HOT AIR GENERATOR WITH GAS BURNER

GGS

Installation
Operation
Commissioning
Maintenance

NA11.45 A

06 - 2011

CIAT

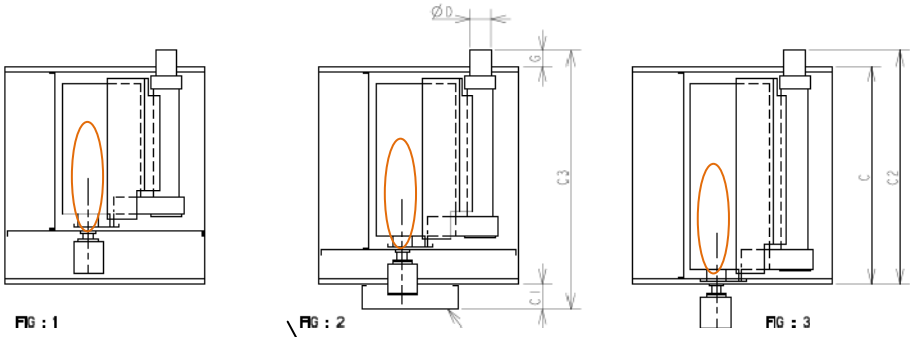
CONTENTS

Note to reader: This document is provided for guidance only. Certain modifications may apply. The manufacturer shall not be held liable for potential errors or omissions in these instructions.

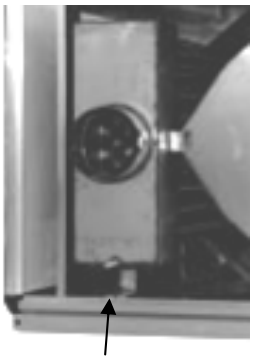
1. DESCRIPTION OF THE UNIT

3 CONFIGURATION TYPES:

- Int. burner (fig1.)
- Ext. burner (fig2.)
- Burner fixed outside (fig3.)



Burner cover

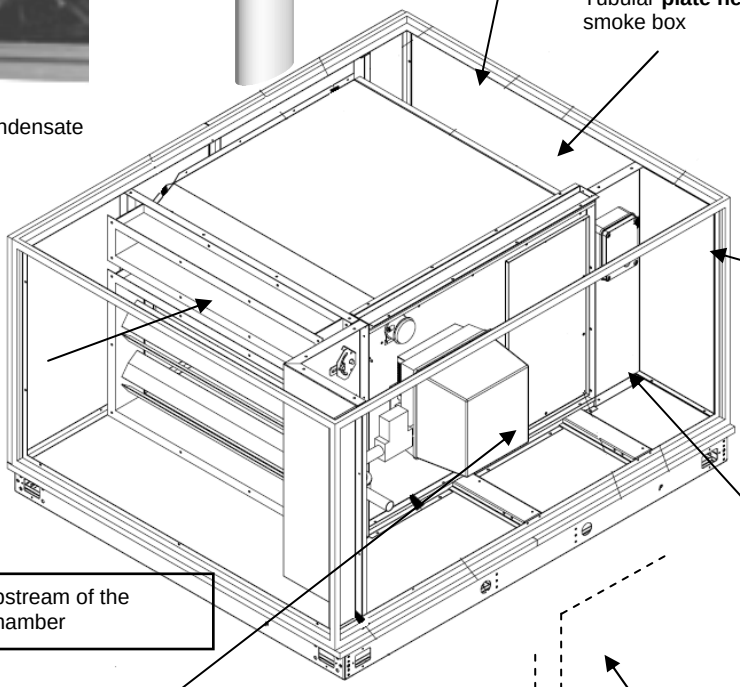


Threaded condensate drain union

Flue (not supplied)

Combustion chamber
- Stainless steel chamber
- Stainless steel exchanger
- Stainless steel smoke box
- Hot air deflector: zinc-plated sheet metal

Tubular **plate heat exchanger** and smoke box



Integrated bypass

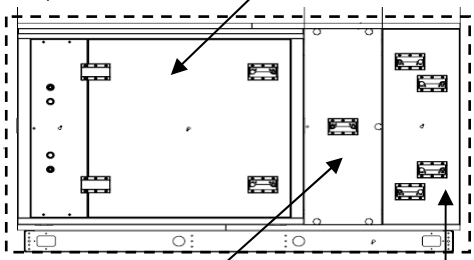
Three thermostat chamber outlet
Use a differential pressure switch or another system to control the air flow (compulsory). This component is provided by CIAT service if the power and electrical control box is supplied.

Chamber cleaning access hatch

Fan always upstream of the combustion chamber

Burner
Main components:
1 air pressure switch
1 min. and max. gas pressure switch
1 ignition and safety valve block
1 gas filter
1 flame detection and control unit
Burner power supply voltage: single-phase 240 V or three-phase 240/400 V; 50 Hz + Earth

Burner access door



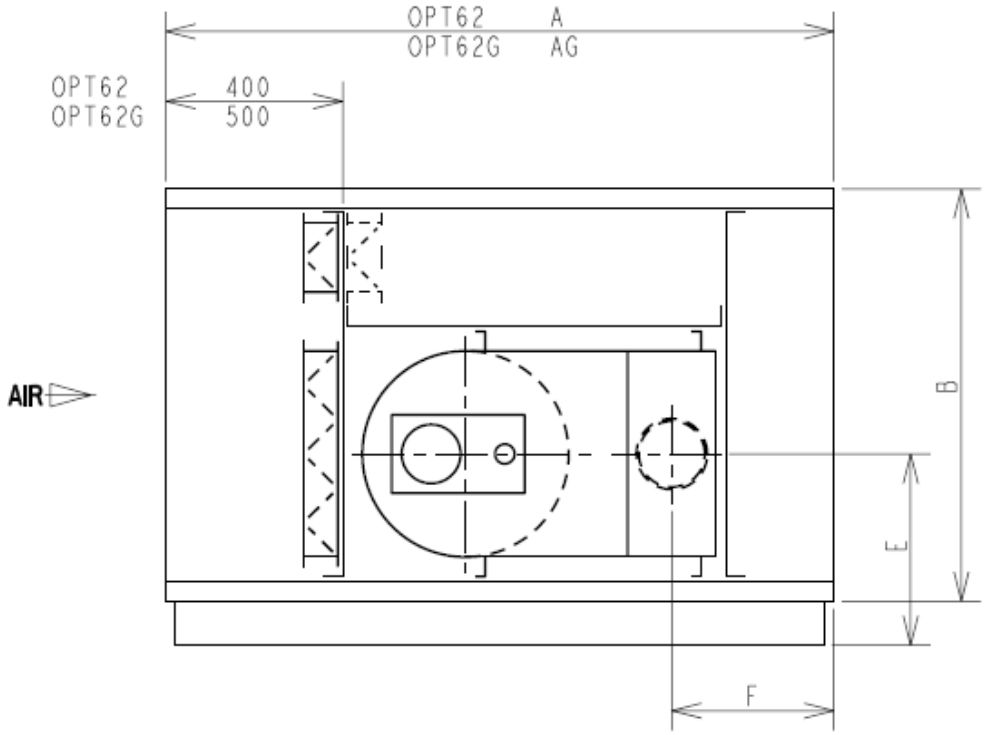
Power and electrical control box (optional)

Panel to access chamber cleaning hatch

3-thermostat access panel

Flue, gas expansion valve, buffer tank and sectional valves not supplied

DIMENSIONS



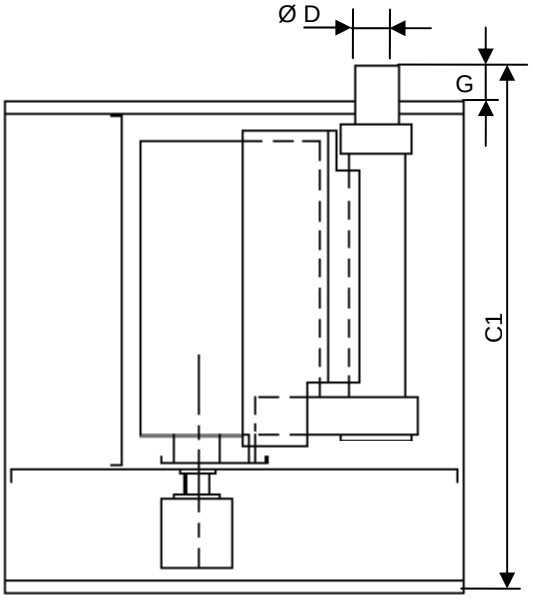


Fig.1

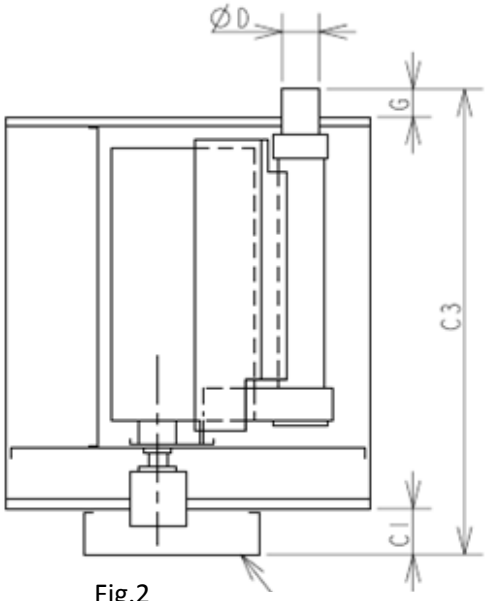


Fig.2

Burner casing

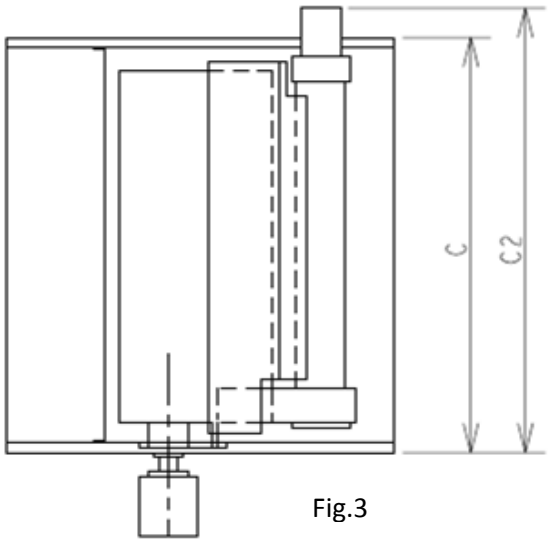


Fig.3

TABLE OF DIMENSIONS

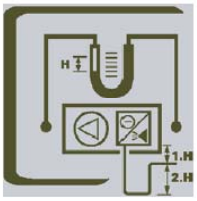
CLIMA CH	FIG	CHAMBER		BURNERS			A	AG	B	C	C1	C2	C3
		P Max Kw	AIR FLOW	P Max Kw	CUENOD	WEISHAUPT	QPT62	QPT62G					
A050 Ch 45	3	54	4300	60	NC9-12	WG10	1500	1600	865	875		905	
A075 Ch 45	2	54	4300	60	NC9-12	WG10	1500	1600	865	1185	86	(1231)	1317
A075 Ch 75	2	82	6000	92	NC12	WG10	1600	1700	865	1185	254	(1237)	1491
A075 Ch 80/100	3	93/107	7600/7600	104/120	NC12-16	WG10-20	1700	1800	865	1185		1225	
A100 Ch 45	1	54	4300	60	NC9-12	WG10	1500	1600	946	1516		1546	
A100 Ch 75	1	82	6000	92	NC12	WG10	1600	1700	946	1516		1566	
A100 Ch 80/100	2	93/107	7600/7600	104/120	NC12-16	WG10-20	1700	1800	946	1516	160	1556	1716
A150 Ch 45	1	54	4300	60	NC9-12	WG10	1500	1600	1236	1516		1546	
A150 Ch 75	1	82	6000	92	NC12	WG10	1600	1700	1236	1516		1566	
A150 Ch 80/100	2	93/107	7600/7600	104/120	NC12-16	WG10-20	1700	1800	1236	1516	160	1556	1716
A150 Ch 125/150	2	145/168	9600/11500	163/188	NC16-21	WG20	1900	2000	1236	1516	390	1586	1936
A200 Ch 75	1	82	6000	92	NC12	WG10	1600	1700	1566	1516		1566	
A200 Ch 80/100	2	93/107	7600/7600	104/120	NC12-16	WG10-20	1700	1800	1566	1516	160	1556	1716
A200 Ch 125/150	2	145/168	9600/11500	163/188	NC16-21	WG20	1900	2000	1566	1516	415	1586	1936
A200 Ch 175/200	3	203/230	13400/15300	228/258	NC21-30	WG30	2000	2100	1566	1516		1566	
A250 Ch 80/100	1	93/107	7600/7600	104/120	NC12-16	WG10-20	1700	1800	1566	1817		1857	
A250 Ch 125/150	2	145/168	9600/11500	163/188	NC16-21	WG20	1900	2000	1566	1817	150	1887	2037
A250 Ch 175/200	2	203/230	13400/15300	228/258	NC21-30	WG30	2000	2100	1566	1817	310	1867	2127
A250 Ch 250/300	3	290/347	19000/23000	326/389	C43	WG30-40	2200	2300	1566	1817		1877	
A300 Ch 125/150	1	145/168	9600/11500	163/188	NC16-21	WG20	1900	2000	1566	2172		2242	
A300 Ch 175/200	1	203/230	13400/15300	228/258	NC21-30	WG30	2000	2100	1566	2172		2222	
A300 Ch 250/300	2	290/347	19000/23000	326/389	C43	WG30-40	2200	2300	1566	2172	310	2232	2492
A300 Ch 375/450	3	415/523	28700/34500	465/586	C54-60	WG40-100	2500	2600	1566	2172		2297	
A375 Ch 125/150	1	145/168	9600/11500	163/188	NC16-21	WG20	1900	2000	1886	2172		2242	
A375 Ch 175/200	1	203/230	13400/15300	228/258	NC21-30	WG30	2000	2100	1886	2172		2222	
A375 Ch 250/300	2	290/347	19000/23000	326/389	C43	WG30-40	2200	2300	1886	2172	310	2232	2492
A375 Ch 375/450	3	415/523	28700/34500	465/586	C54-60	WG40-100	2500	2600	1886	2172		2297	
A450 Ch 125/150	1	145/168	9600/11500	163/188	NC16-21	WG20	1900	2000	2226	2172		2242	
A450 Ch 175/200	1	203/230	13400/15300	228/258	NC21-30	WG30	2000	2100	2226	2172		2222	
A450 Ch 250/300	2	290/347	19000/23000	326/389	C43	WG30-40	2200	2300	2226	2172	310	2232	2492
A450 Ch 375/450	3	415/523	28700/34500	465/586	C54-60	WG40-100	2500	2600	2226	2172		2297	
A600 Ch 175/200	1	203/230	13400/15300	228/258	NC21-30	WG30	2000	2100	2226	2812		2862	
A600 Ch 250/300	1	290/347	19000/23000	326/389	C43	WG30-40	2200	2300	2226	2812		2872	
A600 Ch 375/450	1	415/523	28700/34500	465/586	C54-60	WG40-100	2500	2600	2226	2812		2937	
A600 Ch 500/600	2	581/683	40200/49000	651/765	C75-100	WFM100	2600	2700	2226	2812	600	2882	3432

Ch COMB	UNIT	∅D	E	F	G	dPa chamber combustion circuit	dPa chamber air side	Chamber weight kg
Ch 45	A050	149	434,5	437	3C	20 Pc	150-170 Pa	47
	A075		434,5		4G			
	A1C0&150							
Ch 75	A075	179	504,5	445	5C	25 Pa	150-170 Pa	68
	A1C0&150		509					
	A2C0							
Ch 80/100	A1C0	200	537	437	4C	18/22 Pa	150-170 Pa	84
	A150		537	457				
	A2C0&250							
Ch 125/ 50	A150	250	616	443	7C	18/20 Pa	150-170 Pa	144
	A2C0A450		631	443				
Ch 175/200	A2C0A600	250	681	425	8S	17/39 Pa	150-170 Pa	184
Ch 250/300	A250A600	300			6C	21/32 Pa	150-170 Pa	267
Ch 375/450	A3C0A600	330			125	20/22 Pa	150-170 Pa	395
Ch 500/600	A6C0	370			7C	20/23 Pa	150-170 Pa	565

Volume of gas combustion products m^3/m^3	GN	21.05 x (gas flow m^3/h)
	Propane	59.04 x (gas flow m^3/h)

If the air-handling unit is equipped with a fan with a 2-speed or variable-speed motor, the control must ensure that the reduction in the air flow automatically causes a reduction in power.

PICTOGRAMS



Condensate drain siphon

Grounding compulsory

Air flow

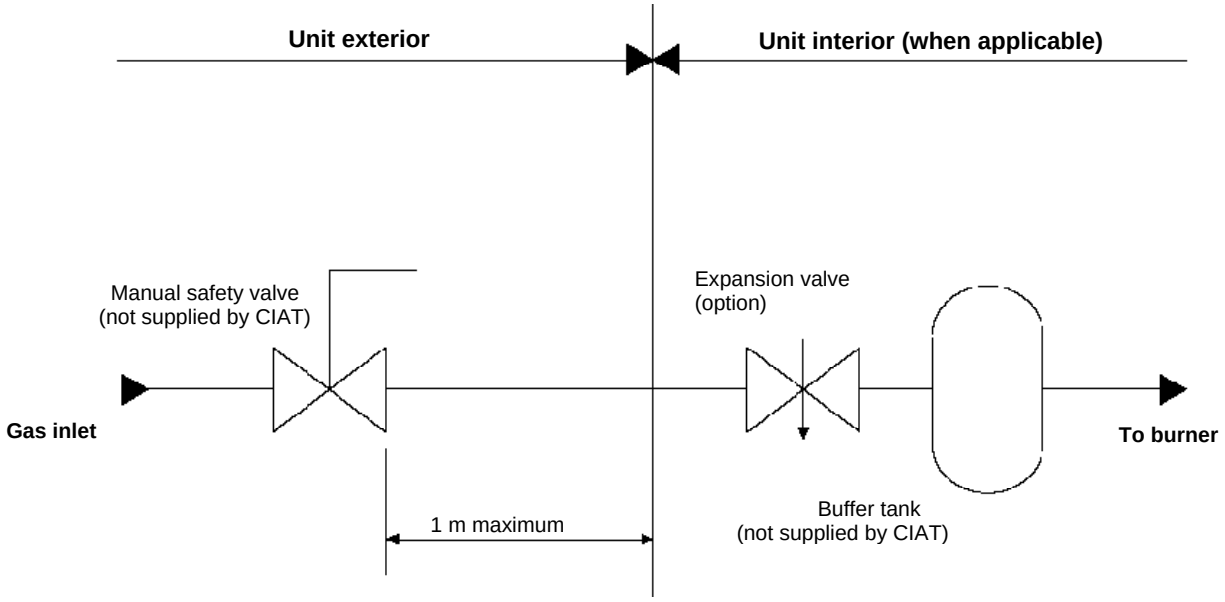
Electric heater

2. INSTALLATION & CONNECTION

GAS SUPPLY

For a supply pressure greater than that recommended by the burner manufacturer, a pressure expansion valve must be installed to obtain the correct value while respecting the flow.
The installation must have a gas supply cutoff valve for each burner and a manual valve located at the entrance to the premises, as per the conditions set out in article **GZ 15** (fire safety regulations for establishments open to the public).

Schematic diagram of the gas system



Operating pressure

Natural gas**:** **MPA** = 30 to 400 mbar expansion 18 mbar
MPB = 0.4 to 4 bar expansion 18 mbar/300 mbar
LPG**:** **BUTANE** expansion 28 mbar/118 mbar
PROPANE expansion 37 mbar/148 mbar

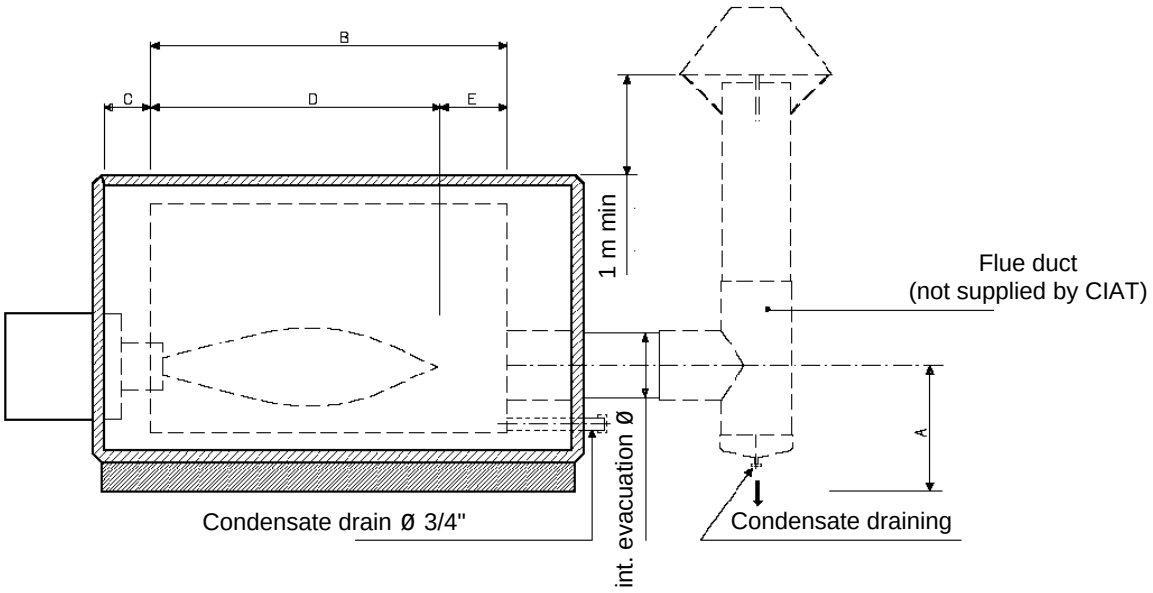
- Recommendation for calculating the pipework diameter, see following sections.
- The pipework must always be installed with the greatest care. The local gas distribution prescriptions must be strictly followed (in FRANCE comply with DTU 61.1).

Burnt gas evacuation duct

The duct should preferably be made from **special gas-grade** aluminium sheet with a purity of at least 99.5% or from stainless steel sheet metal.
the duct is neither flush-mounted nor engraved but fixed only to the masonry using clamps.
Each duct inlet is labelled to indicate that it can only be used for the evacuation of gas combustion products.

The roof outlet complies with the usual standards.
Minimum height of 0.40m above any ridge (sloping roof).
Minimum height of 1.20m above a terrace roof (15% slope).
A T-joint with an inspection cover is provided at the base.
Double-wall ducts are recommended to prevent the formation of condensates.
The duct cross-section must not be smaller than that of the unit's connection nozzle.
The ducts are positioned at least 20 cm from any flammable material.
The burnt gas ducts are made in accordance with the prescriptions of the CE directives.

Flame length and flue installation principle



The sum of the pressure drops (flue duct + combustion chamber) must not exceed that authorised by the burner (refer to the table in the "Dimensions" section).
The combustion gas outlet must extend at least 1 metre above the top of the roof. It is also necessary to check that the combustion gas cannot be recycled in the premises (allow a sufficient distance between the flue outlet and the building air inlets).
The condensate drains will be connected to the gutter via a sealed duct.

POWER SUPPLY AND ELECTRICAL CONNECTION

All the electrical connections and wiring are configured and installed in accordance with the codes, local regulations and wiring diagrams located inside the units.

Check that the available electrical power supply corresponds to the characteristics on the manufacturer's plate.

Connecting the safety unit

Safety thermostat mounted at the chamber outlet

- **1st thermostat (automatic reset)**

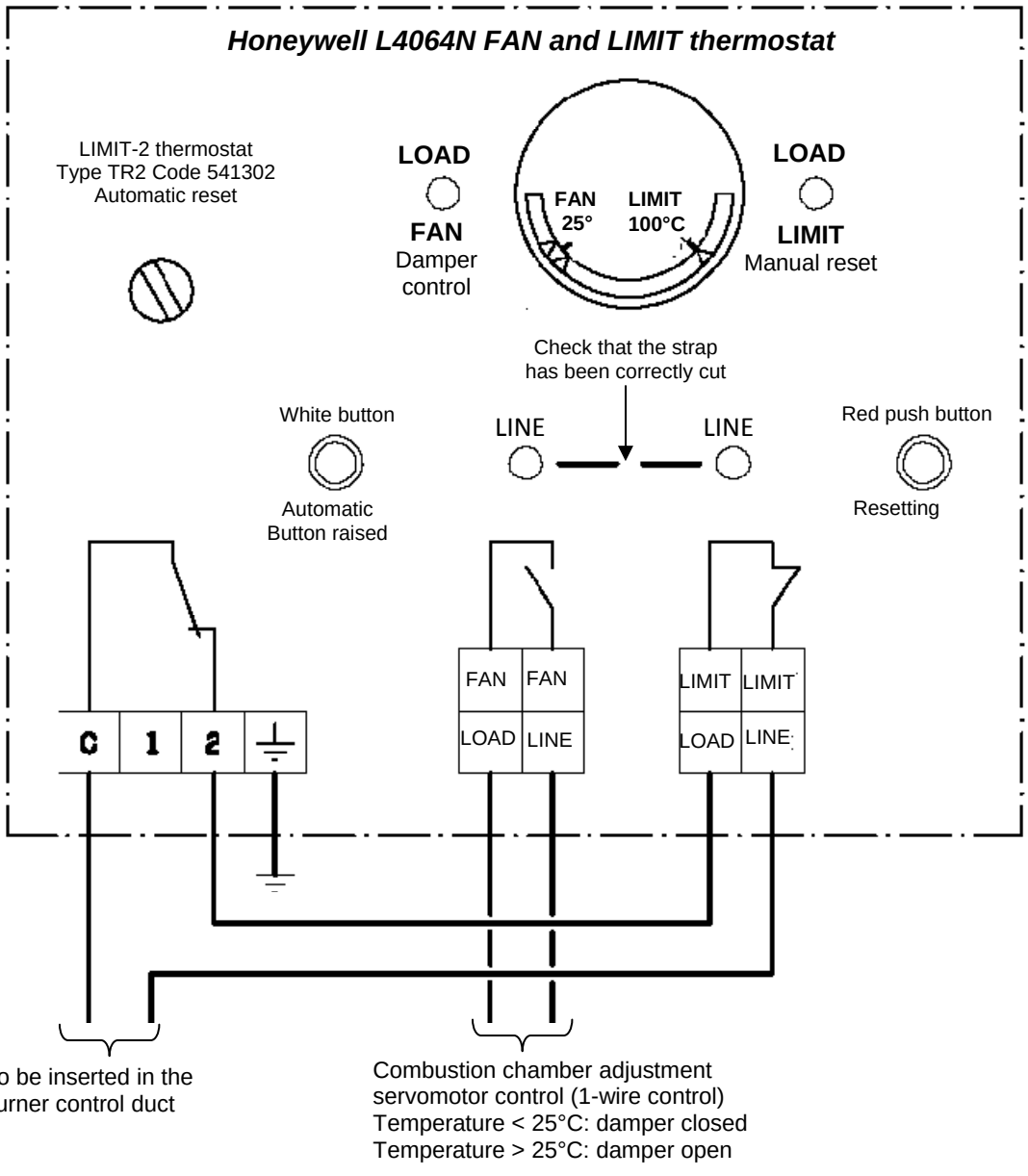
Adjustable using the knob on the thermostat housing (range from 0 to 80°C).
This stage can control the ventilation units in fresh air only operation (set to approximately 25°C).

- **2nd thermostat (automatic reset)**

Adjustable inside the unit (range from **30** to **120**°C)**.**
This stage provides overheating protection for the combustion chamber (set to approximately **90**°C). The stage must be incorporated into the burner's control chain.

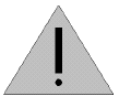
- **3rd thermostat (automatic reset)**

Adjustable inside the unit (range from **40** to **100**°C)**.**
This stage provides overheating protection for the combustion chamber (set to approximately **100°C**). The stage must be incorporated into the burner's control chain.



Breaking capacity for each thermostat

- **15 A (2.5 A) at 250 V**
- **10 A (2.5 A) at 400 V**



- **Only qualified personnel may carry out work on the thermostat.**
- **When replacing an old thermostat with a new model, remember to carry out the wiring modifications and run an operating test.**

VENTILATION UNITS

1. Fresh air only operation

If the temperature at the chamber outlet is lower than 25°C, the combustion chamber ventilation unit is 90% closed.
If the temperature at the chamber outlet is greater than 25°C, the combustion chamber ventilation unit is open.
The ventilation unit can be controlled by an On/Off servomotor without a zero return (zero return by phase inversion). This servomotor may be controlled by the thermostat's 1st stage (to fine-tune the air outlet temperature setting, the servomotor may be the modulating type controlled by a modulating regulator with a supply air sensor).
The servomotor will have a mechanical stop to allow the opening and closing percentages to be set (travel limit).

2. Adjusting the bypass flap

To obtain the ideal temperature at the combustion chamber outlet and reduce the risk of condensation, please set the combustion chamber bypass according to the exhaust temperature (min. 160°C in the worst-case scenario).

Note: the settings are given for information only; they must be fine-tuned during operation at a low return temperature. A larger bypass opening improves operation.

GENERATOR

For safety and maintenance reasons, please observe the clearances given below.

Access side

La distance between the GGS generator and the wall must be at least 900 mm (the desired distance is the depth of the GGS generator).

Opposite side

The distance between the GGS and the wall must be determined on the basis of how the burnt gas duct is installed (see section relating to its installation).
The unit must be installed in accordance with current regulations and standards in a well-ventilated area.

The unit must not be installed in an area with a risk of fire (fine flammable dust) or explosion, or in an area containing aggressive products such as trichloroethylene, perchlorate, etc.
The fresh air flow required to supply combustion is at least 2 m^3/h per kW of heat flow.

GAS PIPE AND ELECTRICAL ROUTING

Inside the GGS generator

- Observe the correct clearance for the smoke box access panel.
- Allow room to access the minimum gas pressure switch (adjustment).

SELECTING THE BUFFER CAPACITY

The volume of the buffer tank + the volume of the pipework (expansion valve at the consumption point) must be based on the maximum flow of the installation, at least**: BP (16 to 21 mbar)** 2 litres per Nm3
MP (0.06 to 4 bar) 1 litre per Nm3

NOTE: the buffer capacity does not compensate for undersized pipework**.**

Required buffer capacity in litres based on the max. flow in Nm^3/h

Gas flow rate	***Nm^3/h***	6	10	16	25	40	65	100	160	250	400	650	1000
Buffer volume	***LP pressure***	12	20	32	50	80	130	200	320	500	800	1300	2000
Buffer volume	***MP pressure***	6	10	16	25	40	65	100	160	250	400	650	1000

Capacity in litres per linear metre of pipe

Bore (mm)	25	32	40	50	65	80	100	125	150	200
Steel	0.66	1.08	1.4	2.3	3.8	5.3	9	13.3	19.9	33.7
Copper	0.53	0.85	-	2.1	-	-	-	-	-	-
Polyethylene	0.53	0.83	-	2.07	-	4.2	6.3	7.8	13.4	21

NOTE: the buffer tank is required if the volume of the pipework is less than the buffer capacity calculated.

GAS PIPEWORK DIAMETER SELECTION AID

Correction factor depending on altitude and temperature

$$F = \frac{\text{Barometric pressure + gas pressure}}{1013} \times \frac{273}{273+T^\circ \text{ of gas}}$$

F normal average

Natural GAS	l 020 mbar	F = 1
LPG	37 mbar	F = 1
LPG	150 mbar	F = 1.1
Natural GAS	300 mbar	F = 1.25

GAS FLOW RATE CALCULATION

NATURAL GAS

$$\text{Flow rate in } Nm^3/h = \frac{\text{Generator power (kW)}}{\text{NCV x efficiency}}$$

If the temperature is not 0°C, the gas flow rate read on the meter must be corrected using the F coefficient determined above.

PROPANE GAS

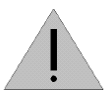
$$\text{Flow rate in kg} = \frac{\text{Generator power (kW)}}{\text{13 kW/h x efficiency}}$$

Flow rate in Nm3/h = flow rate in kg/h x 0.5 Nm^3/kg

Reminder:
1 kg of propane = 13 kW/h or 1kg/h of propane = 13 kW

$$K: 0.5\ Nm^3/kg = \frac{1}{1.98\ kg/Nm^3}$$ (1.98 kg/Nm3 = density of propane)

Propane gas: to use the pipework diameter selection tables below, apply a coefficient of 1.66 to the calculated flow rate



Corrected PROPANE GAS flow rate = propane flow rate x 1.66

Reminder: the pipework diameter based on the pressure drop (dp), depends on 3 criteria:

- **Pressure downstream of the expansion valve**
- **Maximum flow rate**
- **Equivalent pipe length.**

The tables give the theoretical internal diameters for straight pipes.
Formed parts and accessories must be converted into straight lengths to check the influence on the selected diameter.

Theoretical diameters for pressure = 18 mbar and dP = 1 mbar										
18 mbar		Pipe lengths in m								
		10	20	30	40	75	100	150	300	350
Flow rate in Nm^3/h	6	25	27	30	32	35	38	41	47	52
	10	30	33	35	37	42	45	48	56	63
	16	33	38	42	45	51	54	58	68	76
	25	40	45	50	52	60	64	69	80	89
	40	47	54	60	63	72	76	82	95	106
	65	56	65	71	75	85	90	98	116	126
	100	67	76	83	88	102	108	116	135	150
	160	80	92	100	105	120	128	138	162	179
	250	95	108	116	125	145	152	164	190	213
	400	116	130	145	150	170	181	198	228	253
	650	140	162	168	179	204	220	233	268	305
	1000	162	180	200	216	240	258	277	325	357

Theoretical diameters for pressure = 300 mbar and dP = 5 mbar										
300 mbar		Pipe lengths in m								
		10	20	30	40	75	100	150	300	350
Flow rate in Nm^3/h	6	20	20	20	21	23	25	28	34	36
	10	20	21	24	25	29	31	33	41	43
	16	22	27	28	31	35	37	40	49	51
	25	28	31	34	36	41	42	47	58	61
	40	32	37	40	43	48	52	56	70	73
	65	38	45	48	52	58	62	68	83	88
	100	46	56	57	62	69	73	78	92	102
	160	54	63	68	72	83	88	92	112	120
	250	65	74	81	86	98	103	112	130	145
	400	77	89	96	102	116	123	131	155	173
	650	92	106	116	120	140	146	160	185	210
	1000	108	125	137	145	164	175	186	220	243

Theoretical diameters for pressure = 1 mbar and dP = 10 mbar										
1 bar		Pipe lengths in m								
		10	20	30	40	75	100	150	300	350
Flow rate in Nm^3/h	100	36	42	45	48	55	58	63	73	81
	160	43	50	54	58	65	71	76	88	96
	250	51	58	63	68	78	82	89	103	117
	400	62	71	77	81	92	97	107	120	138
	650	73	85	92	98	112	115	128	148	164
	1000	86	100	108	115	130	140	150	175	195

Example of pipework selection for propane gas

Generator: 150 kW
Generator efficiency: 90%
Metering under: 150 mbar
Natural gas NCV: 13 kW / h / m^3
Equivalent length: 40 m

Flow rate in Nm3/h: 12.8 x 0.5 = 6.4 Nm^3/h
Corrected flow rate (see previous page): 6.4 Nm^3/h x 1.66 = 10.62 Nm^3/h
Pipework diameter: 31 mm minimum*
Buffer capacity = 7 litres

$$\text{Flow rate} = \frac{150}{13 \times 0.9} = 12.8 \text{ kg/h}$$

Dimension based on bore and material

The smallest required bore is selected (see table of standard dimensions below) based on the necessary theoretical internal diameter and the type of pipe.
The section capacity is calculated based on the selected bore and the section length, and compared to the required buffer capacity.
If the section capacity is less than the required buffer capacity, a larger bore should be selected or a buffer capacity created.
The actual bore to be used is defined based the material used and the standard bores available for this material.

Dimensions based on standard bore and material					
Bore		Steel in accordance with NF A 49.110 up to DN 20 inclusive and in accordance with NF A 49.111 from DN 25		Copper in accordance with NF E 29.591	
DN mm	Inch(es)	external Ø mm	thickness mm	external Ø mm	thickness mm
15	1/2	21,3	2,65	18	1
20	3/4	26,9	2,65	22	1
25	1	33,7	2,30	28	1
32	1 1/4	42,4	2,60	35	1
40	1 1/2	48,3	2,60	42	1
50	2	60,3	2,90	54	1
80	3	88,9	3,20	85	2

Capacity in litres/metre of pipes depending on their type							
Bores mm	15	20	25	32	40	50	80
Steel	0,20	0,36	0,66	1,08	1,45	2,33	5,34
Copper	0,20	0,31	0,53	0,85	1,25	2,12	5,15

3. COMMISSIONING

If you have not subscribed to CIAT commissioning: all the startup operations must be carried out by **approved personnel.**
The combustion equipment is installed in accordance with current regulations relating to its category.

- Check the sealing of the gas ducts before connecting them to the equipment using a soapy solution, placing the ducts under pressure.
- When all the connections have been made, bleed the air from the gas supply duct.
- Adjust the burner pressure according to the generator pressure.
- Check that the flame does not touch the back of the chamber.

Flame length (m) = $\sqrt{burner\ power\ kW}$ x 0.06 (with 15% excess air)

If control is included, refer to the corresponding manual.

4. SERVICING AND MAINTENANCE

If you have not taken out a CIAT Servicing and Maintenance contract, these operations must be carried out by **approved personnel.**

Before servicing:
- Cut the gas supply
- Cut the electrical power supply
- Ensure that the AHU fan is stopped

Do not use water to clean electrically-supplied parts

No equipment may be modified or replaced without the manufacturer's authorisation

Components	*Action*	*Frequency*
GGS	• Check the equipment's sealing • Check the gas supply pipework's sealing • Check that the burner, safety and regulation devices are operating correctly.	1 year
Exhaust ducts and smoke box	• Chimney sweeping • Cleaning	1 year
Connections	• Check the tightness of all connections	6 months
Electrical cable and wires	• Visually check the condition of the components	6 months

5. PROBLEM/CAUSE/OPERATION

Refer to the burner manual

6. CERTIFICATION

kiwa
Partner for progress

Product Conformity Certificate

Numero / *Number* I 6400 Sostituisce / *Replaces* –

Emesso / *Issued* 11/10/2007 Scopo / *Scope* Directive 90/396/CEE

Rapporto / *Report*: 163164

Kiwa Gastec Italia certifica che
Kiwa Gastec Italia hereby declares that

i prodotti riportati nelle pagine seguenti, commercializzati da
the products mentioned in the following pages, marketed by

CIAT

di / *in* CULOZ, France

soddisfano i requisiti riportati nella
meet the essential requirements as described in the
Direttiva Apparecchi a Gas (90/396/CEE)
Directive on appliances burning gaseous fuels (90/396/CEE)

Kiwa Gastec Italia Spa.

Daniël Vangheluwe
Vice Presidente

E' permessa la pubblicazione del certificato.
Pubblication of the certificate is allowed.

Kiwa Gastec Italia Spa.
Via Treviso, 32/34
31020 San Vendemiano (TV)
Tel. 0438 411755 Fax 0438 22428

GASTEC

Notified Body

0694

CE

kiwa
Partner for progress

Product Conformity Certificate

Numero / *Number* 16400 Sostituisce / *Replaces* –

Emesso / *Issued* 11/10/2007 Scopo / *Scope* Directive 90/396/CEE

Rapporto / *Report* : 163164

generatori d'aria calda, tipo
air heaters, type

Marchio / *trade mark*: **CIAT**

Modelli / *models*:

SC 45	SC 150	SC 375
SC 75	SC 175	SC 450
SC 80	SC 200	SC 500
SC 100	SC 250	SC 600
SC 125	SC 300	SC 800

commercializzati da /
marketed by **CIAT**
di / *in* CULOZ, France

NIP/ *PIN* : 0694BL3164
Rapporto / *report* : 163164
Tipi di apparecchi / *appliance type* : B_{23}

I suddetti prodotti sono stati approvati per
Mentioned products have been approved for

AT	$II_{2H3B/P}$	BE	$I_{2E(R)B}$, I_{3P}	CH	$II_{2H3B/P}$
DE	$II_{2ELL3B/P}$	DK	$II_{2H3B/P}$	ES	II_{2H3+}
FI	$II_{2H3B/P}$	FR	II_{2Er3P}	GB	II_{2H3+}
GR	$II_{2H3B/P}$	HU	$II_{2H3B/P}$	IE	II_{2H3P}
IT	II_{2H3+}	LU	$II_{2E3B/P}$	PT	II_{2H3+}
SE	$II_{2H3B/P}$	NL	II_{2L3P}	NO	$I_{3B/P}$
AL	$II_{2H3B/P}$, II_{2H3P}	BG	$II_{2H3B/P}$, II_{2H3P}	CY	$I_{3B/P}$, I_{3P}
EE	$II_{2H3B/P}$	HR	$II_{2H3B/P}$, II_{2H3P}	LT	$II_{2H3B/P}$, II_{2H3P}
LV	I_{2H}	MC	$II_{2H3B/P}$, II_{2H3P}	MT	$I_{3B/P}$, I_{3P}
PL	$II_{2E3PB/P}$	RO	$II_{2H3B/P}$, II_{2H3P}	SI	$II_{2H3B/P}$, II_{2H3P}
TR	$II_{2H3B/P}$	SK	$II_{2H3B/P}$, II_{2H3+}, II_{2H3P}		
CZ	$II_{2H3B/P}$, II_{2H3+}, II_{2H3P}				

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d'**A**pplications **T**hermiques
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ISO9001 • ISO14001
OHSAS 18001

CIAT Service
Tel. : 08 11 65 98 98 - Fax : 08 26 10 13 63 (0,15 € / mn)