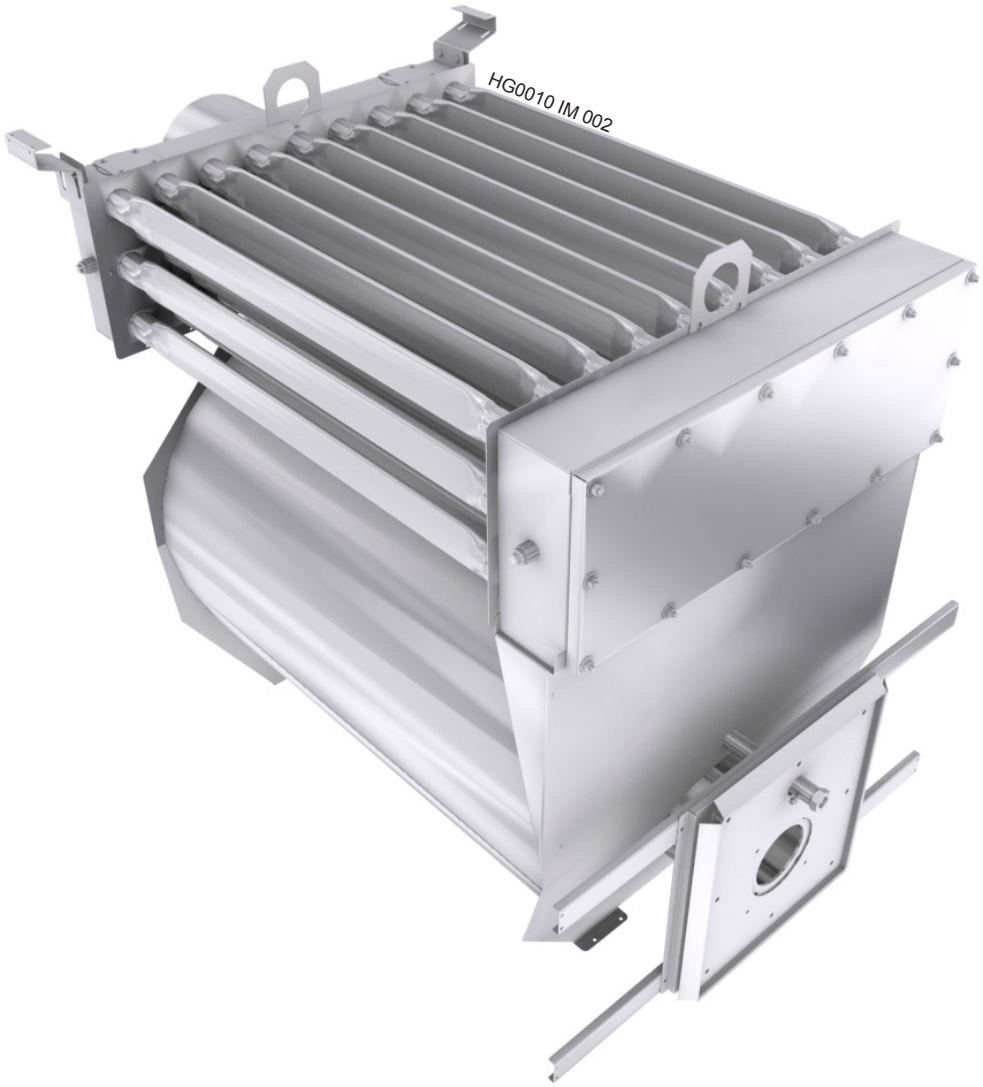
ApenGroup®
aermaxline

| GB | *Use, Installation and Maintenance Manual*<br>*G0 heat exchanger* |
|---|---|

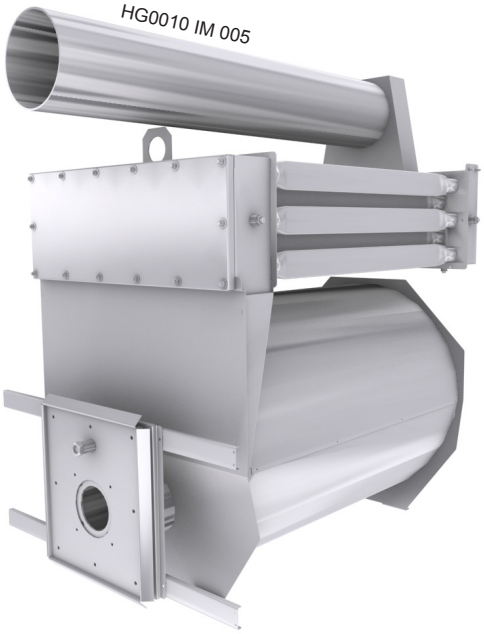
# Steel heat exchangers for industrial applications and air treatment stations

Apen Group has been manufacturing combustion chambers for AIR-GAS thermal exchange since 1967.
G0 series combustion chambers (heat exchangers) are manufactured in 12 different power versions, from 50 kW to 1170 kW, for a total of 48 models according to the type of construction; they can be fed with gaseous as well as liquid fuels (available on request only).
Thanks to the long experience acquired by our Company in the research and development of exchangers, three very useful and important patents have been registered.
G0 series combustion chambers have been designed to be fitted into warm air heaters fed by gas and gas oil burners (available only on request) and in the air treatment units.
In general G0 series combustion chambers are used in a wide variety of production processes.
G0XXXX exchangers include four different series to meet the different operating conditions where this product can be used.



## STANDARD APPLICATIONS: UTA OR ROOF TOP

**G0XXXX** and **G0XXXX-TF** series correspond to base models thought and designed to be installed in standard operating condition systems, which are typical in air treatment units: not too high temperature differences and air flow high enough (delta T between 20 and 35°C). -TF series differs from base version as it is manufactured with front flue gas outlet, on the burner side, to make particular installations easier.





## SPECIAL APPLICATIONS: PROCESSING PLANTS

**G0XXXX-2** and **G0XXXX-310** series have been designed to be used in particular operating conditions (ex. in processing plants, painting cabins, drying chambers or at high air static pressures).

G0XXXX-2 exchangers can tolerate high pressures (up to 2,500 Pa) as they are built with highly stress-resistant materials. G0XXXX-310 exchangers are built to operate at very high air temperatures (up to 280°C) or at very high air temperature differences, thanks to special manufacturing materials.

Please refer to Paragraph 3.4 for sizing and choice of exchangers to be used in processing plants.

# INDEX

## 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 exchanger for 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.
The warranty conditions are specified on the warranty certificate supplied with this equipment.
Warm air heaters indoor installation must comply with laws existing in the Country where the unit is installed, according to the equipment installation site.

## 2. SAFETY-RELATED WARNINGS

This chapter describes the safety instructions to be followed by machine operators.

### 2.1 Fuel

Before starting up the appliance make sure that:

- the fuel flow rate is suitable for the power required by the heater;
- network gas supply specifications match those written on the rating nameplate of the matched burner;
- the fuel supply pressure is between the range specified on the nameplate of the matched burner;
- the gas seal of the feeding system has been tested and approved in compliance with the applicable standards;
- the system is correctly sized for such flow rate and is fitted with all safety and monitoring devices required by applicable standards.

### 2.2 Gas Leaks

If you smell gas:
- do not operate electrical switches, telephones or any other object or device that could produce sparks;
- 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.

### 2.3 Power Supply

The equipment must be correctly connected to an effective earthing system, made in compliance with current regulations in the site of installation.
- 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.

Do not pull electric cables and keep them away from heat sources.
All electrical operations (installation and maintenance) must be carried out 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 touch the hot parts of the heater, such as the flue gas duct;
- 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.

### 2.5 Maintenance

Maintenance and combustion checks shall be executed exclusively in compliance with national laws in force in the countries and sites where the exchanger is installed.
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 the Manufacturer.
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.
**If the equipment is not used for long periods, shut fuel supply off and switch power supply off.**
If the equipment is to be put out of service, in addition to the above operations, potential sources of hazard on the unit must be disabled.

### 2.6 Transport and Handling

The exchanger is supplied properly secured on wooden pallet, covered with transparent film (upon request it can be supplied packed in a cage or in a box).
Unload the heater from the truck and move it to the site of installation by using means of transport suitable for the shape of the load and for the weight.
If the unit is stored at the customer's premises, make sure a suitable place is selected, sheltered from rain and from excessive humidity, for the shortest possible time.
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.
Once the equipment is moved to the correct position, the unpacking operation can be started.
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 or unloading.

## 3. TECHNICAL FEATURES

G0xxxx exchanger module has been designed to be used in warm air heaters in the air treatment units and in the roof-tops as heating unit.
The unit can also be used on all machines requiring air to be heated during their operation (such as dryers, fresh air systems etc.).

To operate, the module needs to be placed inside an adequately insulated structure and matched to a gaseous or liquid fuel burner (only available upon request).

The unit thermal power output ranges from 32 to 1,060 kW. For greater output levels, multiple modules must be combined. They can be assembled both in series and in parallel to reach high heat output levels.

The setting depends on the matched burner. The following types are available:
• modulating;
• two stages, high - low flame;
• ON / OFF.

The air is heated through its passage on combustion chamber and exchanger pipe surfaces.

**The heat exchanger can also operate under conditions that lead to condensation (if equipped with the necessary accessories) only if the relevant burner is fed with gaseous fuel.**

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 stainless steel (AISI 441 or AISI 310), while the surfaces in contact with flue gases (tube bundle) are made of stainless steel with low carbon content, in order to ensure a high resistance to corrosion. Tube bundle design is patented.

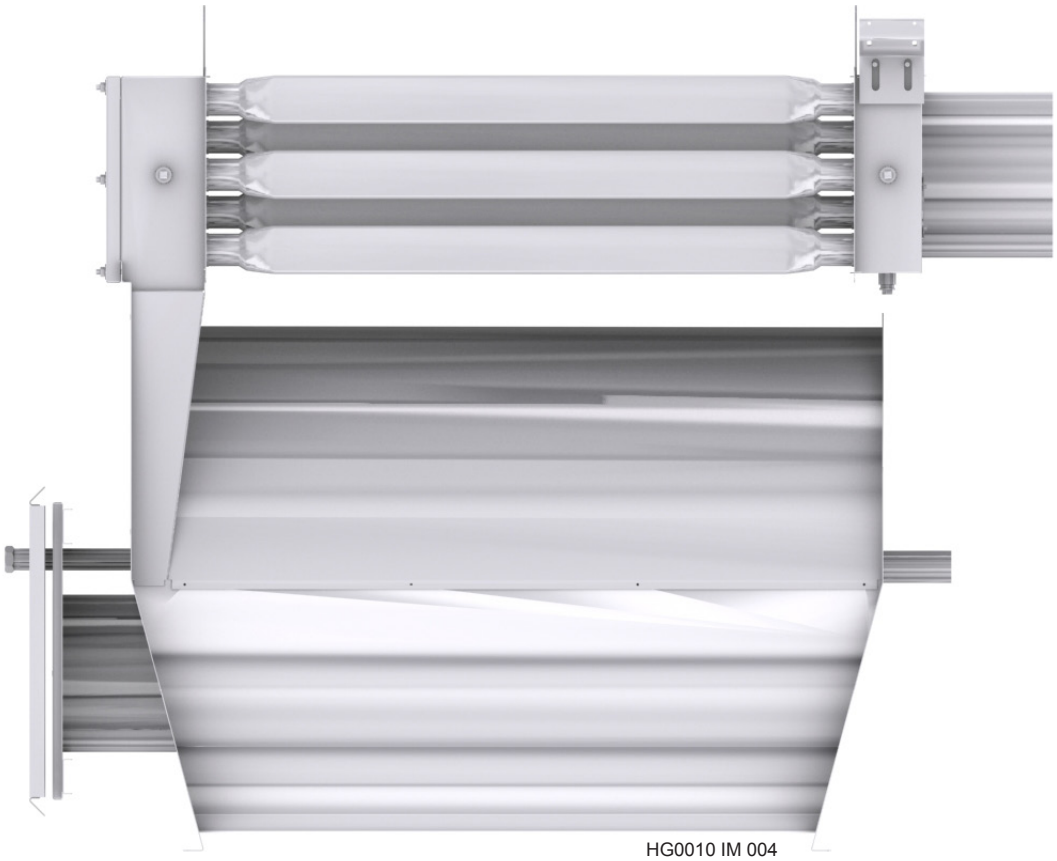
Combustion chambers are manufactured in the following versions:

- G0xxxx AISI 441 combustion chamber
- G0xxxx-TF as above, but with chimney on the burner side
- G0xxxx-2 for high pressures [2,500 Pa]
- G0xxxx-310 AISI 310 combustion chamber to be used at high temperatures.

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

| USA | EN | |
|---|---|---|
| AISI | No. | Composition |
| AISI 310 | 1.4845 | X8 CrNi 25-21 |
| AISI 441 | 1.4509 | X2 CrTiNb 18 |
| AISI 304 | 1.4301 | X5 CrNi 18-10 |

Other materials and/or configurations may be evaluated depending on particulars requirements.



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## 3.1 Technical Information

Design, shape and size of G0xxxx exchanger module are identical to the module used for PKA/PKE and EMS generators, with performance certified according to EN1020 regulation.
Performance directly depends on the installation and use under specific conditions. Efficiency and performance of the exchanger itself, installed for different applications than those mentioned, can significantly differ from those declared.

**Safety**
The exchanger is not provided with any control and safety devices; these will have to be **compulsorily** provided by the entity manufacturing the equipment where the exchanger is installed. Other sections of the Manual provide information for safety device positioning.

**Burner**
G0XXXX heat exchangers operate with gas or gas oil air forced draught burners (only available upon request).
All models are designed, manufactured and tested to match the burners produced by main burner manufacturers on the market. Apen Group product catalogue provides correct matchings.

## 3.2 Technical Data

Technical data provided below are valid, **with some exceptions underlined in the notes**, for all versions manufactured.

In the following paragraphs more technical information will be provided for correct data interpretation.

| Model | | | G07880 | | G07980 | | G08080 | | G08180 | | G08280 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of appliance | | | B23 | | | | | | | | | |
| NOx Class | $NO_x$ | | LOW NOx GAS BURNERS: CLASS 3 (<80 mg/kWh) according to EN676 | | | | | | | | | |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| Furnace Heat Input | $P_{min}$; $P_{ated,h}$ | kW | 96.0 | 195.0 | 115.0 | 230.0 | 154.0 | 310.0 | 185.0 | 380.0 | 260.0 | 508.0 |
| Useful Heat Output | | kW | 90.2 | 171.0 | 108.1 | 205.9 | 145.0 | 275.0 | 173.9 | 335.9 | 245.0 | 450.0 |
| Combustion Efficiency (Hi) *1 | $\eta_{pl}$; $\eta_{nom}$ | % | 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. 3.10 | | | | | | | | | |
| Output efficiency | $\eta_{s,flow}$ | % | According to the chosen burner: see table in Par. 3.10 | | | | | | | | | |
| 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 | $F_{env}$ | % | 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 | | $m^3$ | 0.37 | | 0.52 | | 0.76 | | 1.06 | | 1.55 | |
| Minimum air flow rate *2 | | $m^3/h$ | 5,200 | 9,850 | 6,200 | 11,850 | 8,350 | 15,800 | 10,000 | 19,300 | 14,050 | 25,800 |
| Rated air flow rate *3 | | $m^3/h$ | 10,500 | | 14,000 | | 18,000 | | 23,000 | | 30,000 | |
| Module pressure drop | | Pa | see diagram | | | | | | | | | |
| MAX applicable pressure *4 | | Pa | 800 | | 800 | | 800 | | 800 | | 800 | |
| MAX air temperature *5 | | °C | 120 | | 120 | | 120 | | 120 | | 120 | |

Notes to the tables in the following pages:

1) **Efficiency** - efficiency is considered for 35 K $\Delta$t air flow rate, with 15°C air temperature at the inlet; for different applications please refer to other sections of the manual
2) **Minimum Air Flow Rate** - minimum air flow rate has been calculated for 50 K $\Delta$t, suitable for processing plants or for special applications; for more severe applications, with more than 50 K $\Delta$t, refer to other sections for efficiency and precautions to be taken.

Values in the table refer to maximum and minimum power.
To meet ErP requirements refer to Para.3.10 with burner matching.
3) **Rated Air Flow Rate** - flow rate used for the calculation and to meet 2018 ErP requirements.
4) **MAX Pressure** - The maximum pressure that can be applied is valid for models code G0xxxx and G0xxxx-TF; for models code G0xxxx-2 and Gxxxx-310 the maximum pressure is **2,500Pa**.
5) **MAX Air Temperature** - Valid for all models, excluding codes G0xxxx-310: for these the maximum value is **270°C**.

| Model | | | G083080 | | G08480 | | G08580 | | G08680 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type of appliance | | | B23 | | | | | | | |
| NOx Class | $NO_x$ | | LOW NOx GAS BURNERS: CLASS 3 (<80 mg/kWh) according to EN676 | | | | | | | |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| Furnace Heat Input | $P_{min}$; $P_{ated,h}$ | kW | 320 | 670 | 397 | 818 | 447 | 1028 | 617 | 1170 |
| Useful Heat Output | | kW | 301 | 592 | 374 | 730 | 422 | 920 | 583 | 1049 |
| Combustion Efficiency (Hi) *1 | $\eta_{pl}$; $\eta_{nom}$ | % | 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. 3.10 | | | | | | | |
| Output efficiency | $\eta_{s,flow}$ | % | According to the chosen burner: see table in Par. 3.10 | | | | | | | |
| 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 | $F_{env}$ | % | 0.97 | | 1.00 | | 1.01 | | 1.01 | |
| Combustion Chamber pressure | | Pa | 21 | 110 | 25 | 120 | 28 | 130 | 53 | 205 |
| Combustion Chamber volume | | $m^3$ | 1.79 | | 4.78 | | 5.58 | | 5.58 | |
| Minimum air flow rate *2 | | $m^3/h$ | 17,300 | 33,950 | 21,450 | 41,900 | 24,200 | 52,750 | 24,200 | 52,750 |
| Rated air flow rate *3 | | $m^3/h$ | 40,000 | | 54,000 | | 68,500 | | 74,000 | |
| Module pressure drop | | Pa | see diagram | | | | | | | |
| MAX applicable pressure *4 | | Pa | 800 | | 800 | | 800 | | 800 | |
| MAX air temperature *5 | | °C | 120 | | 120 | | 120 | | 120 | |

| Model | | | G0K7580 | | G0K7680 | | G0K7780 | | G0K7880 | | G0K7980 | | G0K8080 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of appliance | | | B23 | | | | | | | | | | | |
| NOx Class | $NO_x$ | | LOW NOx GAS BURNERS: CLASS 3 (<80 mg/kWh) according to EN676 | | | | | | | | | | | |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| Furnace Heat Input | $P_{min}$; $P_{ated,h}$ | 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) *1 | $\eta_{pl}$; $\eta_{nom}$ | % | 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. 3.10 | | | | | | | | | | | |
| Output efficiency | $\eta_{s,flow}$ | % | According to the chosen burner: see table in Par. 3.10 | | | | | | | | | | | |
| Chimney loss - Burner ON (Hi) | | % | | 7.5 | | 7.6 | | 7.5 | | 7.4 | | 7.4 | | 7.8 |
| Chimney loss - Burner OFF | | % | < 0.1 | | < 0.1 | | < 0.1 | | < 0.1 | | <0,1 | | <0,1 | |
| Casing losses | $F_{env}$ | % | 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 | | $m^3$ | 0.06 | | 0.12 | | 0.24 | | 0.37 | | 0.52 | | 0.76 | |
| Minimum air flow rate *2 | | $m^3/h$ | 820 | 1,835 | 1,290 | 3,815 | 1,550 | 6,050 | 2,210 | 8,075 | 2,770 | 10,450 | 3,535 | 14,270 |
| Rated air flow rate *3 | | $m^3/h$ | 2,700 | | 5,000 | | 7,300 | | 10,500 | | 14,000 | | 18,000 | |
| Module pressure drop | | Pa | see diagram | | | | | | | | | | | |
| MAX applicable pressure *4 | | Pa | 800 | | 800 | | 800 | | 800 | | 800 | | 800 | |
| MAX air temperature *5 | | °C | 120 | | 120 | | 120 | | 120 | | 120 | | 120 | |

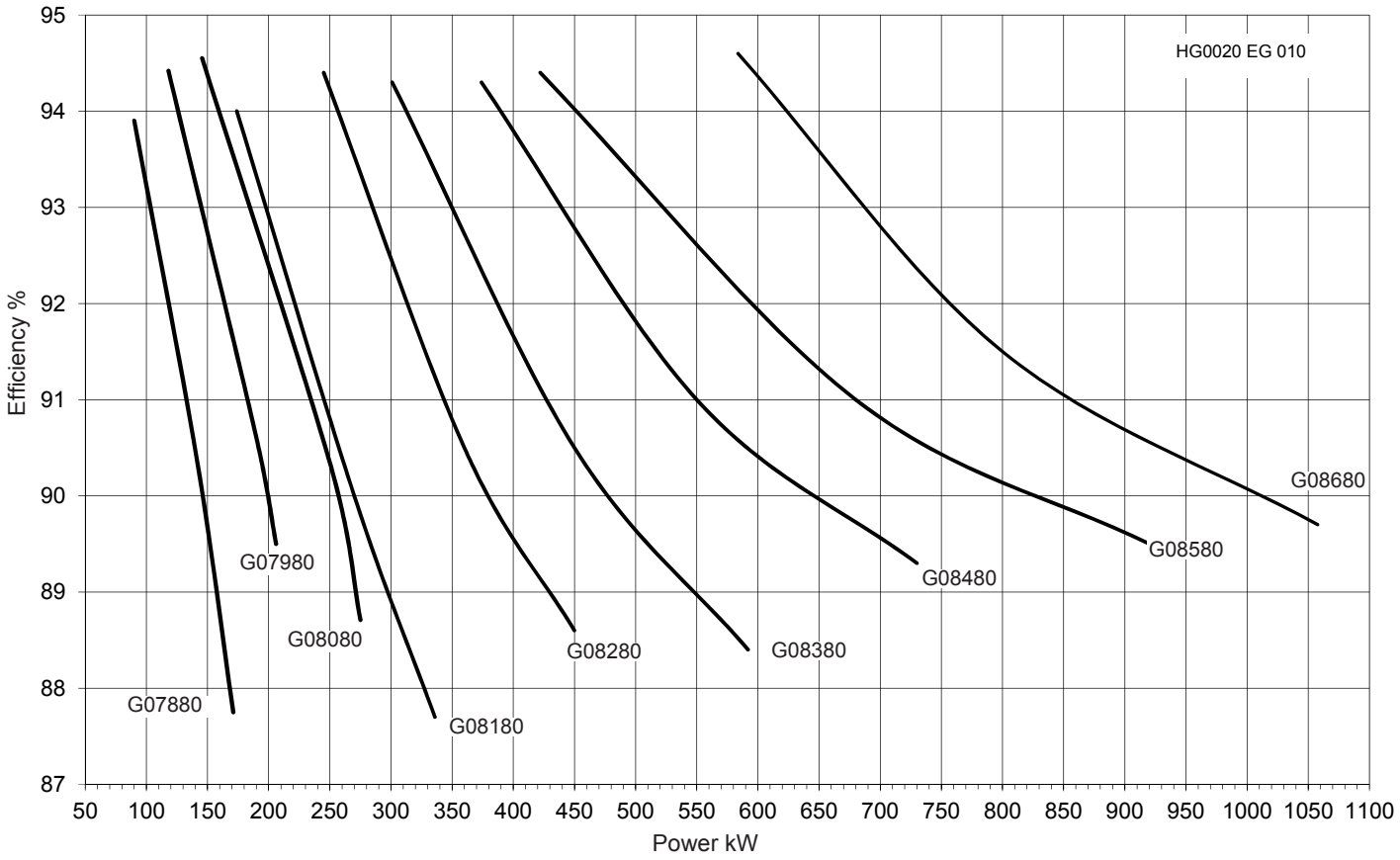
| Model | | | G0K8180 | | G0K8280 | | G0K8380 | | G0K8480 | | G0K8580 | | G0K8680 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of appliance | | | B23 | | | | | | | | | | | |
| NOx Class | $NO_x$ | | LOW NOx GAS BURNERS: CLASS 3 (<80 mg/kWh) according to EN676 | | | | | | | | | | | |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| Furnace Heat Input | $P_{min}$; $P_{ated,h}$ | kW | 74.0 | 347.0 | 83.0 | 455.0 | 95.0 | 595.0 | 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) *1 | $\eta_{pl}$; $\eta_{nom}$ | % | 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 | $\eta_{s,h}$ | % | According to the chosen burner: see table in Par. 3.10 | | | | | | | | | | | |
| Output efficiency | $\eta_{s,flow}$ | % | According to the chosen burner: see table in Par. 3.10 | | | | | | | | | | | |
| Chimney loss - Burner ON (Hi) | | % | | 7.8 | | 7.8 | | 7.7 | | 7.8 | | 7.6 | | 7.6 |
| Chimney loss - Burner OFF | | % | < 0.1 | | < 0.1 | | < 0.1 | | < 0.1 | | < 0.1 | | < 0.1 | |
| Casing losses | $F_{env}$ | % | 1.02 | | 1.03 | | 0.97 | | 1.00 | | 1.01 | | 1.01 | |
| Combustion Chamber pressure | | Pa | 23 | 225 | 30 | 275 | 40 | 365 | 45 | 410 | 45 | 420 | 60 | 615 |
| Combustion Chamber volume | | $m^3$ | 1.06 | | 1.55 | | 1.79 | | 4.78 | | 5.58 | | 5.58 | |
| Minimum air flow rate *2 | | $m^3/h$ | 4,290 | 18,335 | 4,805 | 24,050 | 5,510 | 34,850 | 7,320 | 39,975 | 10,305 | 46,620 | 10,305 | 59,864 |
| Rated air flow rate *3 | | $m^3/h$ | 23,000 | | 30,000 | | 40,000 | | 54,000 | | 68,500 | | 74,000 | |
| Module pressure drop | | Pa | see diagram | | | | | | | | | | | |
| MAX applicable pressure *4 | | Pa | 800 | | 800 | | 800 | | 800 | | 800 | | 800 | |
| MAX air temperature *5 | | °C | 120 | | 120 | | 120 | | 120 | | 120 | | 120 | |

## 3.3 Efficiency

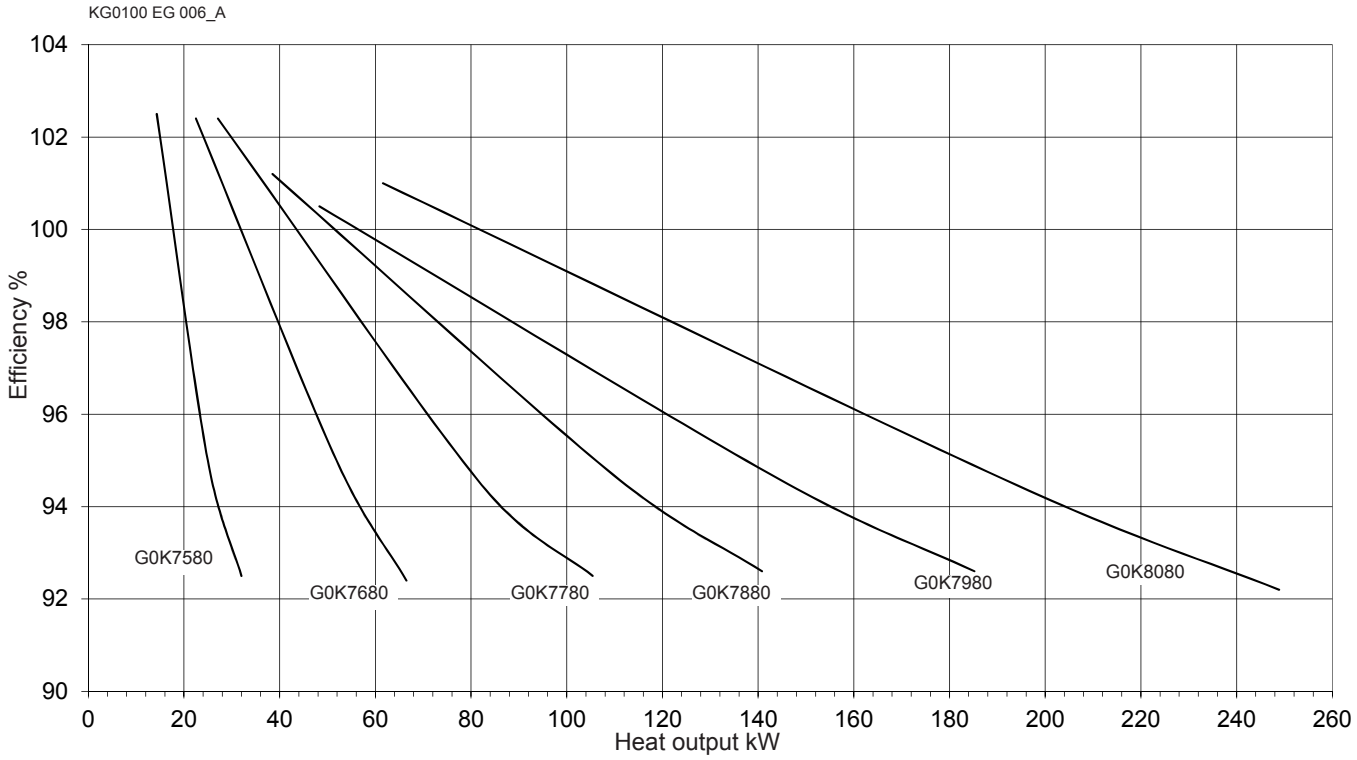
Each exchanger has a work field that allows it to be used at different power and efficiency levels based on effective output power. Minimum and maximum heat output limits must be absolutely complied with in burner adjustment.
Power adjustment outside the work field will invalidate the exchanger warranty.

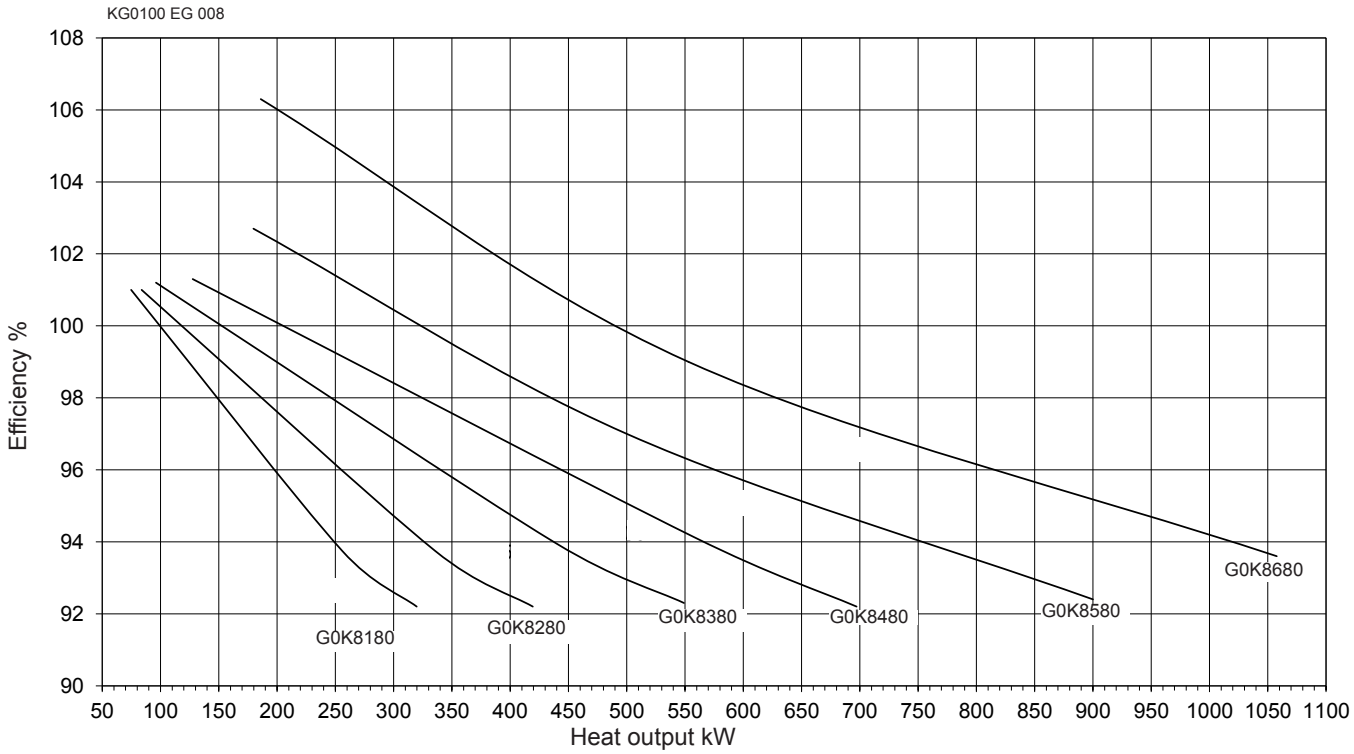
The efficiency values mentioned below refer to operation at 15°C air at the inlet, with 35 K $\Delta t$ .

**Series G0**



**Series G0K**


KG0100 EG 006_A
Efficiency %
Heat output kW
G0K7580
G0K7680
G0K7780
G0K7880
G0K7980
G0K8080


KG0100 EG 008
Efficiency %
Heat output kW
G0K8180
G0K8280
G0K8380
G0K8480
G0K8580
G0K8680

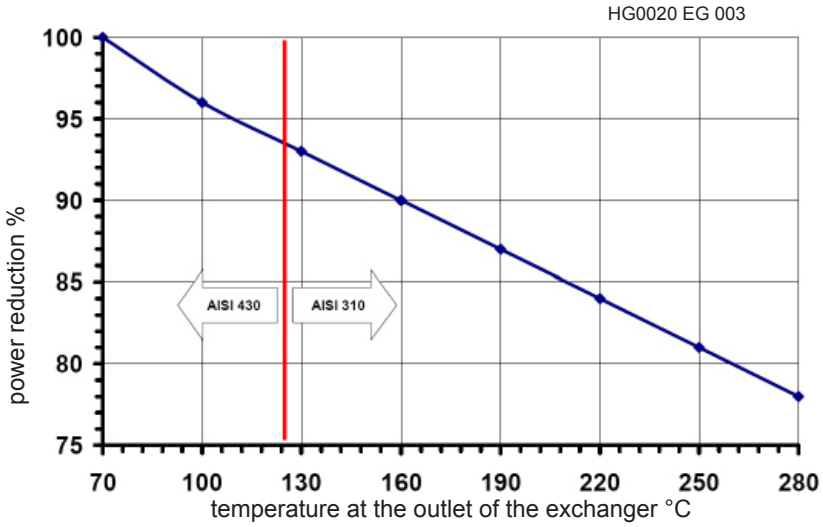
## 3.4 Limitation of Heat Output

When the exchanger is used under different conditions than those mentioned, the maximum heat output adjustment must be limited in the following cases:

- Output air temperature exceeding 70°C
- Heat drop between the air at the inlet and at the outlet exceeding 35 K

- **Outlet Air Temperature**

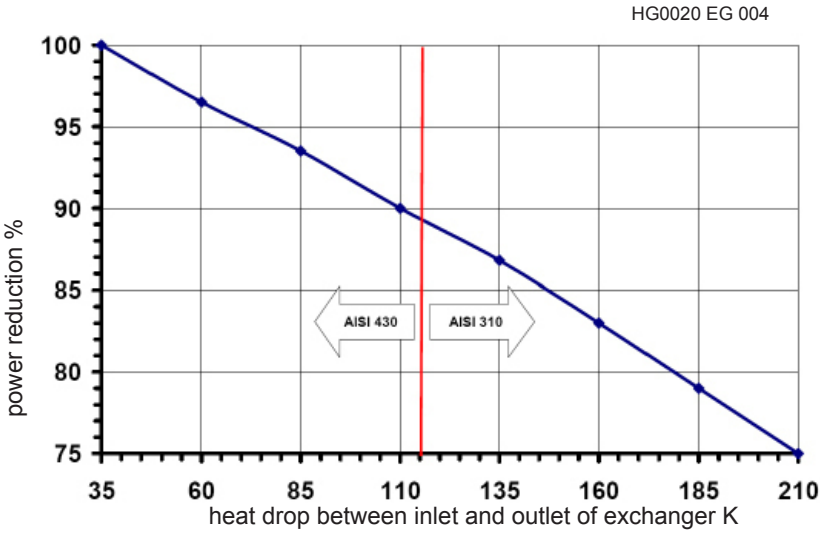
If the temperature at the outlet of the exchanger exceeds 70°C you need to reduce the burner adjusted maximum heat output of a percentage equal to the value shown on the accompanying graph.
It should be remembered that when the temperature at the inlet exceeds 125°C it is advisable to use AISI 310 exchangers.




Example:
Exchanger G07980;
maximum heat output 230 kW;
output air temperature 190°C:
Maximum adjusted power [burnt]
= 230*0.87 = 200 kW.

**- High Heat Drop**

In case of high heat drop, with values exceeding 35K, you need to reduce the burner adjusted maximum heat output of a percentage equal to the value shown on the accompanying graph.
If the heat drop exceeds 115K it is advisable to use AISI 310 exchangers.




Example:
Exchanger G07980;
maximum heat output 230 kW;
heat drop 120 K:
Maximum adjusted power [burnt]
= 230*0.88 = 202 kW.

**- Combined Effect**

In case the exchanger is used with high air temperature at the outlet and high heat drop, the reduction of heat drop must consider both conditions and relevant heat output reductions.

Example:
Exchanger G07980;
maximum heat output 230 kW;
heat drop 120 K:
output temperature 220°C:
Maximum adjusted power [burnt] = 230*0.88*0.84 = 170 kW.

## 3.5 Operating Cycle

**Operation of the Generator**

The exchanger operation only depends on the matched burner and on the installed control devices.
Operation consists of different phases:

- Start-up
- Switch-off
- Control devices
- Safety devices

**Start-up**

Starting occurs when the matched burner starts together with the cooling fan that must be necessarily installed on the machine and/or the system.
The fan can be started together with the burner or it can be delayed for approximately 60 - 90 seconds by means of a specially provided thermostat or timing device, to prevent cold air from entering the room.
If a fan electrical protection control and/or a fan air flow control exist, these must be connected in series to the burner start enabling.

**Switch-off**

**At the end of the heat request the burner will be switched off, the control system will have to keep ventilation active to allow the exchanger cooling.**
**Exchanger cooling must be kept for more than three minutes; this is to allow the correct cooling of the exchanger.**
Failure to perform the post-cooling operations on the exchanger will cause:

- a shorter lifetime of the exchanger and the guarantee will be null and void;
- the safety thermostat to trigger, where present, and the relevant manual reset.

The exchangers used in processing plants with air temperatures exceeding 90°C must be cooled for a longer time, proportional to the processing temperature.

**Control devices**

Different kinds of control devices may be provided:

- for temperature
- for air flow

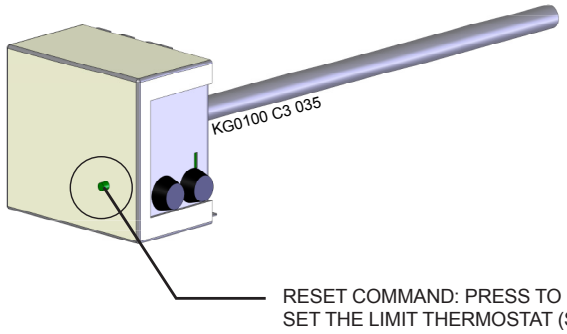
For temperature controls: ON/OFF, high/low flame or modulating types: these will have to act on the burner directly.
Obviously the best position is where it is possible to control actual air temperature. If the control device is positioned near the exchanger the radiant effect should be considered, as it may remarkably influence the measured temperature value.
If air flow control devices are installed, such as inverters, double polarity motors or dampers, it is necessary that as long as the air flow lowers, the heat output lowers proportionally. In the absence of direct automatic devices, a thermostat must be installed at the outlet of the exchanger so that, when the air flow diminishes with consequent temperature increase, the burner lowers its heat output or switches off.

**Safety thermostats**

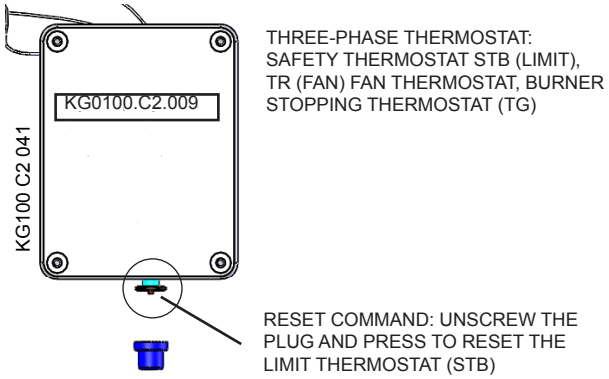
The Gas Regulation stipulates that a safety thermostat with manual reset and positive safety setting must be necessarily installed; the breakage of the sensitive element corresponds to a safety intervention.
The thermostat activation must immediately stop the burner.
In processing plants, where suitable safety thermostat with reset is not provided, it is advisable to use a double thermostat.
Electrical wiring should prevent automatic burner restarting when the thermostat is reset after activation.
When required, the fire damper is another safety device: it must immediately stop the burner.

**Example of safety thermostats used on APEN GROUP SPA heaters**

**Safety thermostat Jumo code. G04750**




**Safety three-phase thermostat code G10040.01**

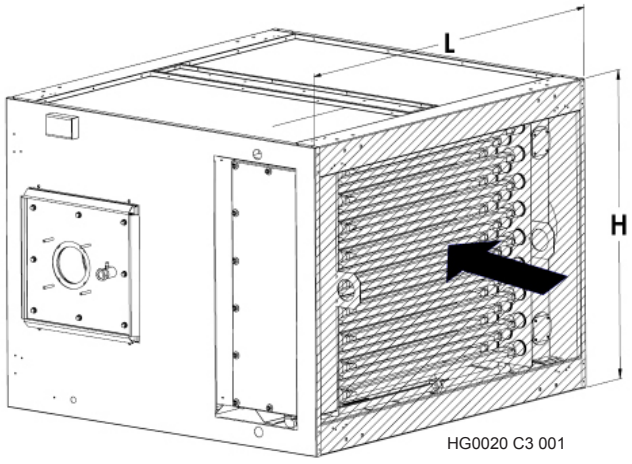


## 3.6 Air flow rates

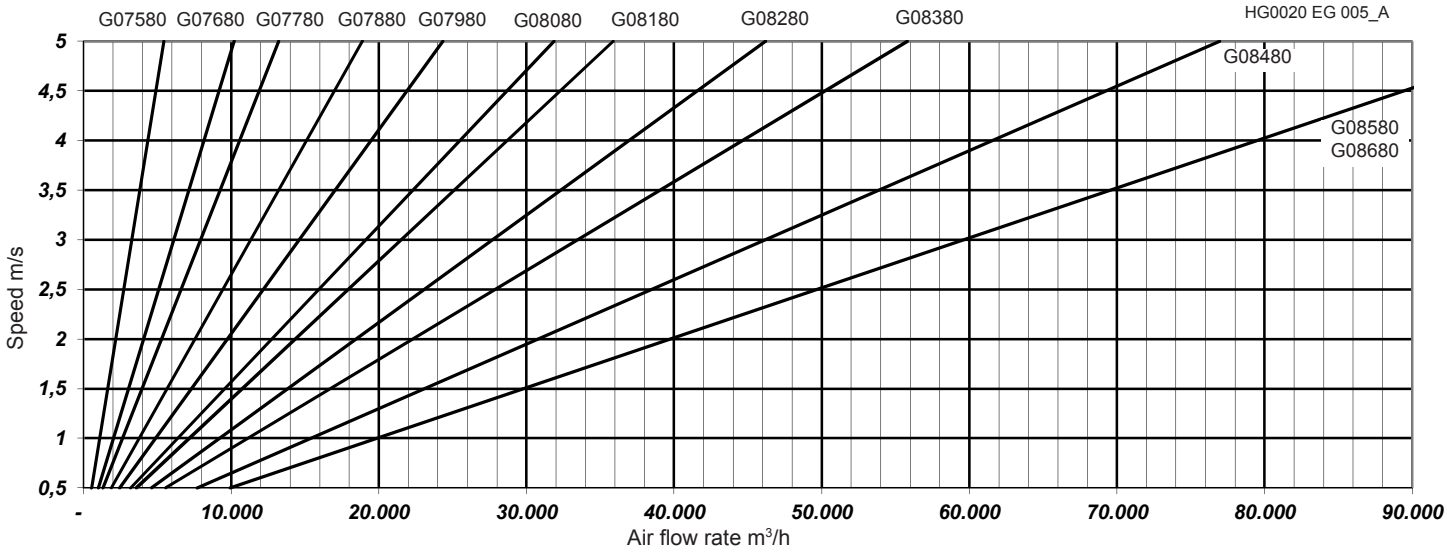
For air treatment stations, roof top type and in general for heating systems, use the exchanger at a speed between 1.5 and 4.5 m/s. Lower speeds require a more accurate outlet temperature control to prevent overheating. Higher speeds can be used according to pressure drops that can be produced and that improve the equipment efficiency.

If the exchanger is fitted into a module sized as shown in the figure below, for inlet speeds between 1 and 5 m/s obtained air flow rates are shown.
In the next page pressure drops referred to the air flow rate are shown: the air flow is always referred to the passage through a module sized as below.

| Type | Overall dimensions | |
|---|---|---|
| | L | H |
| G07580 | 750 | 530 |
| G07680 | 995 | 700 |
| G07780 | 1,100 | 800 |
| G07880 | 1330 | 920 |
| G07980 | 1,460 | 1,060 |
| G08080 | 1,750 | 1,140 |
| G08180 | 1,960 | 1,140 |
| G08280 | 2,170 | 1,340 |
| G08380 | 2,600 | 1,340 |
| G08480 | 2,950 | 1,600 |
| G08580 | 3,550 | 1,700 |
| G08680 | | |

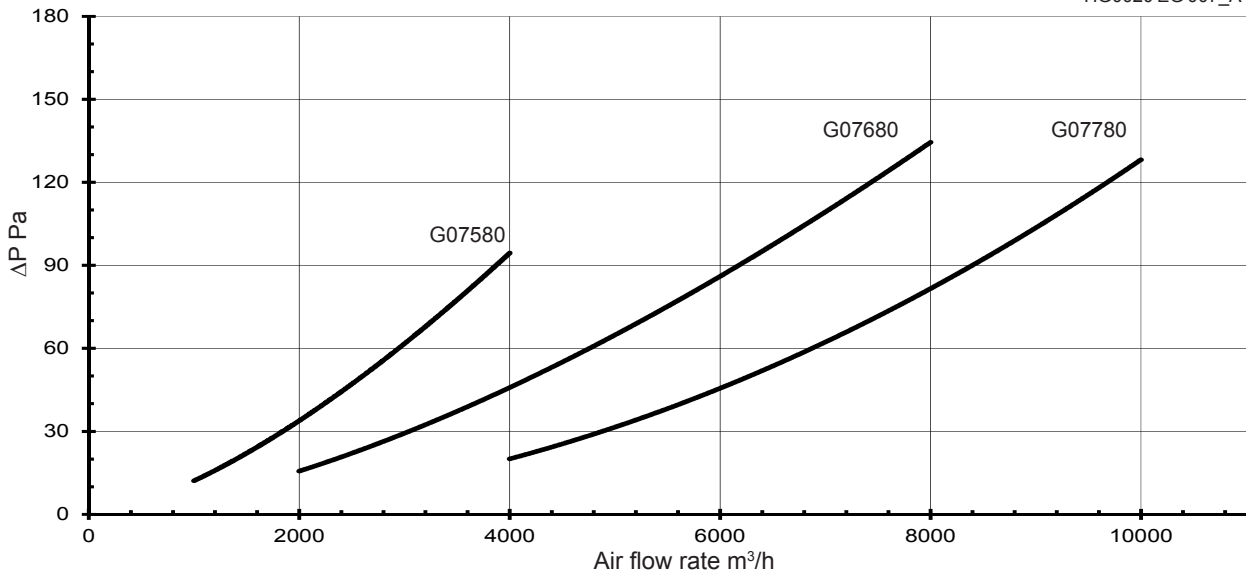



**PASSAGE SPEED / AIR FLOW RATE DIAGRAM**

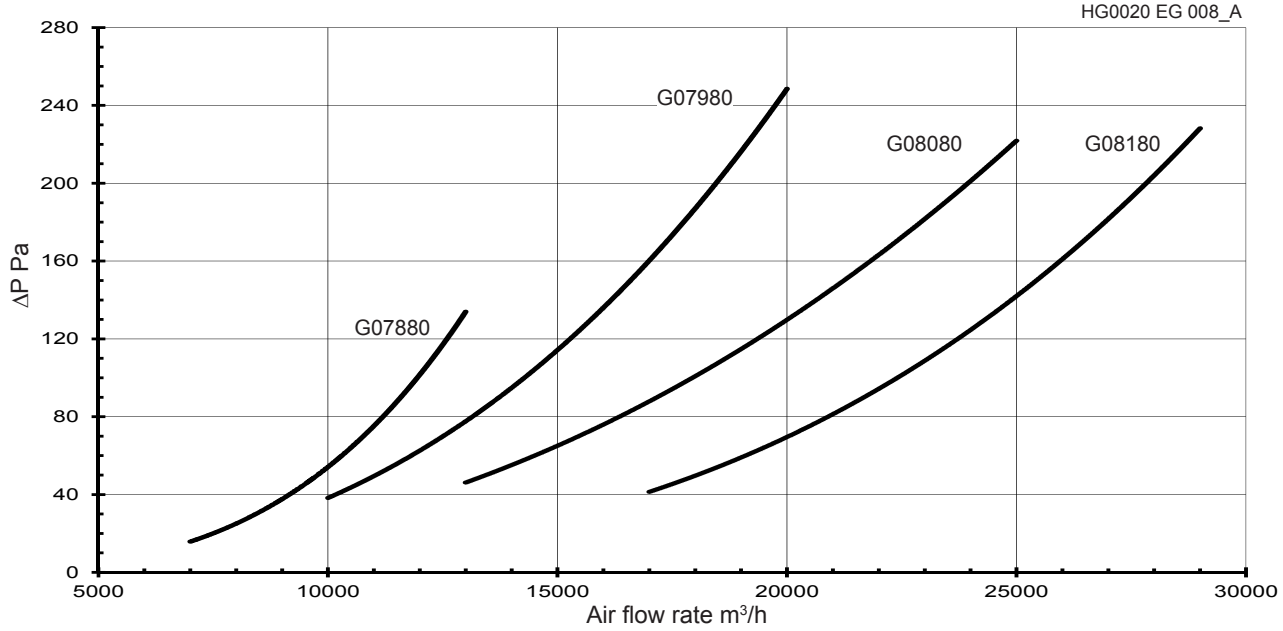


**AIR FLOW - PRESSURE DROP DIAGRAM**

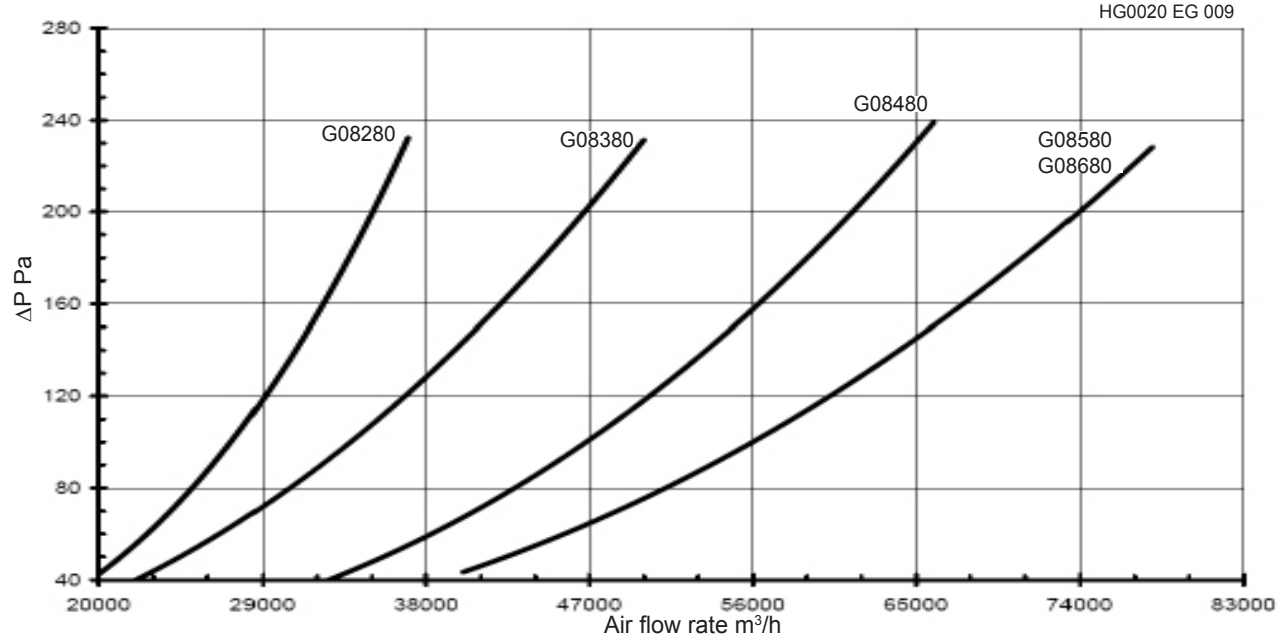
HG0020 EG 007_A




HG0020 EG 008_A




HG0020 EG 009

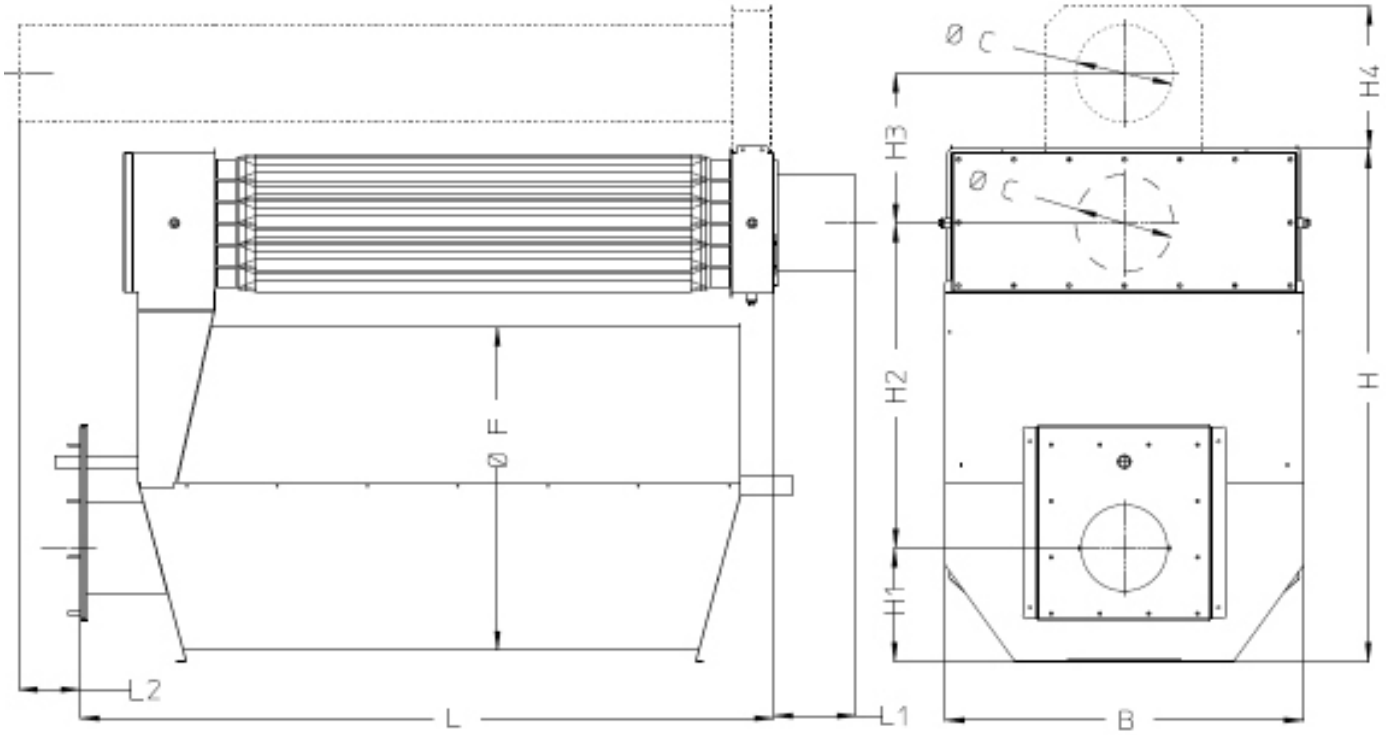


## 3.7 Dimensions

The drawing below shows the exchanger dimensions.
G0xxxx-2 version only differs for the combustion chamber thickness.
G0xxxx-TF version differs for the front chimney outlet shown in dotted lines in the drawing.

Dimensions are indicative and can be changed without notice. On request APEN GROUP can supply the cad drawing for the exchanger, in all versions, in dxf format or different, upon request.

**Size for models G0XXXX; G0XXXX-2; G0XXXX-TF**

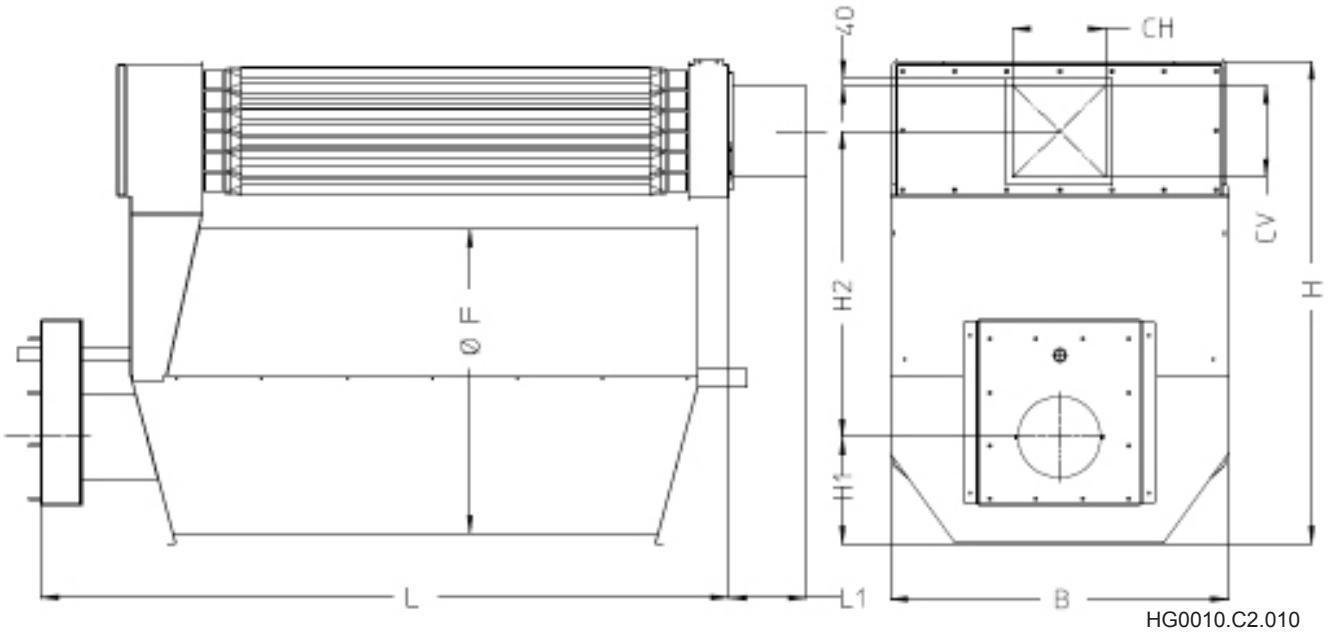



| Model | Overall dimensions | | | | Chimney | | | | Series "TF" | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L | B | H | Ø F | Ø C | H1 | H2 | L1 | H3 | H4 | L2 | kg |
| G07580 | 660 | 400 | 710 | 270 | 120 | 170 | 350 | 115 | 300 | 215 | 65 | 40 |
| G07680 | 940 | 515 | 815 | 468 | 150 | 165 | 480 | 83 | 275 | 222 | 80 | 50 |
| G07780 | 1,000 | 665 | 980 | 620 | 180 | 250 | 575 | 130 | 280 | 250 | 140 | 80 |
| G07880 | 1,230 | 750 | 1,070 | 680 | 180 | 260 | 650 | 460 | 325 | 300 | 140 | 110 |
| G07980 | 1,400 | 870 | 1,205 | 785 | 250 | 275 | 770 | 202 | 355 | 400 | 140 | 130 |
| G08080 | 1,625 | 910 | 1,340 | 865 | 250 | 290 | 860 | 220 | 390 | 400 | 125 | 177 |
| G08180 | 1,850 | 955 | 1,340 | 865 | 250 | 290 | 860 | 220 | 400 | 400 | 150 | 195 |
| G08280 | 2,060 | 1,150 | 1,560 | 1,060 | 300 | 335 | 1,040 | 210 | 405 | 405 | 140 | 264 |
| G08380 | 2,380 | 1,150 | 1,620 | 1,060 | 300 | 335 | 1,070 | 300 | 415 | 405 | 170 | 376 |
| G08480 | 2,755 | 1,335 | 1,940 | 1,280 | 350 | 435 | 1,270 | 355 | 450 | 450 | 115 | 520 |
| G08580<br>G08680 | 3,130 | 1,480 | 2,155 | 1,445 | 400 | 495 | 1,375 | 550 | 500 | 500 | 140 | 610 |

(*) L overall dimension does not consider gasket and burner plate thickness.
(**) L quoted dimension in model G08580 refers to the distance between the bottom of the combustion chamber and the burner connection, as in this model the combustion chamber projects beyond the size of the rear flue gas collector contrary to the layout of all the other models

Note: the chimney diameter is referred to as rated diameter; the chimney is supplied as female connection; internal diameter is 3mm larger compared to rated diameter. For example a rated diameter of 250 mm corresponds to an internal diameter of 253 mm.

**Size for models G0XXXX-310**




HG0010.C2.010

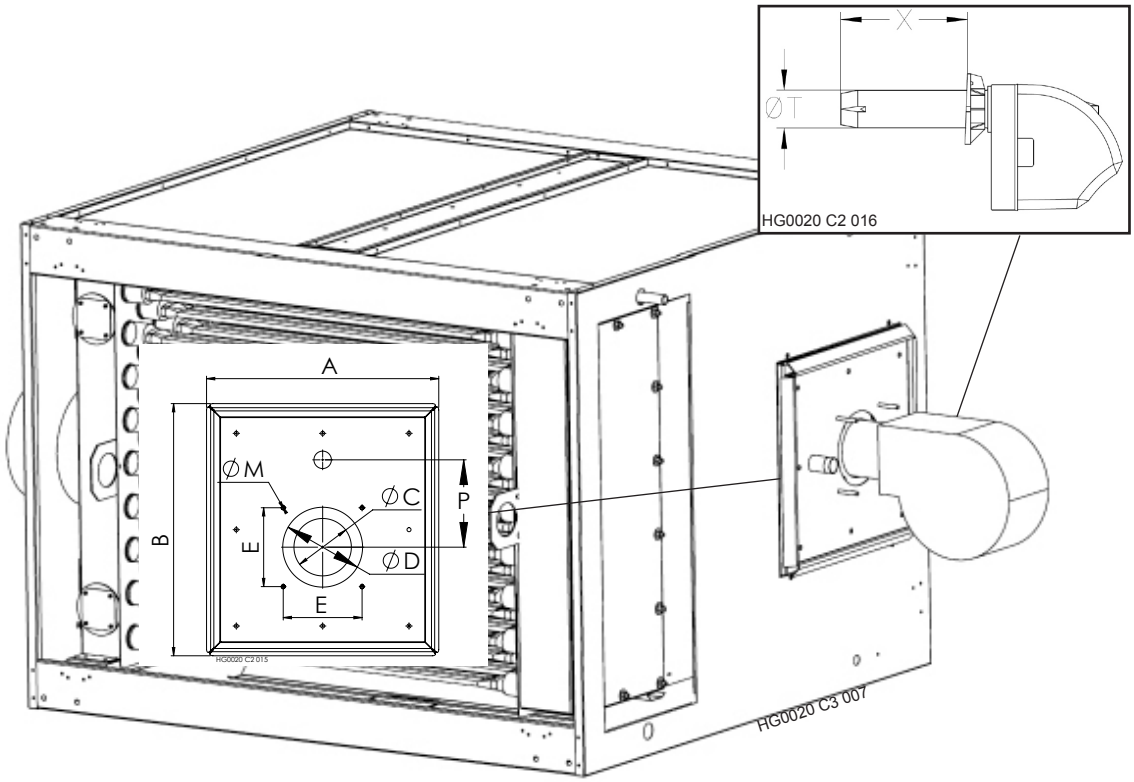
| Model | Overall dimensions | | | | Chimney | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | L | B | H | Ø F | H1 | H2 | L1 | CH | CV |
| G07580-310 | 760 | 400 | 710 | 270 | 170 | 350 | 200 | 120 | 120 |
| G07680-310 | 1,040 | 515 | 815 | 468 | 165 | 480 | 200 | 150 | 150 |
| G07780-310 | 1,100 | 665 | 980 | 620 | 250 | 575 | 200 | 180 | 180 |
| G07880-310 | 1,292 | 750 | 1,070 | 680 | 260 | 650 | 200 | 210 | 210 |
| G07980-310 | 1,500 | 870 | 1,205 | 785 | 275 | 770 | 200 | 210 | 210 |
| G08080-310 | 1,725 | 910 | 1,340 | 865 | 290 | 860 | 200 | 250 | 250 |
| G08180-310 | 1,950 | 955 | 1,340 | 865 | 290 | 860 | 200 | 250 | 250 |
| G08280-310 | 2,160 | 1,150 | 1,560 | 1,060 | 335 | 1,040 | 200 | 300 | 300 |
| G08380-310 | 2,480 | 1,150 | 1,620 | 1,060 | 335 | 1,070 | 200 | 300 | 300 |
| G08480-310 | 2,955 | 1,335 | 1,940 | 1,280 | 435 | 1,270 | 200 | 400 | 250 |
| G08580-310<br>G08680-310 | 3,230 | 1,480 | 2,155 | 1,445 | 495 | 1,375 | 200 | 400 | 250 |

(*) L overall dimension does not consider gasket and burner plate thickness.
(**) L quoted dimension in model G08580 refers to the distance between the bottom of the combustion chamber and the burner connection, as in this model the combustion chamber projects beyond the size of the rear flue gas collector contrary to the layout of all the other models

## 3.8 Burner Matching

"ØT" value indicates maximum nosepiece diameter for a specific exchanger. If the installed nosepiece is larger, the exchanger will have to be modified at an extra cost.
Contact Apen Group S.p.A. Workshop Customer Service if you need to use a low NOx rate burner with flue gas recirculation outside the combustion head.
Standard exchangers supplied include standard burner plates sized as shown in the table below. If standard burner plate holes are not suitable for the burner to be installed, a plate with customised holes can be ordered (specify burner brand and model at order placement).

***Important: Burner nosepiece length must be greater than "X" minimum value. Shorter nosepieces could damage the exchanger and suspend the guarantee.***
***For version G0xxxx-310 exchangers, a 100 mm increase for "X" minimum value is necessary.***




| Model | X* | | ØT | P | A | B | ØC | ØD | ØM | E |
|---|---|---|---|---|---|---|---|---|---|---|
| | min | max | max | | | | | | | |
| | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| G07580 | 150 | 220 | 135 | 150 | 270 | 382 | 115 | 170 | M8 | 120 |
| G07680<br>G07780 | 150 | 220 | 135 | 150 | 270 | 382 | 133 | 170 | M8 | 120 |
| G07880 | 270 | 350 | 190 | 175 | 414 | 454 | 140 | 175 | M8 | 124 |
| G07980<br>G08080 | 270 | 350 | 190 | 175 | 414 | 454 | 160 | 223 | M8 | 158 |
| G08180 | 270 | 350 | 230 | 230 | 464 | 484 | 160 | 223 | M8 | 158 |
| G08280<br>G08380 | 270 | 350 | 230 | 230 | 464 | 484 | 190 | 269 | M8 | 190 |
| G08480<br>G08580<br>G08680 | 350 | 480 | 290 | 280 | 560 | 590 | 210 | 325 | M10 | 230 |

✱ ***Note: For version G0-310 exchanger a 100 mm increase for "X" minimum and maximum value is necessary. "X" value is calculated for installations with 25 mm thick panels. For thicker panels, the "X" value must be increased accordingly.***

## 3.9 Gas Burners

G0 and G0K heaters must be matched to gas burners certified by an EC mark as compliant to Gas Regulation 2016/426/EU. Heaters can be operated either with natural gas, G20, or with L.P.G., G30, and G31 gas.
The equipment must be matched to gas burners certified in EC and non-EC countries, according to the gas categories shown in the table below.
All models are designed, manufactured and tested to match the burners produced by main burner manufacturers on the market. Apen Group product catalogue and following pages in this manual provide correct matchings.
First start up shall be executed exclusively by authorized service centres complying with relevant laws existing in the Country where the unit is installed.
The first start-up also includes a combustion analysis, which is compulsory.

**Gas G0 flow rate table**

| TYPE OF GAS G20 - Cat. E-H | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TYPE OF MACHINE | | 7880 | 7980 | 8080 | 8180 | 8280 | 8380 | 8480 | 8580 | 8680 |
| | | max | max | max | max | max | max | max | max | max |
| SUPPLY PRESSURE | [mbar] | according to the burner | | | | | | | | |
| GAS CONSUMPTION (0°C-1013mbar) | [$Nm^3/h$] | 19.6 | 23.1 | 31.1 | 38.1 | 51.0 | 67.2 | 82.0 | 103.1 | 117.4 |
| CARBON DIOXIDE -$CO_2$ 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 |

**Gas G0K flow rate table**

| TYPE OF GAS G20 - Cat. E-H | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TYPE OF MACHINE | | 7580 | 7680 | 7780 | 7880 | 7980 | 8080 | 8180 | 8280 | 8380 | 8480 | 8580 | 8680 |
| | | max | max | max | max | max | max | max | max | max | max | max | max |
| SUPPLY PRESSURE | [mbar] | according to the burner | | | | | | | | | | | |
| GAS CONSUMPTION (0°C-1013mbar) | [$Nm^3/h$] | 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 -$CO_2$ 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 |

## 3.10 Burner Matching Tables

Matching between heaters series G0 and G0K to gas burners from main European manufacturers are shown.
We remind you that the burner must be provided with EC certification valid for the country of destination; it must be certified for the type of gas to be used; it must be provided with the documentation written in the language of the country of destination.

We remind you that the length of the burner nosepiece must comply with the values shown in the table in Paragraph 3.8 and that the adjusted power must always be included between the minimum and the maximum values of the used exchanger.
Burner matching has been performed according to the following criteria:

- burner in class 3 for NOx, with emissions of less than 80 mg/kWh;
- if heaters are to be installed outdoor or in a place different from the served one;
- compliance with ErP2018 requirements;
- compliance with ηs seasonal efficiency calculated according to standard prEN 17082:2017 that implements the European Commission's communication 2017-C229/01.

The following tables show the burners that comply with ErP2018 with ηs higher than 72%; burners with ηs higher than 78% comply also with ErP2021 requirements.
The ηs seasonal efficiency has been calculated using, for the indicated burners, the suitable regulation:
- ON/OFF adjustment for single-stage burners;
- two-stage regulations for two-stage burners;
- modulating regulations for modulating burners.

The air flow rate shown in the table has been assumed to choose the burners. If the air flow rate shown in the table differs from the used one, it is necessary to check compliance with ErP2018 requirements (ηs seasonal efficiency higher than 72%).

In principle, according to an estimated calculation made by Apen Group, it can be assumed that for G0K series the efficiency is compliant to ErP2018 both for a 20% reduced air flow rate and for an air flow rate higher than that mentioned.

| Heater Model G0 | Air flow rate $m^3/h$ | Riello | | | | | Weishaupt | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Model | ηs % | ηflow % | Qmin. speed kW | Qmax. speed kW | Model | ηs % | ηflow % | Qmin. speed kW | Qmax. speed kW |
| **140 kW - 7880** | **10,500** | BS3/M | 72.9 | 89.96 | 96 | 195 | WG20N/1-C Z-LN | 72.4 | 89.96 | 96 | 195 |
| | | | | | | | WG20N/1-C ZM-LN | 73.4 | 89.96 | 96 | 195 |
| **190 kW - 7980** | **14,000** | BS3/M | 73.8 | 91.46 | 115 | 195 | WG20N/1-C Z-LN | 73.5 | 91.41 | 115 | 200 |
| | | BS3D | 73.0 | 91.41 | 115 | 200 | WG20N/1-C ZM-LN | 74.3 | 91.41 | 115 | 200 |
| | | BS4/M | 73.5 | 91.06 | 115 | 230 | WG30N/1-C ZM-LN | 74.6 | 91.06 | 115 | 230 |
| | | BS4D | 72.9 | 91.06 | 115 | 230 | | | | | |
| **250 kW - 8080** | **18,000** | BS4/M | 73.5 | 91.14 | 154 | 250 | WG30N/1-C ZM-LN | 74.5 | 90.59 | 154 | 310 |
| | | BS4D | 72.7 | 91.14 | 154 | 250 | WG40N/1-A ZM-LN | 74.5 | 90.59 | 154 | 310 |
| | | BLUE RS 25/E | 73.9 | 90.59 | 154 | 310 | | | | | |
| | | BLUE RS 25/M | 73.9 | 90.59 | 154 | 310 | | | | | |
| **320 kW - 8180** | **23,000** | BLUE RS 25/E | 74.0 | 91.32 | 185 | 370 | WG30N/1-C ZM-LN | 74.4 | 91.45 | 185 | 350 |
| | | BLUE RS 25/M | 74.0 | 91.32 | 185 | 370 | WG40N/1-A ZM-LN | 74.6 | 91.25 | 185 | 380 |
| | | BLUE RS 35/E | 74.0 | 91.25 | 185 | 380 | | | | | |
| | | BLUE RS 35/M | 74.0 | 91.25 | 185 | 380 | | | | | |
| **420 kW - 8280** | **30,000** | BLUE RS 35/E | 73.7 | 90.73 | 260 | 480 | WG30N/1-C ZM-LN | 73.2 | 91.41 | 260 | 350 |
| | | BLUE RS 35/M | 73.7 | 90.73 | 260 | 480 | WG40N/1-A ZM-LN | 74.2 | 90.58 | 260 | 508 |
| | | BLUE RS 45/E | 73.8 | 90.58 | 260 | 508 | | | | | |
| | | BLUE RS 45/M | 73.8 | 90.58 | 260 | 508 | | | | | |
| **550 kW - 8380** | **40,000** | BLUE RS 45/E | 74.1 | 91.68 | 320 | 550 | WG40N/1-A ZM-LN | 74.5 | 92.42 | 320 | 550 |
| | | BLUE RS 45/M | 74.1 | 91.68 | 320 | 550 | WM-G10/3-A ZM-LN | 74.3 | 91.68 | 320 | 670 |
| | | BLUE RS 55/E | 74.3 | 91.21 | 320 | 670 | | | | | |
| | | BLUE RS 55/M | 74.3 | 91.21 | 320 | 670 | | | | | |
| **700 kW - 8480** | **54,000** | BLUE RS 120/E | 74.6 | 92.01 | 397 | 818 | WM-G10/3-A ZM-LN | 75.0 | 92.01 | 397 | 818 |
| | | BLUE RS 123/M | 74.6 | 92.01 | 397 | 818 | | | | | |
| | | BLUE RS 55/E | 74.5 | 92.40 | 397 | 680 | | | | | |
| | | BLUE RS 55/M | 74.5 | 92.40 | 397 | 680 | | | | | |
| | | BLUE RS 68/E | 74.9 | 92.01 | 397 | 818 | | | | | |
| | | BLUE RS 68/M | 74.9 | 92.01 | 397 | 818 | | | | | |
| **900 kW - 8580** | **68,500** | BLUE RS 120/E | 76.0 | 92.70 | 447 | 1028 | WM-G10/3-A ZM-LN | 76.0 | 92.99 | 447 | 900 |
| | | BLUE RS 123/M | 76.0 | 92.70 | 447 | 1028 | WM-G20/2-A ZM-LN | 76.7 | 92.70 | 447 | 1028 |
| | | BLUE RS 68/E | 75.8 | 93.08 | 447 | 860 | | | | | |
| | | BLUE RS 68/M | 75.8 | 93.08 | 447 | 860 | | | | | |
| **1200 kW - 8680** | **74,000** | BLUE RS 120/E | 74.1 | 91.00 | 617 | 1170 | WM-G10/3-A ZM-LN | 73.6 | 91.58 | 617 | 900 |
| | | BLUE RS 123/M | 74.1 | 91.00 | 617 | 1170 | WM-G20/2-A ZM-LN | 74.8 | 91.00 | 617 | 1170 |

| Heater Model G0 | Air flow rate $m^3/h$ | Baltur | | | | | CIB | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Model | ηs % | ηflow % | Qmin. speed kW | Qmax. speed kW | Model | ηs % | ηflow % | Qmin. speed kW | Qmax. speed kW |
| **140 kW - 7880** | **10,500** | BalturBTG 20 ME | 72.9 | 89.96 | 96 | 195 | NGX280_M-.AB.L.IT.A.0.xx | 72.1 | 90.04 | 96 | 190 |
| | | | | | | | NGX280_M-.MD.L.IT.A.0.xx | 73.0 | 90.04 | 96 | 190 |
| | | | | | | | NGX280_M-.MD.L.IT.A.1.xx | 73.0 | 90.04 | 96 | 190 |
| | | | | | | | NGX280_M-.PR.L.IT.A.0.xx | 73.0 | 90.04 | 96 | 190 |
| | | | | | | | NGX280_M-.PR.L.IT.A.1.xx | 73.0 | 90.04 | 96 | 190 |
| **190 kW - 7980** | **14,000** | BalturTBG 35 P | 72.9 | 91.06 | 115 | 230 | NGX280_M-.AB.L.IT.A.0.xx | 73.0 | 91.52 | 115 | 190 |
| | | BalturTBG 35 ME | 73.9 | 91.06 | 115 | 230 | NGX280_M-.MD.L.IT.A.0.xx | 73.8 | 91.52 | 115 | 190 |
| | | | | | | | NGX280_M-.MD.L.IT.A.1.xx | 73.8 | 91.52 | 115 | 190 |
| | | | | | | | NGX280_M-.PR.L.IT.A.0.xx | 73.8 | 91.52 | 115 | 190 |
| | | | | | | | NGX280_M-.PR.L.IT.A.1.xx | 73.8 | 91.52 | 115 | 190 |
| | | | | | | | NGX350_M-.MD.M.IT.A.0.xx | 74.1 | 91.06 | 115 | 230 |
| | | | | | | | NGX350_M-.MD.M.IT.A.1.xx | 74.1 | 91.06 | 115 | 230 |
| | | | | | | | NGX350_M-.PR.M.IT.A.0.xx | 74.1 | 91.06 | 115 | 230 |
| | | | | | | | NGX350_M-.PR.M.IT.A.1.xx | 74.1 | 91.06 | 115 | 230 |
| **250 kW - 8080** | **18,000** | BalturTBG 35 P | 72.9 | 90.59 | 154 | 310 | NGX350_M-.MD.M.IT.A.0.xx | 73.8 | 91.05 | 154 | 260 |
| | | BalturTBG 35 ME | 74 | 90.59 | 154 | 310 | NGX350_M-.MD.M.IT.A.1.xx | 73.8 | 91.05 | 154 | 260 |
| | | | | | | | NGX350_M-.PR.M.IT.A.0.xx | 73.8 | 91.05 | 154 | 260 |
| | | | | | | | NGX350_M-.PR.M.IT.A.1.xx | 73.8 | 91.05 | 154 | 260 |
| | | | | | | | NGX400_M-.MD.M.IT.A.0.xx | 74.1 | 90.59 | 154 | 310 |
| | | | | | | | NGX400_M-.MD.M.IT.A.1.xx | 74.1 | 90.59 | 154 | 310 |
| | | | | | | | NGX400_M-.PR.M.IT.A.0.xx | 74.1 | 90.59 | 154 | 310 |
| | | | | | | | NGX400_M-.PR.M.IT.A.1.xx | 74.1 | 90.59 | 154 | 310 |
| **320 kW - 8180** | **23,000** | BalturTBG 35 P | 73.1 | 91.25 | 80 | 410 | NGX400_M-.MD.M.IT.A.0.xx | 74.1 | 91.45 | 185 | 350 |
| | | BalturTBG 35 ME | 74.1 | 91.25 | 80 | 410 | NGX400_M-.MD.M.IT.A.1.xx | 74.1 | 91.45 | 185 | 350 |
| | | | | | | | NGX400_M-.PR.M.IT.A.0.xx | 74.1 | 91.45 | 185 | 350 |
| | | | | | | | NGX400_M-.PR.M.IT.A.1.xx | 74.1 | 91.45 | 185 | 350 |
| | | | | | | | NGX550_M-.MD.L.IT.A.0.xx | 74.1 | 91.25 | 185 | 380 |
| | | | | | | | NGX550_M-.MD.L.IT.A.1.xx | 74.1 | 91.25 | 185 | 380 |
| | | | | | | | NGX550_M-.PR.L.IT.A.0.xx | 74.1 | 91.25 | 185 | 380 |
| | | | | | | | NGX550_M-.PR.L.IT.A.1.xx | 74.1 | 91.25 | 185 | 380 |
| **420 kW - 8280** | **30,000** | BalturTBG 45 P | 72.7 | 90.89 | 260 | 450 | NGX550_M-.MD.L.IT.A.0.xx | 73.8 | 90.68 | 260 | 490 |
| | | BalturTBG 45 ME | 73.5 | 90.89 | 260 | 450 | NGX550_M-.MD.L.IT.A.1.xx | 73.8 | 90.68 | 260 | 490 |
| | | BalturTBG 60 P | 72.7 | 90.58 | 260 | 508 | NGX550_M-.PR.L.IT.A.0.xx | 73.8 | 90.68 | 260 | 490 |
| | | BalturTBG 60 ME | 73.7 | 90.58 | 260 | 508 | NGX550_M-.PR.L.IT.A.1.xx | 73.8 | 90.68 | 260 | 490 |
| | | | | | | | LX60_M-.AB.L.IT.A.0.XX | 72.6 | 90.58 | 260 | 508 |
| | | | | | | | LX60_M-.MD.L.IT.A.0.XX | 73.6 | 90.58 | 260 | 508 |
| | | | | | | | LX60_M-.MD.L.IT.A.1.XX | 73.6 | 90.58 | 260 | 508 |
| | | | | | | | LX60_M-.PR.L.IT.A.0.XX | 73.6 | 90.58 | 260 | 508 |
| | | | | | | | LX60_M-.PR.L.IT.A.1.XX | 73.6 | 90.58 | 260 | 508 |
| **550 kW - 8380** | **40,000** | BalturTBG 60 P | 73.3 | 91.48 | 320 | 600 | LX60_M-.AB.L.IT.A.0.XX | 73.4 | 91.21 | 320 | 670 |
| | | BalturTBG 60 ME | 74.3 | 91.48 | 320 | 600 | LX60_M-.MD.L.IT.A.0.XX | 74.4 | 91.21 | 320 | 670 |
| | | BalturTBG 80 LX ME | 74.4 | 91.21 | 320 | 670 | LX60_M-.MD.L.IT.A.1.XX | 74.4 | 91.21 | 320 | 670 |
| | | | | | | | LX60_M-.PR.L.IT.A.0.XX | 74.4 | 91.21 | 320 | 670 |
| | | | | | | | LX60_M-.PR.L.IT.A.1.XX | 74.4 | 91.21 | 320 | 670 |
| **700 kW - 8480** | **54,000** | BalturTBG 80 LX ME | 75.1 | 92.06 | 397 | 800 | LX60_M-.AB.L.IT.A.0.XX | 74.0 | 92.29 | 397 | 720 |
| | | BalturTBG 110 LX ME | 75 | 92.01 | 397 | 818 | LX60_M-.MD.L.IT.A.0.XX | 74.9 | 92.29 | 397 | 720 |
| | | | | | | | LX60_M-.MD.L.IT.A.1.XX | 74.9 | 92.29 | 397 | 720 |
| | | | | | | | LX60_M-.PR.L.IT.A.0.XX | 74.9 | 92.29 | 397 | 720 |
| | | | | | | | LX60_M-.PR.L.IT.A.1.XX | 74.9 | 92.29 | 397 | 720 |
| | | | | | | | LX72_M-.AB.L.IT.A.0.XX | 73.8 | 92.01 | 397 | 818 |
| | | | | | | | LX72_M-.MD.L.IT.A.0.XX | 74.8 | 92.01 | 397 | 818 |
| | | | | | | | LX72_M-.MD.L.IT.A.1.XX | 74.8 | 92.01 | 397 | 818 |
| | | | | | | | LX72_M-.PR.L.IT.A.0.XX | 74.8 | 92.01 | 397 | 818 |
| | | | | | | | LX72_M-.PR.L.IT.A.1.XX | 74.8 | 92.01 | 397 | 818 |
| **900 kW - 8580** | **68,500** | BalturTBG 110 LX ME | 76.3 | 92.70 | 447 | 1028 | LX72_M-.AB.L.IT.A.0.XX | 74.8 | 92.70 | 447 | 1028 |
| | | | | | | | LX72_M-.MD.L.IT.A.0.XX | 76.1 | 92.70 | 447 | 1028 |
| | | | | | | | LX72_M-.MD.L.IT.A.1.XX | 76.1 | 92.70 | 447 | 1028 |
| | | | | | | | LX72_M-.PR.L.IT.A.0.XX | 76.1 | 92.70 | 447 | 1028 |
| | | | | | | | LX72_M-.PR.L.IT.A.1.XX | 76.1 | 92.70 | 447 | 1028 |
| **1200 kW - 8680** | **74,000** | BalturTBG 110 LX ME | 74.4 | 91.00 | 617 | 1170 | LX72_M-.AB.L.IT.A.0.XX | 73.1 | 91.28 | 617 | 1040 |
| | | | | | | | LX72_M-.MD.L.IT.A.0.XX | 73.9 | 91.28 | 617 | 1040 |
| | | | | | | | LX72_M-.MD.L.IT.A.1.XX | 73.9 | 91.28 | 617 | 1040 |
| | | | | | | | LX72_M-.PR.L.IT.A.0.XX | 73.9 | 91.28 | 617 | 1040 |
| | | | | | | | LX72_M-.PR.L.IT.A.1.XX | 73.9 | 91.28 | 617 | 1040 |
| | | | | | | | RX75R_M-.AB.L.IT.A.0.XX | 73.3 | 91.00 | 617 | 1170 |
| | | | | | | | RX75R_M-.MD.L.IT.A.0.XX | 74.2 | 91.00 | 617 | 1170 |
| | | | | | | | RX75R_M-.MD.L.IT.A.1.XX | 74.2 | 91.00 | 617 | 1170 |
| | | | | | | | RX75R_M-.PR.L.IT.A.0.XX | 74.2 | 91.00 | 617 | 1170 |
| | | | | | | | RX75R_M-.PR.L.IT.A.1.XX | 74.2 | 91.00 | 617 | 1170 |

# G0 heat exchanger module

ApenGroup aermaxline

| Heater Model G0K | Air flow rate $m^3/h$ | Riello Model | ηs % | ηflow % | Qmin. speed kW | Qmax. speed kW | Weishaupt Model | ηs % | ηflow % | Qmin. speed kW | Qmax. speed kW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **032 kW - 7580** | **2,700** | BS1D | 80.6 | 93.0 | 16 | 34.4 | WG10N/0-D ZM-LN | 83.9 | 93.72 | 14 | 34.6 |
| **060 kW - 7680** | **5,000** | BS1 | 75.0 | 89.20 | 52 | 52 | WG5N/1-A LN | 76.1 | 89.65 | 50 | 50 |
| | | BS1D | 82.5 | 94.81 | 22 | 52 | WG10N/0-D ZM-LN | 84.5 | 94.87 | 22 | 50 |
| | | BS2/M | 83.2 | 93.46 | 26 | 72 | WG10N/1-D Z-LN | 82.3 | 93.64 | 25 | 72 |
| | | BS2D | 79.7 | 91.82 | 35 | 72 | WG10N/1-D ZM-LN | 84.1 | 93.64 | 25 | 72 |
| **100 kW - 7780** | **7,300** | BS2 | 73.0 | 86.80 | 91 | 91 | WG10N/1-D Z-LN | 83.3 | 94.73 | 26.5 | 110 |
| | | BS2/M | 85.4 | 95.16 | 26.5 | 91 | WG10N/1-D ZM-LN | 85.8 | 94.73 | 26.5 | 110 |
| | | BS2D | 82.2 | 94.13 | 35 | 91 | WG20N/1-C Z-LN | 82.2 | 93.62 | 35 | 114 |
| | | BS3/M | 81.3 | 92.01 | 48 | 114 | WG20N/1-C ZM-LN | 84.5 | 93.62 | 35 | 114 |
| | | BS3D | 77.3 | 89.81 | 65 | 114 | | | | | |
| **140 kW - 7880** | **10,500** | BS3/M | 83.3 | 94.05 | 48 | 152 | WG20N/1-C Z-LN | 82.5 | 94.88 | 38 | 152 |
| | | BS3D | 79.9 | 92.61 | 65 | 152 | | | | | |
| **190 kW - 7980** | **14,000** | BS3/M | 84.3 | 95.15 | 48 | 195 | WG20N/1-C Z-LN | 82.2 | 95.09 | 48 | 200 |
| | | BS3D | 80.8 | 94.05 | 65 | 200 | WG20N/1-C ZM-LN | 84.7 | 95.09 | 48 | 200 |
| **250 kW - 8080** | **18,000** | BS4/M | 84.2 | 94.85 | 68 | 250 | WG30N/1-C ZM-LN | 84.9 | 95.00 | 61 | 270 |
| | | BS4D | 79.9 | 92.80 | 110 | 250 | | | | | |
| | | BLUE RS 25/E | 84.3 | 95.00 | 61 | 270 | | | | | |
| | | BLUE RS 25/M | 84.3 | 95.00 | 61 | 270 | | | | | |
| **320 kW - 8180** | **23,000** | BLUE RS 25/E | 84.6 | 95.14 | 74 | 347 | WG30N/1-C ZM-LN | 85.1 | 95.14 | 74 | 347 |
| | | BLUE RS 25/M | 84.6 | 95.14 | 74 | 347 | | | | | |
| **420 kW - 8280** | **30,000** | BLUE RS 35/E | 85.0 | 95.50 | 83 | 455 | WG40N/1-A ZM-LN | 85.4 | 95.50 | 83 | 455 |
| | | BLUE RS 35/M | 85.0 | 95.50 | 83 | 455 | | | | | |
| **550 kW - 8380** | **40,000** | BLUE RS 45/E | 85.7 | 96.06 | 95 | 550 | WG40N/1-A ZM-LN | 86.0 | 96.06 | 95 | 550 |
| | | BLUE RS 45/M | 85.7 | 96.06 | 95 | 550 | WM-G10/3-A ZM-LN | 84.6 | 95.24 | 125 | 595 |
| | | BLUE RS 55/E | 85.1 | 95.77 | 100 | 595 | | | | | |
| | | BLUE RS 55/M | 85.1 | 95.77 | 100 | 595 | | | | | |
| **700 kW - 8480** | **54,000** | BLUE RS 55/E | 85.7 | 96.28 | 126 | 680 | WM-G10/3-A ZM-LN | 85.5 | 96.03 | 126 | 765 |
| | | BLUE RS 55/M | 85.7 | 96.28 | 126 | 680 | | | | | |
| | | BLUE RS 68/E | 85.0 | 95.65 | 150 | 765 | | | | | |
| | | BLUE RS 68/M | 85.0 | 95.65 | 150 | 765 | | | | | |
| **900 kW - 8580** | **68,500** | BLUE RS 68/E | 86.5 | 96.07 | 175 | 860 | WM-G10/3-A ZM-LN | 86.6 | 95.97 | 175 | 900 |
| | | BLUE RS 68/M | 86.5 | 96.07 | 175 | 860 | WM-G20/2-A ZM-LN | 86.1 | 94.85 | 250 | 974 |
| | | BLUE RS 120/E | 84.4 | 94.21 | 300 | 974 | | | | | |
| | | BLUE RS 123/M | 84.4 | 94.21 | 300 | 974 | | | | | |
| **1200 kW - 8680** | **74,000** | BLUE RS 120/E | 87.5 | 94.16 | 300 | 1130 | WM-G10/3-A ZM-LN | 89.7 | 96.19 | 175 | 900 |
| | | BLUE RS 123/M | 87.5 | 94.16 | 300 | 1130 | WM-G20/2-A ZM-LN | 88.8 | 94.78 | 250 | 1130 |

| Heater Model G0K | Air flow rate $m^3/h$ | Baltur Model | Baltur ηs % | Baltur ηflow % | Baltur Qmin. speed kW | Baltur Qmax. speed kW | CIB Model | CIB ηs % | CIB ηflow % | CIB Qmin. speed kW | CIB Qmax. speed kW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **032 kW - 7580** | **2,700** | | | | | | NGX70_M-.AB.L.IT.A.0.xx | 78.6 | 91.34% | 21 | 34.6 |
| **060 kW - 7680** | **5,000** | | | | | | NGX70_M-.AB.L.IT.A.0.xx | 82.5 | 94.40 | 22 | 65 |
| | | | | | | | NGX70_M-.TN.L.IT.A.0.xx | 72.6 | 86.16 | 65 | 65 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| **100 kW - 7780** | **7,300** | | | | | | NGX120_M-.AB.L.IT.A.0.20 | 81.8 | 93.62 | 35 | 114 |
| | | | | | | | NGX200_M-.AB.L.IT.A.0.xx | 81.3 | 93.00 | 40 | 114 |
| | | | | | | | NGX200_M-.MD.L.IT.A.0.25 | 83.1 | 93.00 | 40 | 114 |
| | | | | | | | NGX200_M-.PR.L.IT.A.0.25 | 83.1 | 93.00 | 40 | 114 |
| | | | | | | | | | | | |
| **140 kW - 7880** | **10,500** | BalturBTG 20 P | 80.2 | 93.04 | 60 | 152 | NGX200_M-.AB.L.IT.A.0.xx | 82.1 | 94.74 | 40 | 150 |
| | | BalturBTG 20 ME | 81.8 | 93.04 | 60 | 152 | NGX200_M-.MD.L.IT.A.0.25 | 84.6 | 94.74 | 40 | 150 |
| | | | | | | | NGX200_M-.PR.L.IT.A.0.25 | 84.6 | 94.74 | 40 | 150 |
| **190 kW - 7980** | **14,000** | BalturBTG 20 P | 81.1 | 94.36 | 60 | 200 | NGX280_M-.AB.L.IT.A.0.xx | 81.3 | 94.47 | 60 | 190 |
| | | BalturBTG 20 ME | 83.4 | 94.36 | 60 | 200 | NGX280_M-.MD.L.IT.A.0.xx | 83.5 | 94.47 | 60 | 190 |
| | | BalturTBG 35 P | 79.7 | 93.11 | 80 | 200 | NGX280_M-.MD.L.IT.A.1.xx | 83.5 | 94.47 | 60 | 190 |
| | | BalturTBG 35 ME | 81.2 | 93.11 | 80 | 200 | NGX280_M-.PR.L.IT.A.0.xx | 83.5 | 94.47 | 60 | 190 |
| | | | | | | | NGX280_M-.PR.L.IT.A.1.xx | 83.5 | 94.47 | 60 | 190 |
| **250 kW - 8080** | **18,000** | BalturTBG 35 P | 81.1 | 94.09 | 80 | 270 | NGX350_M-.MD.M.IT.A.0.xx | 84.5 | 94.90 | 65 | 260 |
| | | BalturTBG 35 ME | 83.4 | 94.09 | 80 | 270 | NGX350_M-.MD.M.IT.A.1.xx | 84.5 | 94.90 | 65 | 260 |
| | | | | | | | NGX350_M-.PR.M.IT.A.0.xx | 84.5 | 94.90 | 65 | 260 |
| | | | | | | | NGX350_M-.PR.M.IT.A.1.xx | 84.5 | 94.90 | 65 | 260 |
| | | | | | | | NGX400_M-.MD.M.IT.A.0.xx | 82.9 | 93.61 | 90 | 270 |
| | | | | | | | NGX400_M-.MD.M.IT.A.1.xx | 82.9 | 93.61 | 90 | 270 |
| | | | | | | | NGX400_M-.PR.M.IT.A.0.xx | 82.9 | 93.61 | 90 | 270 |
| | | | | | | | NGX400_M-.PR.M.IT.A.1.xx | 82.9 | 93.61 | 90 | 270 |
| **320 kW - 8180** | **23,000** | BalturTBG 35 P | 81.9 | 94.91 | 80 | 347 | NGX400_M-.MD.M.IT.A.0.xx | 84.2 | 94.54 | 90 | 347 |
| | | BalturTBG 35 ME | 84.4 | 94.91 | 80 | 347 | NGX400_M-.MD.M.IT.A.1.xx | 84.2 | 94.54 | 90 | 347 |
| | | | | | | | NGX400_M-.PR.M.IT.A.0.xx | 84.2 | 94.54 | 90 | 347 |
| | | | | | | | NGX400_M-.PR.M.IT.A.1.xx | 84.2 | 94.54 | 90 | 347 |
| | | | | | | | NGX550_M-.MD.L.IT.A.0.xx | 81.8 | 92.94 | 132 | 347 |
| | | | | | | | NGX550_M-.MD.L.IT.A.1.xx | 81.8 | 92.94 | 132 | 347 |
| | | | | | | | NGX550_M-.PR.L.IT.A.0.xx | 81.8 | 92.94 | 132 | 347 |
| | | | | | | | NGX550_M-.PR.L.IT.A.1.xx | 81.8 | 92.94 | 132 | 347 |
| **420 kW - 8280** | **30,000** | BalturTBG 35 P | 82.7 | 95.75 | 83 | 410 | NGX550_M-.MD.L.IT.A.0.xx | 83.6 | 94.10 | 132 | 455 |
| | | BalturTBG 35 ME | 85.2 | 95.75 | 83 | 410 | NGX550_M-.MD.L.IT.A.1.xx | 83.6 | 94.10 | 132 | 455 |
| | | BalturTBG 45 P | 82.1 | 95.05 | 100 | 450 | NGX550_M-.PR.L.IT.A.0.xx | 83.6 | 94.10 | 132 | 455 |
| | | BalturTBG 45 ME | 84.6 | 95.05 | 100 | 450 | NGX550_M-.PR.L.IT.A.1.xx | 83.6 | 94.10 | 132 | 455 |
| **550 kW - 8380** | **40,000** | BalturTBG 60 P | 82.5 | 95.35 | 120 | 595 | NGX550_M-.MD.L.IT.A.0.xx | 85.2 | 95.52 | 132 | 490 |
| | | BalturTBG 60 ME | 85 | 95.35 | 120 | 595 | NGX550_M-.MD.L.IT.A.1.xx | 85.2 | 95.52 | 132 | 490 |
| | | | | | | | NGX550_M-.PR.L.IT.A.0.xx | 85.2 | 95.52 | 132 | 490 |
| | | | | | | | NGX550_M-.PR.L.IT.A.1.xx | 85.2 | 95.52 | 132 | 490 |
| | | | | | | | LX60_M-.AB.L.IT.A.0.XX | 81.5 | 94.38 | 165 | 595 |
| | | | | | | | LX60_M-.MD.L.IT.A.0.XX | 84.0 | 94.38 | 165 | 595 |
| | | | | | | | LX60_M-.MD.L.IT.A.1.XX | 84.0 | 94.38 | 165 | 595 |
| | | | | | | | LX60_M-.PR.L.IT.A.0.XX | 84.0 | 94.38 | 165 | 595 |
| | | | | | | | LX60_M-.PR.L.IT.A.1.XX | 84.0 | 94.38 | 165 | 595 |
| **700 kW - 8480** | **54,000** | BalturTBG 80 LX ME | 85.6 | 95.96 | 130 | 765 | LX60_M-.AB.L.IT.A.0.XX | 82.7 | 95.55 | 165 | 720 |
| | | | | | | | LX60_M-.MD.L.IT.A.0.XX | 85.2 | 95.55 | 165 | 720 |
| | | | | | | | LX60_M-.MD.L.IT.A.1.XX | 85.2 | 95.55 | 165 | 720 |
| | | | | | | | LX60_M-.PR.L.IT.A.0.XX | 85.2 | 95.55 | 165 | 720 |
| | | | | | | | LX60_M-.PR.L.IT.A.1.XX | 85.2 | 95.55 | 165 | 720 |
| | | | | | | | LX72_M-.AB.L.IT.A.0.XX | 81.2 | 94.20 | 241 | 765 |
| | | | | | | | LX72_M-.MD.L.IT.A.0.XX | 83.3 | 94.20 | 241 | 765 |
| | | | | | | | LX72_M-.MD.L.IT.A.1.XX | 83.3 | 94.20 | 241 | 765 |
| | | | | | | | LX72_M-.PR.L.IT.A.0.XX | 83.3 | 94.20 | 241 | 765 |
| | | | | | | | LX72_M-.PR.L.IT.A.1.XX | 83.3 | 94.20 | 241 | 765 |
| **900 kW - 8580** | **68,500** | BalturTBG 110 LX ME | 86.4 | 95.73 | 180 | 974 | LX72_M-.AB.L.IT.A.0.XX | 83.1 | 94.97 | 241 | 974 |
| | | | | | | | LX72_M-.MD.L.IT.A.0.XX | 85.6 | 94.97 | 241 | 974 |
| | | | | | | | LX72_M-.MD.L.IT.A.1.XX | 85.6 | 94.97 | 241 | 974 |
| | | | | | | | LX72_M-.PR.L.IT.A.0.XX | 85.6 | 94.97 | 241 | 974 |
| | | | | | | | LX72_M-.PR.L.IT.A.1.XX | 85.6 | 94.97 | 241 | 974 |
| **1200 kW - 8680** | **74,000** | BalturTBG 110 LX ME | 89.2 | 95.62 | 180 | 1130 | RX75R_M-.AB.L.IT.A.0.XX | 85.5 | 94.53 | 270 | 1130 |
| | | | | | | | RX75R_M-.MD.L.IT.A.0.XX | 88.0 | 94.53 | 270 | 1130 |
| | | | | | | | RX75R_M-.MD.L.IT.A.1.XX | 88.0 | 94.53 | 270 | 1130 |
| | | | | | | | RX75R_M-.PR.L.IT.A.0.XX | 88.0 | 94.53 | 270 | 1130 |
| | | | | | | | RX75R_M-.PR.L.IT.A.1.XX | 88.0 | 94.53 | 270 | 1130 |
| | | | | | | | LX72_M-.AB.L.IT.A.0.XX | 86.0 | 95.09 | 241 | 1040 |
| | | | | | | | LX72_M-.MD.L.IT.A.0.XX | 88.5 | 95.09 | 241 | 1040 |
| | | | | | | | LX72_M-.MD.L.IT.A.1.XX | 88.5 | 95.09 | 241 | 1040 |
| | | | | | | | LX72_M-.PR.L.IT.A.0.XX | 88.5 | 95.09 | 241 | 1040 |
| | | | | | | | LX72_M-.PR.L.IT.A.1.XX | 88.5 | 95.09 | 241 | 1040 |

# 4. INSTALLATION INSTRUCTIONS

Instructions for the installation and heat exchanger module temperature setting are intended for authorized personnel only. Please read the safety warnings.
Installation of units including a G0xxxx exchanger module are subject to the regulations in force for warm air generators in the places and countries of destination, because, from the regulatory point of view, they are warm air generators.
EC certification of the appliance containing G0xxxx exchanger has to be provided by the manufacturer of the appliance.
For exchanger modules used with gas burner, with the exclusion of processing plants, the reference Regulation is 2016/426/EC.

## 4.1 Supply of the exchangers

**Supply**
In its standard version G0xxxx exchanger is supplied complete with the following accessories:

- Burner plate, in stainless steel up to model G08380, in very thick painted steel for larger models. Upon request the plate is supplied with customised hole pattern for the provided burner.
- Double seal ring on the burner plate, in mineral fibre.
- Pyrex sight glass, ring nut and gaskets for flame inspection pipe.
- Sealed connections arranged for condensate drain on front and rear flue gas collectors.

Condensate drain arrangement is not provided for AISI310 models.
Upon request Apen Group will supply cad or other digital format drawings to install the exchanger in the appliance for which it is intended.

**Accessories:**
The accessories supplied by Apen Group are:

- control, setting and safety thermostats for the burner.
- vertical or horizontal condensate drain kit.

**Packaging**
The exchangers are supplied secured on pallets and protected by transparent film.
Upon arrival, check integrity of the exchanger, with no deformations neither on the tube bundle nor on the combustion chamber.

**Flue gas outlet - Combustion Air Intake**
Regarding flue gas outlet and air intake, exchangers can be classified as type “B23”, with combustion circuit open towards the place where it is installed. Basically, the combustion air is sucked from the place where the matched burner is installed, except for special combustion air piping provided for the burner. Installation of type “B” appliances must be in a ventilated place. Combustion is forced. The fan is a burner component and is placed upstream the exchanger.

## 4.2 Assembling the Module Inside the Units

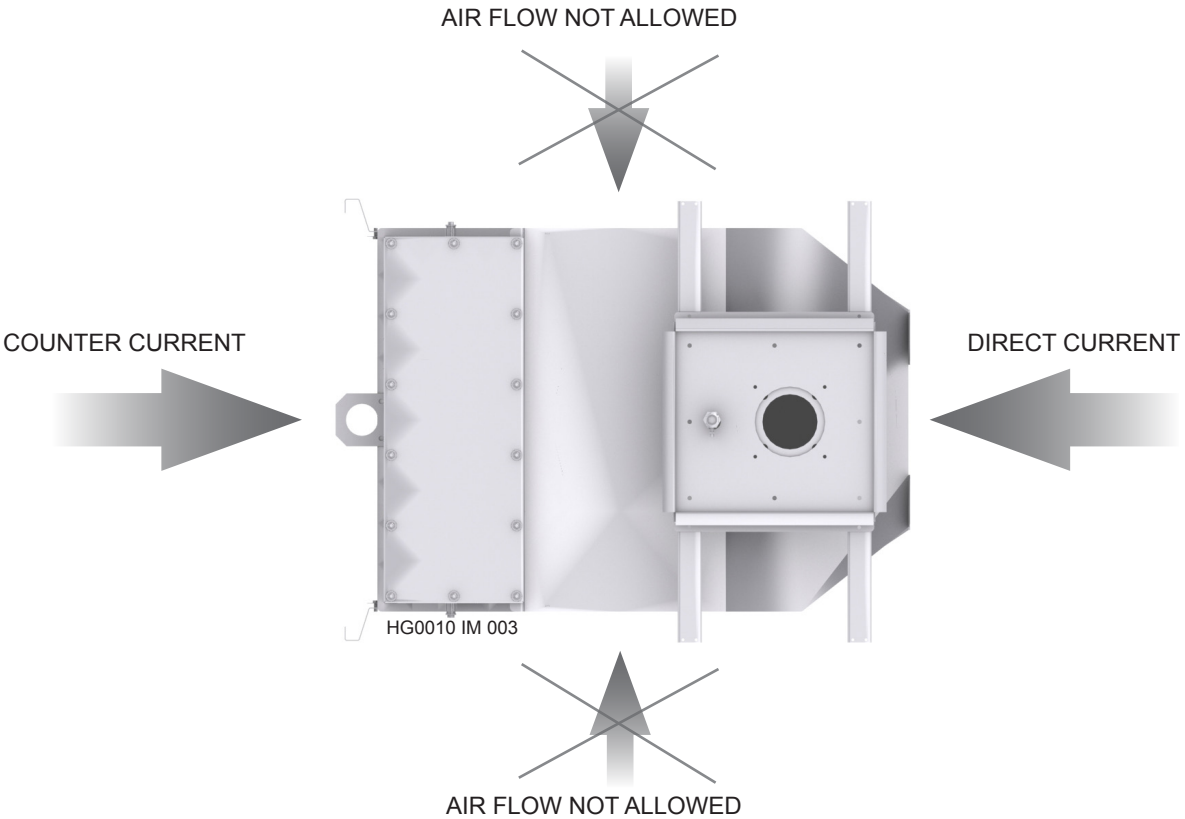
The module can be fitted into warm air generators both in vertical and in horizontal position; air flow can be provided into two ways:
DIRECT CURRENT: the cold air gets in contact with the hottest part of the exchanger [combustion chamber].
COUNTER-CURRENT: the cold air gets in contact with the coldest part of the exchanger [tube bundle].
Depending on the application, one or the other installation may be more convenient.

**COUNTER-CURRENT installation**
This is the preferable application most of the time. These are the advantages:

- in applications with very hot air [painting ovens, dryers] combustion efficiency is better.
- with high heat drop applications the air at the outlet gets near the combustion chamber that is much hotter, allowing lower thermal stress to the whole exchanger.
- tubes serve as deflectors making the air flow on the exchanger more even, especially for the applications where the fan is placed downstream the exchanger and/or where the air speed around the exchanger is low.
- If the appliance is without power supply during operation, the exchanger irradiation is reduced by the tube bundle and protects the filters or other material upstream the exchanger that is not particularly heat resistant .

Precautions to be taken especially involve the possible formation of condensate inside pipes at the minimum heat outputs. If possible, this is a phenomenon to be avoided during operation.

**DIRECT CURRENT installation**
This is a suggested application when the fan is placed upstream the exchanger and the fan opening, or openings, can be well positioned with respect to the combustion chamber. In this way the combustion chamber can be better cooled.
In many cases this avoids condensate formation inside the tube bundle.



## 4.3 Installing Single or Multiple Modules

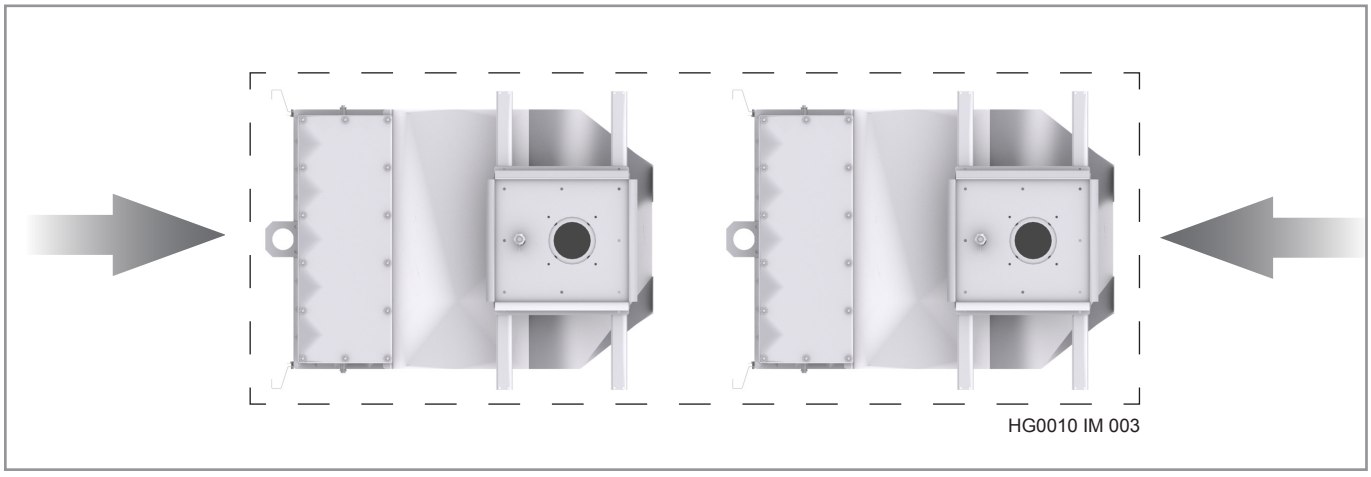
In the applications where the requested heat output exceeds the maximum power available, or where the minimum heat output is partialised under the minimum value of one exchanger only, it is possible to assemble several G0xxxx modules in a single air treatment unit, roof top or processing plant to achieve high heat output intervals.
With the necessary precautions, the modules can be assembled both in series and in parallel. With the necessary precautions ventilation can be direct current or counter-current.

**To ensure safety, the applications including different modules must always be provided with a suitable manual reset safety thermostat for each module. However, a control thermostat for input air temperature must be fitted to be activated before the safety thermostat in case of abnormal operation of the ventilation system.**

**Assembling modules in series**

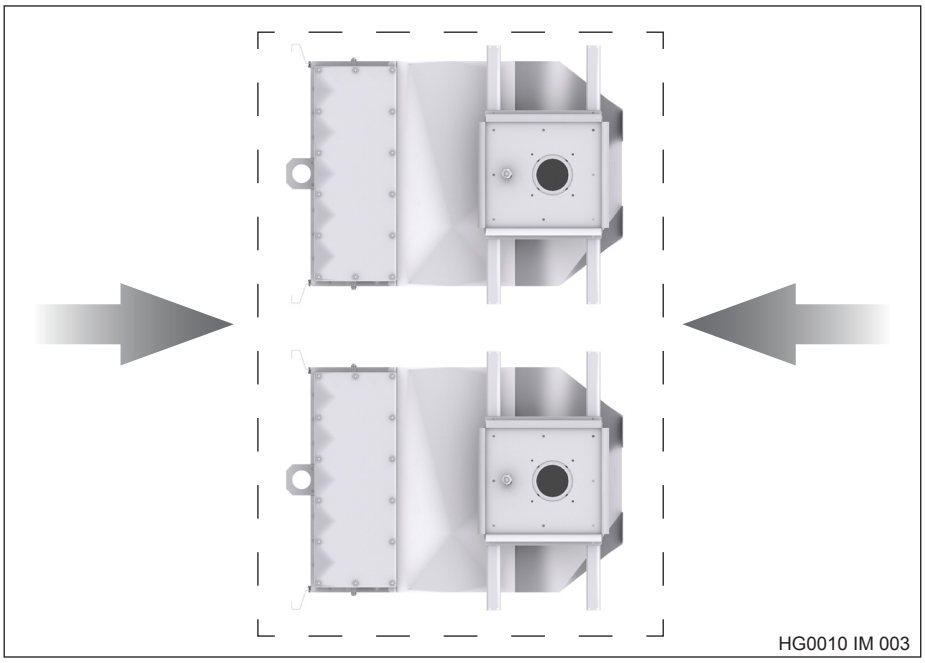
This is the preferred application for little air flow rate and high temperature differences (processing plants). Obviously pressure drops for each module must be added up.

Fan can be installed both upstream and downstream the module. In this case it should be checked that the temperature at the outlet of the first module is proportional to the final air temperature.




**Parallel modules**

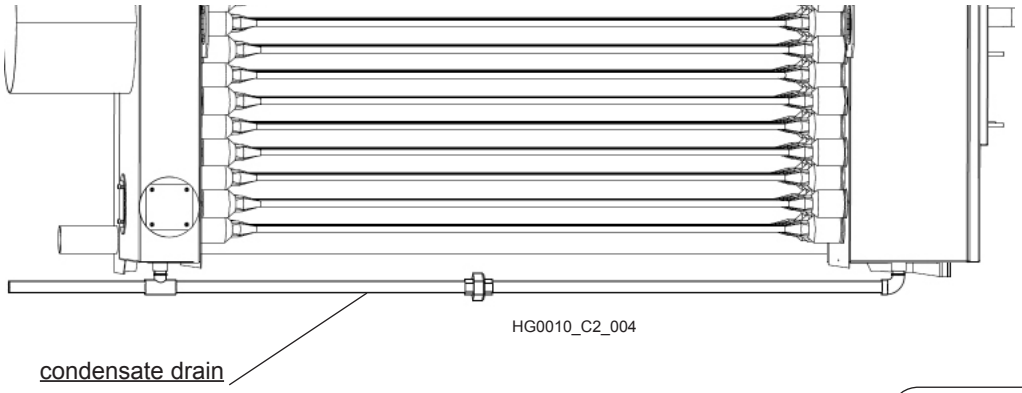
This is the preferred application for great air flow rates and low temperature differences. For this installation it should be checked that the air flow on the modules is evenly distributed.



## 4.4 Condensate

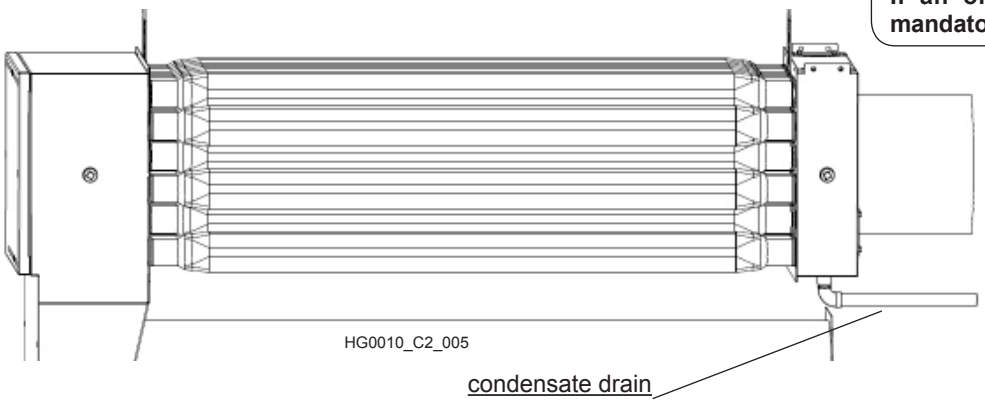
If an exchanger is installed inside an air treatment unit and/or a roof top unit, with high air flow rates and low heat drop, you will need to provide a suitable system to drain the condensate produced inside the exchanger.
All G0xxxx, G0xxxx-2, and G0xxxx-TF series exchangers are provided with five unions to allow condensate drain. Unions are placed on the collectors, the front one and the rear one, on the right side and on the left side and in the lower side of the rear flue gas collector. The manufacturer of the unit will have to provide the connection between the unions and the external part of the unit where the exchanger is fitted.

Upon request Apen will supply necessary kits for condensate drain.
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.
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.




Installation horizontal

**If an oil burner is matched, it is mandatory to prevent any condensate.**




Installation vertical

**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 cast iron. Galvanized steel is not recommended since it can be corroded by acid condensate.

**Connection to the Condensate Drain**
Special attention must be paid to the condensate drain; an incorrectly installed drain, in fact, could jeopardize the correct operation of the equipment.

The factors to be taken into account are:
- risk of flue gas spillage from condensate drain, when the exchanger is installed in a closed environment;
- risk of condensation water freezing in the pipes;

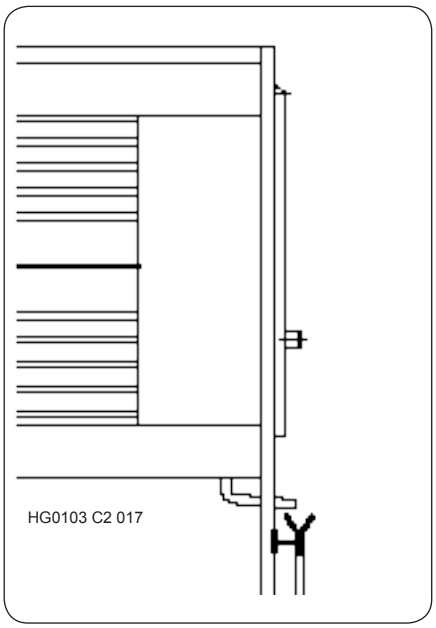
According to the type of installation, the module can drain the condensate in the following ways:
- free drainage with no connections;
- drainage using a siphon;
- drainage inside the unit (water trap).

**Free Drainage**

If the unit is installed outdoors, unless the temperatures never drop below freezing, water could be drained directly outside, where it is allowed, without any connections to other pipes. It will be essential to check that the condensate flows away from the unit.

If the drainage needs to be ducted, it is necessary to install an open type connection, similar to the one in the picture below, to prevent ice forming in the pipe from blocking condensate drainage, resulting in water accumulation in the exchanger.

During operation the flue gas temperature will melt any ice formed at the end of the pipes.




**Draining using a Siphon**

When the unit and therefore the exchanger are installed inside a room, whether it is dedicated or not, it is necessary to provide a flue-tight siphon connection.

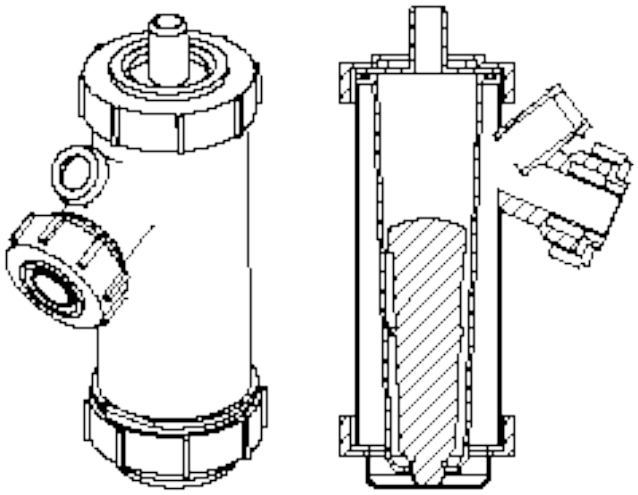
The siphon includes an internal float that prevents any flue gas leaks, even when there is no water. Fill manually the siphon with water at first start-up.

The kit includes a siphon adapter to the condensate drain pipe. Please consider the minimum requested height between the drain module and the floor or the unit support surface.

Even in this case, the piping after the siphon, if it fitted outdoors, must be open connection type, to block condensate drain because of any ice formed in the pipe.

The first section of the pipe, for 2/3 meters from the exchanger, should be metal type, to be flue gas temperature resistant. Then, after the siphon, silicone pipes should be fitted to make installation easier.

**Drainage inside the unit**



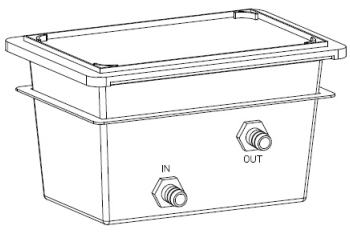
This solution too is a good alternative to prevent ice from forming in the condensate drain. For this type of installation too, siphon with floating device is compulsory.

At the outlet of the siphon condensation may be collected in the water trap only if it is manufactured in stainless steel or aluminium. If it is manufactured in galvanised sheet metal, a basic solution condensation treatment will be necessary.

**Kit for acid condensate neutralising**

Apen has acid condensate treatment kits:

- G14303 - 032 kW - 7580 to 100 kW - 7780;
- G10858 from 140 kW - 7880 to 320 kW - 8180;
- G05750 - 420 kW - 8280 to 1,200 kW - 8680.




neutral pH condensation output

acid pH condensation input

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## 4.5 Mounting into the structure

**Anchoring the module to the structure**

There are 5 anchoring and/or support points in the exchanger module: two in the front part and three in the rear part. These are the anchoring points:

1 burner plate
2 front flue gas collector
3 chimney
4 rear flue gas collector
5 combustion chamber support

All exchanger modules are provided with 1, 3, and 4 anchoring points to be secured. Mounting into the combustion chamber support (point 5) is necessary and available only starting from G07980 module, while securing by means of front flue gas collector (point 2) is necessary and available only starting from G08480, G08580 and G08680 models.

For smaller exchangers model G07580, G07680, anchoring points 1 and 3 will be enough.

Note: Panel insulation type in the section where the exchanger is fitted must be Ø or MØ [zero or Mzero] class.

**Anchoring the burner plate**

While securing the burner plate to the structure, flue gas circuit tightness must be carefully checked with regards to air treatment and external environment.

The module is equipped with an “internal” plate welded to the exchanger, with and external plate where the burner is fitted and with two gaskets.

One gasket must be fitted to the internal side of the air treatment unit panel and the other to the external side.

The holes in the burner plate allow support [brackets] anchoring, so that the surface of the heater plate is secured to the surface of the aluminium profile section.

Support bracket installation allows correct positioning of the exchanger inside the aluminium structure, providing necessary spacing between the internal and the front panel, which allows its correct cooling.

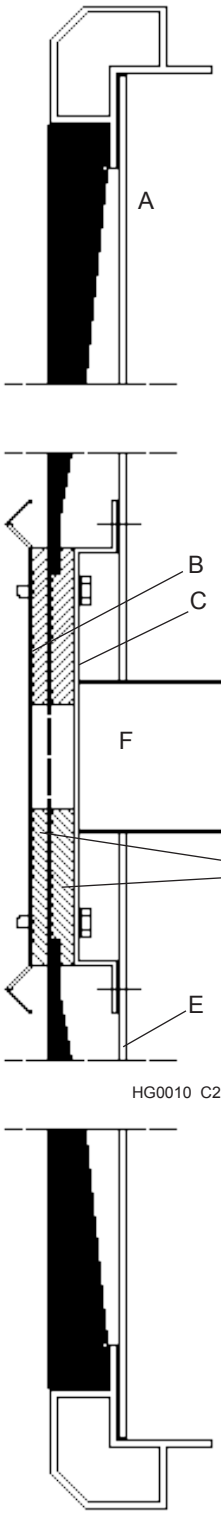
If the burner plate is correctly positioned and provided with the supplied gaskets to be fitted for 23 to 27 mm thick panels, flue gas circuit tightness is assured.

For thicker panels (45, 50 or 60 mm) a small spacer frame is necessary to assure flue gas circuit tightness with regards to the air.

APEN GROUP technical department is available to design customised solutions to provide tightness, as it is a very important aspect.

**IMPORTANT: to install the exchangers in machines with panels ticker than 30 mm Apen Group may supply “special” exchangers according to the customer needs. Please contact Apen Group technical department for offers and sizing.**

Thickness < 30 mm

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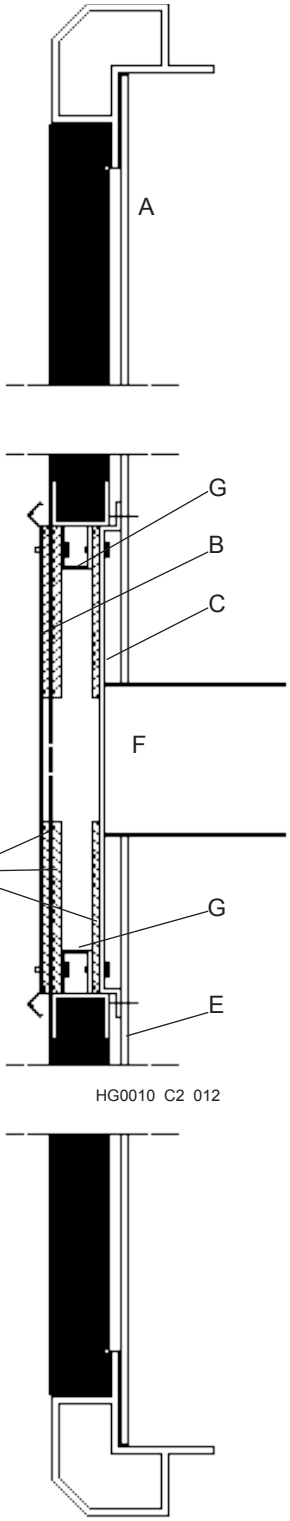
Thickness > 30 mm

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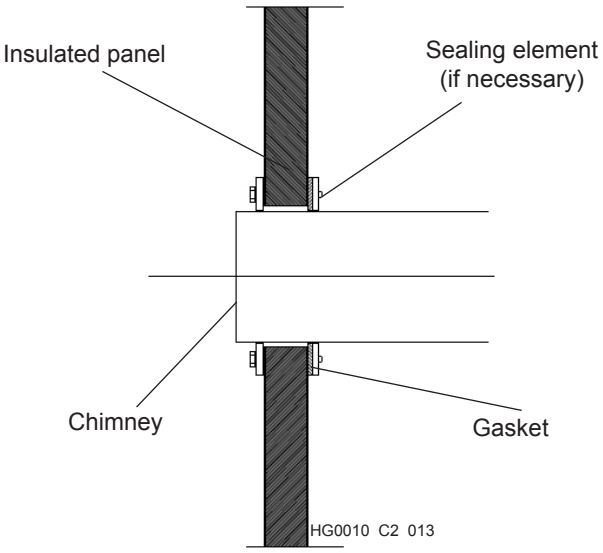
**Key:**

A Insulated panel;
B Burner external plate;
C Burner internal plate;
D Gaskets;
E Supports (brackets);
F Burner cylinder fitting device;
G Spacer frame (for > 30mm thick panels)

**Mounting the chimney**

The chimney is fitted onto the opening, therefore it is a natural support point for the combustion chamber.
Chimney connection is female type. Chimney rated diameter refers to the chimney internal diameter; external diameter is 5 to 6 mm larger than the rated diameter. Therefore it is suggested to provide at least a 10 mm larger hole with respect to the rated diameter. For the installations where the air pressure is higher than 300 Pa, it is suggested to seal the space between the chimney and the hole in the panel. Upon request and for special executions rectangular section chimney with welded flange can be supplied; please refer to AISI310 versions.



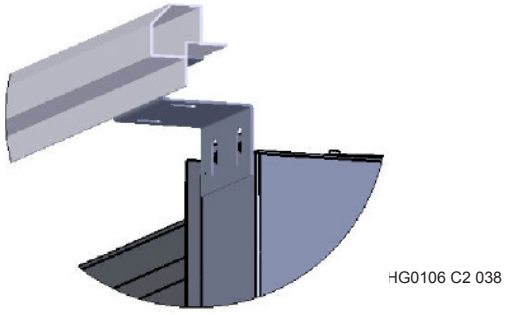

**Rear flue gas collector mounting**

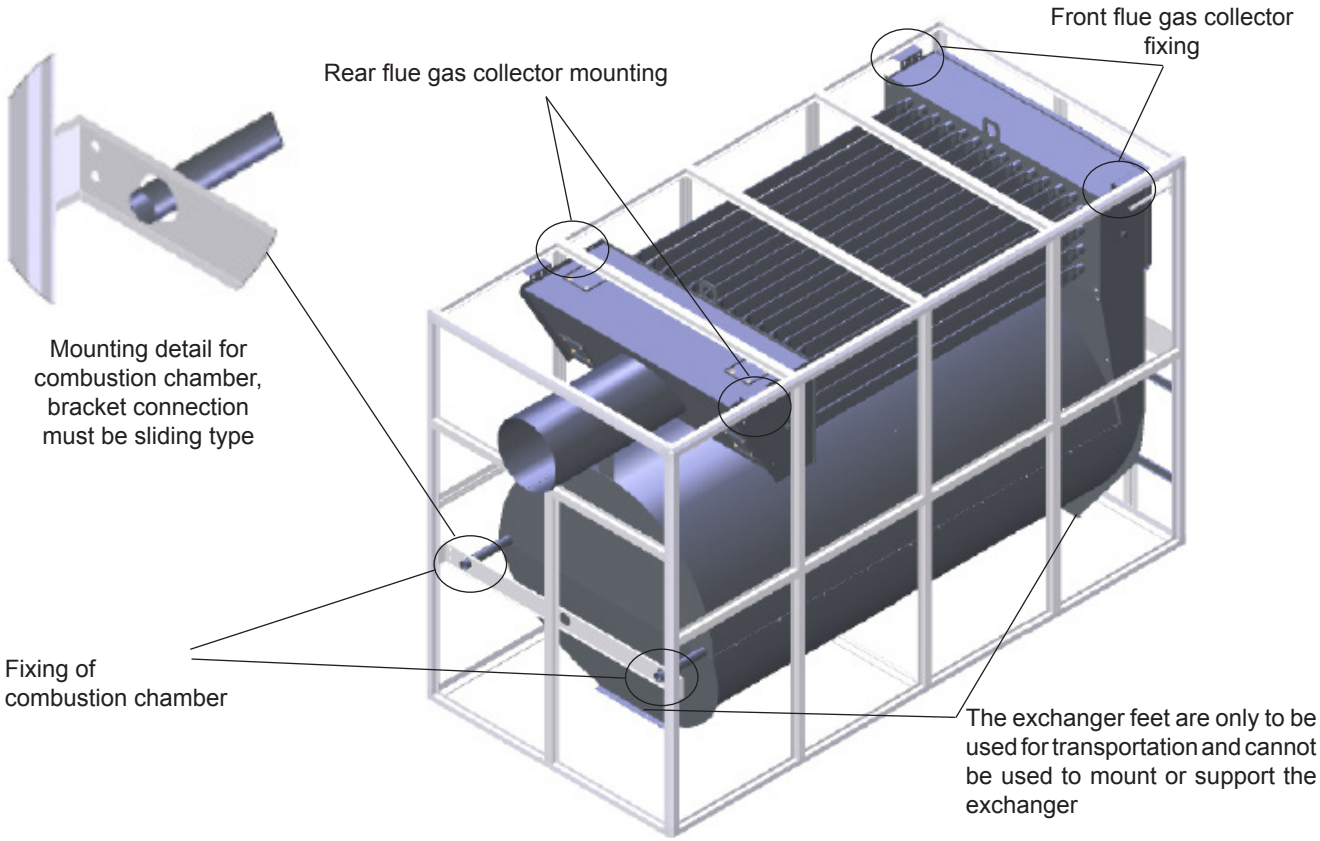
Rear flue gas collector mounting avoids exchanger rotation. This is provided for all exchangers and it is compulsory to use it starting from model G07880. Please refer to the drawing for its use.

**Mounting the combustion chamber**

Combustion chamber mounting is the most delicate operation. Starting from model G07980 the combustion chamber is provided with one-two supports and bottom welded pipes serving as sliding supports for the exchanger. The exchanger must be supported while support pipes sliding is ensured inside the holes.

**IMPORTANT: The combustion chamber must in no way be anchored to the tube bundle and/or to the structure because, when it heats it expands and gets larger. If expansion is not possible the combustion chamber will be surely broken.**



## 4.6 Positioning thermostats and deflectors

**Safety thermostat**

The exchanger module is supplied without the safety thermostat (STB). The thermostat is compulsory according to Gas Regulation 2016/426/EU, except for processing plants. The safety thermostat must comply with the following prescriptions:

- prevent the air at the outlet of the module from exceeding 85°C [average air temperature]
- be manual reset type
- be “positive safety” type: if the sensitive element breaks, it must be safety activated
- provided with EC certification.

The safety thermostat must be fitted to the higher part of the exchanger and downstream the exchanger, considering the air flow direction (with right flow on the left of the exchanger; with left flow on the right of the exchanger - please refer to the figure), in order to receive the heat radiated by the exchanger when the fan is not operating and to be cooled by the air flow, to prevent irradiation from causing its activation during normal operation. Thermostat STB is available for high temperatures.

**Control thermostat**

It is useful to fit another thermostat (TW) in the same position as the safety thermostat. It must be adjustable type and should stop burner operation before safety thermostat is activated. This is especially useful when the appliance is put into service or when there are filters that may change the air flow over time, thus affecting the air temperature.

**Adjustment thermostat**

The thermostat to control operation can be modulating type, two stages or ON/OFF type depending on the matched burner. It is suggested to install this thermostat outside the area of influence of the exchanger [irradiation].

**Precautions to be taken for surrounding areas**

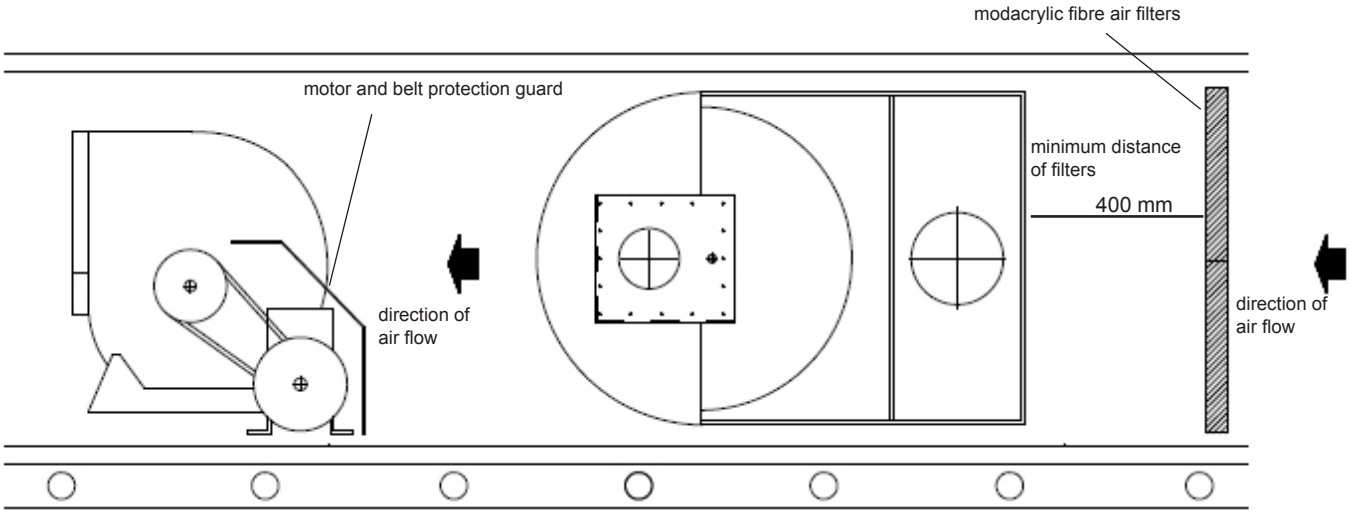
During normal operation, with the fan operating, the exchanger irradiation to other treatment sections in the unit is limited. If the fan stops due to chance events [no power] when the exchanger is hot, the heat flows due to irradiation and convection to the surrounding areas.

IT is therefore necessary that no flammable or heat sensitive parts (plastic or paper) are in the surrounding areas.

If synthetic fibre air filters are used (maximum operation temperature 80°C), they must be positioned at least 400-450 mm from the module.

Metal fibre filter or fibreglass filters should be used (Tmax 100-120°C).

If the fan motor is placed near the G0xxxx heater module (less than 500 mm) it is suggested to fit a metal screen to protect the electric motor from the exchanger irradiation.

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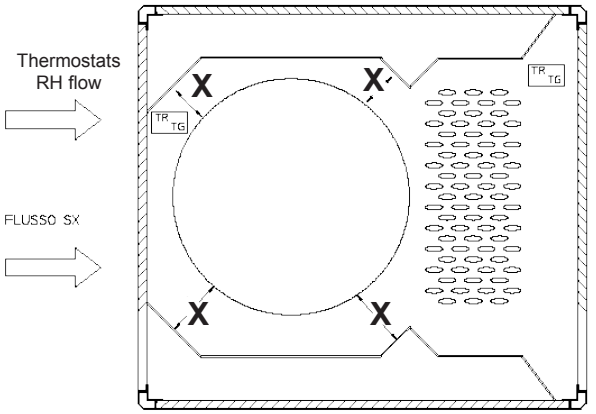
**Positioning deflectors**

For a correct operation of the exchanger it is very important to direct the air flow to the exchanger when positioning deflectors. To ensure the correct thermal exchange between the air and the combustion chamber you need to consider the size of the frame where the exchanger is positioned. As shown in the figure you need to keep a suitable distance between the combustion chamber and the frame. IT is always advisable to make sure that the frame design is suitable to the exchanger size, so that only one or two small-sized deflectors near the combustion chamber are required (figure HG0010 C2 016).
If it is not possible to respect optimal distance, specially designed deflectors are required (figure HG0010 C2 015).

The distance to be kept between the frame where the exchanger is fitted and the rear part of the combustion chamber (figure HG0010 C2 017) must be adequate to allow the air lateral flow and cool these parts of the exchanger as well.
Apen Group technical department is available to suggest the customer where to position the exchanger and the deflector for the first installation of the exchangers inside the appliances.

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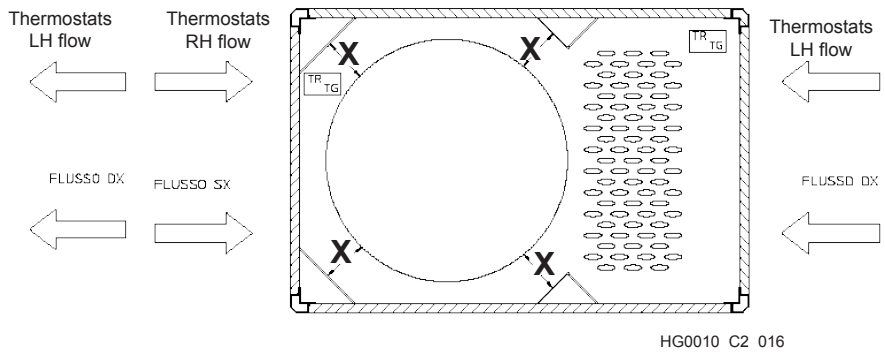


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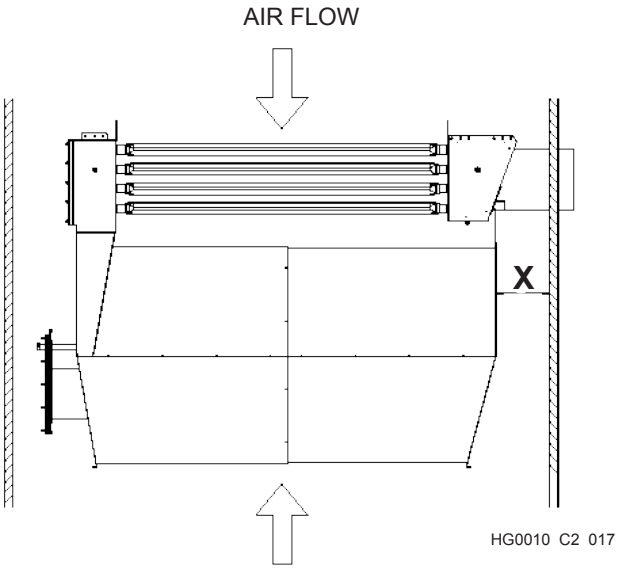


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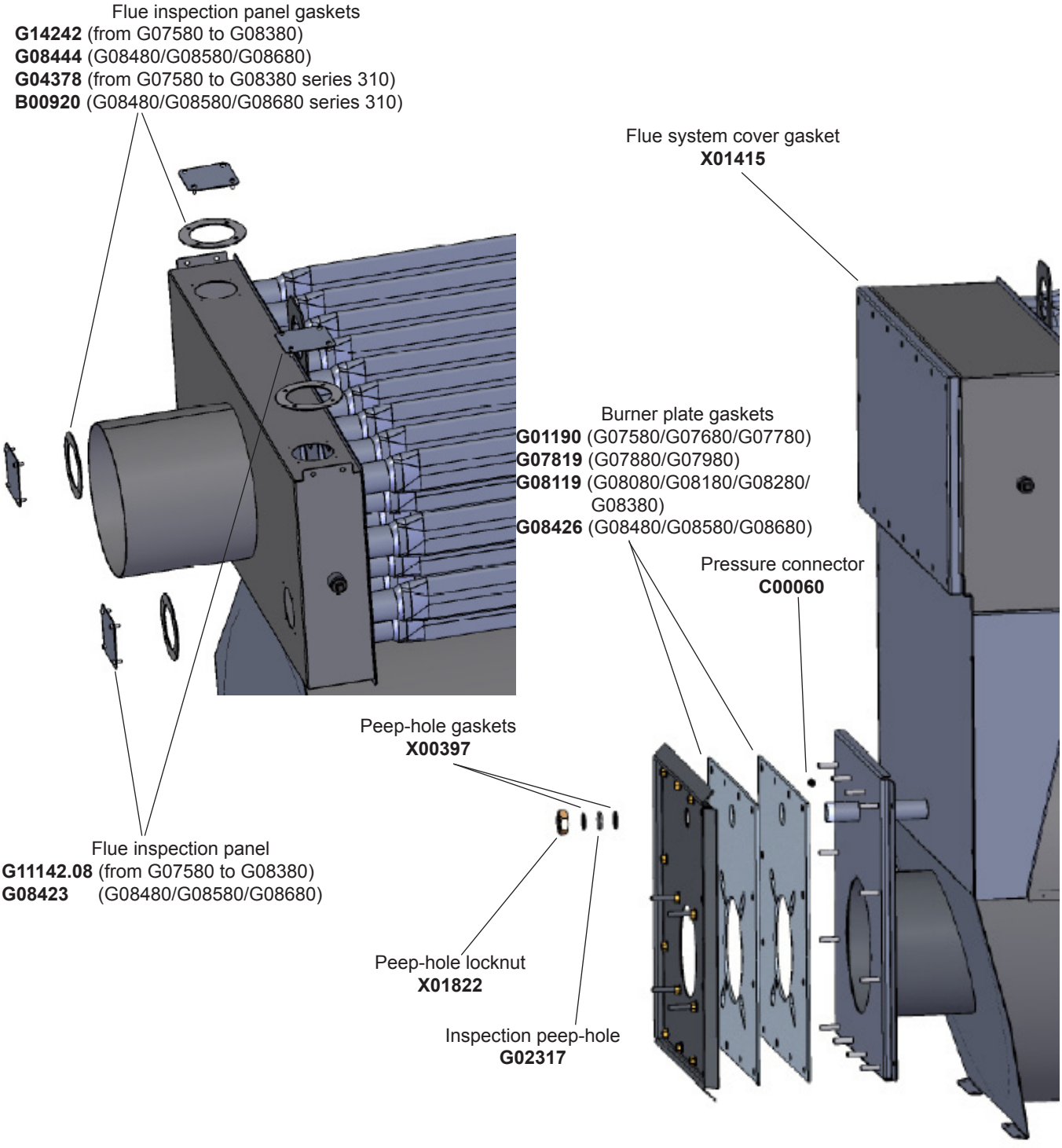
## 5. LIST OF SPARE PARTS AND ACCESSORIES

### 5.1 Spare Parts

G0K series spare parts are the same as the corresponding ones for G0 series.



# 6. MAINTENANCE

## 6.1 Controls at First Start Up

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

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

**Safety Checks**
STB safety thermostat and TG control thermostat activation check (see paragraph 4.6).
Microswitch for fire dampers (if installed)
Room thermostat control
Cooling the Exchanger

**Combustion Check**
We recommend checking that burner nosepiece is suitable for use (see relevant paragraph 3.8)
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.
$CO_2$ content values are shown in the tables of Para. 3.9.
$CO_2$ 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 output it is necessary to measure flue gas temperature, once combustion has been adjusted.
If combustion efficiency is known and if $CO_2$ content is similar to the values shown in the tables of Para. 3.9, you can use graphs included in Para. 3.3 and read the heater “adjusted” useful heat output next to the efficiency.

**Checks on Safety Controls**
Safety device correct operation depends on installation site electrical wiring.
WHEN first starting the appliance, the following checks must be performed:

**STB+TG safety and control thermostats**
If STB+TG double thermostat is fitted, it is enough to lower the TG value until the burner turns off, then reset the TG value.

**Fire Damper**
If fire dampers are installed, you need to check that the damper closure actually stops the burner and, if necessary, also the fan and that the ejection damper, if present, opens.

**Room Thermostat**
Make sure that room thermostat and/or the timer turn off ONLY the burner, not the cooling fan. The fan shall stop only when the exchanger has cooled down.

**Cooling the Exchanger**
Make sure that the fan delayed turning off is at least 180 seconds after the burner turning off, to ensure exchanger cooling.

## 6.2 Routine Maintenance

Besides the routine checks to be performed on the parts of the unit where the exchanger is installed, perform the following maintenance operations to safeguard its integrity over time:

**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.

**These are essential checks for all models of exchangers and for any type of installation.**

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