User, Installation, and Maintenance Manual
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1. GENERAL WARNINGS

This manual is an essential component of the product and must always accompany it.
If this equipment is sold or transferred to another owner, ensure that the manual is follows it, to enable the new installer/owner to consult it.
The manufacturer disclaims any liability (under contract provisions or otherwise) for damage to persons, animals, or objects resulting from wrong installation or misuse, and/or non compliance with the manufacturer’s instructions.
This unit is intended only and exclusively for the use for which it has been built. Any different, wrong, or unreasonable use is to be considered improper and therefore dangerous.
For the installation, the operation and the maintenance of the unit, the user shall strictly follow the instructions stated in this manual.
Any installation, maintenance or servicing operations shall be performed only by authorised personnel, with specific technical skills in the heating field.
First start-up, conversion to another gas type and maintenance must be exclusively carried out by qualified personnel appointed by Apen Group authorised Service Centers.
APEN GROUP’s business organization can count on a widespread network of approved Technical Support Centres. For information, contact your local Representative or directly the Manufacturer.
The unit is covered by a guarantee whose conditions and validity are specified on the relevant certificate.
The manufacturer declares that the unit is workmanlike built in compliance with UNI, UNI-CIG, and CEI technical regulations, and according to the relevant laws and to the Gas Directive 90/396/CEE.

Reference regulations:
- UNI-CIG 7129 regulating appliances fired with natural gas.

2. SAFETY WARNINGS

This section describes the safety rules for operators.

2.1 Fuel

Before starting the heater, check that:
- Gas supply specifications match those on the rating plate
- Combustion air inlet pipes (if installed) and flue discharge pipes are exclusively those specified by the manufacturer.
- The grid of combustion air intake system is free from debris, leaves, etc.
- Internal and external sealing of the fuel supply system is tested in compliance with the law.
- The heater’s fuel is the one specified for the unit.
- The unit is correctly sized to match required flow and includes all safety and control devices required by the law.
- Gas pipes and air distribution ducts for ducted heaters have been properly cleaned.
- Fuel capacity adjustment matches equipment power rating.
- Fuel supply pressure matches values on rating plate.

2.2 Gas Leaks

If you smell gas:
- Do not operate electrical switches, telephone or any other object or device that can cause sparks.
- Immediately open doors and windows to vent the room.
- Close gas valves.
- Call for qualified personnel.
2.3 Power Supply

The heater shall be correctly wired to an efficient grounding system, complying with existing regulations (CEI 64-8).

**WARNING:**
- Check the grounding system or have it checked by qualified personnel, if necessary.
- Make sure network wire gauge suits the unit rated input shown on rating plate and in this Manual.
- Do not reverse neutral and phase wires.

The heater can be plugged into mains using a plug-socket only if the latter prevents any mix up of phase and neutral wires.
- The system wire gauge in general, and cable section in particular, must suit the unit rated input shown on equipment data plate and in this Manual.

Do not pull electrical wires and keep them far from heat sources.

**REMARK:** A multipole switch with fuses and contact opening greater than 3 mm should be installed before the supply cable, in a visible and accessible position and within a 3-meter radius from the control board.

Any installation or maintenance operation concerning the electrical system must be accomplished by qualified personnel.

2.4 Use

Children and inexperienced people shall not be allowed to use any electrical appliance and users shall adopt the following precautions:
- Do not touch the unit with wet or damp parts of the body and/or barefoot.
- Do not leave the unit exposed to adverse weather conditions (rain, sunshine, etc.) unless the unit has been expressly designed to.
- Do not use gas pipes to ground electrical devices.
- Do not touch hot surfaces of the heater, such as flue pipes.
- Do not wet the unit either with water or other liquids.
- Do not put any objects on the unit.
- Do not touch moving parts of the heater while it is working.

2.5 Maintenance

Maintenance and combustion control operations shall be carried out in compliance with existing regulations and laws. Before running any servicing or cleaning, disconnect power and gas supply by means of main ON/OFF switch and/or appropriate detection devices.

In case of failure and/or improper operation, switch off the heater and do not attempt to repair it directly. Contact the authorised Service Centre.

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

If the unit is not used for long periods, shut the gas off using gas cocks and disconnect the unit from power supply.

If the unit is to be definitively decommissioned, in addition to above suggestions, any potential source of hazard shall have to be made inoffensive.

It is mandatory that the inlet of the Venturi tube on the burner-fan assembly is kept free from any debris or obstructions. In case it is not, a backfire from the pre-mix burner might occur.

2.6 Transport and handling

The heater is delivered fastened to a pallet and covered by paperboard.

Unload the heater from truck and move it to the installation place using a convenient system, suited to the weight of the load.

If the unit is stored at the customer’s premises, make sure a suitable place is chosen, sheltered from rain and excessive humidity.

Any lifting and transport operations must be accomplished by skilled personnel, adequately trained on working procedures and safety rules.

Once the unit is placed in the right spot, you can start unpacking it using suitable tools and protections, where necessary.

Materials resulting from unpacking shall be disposed of according to relevant regulations.

While unpacking the unit, check its integrity and its compliance to the order.

Should damages or missing pieces be found, immediately inform the supplier.

The manufacturer is not liable for any damages occurred during transport, handling, or unpacking.
3. TECHNICAL FEATURES

Modulating air heaters with condensation drainage system series PCH have been designed to serve as heating units into air treatment appliances and in roof-top equipment.

It takes advantage of premixing and modulation technology in order to guarantee top efficiency levels up to 105%. In addition, each module can be assembled into any kind of equipment that need to warm up air (such as dryers, air changes, etc.)

Modules work as standalone units. In order to start it up, just connect it to power and gas supply.

Module thermal power ranges from 10.1 to 93.4 kW. For higher values, several PCH heaters must be combined. They can be assembled in series or parallel configuration to reach the required output.

For instance, two PCH200 modules can reach a maximum output power of 394 kW with a modulation field ranging from 374 kW down to a minimum power of 55.7 kW, according to specific needs.

The units can be controlled in three ways:
• Incrementally, by means of an external 0-10 Vdc control.
• Through an ON-OFF control.
• Incrementally, when more units are installed.

When the PCH module is installed as a standalone unit, its front panel doesn’t require any cover.

Air is heated by contact with the combustion chamber and heat exchanger surfaces.

The heat exchanger complies with production requirements for equipment where combustion gases produce condensation set by EN1196 regulations.

The combustion chamber is entirely built in AISI 430 stainless steel while surfaces of components, such as the heat exchanger or the hood for flue collection, where condensation can be found, are made of AISI 304L, in order to provide high resistance to condensation.

The leading-edge design of the combustion chamber and the heat exchanger, the balancing of pressure drops and the extended surface, guarantee optimum efficiency and durability.

The burner is entirely built with stainless steel, and it takes advantage of special mechanical solutions to guarantee optimal reliability and performance rates, as well as high thermal and mechanical resistance.

Remote control allows you to control and display working phases and possible faults.

Note: Later in this manual it will be explained how to regulate the heater using a 0-10 Vdc signal. PCH modules can independently regulate room or delivery air temperature by means of a common NTC probe replacing the 0-10 Vdc signal. Ask Apen Group support for more information.
3.1 Efficiency

The main characteristic of PCH heaters is modulation, which means that thermal power output, and therefore power input and fuel consumption, vary according to heat request. When less heat is needed, the heater reduces gas consumption and increases efficiency up to 105% (efficiency upon Hi).

Intrinsic safety

The efficiency increase at minimum power is obtained through a sophisticated technique of air/gas mixing and by means of the simultaneous adjustment of the combustion air and gas flows.

This technique makes the unit safer since the ratio between the gas flow through the gas valve and the air flow always corresponds to the manufacturer’s setting. As opposed to the behaviour of atmospheric burners, here the CO2content remains steady throughout the whole working range of the heater.

If combustion air fails, the gas valve shuts up. If combustion air decreases, the valve automatically reduces gas flow without compromising optimal working parameters.

Low pollution

The pre-mix burner, coupled with the air/gas valve, allows “clean” combustion with very low polluting emissions.

3.2 Technical data

<table>
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<td>Minimum air flow * m3/h</td>
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<td>Max. applicable pressure Pa</td>
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Note: Minimum air flow has been calculated for a Δt value of 50°C, which is suitable for process plants or special applications.

AIR FLOW RATE / THROUGHPUT SPEED CHART

In air treatment, roof-top, and heating installations, use modules within a speed range from 3.0 to 7 m/s. Lower speeds require an accurate control of output temperature to prevent the safety thermostat from triggering. Higher speeds can be used depending on pressure drops generated in the module.
3.3 Working Cycle

Burner Operation

When heating is required, terminals 7/9 of CN6 [A] board close and the remote control launches modulation card working cycle. This card triggers the flame control device. The new CPU-PLUS card enables start-up when the 0-10 Vdc signal exceeds minimum startup threshold (see Electrical Wiring section).

The flame control device starts the burner fan [A], beginning to pre-wash the combustion chamber for a default period. Once this phase is over, the start-up cycle is initialised: the EV1 electrical valve opens simultaneously with the EVP valve, feeding the pilot burner [B].

After detecting the pilot flame, the device causes the EV2 main gas valve [C] to open and feed the main burner. Pilot and main burner work together for a short period, then the modulation card closes the EVP electrical valve, turning pilot burner [D] off.

A single electrode assures flame detection both for pilot and main burner.

The start-up cycle turns the burner on at intermediate capacity (about 70% of max. capacity). Two minutes after start-up, burner shifts to minimum capacity, then it starts modulating and can reach maximum capacity, if necessary, in the default time set in modulation card program.

During operation, the modulation card will regulate burner thermal power output according to 0-10Vdc voltage value available at 1/2 contacts of CN6 terminal board. This value must be issued by an external regulator, which is not supplied by APEN GROUP.

Turning off the burner

When heat request stops, 7/9 terminals of CN6 board open and the card turns off the burner [E], no matter what the 0-10Vdc voltage value is. The fan keeps cooling down the combustion chamber (post-washing) for the default time [F]. The opening of 7/9 terminals always turns the burner off. Using the new CPU-PLUS card, the burner can be turned off also using the 0-
**Note:** If cooling fans are separately controlled, please follow the time schedule specified in the following paragraphs.

**Start up**

The fan can be started together with the burner [G] or about 60 seconds later [H], in order to prevent cold air to be blown into the room. If an electrical protection device and/or an air flow control is installed on the fan, it must be connected in series to the burner’s ON position on 8/9 terminals of CN6 board.

**Turn off**

- When heating is no more required, the burner must be turned off (7/9 contacts of CN6 board) [I] and cooling fans must keep working for at least three minutes [L]. This will allow the heat exchanger to properly cool down. If post-washing phase is too short and the exchanger is not correctly cooled down, the following problems may arise:
  - Shorter life of the heat exchanger
  - The safety thermostat triggers and will require manual reset.

If, during the cooling cycle, a new heat request arises, the modulation card waits for the fan to stop, zeroes any counts, and starts a new cycle.

The minimum interval between a turn off and the subsequent start up depends on the value of one parameter of the modulation card which must be set in a range from 0 to 256 seconds.

**Safety thermostats**

Two safety thermostats with manual reset and positive safety are installed on the heating module. The breaking of the sensible element causes a safety state. Two thermostats, one before and one after the exchanger, are always assembled in order that the heater be installed either with rightward or leftward air flow.

The thermostats are wired in series. When the thermostat triggers, the flame detection device locks, turning the burner off.

This lock is displayed on the remote control (F2).

The heater is equipped with an air pressure switch controlling possible obstructions of flue and/or air intake pipes. This pressure switch is wired in series to the safety thermostats and operates identically, thereby causing the F2 lock on the remote control.

**Fx locks**

The modulation card can detect eight different types of failures:
- F1 - device lock caused by lack of flame.
- F2 - safety thermostat (or pressure switch) lock
- F3 - lock caused by the burner motor
- F4, F5, F6 - not used
- F7 - data transfer failure between CPU and remote control
- F8 - Failure of flame control device

F1 and F2 locks are caused by safety items and are therefore non-volatile, i.e. they require manual reset and cannot be removed by cutting and then turning on again power supply. F3 and F8 locks, though they are not safety locks, are non-volatile, too.

F4 to F7 locks are automatically removed when their cause is removed.

To reset F1 and F2 locks, read the relevant paragraph in the “User’s Instructions” section.

**3.4 Air/Gas Premixing Operation and Setting**

A burner that completely pre-mixes air and gas is mounted on PCH heaters. Air and gas are mixed inside the blades of the fan motor assembly.

Air is taken in through a calibrated Venturi pipe where gas is drawn by air vacuum.

The air/gas pressure ratio is 1:1 and this ratio can be adjusted by turning the offset screw on the gas valve. The heater is supplied with the offset already set and the screw sealed.

The burner can also be regulated by adjusting the screw on the Venturi which sets the value of maximum gas flow rate and therefore determines the carbon dioxide content (CO$_2$) in the flue (change in the offset curve). This setting is a factory default but the screw is not sealed in order to allow switching to another gas. To know how to regulate the offset value and the CO$_2$ content, see the “Assistance by the Service Centre” section.

The modulation card installed on the heater regulates the motor’s revolution speed (in DC) according to the required thermal power output. When motor revolution speed changes, air and gas flows change accordingly. The minimum and maximum fan speed values are set in the card and cannot be changed by the user and/or the installer.

![Graph of air and gas pressure ratio](image)

**Graph: Modified curve**
### 3.5 Dimensions

#### A: burner air inlet
#### S: flue outlet

<table>
<thead>
<tr>
<th>Heater Model</th>
<th>L (2)</th>
<th>B (3)</th>
<th>H (3)</th>
<th>B1 (2)</th>
<th>H1 (2)</th>
<th>L1 (1)</th>
<th>L2 (1)</th>
<th>L3 (3)</th>
<th>H2 (1)</th>
<th>H3 (2)</th>
<th>H4 (3)</th>
<th>H5 (3)</th>
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</table>

#### EXHAUST AND INTAKE

<table>
<thead>
<tr>
<th>Heater Model</th>
<th>E (4)</th>
<th>F (4)</th>
<th>G (1)</th>
<th>M (1)</th>
<th>ØS (1)</th>
<th>ØA (1)</th>
<th>N (1)</th>
<th>P (4)</th>
<th>R (4)</th>
<th>ØW (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCH032</td>
<td>106</td>
<td>180</td>
<td>75</td>
<td>195</td>
<td>80</td>
<td>80</td>
<td>204</td>
<td>373</td>
<td>60</td>
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<tr>
<td>PCH035</td>
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<td>45</td>
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<td>PCH043</td>
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<td>130</td>
<td>360</td>
<td>168</td>
<td>178</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

1. Fixed, unchangeable size.
2. Minimum dimensions can be increased by adding panels or spacers to existing panels.
3. Minimum dimensions. Larger dimensions are available on demand.
4. These dimensions refer to front panel in the table.

APEN GROUP reserves the right to change products and documents as required.
3.6 Supply of PCH modules

Flue outlet - Combustion air inlet

The following two types of flue outlet/combustion air intake layout are certified for PCH modules:
- "C" type: the combustion circuit is sealed from the room where the heater is installed.
- "B" type: the combustion circuit is open on the room and that means that combustion air is taken in from the room where the heater is installed.

The main difference between the two types is that the terminal installed on air intake for type “B” is made of steel and it is shaped so as to stop water from entering inside. Terminal for type “C” is a female fitting that must be connected to the suitable pipe.

APEN GROUP supplies both types of terminal (“B” and “C”) as a standard.

Panels

PCH heating module is supplied with a standard front panel made of sheet zinc that is not suitable as outer panel. A kit including one front panel and one door panel is available upon request.

The manufacturer has chosen not to supply the front panel in order to allow the final user to install the module into another unit and finish its outer paneling adapting it to company colours and materials.

Apen Group’s standard kit includes one front panel (for dimensions, see previous page). The kit is optional and the panel is RAL 9003 white.

Panels with different colours, size and material can be supplied on demand and at a price to be defined.

However, standard supply includes: hinges, fast locks, cable holders, lamps, and the gasket to be installed on burner casing.

If requested, Apen Group will supply a drawing in CAD format in order to ease the manufacturing of front panel and door.

Assembling the front panel and the door

In order to assemble the module, do the following:
- Fasten hinges on front panel.
- Install the front panel on the module and fasten the four M6 front screws. Finish assembling the panel using the four 3.9x13 self-tapping screws (see picture).
- Fasten the gas tube to the front panel using the brass locknut supplied.
- Install electrical cable holders on front or side panel, as expected.
- Plug lamps in and cover them with the rubber caps supplied. Rubber caps are mandatory to make the unit comply with IP44 and suitable for outdoor installation.
- Wire lamps according to the diagram.
- For “B” type modules, assemble air inlet connection pipe installing the black ring gasket between this pipe and front panel. Use the four 3.9x13 self-tapping screws.
- Assemble protection panel over the door, if necessary.
- Place the white silicone gasket around flue outlet, making sure it sticks to front panel.
- Install hinges and locks on door panel.
- Install the black lip seal in the kit around the burner casing and make sure that the joint is on bottom side. On corners, use the enclosed cyanoacrylate adhesive to make the seal stick.

Components of front panel kit, not included in supply. They are required for installation.

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
</tr>
</thead>
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<td></td>
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<tr>
<td>PCH043</td>
<td></td>
</tr>
<tr>
<td>PCH054</td>
<td>G14920</td>
</tr>
<tr>
<td>PCH072</td>
<td></td>
</tr>
<tr>
<td>PCH092</td>
<td></td>
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<tr>
<td>PCH150</td>
<td>G14930</td>
</tr>
<tr>
<td>PCH200</td>
<td></td>
</tr>
</tbody>
</table>

"B"-type inlet terminal

"C"-type inlet terminal
4. USER'S INSTRUCTIONS

Read General and Safety Warnings on page 3. User’s operations on the heater are limited to regulating remote control options.

4.1 Heater Operation

Heater operation is completely automatic. An electronic self-checking device handles any control operations of the burner while an electronic card with built-in microprocessor uses the remote control to regulate thermal output power.

Heating request causes the unit to start when the following conditions are met:
- Remote control is ON (green light on). Use ON/OFF button to switch on or off the remote control. Regular operation is indicated by green light.
- Closed bridge on remote control (2-pole board)
- Closed contact for 7/9 terminals of CN6 board on modulation card installed into the heater (screw 9-pole CN6 board).
- 0-10 Vdc voltage is higher than Von threshold [Axx parameter], if configured.

Note: Remote control contacts and 7/9 terminals are wired in series and if one opens, the burner turns off. At delivery, the remote control contact is bridged. The client can choose to use 7/9 terminals for turning the unit on or off.

When heating is required and the burner turns on, a red light is lit beside the green one.

During regular operation, the 0-10 Vdc voltage value of 1/2 terminals on CN6 board is displayed on the remote control.

Configuring set points

The user doesn’t need to set any parameters for PCH heating module. Set points (ST1 to ST4 and related differentials P1 to P4) are not used since regulation is provided by external device through a 0-10 Vdc signal.

4.2 Resetting

Modulation and control card automatically runs a set of re-start attempts (4 reset attempts max, A 17 parameter).

During startup cycle, an ignition failure of the burner causes the unit to lock up and the F1 fault to be displayed on remote control screen. Only after completion of the automatic restart set, the external lockup lamp lights up (red light) on the module and an output signal is issued on the digital line.

If, during heater operation, one safety thermostat or control pressure switch is engaged, the unit immediately locks up, the F2 alarm is displayed on remote control screen, a red lamp light up on the module, and the digital output signal is issued. F1 and/or F2 alarms, as well as F3 and F8, can only be manually reset.

To unlock the unit, press simultaneously the two arrow buttons for at least 3 seconds.

REMARK: only 15 seconds after burner motor stops, the unit can be reset.

WARNING: Besides storing all possible alarm conditions (F1 to F8), the modulation card runs an further partial count for F1 and F2 errors: after 5 manual reset operations, the microprocessor itself must be reset in order to continue.

To reset the microprocessor, use the Reset switch on the card or turn power off and on by using 0/1 main switch.

NOTE: another microprocessor is installed on the control card. It independently checks maximum number of flame control unlocks. If this number exceeds maximum value allowed, this microprocessor prevents flame control unlock and indicates the fault by turning on a red led on the card.

To restart the system, reset the microprocessor by means of the Reset switch on the card or turn power off by using 0/1 main switch.
5. INSTRUCTIONS TO THE INSTALLER

Instructions for installing and setting the heater are intended for authorised personnel only.
Read safety rules first.
Installation rules for units including a PCH modules are the same as those applying to air heater installation.

5.1 Installing the Module into the Units

The module can be assembled into air handling or roof-top units in two ways:
EXTERNAL installation: the module’s outer panel is outside the unit.
INTERNAL installation: the module’s outer panel is inside the unit and there is a hollow space between the module and the outer panel of the unit.

Outdoor installation
Either “C” type (sealed combustion chamber) or “B” type (open combustion chamber) can be used in this installation.
If the heater is installed outdoor, pay attention to properly install the seal on the door and to assemble IP55 guards on signal lamps. Make sure any measure is taken to prevent any kind of water leak into burner casing.
In order to install a “C” type module, connect a straight or bent pipe to the air inlet.
If a “B” type installation is required, mount on air intake the stainless steel terminal supplied by APEN GROUP as a standard.

Indoor installation
For this kind of installation modules of either “C” type (sealed combustion chamber) or “B” type (open combustion chamber) can be used.
However, some additional cares have to be taken besides preventing water from leaking into burner casing.
The hollow space between the unit’s outer panel and the module must be suitably vented since the gas supply system is placed in it.
The outer panel must therefore have vents whose surface is no less than 2% of the larger internal section (see drawing below). These vents must be equally split between the top and the bottom of the panel (EN525).
The air to be handled must flow in a sealed duct and must never mix with the air in this hollow space. In “B”-type heaters, combustion air can be sucked from the hollow space.
But, if so, the greatest attention is to be paid to the sealing of this space, especially when the fan is installed after the PCH module.
It is mandatory to avoid any depression in the hollow space caused by fan operation since this would determine a hottest air flow from the exchanger through the burner fan to this space, after the burner is off. This hot flow would permanently damage the burner fan.

![Diagram](image-url)
5.2 Assembling the Module

In order to install a PCH module into an air handling or roof-top unit, we suggest you to prepare four slide supports similar to those shown in the figure aside. These supports, besides holding the module, serve as fitters between the module’s size and the available space in the unit and also block the module during transport. These slides can also be totally or partially closed to reduce pressure drops, depending on air flow.

Precautions for surrounding areas

Two safety thermostats of STB type are installed in PCH module. They are wired in series. For safety purposes, the thermostat after the exchanger is used since it is in contact with warmer air. Make sure a convenient space is provided for a technician to easily maintain or replace the thermostat (see diagram below).

Air filters, made of acrylic fibre (maximum operating temperature 176°F) must be installed at a minimum distance of 400-450 mm from the module. This distance protects the filter in case power supply, and consequently ventilation, is cut while the exchanger is still hot.

It is recommended to use metallic-fibre or glass fibre paper filters (max temp. 100-120°C).

If the fan motor is close to the PCH module (i.e., less than 400 mm) a metallic shield is recommended to protect the electrical motor from the heat radiating form the exchanger.
5.3 Assembling One or More Modules

You can assemble many PCH modules in a single air handling or roof-top unit, therefore assuring high outputs. Provided suitable measures are taken, modules can be assembled either in series or in parallel. Air can flow either rightward or leftward, since the module is equipped with two sets of safety devices against overheating, both on the right and on the left side.

Single module assembly
This is the simplest installation: the air can flow rightward or leftward alike. The fan can be installed either before or after the exchanger.

Serial assembly
This type of installation requires that the output temperature of the first module does not affect data detection of the thermostat installed on the intake of the second module. If it does, the second unit thermostat can be bypassed. The only thermostat working on the second module will then be the one on the outlet. This type of installation is suitable when reduced air flows and high temperature differentials are required (process installations). Pressure drops of all modules will obviously have to be summed. The fan can be installed either before or after the module.

Parallel assembly
Choose this type of installation when high air flows and low temperature differentials are required. Check that air flow is balanced through all the modules.

In multiple module units, safety is assured by means of the dedicated thermostat provided in the module. However, the use of an additional thermostat is recommended in order to check the air flow delivered and lock up before the safety thermostat in the event of failure of the fan assembly.
5.4 Flue Connections

PCH modules have sealed combustion circuits, and the fan is installed before the exchanger.
Flue system can have different layouts: type C (combustion air taken in from outdoor) or type B (combustion air coming from indoor).
If the heater is installed outdoor, the two types coincide.
PCH heaters are certified for the following flue types: B23-C13-C33-C43-C53-C63. Please check into existing national laws possible additional requirements.
Only use approved pipes and terminals for flue gas exhaust circuit.
Flue connections for condensation modules must be built using the following materials:
- Aluminum with minimum thickness of 1.5 mm.
- Stainless steel with minimum thickness of 0.6 mm. The carbon content of the steel must not exceed 0.2 %.
Use gasketed tubes to avoid any condensation leaks. The gasket must be suited to flue temperature ranging from 30° to 160°C.
No need to insulate the chimney to prevent condensation from being produced in pipes. Condensation cannot damage the heater which has been designed to drain it. The only reason to insulate pipes is to protect people who might incidentally touch them.
To build the air intake system, use the following materials:
- Aluminum with minimum thickness of 1 mm.
- Stainless steel with minimum thickness of 0.4 mm.

Important
Horizontal flue pipes must be installed with a slight inclination (1°-3°) towards the heater, so that condensation water can flow into the drainage system.

Combined Venting Systems
Individual flue system is to be preferred, whenever possible. Since PCH modules are pressurised, a wrongly-sized collective flue system would cause problems to the unit.

However, if a collective system is required, it will have to be carefully designed and sized, so that chimney always operate in depression. This will prevent a module from exhausting its flue into another module.
**Guidelines to Component Selection**

The following table lists pressure drops of more commonly used terminals and piping. If the terminal is not directly connected to the heater and a distance is to be covered, check that diameters of terminals, extensions and bends are correct. After determining the layout of the flue system, use the following table to check pressure drop of each component according to the relevant PCH module. This value changes according to flue capacity.

<table>
<thead>
<tr>
<th>Component</th>
<th>Pressure available on outlet</th>
<th>Pressure drop [Pa]</th>
<th>Code</th>
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<tbody>
<tr>
<td>C13 Horizontal single terminal Ø80</td>
<td>70</td>
<td>4,1</td>
<td>G14305</td>
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<td>C13 Horizontal single terminal Ø100</td>
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<td>C13 Horizontal single terminal Ø130</td>
<td>120</td>
<td>7,3</td>
<td>G05567</td>
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<td>C13 Horizontal coaxial terminal Ø80</td>
<td>120</td>
<td>13</td>
<td>G14505</td>
</tr>
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<td>C13 Horizontal coaxial terminal Ø100</td>
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<td>23</td>
<td>C04790-A</td>
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<td>28</td>
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<td>2,8</td>
<td>G01500</td>
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<td>120</td>
<td>3,8</td>
<td>G05582</td>
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<td>G05583</td>
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<tr>
<td>Ø100 Pipe (1 meter)</td>
<td>25</td>
<td>2,9</td>
<td>/</td>
</tr>
<tr>
<td>Ø130 Pipe (1 meter)</td>
<td>15</td>
<td>5,8</td>
<td>/</td>
</tr>
<tr>
<td>Ø80 bend 90° wide radius</td>
<td>3,9</td>
<td>3,9</td>
<td>G01337</td>
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<td>4,8</td>
<td>G14502</td>
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<tr>
<td>Grid Ø130</td>
<td>1</td>
<td>1</td>
<td>G05589</td>
</tr>
</tbody>
</table>
5.5 Condensation Drain System

Special care is required by the condensation drain system. If this system is badly built, the unit may not work properly. In building this system, make sure to prevent:
- Condensation water from accumulating into the exchanger.
- Condensation water from freezing in the pipes.
- Exhausting flue through the condensation drain system.

Accumulation of Condensation Water into the Exchanger
During regular operation, condensation water must not accumulate into the exchanger.
The flue pressure switch controls and locks the burner before the water reaches a dangerous level in the flue hood. Exchanger tubes (tube bundle) in PCH modules are slightly inclined to force condensation water to flow into the hood without accumulating, in compliance with the law.
When installing the module into the unit and, afterwards, the unit on the floor, make sure the module, and consequently the exchanger, are perfectly leveled. This assures the tube bundle will keep the correct inclination.

Upon request, Apen Group will supply a suitable kit for each installation. The kit includes:
- siphon and float
- silicone hose (Ø 16 x 21)
- various holders for silicone hose.

The system can drain condensation water in the following ways:
- Free drainage
- Using a siphon
- Into a water pipe
- Into the unit itself (collecting tank)

Precautions
Materials to be used for the condensation drainage system:
- for hot pipes (i.e. flue pipes), aluminum, stainless steel, silicone tube, or Viton;
- for cold pipes (water pipes), PVC and any materials suitable for hot pipes.
Do not use copper nor galvanized iron pipes.

Free Drainage
If the unit is installed outdoor and temperatures are never too cold, you can choose not to connect the water drain tube to any piping. You only need to make sure the water doesn’t stagnate by the unit.
If a collecting hose is to be installed, do not seal it directly to the outlet drain tube (see drawing below). In fact, if water freezes into the tube, ice will block the drain and condensation water will accumulate into the exchanger.
When the heater works at maximum power, the heat of the flue will cause the ice in the tube to melt, freeing the drain outlet.
**CONDENSING WARM AIR HEATER MODULE**

- **Draining into water pipes**
  A good solution to protect the system from ice is to build the drainage within a heated room, connecting it to a water-drain pipe or collecting tank where the condensation water can be handled using basic solutions.
  This solution requires installing a siphon to prevent flue exhaust through the condensation drain system. The siphon can also be installed far from the PCH module. In this latter case, the connecting pipe shall not run outdoor. The first part of the connecting piping (2-3 meters) will be made of metallic or silicone hose that can resist high flue temperatures, and shall never be exposed to low temperatures, whether it runs into the unit or into a heated room.

- **Collecting Tank inside the Unit**
  This is another good solution against ice. Use a silicone hose to connect the outlet tube on the PCH module to the drain system. This type of installation requires a siphon with a float.

- **Draining using a Siphon**
  If the unit with a PCH module is installed into a room, whether dedicated or not, the connected siphon must be smoke-proof.
  The siphon includes a float that prevents any flue leaks, even when the siphon is empty. Fill manually the siphon with water at first start-up.
  The kit includes an adapter for connecting the aluminum tube to the siphon. Please note that a minimum distance is required between the drain tube and the floor or the surface where the unit is installed.
  In this case too, do not close the drain tube but leave it open (see drawing) to prevent ice from possibly blocking the drainage.

**Draining using a Siphon**

- **Hood for flue**
- **Plug for siphon filling**
- **3/4” male fitting for hood**
- **Siphon connecting filling**
- **Siphon for condensation collection**
- **Drain tube (supplied)**

**Collecting Tank inside the Unit**

- Use a silicone hose to connect the outlet tube on the PCH module to the drain system.
- This type of installation requires a siphon with a float.
5.6 Electrical Wiring

Power Supply
The heater shall be correctly wired to an efficient grounding system, complying with existing regulations.
Single-phase 230 Vac supply with neutral. Do not reverse neutral and phase or the flame control device will lock the unit for safety reasons (F1 fault).
If power supply is shunted from a 400V triphase line, use an insulation transformer and ground a pole of the secondary. This pole will be used as neutral.
The heater can be plugged into mains using a plug-socket only if the latter prevents any mix up of phase and neutral wires.
The system wire gauge in general, and cable section in particular, must suit the unit rated input (see technical data table).
Keep cables far from heat sources.

REMARK: A multipole cutout switch must be installed before the PCH module with suitable electric safety.

Remote Control
The remote control is already installed into burner casing. As explained above, it controls the heater and can easily be moved far from the heater, if necessary.
DO NOT BRIDGE THE TERMINALS THE REMOTE CONTROL IS CONNECTED TO.
If you want remove this control from the heater and install it elsewhere, remember the following:
- Do not use a multipole cable carrying both the electrical supply and the remote control, since this would interfere on control signals, jeopardising heater operation.
- No polarity to be respected when connecting the control.

Regulation and Approvals
To properly work, each module requires the following approvals:
- 0-10 Vdc for thermal output regulation and for turning on and off the burner [C2=0 parameter]. If [C2=1], 7/9 terminals of CN9 board must be used to turn the burner on/off.
- Possible safety contact on 7/9 terminals [CN9 board]. When this contact opens, the burner turns off. This input overrides any 0-10 Vdc input.

Safety Contact for Burner ON/OFF
The burner starts up when terminals 7/9 of CN6 board close. Use free contacts. These are low voltage terminals (< 24V). For safety reasons, do not bridge the contact.
The check-out sequence of the unit must include control devices that lock the PCH module when the following faults occur (these devices should be best connected in series to the contact):
- Closed contact of the fan motor thermal cutout.
- Contact of air flow switch or fan motor contactor (if fans start before or together with the burner).
- Firewall (if installed).
- Filter control pressure switch.
- Emergency buttons (if installed).

Remote Control
The remote control is already installed into burner casing. As explained above, it controls the heater and can easily be moved far from the heater, if necessary.

REMARK: A multipole cutout switch must be installed before the PCH module with suitable electric safety.

Wire diameter: untwisted bipolar wire - resistance 2÷5 Ohm
Max length: 50 meters
Warning: Where electrical interference is high, use a twisted or shielded double wire
Modulating Thermal Power Output
Thermal power output modulates according to the 0-10 Vdc signal issued by an external control the user shall install. The signal must be polarised and wired following the diagram in this page.

Multiple modules can be grouped under a single signal. Their thermal output will be regulated in parallel. If the 0-10 Vdc signal fails and [C2=1], the burner will however start at minimum gas capacity when 7/9 terminals close up. If [C2=0], the 0-10 Vdc signal is essential and its value must exceed Von value (see further in this Manual).

Modulation is linear in between Von value and 10V: Von value indicates minimum power while at 10V the heater runs at maximum power.

Technical data for 0-10 Vdc input:
- No optical insulation.
- Impedance about 40K ohm.
- Absorption rate for each card is about 0.3 mA.

Precautions
Do not use PCH module’s low voltage line (24Vac) to power the external temperature control.

Cascade Regulation
The 0-10 Vdc signal can be used to cascade turn on and off multiple modules by means of threshold converter relays. You can connect the 0-10 Vdc signal in parallel to the modules and, by setting convenient parameters, you can obtain progressive start-ups which will increase the modulation range of PCH modules.

For information on setting up parameters and values, please refer to Maintenance chapter.

Check that total absorption of PCH modules does not exceed available voltage at regulator outlet.

Remote Signals
The following signals can be remotely obtained from PCH modules:
- Locked unit
- Burner on

Locked unit
If a fault occurs, a free contact (NC or NO) is available. It can be used to report a fault to a remote console. Use the remote control to unlock the unit. To remotely unlock the appliance, remote control must be remotely controlled.

Burner on
A 230Vac line is available on 8-9 terminals, to report to a remote console a signal for burner on.
5.7 External Gas Valve  
(models 032/92 only)

For LPG-fuelled equipment, laws in some European countries require that a gas valve is installed outside the room where the appliance is located. This valve must open and close simultaneously when the equipment starts up and turns off. The diagram below shows how to wire the gas valve control. The installation of a relay is recommended since the outlet of the flame control device has a limited voltage.

How to Connect an External Gas Valve

Connections:
1) Cut the bridge between terminals 5, 7, and 9 of the flame control device connector, leaving wires long.  
2) Use the terminal to reconnect bridge wires adding another wire that will be connected to the relay coil.  
3) Wire the neutral to the relay bobbin and to the gas valve.  
4) Wire the line cable to the common terminal on the relay  
5) Wire the NO (normally open) contact to the gas valve.

Legend:
L  Line  
N  Neutral  
R  Relay coil  
VGE  External Gas Valve
5.8 Gas Supply System

For this system, use CE-approved and certified components only.

PCH modules are supplied with a double gas valve and a gas filter and stabiliser already installed.
All components are assembled into the burner housing.
To complete installation in compliance with the law, the following components have to be installed:
- Vibration damping joint
- Gas cock

We recommend installing a gas filter with a high flow rate and no pressure stabiliser. In fact, the standard filter installed before the gas valve has a limited surface.

To assure efficient maintenance, use a gasket and a swivel joint to connect the PCH module.

Do not directly use threaded joints on gas fitting.

The law allows a maximum pressure of 40 mbar inside the building or thermal plant. Higher pressure values shall be reduced before the room where the PCH module is installed.

**LEGEND**

1. Main burner gas solenoid valve
2. Pilot burner gas solenoid valve
3. Pressure stabiliser
4. Safety solenoid valve
5. Gas filter (small section)
6. Vibration damping joint
7. Gas filter (large section)
8. Gas cock

---

For PCH150/200

---
6. ASSISTANCE BY SERVICE CENTRE

First start-up must be performed by an APEN GROUP Authorised Service Centre. During first start up, the combustion efficiency must be analyzed. This appliance is certified for EC and Extra-EC countries for gas categories listed in the table below.

6.1 Country Table - Gas Category

<table>
<thead>
<tr>
<th>County</th>
<th>Gas Category</th>
<th>Gas</th>
<th>Pressure</th>
<th>Gas</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>50 mbar</td>
</tr>
<tr>
<td>BE &lt;70kW</td>
<td>I2E(S)B, I3P</td>
<td>G20/G25</td>
<td>20/25 mbar</td>
<td>G31</td>
<td>37 mbar</td>
</tr>
<tr>
<td>BE &gt;70kW</td>
<td>I2E(R)B, I3P</td>
<td>G20/G25</td>
<td>20/25 mbar</td>
<td>G31</td>
<td>37 mbar</td>
</tr>
<tr>
<td>CH</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>50 mbar</td>
</tr>
<tr>
<td>DE</td>
<td>II2ELL3B/P</td>
<td>G20/G25</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>50 mbar</td>
</tr>
<tr>
<td>DK, FI, GR, SE</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>ES, GB, IE, PT</td>
<td>II2H3P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G31</td>
<td>37 mbar</td>
</tr>
<tr>
<td>IT</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>FR</td>
<td>II2Es3P</td>
<td>G20/G25</td>
<td>20/25 mbar</td>
<td>G31</td>
<td>37 mbar</td>
</tr>
<tr>
<td>LU</td>
<td>II2E3P</td>
<td>G20/G25</td>
<td>20 mbar</td>
<td>G31</td>
<td>37/50 mbar</td>
</tr>
<tr>
<td>NL</td>
<td>II2L3B/P</td>
<td>G25</td>
<td>25 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>NO</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>HU</td>
<td>II2HS3B/P</td>
<td>G20/G25.1</td>
<td>25 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>CZ</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>CY, MT</td>
<td>I3B/P</td>
<td>G30/G31</td>
<td>30 mbar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE, LT, LV</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>IS</td>
<td>I3P</td>
<td>G31</td>
<td>37 mbar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>SI</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>BG, RO, TR</td>
<td>II2H3B/P</td>
<td>G20</td>
<td>20 mbar</td>
<td>G30/G31</td>
<td>30 mbar</td>
</tr>
<tr>
<td>PL</td>
<td>II2E3B/P</td>
<td>G20/GZ350</td>
<td>20/13 mbar</td>
<td>G30/G31</td>
<td>36 mbar</td>
</tr>
</tbody>
</table>

On the packaging of each heater the following information are clearly marked: Target country, Gas category and Unit code. The code shows the factory setting for the unit.

Codes without extension:
- PCH043IT: No extension means that the unit has been prepared and tested for [G20] natural gas.

Codes with extension:
the fourth letter identifies the gas for which the unit has been set:
- PCH043FR-xxx0: 0 indicates the unit has been set and tested for [G20] natural gas.
- PCH043MT-xxx1: 1 indicates the unit has been set and tested for [G31] Liquid Propane.
- PCH043NL-xxx2: 2 indicates the unit has been set and tested for [G25] natural gas.
- PCH043HU-xxx3: 3 indicates the unit has been set and tested for [G25.1] natural gas.
- PCH043PL-xxx4: 4 indicates the unit has been set and tested for [GZ350] gas.

Another label on the unit, placed near fuel supply, clearly states which gas type and supply pressure the unit has been set and tested for.
6.2 Gas Setting Data Table

### G20 GAS

<table>
<thead>
<tr>
<th>UNIT TYPE</th>
<th>PCH032</th>
<th>PCH035</th>
<th>PCH043</th>
<th>PCH054</th>
<th>PCH072</th>
<th>PCH092</th>
<th>PCH150</th>
<th>PCH200</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATEGORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUPPLY PRESSURE [mbar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20 [min 17 - max 25]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø OF PILOT NOZZLE [mm]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE CO₂ [%]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.7 ±0.2 [cat. H] - 8.9 ±0.2 [cat. E]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS CONSUMPTION (15°C-1013m) [m³/h]</td>
<td>1.07 - 3.69</td>
<td>1.20 - 4.11</td>
<td>1.57 - 5.03</td>
<td>1.64 - 6.14</td>
<td>2.33 - 8.25</td>
<td>3.17 - 10.37</td>
<td>4.66 - 16.40</td>
<td>5.61 - 22.75</td>
</tr>
</tbody>
</table>

* Supply pressure for Hungary is 25 mbar.

### G25 GAS

<table>
<thead>
<tr>
<th>UNIT TYPE</th>
<th>PCH032</th>
<th>PCH035</th>
<th>PCH043</th>
<th>PCH054</th>
<th>PCH072</th>
<th>PCH092</th>
<th>PCH150</th>
<th>PCH200</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATEGORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUPPLY PRESSURE [mbar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25 [min 20 - max 30]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø OF PILOT NOZZLE [mm]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE CO₂ [%]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.7 ±0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS CONSUMPTION (15°C-1013m) [m³/h]</td>
<td>1.24 - 4.29</td>
<td>1.39 - 4.77</td>
<td>1.82 - 5.84</td>
<td>1.91 - 7.13</td>
<td>2.71 - 9.99</td>
<td>3.69 - 12.05</td>
<td>5.41 - 19.07</td>
<td>6.52 - 24.45</td>
</tr>
</tbody>
</table>

* Supply pressure for Germany is 20 mbar.

** Ugello pilota da 0,65 per i Paesi con categoria "L" o "LL" (Germania e Olanda); 0,60 per gli altri Paesi con categoria "E".

### G30 GAS

<table>
<thead>
<tr>
<th>UNIT TYPE</th>
<th>PCH032</th>
<th>PCH035</th>
<th>PCH043</th>
<th>PCH054</th>
<th>PCH072</th>
<th>PCH092</th>
<th>PCH150</th>
<th>PCH200</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATEGORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUPPLY PRESSURE [mbar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30 [min 25 - max 35] - 50 [min 42.5 - max 57.5]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø OF PILOT NOZZLE [mm]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE CO₂ [%]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.6 ±0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS CONSUMPTION (15°C-1013m) [kg/h]</td>
<td>0.65 - 2.24</td>
<td>0.73 - 2.50</td>
<td>0.95 - 3.06</td>
<td>1.00 - 3.73</td>
<td>1.42 - 5.02</td>
<td>1.93 - 6.31</td>
<td>2.83 - 9.97</td>
<td>3.41 - 13.84</td>
</tr>
</tbody>
</table>

### G31 GAS

<table>
<thead>
<tr>
<th>UNIT TYPE</th>
<th>PCH032</th>
<th>PCH035</th>
<th>PCH043</th>
<th>PCH054</th>
<th>PCH072</th>
<th>PCH092</th>
<th>PCH150</th>
<th>PCH200</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATEGORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUPPLY PRESSURE [mbar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30 [min 25 - max 35] - 37 [min 25 - max 45] - 50 [min 42.5 - max 57.5]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø OF PILOT NOZZLE [mm]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE CO₂ [%]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.4 ±0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS CONSUMPTION (15°C-1013m) [kg/h]</td>
<td>0.64 - 2.21</td>
<td>0.72 - 2.46</td>
<td>0.94 - 3.01</td>
<td>0.98 - 3.68</td>
<td>1.40 - 4.95</td>
<td>1.90 - 6.21</td>
<td>2.79 - 9.83</td>
<td>3.36 - 13.63</td>
</tr>
</tbody>
</table>

### G25.1 GAS

<table>
<thead>
<tr>
<th>UNIT TYPE</th>
<th>PCH032</th>
<th>PCH035</th>
<th>PCH043</th>
<th>PCH054</th>
<th>PCH072</th>
<th>PCH092</th>
<th>PCH150</th>
<th>PCH200</th>
</tr>
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<td>CATEGORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUPPLY PRESSURE [mbar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25 [min 20 - max 30]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø OF PILOT NOZZLE [mm]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE CO₂ [%]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.5 ±0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS CONSUMPTION (15°C-1013m) [m³/h]</td>
<td>1.24 - 4.28</td>
<td>1.39 - 4.77</td>
<td>1.82 - 5.84</td>
<td>1.90 - 7.13</td>
<td>2.70 - 9.98</td>
<td>3.69 - 11.79 **</td>
<td>5.41 - 19.04</td>
<td>6.51 - 26.41</td>
</tr>
</tbody>
</table>

* For Hungary only

** For P092 model min thermal output is 30 KW, while max thermal output is 96 KW.

### TIPO DI GAS G350 *

<table>
<thead>
<tr>
<th>UNIT TYPE</th>
<th>PCH032</th>
<th>PCH035</th>
<th>PCH043</th>
<th>PCH054</th>
<th>PCH072</th>
<th>PCH092</th>
<th>PCH150</th>
<th>PCH200</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATEGORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUPPLY PRESSURE [mbar]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø OF PILOT NOZZLE [mm]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARBON DIOXIDE CO₂ [%]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.7 ±0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAS CONSUMPTION (15°C-1013m) [m³/h]</td>
<td>1.50 - 5.16</td>
<td>1.67 - 5.75</td>
<td>2.19 - 7.04</td>
<td>2.30 - 8.15 **</td>
<td>3.26 - 10.22 ***</td>
<td>6.52 - 22.96</td>
<td>7.85 - 31.85</td>
<td></td>
</tr>
</tbody>
</table>

* For Poland only

** For P054 model min. thermal output is 15.5 KW, while max thermal output is 55 KW.

** For P072 model min. thermal output is 22 KW, while max thermal output is 69 KW.

Based on target Country - see previous table

G30 GAS

G31 GAS

G25.1 GAS

TIPO DI GAS G350 *
6.3 First Start-up
At delivery, the heater is set and tested for using the type of gas as noted on the rating plate. Before starting the heater, go through the following checklist:
• Make sure the available gas matches the type the heater is set for.
• Check that electrical wiring complies with requirements shown in this manual or in other diagrams attached to the heater.
• Using the "IN" pressure tap on the gas valve, verify that the inlet pressure to the valve matches the value required for the type of gas used.
• Power on the heater using the main switch and the switch on the control board.
• Check that the remote control displays 0-10 Vdc voltage value at the module’s inlet.
To turn the heater on, do the following:
1. Press the ON-OFF button
2. Check that the green light on the remote control is on. If heating is required, the red light must turn on, too.
3. If the red light doesn’t turn on, check that the bridge on 7/9 terminals of CN6 board is closed and verify remote control bridge. If you chose to switch the unit on using a 0-10 Vdc signal, check that incoming value (displayed) exceeds Von value. Wait at least for the period set in A9 parameter.
   When the red light turns on, the heater launches the start-up cycle.
   At this stage, the pilot burner is not likely to start because of the presence of air in gas pipes and the heater locks up.
   To unlock the unit, repeat the procedure until the burner lights up.

6.4 Combustion Analysis
Wait until the heater reaches maximum capacity. This happens when the remote control displays a voltage value of 10.0 Vdc. To obtain maximum power request, operate the regulator of the appliance the heater is installed into.
Check again that the inlet pressure to the valve matches the one required by the gas type. If it doesn’t, adjust it.
Analyse the combustion, verifying that the CO₂ value matches the one shown in the “GAS DATA” table.
Should the measured value be different, adjust the screw on the Venturi tube: unscrew to increase the CO₂ value, screw to decrease it.
Run the heater at minimum rate and check if CO₂ value is the same or slightly lower than CO₂ value measured at maximum capacity (up to -0.3%). If the two values do not match, regulate OFFSET screw: screw to increase or unscrew to decrease CO₂ content.
After first start up, train the user on how to use the heater and its controls.
6.5 Converting the Heater to use LPG

This conversion is strictly forbidden in Countries such as Belgium, where double gas category is not allowed. This Kit is not supplied in Countries where conversion is not allowed.

The conversion to another type of gas shall be carried out exclusively by an APEN GROUP certified Service Centre. The heater is supplied to use natural gas. The kit for converting it into Liquid Propane is supplied as a standard and it includes:
- One calibrated diaphragm.
- One pilot flame nozzle.
- One sticker “Appliance converted into...”

Once the conversion and the setting have been made, replace the label “Appliance set for Natural Gas” with the one “Appliance converted into...”, enclosed in the kit.

To convert the heater, do the following:
- Disconnect the unit from power supply
- Replace the pilot nozzle
- Insert the supplied calibrated diaphragm between the gas valve and the Venturi
- Power the heater on and make it ready for start up
- While the starting electrode sparkles, check that the connection between pilot nozzle and copper tube does not leak

When the burner is on and at maximum capacity (10V displayed on the remote control) check that:
1) The inlet pressure to the valve matches the one required for the gas used.
2) The CO₂ value does not exceed the values corresponding to the used gas. Should the value be different, change it by turning the regulation screw: screw to decrease the value and unscrew to increase it.

Check again that gas circuit does not leak.

REMARK: The heater supplied for using LPG is adjusted for G31 gas. In order to use G30, the CO₂ value must be checked and adjusted according to table 6.2, if necessary.
CONSENSING WARM AIR HEATER MODULE

Kit for Liquid Propane includes the following:

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Ø OF PILOT NOZZLE mm</th>
<th>Ø OF GAS DIAPHRAGM mm</th>
<th>PCH032</th>
<th>PCH035</th>
<th>PCH043</th>
<th>PCH054</th>
<th>PCH072</th>
<th>PCH092</th>
<th>PCH150</th>
<th>PCH200</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCH092</td>
<td>5,1</td>
<td>5,1</td>
<td>6,0</td>
<td>6,5</td>
<td>6,5</td>
<td>blind</td>
<td>10</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model PCH092 has two Venturis while the kit only includes one diaphragm since no hole is provided to allow gas flow to the Venturi. The diaphragm must be placed between the side outlet of the gas valve and the corresponding Venturi. Do not place any diaphragm on front outlet. The setting has to be made on the screw of the open Venturi.
6.6 Conversion to G25 - G25.1 Gas

Conversion from G20 into G25 is only allowed for Countries in Cat. 2_{Ell} [Germany] and in Cat. 2_{Hs} [Hungary]. In Countries in Cat. 2_{L} [Holland], the unit is supplied set and tested for G25.

For Cat. 2_{C} Countries [France, Belgium and Luxembourg], where conversion from G20 to G25 is not allowed, the appliance is supplied already set to use both G20 and G25 gases. Therefore, conversion is not needed.

The conversion to another type of gas shall be carried out exclusively by an APEN GROUP certified Service Centre. Conversion to G25 and/or G25.1 gases, where possible, requires:

- (any models) replacement of pilot nozzle.
- for PCH092 model only mounting a calibrated diaphragm on air intake of Venturi [see drawing].

Diaphragm mounting is only allowed in Germany, Holland, and Hungary while it is forbidden in other Countries.

After completing the conversion, turn the burner on and:

- Check that the inlet pressure to the gas valve matches the one required for the available gas [see table 7.1].
- Check that CO₂ value at max and min thermal output does not exceed the accepted range for gas type. If it does, change it by turning the Venturi adjustment screw: turn it clockwise to decrease the value and counterclockwise to increase it.

Stick the label “Appliance converted into G25 gas” over the previous label “Appliance set for ...”.

Note: Pay attention to CO₂ value for G25.1 gas. With this gas, minimum and maximum thermal output values of PCH092 model are lower than when G20 is used.

6.7 Conversion to GZ350 Gas

Conversion is allowed only for Poland.

The conversion to another type of gas shall be carried out exclusively by an APEN GROUP certified Service Centre. Conversion to GZ350 requires:

- (any models) replacement of pilot nozzle.
- Only for PCH043, 054 and 074: mount a calibrated diaphragm on air intake of Venturi [see drawing].

After completing the conversion, turn the burner on and:

- Check that the inlet pressure to the gas valve matches the one required for the available gas [see table 7.1].
- Check that CO₂ value at max and min thermal output does not exceed the accepted range for gas type. If it does, change it by turning the Venturi adjustment screw: screw it to decrease the value and unscrew to increase it.

Stick the label “Appliance converted to GZ350 gas” over the previous label “Appliance set for ...”.

Remark: Minimum and maximum thermal output values of PCH054 and PCH072 models are lower than when G20 is used. PCH092 model is not suitable for GZ350 gas.
6.8 Maintenance

To keep the unit perfectly efficient and guarantee its durability, we recommend to go through the following checklist every year before restarting the heater:

1) Check start-up, flame detection and pilot flame electrodes.
2) Check exhaust and air intake terminals and ducts.
3) Check the Venturi.
4) Check that the heat exchanger is clean.
5) Check that the siphon for condensation drainage is clean.
6) Check the inlet pressure of the gas valve.
7) Check the operation of flame control device and air pressure switch.
8) Check the safety thermostat/s.
9) Check ionisation current.

Note: Checks in steps 1, 2, 3, 4, and 5 must be carried out after power and gas supplies have been cut off.
Checks in steps 6, 7, 8, and 9 must be carried out while the heater is running.

1) Electrodes
Remove the pilot burner assembly and clean the steel grid and the nozzle with a compressed air jet. Check the integrity of the ceramic and use emery paper to remove any oxidation on metal parts of the electrodes. Check that electrodes are correctly placed (see drawing below). Verify that the detection electrode is installed tangent to burner head, not into it. The start-up electrode must discharge over the grid of pilot burner.

2) Flue Exhaust and Air Inlet Terminals
Check duct status looking into them or using suitable tools. Remove dust from air intake terminal.

3) The Venturi
If necessary, use a brush to remove dust on the Venturi inlet, taking care not to let it drop inside.

4) Exchanger
Optimal combustion efficiency in PCH heaters prevents residual combustion products. However, in time, some dirt could settle inside exchanger pipes, due to the fine dust drawn through the combustion air duct. It is not possible to schedule a precise timetable for cleaning the heat exchanger. A sensible decrease in gas flow could indicate there is dirt inside the heat exchanger.

5) Siphon for Condensation Drainage (if installed)
Clean the siphon every year, checking its joints. Make sure no metallic residue is found. In case it is, clean the siphon more frequently. After emptying the siphon, remember to fill it with water and close it with its plug before restarting the heater.

6) Inlet Gas Pressure
Check that the inlet pressure to the valve corresponds to the one required for the available gas. This check is to be carried out while the heater is running.

7) Flame Control Device
While the heater is running, close the gas tap and verify that the unit locks and that F1 is displayed on the remote control. Reopen gas tap, reset, and wait for the heater to restart.

8) Safety thermostat/s and Air Pressure Switch
This operation is to be carried out while the heater is running and the burner is on. Open the thermostat series (230V) using an isolated tool. Disconnect fast-on from air pressure switch or safety thermostat, wait until [F2] lock is displayed on the remote control. Lose back the thermostat series and unlock.
9) Ionisation Current
Carry out this operation using a device capable of testing direct current microAmperes. Do the following:
- Disconnect the unit from power supply.
- Disconnect flame control device cable and connect it to the negative pole of the tester.
- Use a wire to connect the positive pole of the tester and the flame control device of the unit.
- Power on the device and wait for the burner to start up.
- Check ionisation value.
This value must not be lower than 2 micro Amperes. Lower values would indicate that the detection electrode is misplaced, oxidised or it is going to break down.

6.9 Cleaning the Exchanger
The following operations must be carried out when the unit is cold and disconnected from power supply:
- Remove the door and the gasket along the edge of the control board taking care not to damage it.
- Unscrew the auto-threading “A” screws that hold the control board to the right side panel “B” (where the door is fixed).
- Disconnect gas pipe, power supply and flue evacuation system.
- Remove external panel “B”.
- Unscrew self-threading “E” screws fixing the exhaust hood cover.
- Use a suitable brush to clean pipes all along their length, pushing dirt towards the outlet to collect it.
- Check that condensation drain joint is clean.
- Reassemble all the parts, making sure seals are correctly installed.

6.10 Demolition
Should the unit be dismantled or demolished, please take care to:
- remove cables;
- remove all plastic components.

REMARK: Any recovered material shall be treated and disposed of according to existing regulations and/or rules given in safety technical sheets accompanying chemical products.
6.11 Operation of CPU-PLUS Card
This paragraph contains information on how the CPU-PLUS card works.
The setup of this card is extremely easy and the user can perform it using the remote control and passwords to adapt each parameter to his specific needs.
Three levels of password are available:
- User
- Operation
- Manufacturer

User
It allows read-only access to modulation values, percentage of thermal power output for instant operation, and error log. It is up to the manufacturer to choose whether the setup option of set point and "ST" & "P" parameters should be password-protected or not.
Since operation of PCH modules does not require using "ST" & "P" parameters, they can be password-protected [A32 parameter=1].

Operation
It allows to choose the operative mode required. Basic parameters start with "C".
Essential parameters for PCH models are:
- C0 - it depends on the type of modulation signal required. The unit must be idle (i.e. green light on and red light off) to change this parameter.
- C2 - if set to zero (Ø), it turns the burner off when signal is below Voff value and turns it on when signal exceeds Von value. If set to 1, 0-10 VDC signal is used for modulation only (see related flow chart).
- C6 - It’s the timeout between a turning off and the following turning on (OFF-TIMER). It is useful to avoid multiple start-up sequences. It can be set to 1 (1 second), if necessary.

Table of operative parameters
<table>
<thead>
<tr>
<th>Default</th>
<th>range</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>C0</td>
<td>5</td>
<td>1-9 0-10 VDC input</td>
</tr>
<tr>
<td>C1</td>
<td>0</td>
<td>0-1 not used</td>
</tr>
<tr>
<td>C2</td>
<td>0</td>
<td>0-1 Burner ON-OFF with 0-10VDC</td>
</tr>
<tr>
<td>C3</td>
<td>20s</td>
<td>0-255s not used</td>
</tr>
<tr>
<td>C4</td>
<td>20s</td>
<td>0-255s not used</td>
</tr>
<tr>
<td>C5</td>
<td>0</td>
<td>0-1 not used</td>
</tr>
<tr>
<td>C6</td>
<td>10s</td>
<td>0-255s OFF / ON timeout</td>
</tr>
<tr>
<td>C7</td>
<td>80°C</td>
<td>10-80°C not used</td>
</tr>
<tr>
<td>C8</td>
<td>0</td>
<td>0-1 not used</td>
</tr>
<tr>
<td>C9</td>
<td>0</td>
<td>0-1 not used</td>
</tr>
</tbody>
</table>
Manufacturer

It allows to optimize heater operation according to specific needs. Parameter names start with an "A". Some of the parameters are general purpose, others depend on the type of operation you have chosen with the setting of "C" parameters.

General purpose parameters

<table>
<thead>
<tr>
<th>Default</th>
<th>Range</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1**</td>
<td>0</td>
<td>0-100 min. modulation value</td>
</tr>
<tr>
<td>A2**</td>
<td>0</td>
<td>0-100 max. modulation value</td>
</tr>
<tr>
<td>A3</td>
<td>70%</td>
<td>0-100 start-up power value</td>
</tr>
<tr>
<td>A6</td>
<td>2</td>
<td>1-255 failure display delay</td>
</tr>
<tr>
<td>A7</td>
<td>10s</td>
<td>0-255s pilot working time</td>
</tr>
<tr>
<td>A10</td>
<td>90s</td>
<td>0-255s combustion chamber post-washing</td>
</tr>
<tr>
<td>A11</td>
<td>25s</td>
<td>0-255s flame stabiliser time</td>
</tr>
<tr>
<td>A17</td>
<td>4</td>
<td>0-4 number of F1 auto-resets</td>
</tr>
<tr>
<td>A31*</td>
<td>2</td>
<td>2-3 see note</td>
</tr>
<tr>
<td>A32</td>
<td>0</td>
<td>0-1 password-protected ST &amp; P param.</td>
</tr>
</tbody>
</table>

* Set A31 to 2 for PCH032/092 models and to 3 for PCH150/200 models. If set value is wrong, F3 lock is displayed.

**A1, A2 according to model (see following page).

When running in C0=5 mode (0-10VDC input), burner power proportionally modulates according to input voltage value (Vin) ranging from 10V (max power) to Von (min. power).

Von value is calculated by means of the following formula:

\[ Von = A25 + [A27 \times A15] \]

Below Von threshold, the burner runs at minimum power. If C2 parameter is set to 0 (C2=0), the burner turns off when falling below Voff voltage value. Voff value is calculated by means of the following formula:

\[ Voff = A25 + [A27 \times (A15-1)] \]

Once the burner is off, it can only be turned on again if Vin reaches Von value (Vin>Von).

REMARK: If C2=1, when Vin<Von, the burner keeps working at minimum power. Burner controls are not affected by any Voff related settings.

A15 parameter is a default multiplier set by the manufacturer to 1. Do not change it.

If A15=1, previous formulas are simplified as follows:

\[ Von = A25 + A27 \]

\[ Voff = A25 \]

Parameter A27 is the differential between Voff and Von (A27=Von-Voff when A15=1). Therefore it determines Voff/Von voltage range where burner works at minimum power.

The following example shows how to set A25 and A27 parameters. The picture in this page contains two adjustment charts for two PCH heaters installed into the same unit. In Heater "1" Voff and Von have been set to lower values than in Heater "2". This allows the two heaters to correctly and gradually turn on in sequence: Heater 2 turns on (Vin>3V) when Heater 1 is already modulating. Then it switches to modulation mode (Vin>6V) when Heater 1 is working at 50% of modulation power range.

The following table summarises parameters by column, showing relevant default values, the range of accepted values and a brief comment.

** Default Values **

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A25</td>
<td>2.5V</td>
<td>0.1-9.9V</td>
<td>basic turnoff value</td>
</tr>
<tr>
<td>A15</td>
<td>1</td>
<td>0-16</td>
<td>not used</td>
</tr>
<tr>
<td>A26</td>
<td>0.5V</td>
<td>0.1-9.9</td>
<td>not used</td>
</tr>
<tr>
<td>A8*</td>
<td>20s</td>
<td>1-255s</td>
<td>Min. length of incoming signal [Vin&lt;Voff] before the burner is turned off. Voff-Von differential.</td>
</tr>
<tr>
<td>A27</td>
<td>1</td>
<td>0.1-9.9</td>
<td>Min. length of incoming signal [Vin&gt;Von] before the burner is restarted.</td>
</tr>
<tr>
<td>A9*</td>
<td>20s</td>
<td>1-255s</td>
<td>Min. length of incoming signal [Vin&gt;Von] before the burner is restarted.</td>
</tr>
</tbody>
</table>

* A8 and A9 parameters avoid multiple burner start ups and turning offs when Vin signal is irregular.
6.12 Replacing the Modulation Card

When replacing the card, some checks have to be carried out and some parameters have to be set using the remote control. Parameter setup is mandatory in some units while in others it depends on the operative mode chosen by the manufacturer. PCH modules use a default list of values. Please update this list each time a change is made so that replacement cards can be precisely configured, if necessary.

* Following information refer only to PCH modules. For other equipment using the same modulation card, please refer to relevant manual.

- **Verifying hardware configuration of the card**
  It is necessary to build a NTC/VAN bridge on VAN and that VAN switch is ON as shown in figure below. This configuration is required to use 0-10V signal input.

- **Setting up parameters**
  Parameters whose setup is mandatory are: C0, A1, A2, A7, and A31
  C0, Chooses type of operation. Set five (5) for all models with 0-10 Vdc inlet.
  A1, A2 & A3 They determine thermal output power of the heater. For replacement card: A1 and A2 are set to zero (0), A3 to 70. The following table shows specific values for each model. A7 sets the length of pilot operation. Its default value is 10. A31 defaults to 2. This value must be changed for models PCH150-200.

<table>
<thead>
<tr>
<th>Model</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A7</th>
<th>A31</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCH032</td>
<td>18</td>
<td>68</td>
<td>70</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>PCH035</td>
<td>19</td>
<td>82</td>
<td>70</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>PCH043</td>
<td>18</td>
<td>80</td>
<td>70</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>PCH054</td>
<td>19</td>
<td>93</td>
<td>70</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>PCH072</td>
<td>23</td>
<td>100</td>
<td>70</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>PCH092</td>
<td>22</td>
<td>100</td>
<td>70</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>PCH150</td>
<td>20</td>
<td>100</td>
<td>50</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>PCH200</td>
<td>18</td>
<td>100</td>
<td>50</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

To access setup mode, do the following:
- Power the unit on
- Turn it off using ON/OFF switch (green light off).
- Wait until red light, if on, stops flashing (end of the heater shutdown phase).
- Press together PRG and SEL keys until “000” appears.
- Use arrows to change flashing zero (0).
- Press SEL key to confirm. The next digit will automatically start flashing.
- Keep using arrow and SEL keys to change and confirm digits to form correct password.
- Press PRG. C0 will appear on the display.
- Press SEL to select the required parameter, change its value using arrows and press SEL to confirm.
- Press arrows to navigate through parameters. Press PRG to exit setup menu.
Ask the manufacturer for the password.
6.13 Replacing the Gas Valve and Setting the Offset

If the gas valve is to be replaced, the CO₂ content must be checked and adjusted, if necessary, regulating the offset. Refer to paragraph 6.4 for adjustment procedure.
7. TROUBLESHOOTING

PCH MODULE OPERATION

IS BURNER WORKING?

IS AIR DELIVERED AT CORRECT TEMPERATURE?

IS GREEN LIGHT ON?

IS RED LIGHT ON?

- PRESS ON/OFF BUTTON ON REMOTE CONTROL
  - CHECK IF UNIT IS POWERED

YES

10.0V IS DISPLAYED

YES

REGULATE UNIT SETTINGS

CHECK THAT:
  a) A2 VALUE MATCHES THE ONE SHOWN IN THE TABLE
  b) P1 VALUE IS THE SAME AS A2 VALUE
  c) UNSUFFICIENT THERMAL OUTPUT

NO

REGULATE UNIT SETTINGS

CHECK THAT:
  a) BRIDGE ON 7-9 TERMINALS OF CN6 BOARD IS CLOSED
  b) BRIDGE ON 1-2 TERMINALS ON REMOTE CONTROL IS CLOSED

YES

C2 = 1?

YES

REGULAR OPERATION

CHECK:
  a) THAT C0 = 5
  b) FAULTY CARD

HG016/V003
**CONDENSING WARM AIR HEATER MODULE**

- **F1** BURNER DOES NOT START
  - NO GAS SUPPLY
  - PHASE/NEUTRAL EXCHANGE
  - NO GROUNDING
  - PHASE/PHASE CONNECTION WITHOUT NEUTRAL
  - BROKEN OR WRONGLY INSTALLED START-UP ELECTRODE
  - BROKEN OR WRONGLY INSTALLED DETECTION ELECTRODE
  - THE DETECTION ELECTRODE IS NOT FIXED OR GROUNDS WHEN HEATED
  - PILOT NOZZLE IS DIRTY OR ITS DIAMETER IS WRONG

- **F2** SAFETY THERMOSTAT
  - UNSUFFICIENT COOLING OF THE EXCHANGER
  - BROKEN THERMOSTAT BULB
  - THE BULB TOUCHES THE EXCHANGER
  - BROKEN SEALS - HOT SMOKE ON THE BULB
  *NOTE: THE BULB IS SENSIBLE ALL ALONG ITS LENGTH, NOT ONLY AT ITS END*

- **F3** AIR PRESSURE SWITCH
  - THE HOSE IS DISCONNECTED OR WRONGLY INSTALLED
  - DRAIN SYSTEM IS CLOGGED
  - FAULTY PRESSURE SWITCH

- **F4** FAULTY BURNER FAN
  - LOW VOLTAGE WIRE TO BURNER FAN IS FAULTY OR DISCONNECTED
  - CHECK THAT A1, A2, AND A3 VALUES MATCH VALUES SHOWN IN THE TABLE ON PAGE 33
  - FAULTY BURNER FAN

- **F5** SETUP ERROR IN CARD PARAMETERS
  - CHECK THAT C0 PARAMETER VALUE IS THE SAME AS A5 VALUE
  - CHECK THAT 0-10 VDC SIGNAL IS CONNECTED

- **F6** 3RD INLET OF CPU-PLUS CARD IS CLOSED
  - CONTACTS 6 AND 9 ON CN6 CONNECTOR OF CPU-PLUS CARD ARE CLOSED - GENERALLY NOT USED

- **F7** FAULTY SERIAL COMMUNICATION
  - CHECK THAT REMOTE CONTROL IS CORRECTLY CONNECTED TO CPU-PLUS CARD

- **F8** FLAME CONTROL DEVICE
  - CHECK WIRING BETWEEN FLAME CONTROL DEVICE AND CPU-PLUS CARD
  - FLAME CONTROL DEVICE IS FAULTY

- **ERR** WRONG WIRING OF REMOTE CONTROL
  - REVERSED CONNECTION BETWEEN 3 & 4 TERMINALS OF REMOTE CONTROL AND TERMINALS OF CPU-PLUS CARD
8. APPROVAL CERTIFICATE

GASTEC Italia certifica che i generatori d’aria calda a condensazione, tipi PC032XX, PC043XX, PC054XX, PC092XX, PC092XX, PC150XX, PC722XX, PC1200XX, PC043XX, PC0722XX costruiti da
made by
Apen Group S.p.A.,
Pessano con Bornago (MI), Italia
di / in
soddisfano i requisiti riportati nella Direttiva Apparecchi a Gas (90/396/CEE) per apparecchi a gas a immissione di fumi di cui l’ambiente di lavoro è esposto a un pericolo di incendio.
directives. All appliances burning gaseous fuels (90/396/EEC) for apparatus, the working environment is exposed to a risk of fire.

Certificato di conformità CE
Certificate of Conformity CE

GASTEC Italia e la direzione della società Garantizione Costanza, in conformità con l’art. 34 della direttiva (90/396/CEE)
GASTEC Italy and the company management ensure conformity with Article 34 of the Directive (90/396/CE).

San Vendemiano, 15 Dicembre 2004
San Vendemiano, 15 December 2004

Daniel Yancehiw, vice presidente
vice president
9. WIRING DIAGRAMS

See Installation paragraph for connections.

Wiring diagram for PCH032/PCH092 (code JG0084_A)

LEGEND

ACF FLAME CONTROL DEVICE
SEM MODULATION ELECTRONIC CARD
B1 PILOT BURNER SOLENOID VALVE
CR REMOTE CONTROL
EA STARTUP ELECTRODE
ER DETECTION ELECTRODE
EV1 GAS VALVE 1ST COIL
EV2 GAS VALVE 2ND COIL
IG MAIN SWITCH
F1 4 AT FUSE
F2 2.5 AT FUSE

RSB RELAY FOR LOCK SIGNALING
PRS AIR PRESSURE SWITCH
STB SAFETY THERMOSTAT (AUTO RESET)
TR 230/24V TRANSFORMER
VAG AIR/GAS FAN
SB RED LIGHT (LOCK)
SF WHITE LIGHT (UNIT ON)
R1 150OHM, 1 WATT RESISTOR
R2 12 Kohm 1/4 Watt RESISTOR

* For PCH032/092 models EV1 and EV2 coils are not listed since they are directly wired for flame control device.
Wiring diagram for PCH150/PCH200 (code JG0083_B)

CABLE COLOUR
1. BLACK PHASE 230V
2. BLUE NEUTRAL 230V
3. RED 24V
4. YELLOW/GREEN GROUND
10. SPARE PART LIST
Control Panel Parts

230V / 24V transformer
G14155

“R” relay
X00859
base
C02780

F2 - 2.5A fuse
X04058

modulation electronic card
G14900.03

F1 - 4A fuse
X00519

main switch
X01011

Flame control device
G01756 (for 150/200 models only)

supply supply
X00577

external connection terminal board
(SF,SB)
X00574
Burner Group Parts

- Flame control device
  - G14073 (032/092)
  - G01756 (150/200 see control panel)

- Gas valve
  - G14067 (032/035/043/054)
  - G14281 (072)
  - G14456 (092)
  - G15535 (150)
  - G15635 (200)

- Gas valve venturi
  - G14068 (032/035)
  - G14154 (043/045/072/092)
  - G15536 (150)
  - G15636 (200)

- Pilot solenoid valve
  - G14153

- Start-up wire
  - G04123.02

- Detection wire
  - G14063

- Start-up electrode
  - G16333

- Detection electrode
  - G16334

- Pilot flame group
  - G14783.05

- Air/gas fan
  - G14069 (032/035/043)
  - G14070.01 (054)
  - G14282 (072/092)
  - G15534 (150/200)

- Glass
  - G16324

- Glass gasket
  - G16329

- Pilot nozzle
  - G14626 (natural gas)
  - G14779 (LPG)

- Fan gasket
  - G14086 (032/035/043/054)
  - G14400 (072/092)
  - G15533 (150/200)

- Torch gasket
  - G14096 (032/035/043/054)
  - G14459 (072/092)
  - G15531 (150/200)

- Gasket for burner flange
  - G16332 (032/092)
  - G15532 (150/200)
More Parts Available

- Silicone hose Ø5x8 (meters) C02800
- Air pressure switch G13039 (032/092) G15539 (150/200)
- 110°C thermostat G14298
- Red light G1250
- White light G02736
- Gasket X00598
- Valve/gas hose gasket C03430 (032/092) X00371 (150/200)
- Panel/gas hose gasket C00520 (032/092) X01743 (150/200)
- Remote control G14950
- More Parts Available