion Chamber pressure		Pa	14	100	15	140	15	130	19	175
Combustion Chamber volume		m³	0.24		0.37		0.52		0.76	

Model			PKA320R		PKA420R		PKA550R	
Type of appliance			B23					
EC approval			0476CT2224					
NOx Class EN 17082	NO <sub>x</sub>		CLASS 5**					
			MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	$\frac{P_{min}}{P_{rated,h}}$	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)	$\frac{\eta_{pl}}{\eta_{nom}}$	%	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 chosen burner: see table in Par. 6.9					
Output efficiency	$\eta_{s,flow}$	%	According to the chosen burner: see table in Par. 6.9					
Chimney loss - Burner ON (Hi)		%		7.7		7.8		7.7
Chimney loss - Burner OFF		%	< 0.1		< 0.1		< 0.1	
Casing losses *	F <sub>env</sub>	%	1.03		1.03		0.97	
Combustion Chamber pressure		Pa	23	225	30	275	40	365
Combustion Chamber volume		m³	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 the building to be heated, heat is irradiated inside, so casing losses are zero

\*\* With CLASS 3 GAS BURNERS according to EN676

# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



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

Values of **PKA** and **PKE** are identical, as well as values of **N**, **K** and **R** series

Model		PKA100			PKA140		PKA190	
Version		10W		20W	10W	20W	10W	20W
Air Flow Rate - 15°C	m³/h	7,300			10,500		14,000	
Available Head Pressure	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	18,000		23,000		30,000		40,000	
Available Head Pressure	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)							

\* 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 multiplied by the supplied motor efficiency (efficiency IE3); the power absorbed by the matching burner must be add to the value indicated in the table.

# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



## 3.7. Noise

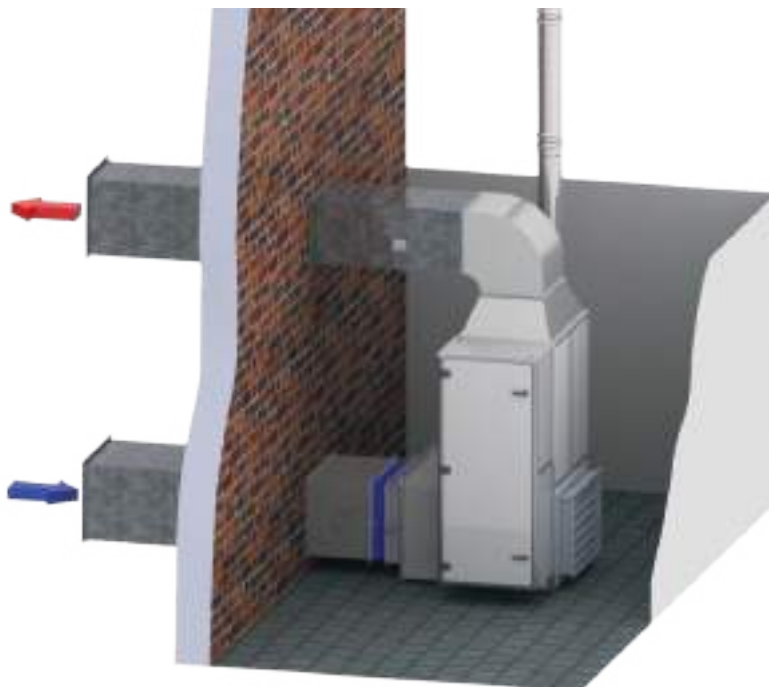
### DUCTED HEATERS

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.

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

Detection distances for sound pressure have been changed according to heater size.

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



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

Heater with ducted delivery and intake											
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

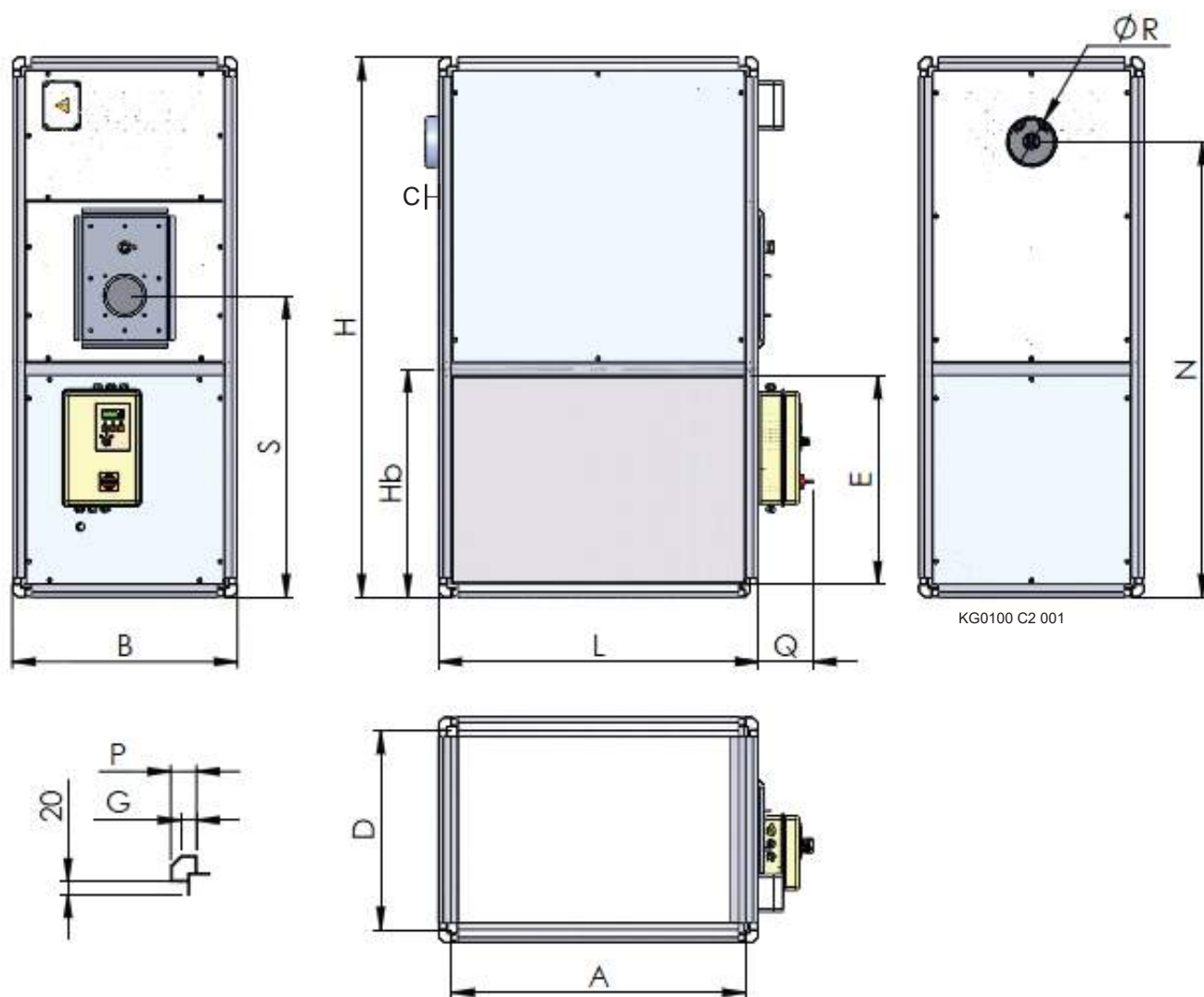
# Floor Standing Warm Air Heater PK series

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## 3.8. Dimensions of PKA Vertical Heater

INDOOR VERTICAL HEATERS (Series N, K and R)



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



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## Integrated Models

All PKA vertical 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 on top of the other without any fixing. Fan assembly includes slots for sliding the two parts into place.

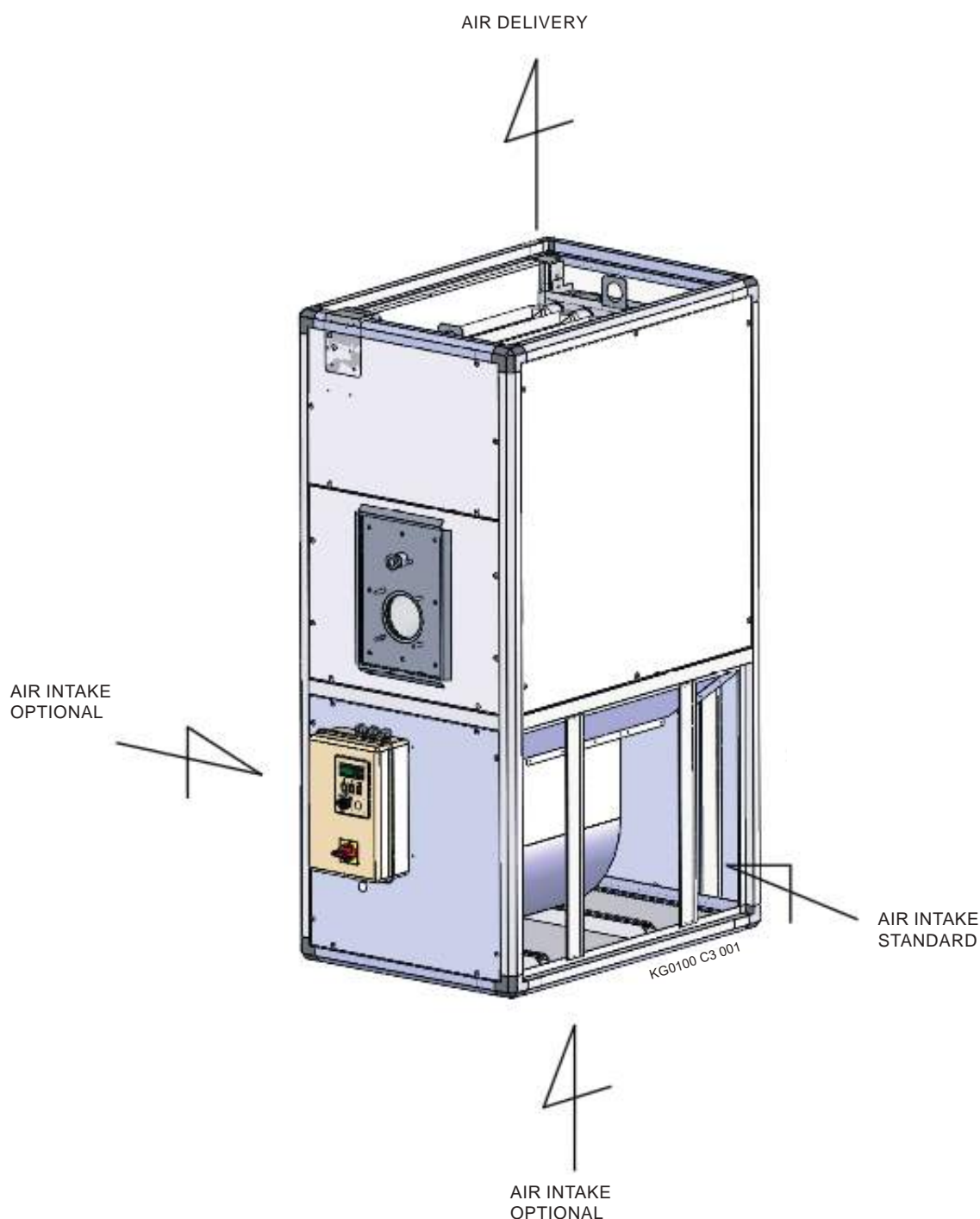
USE the supplied polarised connector for the electrical connection between exchanger (thermostats) and control panel.

## Air Intake

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 side of the unit.



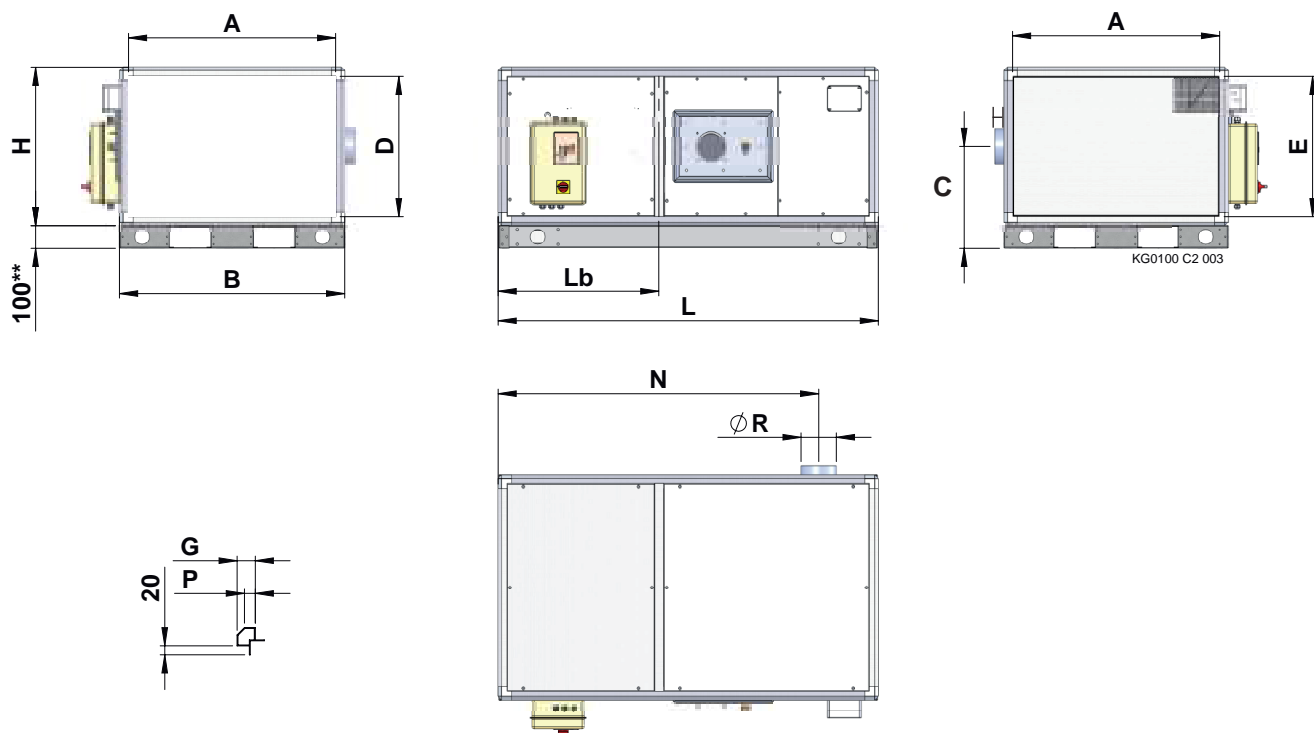
# Floor Standing Warm Air Heater PK series

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## 3.9. Dimensions of PKA Horizontal Heater

INDOOR HORIZONTAL HEATERS (Series N, K and R)



Model	Overall dimensions				Intake		Delivery		Profile		Chimney			Burner		Weight kg
	B	H	L	Lb	A	E	A	D	P	G	N	Ø R	C	S	Ø T	
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

# Floor Standing Warm Air Heater PK series

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## Integrated Models

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

## Two-Assembly Models

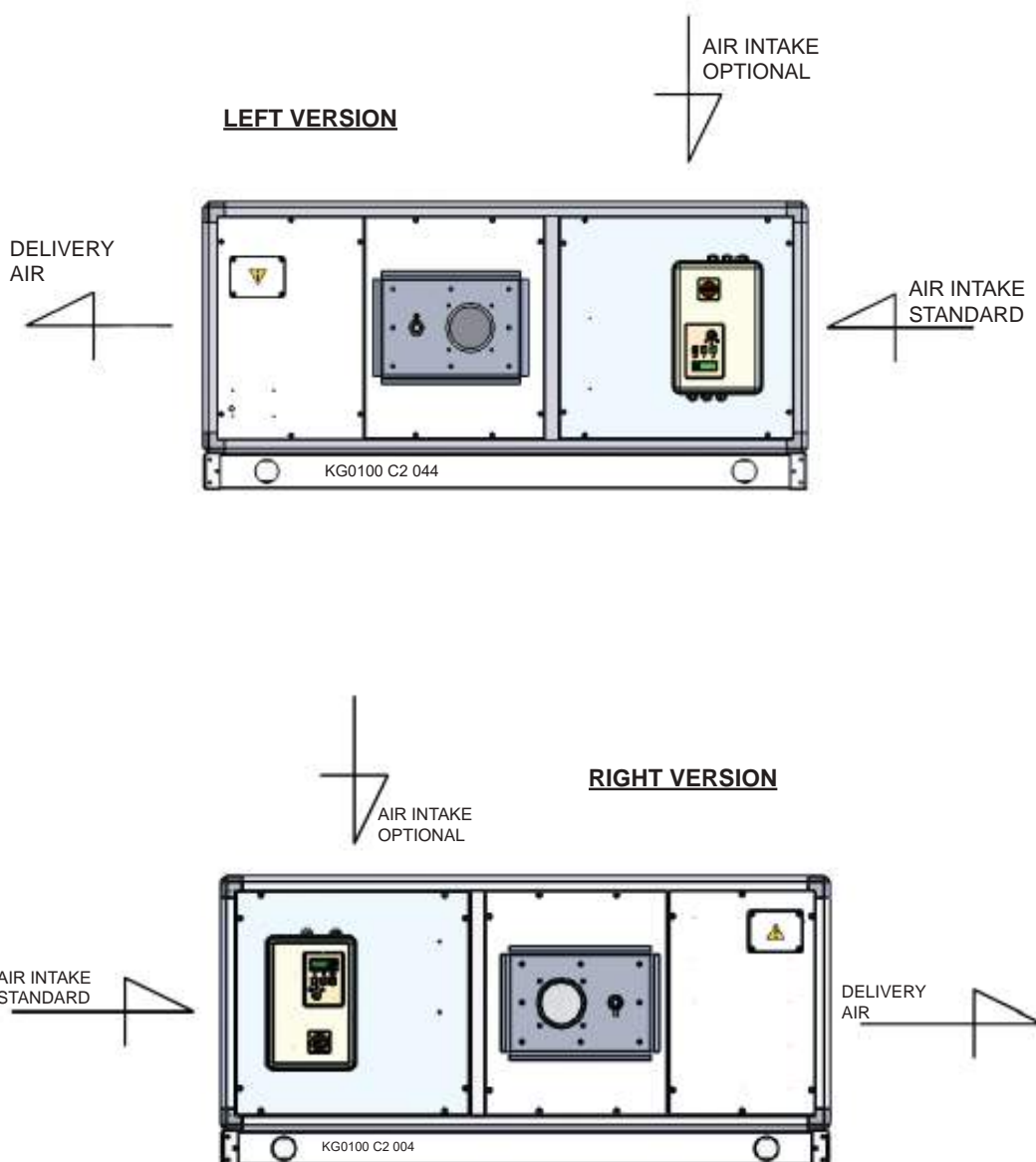
From 420 model onward, heaters are split in two assemblies: fan and exchanger. These two assemblies are to be installed one next to the other and fixed with the profile and the screws provided. Fan assembly includes slots for sliding the two parts into place.

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. For horizontal heaters, you must specify air flow direction: rightward or leftward (always referred to burner).



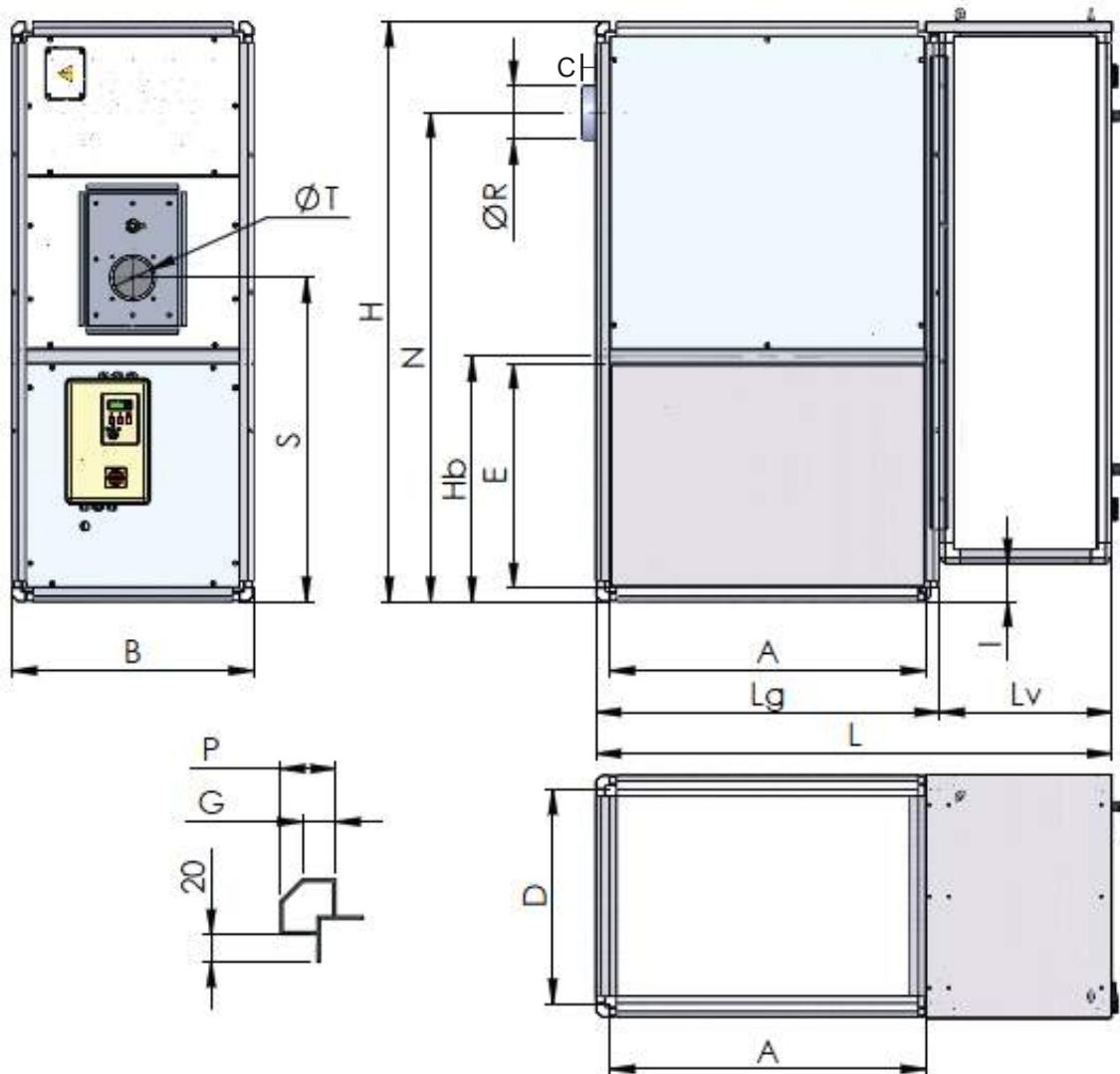
# Floor Standing Warm Air Heater PK series

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## 3.10. Dimensions of PKE Vertical Heater (Series N, K and R)

### OUTDOOR VERTICAL HEATERS (Series N, K and R)



Model	Overall dimensions				Intake		Delivery		Profile		Chimney			Burner		Burner Casing			Weight kg
	L	B	H	Hb	A	E	A	D	P	G	N	ØR	C	S	ØT	LG	LV	I	
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

# Floor Standing Warm Air Heater PK series

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## 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 the 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.**

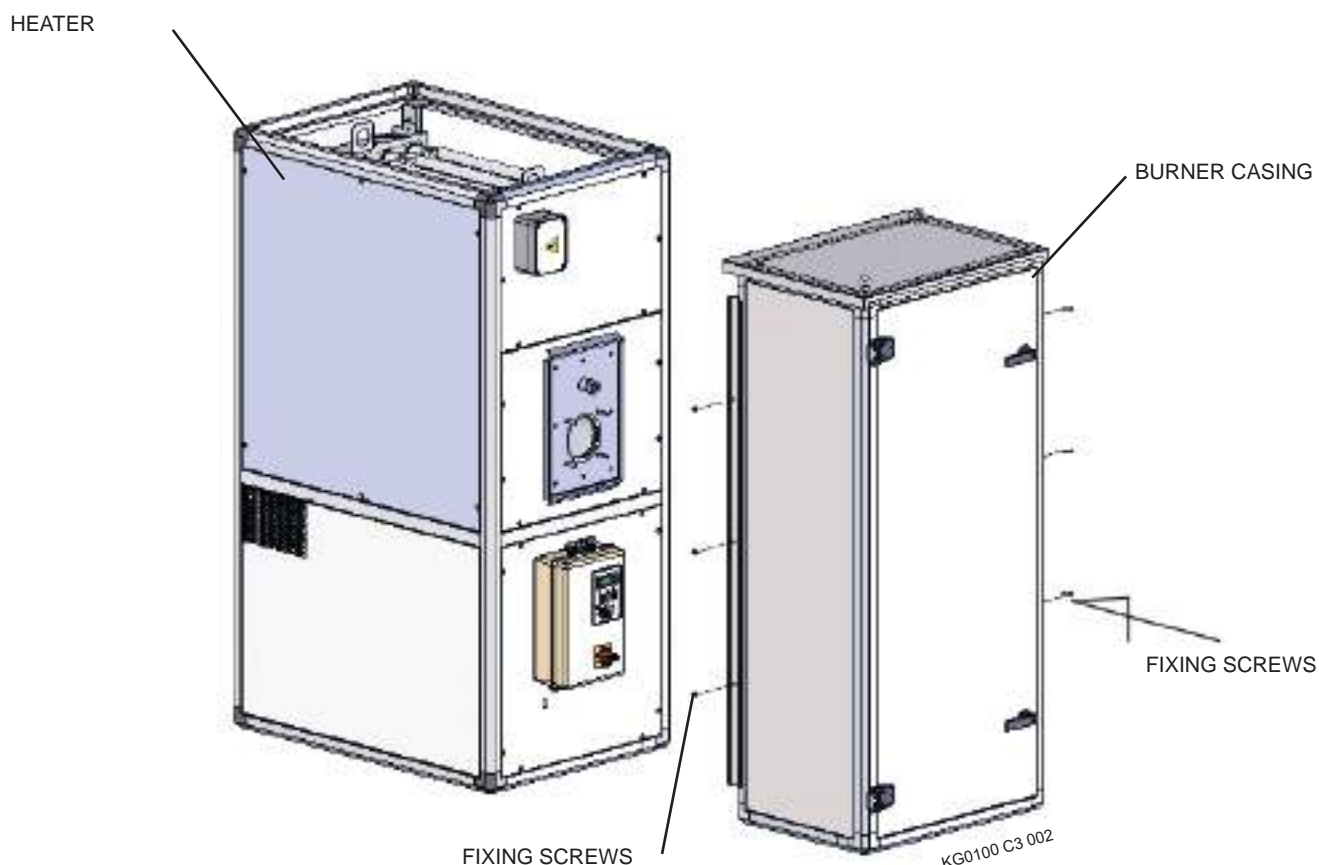
USE the supplied polarised connector for the electrical connection between exchanger (thermostats) and control panel.

## 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.



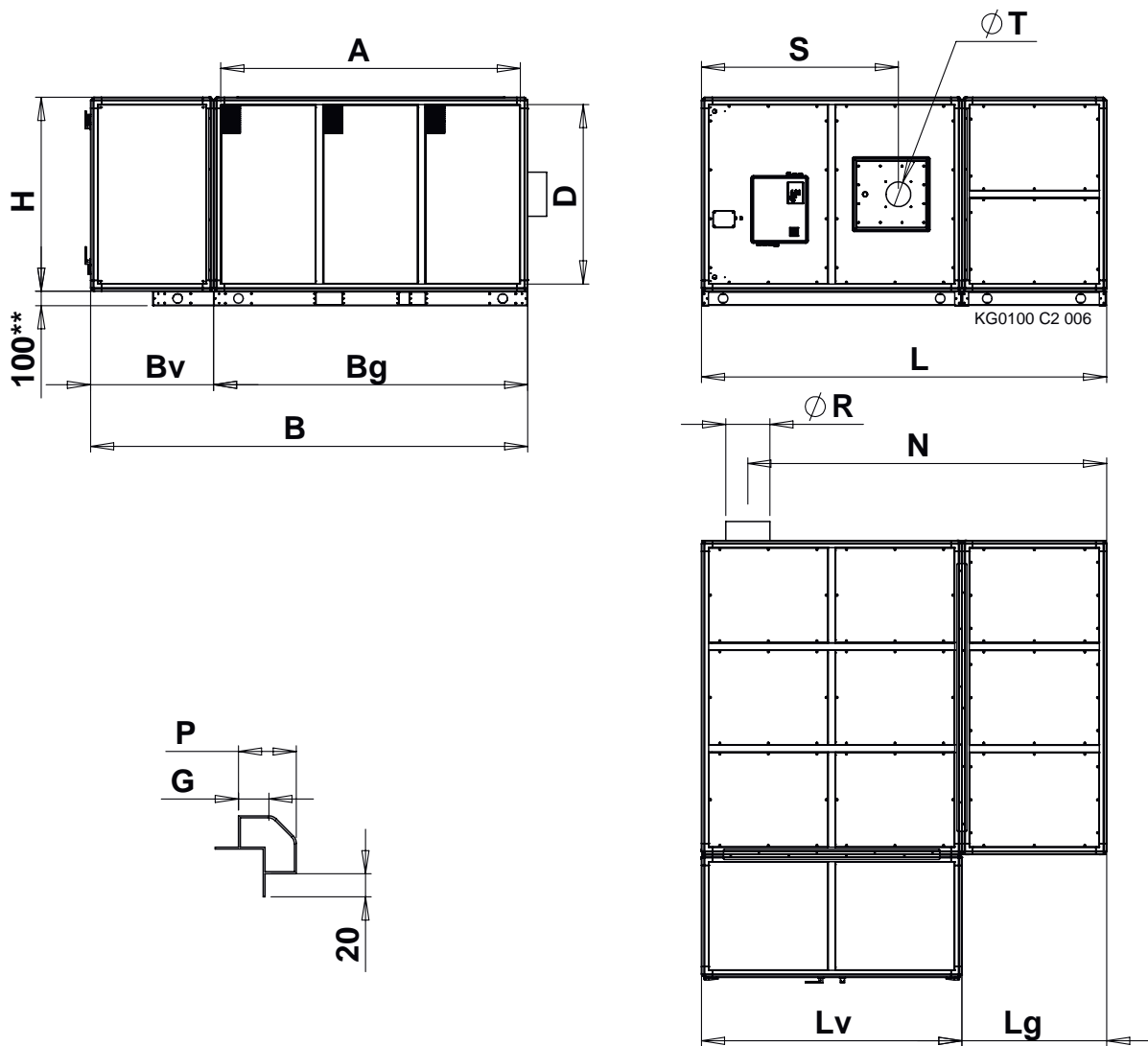
# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



## 3.11. Dimensions of PKE Horizontal Heater (Series N, K and R)

### OUTDOOR HORIZONTAL HEATERS (Series N, K and R)



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



# Floor Standing Warm Air Heater PK series

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## 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.

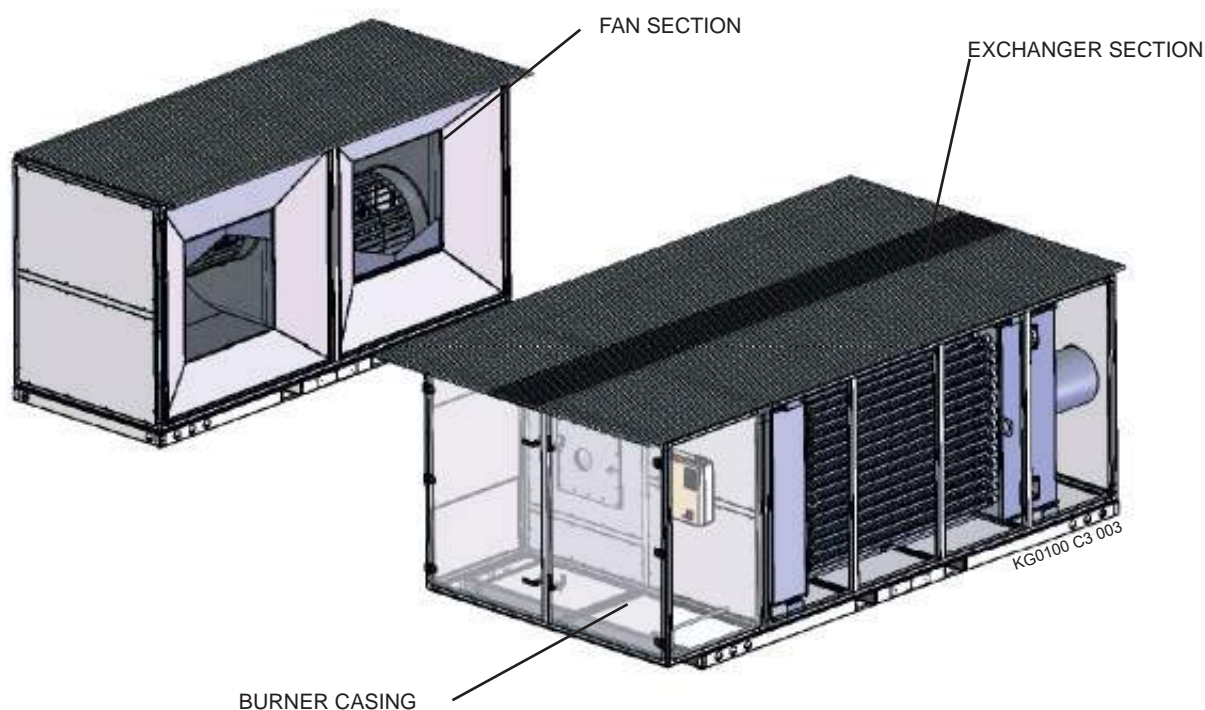
Heaters are supplied on a galvanized base, prepared for lifting with lift truck or crane.

## 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.

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:

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

(\*only in the presence of Smart X)

(\*\*only active in ABSENCE OF SMART X)

During normal operation, the display will show the wording **HEA** if the burner is on; **rdy** or **Sty** when the boiler is being switched off; **rOF** if the room control has been met.

**Air** "CTRL\_07" control (parameter C71=1) under the PAr menu has been enabled by mistake; change C71=0;

**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")



Smart X EASY

Smart X WEB

## 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.

# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



## 4.3. Smart X

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:

10:15	System Configuration	Mon 01 Jan
None	≡	⬆
Hot Air Heaters	≡	⬆
Boilers / Hybrids	≡	
Pressostatic Buildings	≡	⬇
🏠	↩	OK

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

10:15	Heater Management	Mon 01 Jan
Probe Management		⬆
Ventilation	NO	≡
Pool	NO	≡
Silent	NO	≡
🏠	↩	OK

### 4.3.1. CONTINUOUS VENTILATION

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

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

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

10:15	Continuous Ventilation	Mon 01 Jan
NO		
YES		
🏠	↩	OK

**NOTE. 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

**NOTE. 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**

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## 4.3.2. POOL CONTROL

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

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

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

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

10:15	SET_ST3	Mon 01 Jan
22		
⬆	⬅	OK

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

- Continuous ventilation control **ACTIVE VENTILATION**

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

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

## 4.3.3. SILENT FUNCTION

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

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

10:15	Heater Management	Mon 01 Jan
Probe Management		
Ventilation	NO	≡
Pool	NO	≡
Silent	NO	≡
⬆	⬅	OK

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

10:15	Silent	Mon 01 Jan
NO		
YES - SMART		
YES - ID2		
⬆	⬅	OK

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

**NOTE: 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

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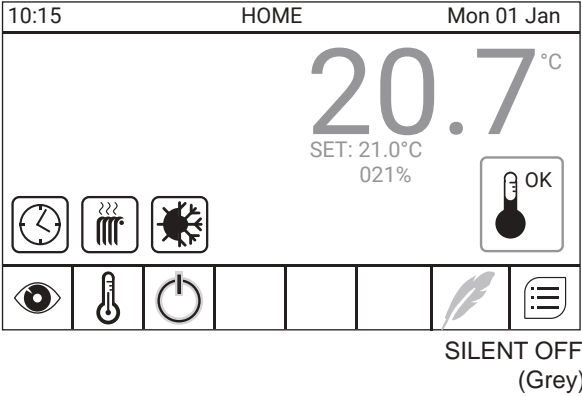
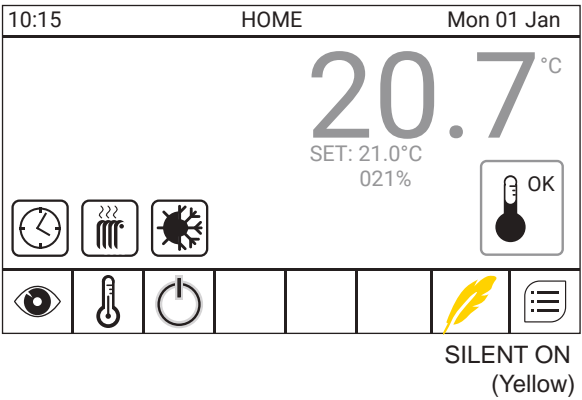


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## Virtual Mode

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

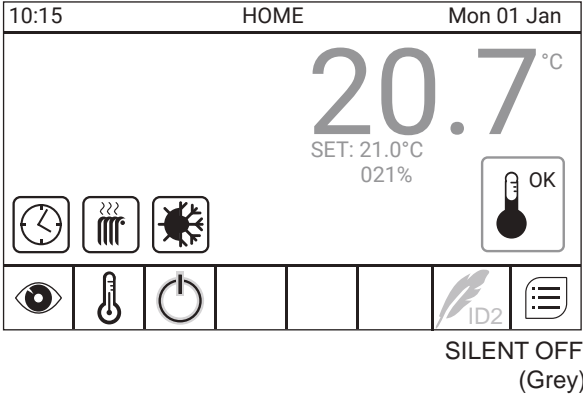
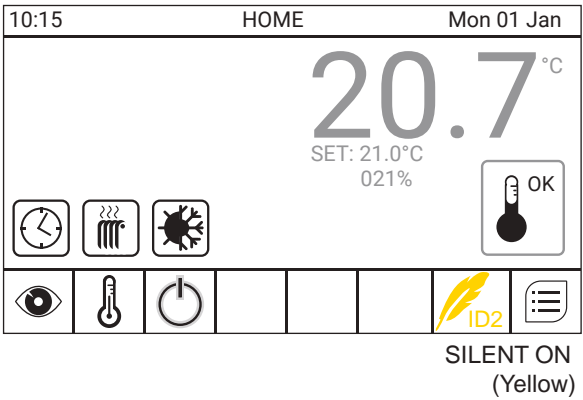
The “FEATHER” key changes its colour depending on the ON-OFF condition



## Remote ID2 Mode

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

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





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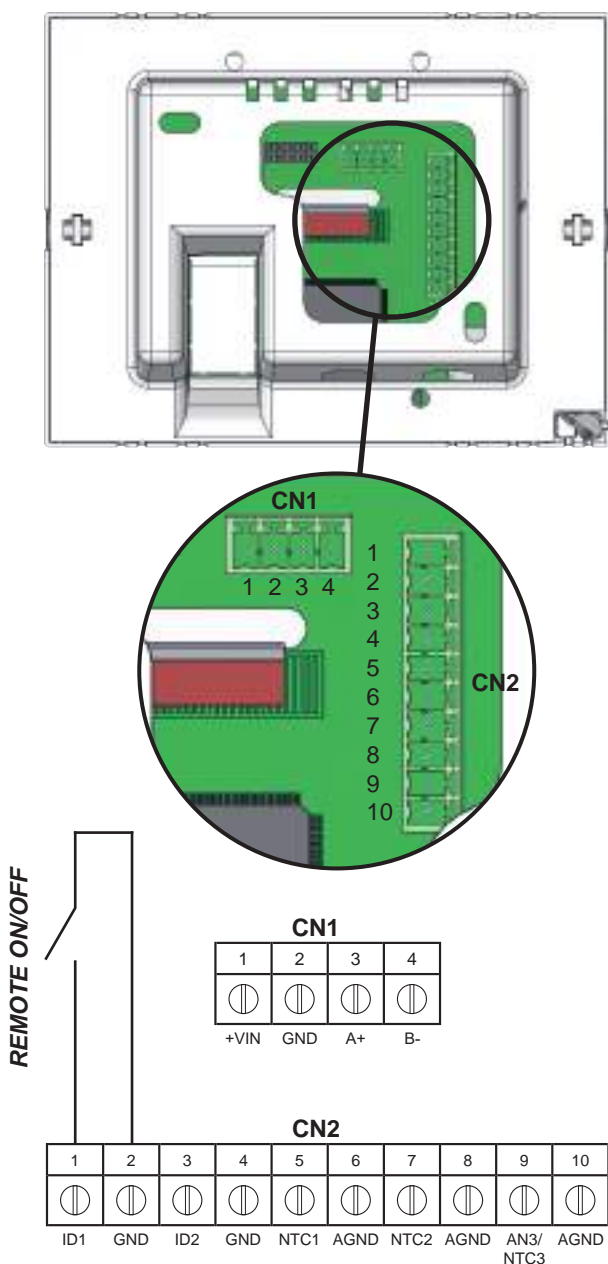


## 4.3.4. REMOTE ON/OFF (OPTIONAL)

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.

## ELECTRICAL CONNECTION



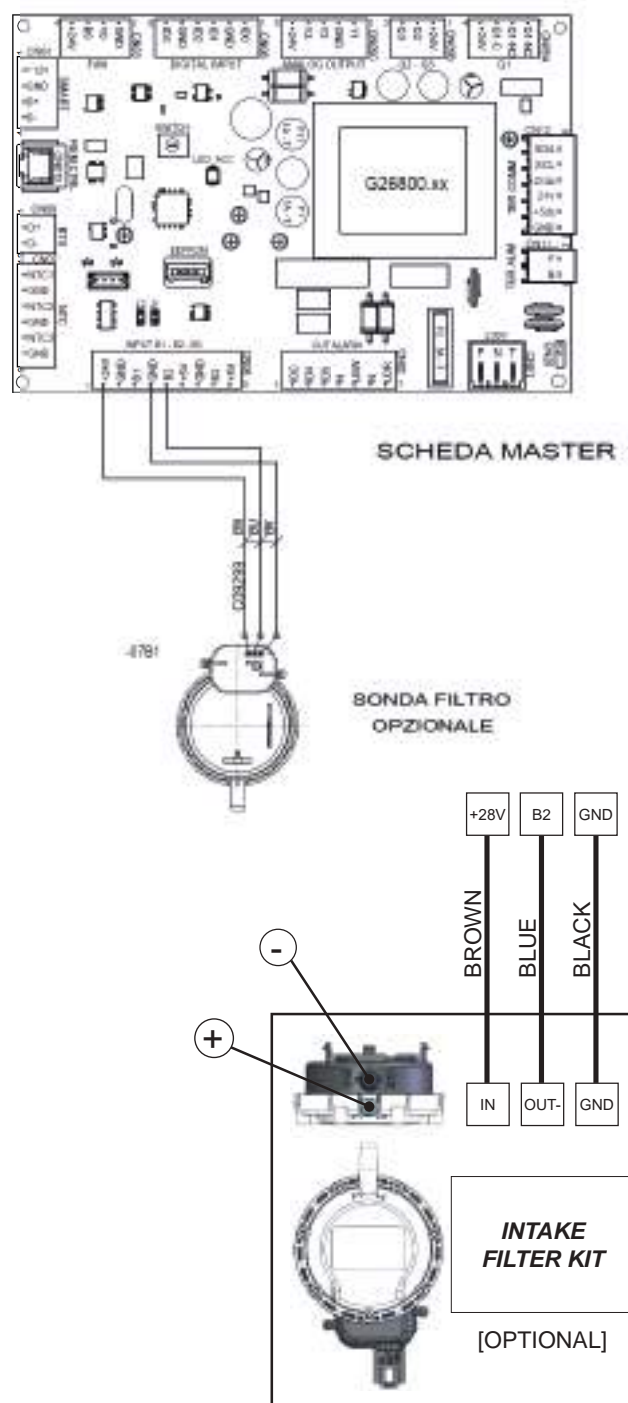
## 4.3.5. FILTER CONTROL (OPTIONAL)

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. 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.**

SMART WEB

- HOME
- Fasce Orarie
- Impostazioni
- Regolazione
- Sistema
- Modo
- CPU-Smart
- Ingressi
- Set-Point
- Ibrido
- Info Dispositivo

13:44 - Mercoledì 03 Ottobre

Set-Point Temperatura OFF

Funzionamento Fasce Orarie

Ventilazione

OFF

-

-

Hybrido -

-

-

Strutture Sportive -

-

-

-

21.5

-

IMPIANTO ON

## 5. SERVICING INSTRUCTIONS

### 5.1. 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 150 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.

**IMPORTANT: Powering off the machine 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.**

### 5.2. Interface Panel

The PK heaters are fitted as standard with a multifunction LCD panel located on the front panel of the suspended heater, 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:  $\uparrow$ ,  $\downarrow$ , ESC and ENTER; the display allows the user to display the heater operating mode and its Faults. It also allows the service centre to change the main operating parameters.

Changing parameters requires a password.

#### Viewing the machine status

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

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

(\*only in the presence of Smart)

(\*\*only active in ABSENCE OF SMART)

During normal operation, the display will show the wording **HEA** if the burner is on; **rdy** or **Sty** when the boiler is being switched off; **rOF** if the room control has been met.

<b>Air</b>	<b>"CTRL_07" control (parameter C71=1) under the PAr menu has been enabled by mistake; change C71=0</b>
<b>Axx</b>	<b>Unit address;</b> If the module has an address other than Ø, the display will show, alternating it with the operation in progress, the address assigned to the module. (e.g. "A01")

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.

## 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 0, 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 indicated 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:

<b>Machine status</b>	Provides information on unit operation (rdy/Sty/OFF/HEA/Air/COO/SAn)
<b>Axx</b>	Shows the address assigned to the CPU OCB of the unit (1 to 15); it is displayed alternating with "Machine Status" (e.g., "A01" = address1)
<b>Exx</b>	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:

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

## Operation - Fun Menu

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

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

## 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".

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

## 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".

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

## 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

<b>rGL</b>	(adjustments parameters)
<b>CrL</b>	(controls parameters)
<b>Fnu</b>	(functions parameters)
<b>rtU</b>	(modbus serial parameters)

# Floor Standing Warm Air Heater PK series

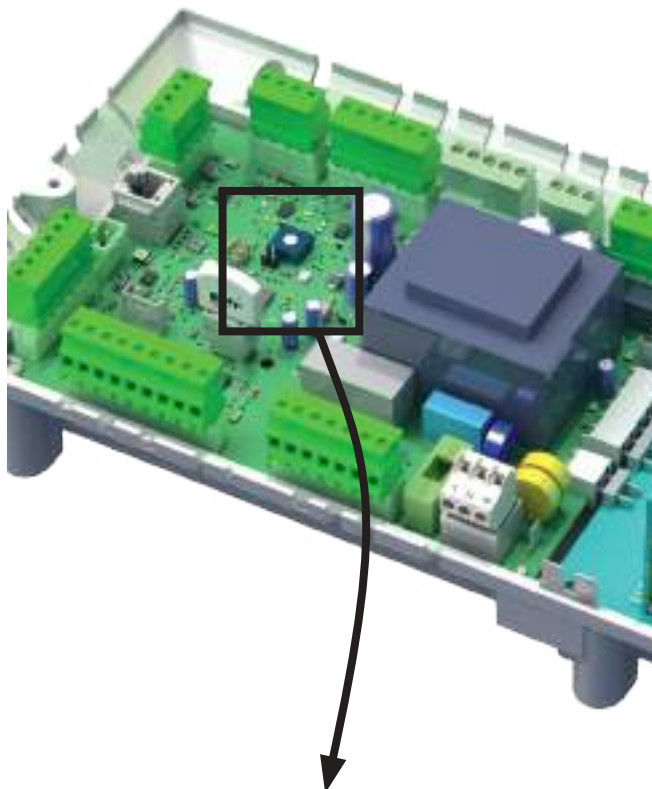
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In order to change the value of the parameters, the password must be entered in the **Abi** submenu.

## 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.



Switch for CPU PCB address

## 5.3. 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 digital input ID1-GND - button N.O.;
- the Smart X Web/Easy control - optional;
- the ModBus protocol, if implemented by the manufacturer of the machine containing the PCH module.

The lockout codes and their cause are shown in the ERRORS table in Paragraph 5.7 "Analysis of Lockouts - Exx".

## 5.4. Smart X Web/Easy connection

Use the connector provided to connect the Smart X Web/Easy. 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.

**NOTE: 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/Easy, please read the operating manual supplied with the accessory.**



Address #0



Address #2



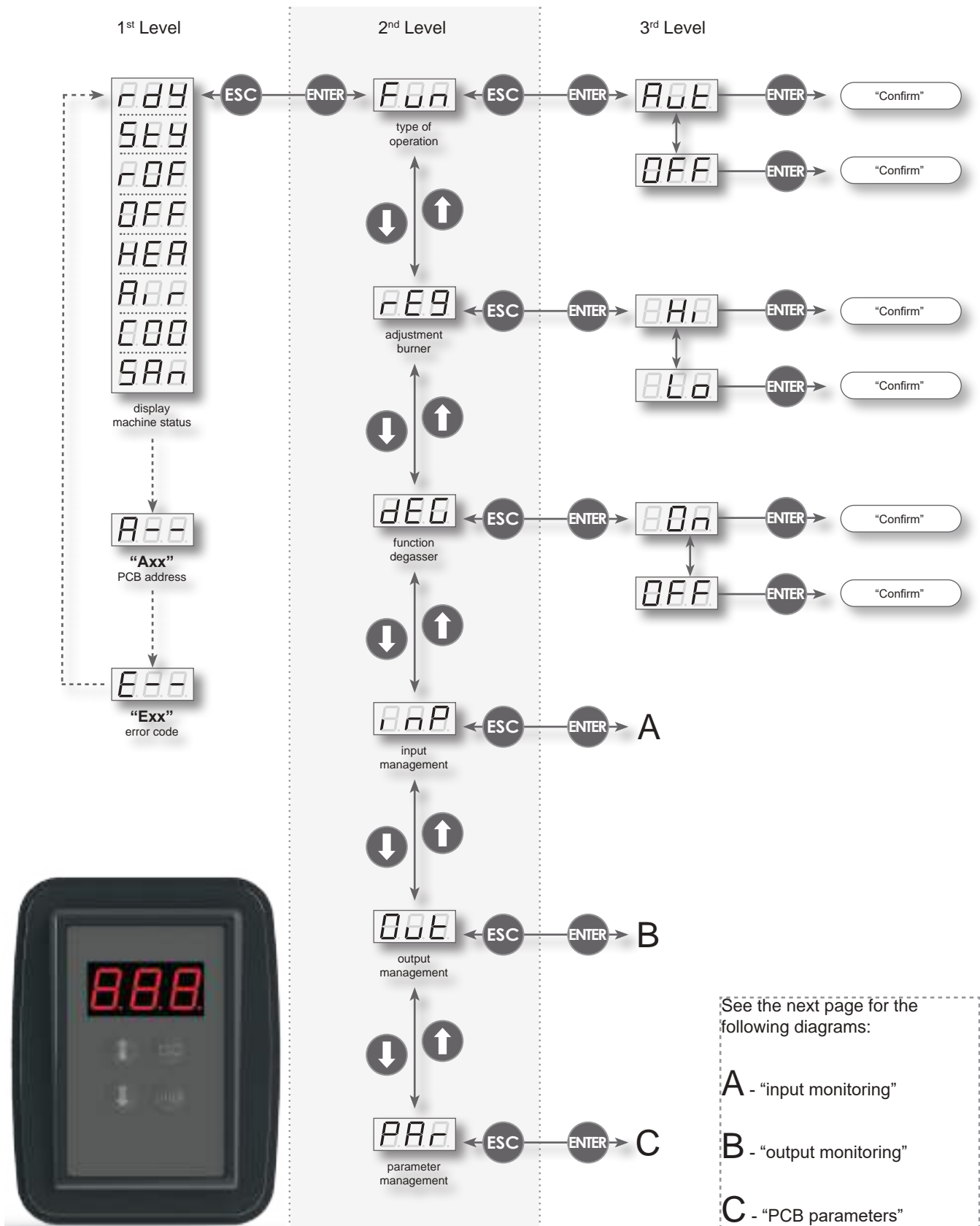
Address #15

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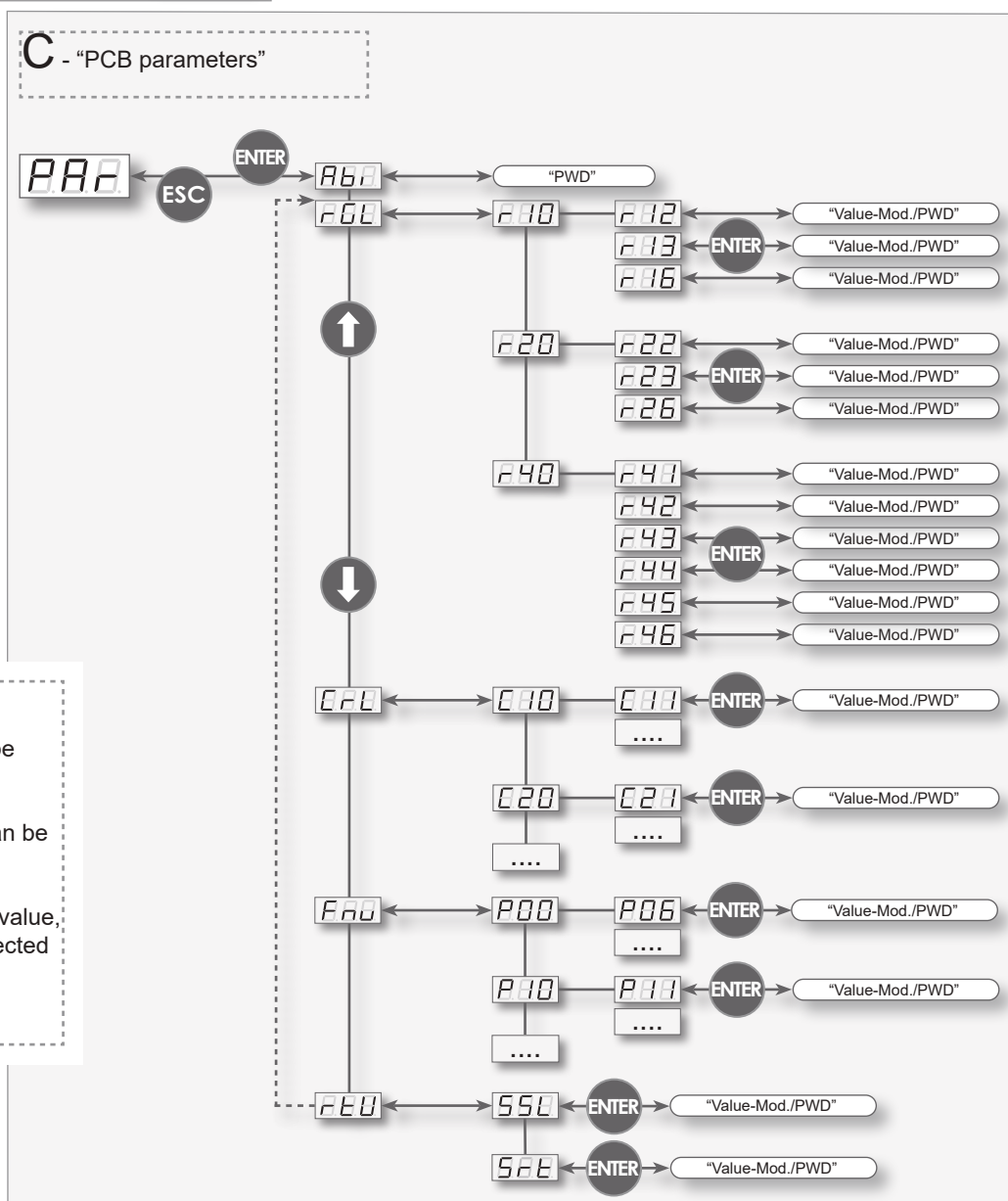
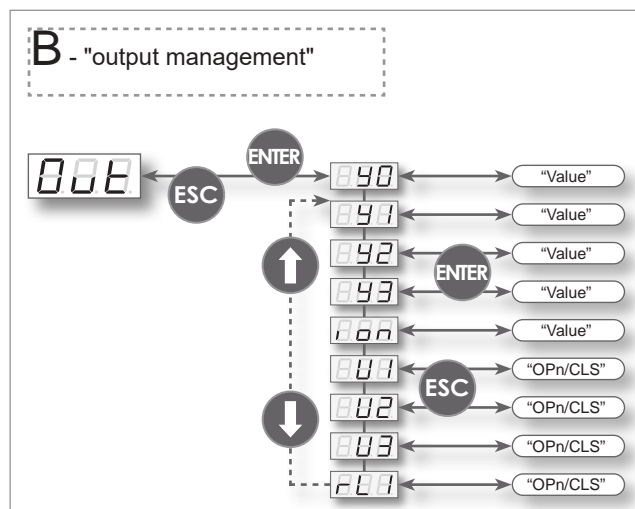
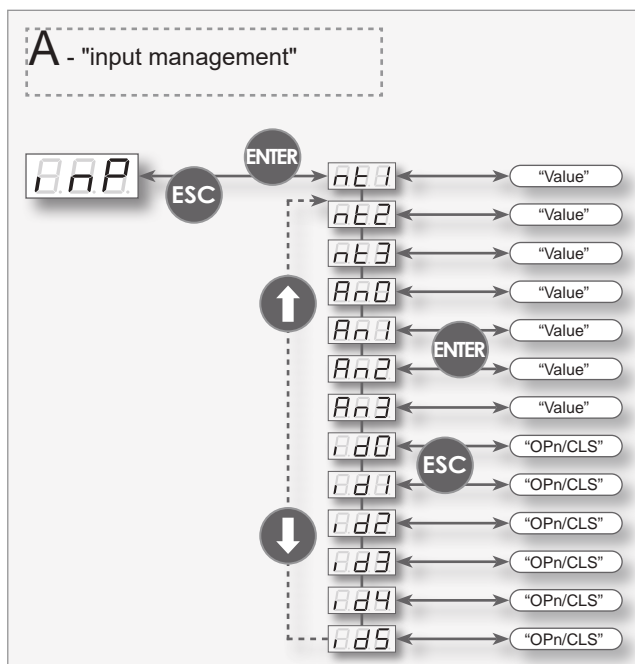
### 5.5. Navigation map of LCD display menu CPUE G26800





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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

# Floor Standing Warm Air Heater PK series

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## 5.6. 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 "007" 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 CPU PCB version 8.02.xx				
Parameter Name				
Smart	LCD	U.M.	PK heater	DESCRIPTION
<b>FUNC 00</b>	<b>Fnu P00</b>			<b>Equipment operation</b>
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
<b>FUNC 01</b>	<b>Fnu P10</b>			<b>Burner operation - NOT USED</b>
<b>REG 01</b>	<b>rGL R10</b>			<b>Modulation DELIVERY Probe NTC Adjustment</b>
REG_01	R11		1	0 = disabled 1 = enabled
ST1	R12	°C	55	ST1 function setpoint
Xd1	R13	°C	5	ST1 hysteresis
Kp1		%	10	Proportional coefficient
Ki1		%	5	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
<b>REG 02</b>	<b>rGL R20</b>			<b>NTC adjustment - NOT USED</b>
<b>REG 03</b>	<b>rGL R30</b>			<b>Probe NTC Control Adjustment for Temperature Maintenance (AIR+POOL)</b>
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	°C	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)
Xd3	R33	°C	5	ST3 adjustment hysteresis (burner OFF)
Kp3		%	10	Proportional coefficient
Ki3		%	5	Integral coefficient
TH3	R36	°C	65	Alarm temperature for ST3 for fault E53; Autoresolve with NTCx<ST3
ING3A			1 (NTC)	Defines the analogue input to be used for calculation 1 = NTC1 2 = NTC2 3 = NTC3
OUT_A			0	Digital output not used



# Floor Standing Warm Air Heater PK series

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## Parameters of G26800 CPU PCB version 8.02.xx

Parameter Name				
Smart	LCD	U.M.	PK heater	DESCRIPTION
<b>REG 04</b>	<b>rGL R40</b>			<b>Modulation Adjustment from 0/10 Vdc Control - NOT USED</b>
REG_04	R41		0	0 = disabled
<b>REG 05</b>	<b>rGL R50</b>			<b>Air Pressure Adjustment - NOT USED</b>
REG_05	R51		0	0 = disabled
<b>REG 06</b>	<b>rGL R60</b>			<b>Air Quality Adjustment - NOT USED</b>
REG_06			0	0 = disabled
<b>REG 07</b>	<b>rGL R70</b>			<b>Dry System Adjustment - NOT USED</b>
REG_07			0	0 = disabled
<b>CTRL 01</b>	<b>CrL C10</b>			<b>Water Pressure Control - NOT USED</b>
CTRL_01	C11		0	0 = disabled
<b>CTRL 02</b>	<b>CrL C20</b>			<b>Water Antifreeze Control - NOT USED</b>
CTRL_02	C21		0	0 = disabled
<b>CTRL 03</b>	<b>CrL C30</b>			<b>Burner Compartment Antifreeze Control - NOT USED</b>
CTRL_03	C31		0	0 = disabled
<b>CTRL 04</b>	<b>CrL C40</b>			<b>No Voltage Control</b>
CTRL_04	C41		1	Control enabling 0 = disabled 1 = enabled
T4_V	C42	sec	45	Time in seconds of post-ventilation
<b>CTRL 05</b>	<b>CrL C50</b>			<b>Remote Reset Control from Digital Input</b>
CTRL_05	C51		0	0 = disabled 1 = enabled
ING05	C52		0	Digital input enabled as RESET
<b>CTRL 06</b>	<b>CrL C60</b>			<b>Remote alarm or flame presence signal control</b>
CTRL_06	C61		0	0 = disabled 1 = enabled as lockout signal 2 = enabled as flame signal
OUT06	C62		0	Digital output enabled
<b>CTRL 07</b>	<b>CrL C70</b>			<b>Summer ventilation control from digital input</b>
CTRL_07	C71		0	0 = disabled 1 = enabled
ING07	C72		0	Digital input enabled
<b>CTRL 08</b>	<b>CrL C80</b>			<b>Counter and reset control</b>
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
<b>CTRL 09</b>	<b>CrL C90</b>			<b>AIR FILTER Control</b>
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

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## Parameters of G26800 CPU PCB version 8.02.xx

Parameter Name				
Smart	LCD	U.M.	PK heater	DESCRIPTION
<b>FUNC 02</b>	<b>Fnu P20</b>			<b>BLOWN AIR BURNER MANAGEMENT</b>
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)	with FN_02 =1, it defines the analogue output for sending PWM % signal
TSV2		sec	30	burner modulation servomotor stroke time
<b>FUNC 03</b>	<b>Fnu P30</b>			<b>Ventilation Management Function (EC-AC Fans)</b>
FN_03	P31		1	0 = disabled 1 = proportional POT%_OUT enabled 2 = proportional enabled to PID%_PRESS, value of REG_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
<b>FUNC 04</b>	<b>Fnu P40</b>			<b>Ventilation Function for PRESSOSTATIC Units - NOT USED</b>
FN_04	P41		0	0 = disabled
<b>FUNC 05</b>	<b>Fnu P50</b>			<b>MOTOR OPERATION Management Function</b>
S5			1	0=disabled 1=enabled with autoreset for E85/86 2=enabled without autoreset for E85/86
ST5	P52		300	Live setpoint for alarm
P5			10	ST5 hysteresis
ING5			7	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 E85
TI5	P59	sec	5	Delay in seconds for alarm E86
TOFF_5	P5A	sec	180	Switch-off delay in OFF phase
ANT5			1	Anti-lock function enabling
<b>FUNC 08</b>	<b>Fnu P80</b>			<b>Damper Management Function</b>
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
<b>FUNC 10</b>	<b>Fnu-PA0</b>			<b>Extractor and free cooling function - NOT AVAILABLE</b>
FN_10			0	0 = disabled
	<b>rtu</b>			<b>RS485 Serial Communication Configurations</b>
D_SL	SSL		0	slave serial baud rate (SMART X) 0 = baud rate 19,200 - Even Parity
				<b>NTC input configuration</b>
NTC1			1	Activates or deactivates NTC1 input (Heater air delivery)
NTC2			0	Activates or deactivates NTC2 input
NTC3			0	Activates or deactivates NTC3 input

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## Parameters of G26800 CPU PCB version 8.02.xx

Parameter Name			PK heater	DESCRIPTION
Smart	LCD	U.M.		
			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			0.01	Coefficient for PRØ displaying; value displayed on Smart and used for controls
UM1			8	1=°C; 2=bar; 3=mbar; 4=Pa; 5=%; 6=l/h; 7=mc/h; 8= V
			B2 Input Configurations - 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			0.01	Coefficient for PRØ displaying; value displayed on Smart and used for controls
UM2			4	1=°C; 2=bar; 3=mbar; 4=Pa; 5=%; 6=l/h; 7=mc/h; 8= V
			B3 Input Configurations (Motor Alarm Control)	
B3			1	0 = disabled 1=enabled as analogue input
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			0	ID1 digital input enabling 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			0	Alarm triggering or function enabling delay time
ID2			2	See ID1 - NC BURNER ALARM
TD2			5	Alarm triggering or function enabling delay time
ID3			2	See ID1 - STB THERMOSTAT ALARM
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*

## Parameters of G26800 CPU PCB version 8.02.xx

Parameter Name				
Smart	LCD	U.M.	PK heater	DESCRIPTION
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)
<b>Y1 Analogue Output Configuration</b>				
YM1			0	Direct/reverse output configuration 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			0	Minimum voltage (or PWM in %) output value
YH1			10	Maximum voltage (or PWM in %) output value
YF1			10	Fixed voltage or % output value (forced by program)
YT1			1	Voltage increase/decrease (or in %) every second*
YN1			0	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)
<b>Y2 Analogue Output Configuration - INVERTER</b>				
YM2			0	Direct/reverse output configuration 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			1	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)
<b>Y3 Analogue Output Configuration</b>				
YM3			0	Direct/reverse output configuration 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)

## 5.7. 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	Programming error of par. ID1. Set par. ID1=0 (if not used for connection with remote controls) or ID1=4	Manual or 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	Faulty Filter 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
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(s) 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(s) operating cycle. Clean and/ or replace the filters	Manual
E75	No voltage during operating cycle (excluding standby); fault is not visible on remote control but only counted	No voltage during operation	
Thermal relay or motor inverter triggering alarm			
E85	Motor thermal relay triggering	High motor consumption	Autoresolve
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. INSTRUCTIONS TO THE INSTALLER

### 6.1. 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.

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**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 aerodynamic performance of the unit (shown in "TECHNICAL DATA" section of this Manual).

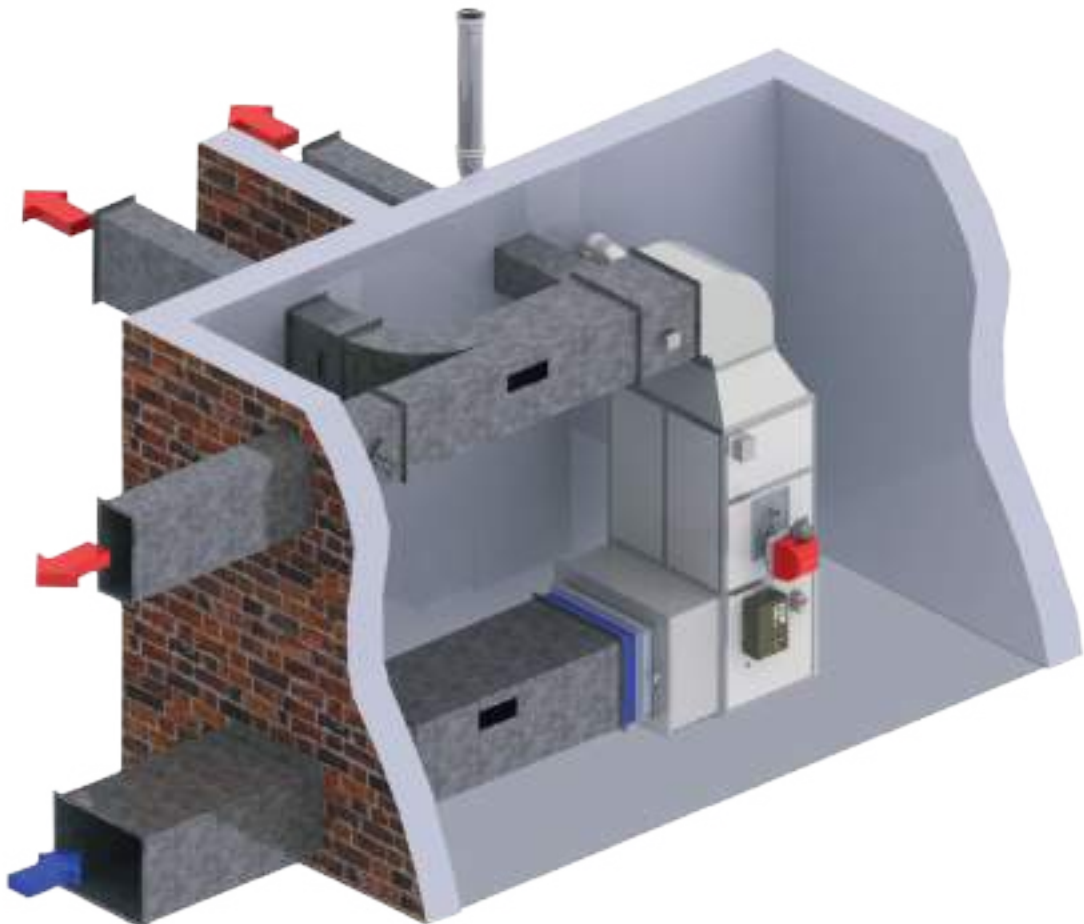
A vibration damping joint should be installed on air delivery duct so as to prevent vibration transmission from the heater to ductwork

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

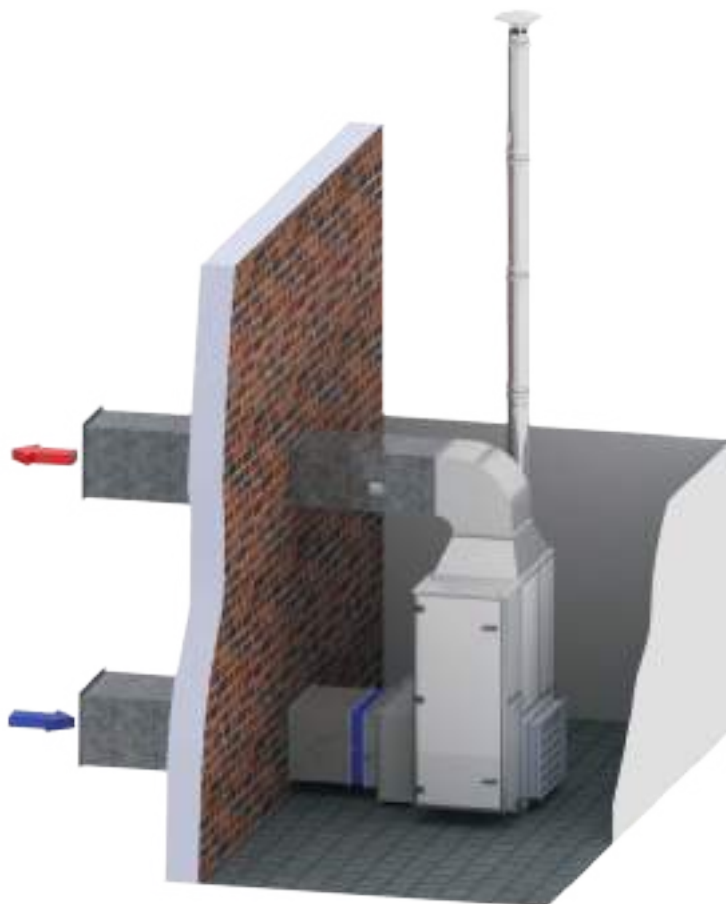
Fuel connection shall be performed by qualified personnel only. Follow instructions in User Manual of the burner installed on the heater and comply with existing regulations.





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## 6.2. Wiring to Power Supply

Warm air heaters come with a main switch with door lock (IG) shown in the figure.

Wire power supply directly to that switch.

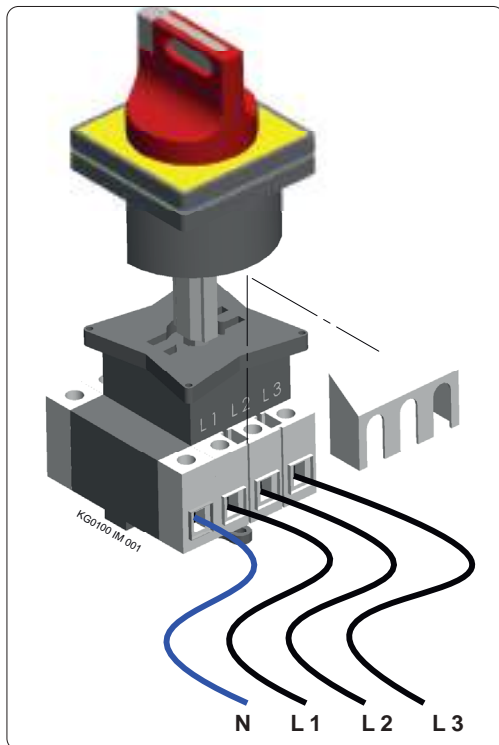
The connection type of the equipment is:

Three-phase	400V+N	Wire three phases to L1, L2, and L3 terminals and Neutral to N terminal
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Ground wire is mandatory. Connect it to relevant terminal.

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

## Electrical Protections



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

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

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

## 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 mm <sup>2</sup>	A protection
100-10A	G01430-IE3	1.5	5.1	5Gx1.5	10
100-20A	G01490-IE3	2.2	6.9	5Gx1.5	10
140-10A; 190-10A	G01260-IE3	3.0	8.7	5Gx2.5	16
140-20A; 190-20A	G00137-IE3	4.0	9.8	5Gx2.5	16
250-10A	G01490-IE3	2x2.2	12.0	5Gx2.5	25
250-20A; 320-10A	G01181-IE3	2x3.0	16.0	5Gx4.0	25
320-20A;	G00137-IE3	2x4.0	19.8	5Gx4.0	25
420-10A; 420-20A	G01181-IE3	2x5.5	23.8	5Gx6.0	40
550-10A;	G00137-IE3	2x4.0	20.2	5Gx6.0	25
550-20A;	G01181-IE3	2x5.5	24.2	5Gx6.0	40

Note: 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.

## 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.

## 6.3. Electrical connections

All PK warm air heater control panels use a modulation PCB which allows 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

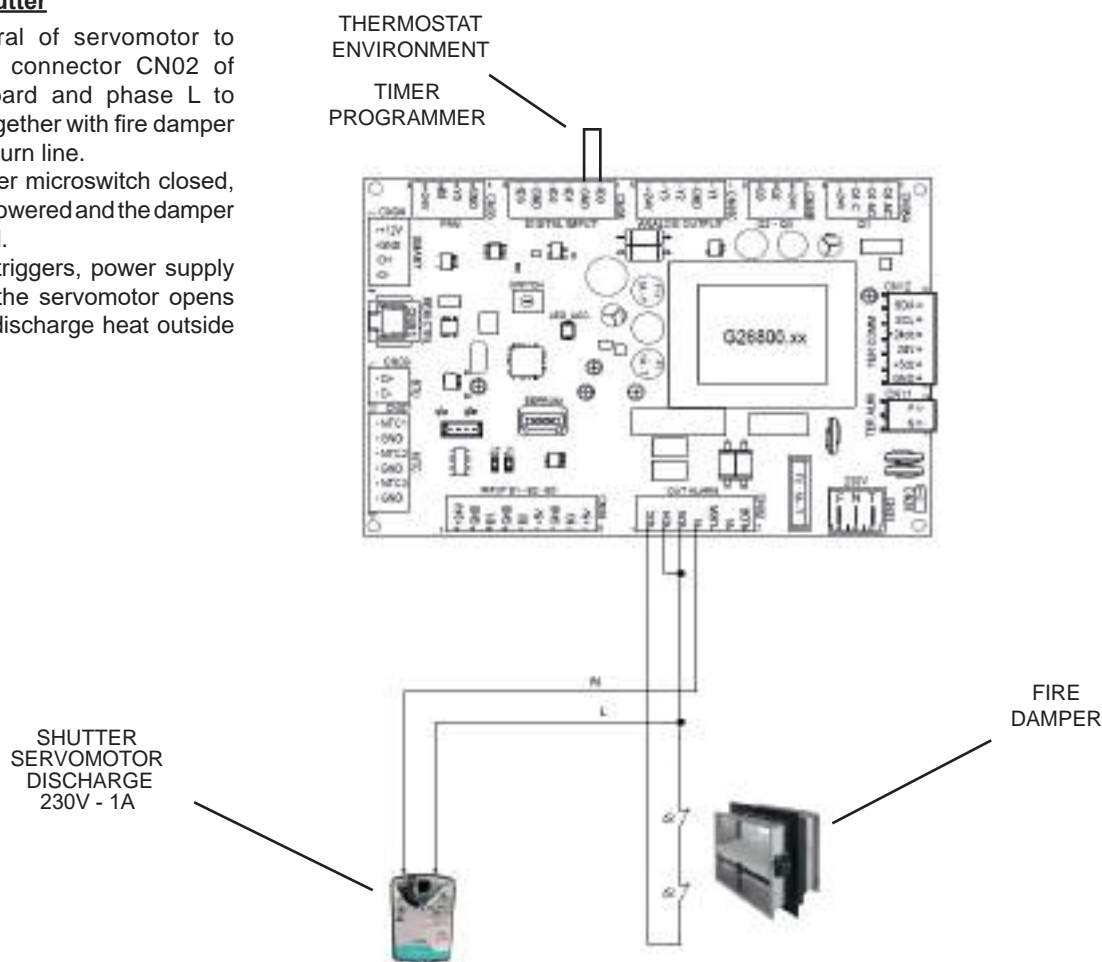
Wire room thermostat to terminals GND and ID0 of CN08 connector on the heater modulation PCB.

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.



**Important:** If no fire damper is installed, create a jumper on terminals IDC - ID5 of connector CN02. THE installation of a room or Smart X thermostat is mandatory. The burner works only if terminals GND and ID0 are closed.

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

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## 6.4. Wiring the Burner

A specific connector on burner control board is dedicated to connecting the burner.

The connector shows standard numbering for two-stage and modulating burners. You only need to wire the burner 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**

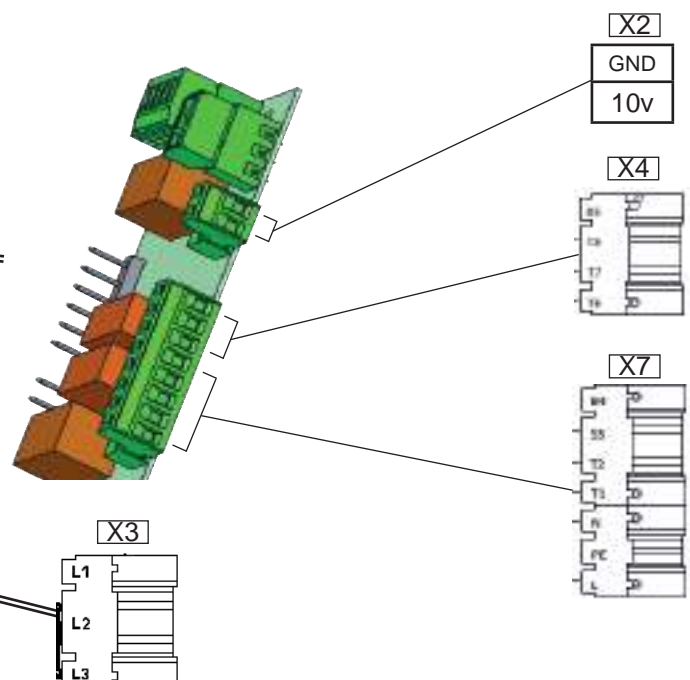
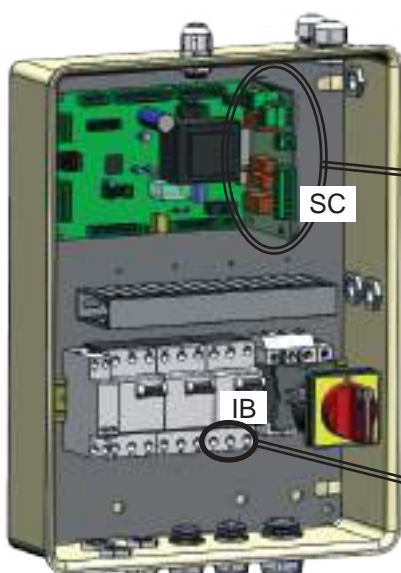
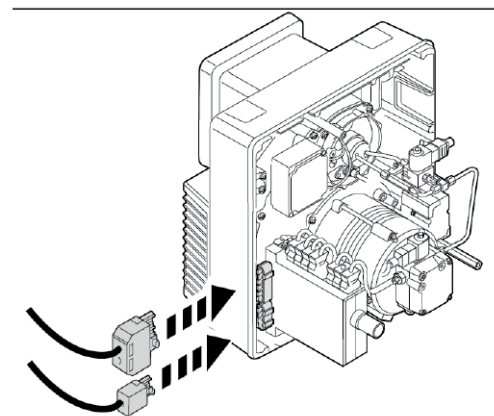
**Breaking capacity 100 kVA**

### 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.

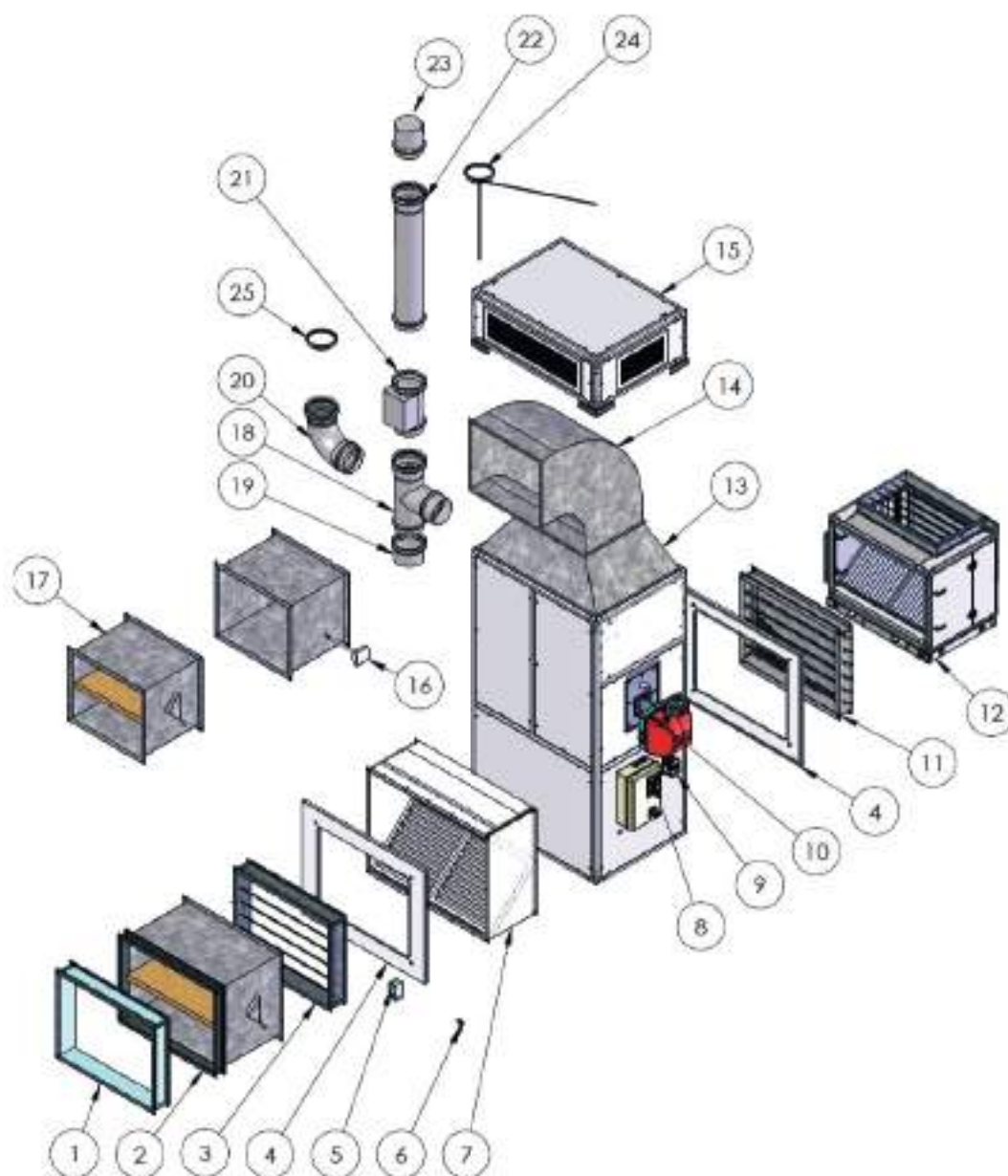
Legend of Burner Plug	
X7	7-pole plug for burner connection
L1	line supply (230V)
T	ground
N	neutral
T1-T2	series of thermostats
S3	lock signal
X4	4-pole plug for high/low flame connection
T6-T7-T8	high/low flame thermostat.
X3	3-pole plug for 3-phase burner
L1-L2-L3	3-phase burner terminal board
X2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



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

# Floor Standing Warm Air Heater PK series

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## 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 ( $\Delta P$ ) 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.**

PK Model	Dimensions			$\Delta P$ Pa
	AF [mm]	HF [mm]	BF [mm]	
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



# Floor Standing Warm Air Heater PK series

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## Installing the Filters

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

**Before installing the filter, make sure the heater is powered off and disconnected from mains. Remove also the heater intake ducts.**

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.

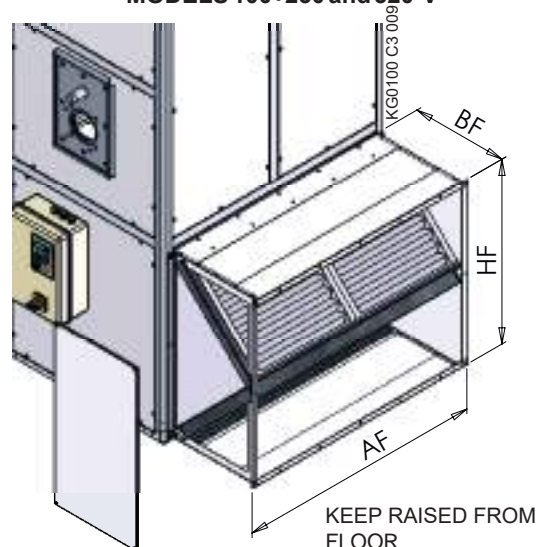
## Code of spare filters

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

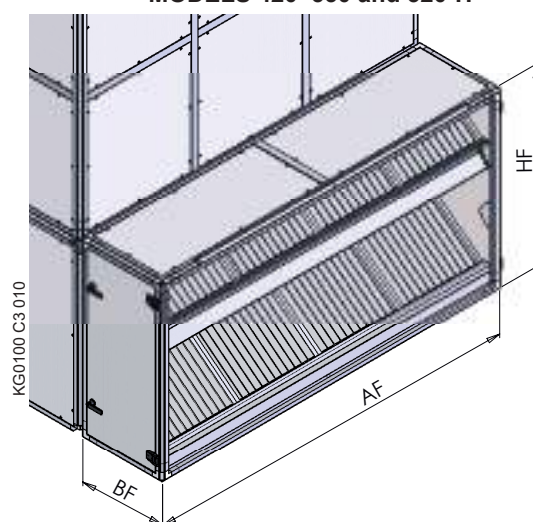
Filters are the same for any versions. They only differ according to heater size

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 FLXPKA420NA-H	96	G04005	8		
FLXPKA420NA-H	96	G04005	12		
FLXPKA550NA FLXPKA550NA-H	96	G07209	12		

MODELS 100÷250 and 320-V



MODELS 420÷550 and 320-H



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## MIXING BOX

Apengroup 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.

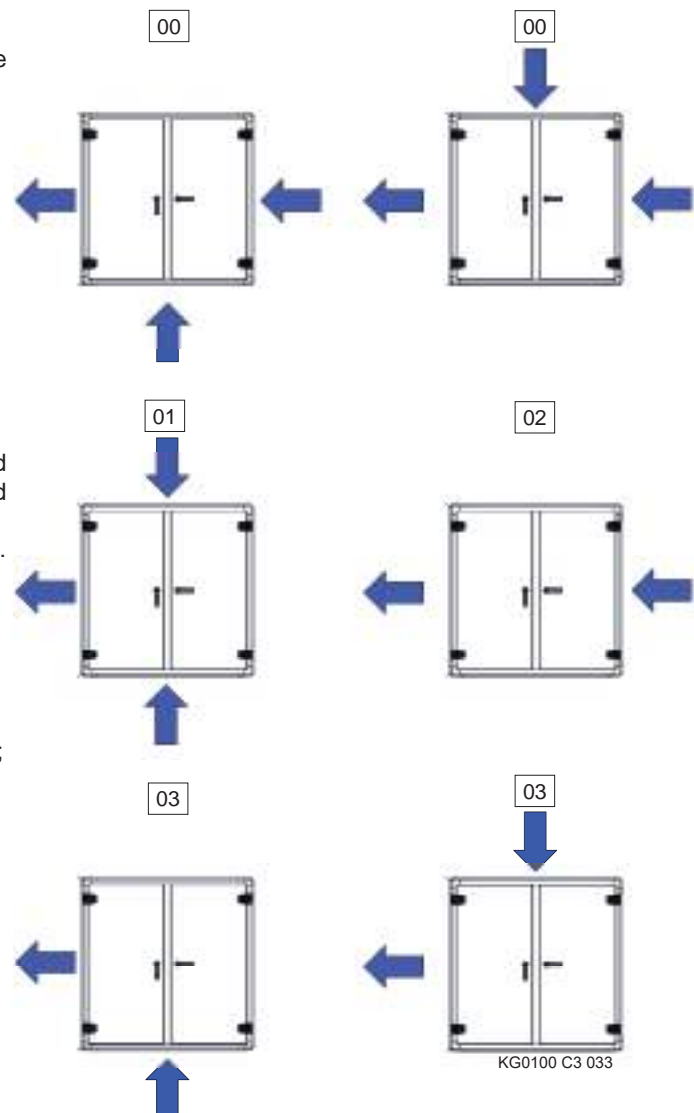
Mixing box code is the following:

### 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	1,100	880	
M140	1,330	920	
M190	1,460	1060	
M250	1,750	1140	
M320	1,960	1140	
M420	2,170	1240	
M550	2,600	1340	





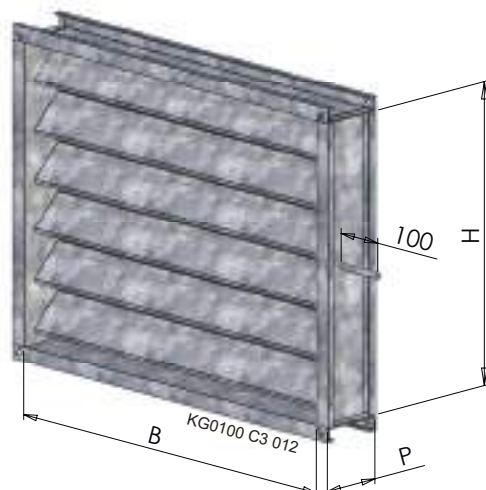
# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



## AIR 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

## 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.



Manual control.

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

# Floor Standing Warm Air Heater PK series

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## FIRE DAMPER

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

Supplied dampers are certified.

NOTE: Damper higher than 500 mm have a blade that, when open (in horizontal position), projects beyond the damper size on both sides. In practice, 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.

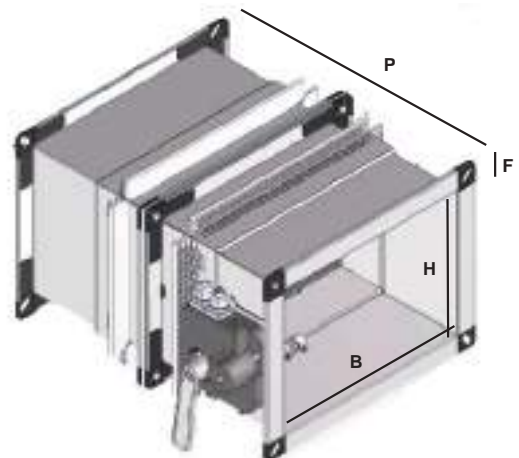
Fire dampers are EC marked.

### 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



## 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.

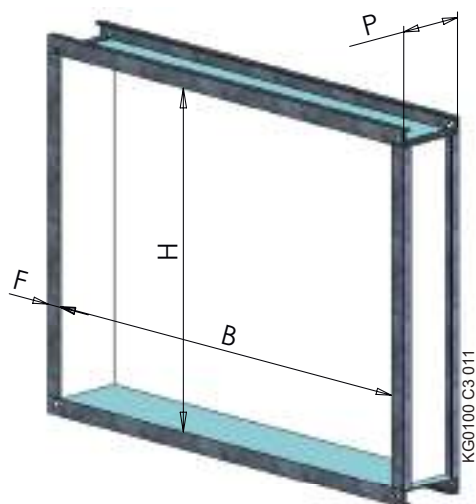
Wire the servomotor to the connector CN2 of the wiring card (see page 49 of this Manual).

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.



## 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.

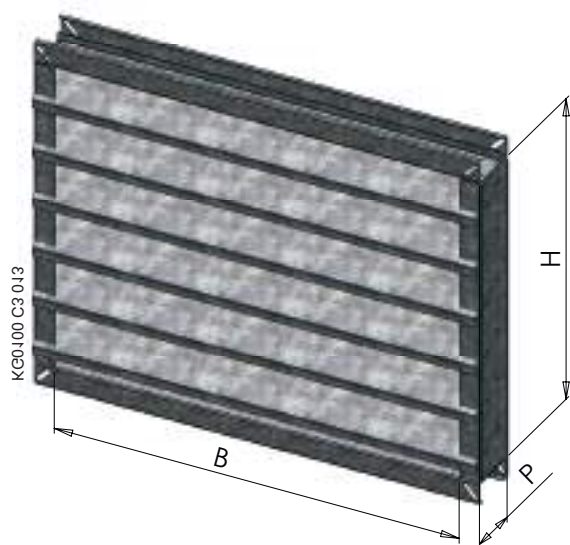


PK Model	Code	B	H	P	F
	Shutter	[mm]	[mm]	[mm]	[mm]
100	G09917	810	610	150	30
140	G09927	1010	610	150	30
190	G09937	1210	710	150	30
250	G09947	1410	710	150	30
320	G09957	1510	810	150	30
420	G09967	1510	810	150	30
550	G09977	1980	810	150	30

KG0100.ET.015 - VIBRATION DAMPING JOINTS

## RAIN DEFLECTOR

If intake air is drawn from outdoor, a rain deflector is available. It also includes a net to prevent animal intrusion. To install the deflector, an adapter kit is required, as for shutters. YOU can install the regulating shutter in 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

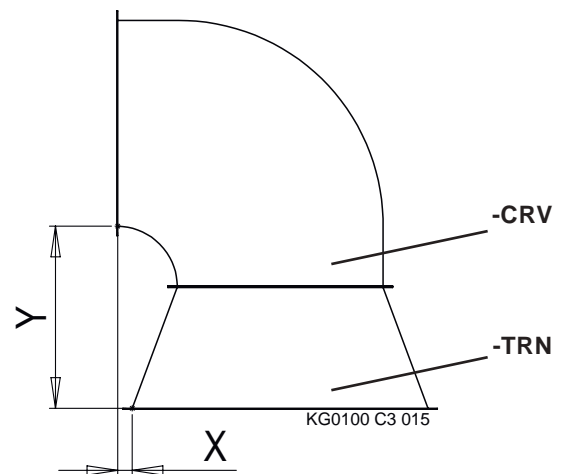
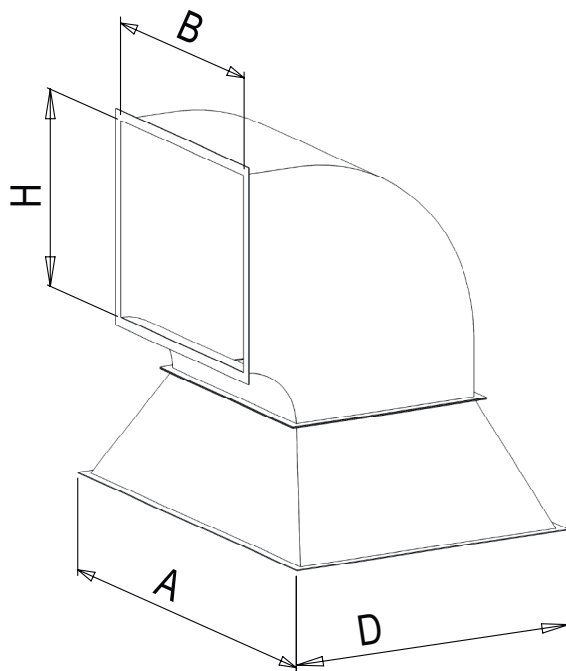
## ACCESSORIES FOR AIR DELIVERY

### 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.



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

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## 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 on short side.

**Long side:** the number and size of louvres on long side.

**H:** total height of plenum. 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°).

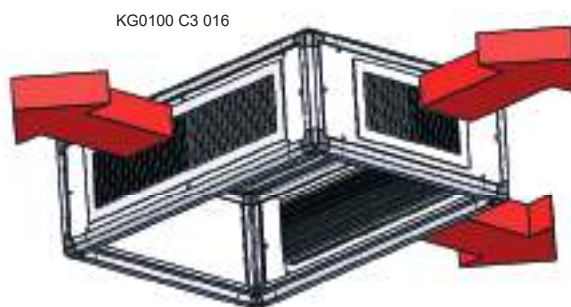
STANDARD VERSION - 2 SHORT SIDES - 1 LONG SIDE

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



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 C3 016

KG0100 ET 022 - PLENUM



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## ACCESSORIES FOR VENTILATION

Apen Group can supply, on request, the following accessories:

- Soft starter
- Motors with isothermal protection
- Inverter for all PK models

### SOFT STARTER

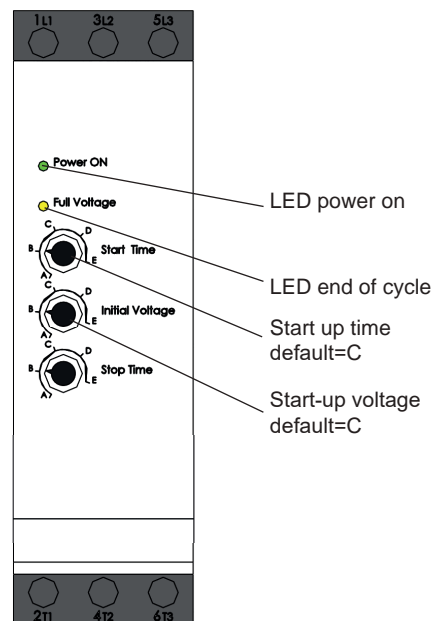
APEN supplies soft starters as a standard for motors with an output equal or higher than 5.5 kW.

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 reducing belt wear and extending 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



### MOTORS WITH ISOTHERMAL 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.

This kind of protection is supplied as a standard with Apen Group single-phase heaters. When the thermostat triggers, the fan stops.

For 3-phase motors this protection is optional and must be expressly requested. The wiring of this safety is shown in the figure below.

### ISOTHERMAL PROTECTION



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## 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 reducing belt wear and extending the life of motor and fan bearings.

### Note:

- 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.

### Notes:

- 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.



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



INVERTER SUPPLEMENT CODES
VVPK100-10A
VVPK100-20A
VVPK140-10A
VVPK140-20A
VVPK190-10A
VVPK190-20A
VVPK250-10A
VVPK250-20A
VVPK320-10A
VVPK320-20A
VVPK420-10A
VVPK420-20A
VVPK550-10A
VVPK550-20A



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## 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.

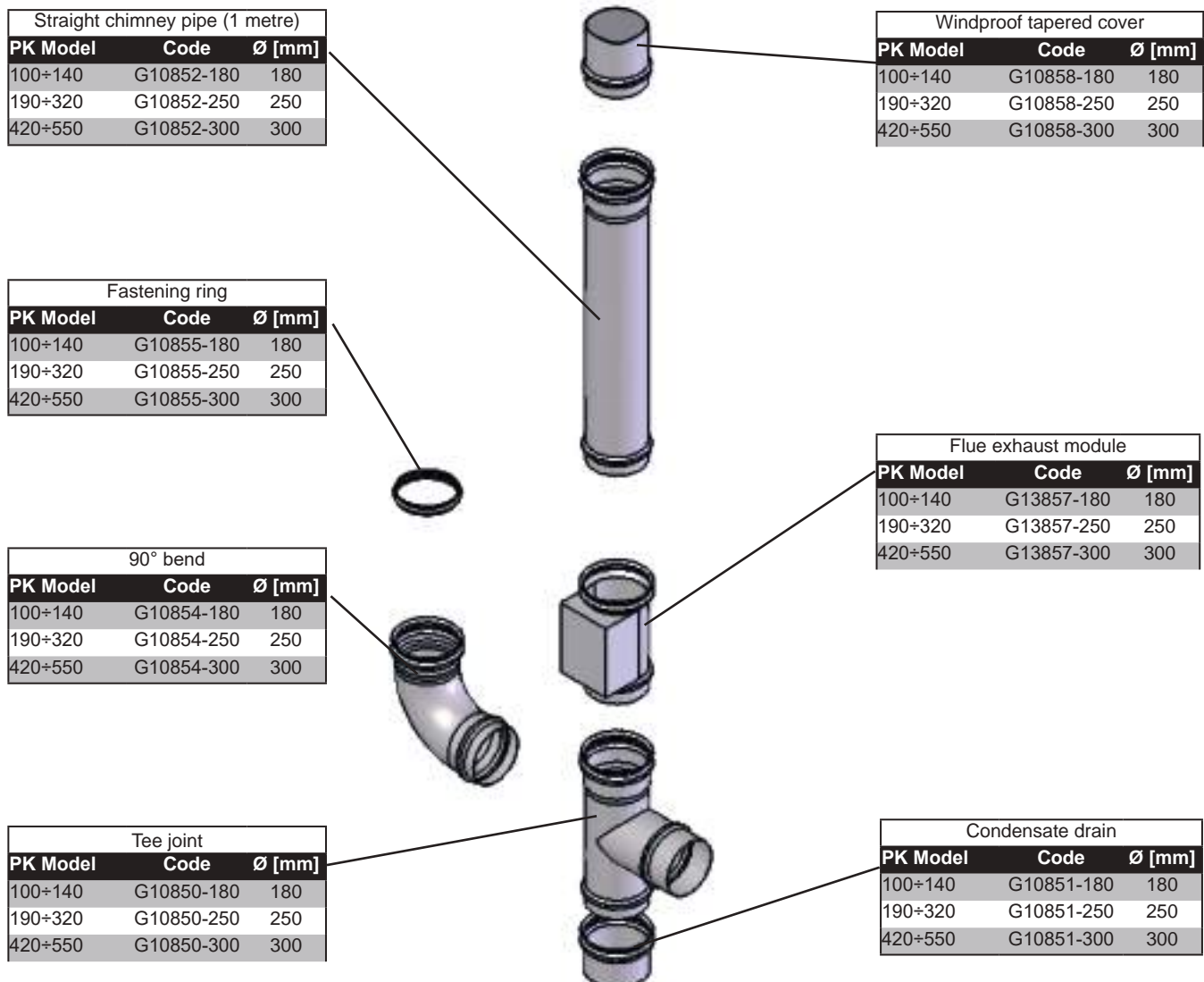
Components have male/female rotating facing. Clamps are only required for chimneys longer than 2 metres.

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.



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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  $\leq 50 \text{ mg/m}^3$ ;  
**V2** - liquid fuels, natural gas, LPG and manufactured gas with nitrogen  $> 50 \text{ mg/m}^3$ ;  
**V3** - solid fuels, natural gas, LPG and manufactured gas with nitrogen  $> 50 \text{ mg/m}^3$ ,  
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 (in mm) from combustible materials \_\_\_\_\_

## CALCULATING THE FLUE GAS WEIGHT

Below are the equations for calculating the flue gas weight according to kW for natural gas combustion.

x = combusted kW

y = flue gas weight in kg.

G20 - Natural gas  $y = 1.566x - 2 \cdot 10^{-13}$

These equations are valid for:

- N series: flue gas temperature of approx.  $270^\circ\text{C}$  and efficiency of approx. 89%;
- K series: flue gas temperature of approx.  $190^\circ\text{C}$  and efficiency of approx. 92%;
- R series: flue gas temperature of approx.  $140^\circ\text{C}$  and efficiency of approx. 94%.

## 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:

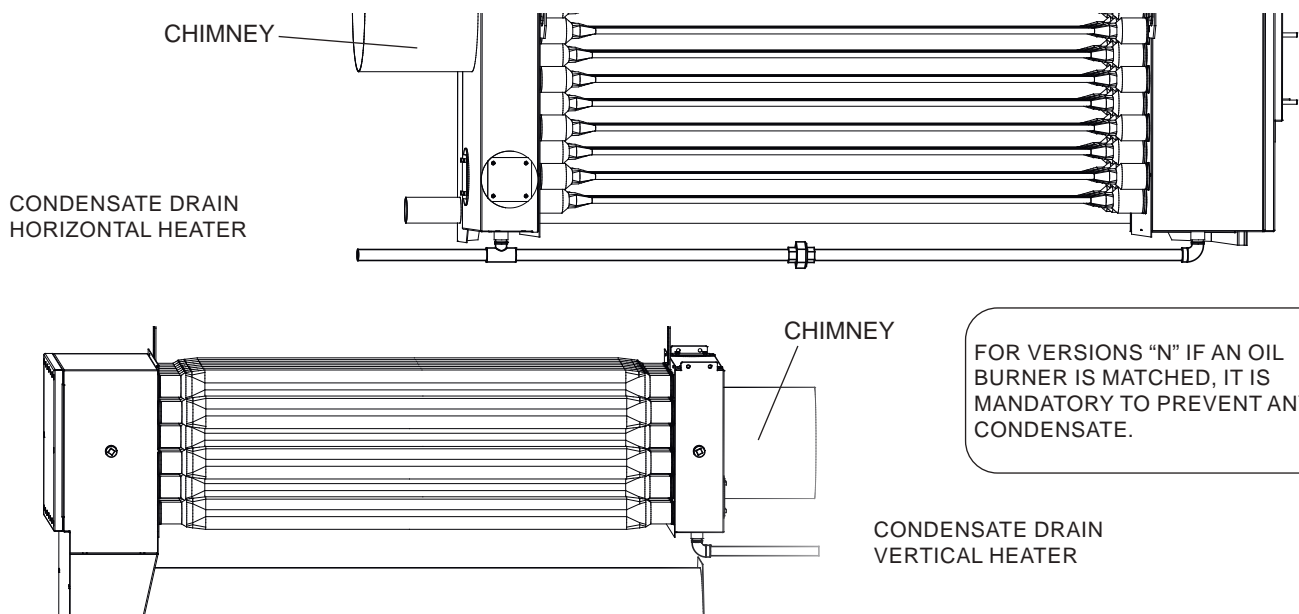
G00740-xxx-H (horizontal)

G00740-xxx-H (vertical)

Replace xxx with heater size code.

**NOTE: Heaters of K and R series have condensate drain installed by default on the back side. If necessary, for horizontal heaters, the condensate drain can be installed on the front.**

**NOTE: N series heaters do not feature a condensate drain nor relevant accessories.**



## Draining using a Siphon

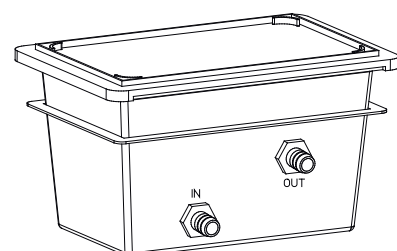
If the heater is installed indoor and a condensate drain system is provided, the siphon must be smoke proof.

Fill manually the siphon with water at first start-up.

## ACID CONDENSATE TREATMENT KIT

Apen Group has kits for the treatment of acid condensation:

- G14303 PK100
- G10858 from PK140 to PK320;
- G05750 from PK420 to PK550.



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## 6.6. Electrical Wiring and Diagrams

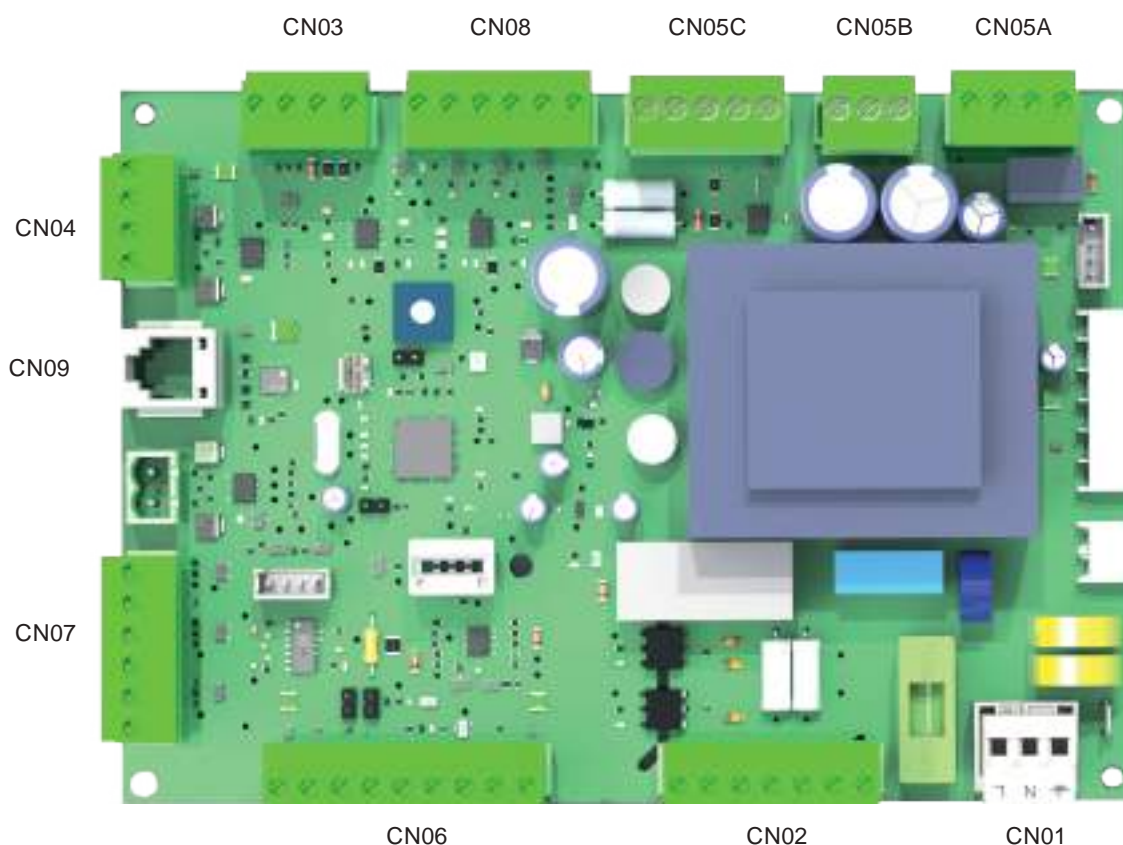
The use of a CPU modulation electronic board simplifies the wiring diagram of all models.

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.

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



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## 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 following procedures describes in User section of this Manual.

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.

## THERMOSTAT CALIBRATION

The thermostat installed on PK heater is set to a temperature value EQUAL TO 100°C.

## THERMOSTAT POSITIONING

In case of replacement, position the thermostat as indicated in the following table.



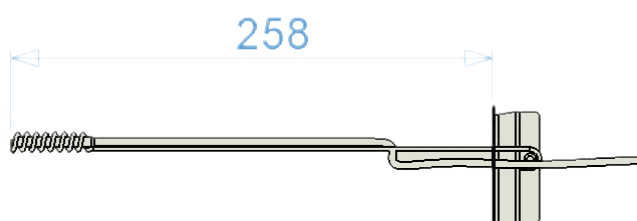
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## NTC 10K intake probe

Next to the STB thermostat, all heaters feature the NTC probe which, connected to the modulation PCB, to terminals NTC1 of connector CN7, keeps the heater air intake temperature constant by adjusting its power.

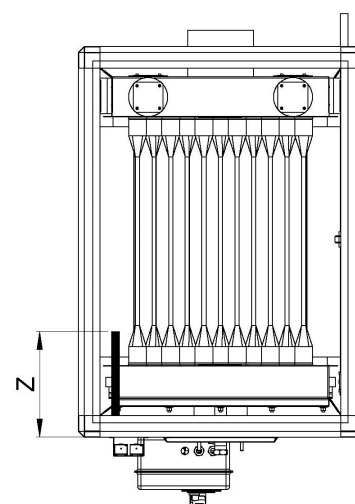
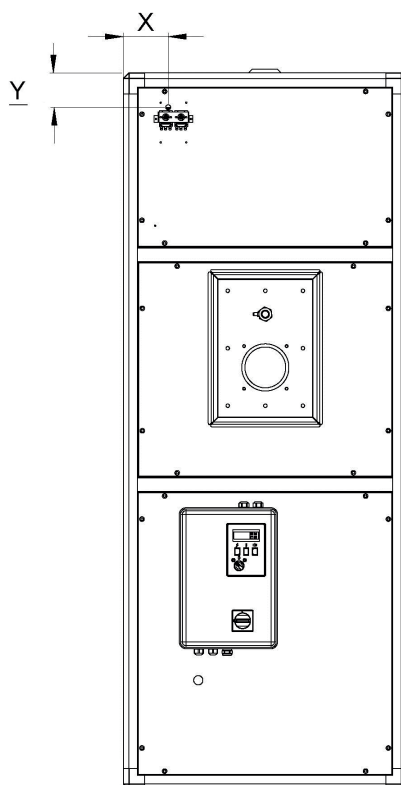


STB THERMOSTAT POSITION

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

NTC PROBE POSITION

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





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## 6.7. Burner Matching

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

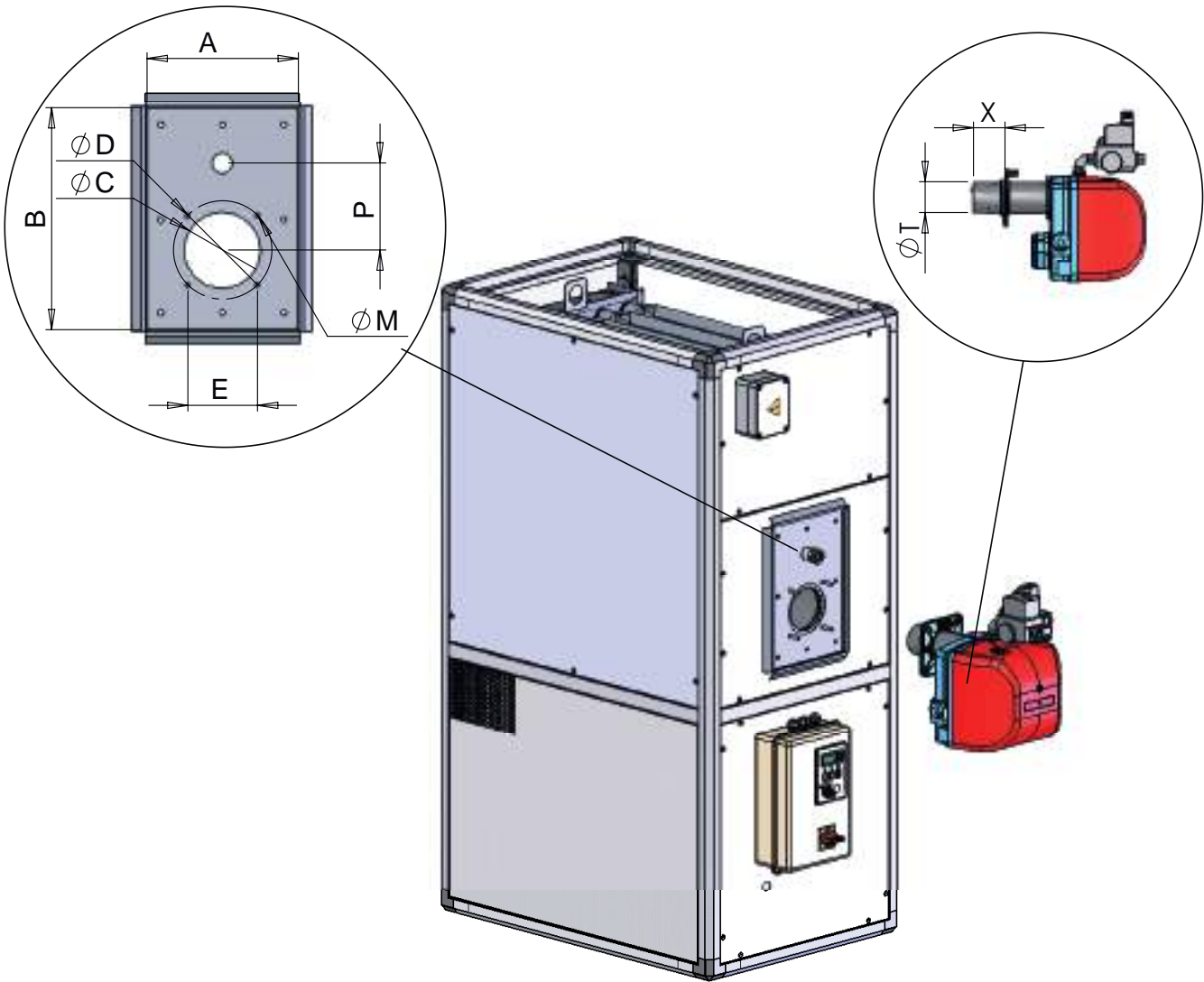
**Important. Nosepiece length must be greater than "X" min value. Shorter nosepieces could damage the exchanger and void the guarantee.**

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.



PK Model	X		ØT	P	A	B	ØC	ØD	ØM	E
	min [mm]	max [mm]								
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

# Floor Standing Warm Air Heater PK series

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## 6.8. 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 authorised 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 N series PK 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 <sub>2</sub> 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 K series PK 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 <sub>2</sub> 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 R series PK 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 <sub>2</sub> 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

## 6.9. Burner matching tables

Burner matching has been performed according to the following criteria:

- burners in class 3 for NO<sub>x</sub>, 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 η<sub>s</sub> 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 KG0270.00 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

#### Checks on Safety Controls

Check of safety thermostat (STB) triggering  
Microswitch for fire dampers (if installed)  
Room thermostat control

#### 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, or eliminate any leaks in the air distribution system.

A higher absorption than rated value means that aerologic 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 6.7)

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 fuel oil burner.

When fuel capacity cannot be measured, adjust the burner by checking combustion parameters.

Reference values are included in tables of Paragraph 6.8.

CO<sub>2</sub> 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 in time.

To define the heat input refer to tables of Paragraph 6.8.

During first start up, the following checks are recommended:

If combustion efficiency is known and CO<sub>2</sub> content is similar to that mentioned in tables of Paragraph 6.8, the diagrams of Paragraphs 3.3, 3.4 and 3.5 can be used reading the useful heat output "regulated" by the heater in correspondence to the efficiency.

#### - Checks on Safety Devices

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 dampers

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 room thermostat and/or the timer turn off ONLY the burner, not the cooling 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.

MOTOR ABSORPTION		
	Motor kW	Current In 400V-50Hz
G02325-IE3	1.1	2.6
G01430-IE3	1.5	3.6
G01490-IE3	2.2	4.5
G01260-IE3	3.0	6.4
G00137-IE3	4.0	8.0
G01261-IE3	5.5	10.6
G01022-IE3	7.5	14.1
G07371-IE3	9.2	17.1
G00837-IE3	11.0	20.4
G01973-IE3	15.0	27.3

## 7.2. Routine Maintenance

Perform routine maintenance operations using the following schedule:

Air Filter	clean it every 30 days
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

By using a pressure regulator for the filters, an air flow switch or similar controls, you can check air filter and belts every 90 days.

### Checking Transmission Belts

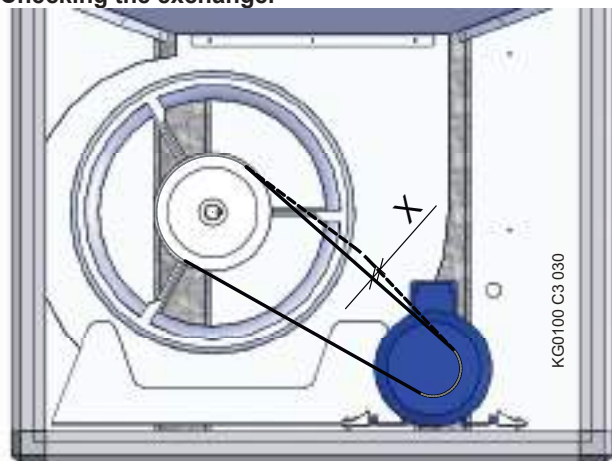
**About 7÷8 hours after first start up, check tension and state of belts between motor and fan. If belts are loose, stretch them.**

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 CO<sub>2</sub> 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.

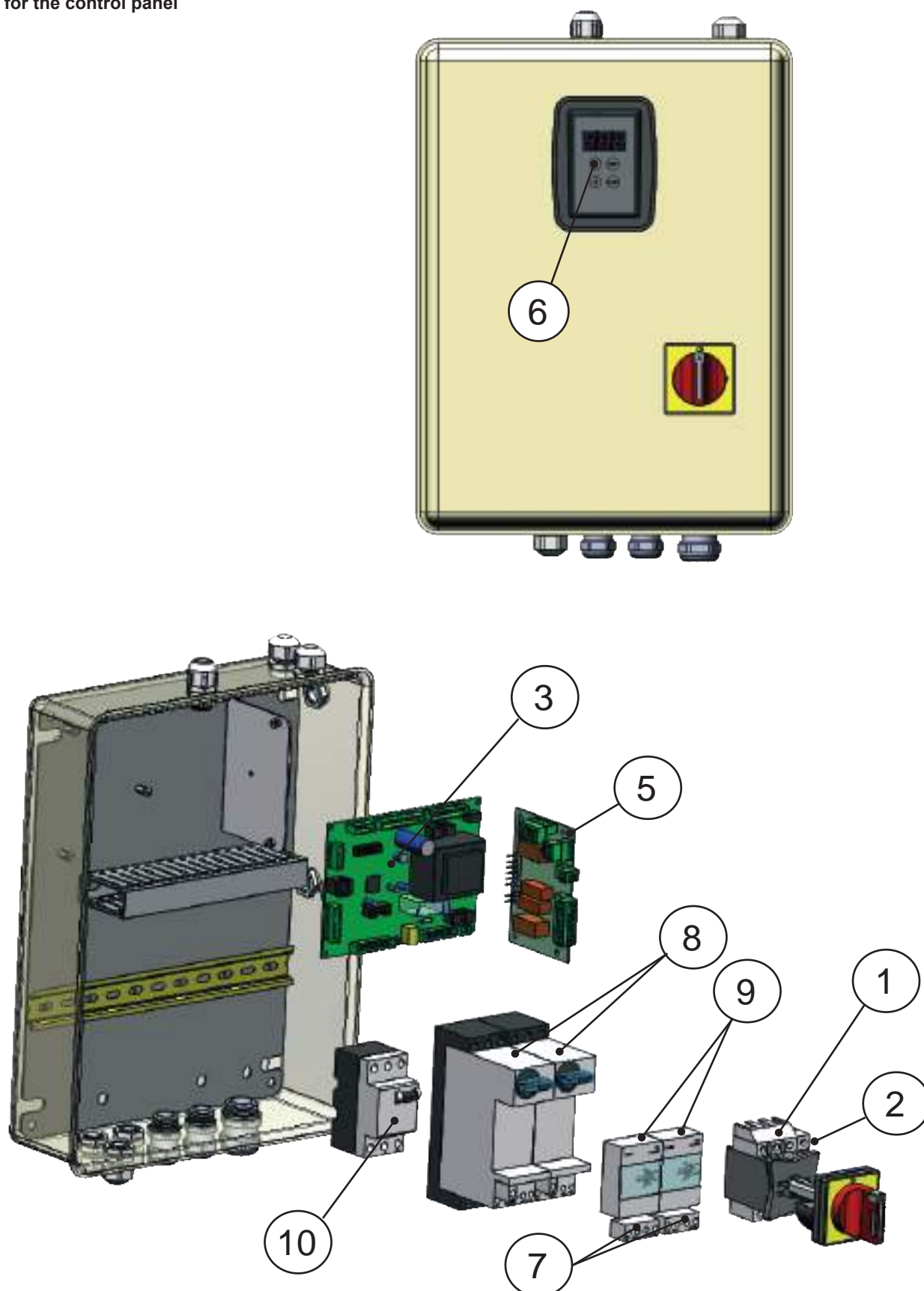
Clean the internal part of the trap, it is possible to clean the trap under running water by checking that all ducts are free. Check the seal conditions.

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 Spare Part List

### Parts for the control panel



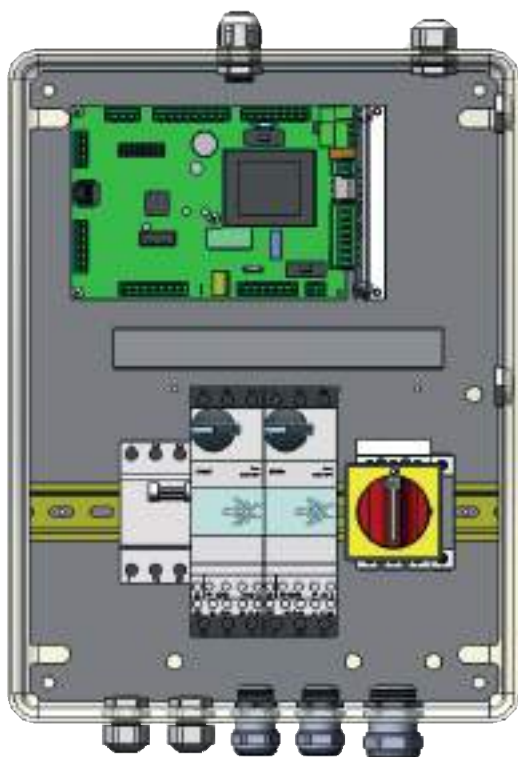


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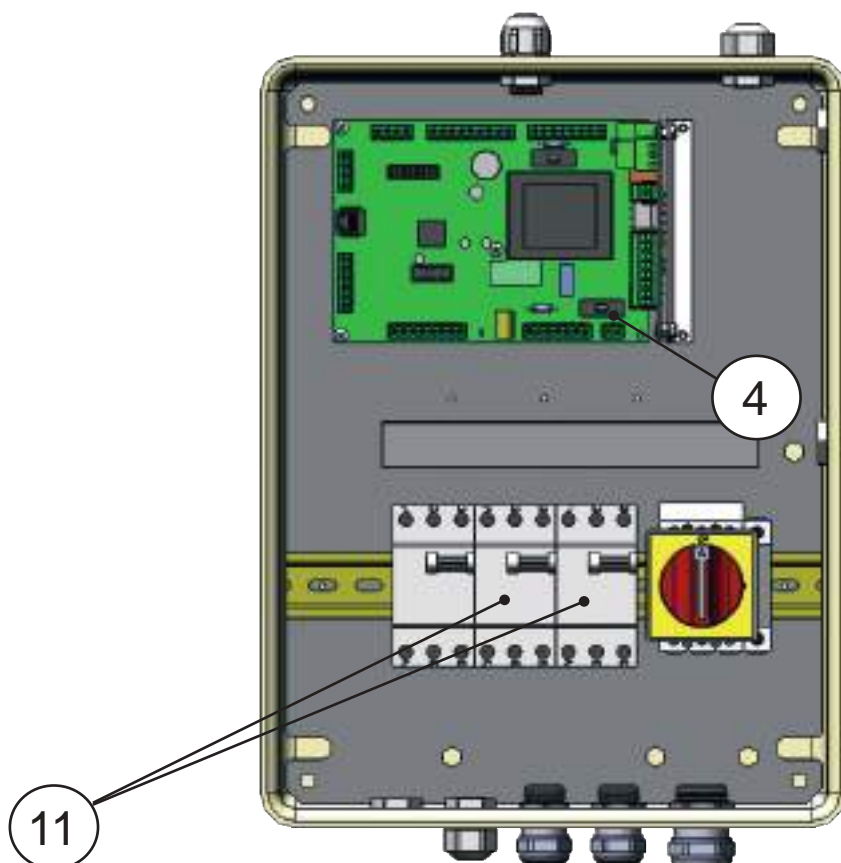


DIRECT START-UP  
CONTROL PANEL



12

START-UP CONTROL PANEL  
WITH INVERTER





# Floor Standing Warm Air Heater PK series

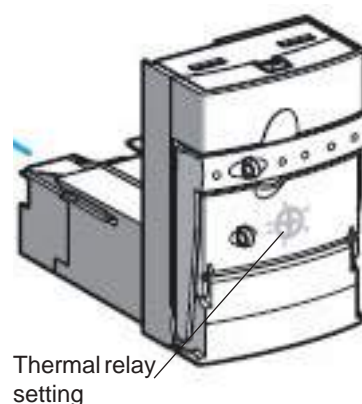
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## TABLE OF CONTROL PANEL COMPONENTS

POS.	Description	Code	Regulation	Use
1	Main door lock switch	G10067	32A	from model 100 to 550
		G10068	63A	Special models on demand
2	Disconnecter Neutral	G10074	20/40A	all models up to 550 included
		G10075	63/80A	Special models on demand
3	Modulation Board	G26800.02		Any heaters, any models
4	Board fuse	G03605	5A	Any heaters, any models
5	Burner PCB	G12940		Any heaters, any models
6	LCD panel unit	G16890		Any heaters, any models
7	LUA1C20 contact	G02271		Any heaters, any models
8	Starter LUB12	G02215	5.5 kW	All models with motor up to 5.5 kW
	Starter LUB32	G02225	15 kW	All models with motor from 7.5 Kw to 15 Kw
9	Thermal relay LUCA05	G02216	1.2-5 A	All heaters with motor up to 1.5 kW included
	Thermal relay LUCA12	G02217	3-12 A	All heaters with motor from 2.2 kW to 5.5 kW included
	Thermal relay LUCA18	G02218	4.5-18 A	All heaters with 7.5 kW motor
	Thermal relay LUCA32	G02219	8-32 A	All heaters with motor from 9.2 kW to 15 kW included
10	Burner 3P automatic switch	G10078	6.3A	All models from 250 to 550
11	Inverter 3P automatic switch	G10197	5.5 kW	All heaters with 5.5kW motor INVERTER start-up panel
		G10198	7.5-11 kW	All heaters with mot. INVERTER start-up panel from 7.5 to 11 kW
		G10175	15 kW	All heaters with 15kW motor INVERTER start-up panel
12	Soft starter	G02801	3 kW	Special models on demand
		G02801	4 kW	Special models on demand
		G18034	5.5 kW	420-10A, 420-20A, 550-20A
		G18035	11 kW	Special models on demand
		G18043	15 kW	Special models on demand

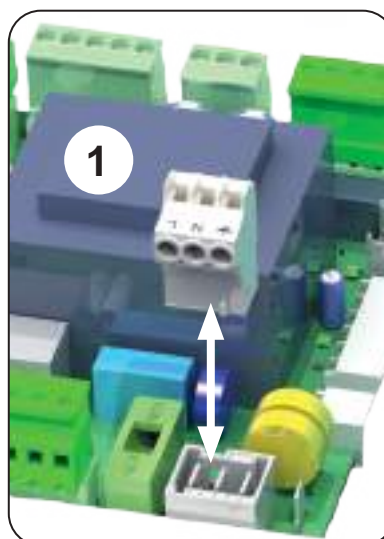
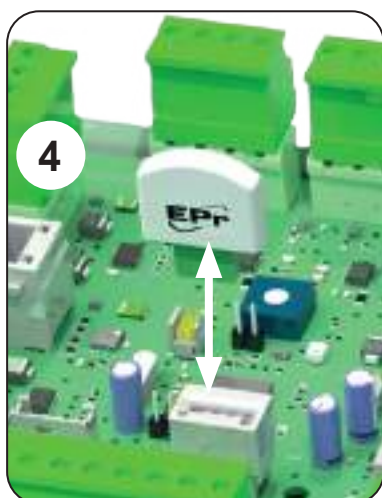
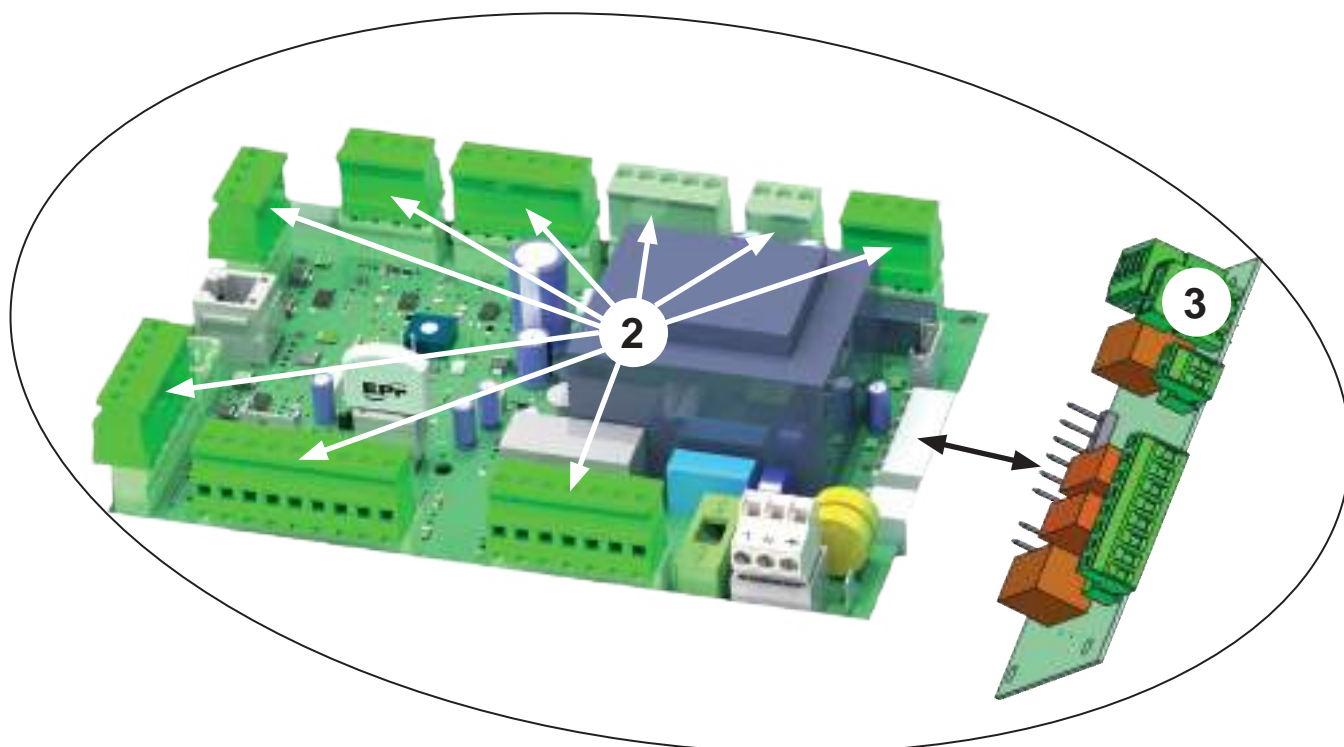
Motor kW	Current In 400V-50Hz	Number of rpm	Thermal Relay	
G02325-IE3	1.1	2.6	1,440	G02216 1.2-5A
G01430-IE3	1.5	3.6	1,440	
G01490-IE3	2.2	4.5	1,450	G02217 3-12A
G01260-IE3	3.0	6.4	1,450	
G00137-IE3	4.0	8.0	1,450	
G01261-IE3	5.5	10.6	1,460	
G01022-IE3	7.5	14.1	1,460	G02218 4.5-18A
G07371-IE3	9.2	17.1	1,460	G02219 8-32A
G00837-IE3	11.0	20.4	1,465	
G01973-IE3	15.0	27.3	1,465	



## REPLACING THE MODULATION PCB

When replacing the CPU modulation PCB, it is required to carry out some essential operations, described below.

1. Disconnect voltage to the module
2. Disconnect all terminals from the CPU PCB
3. 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 (step 4.) **(The EEPROM card contains all configured parameters, by inserting it into the new CPU, there is no need to reprogram the parameters)**

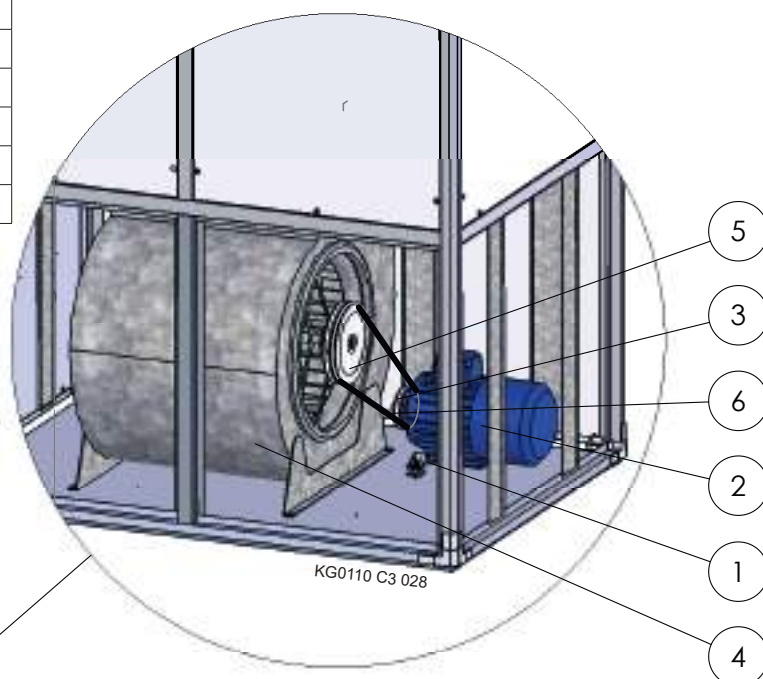
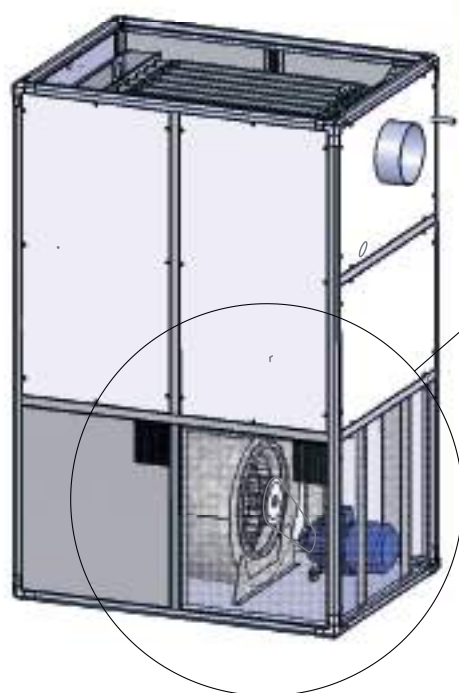


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DESCRIPTION	REFERENCE
BELT TENSIONER	1
ELECTRICAL MOTOR	2
DRIVING PULLEY	3
FAN	4
DRIVEN PULLEY	5
TRANSMISSION BELT	6



**TABLE OF VENTILATION SPARE PARTS**

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

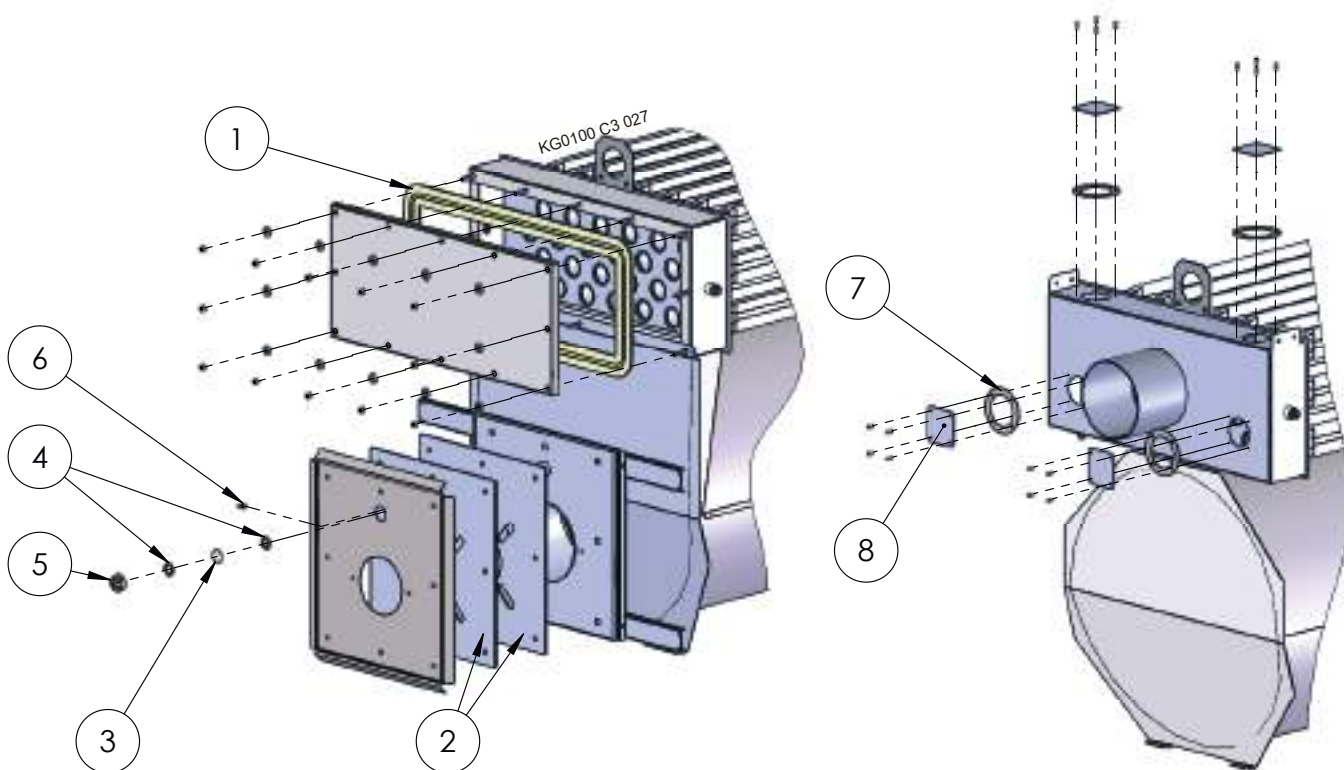
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## HEAT EXCHANGER SPARE PARTS

POS.	Description	Code	Use
1	Flue system gasket	X01415	Any heaters, any models; in metres
2	Burner plate gasket* *NOTE: To be cut according to the burner head diameter	G01190	For model 100
		G07819	From model 140 to model 250 included
		G08119	From model 320 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	From model 100 to model 550 included
8	Flue inspection panel	G11142.08	From model 032 to model 550 included





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## 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 AIR DELIVERY probe	G16401	All heater models



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