

**GB**

*User, Installation and Maintenance Manual  
PK series floor standing warm air heater with CPU-PLUS*



**Capacities from 14 to 1170 kW**

**Efficiency up to 101%**

**Reduction of  
Thermal Stratification**



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

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



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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.

---

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

---

"First 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.

---

**Gas 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;
- 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.

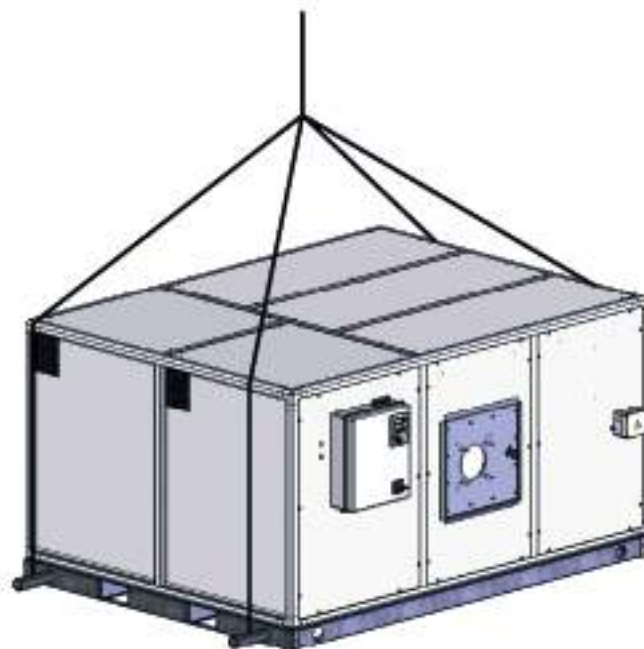
Based on their weight and dimensions, heaters can be lifted with lift trucks or wheel-mounted crane.

If a crane is to be used, insert in holes in heater base rods with a suitable lifting resistance and install protections to prevent crane ropes from damaging heater body.

Once the equipment is moved to the correct position, the unpacking operation can be started.



KG0100 C3 022



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



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

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

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



# Floor Standing Warm Air Heater PK series

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## 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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<b>GENERATORE DI ARIA CALDA</b>							
<b>Modello</b>		<b>PKA250N-2HA</b>		<b>CIRCUITO ARIA</b>			
<b>Tipo</b>		<b>B23</b>		<b>Portata aria 15 °C</b>		<b>18000 m3/h</b>	
<b>Categoria</b>		<b>II 2H3B/P</b>		<b>Prevalenza</b>		<b>250 Pa</b>	
<b>Portata termica nominale (Hi)</b>		<b>278,0 kW</b>					
<b>Potenza termica nominale</b>		<b>250,0 kW</b>					
<b>Portata termica max. (Hi)</b>		<b>310,0 kW</b>					
<b>Portata termica min. (Hi)</b>		<b>154,0 kW</b>					
<b>Pressione focolare max</b>		<b>50 Pa</b>					
<b>Matricola</b>		<b>G09HE90006</b>		<b>ALIMENTAZIONE ELETTRICA</b>			
<b>Codice PIN</b>		<b>0694BP0758</b>		<b>Tensione</b>		<b>400V/ ~ /3N</b>	
<b>Destinazione</b>		<b>IT</b>		<b>Frequenza</b>		<b>50 Hz</b>	
				<b>Potenza max</b>		<b>7.44 kW</b>	
				<b>Grado di protezione</b>		<b>IP20</b>	
				<b>Made in Italy</b>			
<b>GENERATORE DI ARIA CALDA</b>							

PK	A	250	N	-	2	H	W
----	---	-----	---	---	---	---	---

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):	
0 - Low Head Pressure;	
1 - Medium Head Pressure;	
2 - High Head Pressure.	
Installation:	
H - Horizontal	
0 - Vertical	
Control panel implemented for accessory management	

## 3. TECHNICAL FEATURES

### 3.1. Main Components

Warm air heaters 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. Two types of fan are used:

- direct drive fans: the motor is directly coupled to the fan. They are used on heaters with single phase power supply (PKA060-00W)
- fans for square duct: 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 degree 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:

- ON-OFF
- 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.

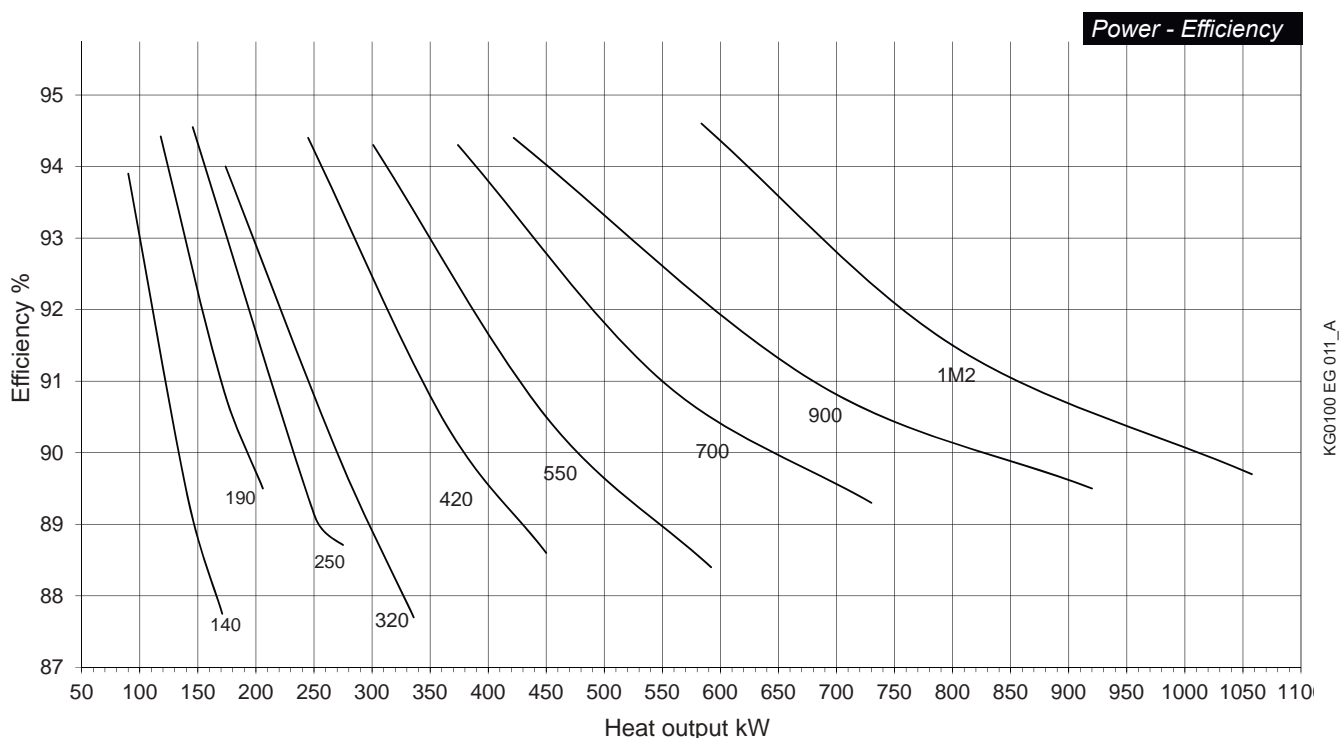
## 3.2. Choosing the Heater

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.

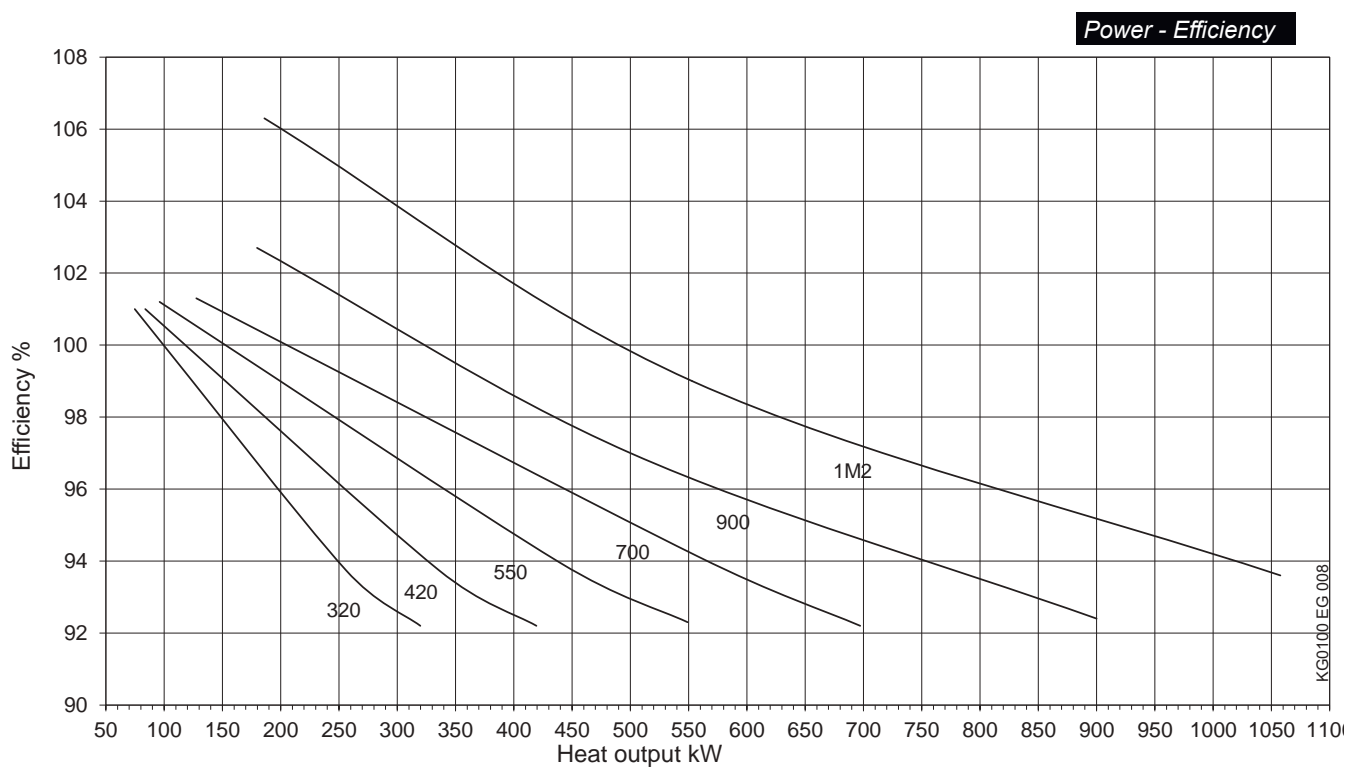
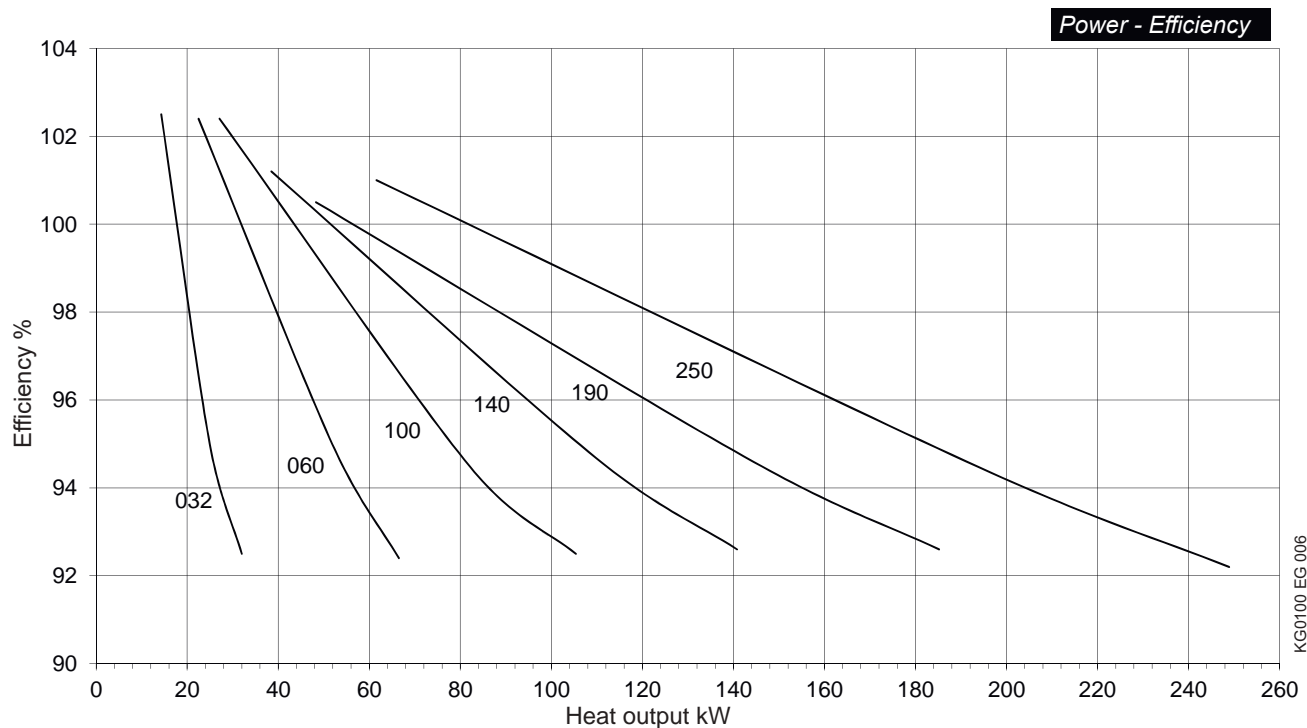
Heaters for indoor installation (**PKA**) are supplied with exchanger, fan unit and control panel to be installed indoor or in a sheltered position; those for outdoor installation (**PKE**) are supplied with exchanger, fan unit, control panel and burner casing to be positioned outdoor.

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 (on-off, two stages or modulating).

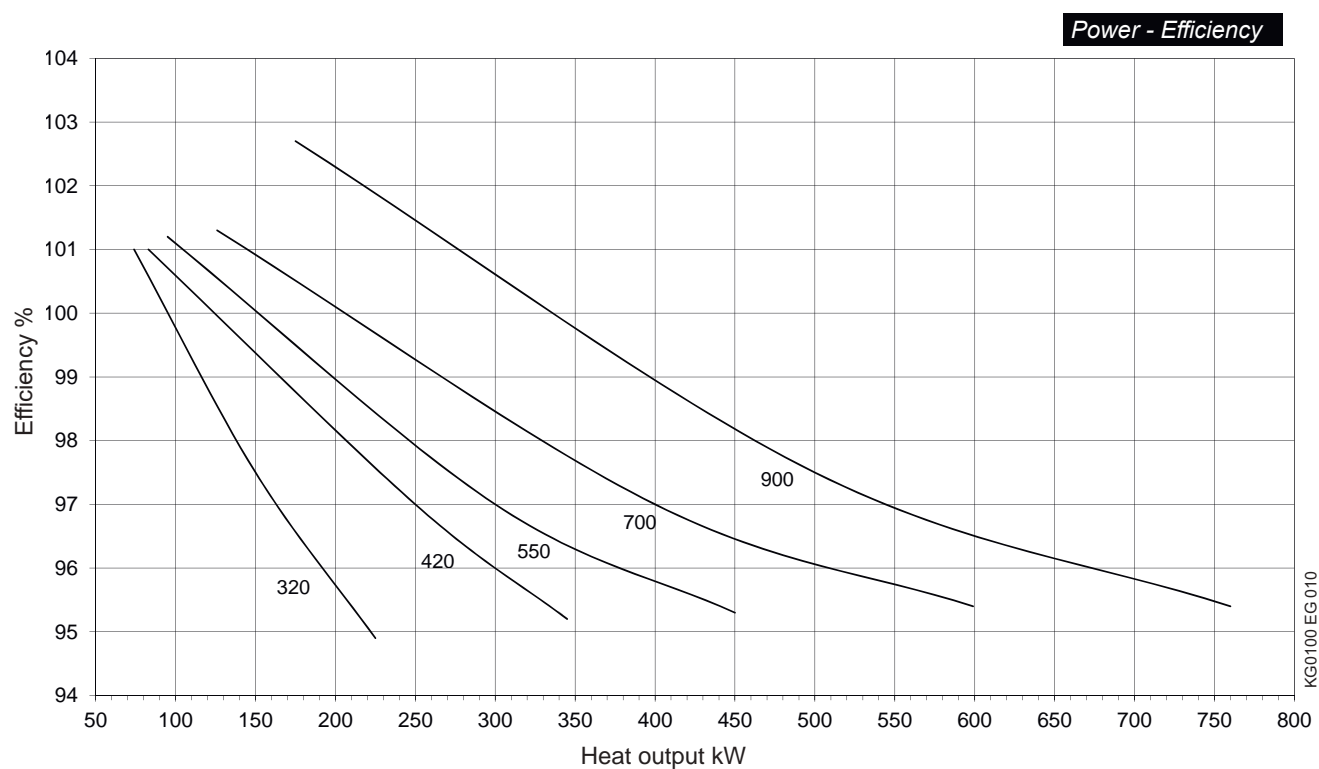
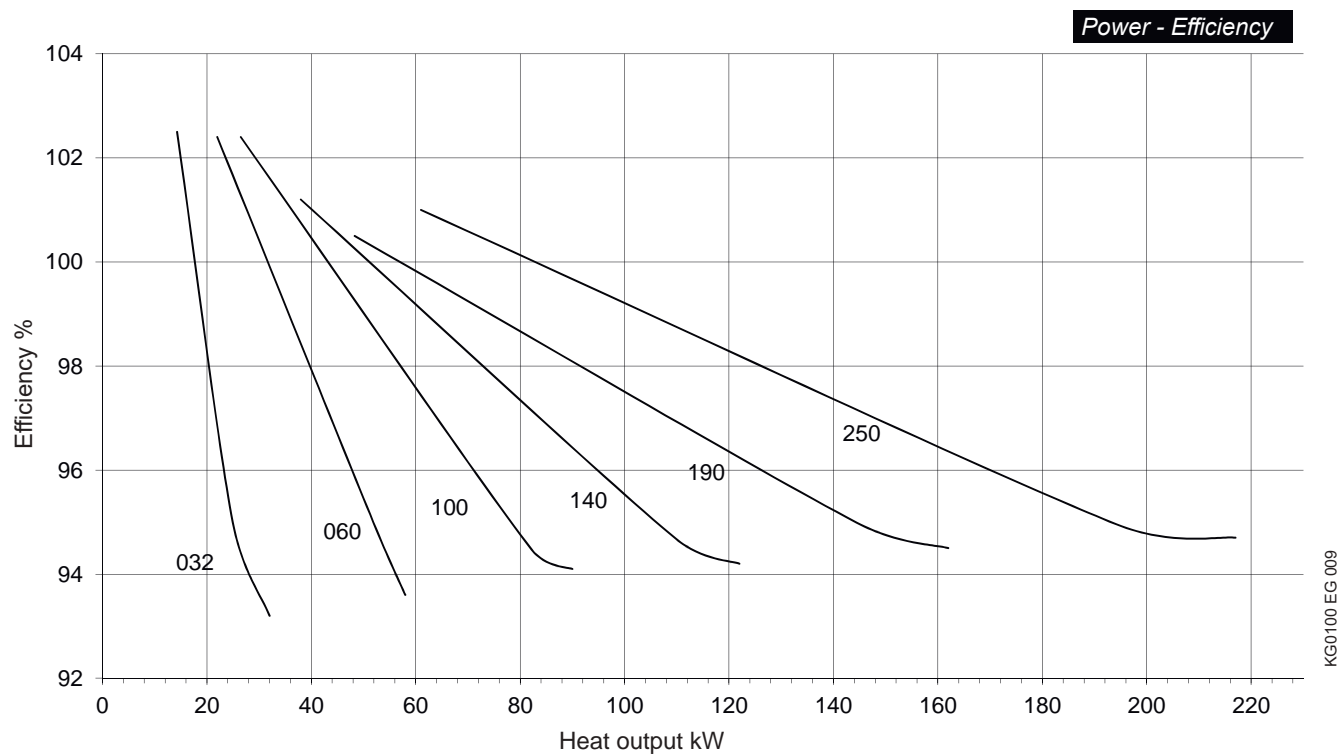
## 3.3. Diagrams of Output Heat/Efficiency Ratio of PK-N Heaters



## 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

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## 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	
Type of appliance			B23									
EC approval			0476CT2224									
NOx Class	NO <sub>x</sub>		CLASS 5**									
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	$\frac{P_{min}}{P_{rated,h}}$	kW	96.0	195.0	115	230.0	154.0	310.0	185.0	380.0	260	508
Useful Heat Output		kW	90.2	171.0	108.1	205.9	145.0	275.0	173.9	335.9	245	450
Combustion Efficiency (Hi)	$\frac{\eta_{pl}}{\eta_{nom}}$	%	94.0	87.7	94.0	89.5	94.0	88.7	94.0	87.7	94.4	88.6
Combustion Efficiency (Hs)		%	84.7	79.0	84.7	80.6	84.7	79.9	84.7	79.0	85.0	79.8
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)		%	6.0	12.3	6.0	10.5	6.0	12.3	6.0	12.3	5.6	11.4
Chimney loss - Burner OFF		%	< 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	
Combustion Chamber pressure		Pa	13	50	10	40	10	50	15	60	28	120
Combustion Chamber volume		m³	0.37		0.52		0.76		1.06		1.55	

Model			PKA550N		PKA700N		PKA900N		PKA1M2N			
Type of appliance			B23									
EC approval			0476CT2224									
NOx Class	NO <sub>x</sub>		CLASS 5**									
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
Furnace Heat Input	$\frac{P_{min}}{P_{rated,h}}$	kW	320	670	397	818	447	1028	617	1170		
Useful Heat Output		kW	301	592	374	730	422	920	583.7	1049.5		
Combustion Efficiency (Hi)	$\frac{\eta_{pl}}{\eta_{nom}}$	%	94.3	88.4	94.3	89.3	94.4	89.5	94.6	89.7		
Combustion Efficiency (Hs)		%	85.0	79.6	85.0	80.5	85.0	80.6	85.2	80.8		
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)		%	5.7	11.6	5.7	10.7	5.6	10.5	5.6	10.5		
Chimney loss - Burner OFF		%	< 0.1		< 0.1		< 0.1		< 0.1			
Casing losses *	F <sub>env</sub>	%	0.97		1.00		1.01		1.01			
Combustion Chamber pressure		Pa	21	110	25	120	28	130	53	205		
Combustion Chamber volume		m³	1.79		4.78		5.58		5.58			

\* 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

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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			PKA032K		PKA060K		PKA100K		PKA140K		PKA190K		PKA250K	
Type of appliance			B23											
EC approval			0476CT2224											
NOx Class	NO <sub>x</sub>		CLASS 5**											
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	$\frac{P_{min}}{P_{rated,h}}$	kW	14	34.6	22.0	72.0	26.5	114	38.0	152.0	48.0	200.0	61.0	270.0
Useful Heat Output		kW	14.3	32.0	22.5	66.5	27.1	105.4	38.5	140.8	48.3	182.2	61.6	248.9
Combustion Efficiency (Hi)	$\frac{\eta_{pl}}{\eta_{nom}}$	%	102.5	92.5	102.4	92.4	102.4	92.5	101.2	92.6	100.5	92.6	101.0	92.2
Combustion Efficiency (Hs)		%	92.3	83.3	92.3	83.2	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>	7.6	<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		<0,1		< 0.1	
Casing losses *	F <sub>env</sub>	%	2.61		1.64		1.81		1.26		1.16		1.17	
Combustion Chamber pressure		Pa	8	40	12	100	14	100	15	140	15	130	19	175
Combustion Chamber volume		m³	0.06		0.12		0.24		0.37		0.52		0.76	

Model			PKA320K		PKA420K		PKA550K		PKA700K		PKA900K		PKA1M2K	
Type of appliance			B23											
EC approval			0476CT2224											
NOx Class	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>ated,h</sub>	kW	74.0	347.0	83.0	455.0	95.0	595.0	126.0	756.0	175.0	974.0	175.0	1130.0
Useful Heat Output		kW	74.8	319.8	83.8	419.4	96.1	549.1	127.6	697.2	179.7	900.0	186.0	1057.7
Combustion Efficiency (Hi)	η <sub>pl</sub> ; η <sub>nom</sub>	%	101.0	92.2	101.0	92.2	101.2	92.3	101.3	92.2	102.7	92.4	106.3	93.6
Combustion Efficiency (Hs)		%	91.0	83.1	91.0	83.1	91.2	83.2	91.3	83.1	92.5	83.24	95.77	84.32
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)		%	<div></div>	8.7	<div></div>	7.8	<div></div>	7.7	<div></div>	7.8	<div></div>	7.6	<div></div>	7.6
Chimney loss - Burner OFF		%	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
Casing losses *	F <sub>env</sub>	%	1.02		1.03		0.97		1.00		1.01		1.01	
Combustion Chamber pressure		Pa	15	225	30	275	40	365	45	410	45	420	60	615
Combustion Chamber volume		m³	1.06		1.55		1.79		4.78		5.58		5.58	

\* 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

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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			PKA032R		PKA060R		PKA100R		PKA140R		PKA190R		PKA250R	
Type of appliance			B23											
EC approval			0476CT2224											
NOx Class	NO <sub>x</sub>		CLASS 5**											
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Furnace Heat Input	$\frac{P_{min}}{P_{rated,h}}$	kW	14.0	32.0	22.0	58.0	26.5	90.0	38.0	115.9	48.0	162.0	61.0	217.0
Useful Heat Output		kW	14.3	29.6	22.5	53.8	27.1	84.8	38.5	113.4	48.3	150.6	61.6	205.5
Combustion Efficiency (Hi)	$\eta_{pl}$ $\eta_{nom}$	%	102.5	93.2	102.4	93.6	102.4	94.1	101.2	94.2	100.5	94.5	101.0	94.7
Combustion Efficiency (Hs)		%	92.3	84.0	92.3	84.3	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)		%	<div></div>	7.5	<div></div>	7.6	<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		<0,1		< 0.1	
Casing losses *	F <sub>env</sub>	%	2.61		1.64		1.81		1.26		1.16		1.17	
Combustion Chamber pressure		Pa	8	40	12	100	14	100	15	140	15	130	19	175
Combustion Chamber volume		m³	0.06		0.12		0.24		0.37		0.52		0.76	

Model			PKA320R		PKA420R		PKA550R		PKA700R		PKA900R	
Type of appliance			B23									
EC approval			0476CT2224									
NOx Class	NO <sub>x</sub>		CLASS 5**									
			MIN	MAX	MIN	MAX	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	126.0	599.0	175.0	760.0
Useful Heat Output		kW	74.8	256.5	83.8	325.8	96.1	430.1	127.6	571.4	179.7	723.4
Combustion Efficiency (Hi)	$\eta_{pl}$ $\eta_{nom}$	%	101.0	94.9	101.0	95.2	101.2	95.3	101.3	95.4	102.7	95.4
Combustion Efficiency (Hs)		%	91.0	85.5	91.0	85.8	91.2	85.9	91.3	85.9	92.5	85.95
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>	7.7	<div></div>	7.8	<div></div>	7.7	<div></div>	7.8	<div></div>	7.6
Chimney loss - Burner OFF		%	< 0.1		< 0.1		< 0.1		< 0.1		< 0.1	
Casing losses *	F <sub>env</sub>	%	1.03		1.03		0.97		1.00		1.01	
Combustion Chamber pressure		Pa	23	225	30	275	40	365	45	410	45	420
Combustion Chamber volume		m³	1.06		1.55		1.79		4.78		5.58	

\* 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

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## 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		PKA032	PKA060	PKA100	PKA140	PKA190
Version		10A	10A 20A	10A 20A	10A 20A	10A 20A
Air Flow Rate - 15°C	m³/h	2,700	5000	7300	10500	14000
Available Head Pressure	Pa	150	120 240	150 270	140 280	150 230
Heat drop Min and Max*	K	26.8 - 32.5	26.0 - 41.7	28.3 - 38.0	23.8 - 45.2	23.4 - 40.8
Power supply	V	230M	400T+N	400T+N	400T+N	400T+N
Frequency	Hz	50				
Motor Max. capacity **	kW	0.35	1.1 1.5	1.5 2.2	3.0 4.0	3.0 4.0
Max. Absorbed power***	kW	0.56	1.44 1.91	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	PKA700
Version		10A 20A	10A 20A	10A 20A	10A 20A	10A 20A
Air Flow Rate - 15°C	m³/h	18,000	23000	30000	40000	54000
Available Head Pressure	Pa	130 250	210 320	180 270	180 280	240 350
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)	19.9 - 38.8
Power supply	V	400T+N	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	2x5.5 2x7.5
Max. Absorbed power***	kW	5.43 7.26	7.26 9.46	12.8 12.8	9.46 12.8	12.8 17.1
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		PKA900	PKA1M2
Version		10A 20A	10A 20A
Air Flow Rate - 15°C	m³/h	68,500	74000
Available Head Pressure	Pa	260 400	260 400
Heat Drop Min and Max	K	18.8 - 38.5	24.4 - 43.9 7.8 - 44.3 (Series K)
Power supply	V	400T+N	400T+N
Frequency	Hz	50	
Motor Max. capacity **	kW	2x9.2 2x11.0	2x11.0 2x15.0
Max. Absorbed power***	kW	20.7 24.8	24.3 32.8
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.

## 3.7. Noise

### HEATERS INSTALLED INDOOR

The following table shows sound pressure values (LpA), issued by PK-A heaters 00W version, installed as follows:

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

Sound pressure value refers to the heater standard installation with the long side adjacent to a wall and the plenum with air blowing on one long side and 3 short sides.

The estimated value only refers to the amount of sound directly produced by the heater.

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

In PK-A heaters for indoor installation, the noise generated on intake by centrifugal fans is the main component of noise produced by the heater, since only a protective grid is installed.

The value on delivery is lower since exchanger, panelling and plenum help reducing it.

Detection distance for sound pressure in the table changes according to heater size.



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

Model	Distance	LpA - Sound Pressure Level [dB(A)]								dB(A)
	metres	63	125	250	500	1000	2000	4000	8000	
PKA032-00A	6	18.6	32.6	38.5	43.2	47.0	46.6	39.2	32.5	51.3
PKA060-00A	6	24.3	38.8	44.0	46.0	48.7	48.1	43.1	36.0	53.7
PKA100-00A	6	28.8	43.3	48.5	50.5	53.2	52.6	47.6	40.5	58.2
PKA120-00A	6	28.8	43.3	48.5	50.5	53.2	52.6	47.6	40.5	58.2
PKA140-00A	9	27.3	41.8	47.0	49.0	51.7	51.1	46.1	39.0	56.8
PKA190-00A	9	29.7	44.2	49.4	51.4	54.7	53.5	48.5	41.4	59.4
PKA250-00A	9	28.1	42.6	47.8	49.8	52.5	51.9	46.9	39.8	57.6
PKA320-00A	9	30.3	44.8	50.0	52.0	54.7	54.1	49.1	42.0	59.8
PKA420-00A	12	35.3	49.8	55.0	57.0	59.7	59.1	54.1	47.0	64.8
PKA550-00A	12	32.0	41.3	47.2	49.0	47.9	47.4	42.6	35.0	54.6
PKA700-00A	12	32.7	40.8	46.5	49.6	50.9	49.9	43.8	34.9	56.0
PKA900-00A	12	39.6	43.2	52.6	51.0	54.8	50.5	44.4	37.5	59.0
PKA1M2-00A	12	43.6	47.5	57.9	56.1	60.3	55.6	48.8	41.3	64.9

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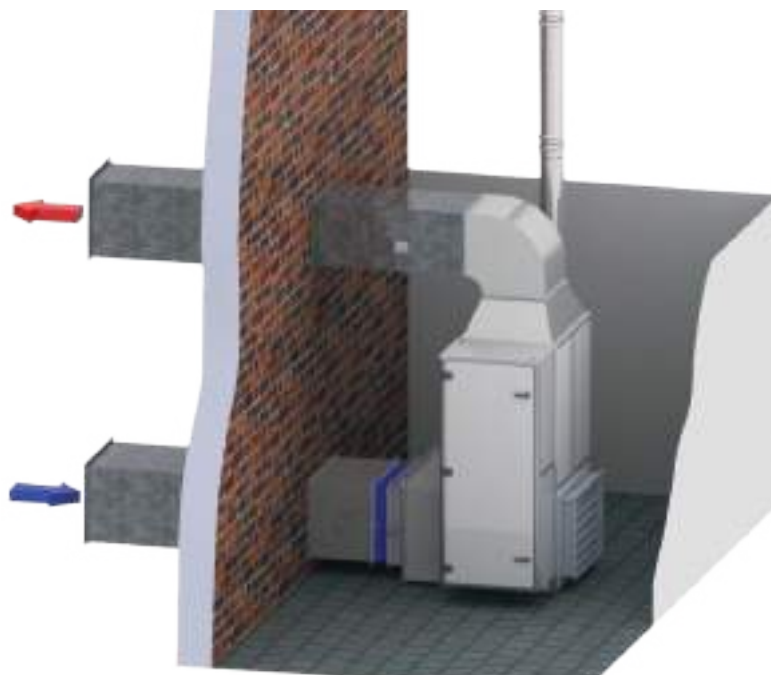


## DUCTED HEATERS

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 and K series heaters.

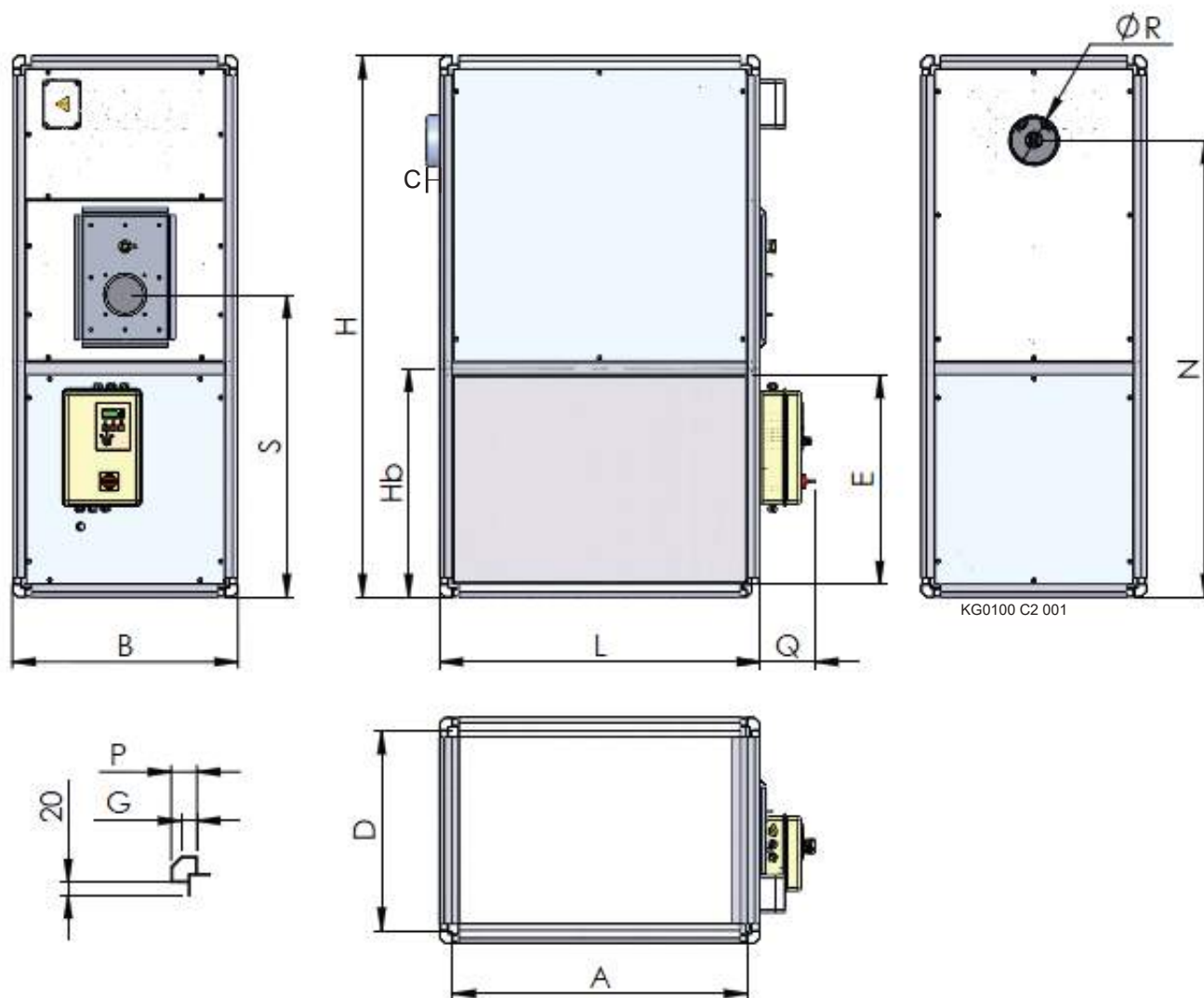
Heater with ducted delivery and intake											
MODEL	LwA - Sound Power Level [dB(A)]								LwA	distance	LpA
	63	125	250	500	1000	2000	4000	8000	dB(A)	metres	dB(A)
PK032-10A	37.9	51.9	52.1	52.5	51.4	47.0	37.7	30.1	58.4	4	35.4
PK060-10A	42.7	57.2	56.7	55.9	54.1	49.3	41.6	33.0	62.5	4	39.4
PK060-20A	44.6	59.1	58.6	57.8	56.0	51.2	43.5	34.9	64.4	4	41.3
PK100-10A	47.4	61.9	61.4	60.6	58.8	54.0	46.3	37.7	67.2	4	44.1
PK100-20A	48.4	62.9	62.4	61.6	59.8	55.0	47.2	38.7	68.2	4	45.1
PK140-10A	48.8	63.3	62.8	62.0	60.2	55.4	47.7	39.2	68.6	4	45.5
PK140-20A	50.0	64.5	64.0	63.2	61.4	56.6	48.9	40.3	69.8	4	46.7
PK190-10A	51.6	66.1	65.6	64.8	63.0	58.2	50.5	41.9	71.4	6	44.8
PK190-20A	53.0	67.5	67.0	65.9	64.4	59.6	51.9	43.3	72.7	6	46.1
PK250-10A	49.9	64.4	63.9	63.1	61.3	56.5	48.3	40.2	69.6	6	43.1
PK250-20A	52.4	66.9	66.4	65.7	63.8	59.0	51.3	42.7	72.2	6	45.6
PK320-10A	54.3	68.8	68.3	67.6	65.7	61.0	53.2	44.6	74.1	6	47.5
PK320-20A	55.4	69.9	69.4	68.7	66.8	62.0	54.3	45.7	75.2	6	48.6
PK420-10A	58.9	73.4	72.9	72.2	70.3	65.5	57.8	49.2	78.7	10	47.7
PK420-20A	59.9	74.4	73.9	73.2	71.3	66.5	58.8	50.2	79.7	10	48.7
PK550-10A	58.3	68.0	64.2	63.5	57.6	53.9	46.1	37.1	71.0	10	40.0
PK550-20A	64.7	68.2	64.3	64.5	58.1	53.8	46.5	37.7	72.0	10	41.0
PK700-10A	57.8	67.1	65.2	63.2	61.3	56.4	47.4	36.9	71.1	10	40.1
PK700-20A	59.7	70.5	67.3	65.8	62.9	57.3	49.1	39.1	73.8	10	42.8
PKA900-10A PKA1M2-10A	62.5	68.9	70.5	67.3	61.5	57.3	48.3	39.6	74.5	10	43.5
PKA900-20A	63.1	72.4	70.8	69.8	63.3	58.8	50.1	40.9	76.4	10	45.4
PKA1M2-20A	69.4	79.6	77.9	76.8	69.6	64.7	55.1	45.0	84.0	10	49.9

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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.
PKA032	750	530	1490		670	590	670	450	40	25	1210	120	42	860	135	(119*)
PKA060	995	700	1680		915	650	915	620	40	25	1420	150	40	940	135	(178*)
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*)
PKA700	2950	1600	3420	1290	2850	1190	2850	1500	50	30	3070	350	169	1800	290	1560 (1587*)
PKA900 PKA1M2	3550	1700	3750	1420	3450	1320	3450	1600	50	30	3380	400	158	2000	290	1940 (1975*)

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.

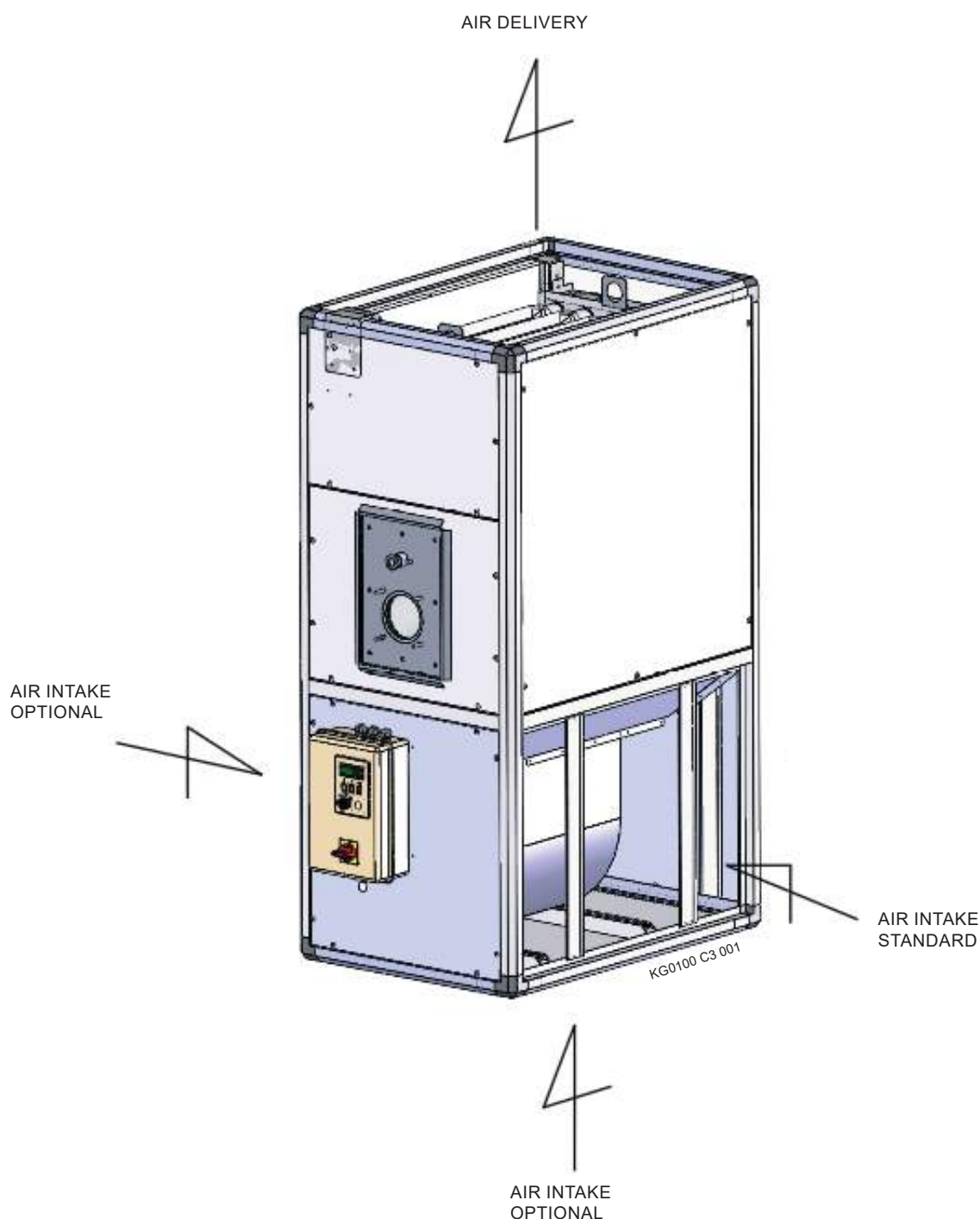
USE the supplied polarised connector for the electrical connection between exchanger (thermostats) and control panel.

## 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.



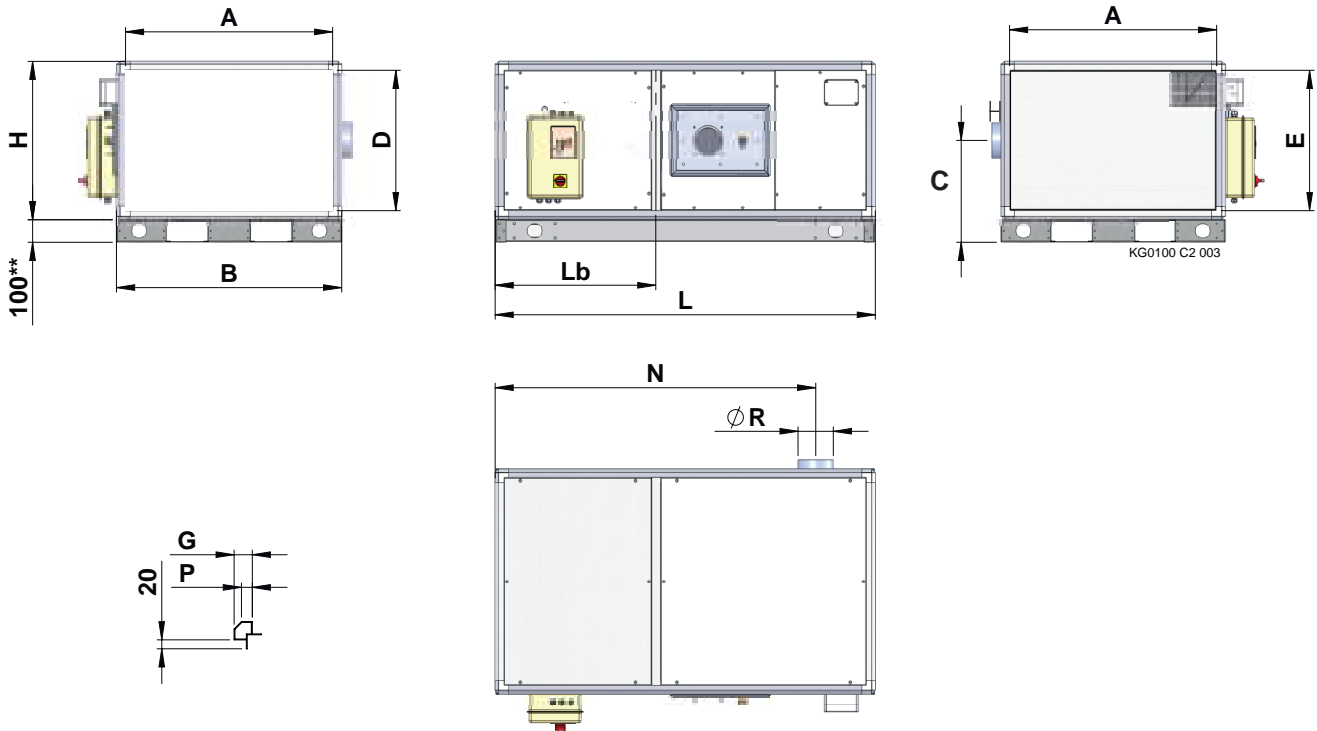
# Floor Standing Warm Air Heater PK series

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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	
PKA032	750	530	1490		670	450	670	450	40	25	1210	120	42	860	135	(121*)
PKA060	995	700	1680		915	620	915	620	40	25	1420	150	40	940	135	(180*)
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*)
PKA700	2950	1600	3830	1700	2850	1500	2850	1500	50	30	3480	350	169	2210	290	1650 (1677*)
PKA900 PKA1M2	3550	1600	4180	1850	3450	1600	3450	1600	50	30	3808	400	158	2434	290	2045 (2080*)

KG0100 ET 005

\* weights of K and R series heaters

\*\* for heaters from model 700 and upwards the bottom frame is 140mm high, 032 and 060 models include feet.

# 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

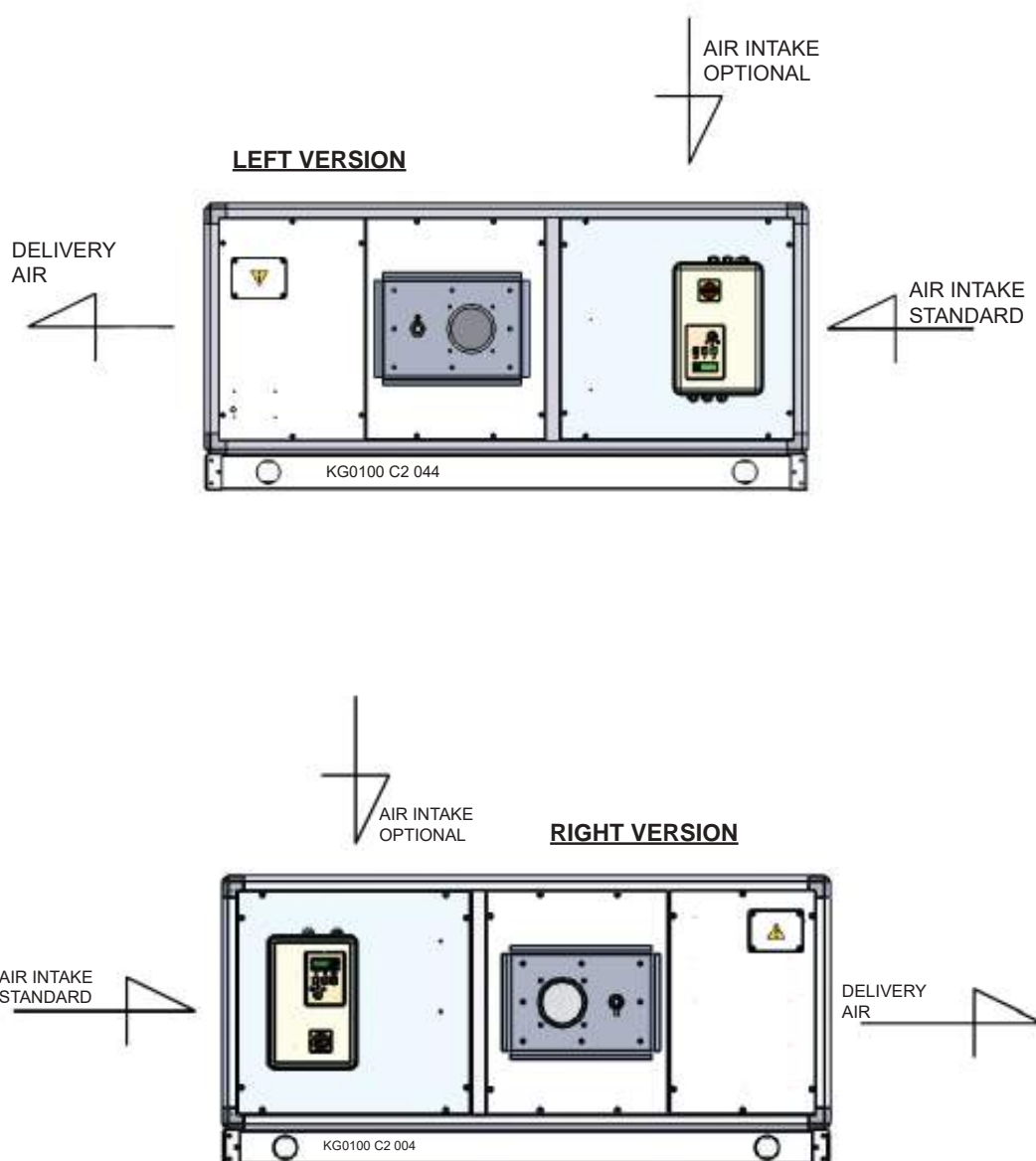
with lift truck or crane, except for 032 models which only include supporting feet.

## 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).



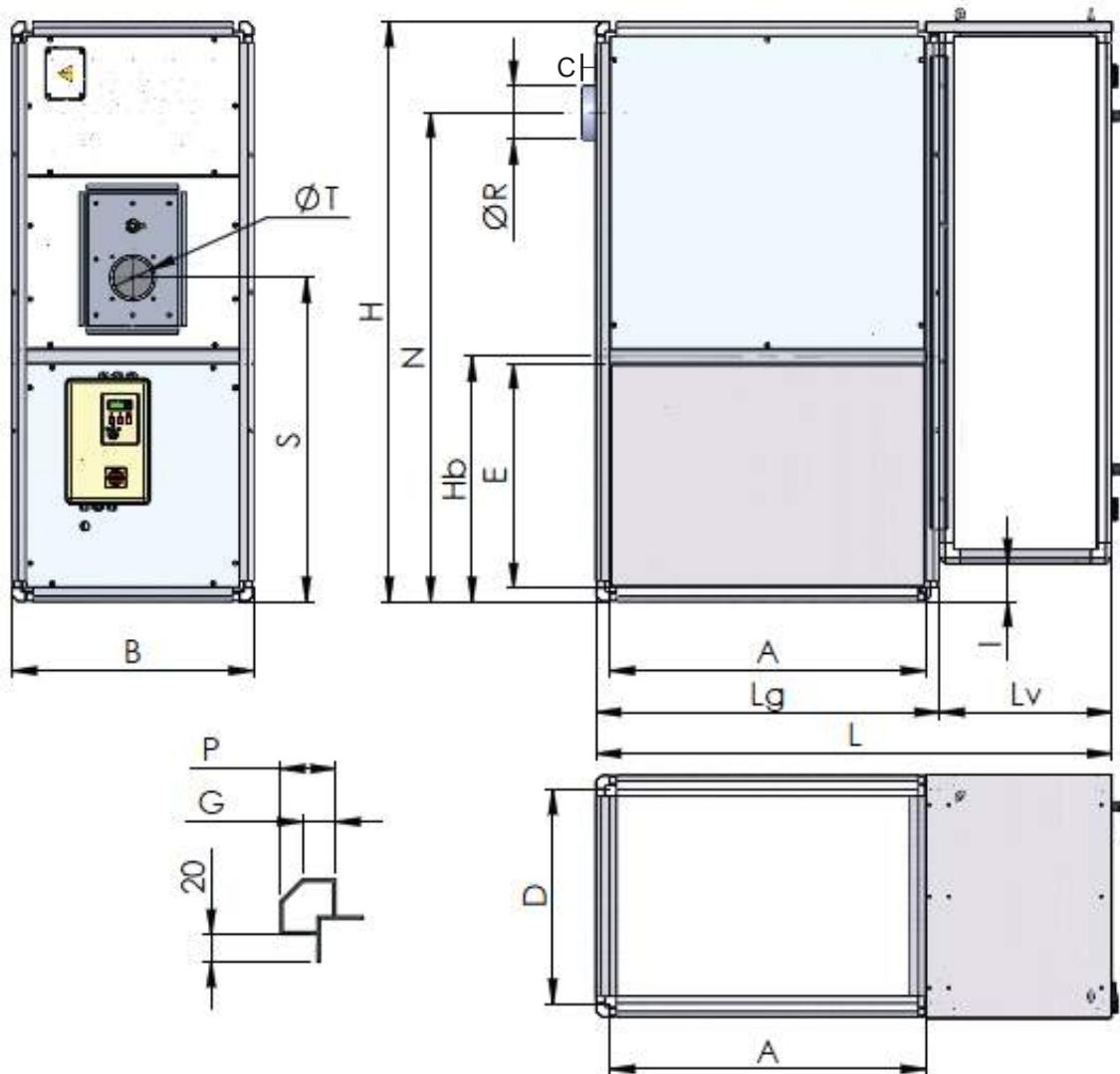
# Floor Standing Warm Air Heater PK series

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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	H <sub>b</sub>	A	E	A	D	P	G	N	ØR	C	S	ØT	L <sub>G</sub>	L <sub>V</sub>	I	
PKE032	1250	530	1490	-	670	590	670	450	40	25	1210	120	42	860	135	750	500	100	(151*)
PKE060	1495	700	1680	-	915	650	915	620	40	25	1420	150	40	940	135	995	500	110	(219*)
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*)
PKE700	3950	1600	3830	1290	2850	1190	2850	1500	50	25	3480	350	169	2211	290	2950	1000	280	1710 (1737*)
PKE900 PKE1M2	4550	1600	4180	1420	3450	1320	3450	1600	50	25	3808	400	158	2434	290	3550	1000	200	2110 (2145*)

KG0100 ET 006

\* weights of K 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.

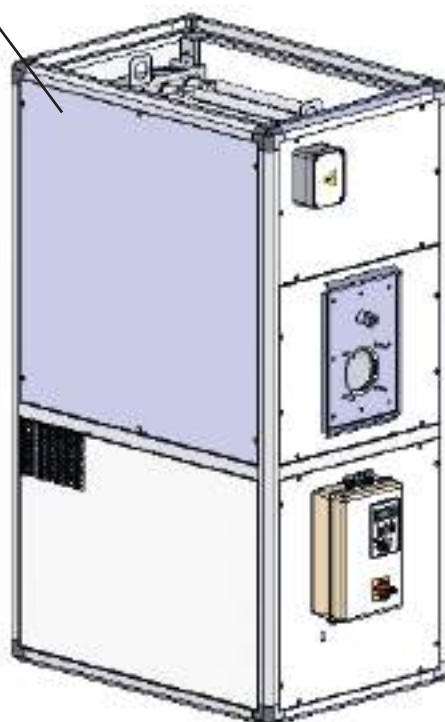
## Air Intake

Standard air intake is on the right side of the heater (seen from the burner).

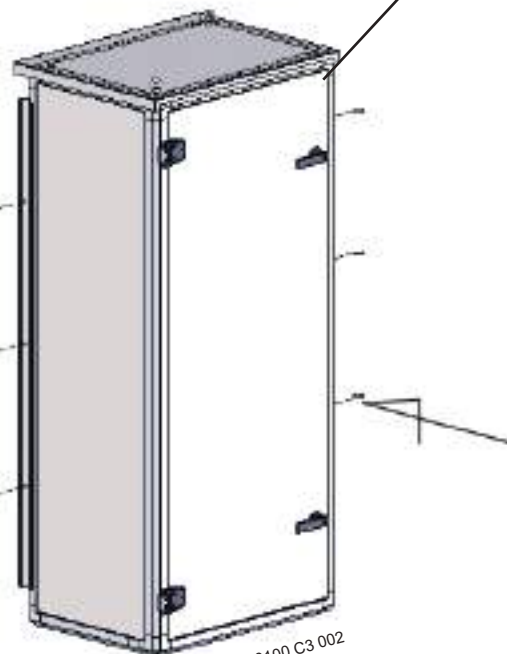
The grid can be moved to left side by the installer or Apen Group (on demand).

Intake can also be moved to the bottom and/or back side of the unit.

HEATER



BURNER CASING



FIXING SCREWS

KG0100 C3 002

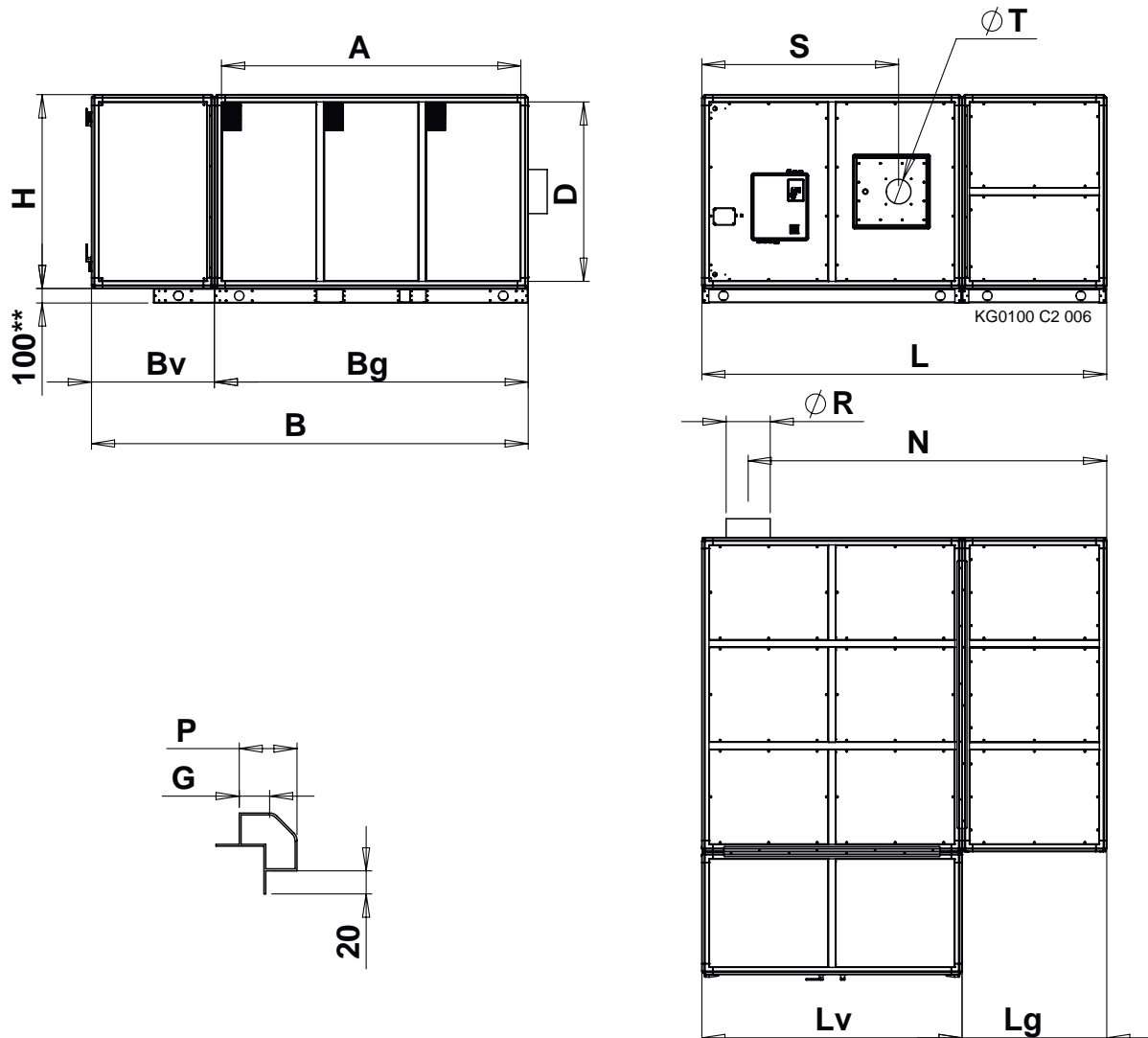
# Floor Standing Warm Air Heater PK series

User, Installation and Maintenance Manual



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

HORIZONTAL HEATERS FOR OUTDOOR INSTALLATION (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
PKE032	1250	530	1490	670	450	670	450	40	25	1208	120	42	860	135	750	500	-	1490	(151*)
PKE060	1495	700	1680	915	620	915	620	40	25	1417	150	40	940	135	995	500	-	1680	(219*)
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*)
PKE700**	3950	1600	3830	2850	1500	2850	1500	50	30	3480	350	169	2211	290	2950	1000	1700	2130	1810 (1837*)
PKE900** PKE1M2**	4550	1600	4180	3450	1600	3450	1600	50	30	3808	400	158	2434	290	3550	1000	1850	2330	2215 (2250*)

KG0100 ET 007

\* weights of K and R series heaters

\*\* for heaters from model 700 and upwards the bottom frame is 140mm high, 032 model includes feet



# 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.

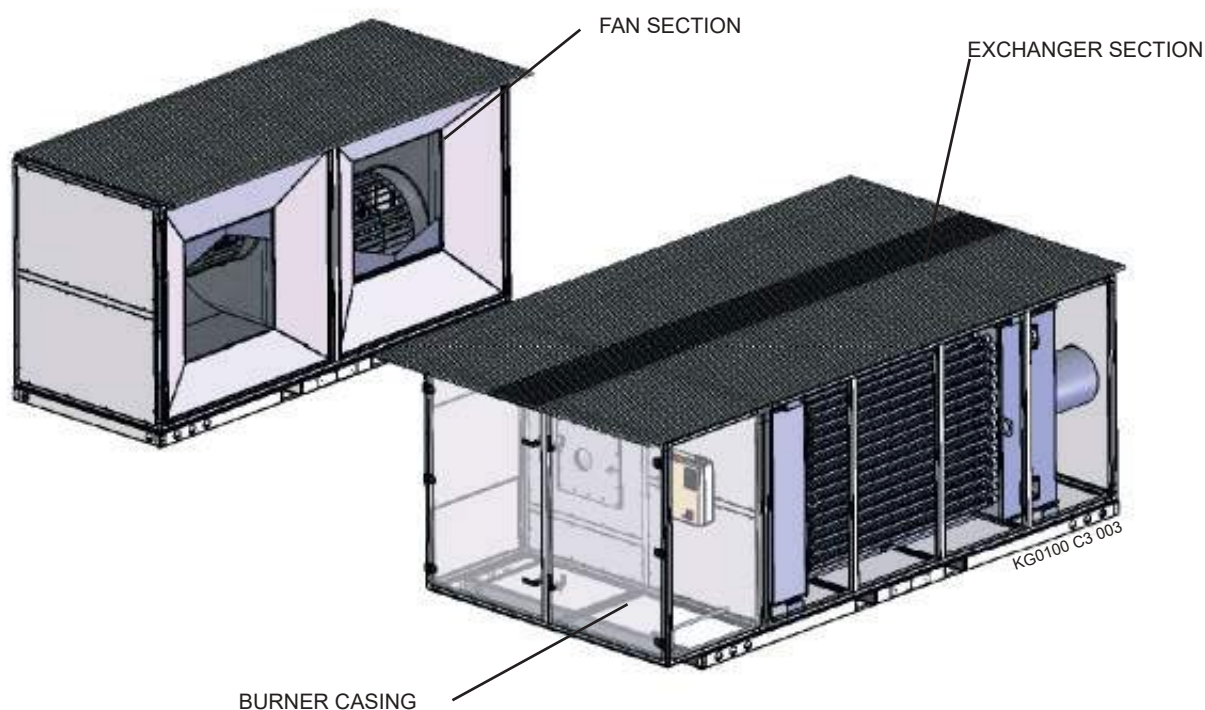
Heaters are supplied on a galvanized steel base, prepared for lifting with lift truck or crane. 032 models only include feet.

## 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 - see picture on page 23).



## 4. USER'S INSTRUCTIONS

### 4.1. Operation

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

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

The panel is fitted with a red 3-digit LCD display and with four function keys: ↑, ↓, ESC and ENTER; the display allows the user to display the heater operating mode and its Faults.

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

Changing parameters is protected by a password.

#### Viewing the machine status

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

- rdy** the machine is on without burner flame, it is waiting for the ON control and/or the heat demand from the thermostat;
- On** the machine is on with burner flame or is in the ignition phase;
- OFF** the machine is turned off by the control on the LCD.  
**Any heat demands will be ignored.**  
To light the burner, the LCD must show the wording "heater ON";
- Fxx** Fault detected.

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

**Air** the EST operation has been selected under the FUN menu; set FUN to ON or OFF;

**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.

In the event of communication problems between CPU-SMART PCB and LCD panel, the word **CPU** will flash on the display if the problem is caused by the CPU; three flashing dots will be displayed if the problem is caused by the display PCB. If needs be, check that the display and the PCB are correctly connected and that the small cable RJ12 is securely held in the connector.



## 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 ID2/IDC2 terminals;
- Smart Web code G27700, Smart Easy G27500

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

### 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 Fxx

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

### Operation with ordinary remote control (optional)

The Customer must install a chronothermostat or a room thermostat with a voltage free contact, between terminals ID2/IDC2; 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 SmartWEB G27700 / SmartEASY G27500 chronothermostat (optional)

Remote controls of SMART 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 32 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.

SmartWEB version allows the complete management of all the system functions, including heater resets, directly from a PC.

For operating instructions and installation diagrams, please refer to the manual of SmartWEB/EASY **HG0060 "SMART WEB / SMARTEASY CHRONOTHERMOSTAT. 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.

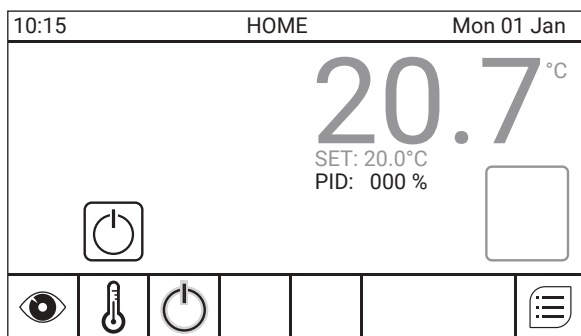
The lockout of the equipment, caused by the safety thermostat triggering, is indicated on the LCD display of the CPU PCB on the machine with F38.

## 4.3. Smart Web

Smart Web remote control must be configured with all the necessary parameters so that the heater can operate at its best. The end user has to configure the type of system and, if necessary, reconfigure some Setpoints and/or time ranges according to his/her needs.

**Some pages of the main menus are described briefly below. For the other functions, or for further information, refer to the manual enclosed with the chronothermostat.**

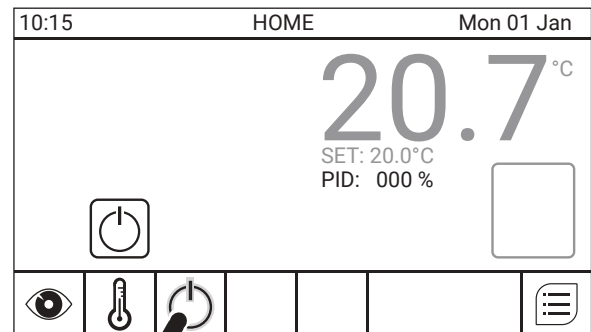
In PK warm air Heaters, the Smart Web is set as "Warm Air Heater" system type and the "HOME" page looks as follows:



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

### 4.3.1. PRIORITY ON/ OFF

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




RED = System OFF



GREEN = System ON

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

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

# Floor Standing Warm Air Heater PK series

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## 4.3.2. TEMPERATURE SETPOINT

The temperature setpoints are the following:

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

10:15	Set. Temperatures	Mon 01 Jan
Comfort (Cm)	°C 20.0	≡
Economy (Ec)	°C 12.0	≡
Antifreeze (An)	2.0	≡
Neutral area (Xd)	°C 0.5	≡
🏠	↩	OK

## 4.3.3. OPERATION MODE

The "Operation Mode" default settings are the following:

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

10:15	Operation Mode	Mon 01 Jan
Mode	OFF	≡
Manual		≡
Time Ranges		≡
Temperature Off	Off	≡
🏠	↩	OK

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

## 4.3.4. CALENDAR / TIME RANGES

The calendar and time ranges default settings are the following:

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

10:15	Progr. Calendar	Mon 01 Jan
START/END		
P1	15 - 10 / 15 - 04	≡
P2	01 - 01 / 01 - 01	≡
P3	01 - 01 / 01 - 01	≡
🏠	↩	OK


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

10:15	Progr. Time Ranges	Mon 01 Jan
Monday		⏮ ⏭
Tuesday		⏮ ⏭
Wednesday		⏮ ⏭
Thursday		⏮ ⏭
🏠	↩	

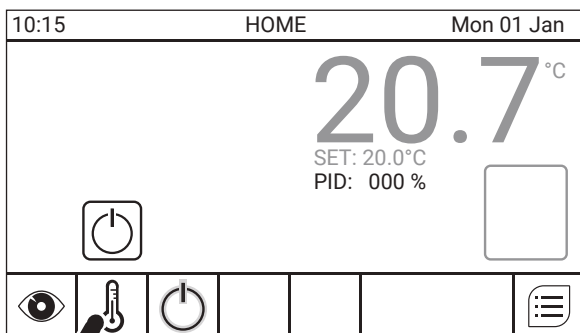
10:15	Monday	Mon 01 Jan
Cm	[Bar chart showing active range from 07:00 to 17:00]	
Ec		
An		
0 3 6 9 12 15 18 21 24		
🏠	↩	⚙

10:15	Change Monday	Mon 01 Jan
M	START/END	⏮
F1	Cm 07:00 / 17:00	≡
F2	N 00:00 / 00:00	≡
F3	N 00:00 / 00:00	≡ ⏭
🏠	↩	OK

## 4.3.5. INPUT MENU

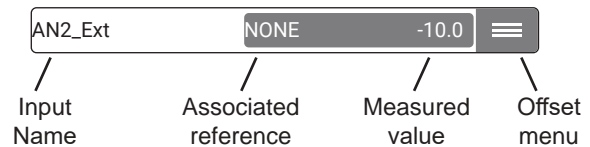
By entering this menu by pushing the  key, it is possible to (for all inputs):

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



10:15	Inputs	Mon 01 Jan
NTC_On Board	T_RIF 20.0	⋮
AN1_Ext	T_RIF 22.3	⋮
AN2_Ext	NONE -10.0	⋮
AN3_Ext	T_RIF -10.0	⋮
⌂	↶	OK

The menu comprises the following




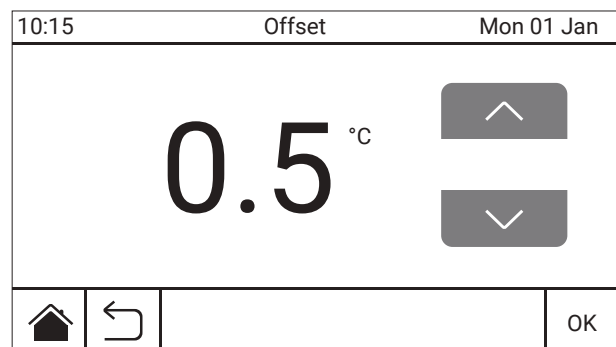
If the probe is not connected the “NONE” indication is displayed and next to it the “-10.0” value:



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



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



The inputs that may be displayed inside the menu are:

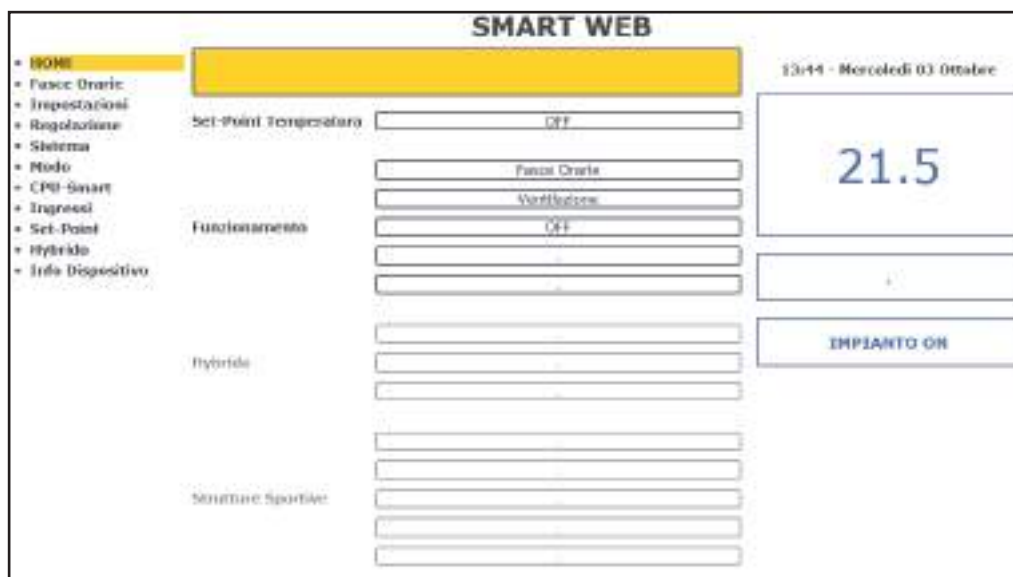
- NTC\_On Board
- AN3\_Ext
- AN1\_Ext
- ID1\_Ext
- AN2\_Ext
- ID2\_Ext



## 4.3.6. SMART WEB configuration

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

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



**SMART WEB**

13:44 - Mercoledì 03 Ottobre

**21.5**

Set-Point Temperatura: OFF

Funzionamento: OFF

Verifica

Impostazioni

Funce On/Off

IMPIANTO ON

Sistema Sportivo

## 5. SERVICING INSTRUCTIONS

### 5.1. Operating Cycle

The heat demand depends on the parameter d0 setting of the heater PCB:

- d0=2: input ID2-IDC2 closed and NTC1<ST1;
- d0=5: input ID2-IDC2 closed and input 0-10Vdc>Von;
- d0=7: input ID2-IDC2 closed and control from Modbus ON.

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

- the heater is powered on and has not been locked out;
- when the contact is closed on terminals ID2/IDC2 of the heater PCB.

In these conditions the burner starts; after a time D3 (delay time of fan ON, parameter on CPU-PLUS) the fan(s) will start.

The heater will be switched off when the ID2/IDC2 contact opens on the terminal board; disconnecting the power supply is prohibited, except for emergencies because, when the heater is switched off, the fan will continue to work for approximately 180 seconds (D4 fan delay time OFF, parameter CPU-PLUS) 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;
- a possible triggering of safety thermostat 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.

Parameter **d6** of the modulation PCB, which can be programmed from 0 to 256 seconds, controls the minimum interval between the time the equipment is switched off and restarted.

Parameter **ST1** is the value of the delivery air modulation temperature

It is not advisable to change the **ST1** value without consulting the APEN GROUP Service Centre.

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

### 5.2. Interface Panel

#### Navigating the menu

The menu is divided into three levels.

Use the arrows to scroll the menus (or parameters): ↑ (up arrow) and ↓ (down arrow). Press ENTER to select the menu (or the parameter). Change the parameter with the arrows and confirm the change by pressing ENTER.

To exit the parameter or menu, press ESC. If you exit the programming function, after about 10 minutes the program will exit the menu and go back to the "machine status" display.

To change the parameter, press the arrow keys: pressing ↑ (up arrow) increases the parameter by 1, pressing ↓ (down arrow) reduces it by 1. When the arrow keys are pressed for at least three seconds, the parameter scrolling speed is increased.

To confirm a change in parameters, press ENTER for at least 3 seconds. A change in the parameter is indicated by the display flashing.

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

#### First level menus

The following menus are available on the first level:

<b>Machine status</b>	provides indications on the PK operation (rdy, ON, OFF, Fxx);
<b>FUN</b>	from this menu it is possible to select the ON, OFF or EST operation;
<b>REG</b>	this menu allows the user to force the burner to the minimum or the maximum for combustion tests; it returns to automatic mode at the end of the preset time (10 minutes);
<b>TIN</b>	provides indications on the value of the 0/10 Vdc signal to the PCH input;
<b>PRA</b>	not used;
<b>ABI</b>	from this menu it is possible to enter the PWD to access and modify the second and third level menus.
<b>PRT</b>	it provides indications on the heat input in kW
<b>CON</b>	it provides indications on gas consumption in m³/h

#### Second and third level menus

Second and third level menus are dedicated to the technical Service Centre. For more detail, see Paragraph 5.4 "Programming with a LCD panel".

## Setpoint Menu (Password protected, level I)

For the meaning and the default values please refer to the table CPU-SMART PCB PARAMETERS in Paragraph 5.5 "Modulation PCB parameters".

## I/O menu - Inputs outputs

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

## PAR - Parameters Menu (Password protected, level II)

For the meaning and the default values, please refer to the table CPU-SMART PCB PARAMETERS in Paragraph 5.5 "Modulation PCB parameters".

## Flt Menu (Fault)

It displays the fault event log; use the arrow keys to scroll the list of error codes and press **ENTER** to view how many times a certain fault has activated after the last reset.

The first visible value, **rst**, is used to reset the fault event log; this operation must not be performed by the user but by the service centre. The reset operation can be carried out by changing the parameter to 1 and confirming it by pressing and holding **ENTER** for at least 3 seconds. After the reset, **rst** returns to 0.

## Entering the password

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

## 5.3. Reset

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

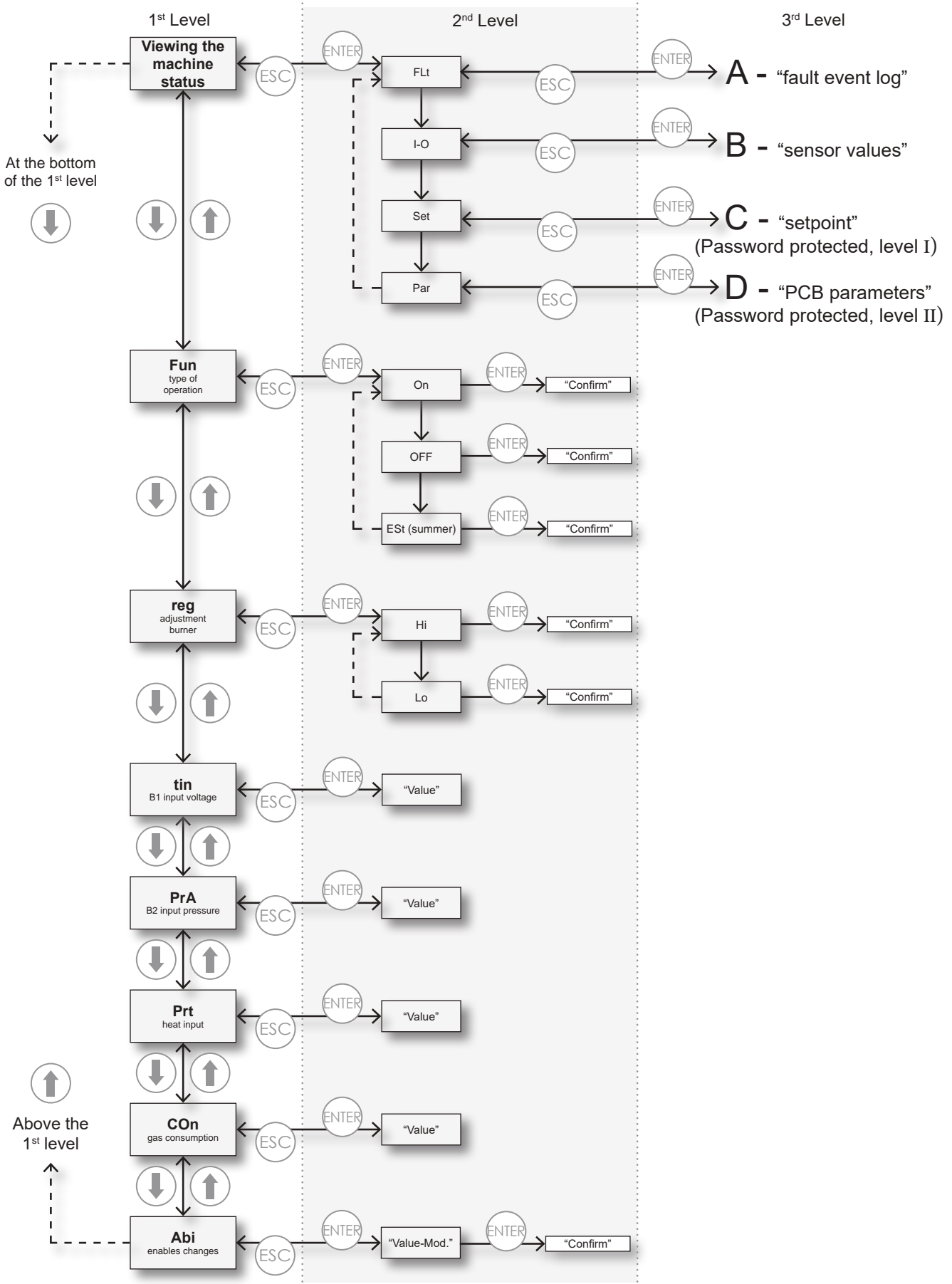
To reset the fault and unlock the heater, just press the two arrow keys of the LCD panel simultaneously and wait for the LCD panel to flash or directly operate on the installed Smart Web.

Lockouts may be remotely controlled by using:

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

Faults are classified according to the type of error; the list and meanings of all faults are shown in the FAULT table in Paragraph 5.6 "Analysis of lockouts - faults".

## 5.4. Navigation map of LCD display menu

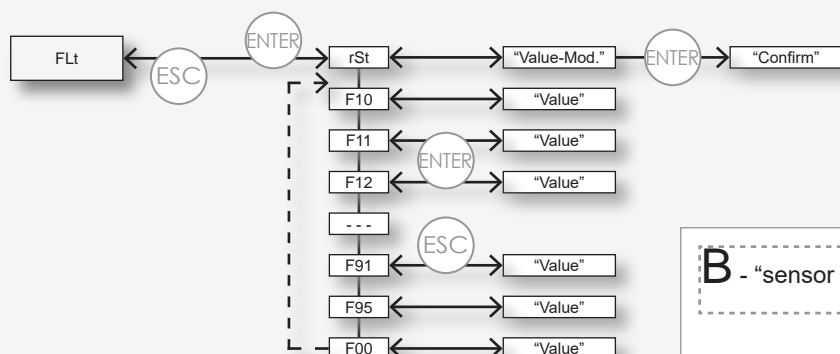


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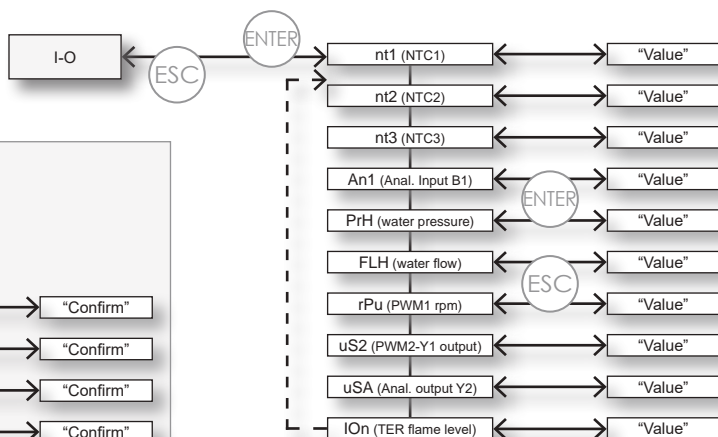
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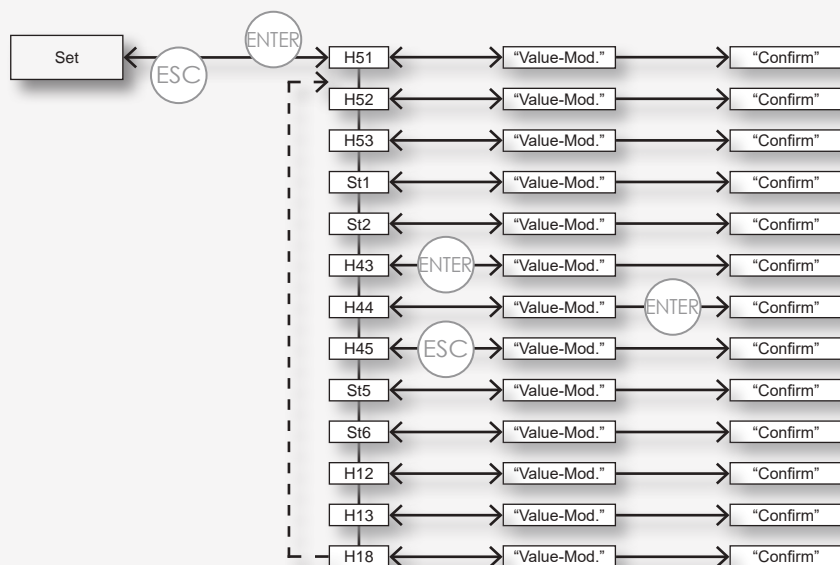
## A - "fault event log"



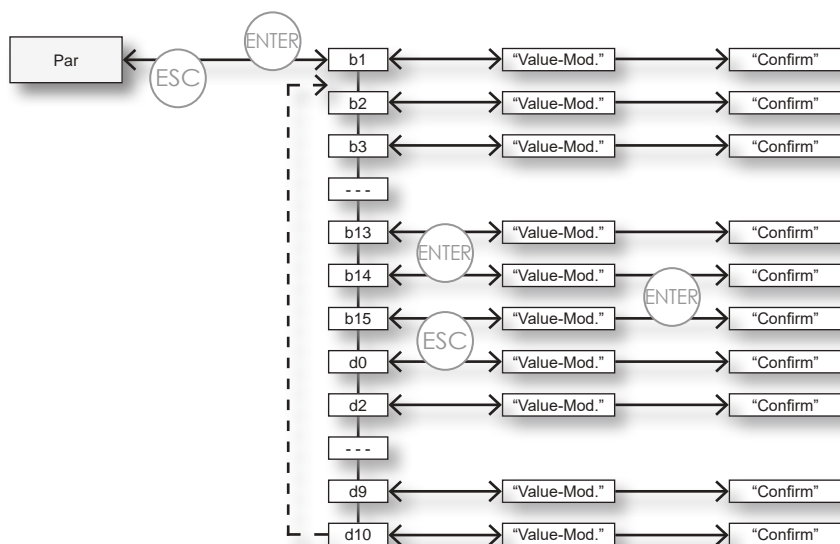
## B - "sensor values"



## C - "setpoint"



## D - "PCB parameters"



### Key:

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

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

## 5.5. Modulation PCB Parameters

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

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

Parameters of CPU-SMART PCB version 7.04.xx				
PARAMETER		PK HEATER		DESCRIPTION
Control parameters				
d0	(2)	-	7	Flame modulation: 2=NTC1; 5=0÷10Vdc; 7=Modbus (SmartWeb in PID mode)
d1	(2)	-	8	Type of equipment: 0=heater; 2=boiler; 5=PCH; 8=PKA/E; 10=Queen; 12=Fan heater
d2	(2)	-	2	Remote lockout signal output (Q1): 0=disabled; 1=enabled; 2 = Q1 and Q2 control the high/low flame external burner
d3	(2)	sec	60	Fan delay time ON (RL2): 0÷255
d4	(2)	sec	36	Fan delay time OFF (RL2): 0÷255 (1=5sec. 60=300 sec.)
d5	(2)	-	0	Flue gas T control enabling (NTC3): 0=disabled; 1=enabled NOT USED
d6	(2)	sec	5	Interval between switching off and on (Off timer): 0÷255
d7	(2)	-	0	1= Fault reset counter; 2= Burner hour-meter reset
d8	(2)	-	0	Boiler antifreeze enabling (NTC1): 0=disabled; 1=enabled NOT USED
d9	(2)	-	0	Dampers enabling: 0=disabled; Do Not Change
d10	(2)	-	0	Continuous ventilation: 0= disabled; 1= enabled (fans always active); 2= enabled with delay par.d3 upon remote heat request - active in Fault in case of heat request
Burner parameters - NOT USED				
b1	(2)	rpm	195	Motor RPM MINIMUM value (PWM1): 90÷999 (1=10 RPM)
b2	(2)	rpm	635	Motor RPM MAXIMUM value (PWM1): 90÷999 (1=10RPM)
b3	(2)	rpm	240	Motor RPM START-UP value (PWM1): 90÷999 (1=10RPM)
b4	(2)	-	2	HALL signal divider: 2÷3
b5	(2)	rpm	50	Error F3x; no. of revolutions x10 (50=500rpm): 0÷300
b6	(2)	sec	20	Error F3x; error dwell time before fault F3x: 0÷255
b7	(2)	sec	20	Pre-cleaning time with maximum output: 0÷255. DO NOT CHANGE THE PRESET VALUE.
b8	(2)	sec	10	Flame stabilisation time (ignition): 0÷255
b9	(2)	sec	90	Combustion chamber post-cleaning time (FAN ON): 0÷255
b10	(2)	%	5	Motor rpm % increase for each b11 seconds: 1÷100
b11	(2)	sec	2	Time interval for motor rpm increase: 1÷100
b12	(2)	%	30	Antifreeze mode FAN motor modulation % value: 30÷100
b13	(2)	pwm	65	Integral factor value (ki_pwm) for PWM1 calculation - (exA36):0÷249
b14	(2)	pem	45	Proportional factor value (kp_pwm) for PWM1 calculation - (exA37):0÷249
b15	(2)	sec	0	with d1=0 or 5: delay time ON flame control equipment (TER); with d1=2 (boiler): F85/F86 water flow delay alarm at start-up
b16	(2)	-	3	ID5 - Blower fan control: 0=input disabled; 1=enabled with N.C. input required; 2=enabled with N.O. input required; 3= enabled with N.C. input required with auto-reset;
b17	(2)	-	3	ID6 - Blower fan control: 0=input disabled; 1=enabled with N.C. input required; 2=enabled with N.O. input required; 3= enabled with N.C. input required with auto-reset;



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## Parameters of CPU-SMART PCB version 7.04.xx

PARAMETER		PK HEATER		DESCRIPTION
Heat input and fuel instantaneous consumption calculation parameters - NOT USED				
Qmin	(3)	kW	21.0	Minimum heat input (ref. Lower calorific value - Hi)
Qmax	(3)	kW	99.9	Maximum heat input (ref. Lower calorific value - Hi)
LCV	(3)	kW/m³	see table of "Gas-type parameters" here below	Lower calorific value (Hi)
Limit NTC1 control (with D0=5 or 7)				
SEL	(2)	-	1	Modulation probe 1=NTC probe1; 3=NTC3 probe
S1	(2)	-	1	NTC1 probe enabling: 0=disabled; 1=enabled
ST1	(1)	°C	60	NTC1 setpoint: -10÷140
SP1	(2)	°C	5	SP1 hysteresis: 0÷10
XD1	(3)	%	5	Proportional band from 4 to 100
TN1	(3)	sec	100	Integral coefficient: 1÷255
AC1	(3)	-	1	0=only modulation; 1= modulation and ON/OFF
TH1	(2)	°C	75	Upper Temperature limit for fault F51 activation: 10÷95 autoreset if NTC1<TH1-15°C
S3	(2)	-	0	NTC3 probe enabling: 0=disabled; 1=enabled
TH3	(2)	°C	90	Upper temperature limit for F53 fault activation (auto-reset if NTC3<TH3): 0÷140
Control 0/10 Vdc - D0=5				
H51	(1)	-	0	Active only with D0=5 (0/10V) 0=modulation only; 1=modulation and ON/OFF
H52	(1)	V	0.5	OFF voltage, burner switching off if H51=1: 0÷10 1st. Module = 0.5; 2nd. Module = 1.5; 3rd. Module = 2.5; 4th. Module = 3.5.
H53	(1)	V	0.5	Voltage Delta with burner ignition ON 1st. Module = 0.5; 2nd. Module = 1.0; 3rd. Module = 1.5; 4th. Module = 1.5.
H54	(3)	sec	5	Lower input dwell time: 0÷255
H55	(3)	sec	5	Upper input dwell time: 0÷255
Fan and damper output control				
H11	(2)	-	2	0=output disabled; 1=analogue output Y1 enabled (PWM); 2=analogue output Y2 enabled (0÷10Vdc); 3=outputs Y1 (PWM) and Y2 (0÷10Vdc) enabled; 4=outputs Y1 (PWM) and Y2 (0÷10Vdc) enabled for pressostatic structures; 5=analogue output Y2 (0÷10Vdc) enabled for operating mode d1=10/12; 6=outputs Y1 (PWM) and Y2 (0÷10Vdc) enabled for boiler summer ventilation with EC fan heater
H12	(1)	V	6	Y2 output minimum voltage: 0÷10
H13	(1)	V	10	Y2 output maximum voltage: 0÷10
H14	(3)	%	0	PWM minimum value: 0÷100
H15	(3)	%	100	PWM maximum value: 0÷100
H16	(3)	-	2	0, 1=not used; 2=blower modulation proportional to FAN (do not change); 3=blower modulation proportional to B1 input (0-10V); 4 proportional to B2 input for pressure check in pressostatic structures; 5= proportional NTC1 for checking Queen/Fan heaters (only output Y2)
H17	(3)	-	2	0=PWM (Y1) or 0/10V (Y2) output according to "direct" logic; 1=PWM (Y1) or 0/10V (Y2) output according to "reverse" logic; 2= PWM (Y1) "reverse" and 0/10V (Y2) "direct" output; 3= PWM (Y1) "direct" and 0/10V (Y2) "reverse" output
H18	(1)	-	8	Y2 output fixed voltage
H19	(3)	-	32	Reading of NTC1 to which the minimum value of Y2 output corresponds - NOT USED
H20	(3)	-	65	Reading of NTC1 to which the maximum value of Y2 output corresponds - NOT USED

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NTC2 control - NOT USED				
<b>S2</b>	(2)	-	0	0=NTC2 disabled; 1=NTC2 enabled; 2=blower output activation for compartment heating function (only with d1=5)
<b>ST2</b>	(1)	°C	5	NTC2 setpoint: -10÷90
<b>P2</b>	(2)	°C	2	ST2 hysteresis: 0÷40
<b>XD2</b>	(3)	-	40	Neutral area, proportional modulation band divided by 100: 4 ÷100
<b>TN2</b>	(3)	sec	5	Integration time: 1÷255
ANTIFREEZE control - active with D8=1 - NOT USED				
<b>STA</b>	(3)	°C	2	Antifreeze setpoint: -10÷+20
<b>PA</b>	(3)	°C	1	Antifreeze setpoint hysteresis: 0÷10
FLUE GAS TEMPERATURE control - active with D5=1 - NOT USED				
<b>H41</b>	(2)	°C	5	Flue gas temperature (NTC3); neutral band from 1÷50
<b>H42</b>	(3)	sec	10	Run time for flue gas control cycle (15=30 seconds): 0÷255
<b>H43</b>	(1)	°C	100	Flue gas temperature at maximum capacity (Tmax with PT%=100): 0÷140
<b>H44</b>	(1)	°C	75	Flue gas temperature at medium capacity (Tmed with PT%=50): 0÷140
<b>H45</b>	(1)	°C	50	Flue gas temperature at minimum capacity (Tmin with PT%=0): 0÷140
<b>H46</b>	(3)	-	0	Flue gas temperature operation: 0=modulation only - 1=burner OFF
Control - FILTERS - Enable only when FILTER control is present - NOT USED				
<b>S5</b>	(2)	-	6	Pressure probe B2 output enabling: 0=disabled; 1=enabled as ON/OFF input; 2=enabled as analogue input without F83 fault auto-reset; 3=enabled as analogue input with F83 fault auto-reset; 4=enabled as air pressure control analogue input without F80 auto-reset; 5=enabled as air pressure control analogue input with F80 fault auto-reset; 6=enabled read only (no Fault) for pressure control via Modbus
<b>ST5</b>	(1)	mbar	1.2	B2 setpoint: 0÷9.99 (setpoint sent by the Smart Web)
<b>P5</b>	(2)	mbar	0.5	ST5 hysteresis: 0÷9.99
<b>XA5</b>	(3)	V	0.5	B2 pressure probe signal input minimum voltage: 0÷9.99
<b>XB5</b>	(3)	V	4.5	B2 pressure probe signal input maximum voltage: 0÷9.99
<b>YA5</b>	(3)	bar	0	Pressure matching the B2 probe input minimum voltage
<b>YB5</b>	(3)	bar	9.99	Pressure matching the B2 probe input maximum voltage
<b>TH5</b>	(3)	V	9.99	Upper pressure limit for fault F82 activation: 0÷9.99
STB Thermostat Alarm Control				
<b>S6</b>	(2)	-	1	Flow sensor B3 output enabling: 0=disabled 1=enabled as ON/OFF input without F85 fault autoreset 2=enabled as ON/OFF input with F85 fault autoreset 3=enabled as pulsed input without F85 and F86 fault autoreset 4=enabled as pulsed input with F85 and F86 fault autoreset
<b>ST6</b>	(1)	From l/h	10	Flowmeter setpoint - in l/h (x10)
<b>P6</b>	(2)	-	5	ST6 hysteresis: - in l/h (x10)
<b>XA6</b>	(3)	Hz	5	B3 pressure probe signal input minimum frequency: 0÷999
<b>XB6</b>	(3)	Hz	14	B3 pressure probe signal input maximum frequency: 0÷999
<b>YA6</b>	(3)	l/h	229	Flow rate matching the B3 probe inlet minimum frequency
<b>YB6</b>	(3)	l/h	29	Flow rate matching the B3 probe inlet maximum frequency
<b>TR6</b>	(3)	sec	2	Fault F85/F86 indication time delay (1=1second): 0÷250. During the ignition stage, the b15 value is used.
PRESSURE control - PID parameters for ventilation of Pressostatic structures				
<b>kp</b>	(3)	%	25	Proportional Gain
<b>ki</b>	(3)	%	10	Integral Gain
<b>kd</b>	(3)	%	5	Derivative Gain
<b>li</b>	(3)	%	100	Maximum limit of integral part

## 5.6. 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.

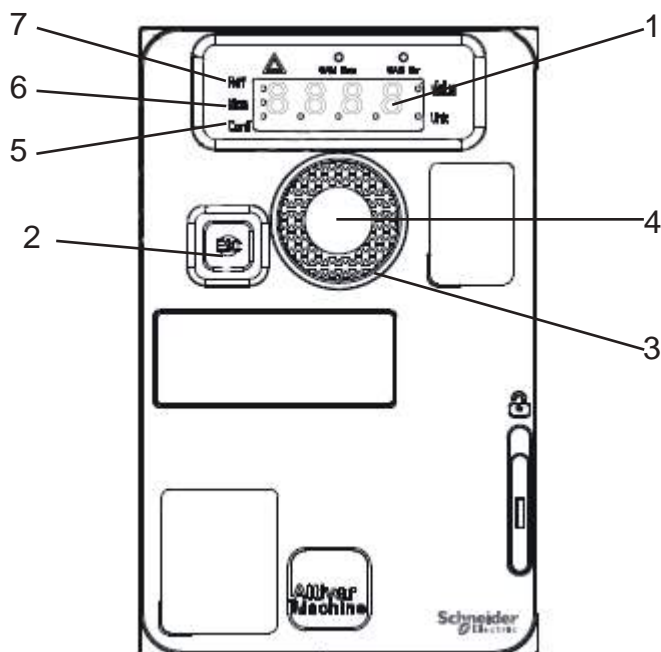
Some operational faults require manual reset; others reset themselves when the problem that caused them is solved.

Below is a complete list of faults, possible causes and possible solutions.

FAULT	DESCRIPTION	CAUSE	UNLOCK
Lockouts caused by temperature (safety lockouts)			
F21	Input ID1 open	• Fire damper activation	Manual reset
F35	Input ID5 open	• Burner alarm	Auto-reset
F38	Input ID6 open	• STB alarm	Auto-reset, with thermostat manual reset
NTC probes broken or missing			
F41	Probe NTC1 error, air intake temperature	No signal from probe or broken probe	Auto-reset
Over-temperature			
F51	The temperature of the air intake probe NTC1>TH1 (NOT used)	<ul style="list-style-type: none"> <li>• Check the TH1 parameter - air intake set point.</li> <li>• Cooling fan(s) inoperative</li> <li>• Air flow rate insufficient</li> </ul>	Auto-reset when NTC1< TH1-15
Check ModBus communication			
F60	Communication error between CPU-SMART PCB and Modbus network, Smart Web	<ul style="list-style-type: none"> <li>• ModBus network is disconnected.</li> <li>• The address of the PCB is wrong and/or not configured in the ModBus network.</li> </ul>	Auto resolve
Voltage presence control			
F75	No voltage during operation cycle (excluding stand-by); the fault is not visible on remote control but only counted.	• No voltage during operation	Auto resolve
Air presence and flow control			
F85	Input B3 open	• Thermal protection or inverter protection triggering	Manual reset
Parameter configuration error			
F99	CPU parameter programming error	<ul style="list-style-type: none"> <li>• S1=0 with SEL=1 and D0=2</li> <li>• S3=0 with SEL=3 and D0=2</li> <li>• D2≠0 and D9=1</li> <li>• D10=1 with D8=1</li> </ul>	Auto resolve
Internal malfunction of CPU-SMART PCB			
F00	Internal malfunction of CPU-SMART PCB	• One or more parameters of the CPU PCB have a value outside of the expected range.	Perform a manual reset of the PCB by interrupting the power supply
CPU	CPU-SMART PCB/LCD communication error on PCB side	• RJ12 cable disconnected or faulty	Auto resolve
...	CPU-SMART PCB/LCD communication error on LCD side	• RJ12 cable disconnected or faulty	Auto resolve

## 5.7. ATV320 SCHNEIDER inverter parameter settings:

This technical configuration refers to the use of Schneider Electric ATV320xxxxN4 inverters.



1	Display	4 x 7 segment display
2	ESC key	It allows the user to exit a menu or a parameter or to delete the value displayed and return to the stored value
3	Rotary switch	It is used to scroll through the items if turned clockwise or counter-clockwise
4	ENTER key	If pressed is used to select or confirm an information [ENTER]
5	CONF LED	ON if [CONF-] menus are enabled
6	MON LED	ON if [MON-] menu is enabled
7	REF LED	ON if [REF-] menu is enabled

PKA/E heaters supplied with inverter are set up for operation with 0-10V analogue signal

**For this type of operation, it is not necessary to change any parameter; if required, change the adjustment parameters; see the table below**

Menu	Parameter	Description	Values
drC	tFr	Maximum motor frequency	60
SEt	LSP	Minimum operation frequency	30
SEt	HSP	Maximum operation frequency	50

Fr1 parameter is used to set the adjustment selection with a 0-10V input signal, LSP and HSP parameters define the operation field. LSP and HSP values cannot exceed the limits of 22 and 55 Hz, respectively.

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## INVERTER PARAMETERS

Menu	Parameter	Description	Value
CONF/FCS	GFS	Inverter reset	GFS (press enter for 2 s)
CONF/FULL	LAC	Makes all parameters visible	ADU (press enter for 3 s)

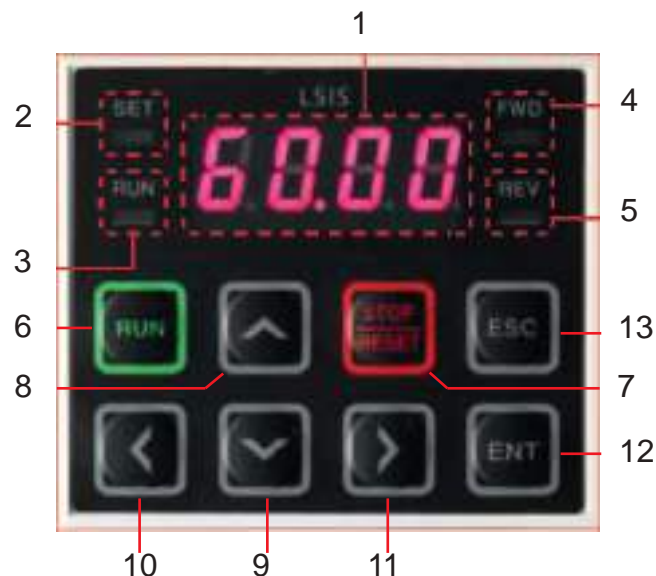
### Summary of inverter calibration parameters

Menu	Parameter	Description	Values
CONF/FULL/SIM	UnS	Motor voltage value	400 (default)
CONF/FULL/SIM	nCr	Motor current value	[ref table]
SEt	ItH	Thermal protection tripping current	[ref table]
SEt	SFr	Switching frequency	16
SEt	LSP	Minimum frequency	25
SEt	HSP	Maximum frequency	50 (default)
SEt	ACC	Acceleration time (seconds) between 0 and HSP	25
SEt	DEC	Deceleration time (seconds) between HSP and 0	25
SEt	CLI	Current limitation value	[ref table]
FLt	Atr / Atr	Automatic motor restart (autoreset) after Fault	Yes
FLt	Atr / TAr	[only with Atr=Yes] autoreset time	5 min (default)
drC	tFr	Maximum motor frequency	60 (default)
drC	bFr	Reference frequency	50 (default)
I-O	tCC	2-wire control setting	2C (default)
I-O	tCt	Restart setting with power supply reactivation	LEL
I-O	R2 / R2	R2 relay assignment	Flt
I-O	A01 / A0It	Analogue output type	10U
I-O	A01 / A01	Signal output with reference to the frequency	OFr
I-O	BSP	Start/stop threshold activation	BNS0
I-O	AI1 / U1L1	Start/stop threshold value setting	1.5v
CtL	Fr1	Reference channel	AI1 (default)
CtL	CHCF	Control profile	SEP
CtL	CD1	Control 1 channel	TER (default)

### Standard heater motor parameters

Output motore		Rated current	Thermal protection tripping current	Limit current
[kW]	Menu	drC	SEt	SEt
	Parameter	nCr	ItH	CLI
1.1	Value	2.6	3.1	2.6
1.5		3.4	4.1	3.4
2.2		4.6	5.5	4.6
3.0		6.3	7.5	6.3
4.0		8.0	9.6	8.0
5.5		11.1	13.3	11.1
7.5		14.3	17.1	14.3
9.2		17.4	20.8	17.4
11.0		20.4	24.4	20.4
15.0		27.3	32.7	27.3

## 5.8. LS-S100 LG inverter parameter settings



Inverter menus are organised as follows:

Menu	Description
DRV	inverter controls group
BAS	basic functions group
ADV	advanced functions group
CON	control functions group
INP	input functions group
OUT	output functions group
COM	serial communication functions group
APP	application functions group
PRT	protection functions group
M2	motor functions group

Element	Specifications
1 Display	4 x 7 segment display
2 SET	The SET LED flashes when parameters are entered
3 RUN	The RUN LED is lit during operation; it flashes during acceleration phases.
4 FWD	the LED is lit during forward operation
5 REV	the LED is lit during reverse operation
6 RUN key	When pressed on the keyboard it allows to start the inverter
7 STOP key	When pressed on the keyboard it allows to stop the inverter; it allows for reset in the presence of a lock-out condition
8 Key UP ARROW	It allows to scroll through parameters It increases the parameter values
9 Key DOWN ARROW	It allows to scroll through parameters it decreases the parameter values
10 Key LH ARROW	used to skip from one parameter menu to another and to move the cursor to the left
11 Key RH ARROW	used to skip from one parameter menu to another and to move the cursor to the right
12 ENT key	Used to save the parameter value during the modification phase
13 ESC key	Used to exit the menu.

If necessary, change adjustment parameters; see table below

Menu	Parameter	Description	Values
INP	IN-09	Minimum frequency with input signal V1>0 -in % of IN-01	50
INP	IN-11	Maximum frequency with input signal V1>0 -in % of IN-01	85

Example:

IN-01 = 60 Hz

IN-09 = 50% (50% of 60) = 30 Hz, Minimum speed

IN-11 = 85% (85% of 60) = 51 Hz, Maximum speed




Motor Power	Rated current
[kW]	
3.0	6.5
4.0	8.1
5.5	10.2
7.5	14.6
9.2	17.4
11.0	20.2
15.0	27.8



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Menu	Parameter	Description	Values
	Frq	Reference channel V1 - speed switch	2
	DRv	Rotation control from terminals	1
	ACC	Acceleration time (seconds)	30
	DEC	Deceleration time (seconds)	30
DR	DR-14	Motor power - enter line number of table below in Kw	ref. table
	DR-18	Motor rated frequency in Hz	50
	DR-20	Maximum motor frequency	60
IN	IN-01	Maximum frequency associated with the maximum V1 input voltage value	60
	IN-08	Minimum stop voltage	1.5
	IN-09	Minimum frequency with input signal V1>0 -in % of IN-01	50
	IN-11	Maximum frequency with input signal V1>0 -in % of IN-01	85
OU	OU-31	A1-B1-C1 digital output - inverter alarm	29
	OU-33	Q1-EG output Activation	13
	OU-52	NC Logic Q1-EG output	(ab) (  )*
BA	BA-10	Mains frequency (0=60Hz; 1=50Hz)	1
	BA-11	Number of motor poles, usually 4	4
	BA-13	Motor rated current	ref. table
	BA-15	Motor rated voltage in Volts	400
	BA-19	Supply voltage	400
	BA-70	Acceleration time 1	10
	BA-71	Deceleration time 1	10
PR	PR-08	Restart upon Alarm reset: 0-disabled, 1 enabled	1
	PR-09	Number of automatic restart attempts in case of fault	4
	PR-10	Waiting time for autoreset, in seconds	10
	PR-12	Action to be performed when analogue reference is lost	2 (Dec)
	PR-13	Analogue reference loss time	1
	PR-15	Input voltage reference loss	1 (below x1)
	PR-20	Action to be performed when an overload alarm occurs	2 (Dec)
	PR-21	Overload alarm level ( % )	180
	PR-22	Overload alarm delay ( sec )	60
	PR-50	Stall prevention activation ( thermal protection)	(bbbab)(  ) *
	PR-51	Stall activation frequency 1 -Hz	50
	PR-52	Stall prevention level 1 (30-250%)	110
AD	AD-10	Start selection at start-up (0=disabled, 1=enabled)	1
	AD-24	Frequency limitation activation: (0=disabled, 1=enabled)	1
	AD-25	Low limit frequency Hz	30
	AD-26	High limit frequency Hz	60
	AD-60	Frequency limit for acceleration/deceleration changes	30
CN	CN-04	Carrier frequency in kHz	10
	CN-71	Restart after voltage drop	(babb) (  )*

\* a=dash  
b=underscore

## 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.

---

**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).

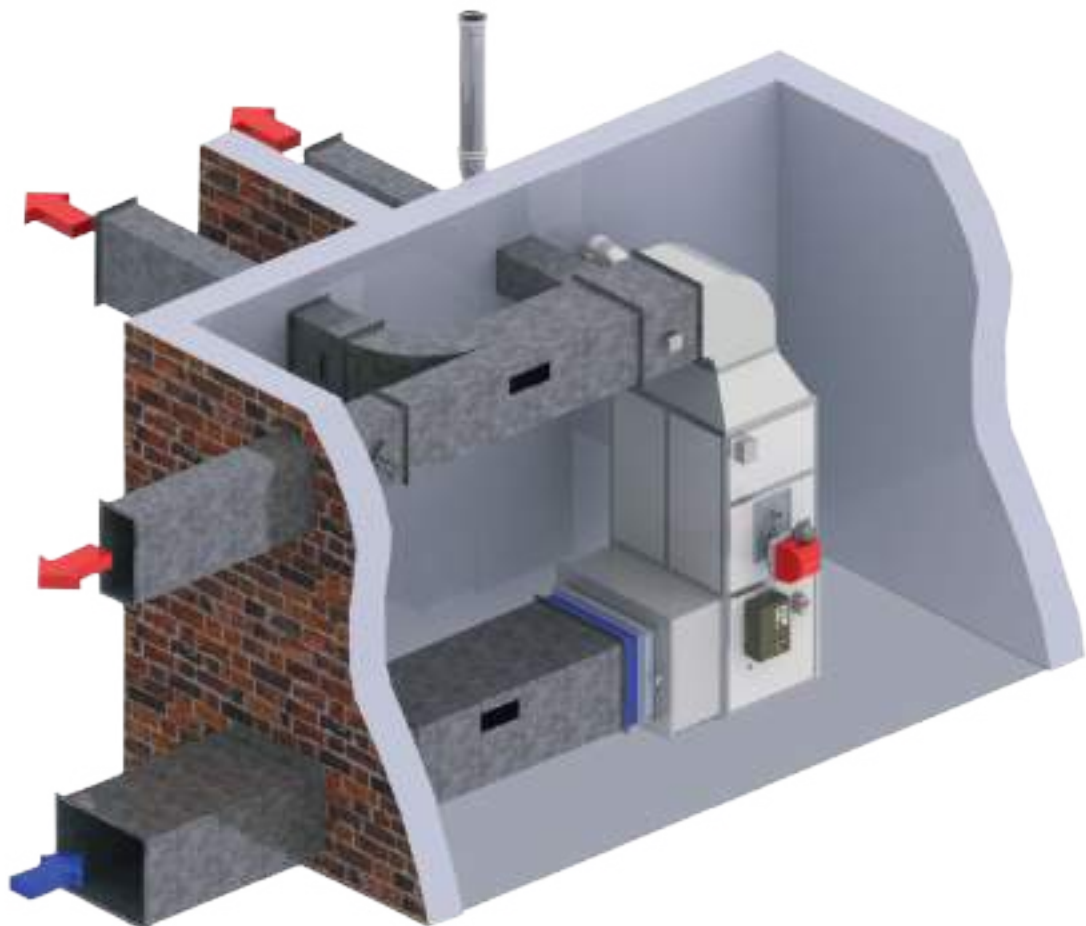
A vibration damping joint should be installed on air delivery duct so as to prevent vibration transmission from the heater to ductwork

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.

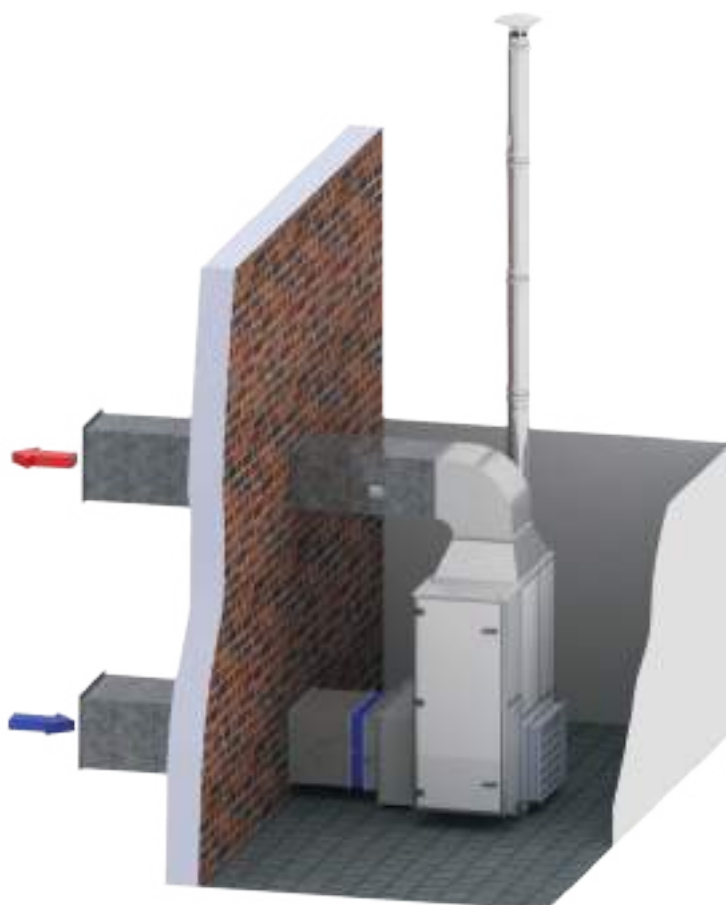
#### Connecting Fuel Supply

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.

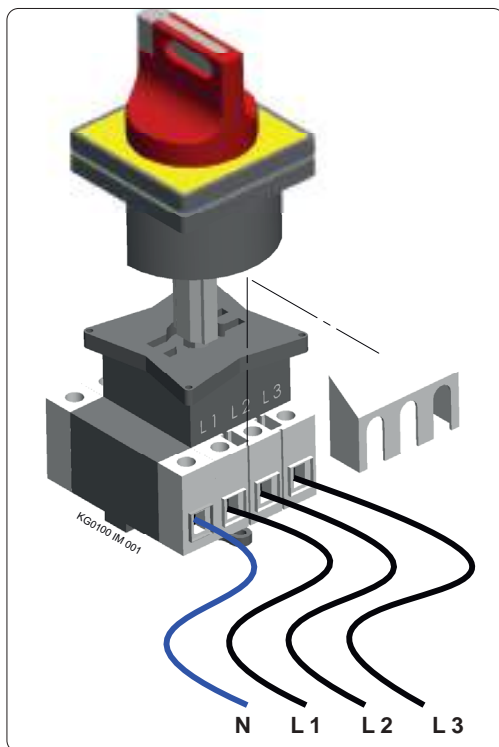
Wiring type changes based on type of device:

Single phase	230V	Wire Phase to L3 terminal and Neutral to N terminal
Three-phase	400V+N	Wire three phases to L1, L2, and L3 terminals and Neutral to N terminal

For both types 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 heater. This switch must include a protection (fuses or automatic) and must comply with existing regulations.

Fuse type, if used, must be rapid. If automatic switch are used, the characteristic curve for their triggering must be of type "K" or "D" or "C".

Automatic switches with "A" or "B" trigger curve are not allowed since they are not suitable for electrical motor protection.

## 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	Breakaway starting current Is/In	Cable section mm <sup>2</sup>	A protection
032-00A	G00962-01	0.25	4.5	6.5	2x1.5	10
032-10A	G04481-01	0.35	6.0	6.5	2x1.5	10
060-00A	G01605-01	0.74	7.5	6.5	2x1.5	12
060-10A; 100-00A	G02325-IE3	1.1	4.0	6	4x1.5	10
060-20A; 100-10A	G01430-IE3	1.5	5.1	6	4x1.5	10
100-20A	G01490-IE3	2.2	6.9	6	4x1.5	10
140-00A; 140-10A	G01260-IE3	3.0	8.7	6	4x2.5	16
190-00A; 190-10A	G01260-IE3	3.0	8.7	6	4x2.5	16
140-20A; 190-20A	G00137-IE3	4.0	9.8	6	4x2.5	16
250-00A; 250-10A; 320-00A	G01490-IE3	2x2.2	12.0	6	4x2.5	25
250-20A; 320-10A	G01181-IE3	2x3.0	16.0	7	4x4.0	25
320-20A; 420-00A	G00137-IE3	2x4.0	19.8	7	4x4.0	25
420-10A; 420-20A	G01181-IE3	2x5.5	23.8	2.4*	4x6.0	40
550-00A	G01260-IE3	2x3.0	16.2	7	4x4.0	25
550-10A; 700-00A	G00137-IE3	2x4.0	20.2	7	4x6.0	25
550-20A; 700-10A	G01181-IE3	2x5.5	24.2	2-4*	4x6.0	40
700-20A; 900-00A	G01022-IE3	2x7.5	34.0	2-4*	4x10.0	63
900-10A; 1M2-00A; 1M2-10A	G07371-IE3	2x9.2	47.0	2-4*	4x16.0	63
900-20A; 1M2-20A	G00837-IE3	2x11	52.0	2-4*	4x16.0	63

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. Add ground cable to the number of cables.

## 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 of three-phase models, 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.

# Floor Standing Warm Air Heater PK series

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## 6.3. Electrical Connections

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

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

### Fire Damper

Wire microswitch (NC contact with activated damper) to terminals IDC1 and ID1 of CN02 connector on the heater modulation board.

If microswitch triggers, the board triggers error F21 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 230Vac power supply of servomotor to terminals IDC1 and N of connector CN02 of modulation board and ON/OFF control to contact ID1 together with fire damper microswitch return line.

With fire damper microswitch closed, servomotor ON/OFF contact is powered and the shutter 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

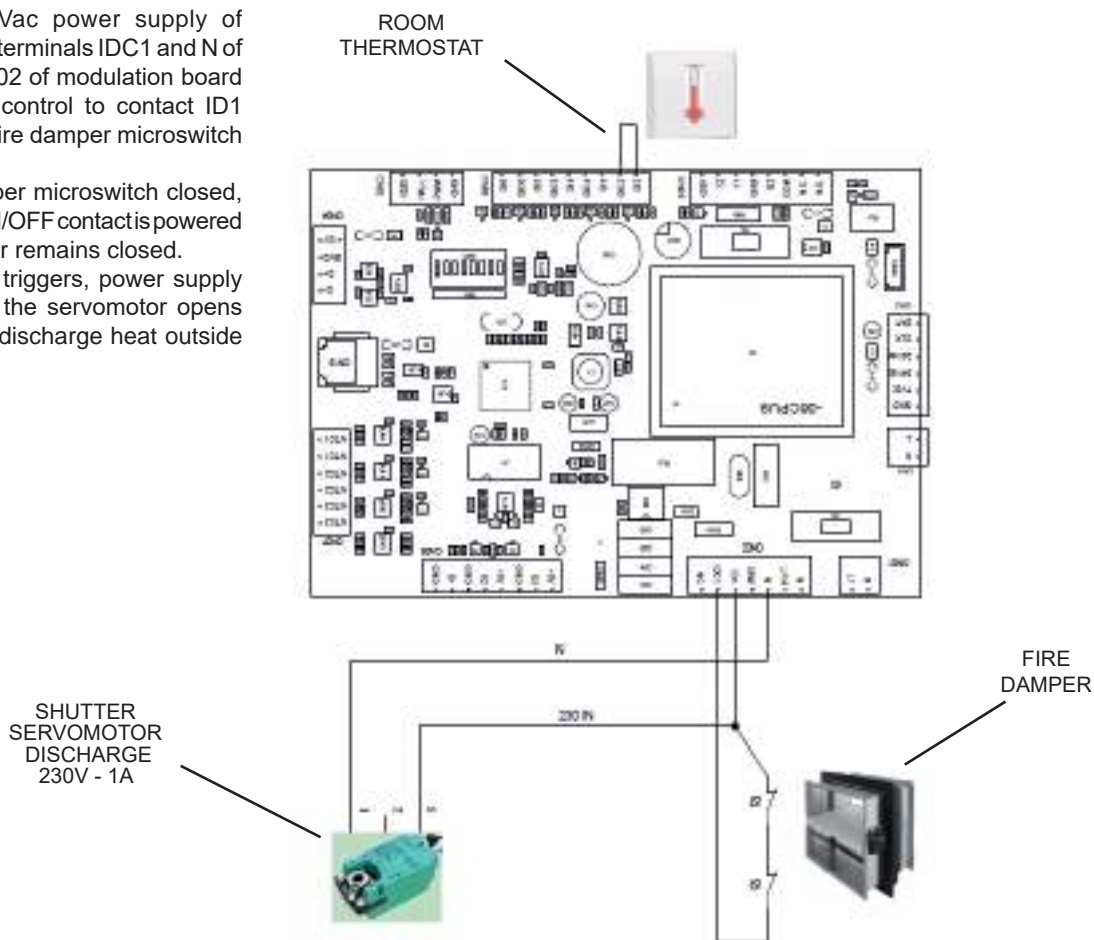
Wire room thermostat to terminals IDC2 and ID2 of CN08 connector on the heater modulation PCB.

This thermostat starts the burner only when room temperature lowers under set value.

### Timer

Wire timer contact in series with room thermostat to terminals IDC2 and ID2 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 IDC1, ID1 of connector CN02. THE installation of a room or Smartweb thermostat is mandatory. The burner works only if terminals IDC2 and ID2 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 one-stage, 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**

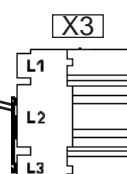
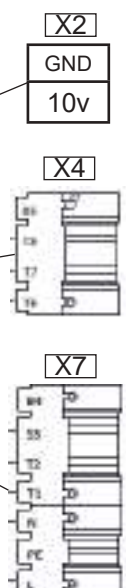
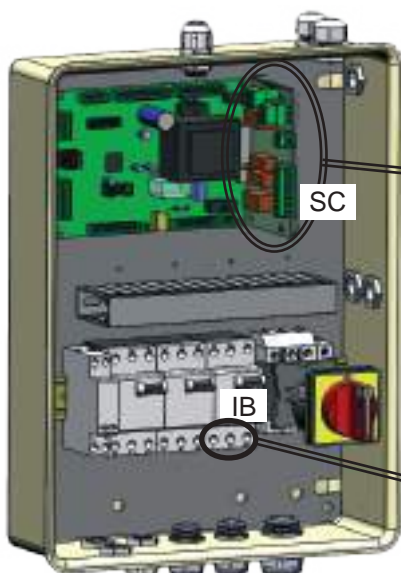
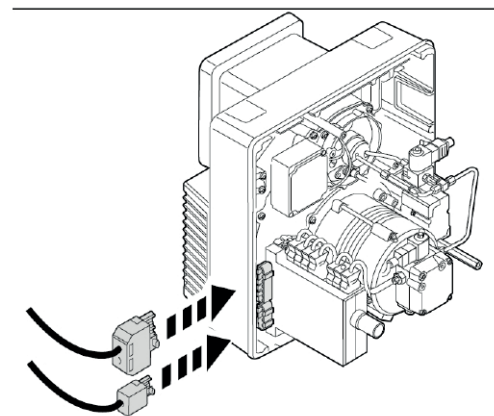
### Single-phase burner

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





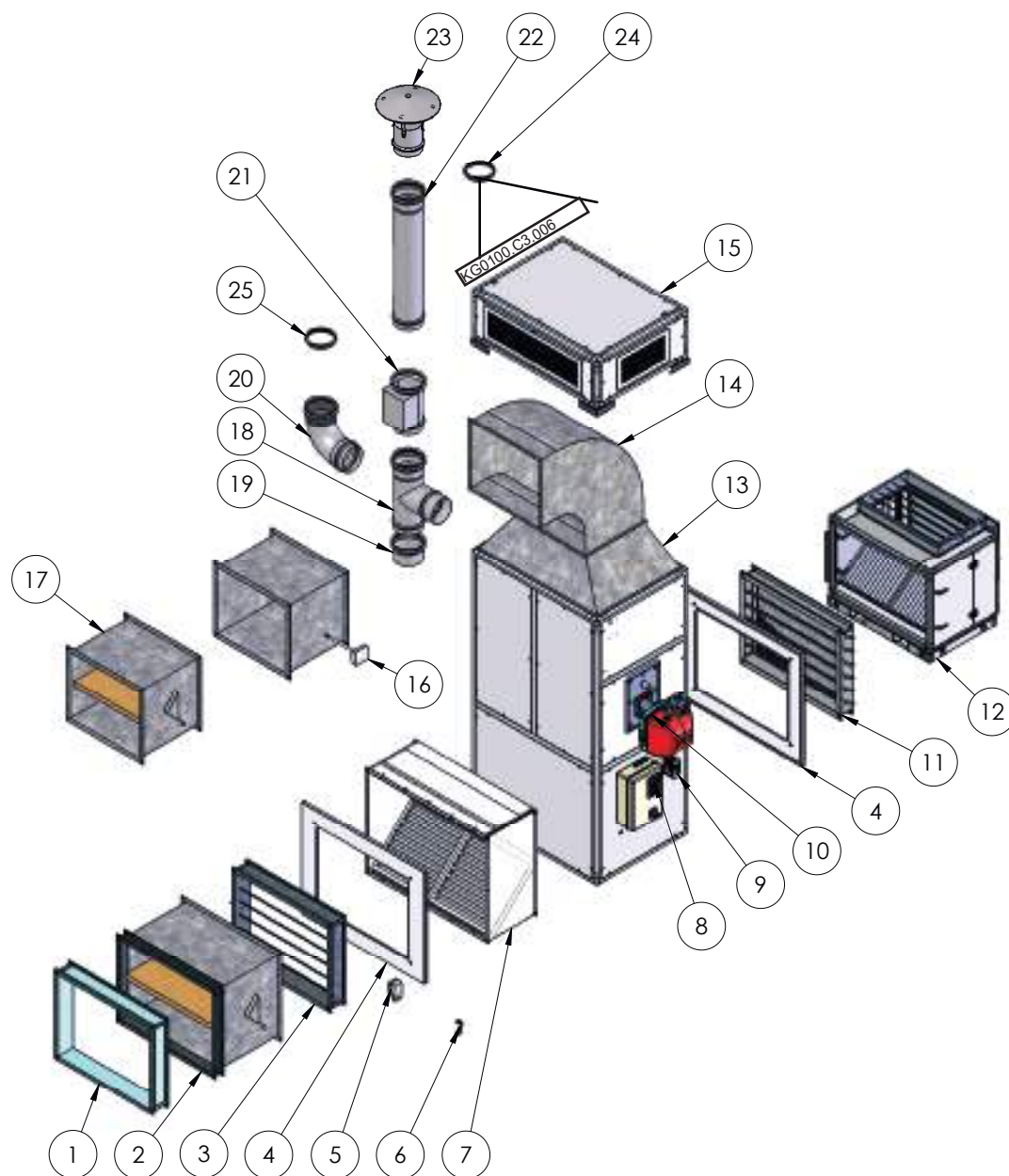
# Floor Standing Warm Air Heater PK series

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

# 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. THE installation of a pressure switch is recommended to stop the heater when threshold is exceeded (indicative value of 150 Pa).**

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]	
032	650	500	60	47
060	825	625	60	61
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
700	2950	1290	630	63
900	3550	1420	720	67
1M2				
320-xHA	1960	1140	510	57
420-xHA	2170	1340	630	57
550-xHA	2600	1340	630	63
700-xHA	2950	1600	630	63
900-xHA	3550	1700	720	67
1M2-xHA				80

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

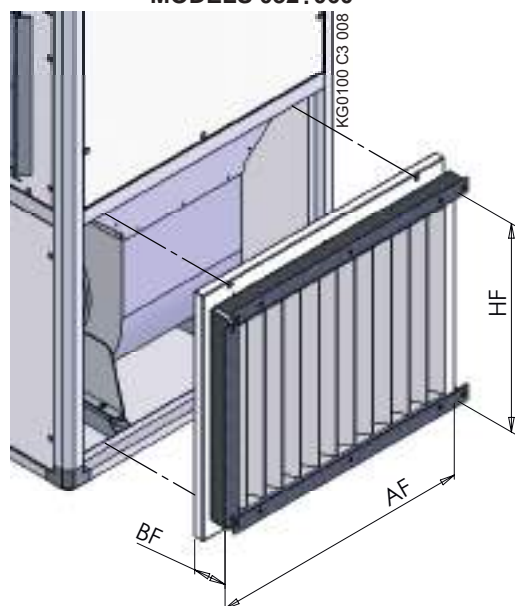
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# Floor Standing Warm Air Heater PK series

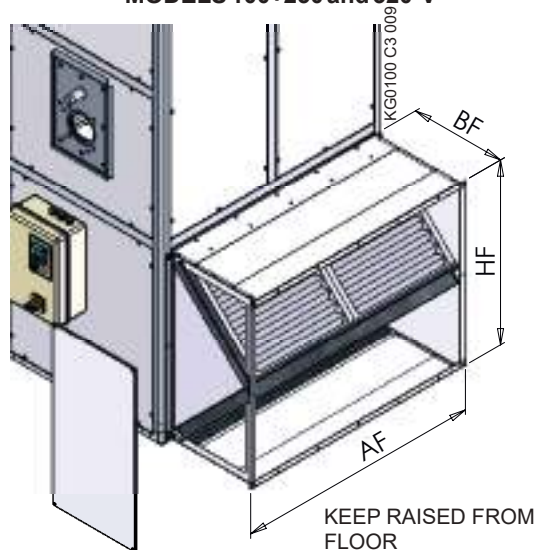
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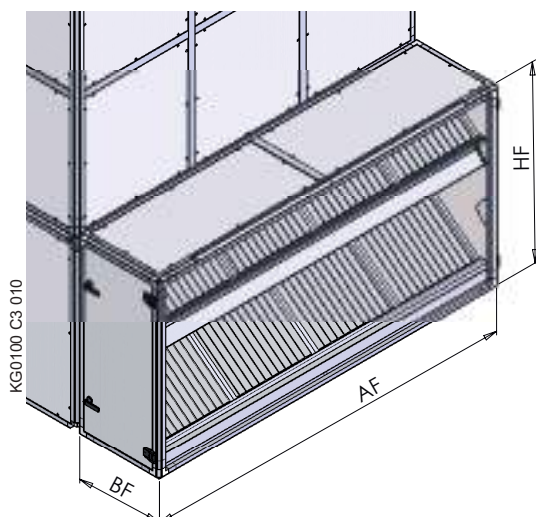
MODELS 032÷060



MODELS 100÷250 and 320-V



MODELS 420÷1M2 and 320-H



## Installing the Filters

Three 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÷1M2), 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.
FLXPKA032NA FLXPKA032NA-H	48	G01950	1		
FLXPKA060NA FLXPKA060NA-H	48	G12655	2		
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 FLXPKA420NA-H	96	G04005	12		
FLXPKA550NA FLXPKA550NA-H	96	G07209	12		
FLXPKA700NA FLXPKA700NA-H	96	G07209	12	G02638	3
FLXPKA900NA FLXPKA900NA-H FLXPKA1M2NA FLXPKA1M2N-H	96	G07209	12	G04005	6

# Floor Standing Warm Air Heater PK series

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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);

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.

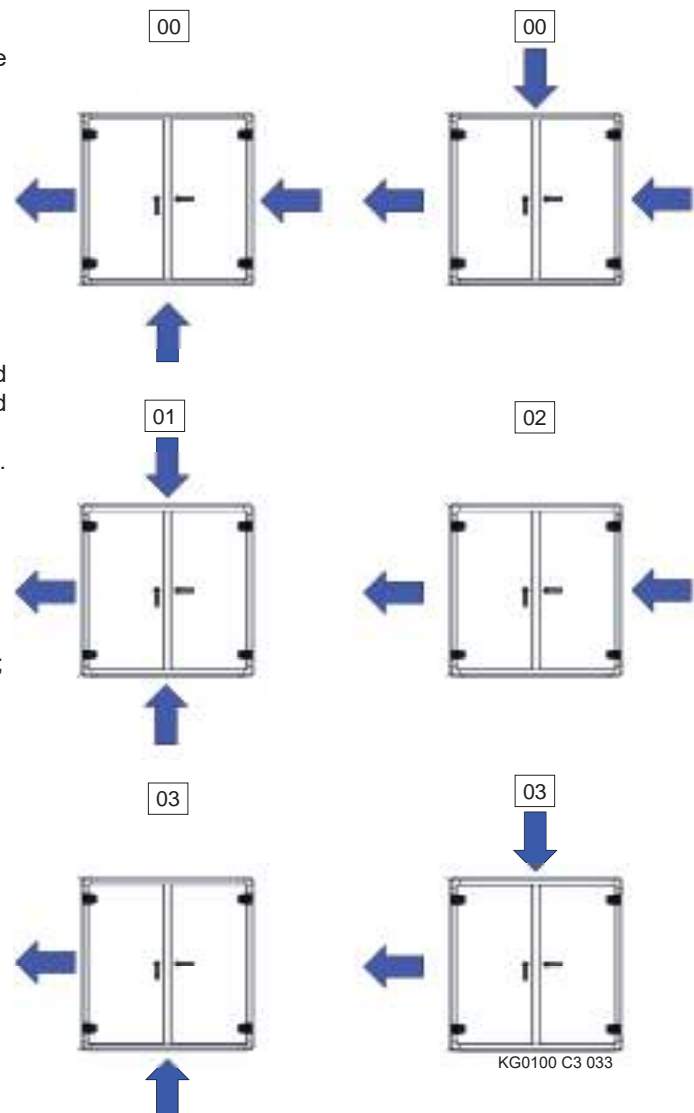
Mixing box code is the following:

### 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
M032	750	530	
M060	995	700	
M100	1100	880	
M140	1330	920	
M190	1460	1060	
M250	1750	1140	
M320	1960	1140	
M420	2170	1240	
M550	2600	1340	
M700	2950	1600	
M900	3550	1700	
M1M2			





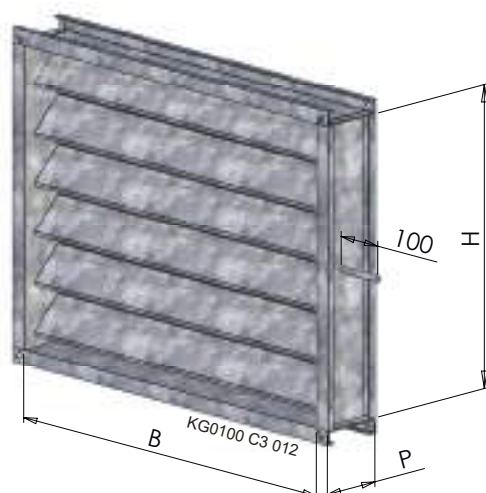
# Floor Standing Warm Air Heater PK series

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## 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]
032	G09884	450	410	130	35	30
060	G09904	600	510	130	35	30
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
700	G09984	2470	810	130	35	30
900	G09994	3070	810	130	35	30
1M2						

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);
- servocontrol for modulating control 0-10 Vdc (24V).

If a motor-assisted control is installed, a control is needed in addition to servomotor. This control can be of the following types:

### ON-OFF

- for ON-OFF models, the control can be made with a simple switch/diverter that, based on the position, opens or closes the shutter (divisions can be performed with the mechanical limit switches on the servomotor).

### Modulating

- MODULATING controls need a controller that regulates the shutter based on the output (0-10 Vdc signal) from a value such as temperature, humidity, air flow rate, and so on. As an alternative, you can also use a potentiometer (0-10 Vdc), to manually set the shutter based on your needs.

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
032-140	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
420-1M2	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
All models	G17745	Shutter spacer - 0-10 Vdc - for modulation servomotors (24V power supply unit)

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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.

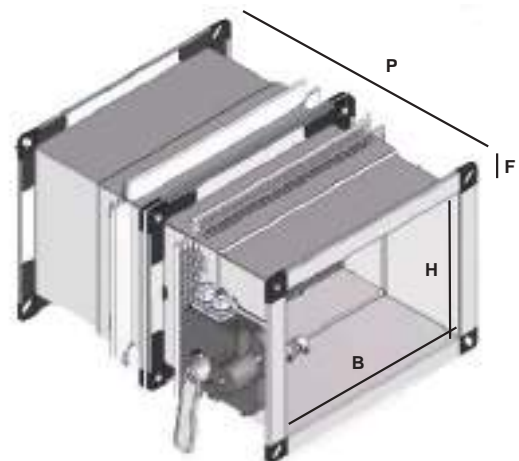
Fire dampers are EC marked.

### ON INTAKE

PK Model	Code	B	H	P	F
032	G09886	450	400	500	35
060	G09906	600	500	500	35
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
700	G09984-T	2470	800	500	35
900 - 1M2	G09994-T	3070	800	500	35

### ON DELIVERY

PK Model	Code	B	H	P	F
032 - 060	G09886	450	400	500	35
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
700	G09984-T	2470	800	500	35
900 - 1M2	G09994-T	3070	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.



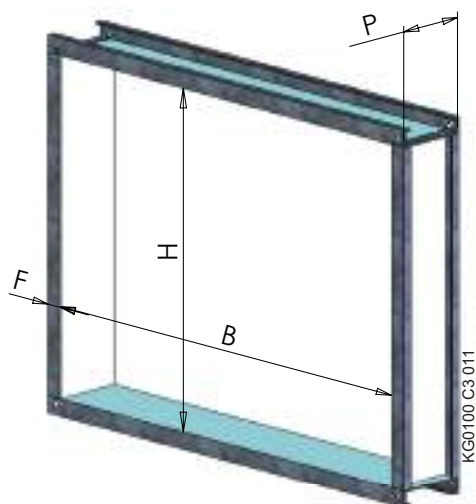
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## VIBRATION DAMPING JOINT

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.

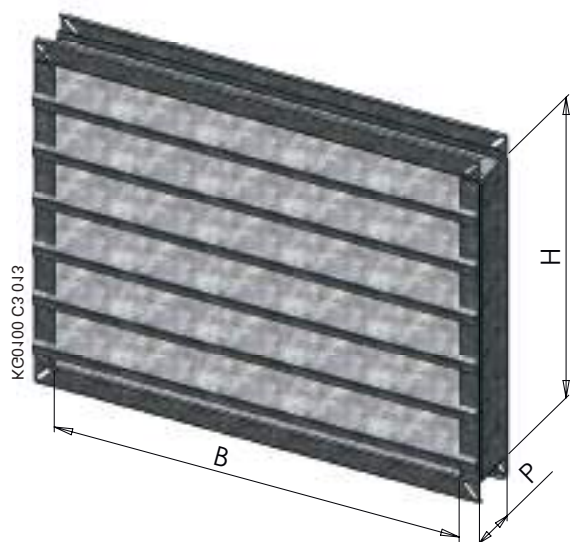


PK Model	Code	B	H	P	F
	Shutter	[mm]	[mm]	[mm]	[mm]
032	G09887	460	410	150	30
060	G09907	610	510	150	30
100	G09917	810	610	150	30
140	G09927	1010	610	150	30
190	G09937	1210	710	150	30
250	G09947	1410	710	150	30
320	G09957	1510	810	150	30
420	G09967	1510	810	150	30
550	G09977	1980	810	150	30
700	G09987	2480	810	150	30
900 - 1M2	G09997	3080	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
032	G09885	450	410	105	40
060	G09905	600	510	105	40
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
700	G09985	2470	810	105	40
900 - 1M2	G09995	3070	810	105	40

KG0100 ET 018 - RAIN DEFLECTORS

# Floor Standing Warm Air Heater PK series

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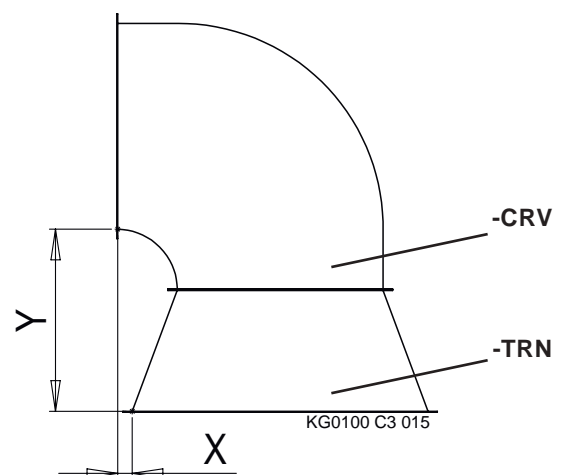
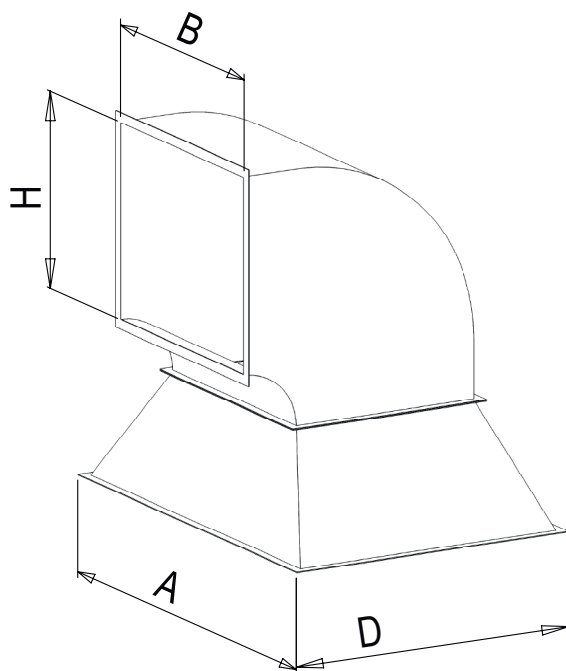
## ACCESSORIES FOR AIR DELIVERY

### 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
032	G09889	670	450	460	410	30	75	400
060	G09909	915	620	460	410	30	45	450
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
700	G05288	2850	1500	2480	810	30	-100	750
900 - 1M2	G05298	3450	1600	3080	810	30	-150	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 aluminium for 032-060 models, and 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°).

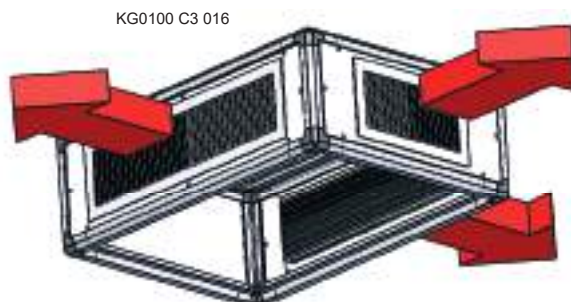
STANDARD VERSION - 2 SHORT SIDES - 1 LONG SIDE

PLENUM Code	Short Side		Long Side		H	VK	Blow distance	ΔP
	No.	Louvre size	No.	Louvre size	mm	m/s	m	Pa
PLXPKA032NA	2	300x160	1	500x160	330	6.7	19	28
PLXPKA060NA	2	500x160	1	600x160	330	7.9	22	41
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
PLXPKA700NA	4	600x400	4	600x400	630	10.7	29	79
PLXPKA900NA	4	800x400	4	600x400	630	11.8	32	98



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
PLXPKA032NA-1	1	300x160	2	500x160	330	5.6	16	19
PLXPKA060NA-1	1	500x160	2	600x160	330	7.5	21	36
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
PLXPKA700NA-1	2	600x400	8	600x400	630	8.6	24	48
PLXPKA900NA-1	2	800x400	8	800x400	630	8.7	24	50



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

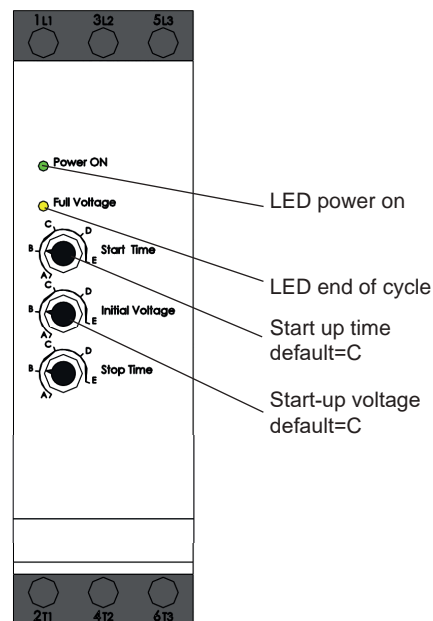
APEN supplies soft starters as a standard for motors with an output equal or higher than 5.5 kW.

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.



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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 22 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	
VVPK060-10A	
VVPK060-20A	
VVPK100-00A	
VVPK100-10A	
VVPK100-20A	
VVPK140-00A	
VVPK140-10A	
VVPK140-20A	
VVPK190-00A	
VVPK190-10A	
VVPK190-20A	
VVPK250-00A	
VVPK250-10A	
VVPK250-20A	
VVPK320-00A	
VVPK320-10A	
VVPK320-20A	
VVPK420-00A	
VVPK420-10A	
VVPK420-20A	
VVPK550-00A	
VVPK550-10A	
VVPK550-20A	
VVPK700-00A	
VVPK700-10A	
VVPK700-20A	
VVPK900-00A	
VVPK900-10A	
VVPK900-20A	
VVPK1M2-00A	
VVPK1M2-10A	
VVPK1M2-20A	



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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.

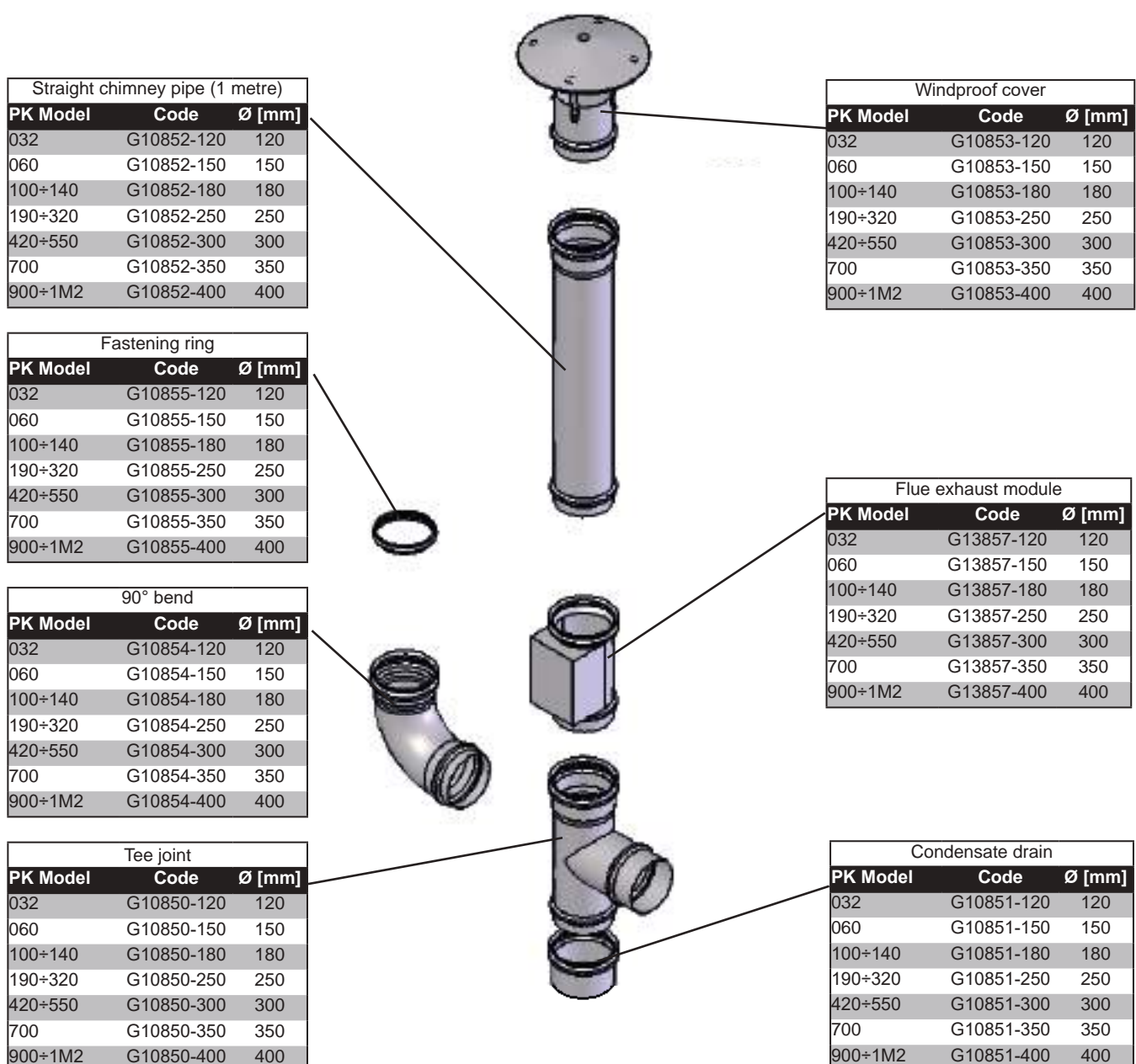
Components have male/female rotating facing. Clamps are only required for chimneys longer than 2 metres.

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  $\leq 50 \text{ mg/m}^3$ ;  
**V2** - liquid fuels, natural gas, LPG and manufactured gas  $> 50 \text{ mg/m}^3$ ;  
**V3** - solid fuels, natural gas, LPG and manufactured gas  $> 50 \text{ mg/m}^3$ ,  
gas 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°C and efficiency of approx. 89%;
- K series: flue gas temperature of approx. 190°C and efficiency of approx. 92%;
- R series: flue gas temperature of approx. 140°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:

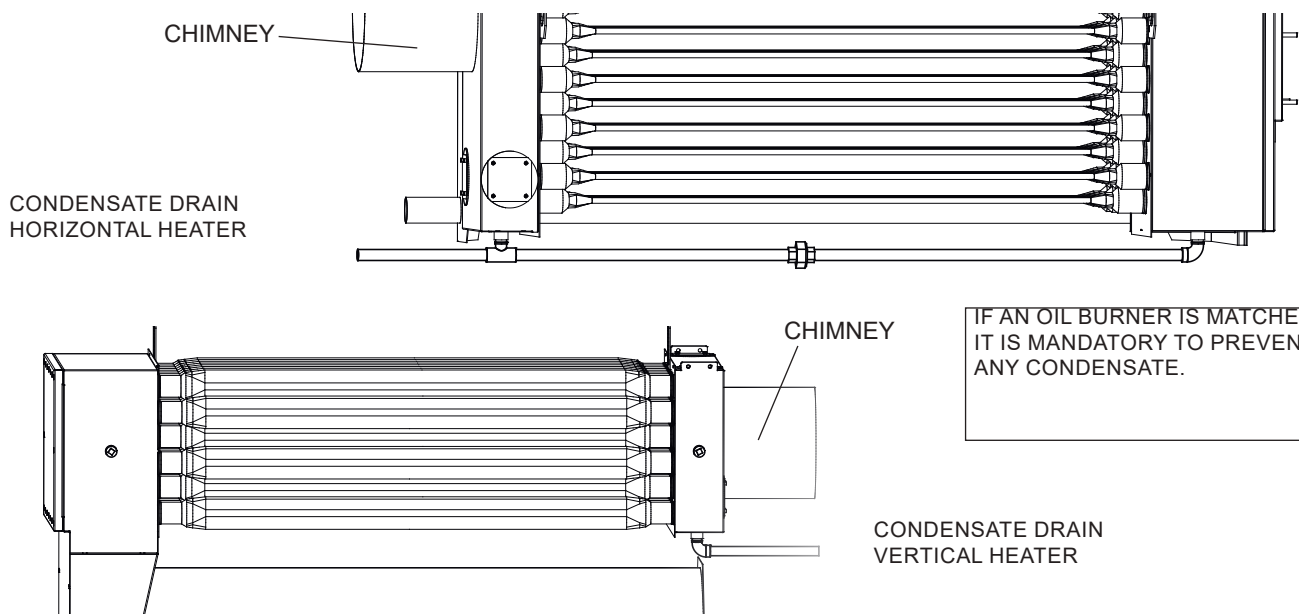
G00740-xxx-H (horizontal)

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

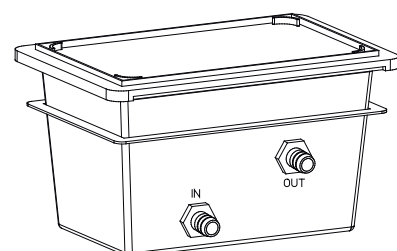
If the heater is installed indoor and a condensate drain system is provided, the siphon must be smoke proof.

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 from PK032 to PK100
- G10858 from PK140 to PK320;
- G05750 from PK420 to PK1M2.



## 6.5. Electrical Wiring and Diagrams

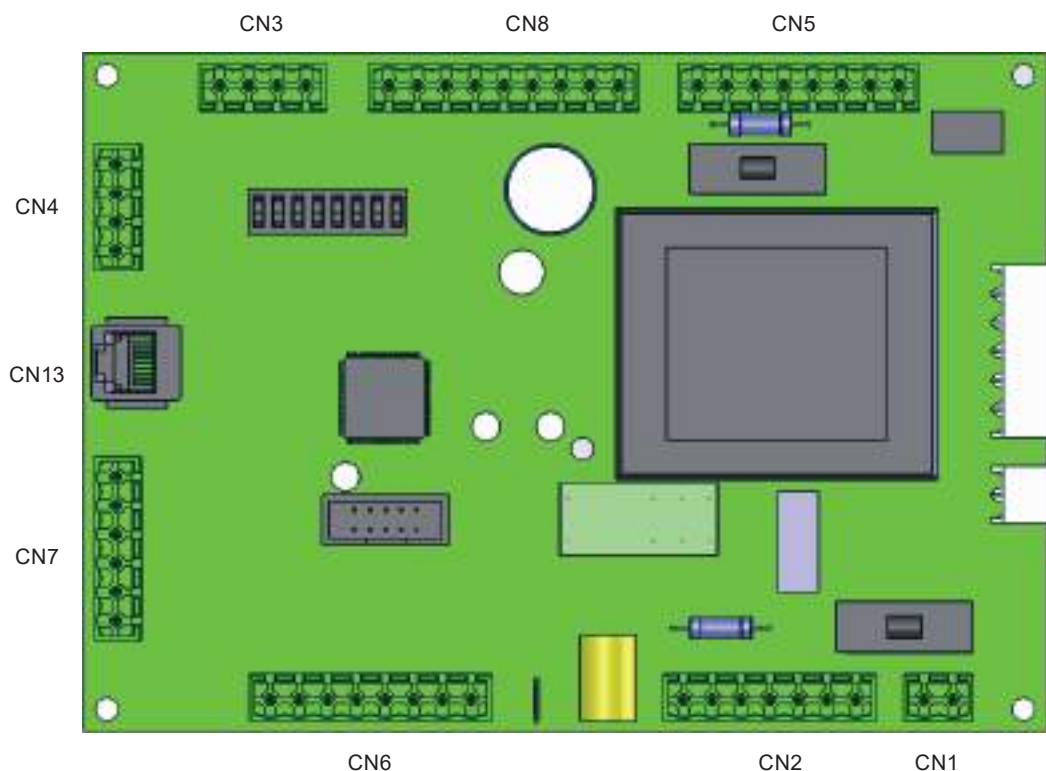
The use of a CPU modulation electronic board simplifies the wiring diagram of all models.

The board includes the following connectors:

Connector	Function
CN1	Power supply input
CN2	Connector reserved for connection of fire damper(s) and control of fan motor(s)
CN3	Connector reserved for the burner PWM connection
CN4	Connector reserved for SMART EASY/WEB connection
CN5	Connector reserved for burner control connection
CN6	Connector reserved for inverter alarm, pressure probe and filter probe connection
CN7	Connector reserved for air intake probe connection
CN8	Connector reserved for burner alarm and STB triggering
CN13	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 ID6 on the modulation board, alarm F35 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.



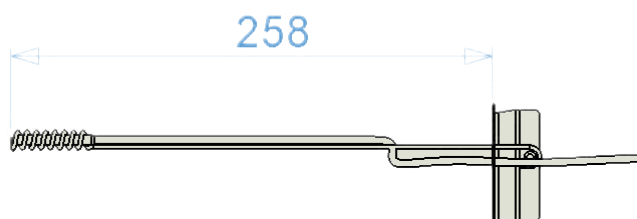
# Floor Standing Warm Air Heater PK series

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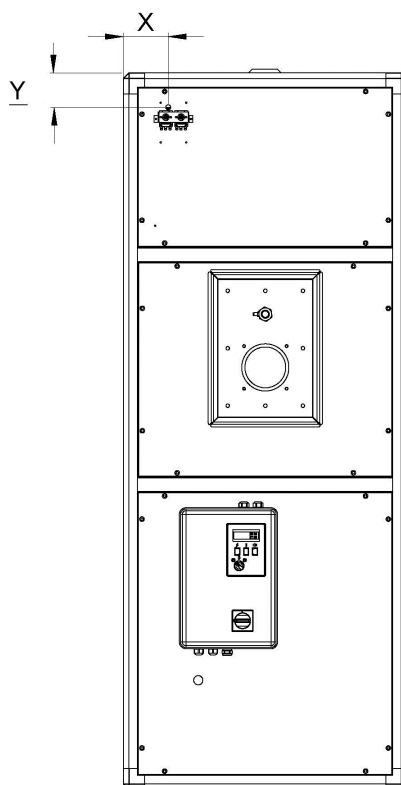
## NTC 10K intake probe

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.



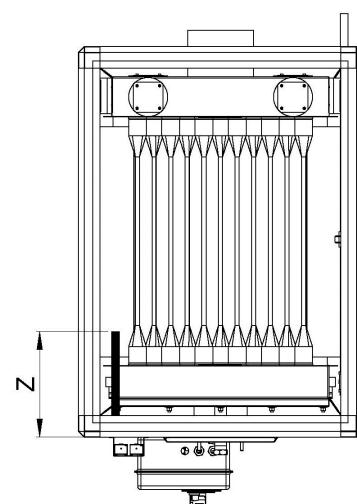
STB THERMOSTAT POSITION

PKModel	Thermostat	X	Y	Z	
032/35	G12450	85	135	350	
060					
100/120					
140					
190					
250					
320		95	145		
420					
550					
700					
900/1M2					



NTC PROBE POSITION

PKModel	Probe	X	Y	Z
032/35	G16401	95	85	258
060				
100/120				
140				
190				
250				
320		105	95	
420				
550				
700				
900/1M2				



# Floor Standing Warm Air Heater PK series

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## 6.6. Burner Matching

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

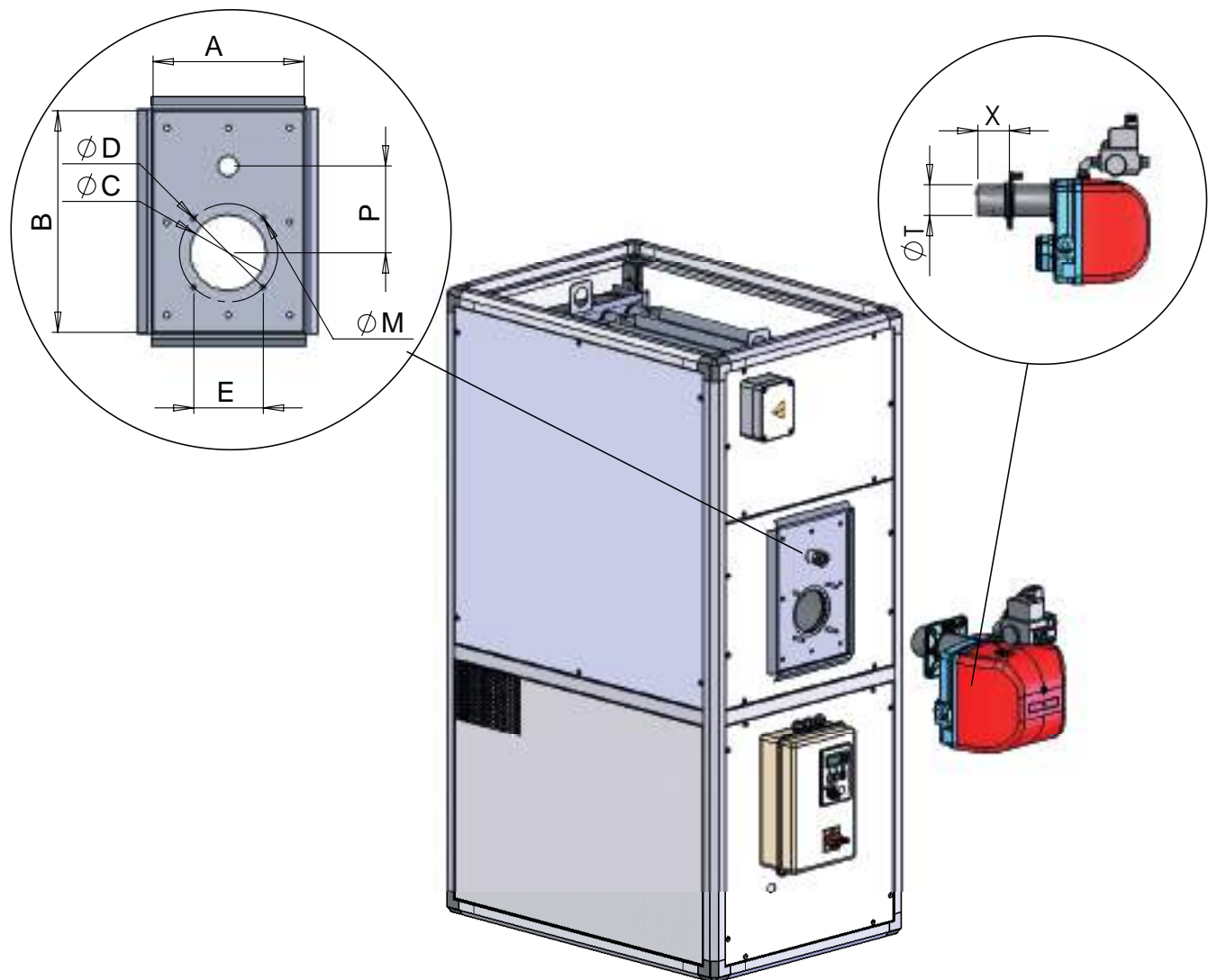
**Important. Nosepiece length must be greater than "X" min value. Shorter nosepieces could damage the exchanger and void the guarantee.**

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]								
032	150	220	135	150	270	382	115	170	M8	120
060-100	150	220	135	150	270	382	133	170	M8	120
140	270	350	190	175	414	454	140	175	M8	124
190-250	270	350	190	175	414	454	160	223	M8	158
320	270	350	230	230	464	484	160	223	M8	158
420-550	270	350	230	230	464	484	190	269	M8	190
700-900-1M2	350	480	290	280	560	590	210	325	M10	230

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## 6.7. 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	700	900	1M2
		max	max	max	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	82.0	103.1	117.4
CARBON DIOXIDE -CO <sub>2</sub> CONTENT	[%]	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
FLUE GAS TEMPERATURE	[°C]	273	230	270	285	270	270	230	250	250
FLUE GAS MASS FLOW RATE	[kg/h]	305.4	360.2	485.5	595.1	795.5	1049.2	1281.0	1609.9	1832.3

Table K series PK gas flow rates in the heater work range

TYPE OF GAS G20 - Cat. E-H													
TYPE OF MACHINE		032	060	100	140	190	250	320	420	550	700	900	1M2
		max	max	max	max	max	max	max	max	max	max	max	max
SUPPLY PRESSURE	[mbar]	according to the burner											
GAS CONSUMPTION (0°C-1013mbar)	[Nm³/h]	3.5	7.2	11.4	15.2	20.1	27.1	34.8	45.6	59.7	75.8	88.3	113.3
CARBON DIOXIDE -CO <sub>2</sub> CONTENT	[%]	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
FLUE GAS TEMPERATURE	[°C]	182	187	183	179	178	192	184	186	187	185	178	177
FLUE GAS MASS FLOW RATE	[kg/h]	54.2	112.8	178.5	238.0	313.2	422.8	543.4	712.5	931.8	1183.9	1378.1	1769.6

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

TYPE OF GAS G20 - Cat. E-H												
TYPE OF MACHINE		032	060	100	140	190	250	320	420	550	700	900
		max	max	max	max	max	max	max	max	max	max	max
SUPPLY PRESSURE	[mbar]	according to the burner										
GAS CONSUMPTION (0°C-1013mbar)	[Nm³/h]	3.2	5.8	9.0	12.2	16.2	21.8	27.6	34.6	45.1	60.1	76.2
CARBON DIOXIDE -CO <sub>2</sub> CONTENT	[%]	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
FLUE GAS TEMPERATURE	[°C]	170	162	151	146	142	135	130	125	125	125	120
FLUE GAS MASS FLOW RATE	[kg/h]	50.1	90.8	140.9	191.1	253.7	339.8	430.7	540.3	704.7	938.1	1190.2

## 6.8. 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 gas oil burner.

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

Reference values are included in tables of Paragraph 6.8.

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

A red lamp on control panel indicates that STB safety thermostat has triggered.

#### - 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 F21 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 gas 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.

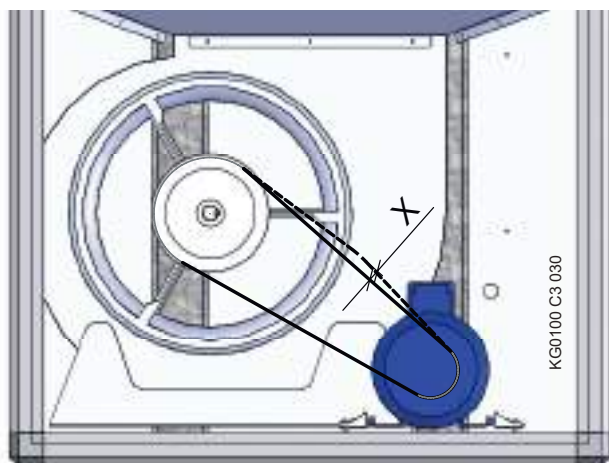
### Checking Transmission Belts

**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 gas 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.

### Inspecting 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 gas 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.

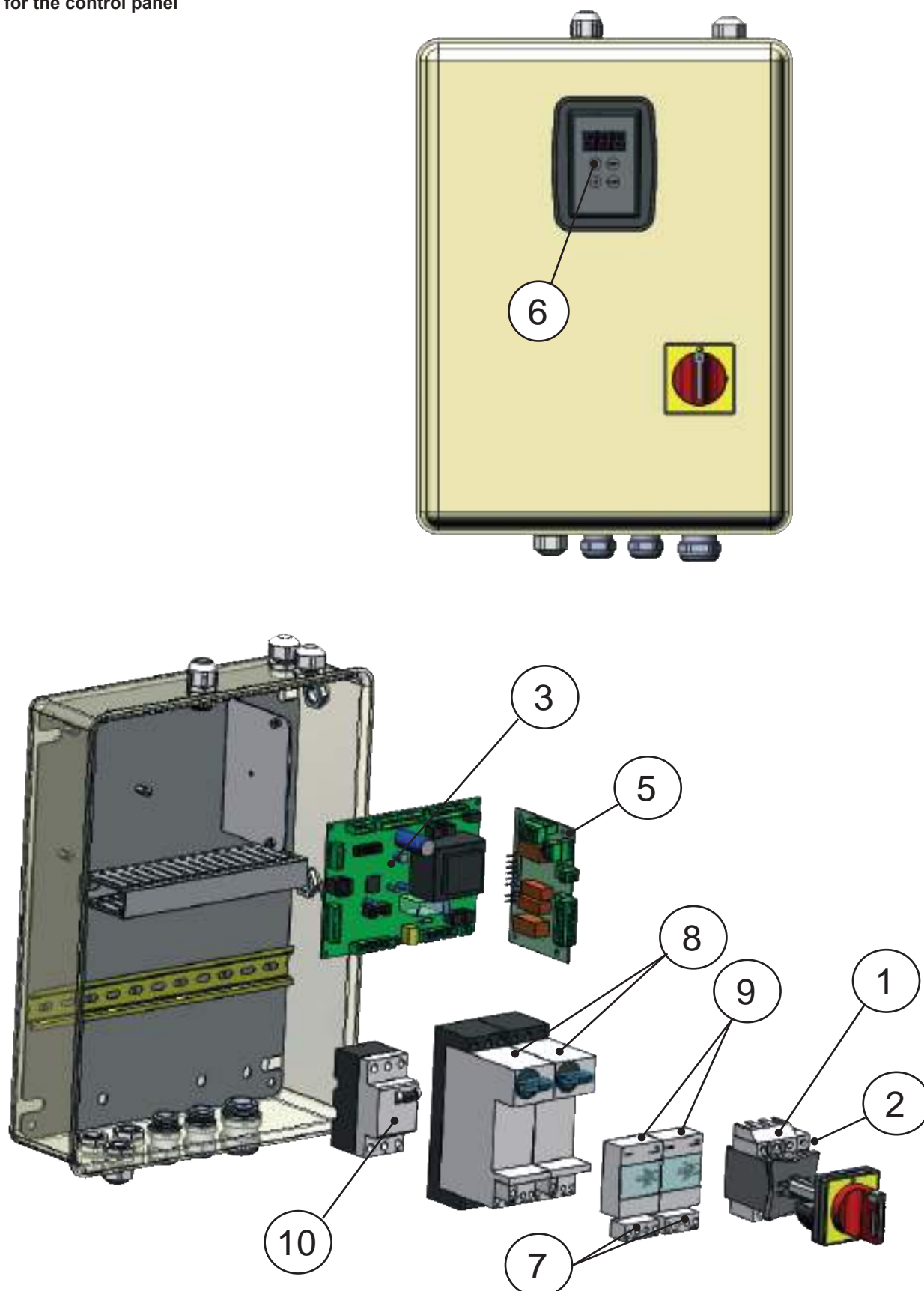
Clean the internal part of the trap, it is possible to clean the trap under running water by checking that all ducts are free. Check the seal conditions.

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

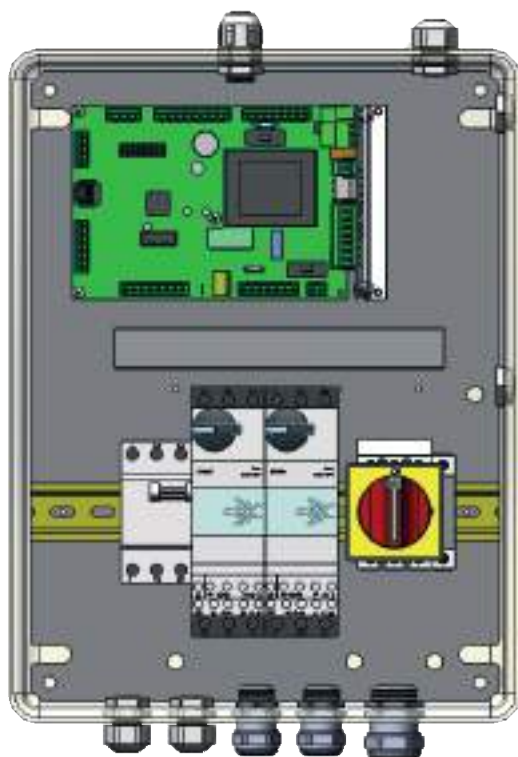


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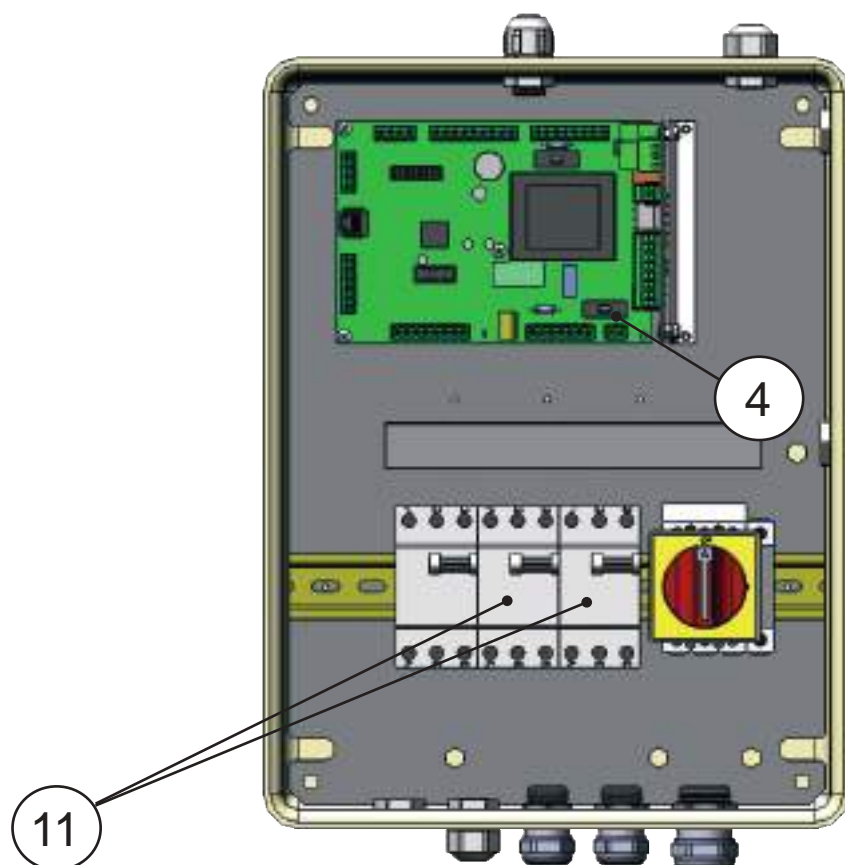


DIRECT START-UP  
CONTROL PANEL



12

START-UP CONTROL PANEL WITH  
INVERTER





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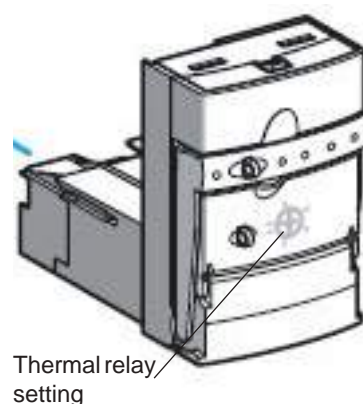
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TABLE OF CONTROL PANEL COMPONENTS

POS.	Description	Code	Regulation	Use
1	Main door lock switch	G10067	32A	models from 060-10A to 700-00A
		G10068	63A	700-10A and 20A models; all 900 and 1M2 models
2	Disconnecter Neutral	G10074	20/40A	all models up to 700-00A included
		G10075	63/80A	700-10A and 20A models; all 900 and 1M2 models
3	Modulation Board	G16800.04		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 1M2
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	700-10A, 700-20A, 900-00A, 900-10A, 900-20A, 1M2-00A, 1M2-10A
		G18043	15 kW	1M2-20A

Motor kW	Current In 400V-50Hz	Number of rpm	Thermal Relay	
G02325-IE3	1.1	2.6	1440	G02216 1.2-5A
G01430-IE3	1.5	3.6	1440	
G01490-IE3	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	1460	
G01022-IE3	7.5	14.1	1460	G02218 4.5-18A
G07371-IE3	9.2	17.1	1460	G02219 8-32A
G00837-IE3	11.0	20.4	1465	
G01973-IE3	15.0	27.3	1465	



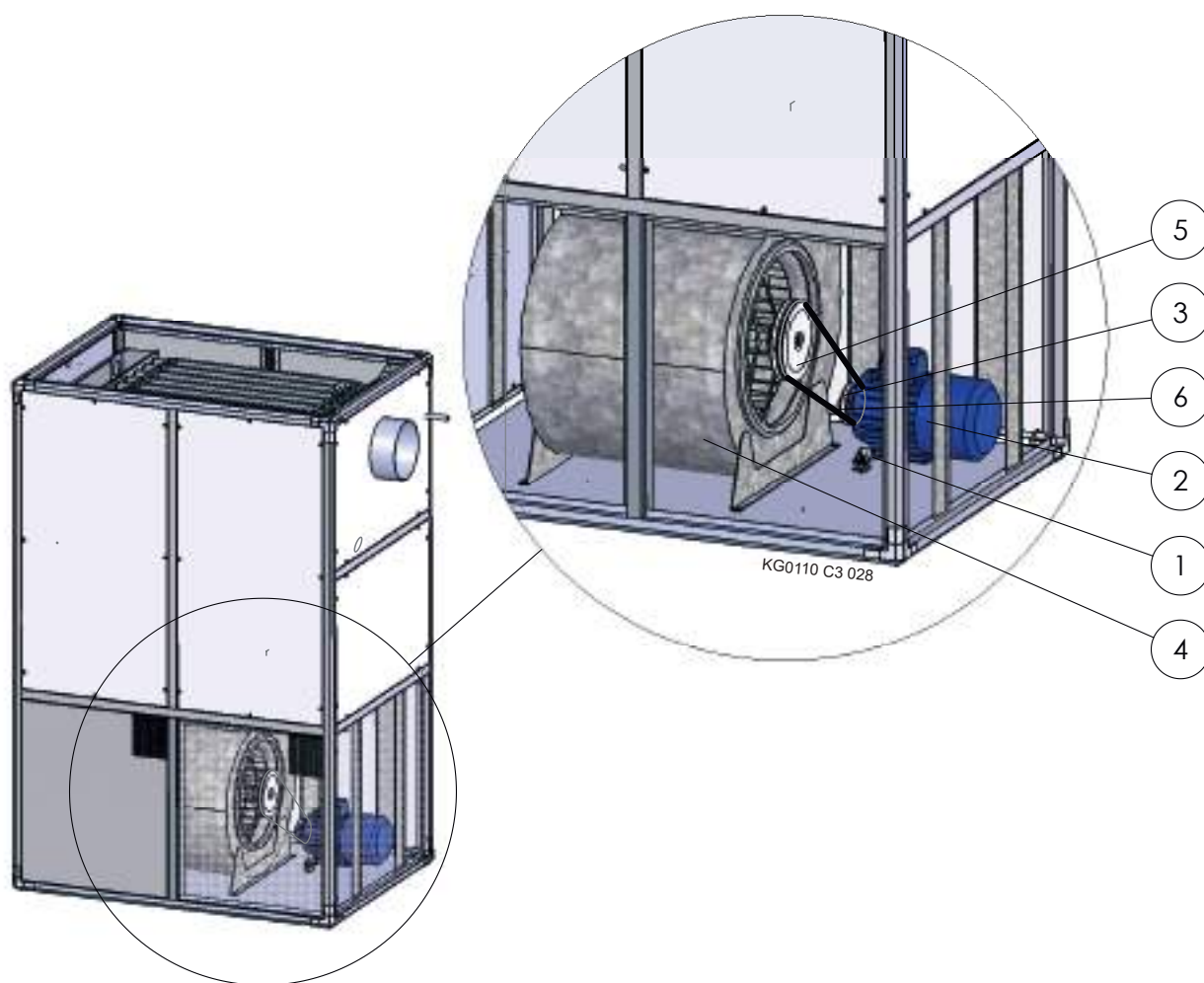


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REFERENCE	DESCRIPTION
1	BELT TENSIONER
2	ELECTRICAL MOTOR
3	DRIVING PULLEY
4	FAN
5	DRIVEN PULLEY
6	TRANSMISSION BELT



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TABLE OF VENTILATION SPARE PARTS

Heater Model	Fan code	No.	Driven pulley		Electrical Motor code	Driving pulley		Belt		
			pulley	shell		pulley	shell	code	No.	
060-10A	G04288	1	G07356	G07406	G02325-IE3	G00393	G00525	G00581	1	
060-20A			G00708		G01430-IE3	G00419				
100-00A	G02324	1	G07231	G07406	G02325-IE3	G00393	G00525	G00613	2	
100-10A			G07318		G01430-IE3					
100-20A			G07356		G01490-IE3		G00392			
140-00A	G01440	1	G07318	G07406	G01260-IE3	G00393	G00392	G00582	2	
140-10A			G01619		G00419					
140-20A			G07356			G00137-IE3				
190-00A	G04133	1	G07231	G07406	G01260-IE3	G00393	G00392	G00509	2	
190-10A			G01809							
190-20A			G07318							G00137-IE3
250-00A	G01440	2	G01619	G07406	G01490-IE3	G00403	G00392	X01843	4	
250-10A						G00393				
250-20A			G00708		G01260-IE3					
320-00A	G04133	2	G07231	G07406	G01490-IE3	G00403	G00392	G07089	4	
320-10A			G01619		G01260-IE3	G00393				
320-20A			G07318		G00137-IE3					
420-00A	G04133	2	G01619	G07406	G00137-IE3	G00393	G00392	G02027	4	
420-10A			G01809		G01181-IE3	G00419	G00864	G01953		
420-20A			G01619							
550-00A	G00865	2	G00867	G01957	G01260-IE3	G00393	G00392	G00868	4	
550-10A			G00866		G00137-IE3					
550-20A					G01181-IE3	G00419	G00864			
700-00A	G00871	2	G00290	G01957	G00137-IE3	G00393	G00392	G00420	4	
700-10A					G01181-IE3	G00419	G00864			
700-20A					G01022-IE3	G07232	G01954			
900-00A	G00836	2	G00128	G00827	G01022-IE3	G00828	G01954	G00420	8	
900-10A					G07371-IE3	G01128				
900-20A			G00839		G00837-IE3	G00828	G00833	G00129		
1M2-00A	G00836	2	G00128	G00827	G07371-IE3	G00828	G00833	G00420	8	
1M2-10A					G00837-IE3	G01128				G00130
1M2-20A			G00839		G01973-IE3					

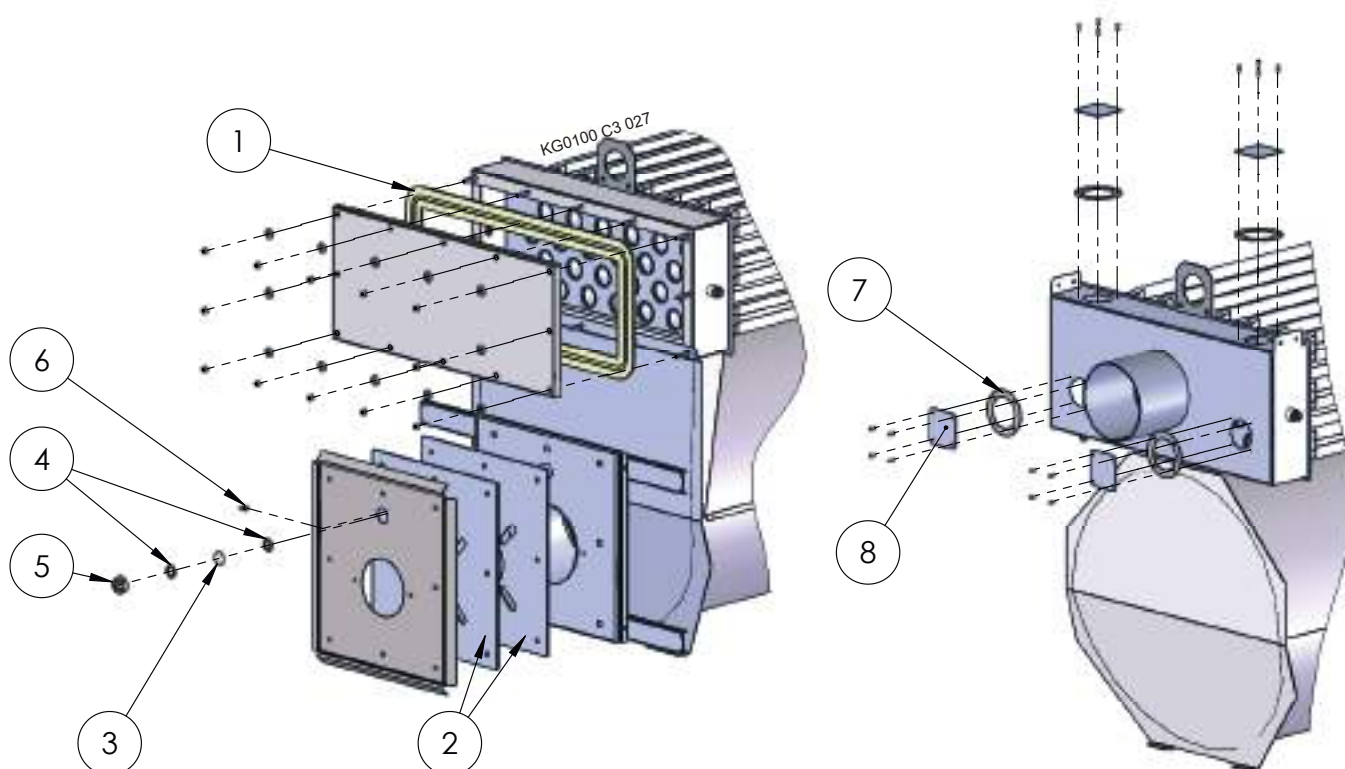
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## HEAT EXCHANGER SPARE PARTS

POS.	Description	Code	Use
1	Flue system gasket	X01415	Any heaters, any models; in metres
2	Burner plate gasket* <small>*NOTE: To be cut according to the burner head diameter</small>	G01190	From model 032 to model 100 included
		G07819	From model 140 to model 250 included
		G08119	From model 320 to model 550 included
		G08426	For models 700, 900 and 1M2
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 032 to model 550 included
		G08444	For models 700, 900 and 1M2
8	Flue inspection panel	G11142.08	From model 032 to model 550 included
		G08423	For models 700, 900 and 1M2



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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 probe	G16401	All heater models



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