

mark[®]

Technical manual **EN**

MARK GSW+

0660302_R09



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Warranty policy

CE-marking

The release of the CE-marking is the official recognition of the quality of design, manufacturer and performance of this unit. The life and performance will be at the highest level when the implementation and maintenance are properly carried out and done by the regulations in force.

Responsibility

This unit may only be used for which MARK has designed and fabricated it. MARK cannot be held liable for damages to persons, animals or property if it is caused by error of installation, controls or maintenance or not permissible use of the unit. The unit may only be equipped with original accessories. MARK cannot be held liable for any damages resulting from use of an accessory that is not suitable for the unit.

The units must be installed by qualified professionals, in compliance with the applicable regulations and in accordance with the instructions in this manual. The references to the standards, rules and guidelines mentioned in this manual are for information purposes and are only valid on the date of issue thereof.

MARK is responsible for the conformity of the device to the applicable rules, guidelines and standards at the time of commercialization. The knowledge and compliance with the legal provisions, as well as the norms inherent in the design. Project planning, startup and maintenance are the responsibility of the consultant, the installer and the user.

Delivery – Storage

The GSW+ is delivered on a wooden pallet, protected by a cardboard box and a plastic film. Immediately after arrival, the condition of the unit delivered must be checked (even if the packaging is intact). Additionally, ensure that the device delivered corresponds with the order. With regard to the product warranty: the general conditions of MARK are in force.

I General information

1.1 General recommendations

The gas-fired condensing air heater of the GSW+ series are intended for the heating of industrial and related areas. The units may only be installed inside. The units may only be used in well ventilated areas. The proper functioning of the heater depends on proper installation and commissioning. Installation and maintenance must be in accordance with the applicable regulations and be carried out by qualified personnel. With the non-compliance of these rules all responsibility of the manufacturer expires.

DO NOT INSTALL GAS-FIRED CONDENSING AIR HEATERS IN:

- Rooms with explosion risk;
- Rooms containing chlorine fumes (or combinations thereof);
- Very humid rooms (electrical hazard).

It is the responsibility of the installer to ensure that during assembly the installation instructions described are fulfilled.

It is expected from the installer to:

1°) inform the user that:

- The user may not modify the design of the units or the implementation of the system application;
- Any modification (exchange, omission) of the safety components or pieces that affect the efficiency of the unit or the combustion, automatically means the CE-marking is expired;
- It is annually required to perform the prescribed maintenance and cleaning activities.

2°) hand over this manual to the user.

This is an integral part of the unit and should be kept with the unit even if it is transferred to another owner or user.

We are involved with the quality of our products and wish to improve them permanently. We therefore reserve the right to change the specification included in this document.

1.2 Description of the devices

The GSW+ gas-fired condensing air heater is a standalone hot air generator, making use of the fuels natural gas or propane. It is built and tested to European standards 2009/142/CE, Gas appliance directive, (EN 1020:2009 and EN 1196:2011). Certificate nr. 0461CNI002 issued 25/10/2012.

The GSW+ is a gas-fired condensing air heater. For all units described in this manual, the flue gases are discharged to the outside. Use is made of a fan that is arranged on the discharge side of the combustion chamber. The combustion air may be sucked from the inside or outside. These units can be connected to an exhaust system, type C13-C33-C53, or onto a chimney outlet, type B23.

1.3 Operation

The gas-fired condensing air heater of the GSW+ series are intended for the heating of industrial and related areas. The GSW+ air heaters consist of a gas-fired boiler and a hot water coil, placed in the airflow. The air that is blown in by the fan will be heated by the coil. This technique provides a perfect homogeneity of the air temperature. Unlike a conventional air heater, the partial or complete restriction of air flow or an interruption of the electrical power during operation will not damage the unit.

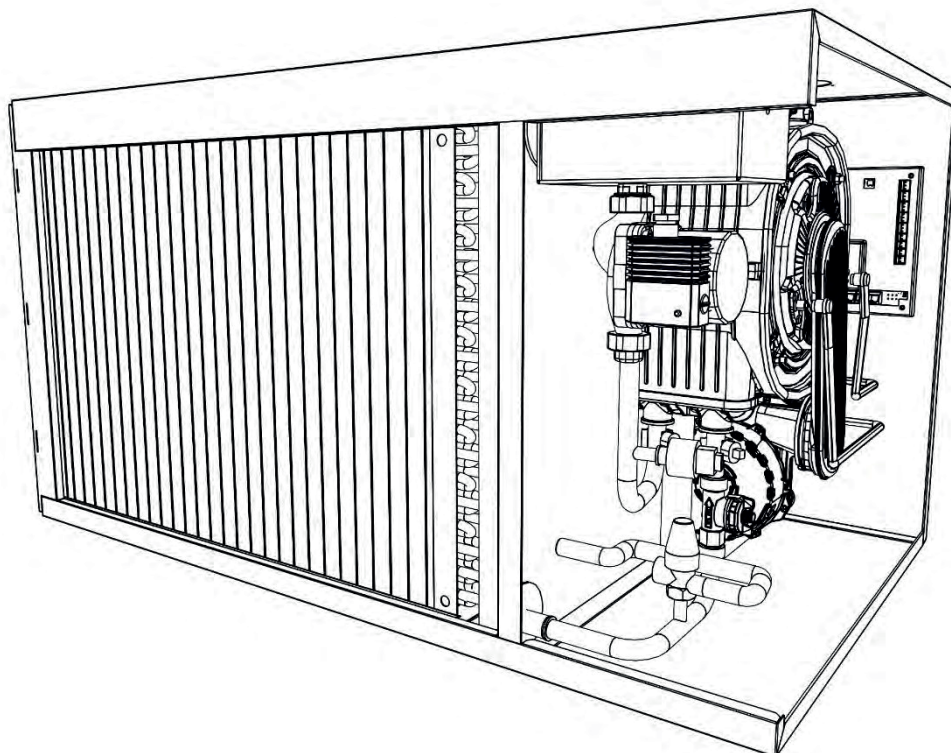
The combustion section is completely isolated from the air circuit, which makes it impossible for the system air to mix with the combustion gases. The unit is equipped with a burner with low Nox emissions. The combustion air is sucked in by a fan with a variable flow rate.

The air is sucked in by a venturi system. This system makes sure that the gas and air over the entire range are in the right proportion. The air/gas mixture is fed to the burner, located in the middle of the boiler.

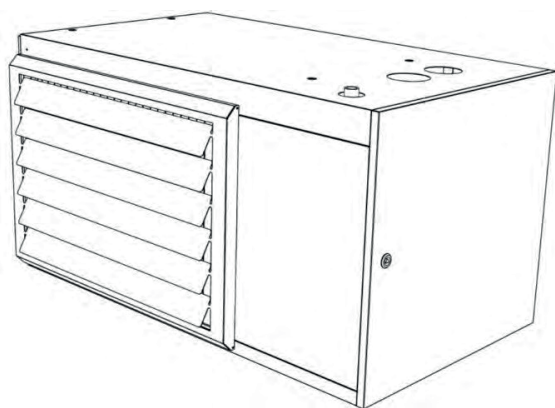
The flame and fumes will go through the heat exchanger twice to give off maximum power. Thanks to this technology, an efficiency of at least 98% at the maximum loads and 108% at full modulation can be achieved. The optimization of the performance of a condensation system is influenced by its controls. The lower the power output of the air heater, the greater the condensation and thus the higher the efficiency. The modulation range of the GSW+ is 30% of the maximum load.

The electrical control of the air heater is connected to the room thermostat. The control device provides the continuous modulation of thermal power.

The modulating effect of the GSW+ heater guarantees perfect adaption to the real heat demand of the building. In versions equipped with fans with a variable flow rate, one can also vary the air supply.



2 Technical specifications



Axial models

The condensing gas-fired air heaters are designed with axial fans that meet the European requirements 2009/125/EC. Optionally, the unit can be provided with a fan that has a variable airflow.

The device is designed as free blowing, provided with horizontal louvres.

2.1 Specifications

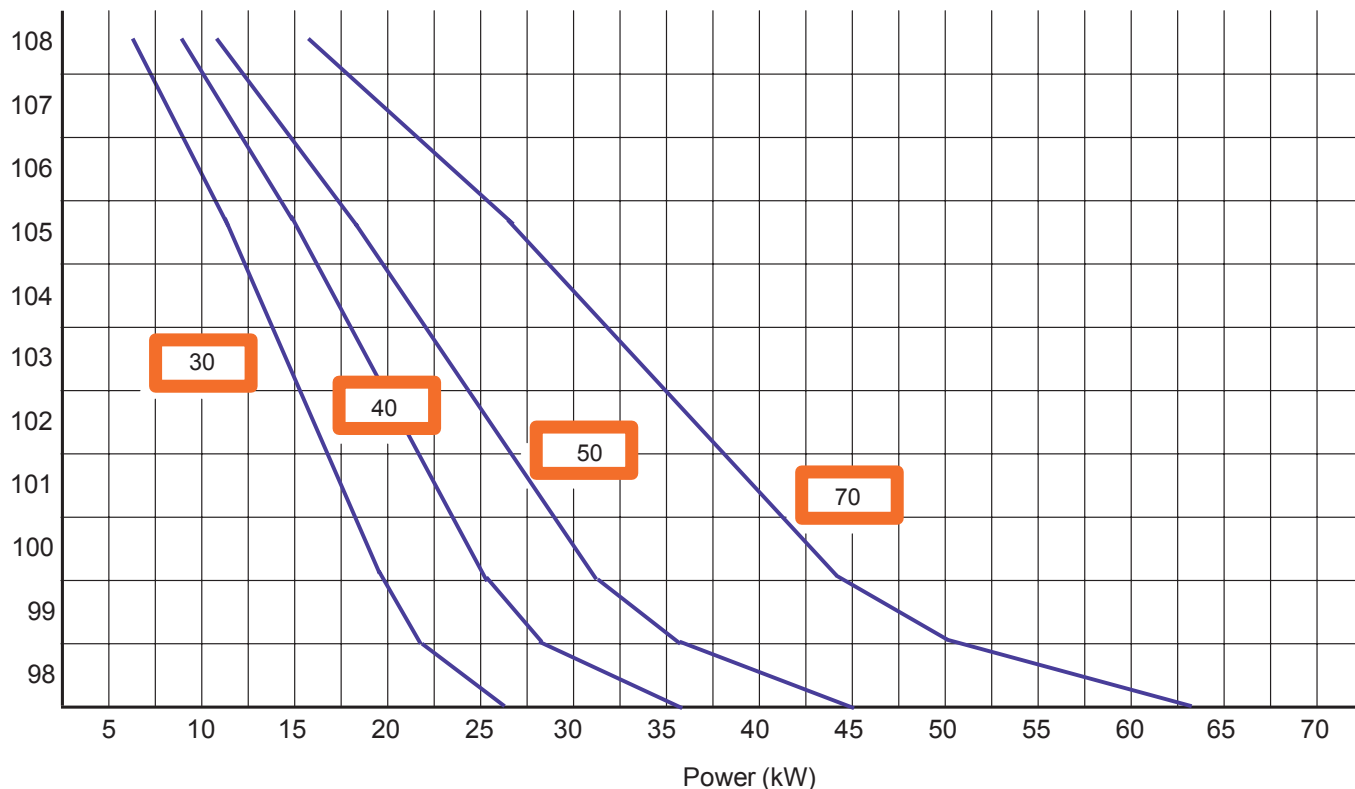
TYPES		GSW+ 30		GSW+ 40		GSW+ 50		GSW+ 70	
		max	min	max	min	max	min	max	min
Nominal load (higher value)	kW	30	7.5	40	10	50	12.5	70	17.5
Nominal load (lower value)	kW	27	6.5	36	9	45	11	63	16
Nominal power	kW	26.5	8.2	34.9	11.5	44.1	13.6	61.7	18.3
Efficiency	%	98	108	98	108	98	108	98	108
ΔT of air flow	°C	25.6	8	28.5	8.8	27.3	8.5	28	8.7
Nox Class	Val.	5		5		5		5	
Gas consumption (15°C)									
Neutral gas G20 (20 mbar)	m³/h	2.86	0.72	3.82	0.96	4.77	1.19	6.68	1.67
Neutral gas G25 (25 mbar)	m³/h	3.16	0.79	4.21	1.05	5.26	1.32	7.37	1.84
Propane G31 (37 mbar)	kg/h	2.10	0.53	2.81	0.70	3.51	0.88	4.91	1.22
Air displacement (15°C)	m³/h	3000	900*	3600	1080*	4700	1400*	6400	
Motor: electrical power / RPM	W/RPM	220/1000		320/1350		500/1350		520/900	
Combustion air ø	mm	80		80		80		80	
Gas flue ø	mm	80		80		80		80	
Condensation connection ø	mm	32		32		32		32	
Gas connection ø **		1/2" M		1/2" M		1/2" M		1/2" M	
Electrical connection		230/240 V IF ~ 50Hz							
Electrical power	W	340		460		640		730	
Water volume (glycol -15°C)	L	6.6		7.2		9.2		11.2	
Operating temperatures	°C	-15/+40		-15/+40		-15/+40		-15/+40	
Max. condensate amount	l/h	1,8		2,4		2,9		5,2	
Weight	kg	88		99		110		135	

* With modulating EC-fan.

** External thread

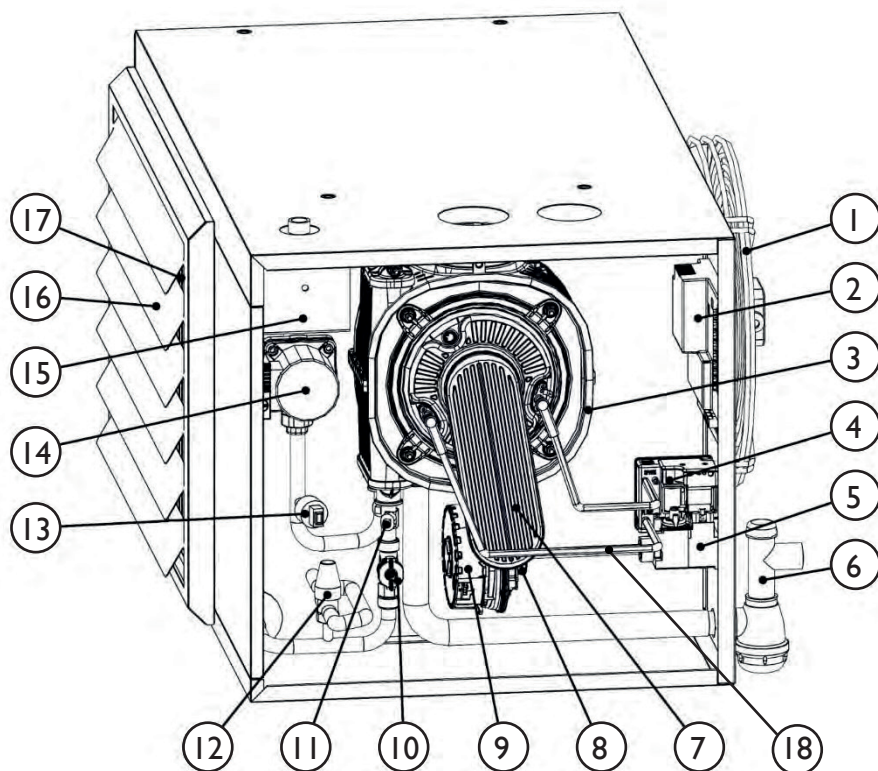
2.2 Relation load / efficiency

Ef. %

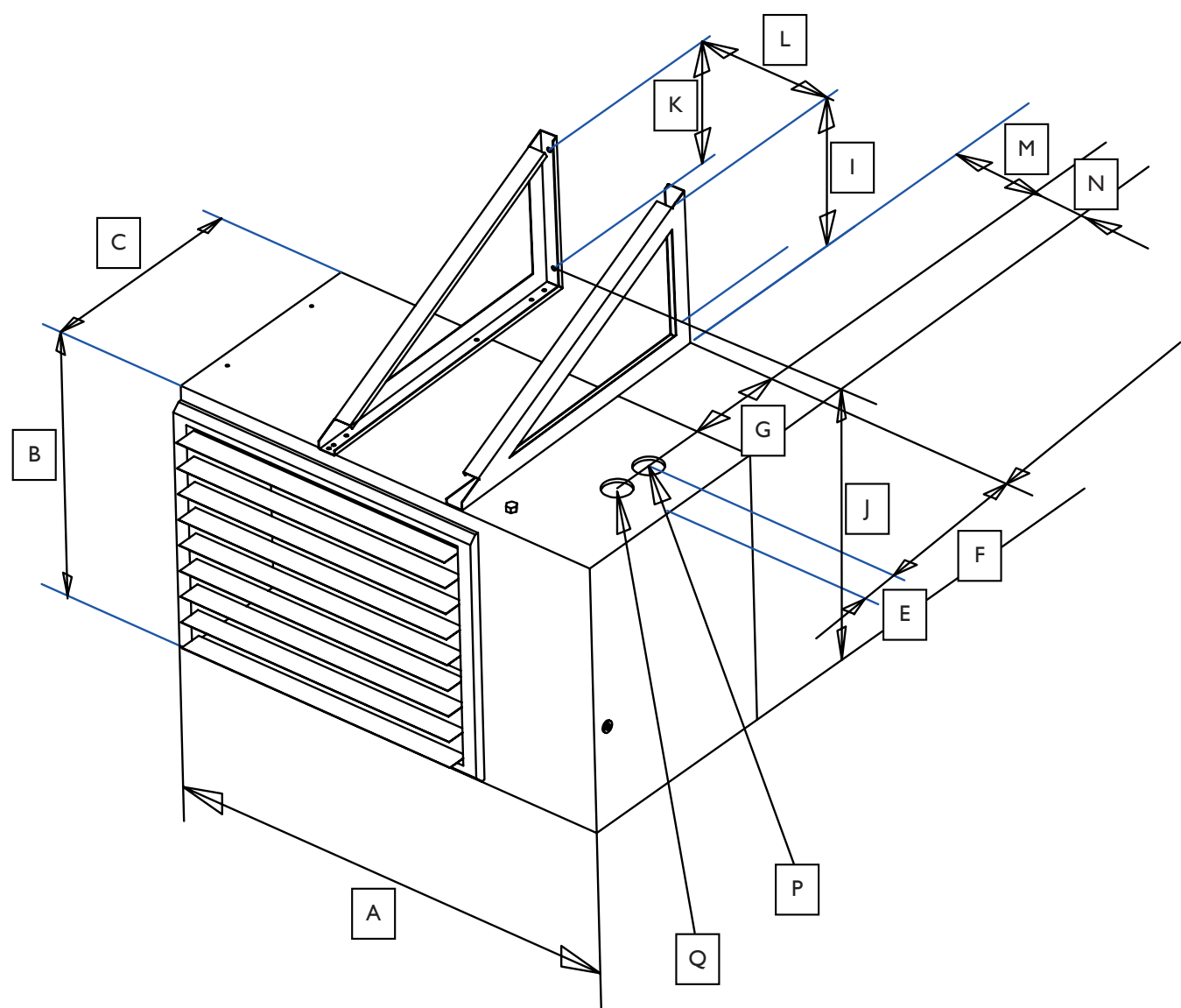


The power ratings apply with an air return temperature of 16 °C. The efficiencies were determined at a water regime 54°C/80°C (maximum power) and 29°C /38°C (minimum power). The efficiency varies in function of the air return temperature.

2.3 Description of the components



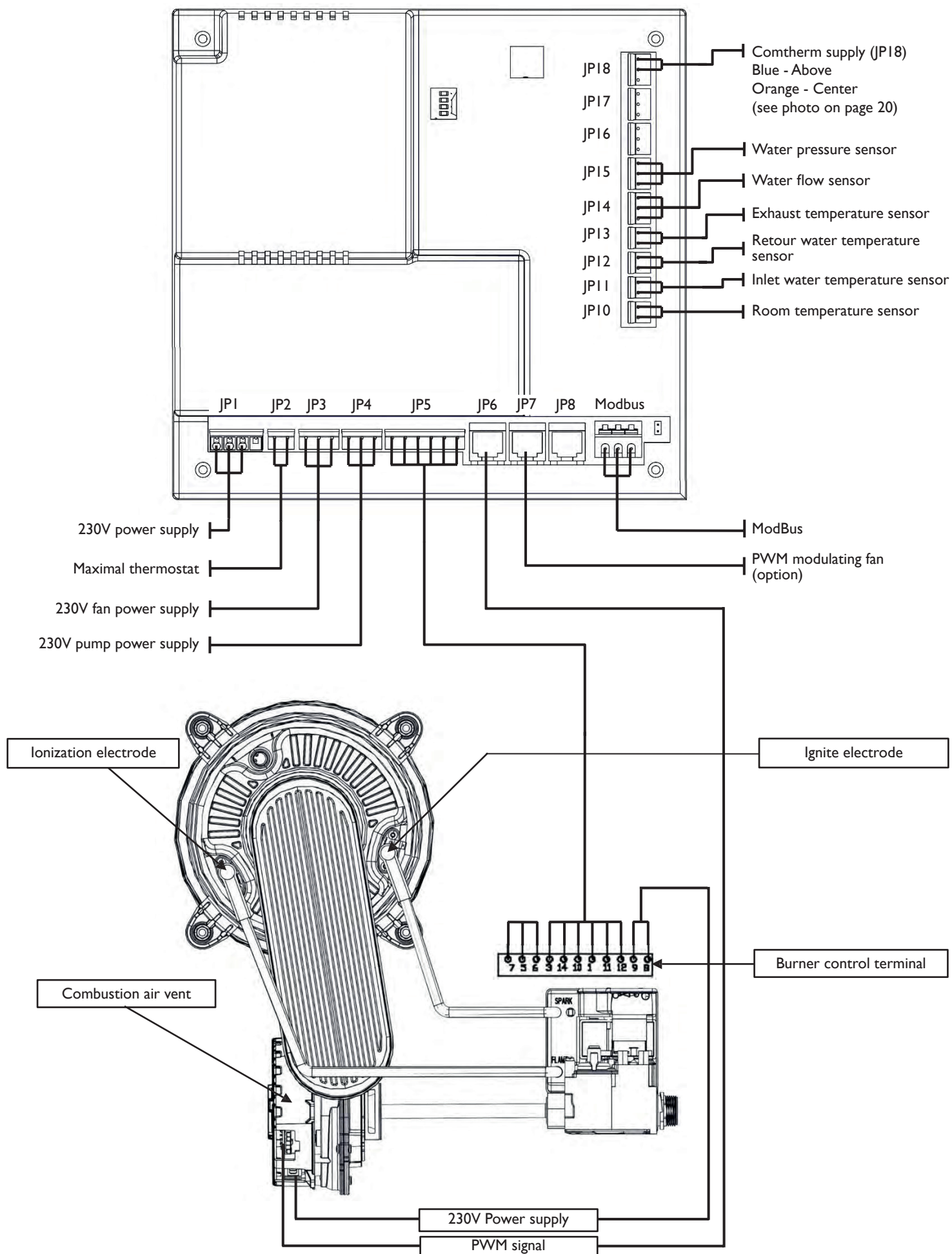
2.4 Dimensions



	A	B	C	E	F	G	I	J	K	L	M	N	P (Air)	Q (Gas)
GSW+ 30	1079	574	605	120	470	280	450	625	350	400	90	165	80	80
GSW+ 40	1080	624	605	120	470	280	450	674	350	400	90	165	80	80
GSW+ 50	1192	674	605	120	470	280	450	724	350	400	90	230	80	80
GSW+ 70	1277	774	605	120	470	280	450	824	350	400	90	320	80	80

Dimensions in millimeters (mm)

2.5 Electrical overview



3 Installation

The installation of the gas units must be done by qualified and competent practitioners. The method of installation depends on the area, volume, ventilation facilities and the possibilities that exist for flue and combustion air. This is to be determined by the installer.

3.1 General rules

The condensing unit can be installed directly in the to be heated room. The installation must comply with national and local regulations, particularly in the field of applied fuels. The installer must abide to the regulations in force. If in doubt, ask for information with the control- and safety regulators.

Aeration

Areas where a device that works on gas is placed, must have a permanent ventilation in accordance with the rules in force in the country of installation.

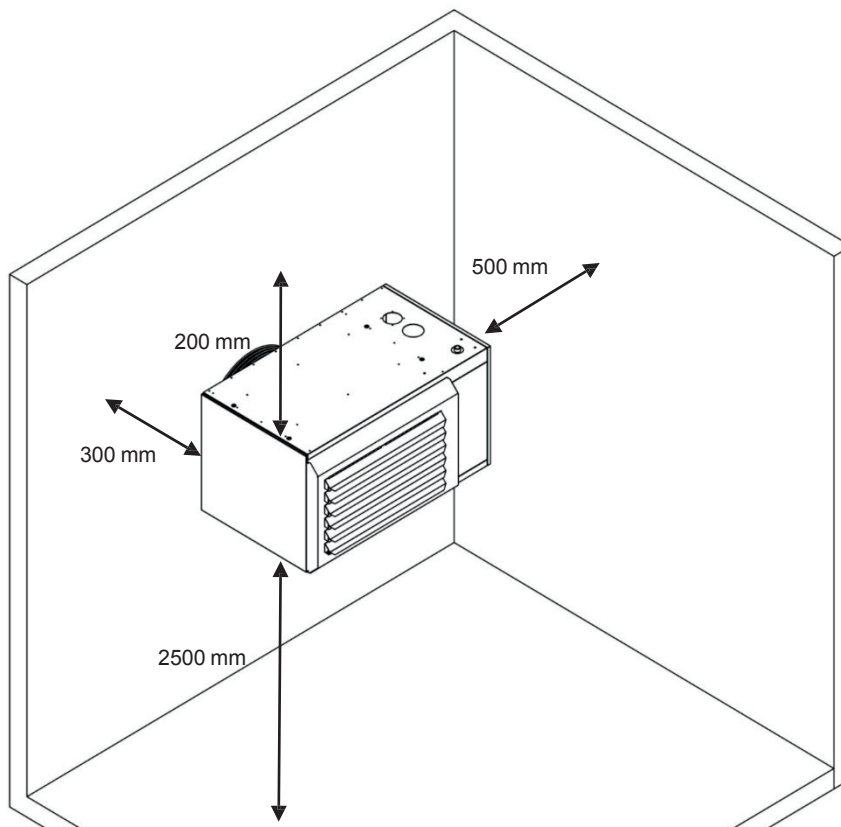
Drainage of the condensate

The air heater must be equipped with the included siphon to drain the condense water. It is a part of the safety system, each replacement by another unapproved type is strictly prohibited. The drainage of the condensate must be carried out in accordance with the applicable requirements in the country of installation.

Gas connection

Before connecting the unit, you must make sure that the local gas supply (type of gas, pressure) match the settings of the unit that must be installed.

Note: minimum distances are essential for the maintenance and safety of the unit.



3.2 Securing the unit

The units that are connected using a fixed gas line must be installed rigid. To make the installation easier we recommend the use of our adjustable hanging brackets. These are adapted to the unit and will position it in compliance with the minimum distances. As for mounting: consult the manual delivered with the brackets.

Before the unit is attached you should check the carrying capacity of the wall.

Step 1

- Assemble the mounting bracket using the enclosed instructions.
- Attach the mounting bracket to the wall. Attach this with material suitable for wall mounting. Perform a safety test, safety factor 2, to check the firmness.

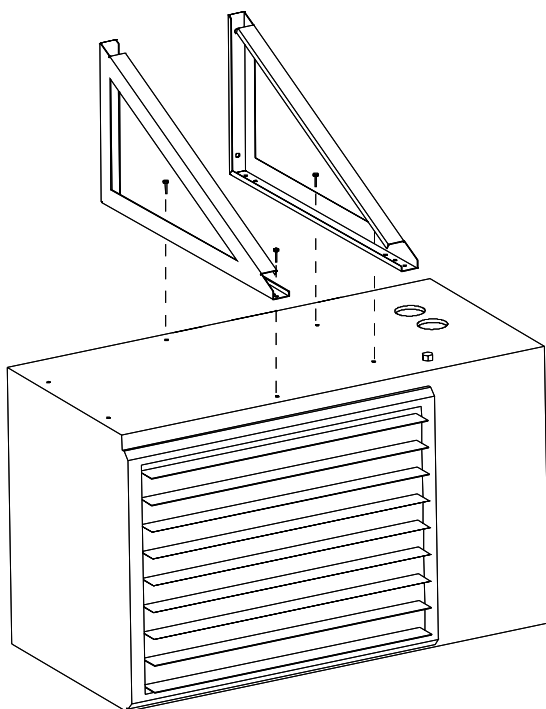
Step 2

- Fix the unit to the bracket using the supplied screws. Secure the screws.
- Level off the appliance using the M8 adjustment screw.

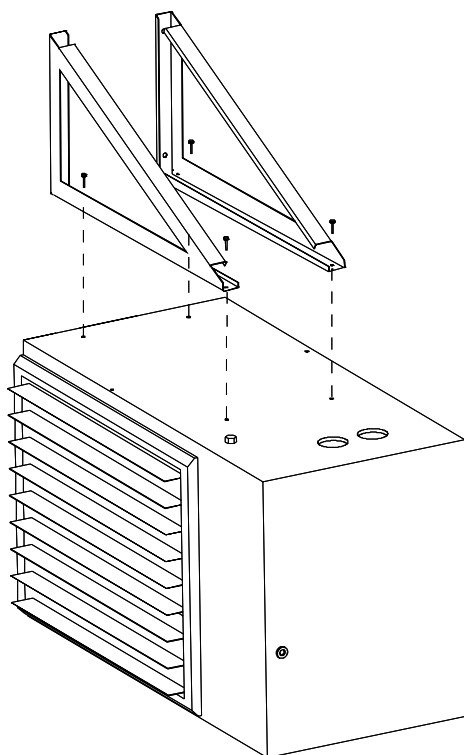
Step 3

- Open the louvres on the front of the device at least 45° so that the air can freely flow out.

Position 1



Position 2



3.3 Placement combustion gas discharge and air supply

The GSW+ units are suitable for following drainage systems: C13, C33, C53, B23. The flue gas drainage system must comply with national and local regulations. The extension pipes must tolerate condensate and be suitable for a flue gas temperature of 100 °C. Flue outlets must be of polypropylene or stainless steel 316L. The drainage material must be positively accessed for the application of gas-fired units. This positive assessment must be done by an ISO 17025 accredited body.

The connection of the flue gas must be placed outside. For the intake of combustion air can be chosen from:

- with the intake of combustion air from the outside (type “C”);
- with the intake of combustion air from the room where the heater is installed (type “B”).

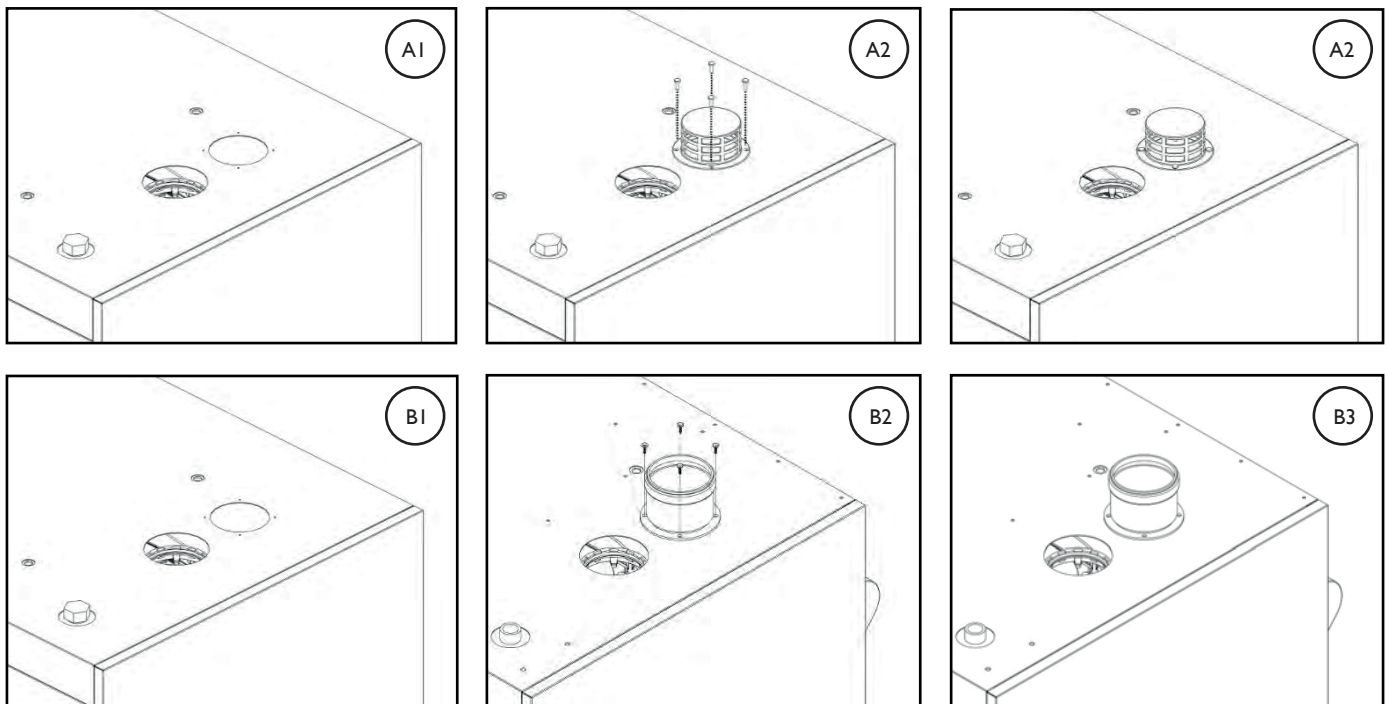
The used flue pipes, terminals and accessories must be tested. Use only suction and discharge terminals referenced by Mark. With the use of non-approved equipment the warranty will expire.

Placement of the air inlet ring

Units that receive the combustion air from the installation area (type “B”) must be fitted with a protective grate. This to prevent large parts of contamination from coming into the compartment of the unit (figures A). Installation areas wherein a type B unit is installed must have sufficient air supply. At least 100 m³/h per unit.

Units where the combustion air is drawn from outside (type “C”) must be provided with the supplied mounting ring (figures B).

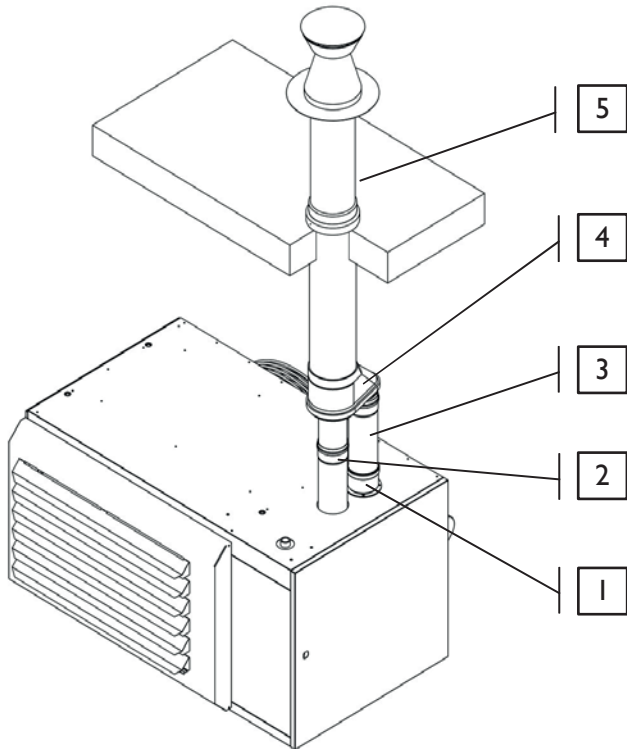
The extensions must be provided with a lip ring. Use soapy water to easily connect them.



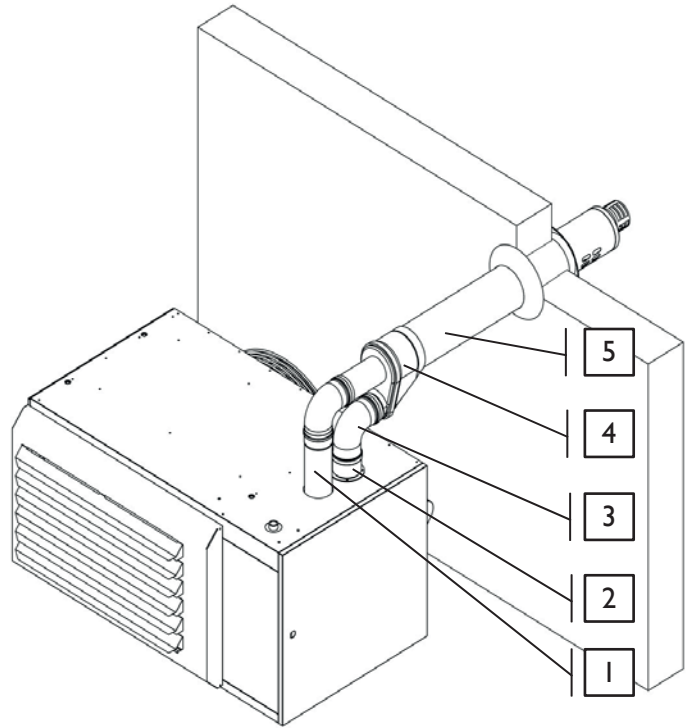
Connection of the extension pipes type C33 and C13

Closed combustion relative to the surroundings. The extension pipes of the combustion air and flue gas are horizontally or vertically placed outside the installation area. The extension pipes may only pass through the installation area.

C33 vertical drainage system



C13 horizontal drainage system



Installation example:

- 1 connection ring $\varnothing 80$
- 2 extension pipe $\varnothing 80$, L=250mm
- 3 2 curves $\varnothing 80$, 90°
- 4 1 transition piece: 2x $\varnothing 80$ to $\varnothing 80/125$
- 5 1 concentric wall or roof terminal $\varnothing 80/125$

The connection pipes can be extended with for this purpose suitable materials. The pipe diameter should be at least equal to the connector on the unit. Never reduce the pipe diameter or plug the vent holes in the installation area.

Don't place the roof or wall flue:

- on less than 2m from a vent or window/doorway, take the dilution factor (NEN 2757 and other national and regional regulations) into account;
- in a transit zone;
- at less than 2m from the ground or directly accessible (risk of obstruction and/or combustion).

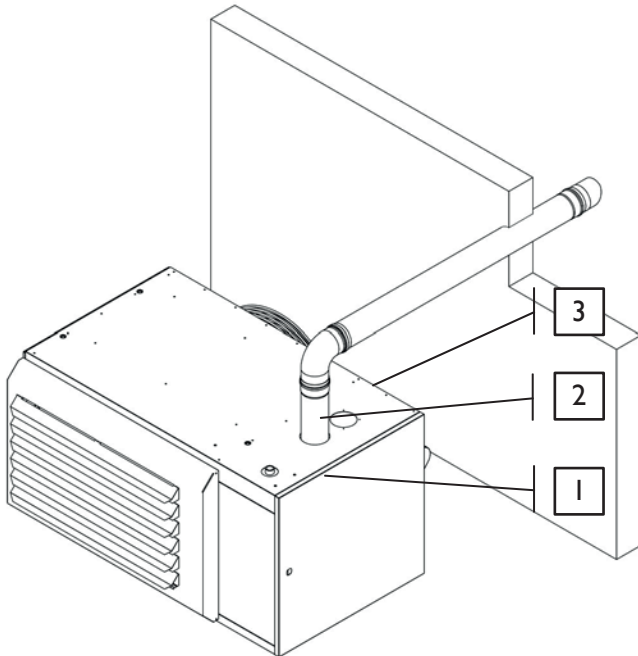
NOTE

The seals between the extension must be close and tight, make sure the lip rings are present. The total length should not exceed 8m, assuming that: 1 angle of 90° or 45° = 1m pipe. In a horizontal section, ensure that the extension pipe lies with a slope to the unit, to avoid outflow of the condensation.

Connection of the extension tubes type B23

Non-closed combustion relative to the surroundings. The combustion air is drawn directly from the installation area and the flue gas goes through a vertical pipe through the roof or a horizontal pipe through the wall. The extension pipes may only pass through the installation area.

B23 Horizontal



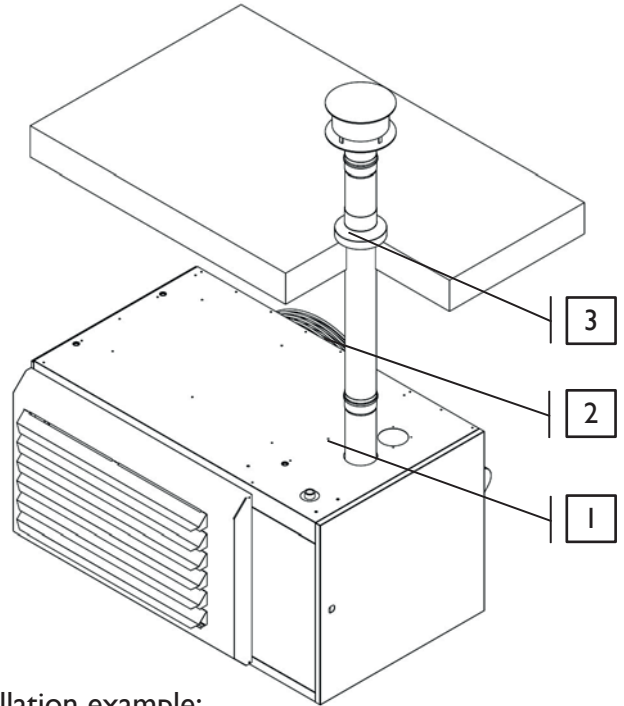
Installation example:

- 1 Extension pipe \varnothing 80, L=250mm
Protection louvre
- 2 Bend \varnothing 80, 90°
- 3 Wall duct \varnothing 80

The wall outlet can be extended with approved pipes and elbows. The pipe diameter should be at least equal to the connector on the unit. Never reduce the pipe diameter or plug the vent holes in the installation area. It is recommended to use 45° bends.

Do not place a wall duct on less than 2m from the ventilation, door or window, of the ground or in a transit zone.

B23 Vertical



Installation example:

- 1 Extension pipe \varnothing 80, L=250mm
Protection louvre
Adhesive plate (optional)
- 3 Roof duct \varnothing 80

The wall outlet can be extended with approved pipes and elbows. The pipe diameter should be at least equal to the connector on the unit. Never reduce the pipe diameter or plug the vent holes in the installation area. It is recommended to use 45° bends.

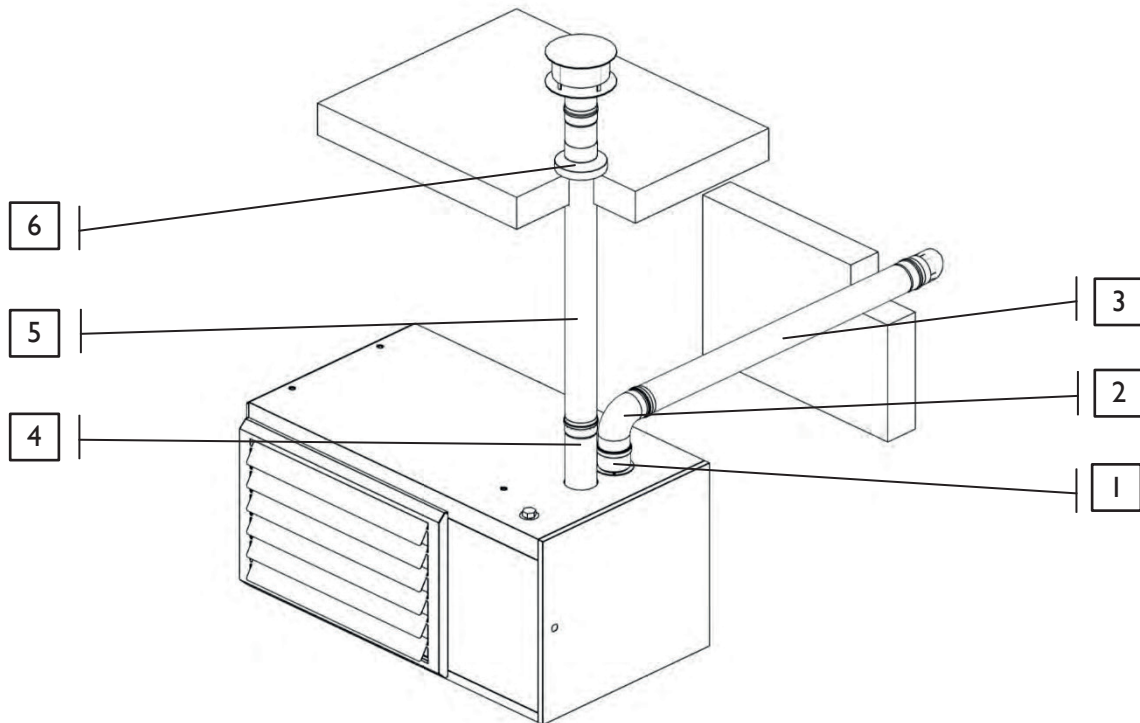
NOTE

The seals between the extension must be close and tight, make sure the lip rings are present. The total length should not exceed 8m, assuming that: 1 angle of 90° of 45° = 1m pipe. In a horizontal section, ensure that the extension pipe lies with a slope to the unit, to avoid outflow of the condensation.

Connection extension pipes type C53

Closed combustion relative to the surroundings. The combustion air will be drawn from outside. The pipe shall be placed horizontal. The flue gas shall be brought out vertically. The extension pipes may only pass through the installation area.

C53 Vertical



Installation example:

- 1 Connection ring \varnothing 80
- 2 Bend \varnothing 80, 90°
- 3 Wall duct \varnothing 80
- 4 Extension pipe \varnothing 80, L=250mm
- 5 Roof duct \varnothing 80
- Adhesive plate (optional)

The inlet and flue gas may be extended with approved pipes and elbows. Never reduce the pipe diameter to a diameter smaller than the connection to the device. Never close the air inlet openings. It is recommended to use bends of 45° instead of 90° . If 90° bends are unavoidable, do not apply more than two pieces.

NOTE

The seals between the extension must be close and tight, make sure the lip rings are present. The total length should not exceed 8m, assuming that: 1 angle of 90° or 45° = 1m pipe. In a horizontal section, ensure that the extension pipe lies with a slope to the unit, to avoid outflow of the condensation.

3.4 Connection condensate pipe

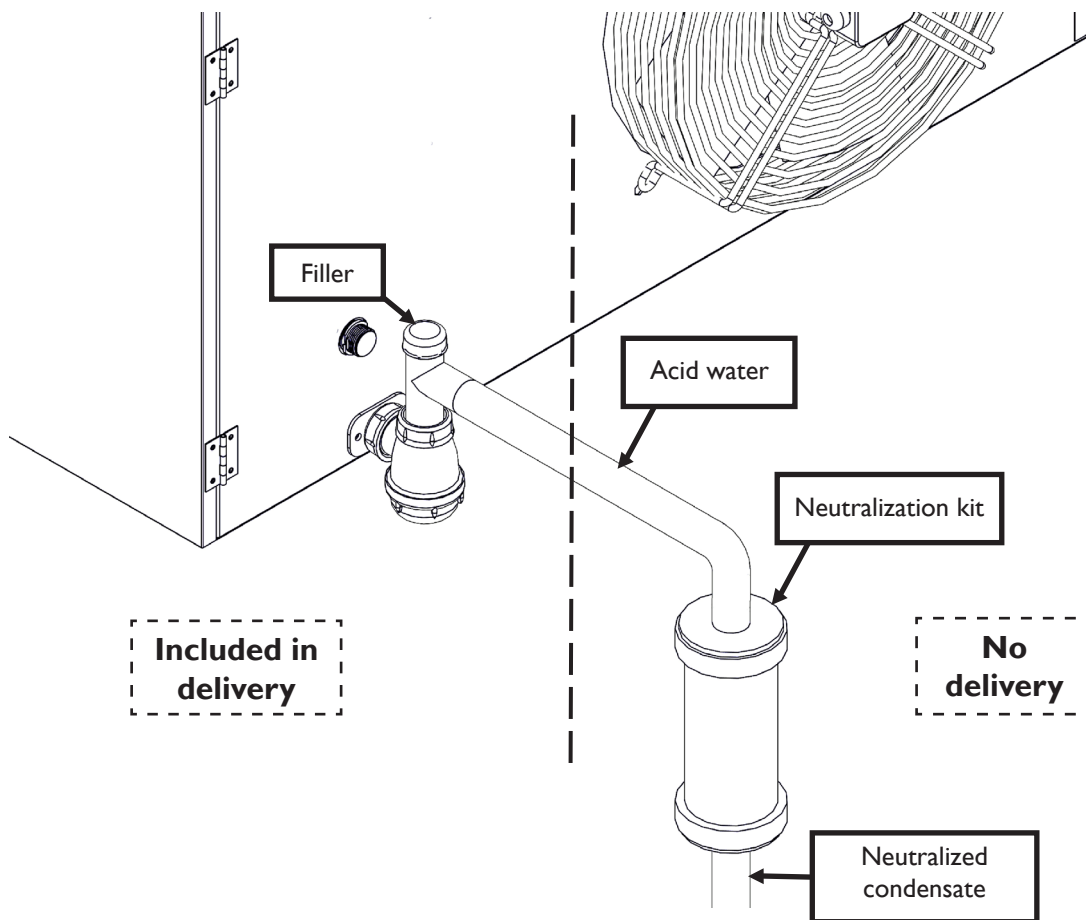
The gas-fired condensing air heater must be fitted with a siphon to drain the condensate water. The supplied siphon must be fitted during installation. Note that the discharge of the condensate must be carried out with material which is resistant to acid water with a pH of 3. Never use copper or galvanized iron pipes. For the disposal of condensed water you must use PVC pipes with a diameter that is equal to this of the unit (PVC Ø 32). Make sure the piping is placed on sufficient slope. Check the tightness of the plumbing of the condensate. Before using the unit, fill the siphon with water through the filler cap. This avoids that combustion gas will get into the sewer during the start-up.

Anti-freeze protection

The condensate drain, including the siphon, must be protected against frost. It is preferred to keep the drains frost-free as best as possible. In case they fall outside the building, the pipe part behind the siphon should be open to avoid the formation of ice which will block the discharge. Take the necessary precautions to avoid such an incident, as this may cause irreversible damage to the heater.

Neutralization of the condensate

The acidity of the condensate from the combustion of natural gas is 3,5-3,8 pH. In certain regions it is required that the condensate must be treated before it can be discharged. In these cases you should take on a neutralization kit in the condensate circuit.

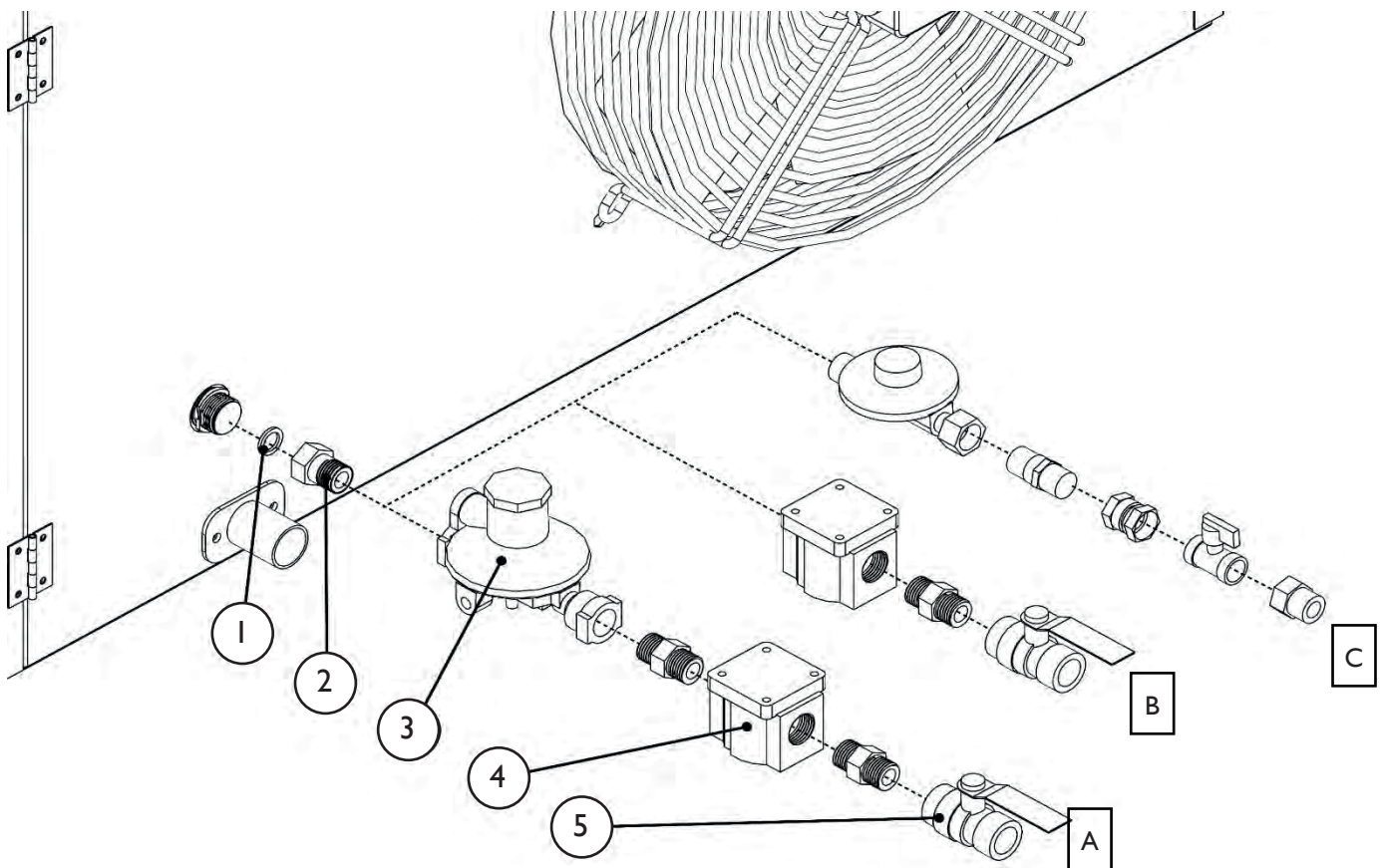


3.5 Gas connection

Foremost you should check whether the delivered unit is made for the gas that unit will be connected to. This data of the device is mentioned on the type plate on the inside of the door. The gas supply must be suitable for the load of the device and must be equipped with all the safety and control devices required by the regulations in force. The diameter of the pipe must be accurately determined. Important factors for this are, among others, the gas flow and the length and route of the pipes.

The maximum allowable line losses may not be greater than 5% of the nominal supply pressure. The gas connections must be installed in accordance with national and regional regulations and must be performed by authorized personnel. Before commissioning the unit must be pressure tested in accordance with the applicable regulations and be cleaned. The maximum allowable pressure of the gas is 60mbar.

Note, before opening the gas you must check the seal on the throttle.



Gas connection:

- A** Connection pressure natural gas higher than 50mbar;
- B** connection pressure natural gas lower than 50mbar;
- C** LPG supply.

Gas connection set:

- 1** Gasket (supplied);
- 2** Suitable connection (supplied);
- 3** Gas pressure regulator;
- 4** Filter;
- 5** Gas tap.

4 Controls

4.1 Comtherm

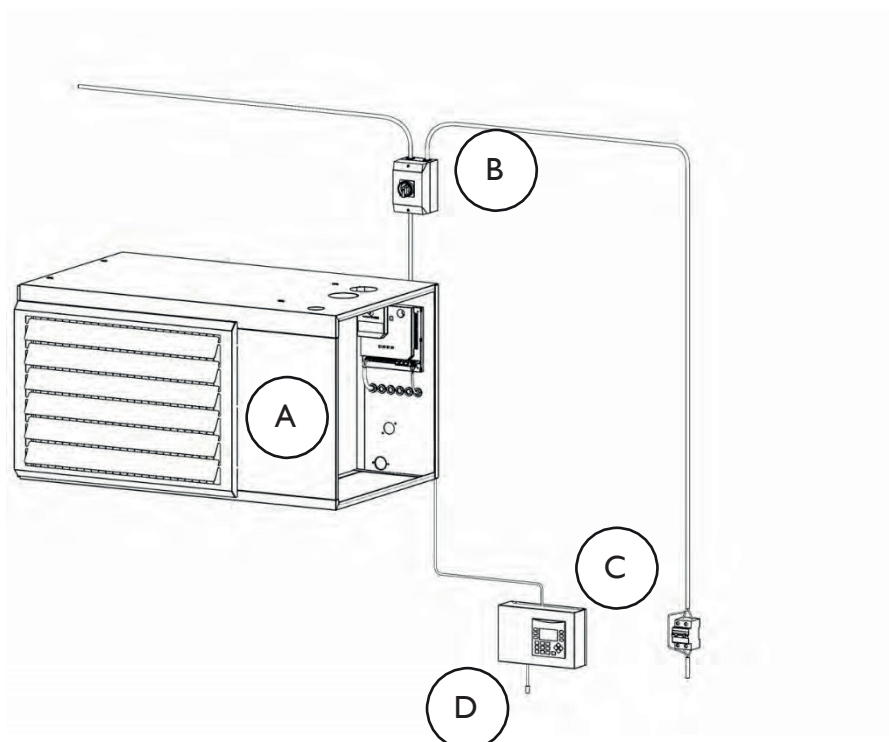
The Comtherm is a modulating temperature controller. The room temperature sensor is integrated in the housing of the controller. The Comtherm is equipped with a clock function, day-night control, continuous running fan and continues daytime. Based on the prevailing room temperature and the desired temperature, the capacity is determined. The controller standardly comes with a 9 meter cable. Maximum cable length is 100m. The cable must be shielded.

For further information about the Comtherm, please refer to the manual of this controller. A Comtherm can control one GSW+.



Connection diagram

- (A) Condensing air heater
- (B) Maintenance switch 230Vac
- (C) Comtherm
- (D) Room sensor

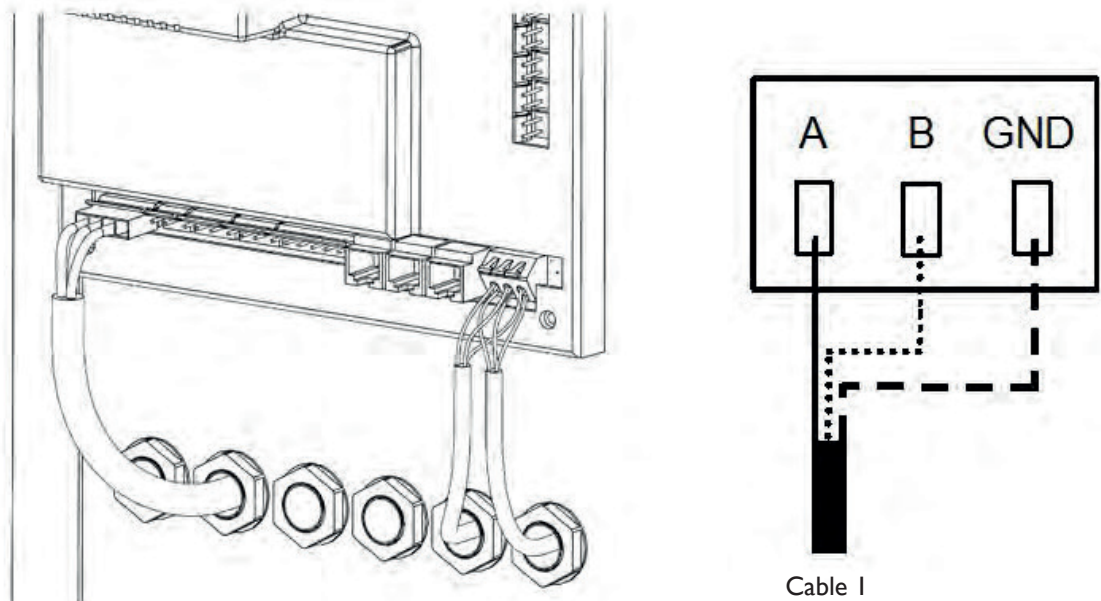


Supply Comtherm (Connector JP 18)



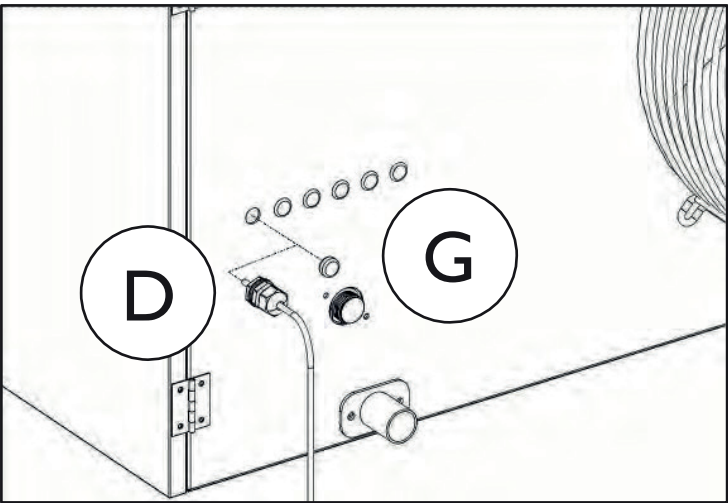
RS 485 Bus connector

Figure 2a



Cable color	Function	Connection
Orange	24v (supply)	Connector JP 18
Blue	0v (supply)	Connector JP 18
Green	0v (rs485)	Clamp GND
Brown	A and B (rs485)	White-brown clamp A Brown clamp B

Figure 2b



5 Commissioning

5.1 Commissioning

- 1 Before commissioning the heater and putting it under voltage, ensure that the connectors are well performed as described in the following chapters:
 - Connecting the condensate, page 16;
 - Connecting the flue, page 12-15;
 - Electrical connection, page 18-21;
 - Gas connection, page 17.
- 2 Also ensure that:
 - The protective film on the panels has been removed;
 - The distance around the unit has been met;
 - All electrical connections are performed;
 - That the ground connection is performed.
- 3 Check the power supply of the heater. This should be between 210V and 230V AC. Note the polarity Neutral and Phase. In case of a two-stage network an isolating transformer should be applied. For more information please ask the manufacturer.
- 4 Ensure that the type of gas and the gas pressure match the information on the type plate.
- 5 Ensure that the Comtherm or the communication with the heater operates.
- 6 Take the air heater into operation:
 - Open the gas valve and purge it;
 - Switch on the electrical supply;
 - Ensure that the exhaust vanes are open at a minimum of 45°;
 - Create heat demand by setting the room temperature control (Comtherm) to a value at least 1°C higher than the actual room temperature. Set the Comtherm to <auto> (see the manual of the Comtherm);
 - The heater starts.

Note: The units are pre-calibrated at the factory, though it may be necessary to correct the initial adjustment values. This is particularly the case when the units are installed at a height higher than 500m. Due to the lower air pressure, the combustion values may be affected. In addition, correction may be necessary in case of different qualities of the local gas. For instruction, see page 25.

- 7 Set the Comtherm according to the manual.

In case of a fan with variable speed the minimum and maximum speeds should also be entered next to the switching times and temperature settings. For the minimum speed a minimum value of 30 should be entered and for the maximum speed a minimum value of 70 should be entered.

5.2 Adjustment of the combustion

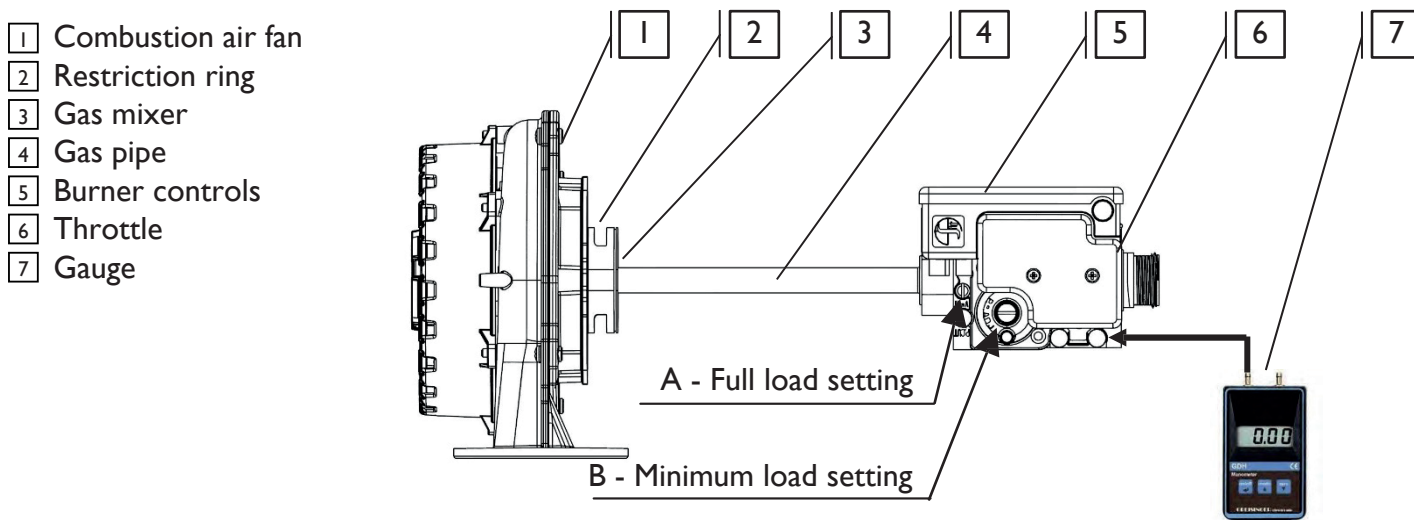
The commissioning of the gas valve must be done by a qualified professional equipped with a flue gas analyzer. Before any intervention you must turn the gas and electrical supplies off. State on the type plate (inside of the door) the gas type being tuned in if the unit was tuned into another gas type. Check the tightness of the gas circuit after each intervention.

Required tools:

- Hex key 2.5mm → balancing air-gas ratio full load (throttle);
- Hex key 4 → balancing air-gas ratio minimum load (offset);
- Gas analyzer (CO₂/CO - gas temperature);
- Gas gauge maximum pressure 50 mBar.

Controlling and regulating procedure of the burner with premix:

- 1 Place your flue gas analyzer in the flue;
- 2 Check the pressure of the gas supply before starting, when stopping and running (see table);
- 3 Turn the heater on:
 - Start the unit in maximum power mode (see description “service menu” of the Comtherm);
 - Check that the O₂ value corresponds with the table below, after the unit has been in operation for at least 2 minutes;
 - If necessary, correct the value with screw A. Turn clockwise to increase the O₂ value and counter clockwise to decrease it;
 - Continue with the minimum load (see description “service menu” of the Comtherm);
 - If necessary, correct the measured value with screw B according to the table below. If necessary, correct the value with screw A. Turn clockwise to decrease the O₂ value and counter clockwise to increase it;
 - Check the maximum and minimum load again. If there are no abnormalities, set the Comtherm in the desired mode.



Gas type	Gas pressure	Minimum pressure	O ₂ full load (screw A)	O ₂ minimum load (screw B)	CO max PPM G20/G25	G31
G20 (natural gas)	20-50 mbar	Min. 18 mbar	5%	6%	160	200
G25 (natural gas)	25-50 mbar	Min. 20 mbar	5%	6%	160	200
G31 (propane)	28-50 mbar	Min. 25 mbar	5%	6%	160	200

Venture restriction ring color

Model	GSW+ 30	GSW+ 40	GSW+ 50	GSW+ 70
Ring color / ø	White / 6mm	White / 6mm	Red / -	- / -

6 Malfunctions

6.1 Malfunctions

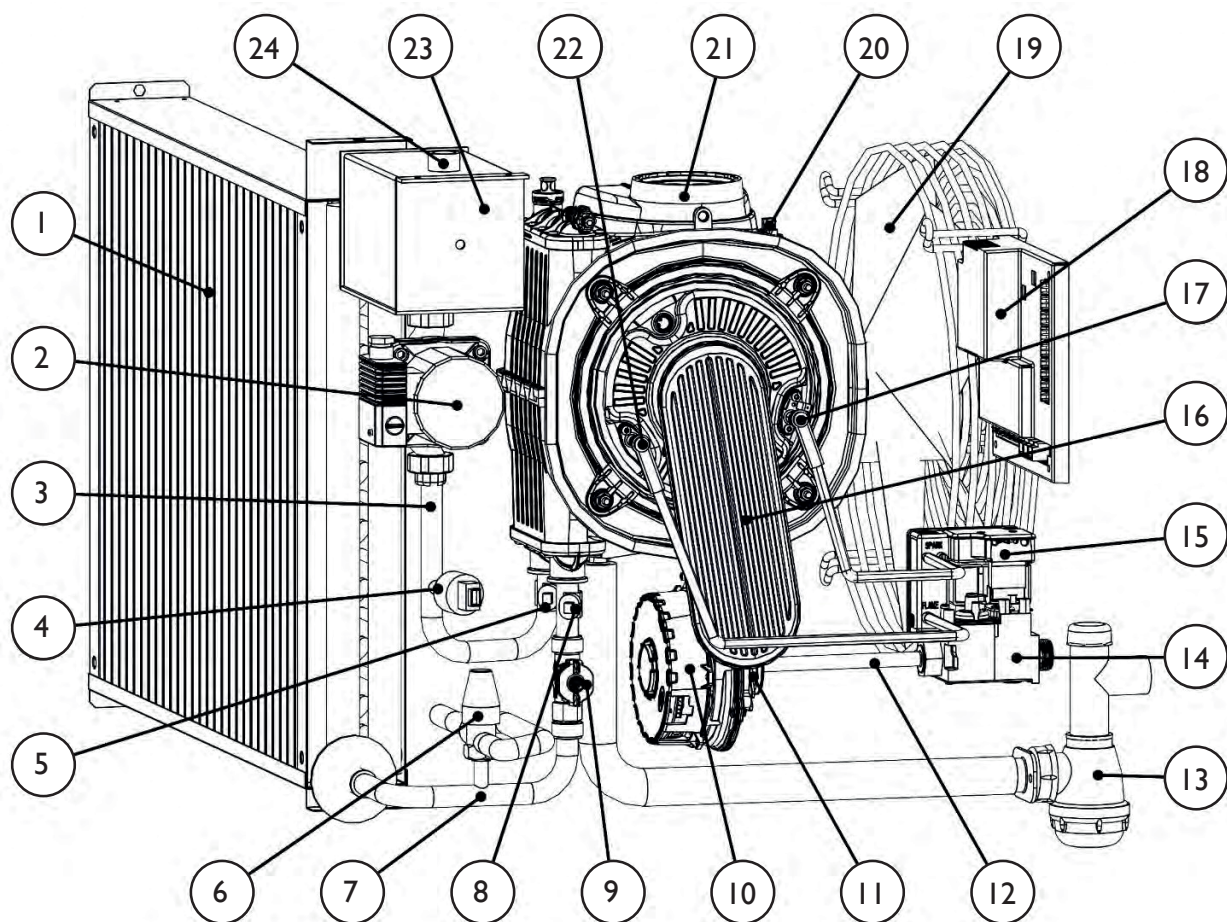
When a malfunction appears, make sure all above mentioned conditions / procedures have been performed.

Note: all electrical or mechanical work has to be done after interrupting the power supply and closing the gas supply.

Malfunction	Cause	Solution
The unit doesn't start	<ul style="list-style-type: none">- The main switch is set to OFF- Blue LED on the control board is turned off = no power- LED on the control board flashes blue → communication error- LED on the control board is red → sensor error- LED on the control board flashes red → overpressure or overheat- LED on the control board is blue/ yellow → burner error- LED on the control board flashes blue/ yellow → water circuit error- Burner fan is not functioning- No heat demand	<ul style="list-style-type: none">- Turn the switch ON- Check the power supply- Check the communication cable- Check the sensor and replace- Check the pump and the water circuit for blockages.- Reset the burner control- Check the water level and the pump- Replace these- Configure the Comtherm
The burner fan starts several times without a flame and the control box goes into malfunction (burner error)	<ul style="list-style-type: none">- No gas- Air in the pipes- Poor control air/gas- Defective gas valve- Igniter is poorly adjusted or defective- Control panel is defective	<ul style="list-style-type: none">- Check the pressure- Vent the pipes- Adjust the ratio air/gas (page 25)- Replace- Adjust or replace- Adjust or replace
The burner fan is at maximum speed but the capacity does not reach the maximum	<ul style="list-style-type: none">- Too long flue pipe- The air intake pipe or chimney pipe is blocked- Incorrect burner control- Too high temperature of the exhaust air	<ul style="list-style-type: none">- Limit or adapt the length- Unclog the pipes- Adjust the combustion (page 3)- Room temperature too high
The burner is not modulating and the speed of the burner fan is set at maximum	<ul style="list-style-type: none">- Incorrectly set Comtherm- The Cable of the PWM-steering is disconnected- The ventilation motor is defective- The control board is defective	<ul style="list-style-type: none">- Tune this in (see manual Comtherm)- Check the connection- Replace- Replace
The burner starts, the flame is formed and the burner control goes to malfunction	<ul style="list-style-type: none">- Phase-Neutral swaps- Power supply two phases network- Defective ionization electrode	<ul style="list-style-type: none">- Apply the phase and neutral to the electrical supply- Use a isolation transformer- Replace
(for units with a variable airflow) The fan is not modulating	<ul style="list-style-type: none">- Variable speed is not set to the Comtherm- The cable for speed variation is disconnected- Defective motor	<ul style="list-style-type: none">- Set to Comtherm- Check the cable- Replace these

Note: only the original parts from the manufacturer can ensure the safety of the product and the persons. When parts of a different origin are used, the product liability of the manufacturer expires.

6.2 Spare parts



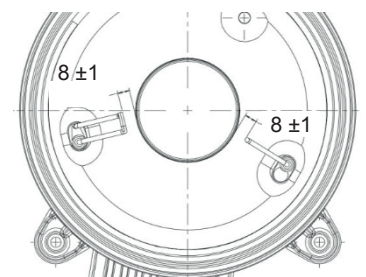
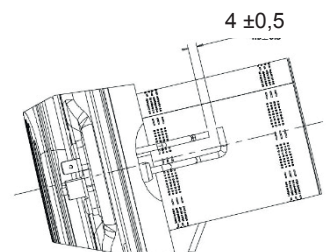
N°	Description	Codes			
		GSW+ 30	GSW+ 40	GSW+ 50	GSW+ 70
1	Water/air heat exchanger	0699303	0699304	0699305	0699307
2	Pump	0699310			
3	Return pipe	0699313			0699314
4	Water pressure sensor	0699316			
5	Return water temperature sensor	0699318			
6	Overflow valve (3bar)	0699320			
7	Supply pipe	0699323	0699324	0699325	0699327
8	Supply water temperature sensor	0699318			
9	Water flow meter	0699317			0699315
10	Combustion air fan	0699331			0699332
11	Gas mixer with restriction	0699333			0699334
12	Gas pipe	-			
13	Siphon	0699339			
14	Throttle	0699341			
15	Automatic burner	0699343			
16	Burner supply pipe	-			
17	Ignite electrode	0699347			
18	Control board	3101670			
19	Axial fan (on/off)	0621690		0621692	0699368
20	Maximum fuse	-			
21	Combustion boiler (body)	-			
22	Ionisation electrode	0699349			
23	Expansion tank	0699380			
24	Cap expansion tank	0699381			

7 Maintenance

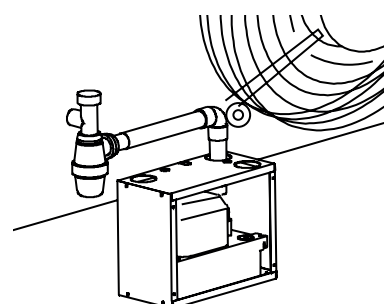
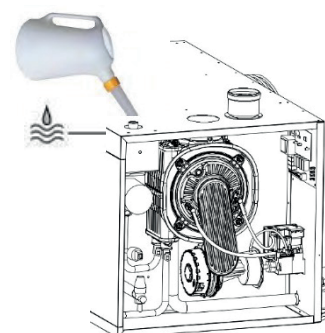
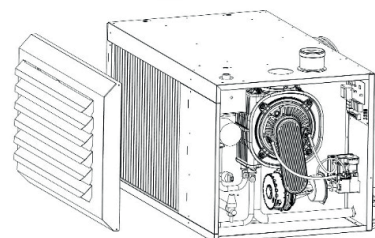
Correct and regular maintenance of at least once a year will increase the safety, reliability and efficiency. Additionally, it will extend the life of the unit.

SERVICE MUST BE PERFORMED WHEN THE UNIT IS COLD. GAS AND ELECTRICAL SUPPLY MUST BE DISABLED. MAINTENANCE SHOULD ONLY BE DONE BY CERTIFIED PROFESSIONALS.

Part	Work to be carried out
Heater	Check that the device is functioning correctly for all safeties. Make sure all the screws are tightened.
Flue gas system	Check the combustion air and flue gas pipe trace. Check the seals and check for corrosion.
Condensate drain	Check the siphon for contamination and clean it.
Burner	Disconnect the electrodes, the electrical connections of the combustion air fan and the gas pipe at the gas valve. Remove the burner / fan / gas mixer composition. Clean the burner with a brush, vacuum cleaner or an air syringe. Check the burner for damages and cracks in the surface. In case of damages, replace it. Note: when re-inserting the gas pipe, check the gasket for damage.
Ignite / Ionization electrode	Check the condition and clean if necessary. Check the distance between the ignition electrodes ($4 \pm 0.5\text{mm}$) and the distance between the electrode and the burner ($8 \pm 1\text{mm}$). Check the seal, replace if necessary. Check the height of the ionization current. If this is lower than $3\mu\text{A}$, check the adjustment and the condition of the ionization electrode and the connection to the ground.



Part	Work to be carried out
Boiler body	Check the sealing of the front plate. Inspect the heat exchanger tubes. Inspect the isolation on the front and back plate of the heat exchanger. Damaged or hardened seals must be replaced. Clean the inside of the heat exchanger with a stiff brush.
Heat exchanger	Remove the exhaust vane window and clean it with a vacuum cleaner or air syringe. Check the heat exchanger for leaks.
Expansion tank	Do not open the filler cap when the unit is still hot. Risk of severe burns! Check the level when the unit is off and cold. The level must touch the filler neck. If necessary, fill it with a monoethylene-glycol solution (-15 °C) provided with corrosion inhibitors.
Pump	Check that the pump is functioning. Pump failure is detected by the water pressure sensor. In an exceptional case, the pump may be stuck. This can be solved by taking the cap on the front of pump off and then getting the pump started by turning a flat screwdriver clockwise. Then attach the protective cap again.
Combustion	Measure the O ₂ /CO ₂ amount and the flue gas temperature. Verify that the measured values of the data match the data that is presented on page 23. If necessary, adjust the setting in accordance with the instructions on page 23. Check the flame status visually through the sight glass. The flame should be stable, blue in color with orange dots (maximum load). During the exhaust gas analysis the end of the probe must be located in the middle of the flue gas pipe.
Condensate pump	When using a condensate pump (3100587) with condensation neutralization kit (3100586) the cartridge needs to be replaced annually.



8 Recommendations for the end user

8.1 Safety rules

- It is prohibited to seal the ventilation openings of the room where the unit is installed or that of the unit.
- Never block the smoke evacuation and the combustion air intake.
- Do not make any changes to the controls that have been installed by qualified professionals.
- Do not spray water on the heater or touch the unit with wet hands.
- Do not touch any hot or moving parts of the air heater.
- Do not place objects on the unit or hook objects onto the unit.
- Turn off the gas and electricity before work is performed on the unit.
- Do not change the type of gas used, unit regulations or safety- and control systems. This can lead to dangerous situations.

When the unit is taken out of operation for a considerable time, disconnect the electrical supply. It is recommended to appeal to an expert when re-commissioning the unit. At least once a year the unit should be serviced by authorized qualified professionals. Consult your installer for this.

Taking out a maintenance contract is highly recommended.

8.2 What to do in case of a problem?

Problem	Solution
The smell of unburned gas	Close the valve and switch of the electricity. Contact your installer.
Burner in fault	Reset the burner control by pushing the reset button or using the Comtherm. See the manual of the Comtherm for this. If this does not resolve the problem, contact your installer.

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