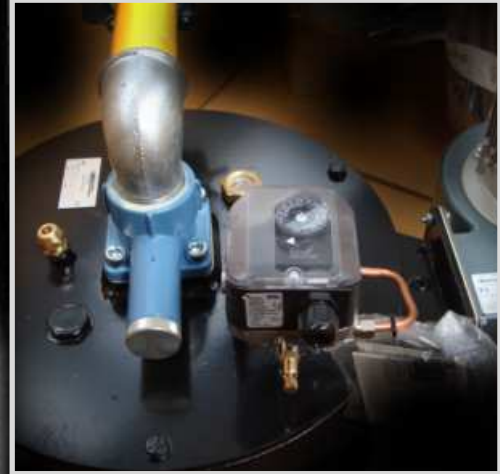


Burners



Metallic monoblock burners

FC (E3002 rev. 06 - 03/12/2012)

GENERAL WARNINGS:



■ All installation, maintenance, ignition and setting must be performed by qualified staff, respecting the norms present at the time and place of the installation.

■ To avoid damage to people and things, it is essential to observe all the points indicated in this handbook. The reported indications do not exonerate the Client/User from observing general or specific laws concerning accidents and environmental safeguarding.

■ The operator must wear proper DPI clothing (shoes, helmets...) and respect the general safety, prevention and precaution norms.

■ To avoid the risks of burns or high voltage electrocution, the operator must avoid all contact with the burner and its control devices during the ignition phase and while it is running at high temperatures.

■ All ordinary and extraordinary maintenance must be performed when the system is stopped.

■ To assure correct and safe use of the combustion plant, it is of extreme importance that the contents of this document be brought to the attention of and be meticulously observed by all personnel in charge of controlling and working the devices.

■ The functioning of a combustion plant can be dangerous and cause injuries to persons or damage to equipment. Every burner must be provided with certified combustion safety and supervision devices.

■ The burner must be installed correctly to prevent any type of accidental/undesired heat transmission from the flame to the operator or the equipment.

■ The performances indicated in this technical document regarding the range of products are a result of experimental tests carried out at ESA-PYRONICS. The tests have been performed using ignition systems, flame detectors and supervisors developed by ESA-PYRONICS. The respect of the above mentioned functioning conditions cannot be guaranteed if equipment, which is not present in the ESA-PYRONICS catalogue, is used.

DISPOSAL:



To dispose of the product, abide by the local legislations regarding it.

GENERAL NOTES:



■ In accordance to the internal policy of constant quality improvement, ESA-PYRONICS reserves the right to modify the technical characteristics of the present document at any time and without warning.

■ It is possible to download technical sheets which have been updated to the latest revision from the **www.esapyronics.com** website.

■ The products manufactured by ESA-PYRONICS have been created in conformity to the **UNI EN 746-2:2010** Norms: Equipment for industrial thermal process - Part 2: Safety requirements for combustion and the movement and treatment of combustible elements. This norm is in harmony with the Machine Directive **2006/42/CE**. It is certified that the products in question respect all the requirements prescribed by the above mentioned Norms and Directives.

■ Certified in conformity with the **UNI EN ISO 9001** Norm by DNV GL.

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The initials FC identify a series of small, light compact design burners. They are used in low temperature processes and the combustion air is supplied by a blower mounted on the side of the burner. The air flow is fixed and thermoregulation takes place in excess air, altering the gas flow.

APPLICATIONS

- Hot air generators
- Steam generators
- Incinerators
- Dryers
- Furnaces for cooking food
- Textile and dyeing machines (Rameause).

CHARACTERISTICS

BURNER GENERAL:

- Capacity: 145 ÷ 435kW
- Maximum working temperature: 400°C
- Burner gas pressure: 50mbar
- Fuel gas: CH4/LPG/Propane/ecc...
- Flow ratio: 20 : 1
- Excellent flame stability with: excess stoichiometric combustion air
- High excess air.
- Electrodes are easy to replace.
- Separated air and gas inputs, mixing at discharge point, no backfiring.

MATERIAL COMPOSITION:

- Burner body: Fe
- Burner cone: AISI310
- Gas nozzle: AISI304

BLOWER GENERAL:

- Flow: 50 ÷ 600 m3/h
- Pressure: 15 ÷ 45 mm H2O
- Frequency: 60 Hz
- Maximum working temperature: 80 °C
- Electric motor: 2 / 4 poles

MATERIAL COMPOSITION:

- Blower body: Fe
- Augers: Fe
- Impellers and blades: galvanized plate



F3002103



F3002104

DESCRIPTION

The fixed air and modulated gas control of the FC burner guarantees excellent flame stability in all operating conditions with consequent temperature and pressure homogeneity in the combustion chamber. The special combustion head allows to obtain extremely high potential ratios, from 30 ÷ 50 ÷ 1 to 1 depending on the various models. The compactness and the entire structure in metal compared with the reduced weight and size, guarantee easy and safe installation.

The burners are particularly suitable for application in systems with combustion chambers in negative or atmospheric pressure; if the burner is mounted in chambers with positive pressure it is essential to know the value at the design stage in order to operate in the right conditions. The FC burners can operate with on-off, dual-stage or modulating control systems.

IGNITION AND DETECTION

The ignition of the FC series burners takes place mainly by means of a high-voltage discharge produced by a WAND / EN electrode. Flame detection also takes place by means of a special WAND/EN electrode;

On request the UV-2 ultraviolet sensibility probe can be used. It is pointed out that the flame controls are required on all systems operating at temperatures below 750 ° C.

Model	Ignition with electrode	
	Igniter	Detector
FC-5	WAND/EN	WAND/EN / UV-2
FC-10	WAND/EN	WAND/EN / UV-2
FC-15	WAND/EN	WAND/EN / UV-2

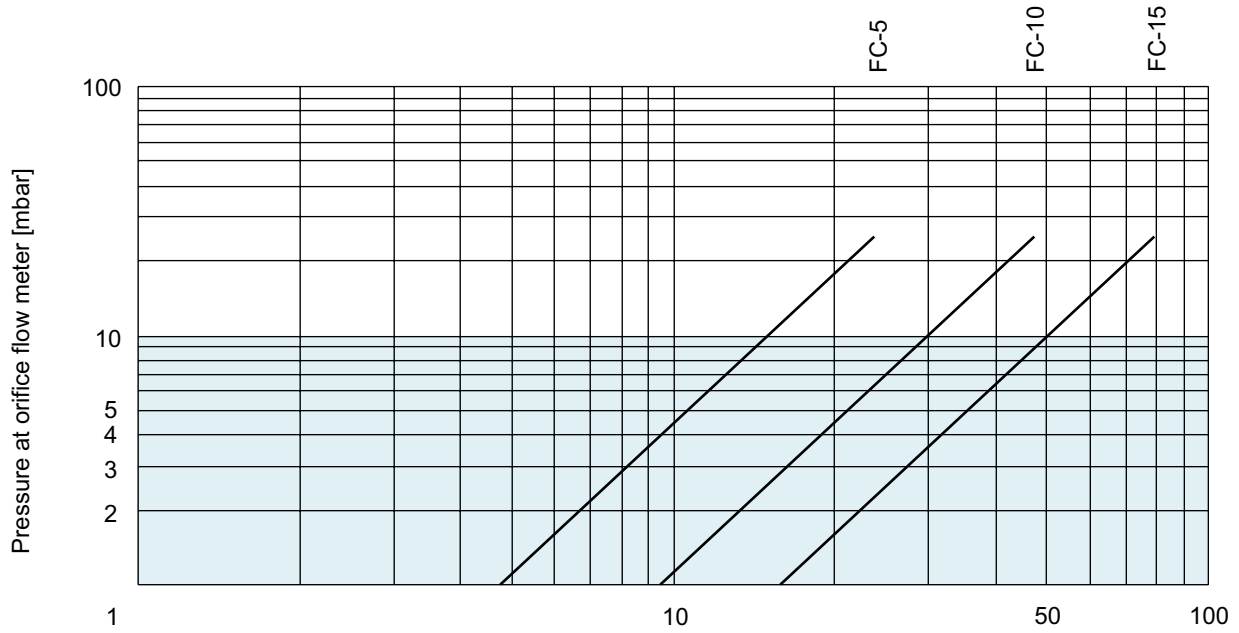
POTENTIAL PARAMETERS AND FLAME SIZE

Model	Flame length [mm]	Potential [kW]	Flame diameter [mm]
FC-5	600 ÷ 800	145	190
FC-10	800 ÷ 1000	290	240
FC-15	1200 ÷ 1400	435	290

NOTE:

The flame lengths are approximate, and refer to gas fed burners, placed in free air, functional in stoichiometric ratio at nominal power.

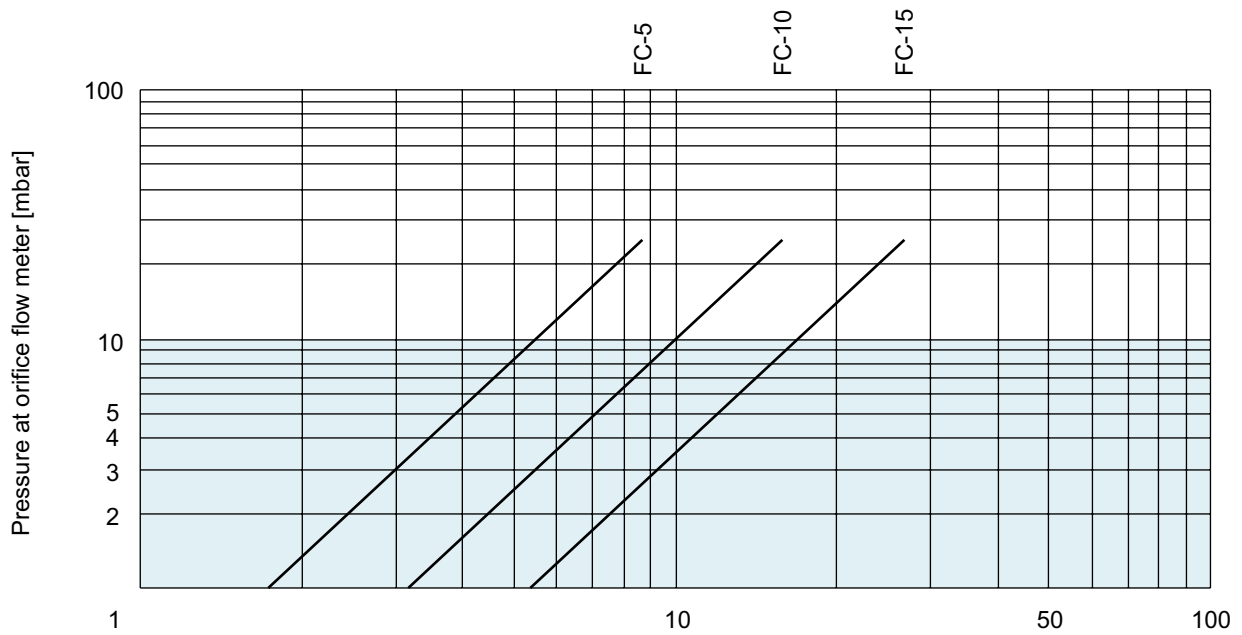
FLOW CHART FOR NATURAL GAS



Natural gas flow @ 20 ° C P.S. = 1 [Nm³/h]

G3002I01

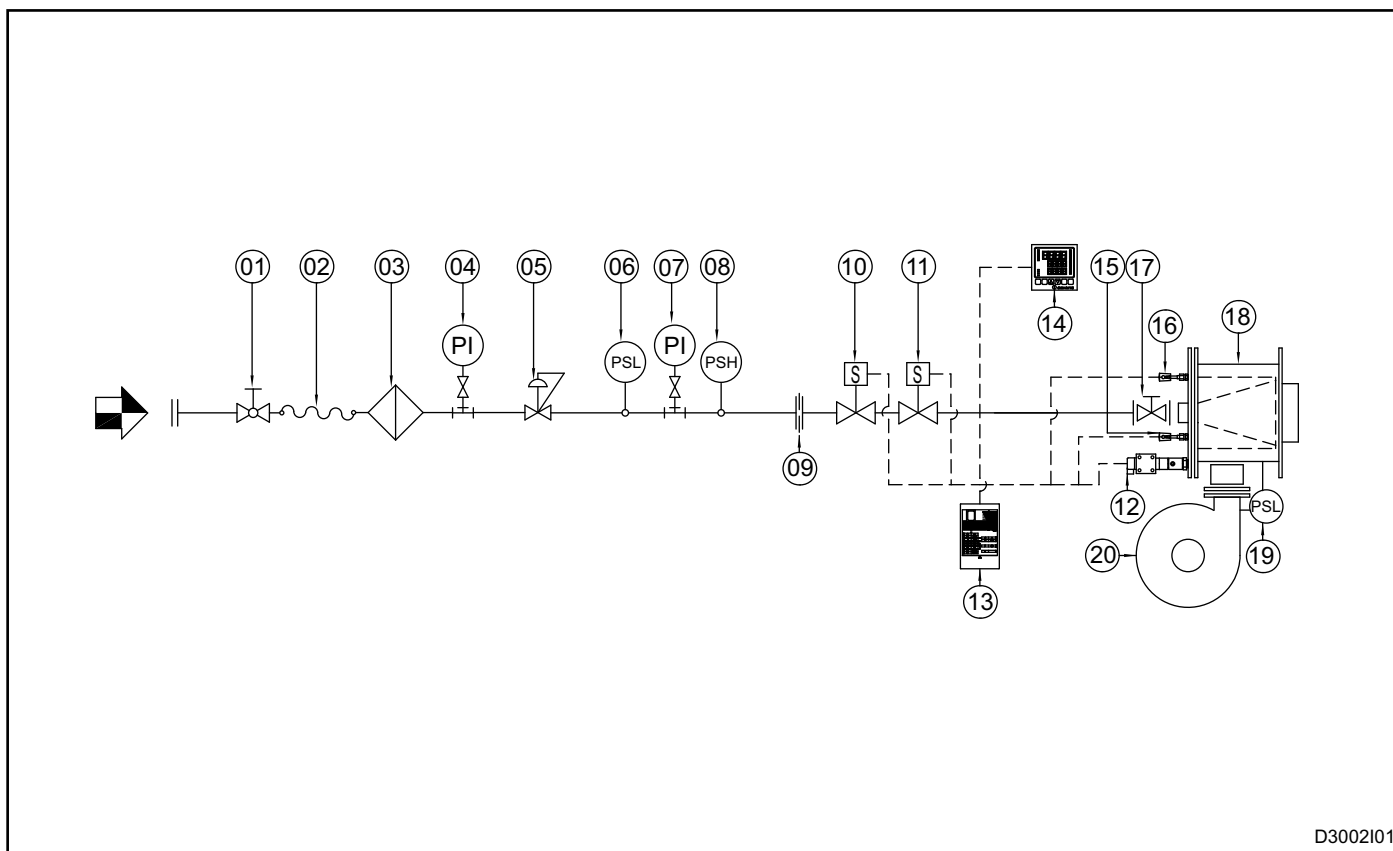
FLOW CHART FOR LPG GAS



LPG gas flow @ 20 ° C P.S. = 1 [Nm³/h]

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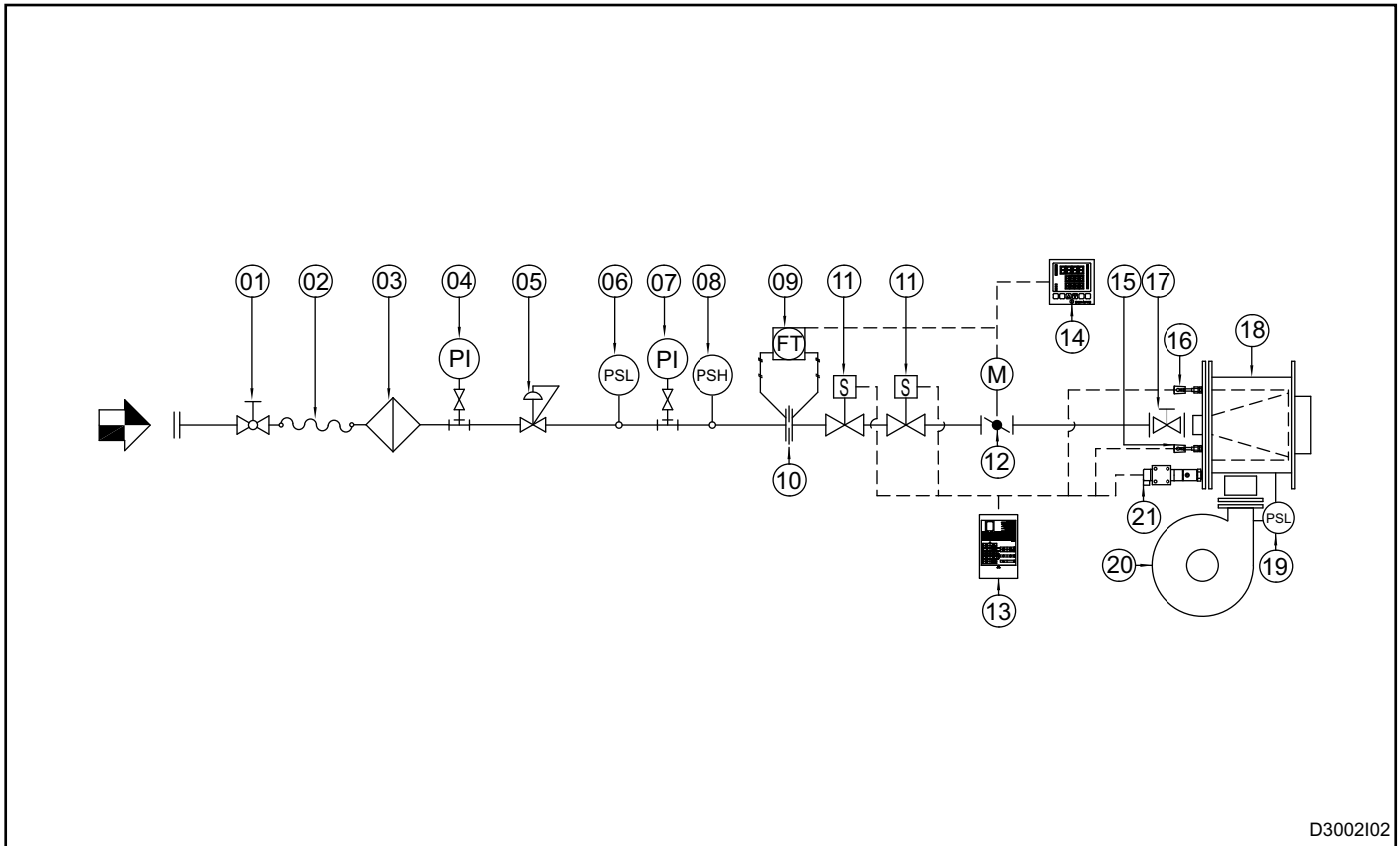
FLOW SCHEME - ON/OFF



D3002I01

Pos.	Description	FC	
		Incl.	Not Incl.
1	Gas interception ball valve		X
2	Flexible hose		X
3	Gas filter		X
4	Pressure gauge		X
5	Pressure stabilizer / reducer		X
6	Minimum gas pressure switch		X
7	Pressure gauge		X
8	Maximum gas pressure switch		X
9	Calibrated gas flange	X	
10	Fast gas safety solenoid valve		X
11	Slow gas safety solenoid valve		X
12	Flame detection probe (optional)		X
13	Flame control device + ignition transformer		X
14	Thermo regulator		X
15	Flame ignition electrode	X	
16	Flame detection electrode	X	
17	Gas flow limiting device	X	
18	Burner	X	
19	Minimum air pressure switch	X	
20	Combustion air blower	X	

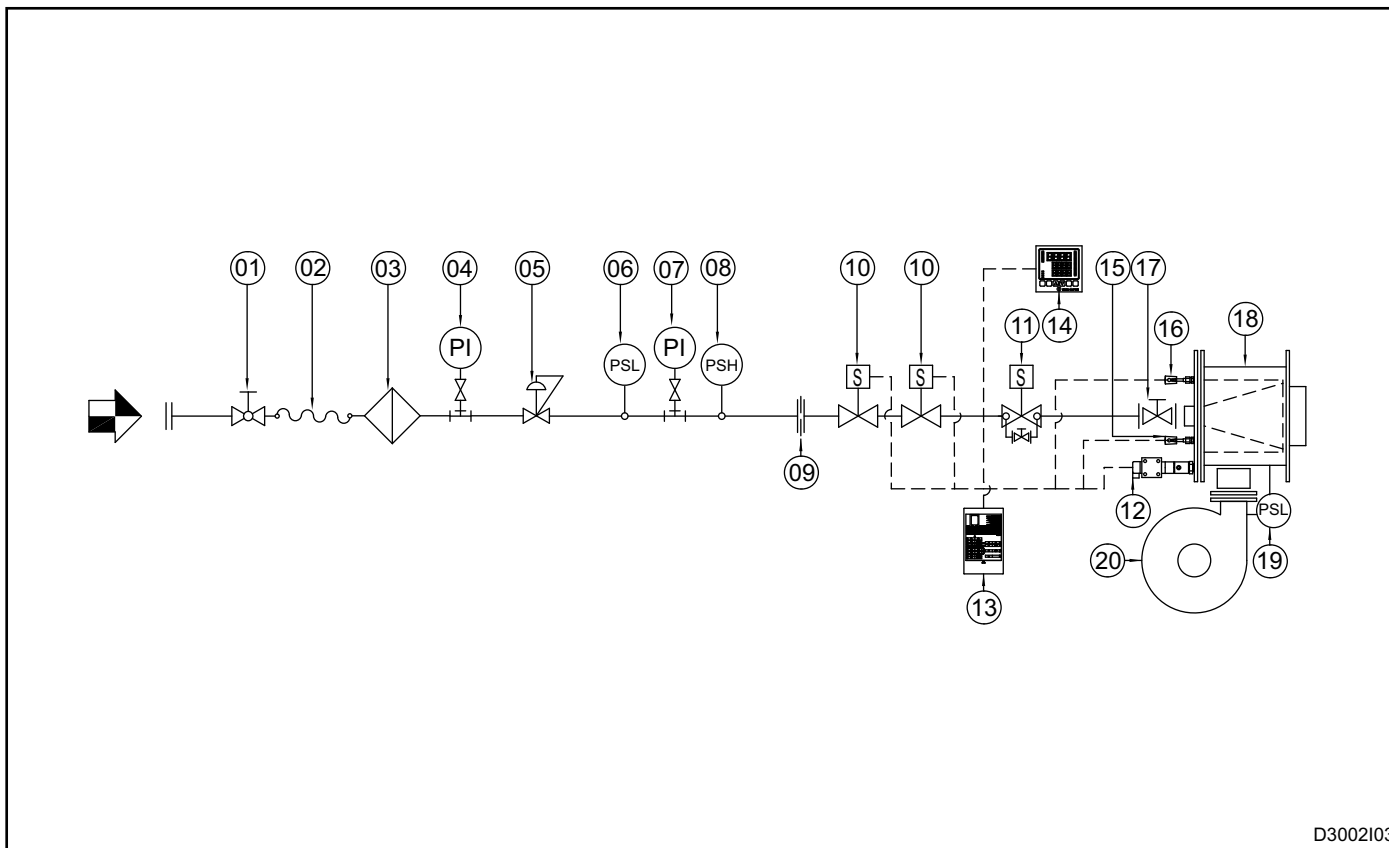
FLOW SCHEME - MODULATING



D3002102

Pos.	Description	FC	
		Incl.	Not Incl.
1	Gas interception ball valve		X
2	Flexible hose		X
3	Gas filter		X
4	Pressure gauge		X
5	Pressure stabilizer / reducer		X
6	Minimum gas pressure switch		X
7	Pressure gauge		X
8	Maximum gas pressure switch		X
9	Flow transmitter		
10	Calibrated gas flange	X	
11	Fast gas safety solenoid valve		X
12	Modulating motorized gas valve		X
13	Flame control device + ignition transformer		X
14	Thermo regulator		X
15	Flame ignition electrode	X	
16	Flame detection electrode	X	
17	Gas flow limiting device	X	
18	Burner	X	
19	Minimum air pressure switch	X	
20	Combustion air blower	X	
21	Flame detection probe (optional)		X

FLOW SCHEME - DUAL STAGE



D3002103

Pos.	Description	FC	
		Incl.	Not Incl.
1	Gas interception ball valve		X
2	Flexible hose		X
3	Gas filter		X
4	Pressure gauge		X
5	Pressure stabilizer / reducer		X
6	Minimum gas pressure switch		X
7	Pressure gauge		X
8	Maximum gas pressure switch		X
9	Calibrated gas flange	X	
10	Gas safety solenoid valve		X
11	Modulating motorized gas valve		X
12	Flame detection probe (optional)		X
13	Flame control device + ignition transformer		X
14	Thermo regulator		X
15	Flame ignition electrode	X	
16	Flame detection electrode	X	
17	Gas flow limiting device	X	
18	Burner	X	
19	Minimum air pressure switch	X	
20	Combustion air blower	X	

WARNINGS

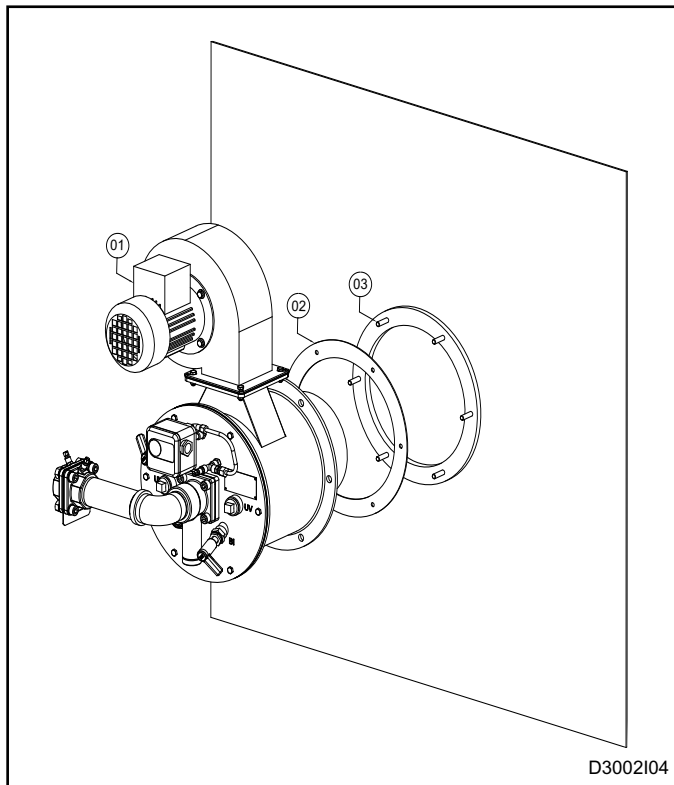
- The FC burners are used for fixed installations. If you require mobile installation it is necessary to first evaluate the possibility of any problems due to handling of the actual furnace.
- Burner ignition should always be performed at minimum power, and then modulating to the maximum.
- The transition from minimum to maximum power, and vice versa, should be gradual and not instantaneous.
- For all applications at low temperature (up 750 °C), the ignition of the burner and the command of the fuel gas solenoid valves must be performed through a certified burner control device.
- To prevent possible damage to the burners, make sure that the blower does not send stale air from combustion products, oils, solvents or other. To prevent the occurrence of these phenomena, possibly install the burner away from sources of pollution or provide intake ducts on the blower.
- The burner must be installed in such a way that the blower has enough space for ventilation.
- Do not place hands or other body parts near the moving organs and be careful not to wear bulky clothing.
- Check the correct connection of power lines after installation. Before turning on the burner, verify the correctness of the fuel gas pressure values and the correct rotation of the combustion blower (if necessary check the electrical wiring).
- If there are disturbances to other equipment during the starting phase of the burner, use the connector with a filter to connect the HV cable (High Voltage) to the ignition electrode.
- Avoid burner ignition close to each other in order to avoid overheating of the ignition system command devices (valves and transformers).
- Consider a minimum time between one ignition attempt and the next equal to the sum of the purging time and the first safety time, increased by at least 5 seconds (but do not carry out more than 2 ignitions in a period of 30 seconds).
- Operate on the burner and its devices in the absence of supply voltage. In case of malfunctioning, follow the Maintenance chapter in this manual, or contact the ESA-PYRONIC service.
- Any modification or repair performed by the third parties can compromise the security of the application and will automatically void general guarantee conditions.

INSTALLATION

FC burners (**pos. 01**) can be installed in any position, for mounting use the special coupling flange (**pos. 03**) interposing the gasket (**pos. 02**) with standard drilling, the gas inlet can be freely rotated and is fitted with a throttle limiter GAF Series.

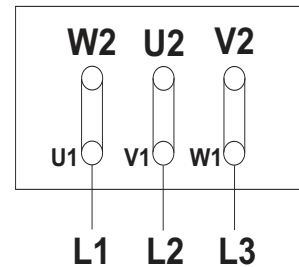
The blower must be installed with a surrounding space sufficient to carry out normal operations assembly / disassembly, cleaning and maintenance.

On request we can supply the burner equipped with refractory blocks or with special steel flame deflectors; the fully assembled version complete with all the equipment for the gas power supply line is also available.

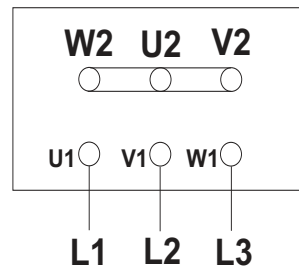


The user must connect to ground both the blower as well as the electric motor: a properly grounded motor prevents voltages and eddy currents in bearings. The motors that are controlled by an electrical frequency converter (inverter) must be equipped with PTC protection thermistors and independent cooling blowers, to prevent overheating of the engine. The use of an inverter could cause an increase in vibration and noise.

MOTOR VOLTAGE 230V 3Ph



MOTOR VOLTAGE 400Vac 3Ph



D3002105

BLOWER MOTOR WIRING

For connections to the motor terminal block refer to the maintenance manual that is attached to the actual motor. The electric equipment for the motor control should include: fuses, overload protection, and timers suitable for the rated motor current. Seen as the power is less than 5.5 Kw, star-delta start-up is not required but it is possible to perform start-up via an inverter or another type of gradual start-up.

IGNITION - SETTING

The operations indicated in the following chapter must be carried out by expert technicians. The failure to follow these instructions may cause dangerous conditions.

1 - Check that the fuel gas supply pressure is in the allowed range.

2 - Adjust the combustion plant working pressures and the intervention of the safety devices such as; gas pressure reducers, shut off valve, relief valve, pressure switches, etc. Simulate the intervention of all the safety devices, including the overheating safety intervention, checking that the fuel safety shut off devices act correctly.

3 - Place the motorized gas regulation valve in the minimum opening position and adjust its opening to obtain the Δp on the calibrated flange related to the minimum power.

4 - Attivare il dispositivo di controllo del bruciatore ed eseguire alcuni tentativi di accensione finchè il bruciatore stesso si accende. Durante l'esecuzione dei tentativi di

accensione, agire sulla valvola di regolazione gas e, partendo dalla posizione di totale chiusura, aprirla gradatamente fino ad ottenere l'accensione del bruciatore.

5 - Place the motorized air regulation valve at its maximum opening position and adjust the maximum fuel flow via the gas regulation valve. If necessary, check the differential pressure created on the calibrated gas flange, if present, otherwise perform burner ignition according to pictures at the bottom of the page.

6 - Place the motorized air regulation valve at its minimum opening position and check that the flame is stable. If necessary adjust the gas to minimum according to the adjustments in the pictures below, acting on the zero-governor spring.

7 - Attempt ignition several times at minimum burner power, passing onto maximum, to check ignition reliability and flame stability during regulation.

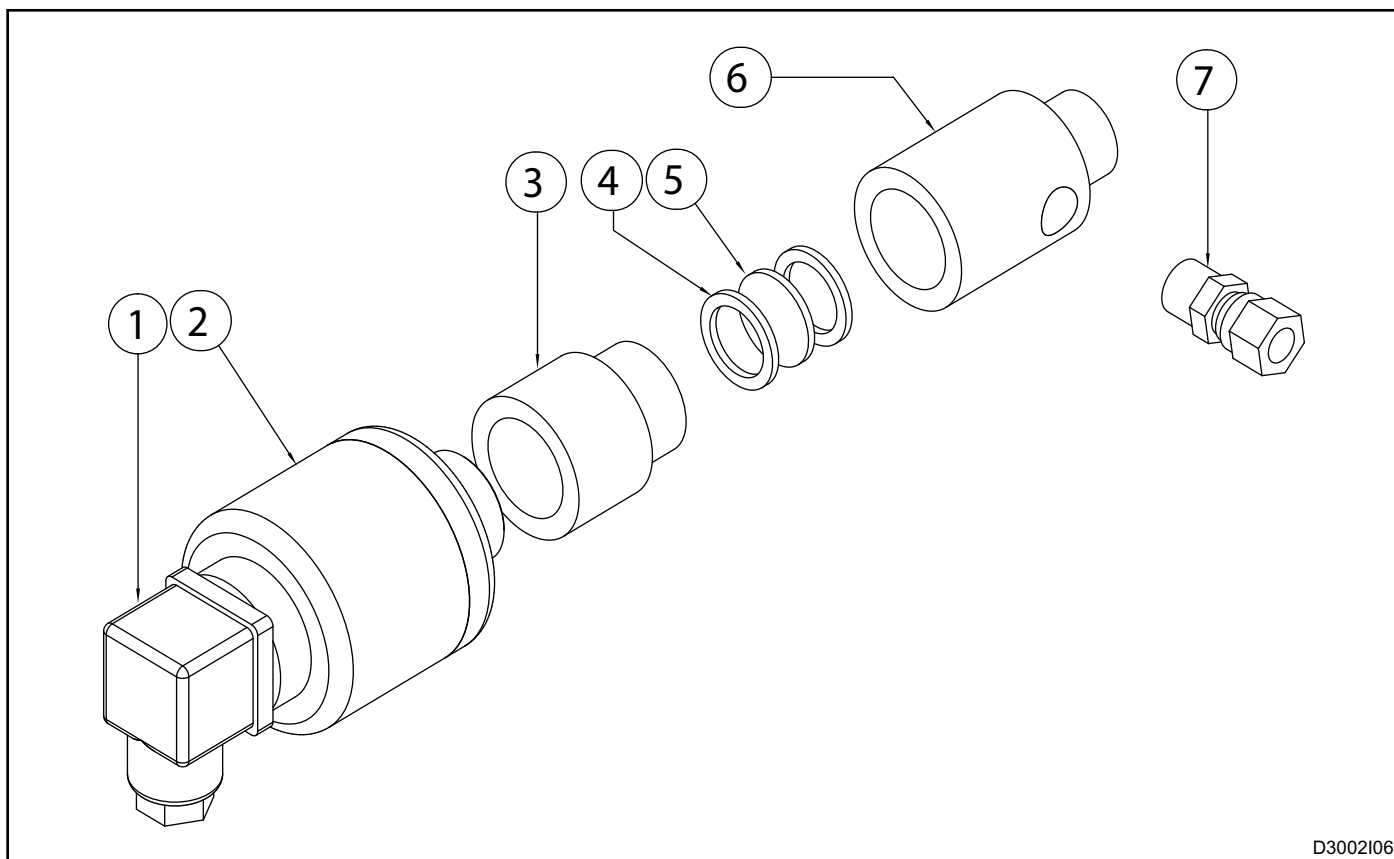
ORDINARY MAINTENANCE

For proper dismantling and better maintenance of the FC burners, strictly follow the instructions with the system off.

CLEANING OF PROBE WATCH GLASS

- 1 - Check that the burner control device is not connected.
- 2 - Disconnect the probe (**pos. 01**) and the cooling line (where present **pos. 07**).
- 3 - Unscrew the aluminum fitting (**pos. 06**) at the base of the gas collector, remove the probe with spacer.

- 4 - Unscrew the aluminum fitting from the fitting in teflon (**pos. 03**) and extract the quartz glass (**pos. 05**).
- 5 - PClean the quartz glass with a soft cloth and reassemble everything. Before tightening, make sure that the gaskets are in the correct position (**pos. 04**) between the aluminum spacer and the spacer in teflon.
- 6 - Restore the cooling hoses and electrical connections.
- 7 - Check the correct flame detection carried out by the probe.



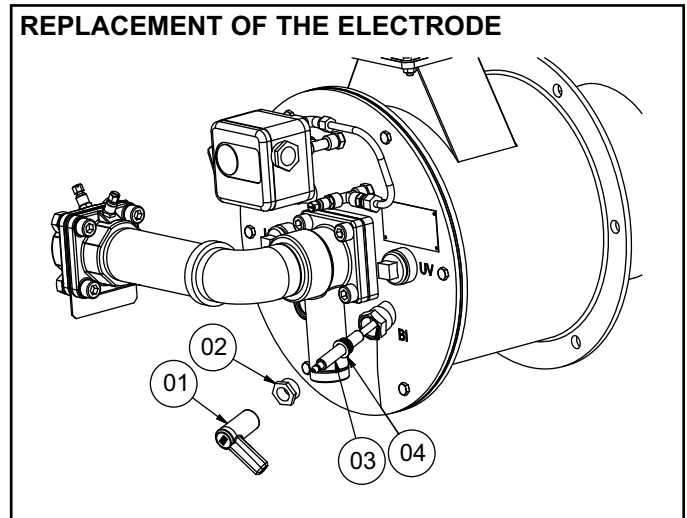
D3002106

EXTRAORDINARY MAINTENANCE

REPLACEMENT OF THR IGNITION ELECTRODE AND FLAME DETECTION

- 1 - Check that the burner control device is not connected.
- 2 - Disconnect the electrodes (**pos. 01**).
- 3 - Unscrew the fitting (**pos. 02**) at the base of the gas collector, removing the electrode (**pos. 03**).
- 4 - Replace the faulty electrode (**pos. 03**) paying attention in placing the gaskets in the correct position again (**pos. 04**).
- 5 - Restore electrical connection (**pos. 01**).
- 6 - Check the correct flame ignition / detection carried out by the electrode.

REPLACEMENT OF THE ELECTRODE

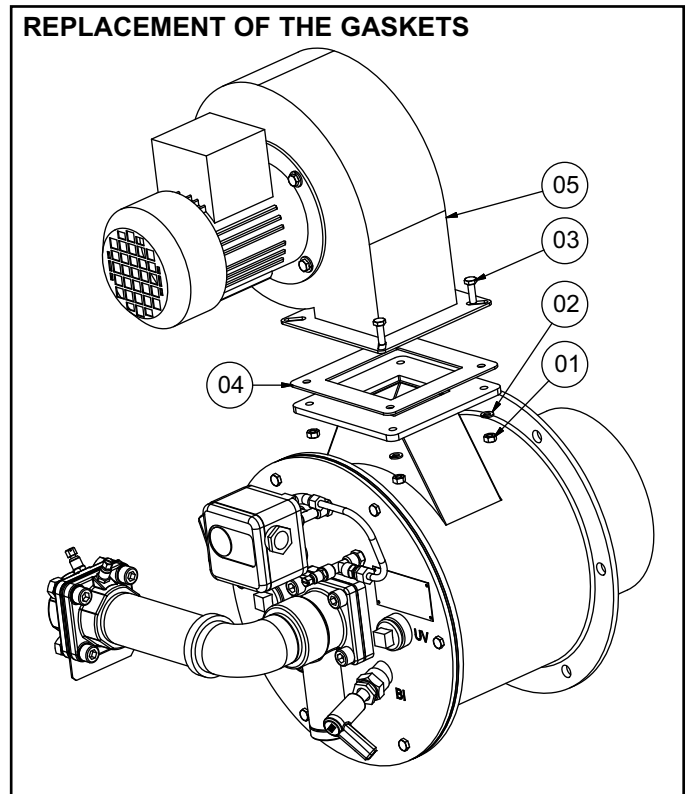


MAINTENANCE OF ELECTRIC BLOWER

GASKETS

- 1 - Check that the burner control device and the electrical connections are disconnected and that the burner is off.
- 2 - Unscrew the nuts (**pos. 01**) with their washers (**pos. 02**) with proper tools and remove the bolts (**pos. 03**) upstream the blower plate (**pos. 05**).
- 3 - Remove the blower (**pos. 05**) from the plate connecting the burner and replace the gasket (**pos. 04**).
- 4 - Reassemble the blower (**pos. 05**) following the dismantling steps backwards.
- 5 - Restore electrical connection.
- 6 - Check the correct blower functioning.

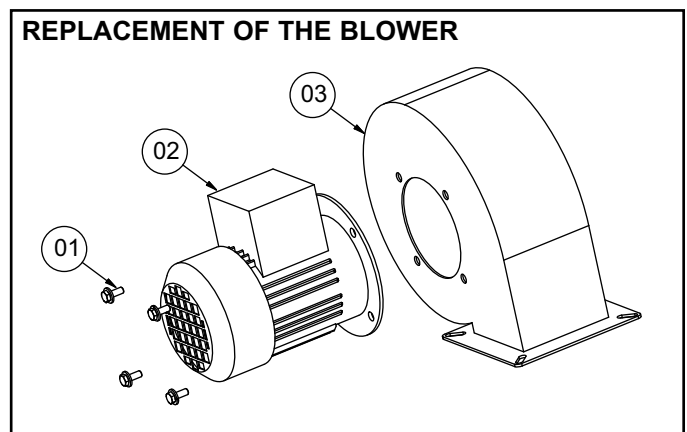
REPLACEMENT OF THE GASKETS



REPLACEMENT OF THE MOTOR

- 1 - Check that the burner control device and the electrical connections are disconnected and that the burner is off. Disconnect the electrical terminations from the motor to be replaced.
- 2 - Unscrew the nuts (**pos. 01**) of the motor (**pos. 02**) from the blower body (**pos. 03**).
- 3 - Replace the broken motor following the dismantling operations backwards.
- 4 - Restore electrical connection.
- 5 - Check the correct blower functioning.

REPLACEMENT OF THE BLOWER



GENERAL MAINTENANCE PLAN

Operation	Type	Recommended time	Notes
Pilot burner high voltage electrode connector	O	annual	Check the integrity of the outer plastic and oxidation of the internal connector and the terminal electrode.
Ignition / detection electrode	O	annual	Replace in case the terminal resistor in Kanthal is worn or if ceramic is damaged.
Integrity and cleaning of flame deflector cone	O	annual	Check that the surface of the cone is not oxidized or damaged.
Probe cleaning	O	annual	Check the integrity of the HT glass and of the gaskets.
Probe glass cleaning	O	every six months	Reduce to three times a year in dusty environments.
Probe replacement	O	10.000 h operation	However, every two years.
Burner settings	O	annual	Repeat all the steps in section "IGNITION AND SETTING".
Blower scroll cleaning	O	Twice a year	Blow compressed air if the impeller parts are blocked.

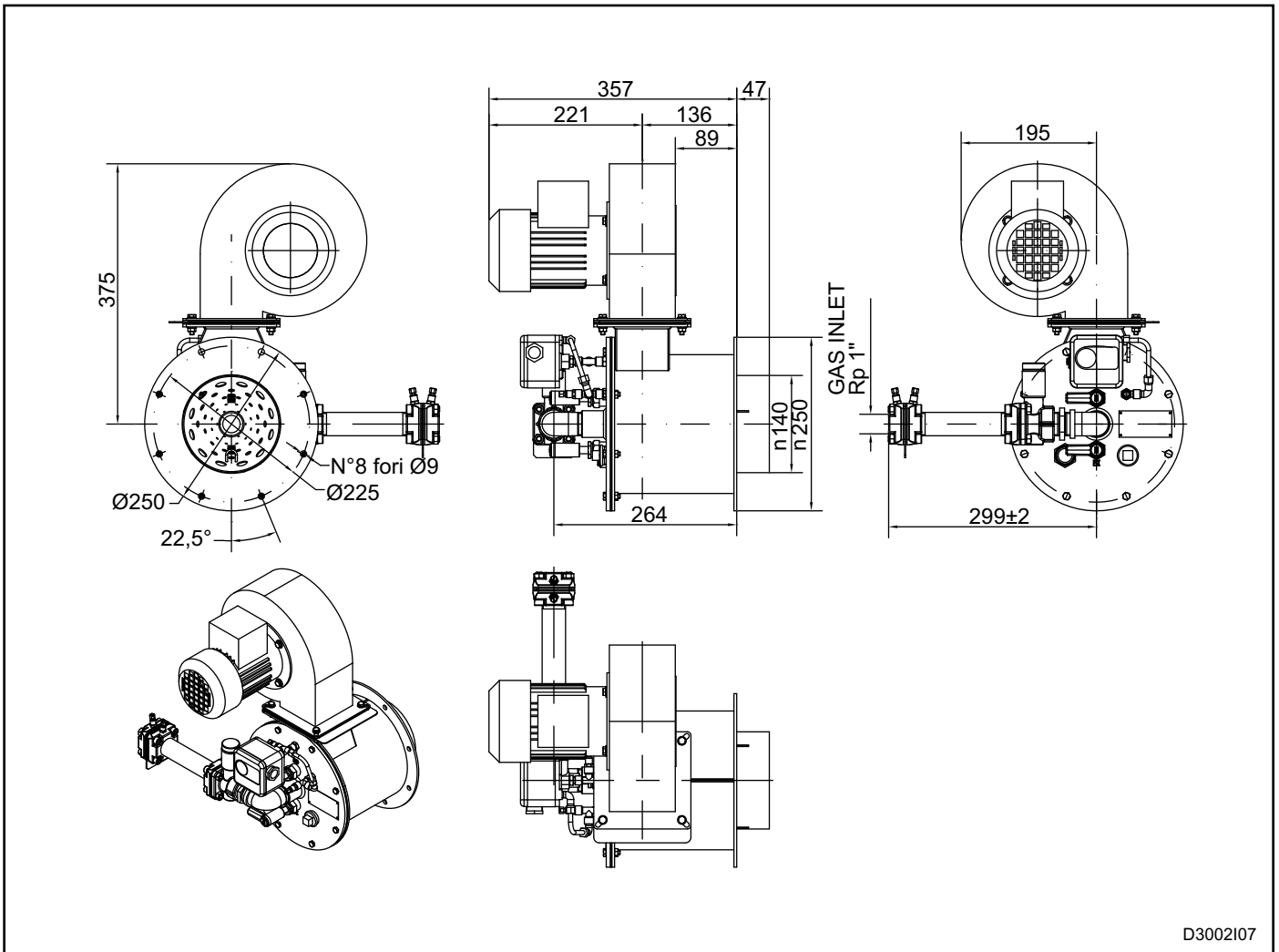
NOTES:

Key: O = ordinary / E = extraordinary

(*) it advisable to replace the gaskets on the gas side each time the gas supply unit is dismantled.

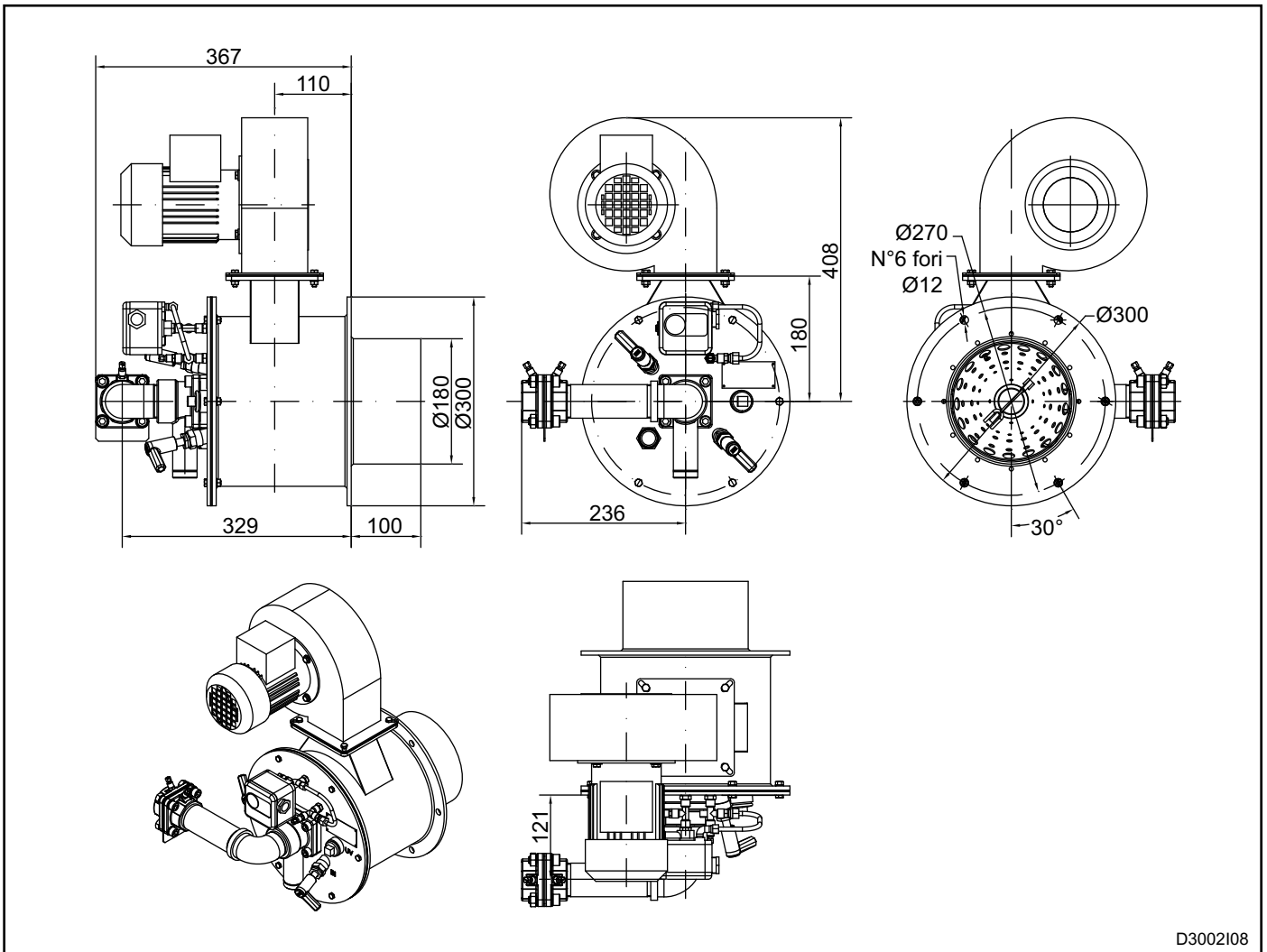
(**) use high temperature gaskets.

OVERALL DIMENSIONS - FC-5



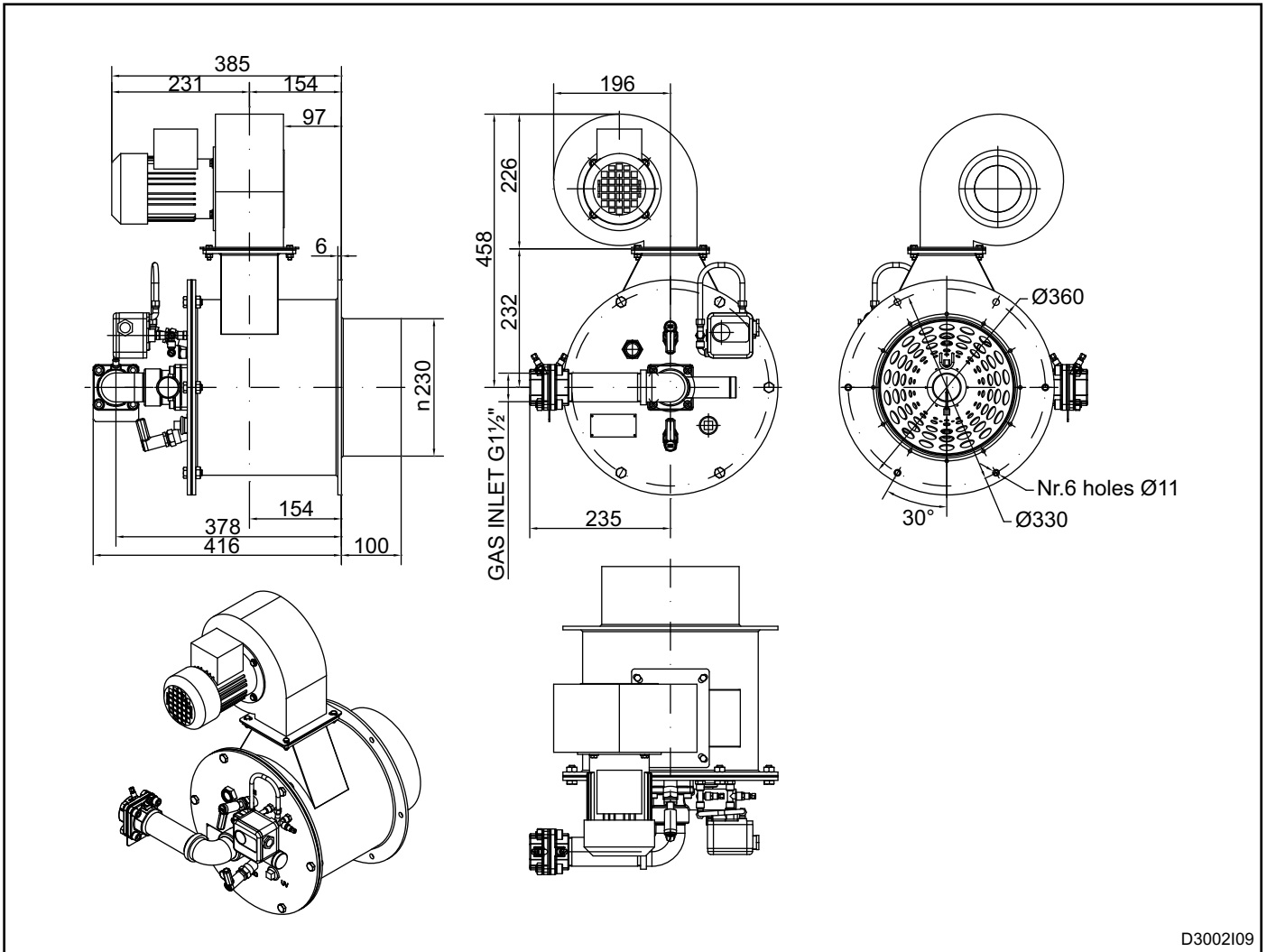
D3002107

OVERALL DIMENSIONS - FC-10



D3002108

OVERALL DIMENSIONS - FC-15



D3002109

ORDERING CODE - COMPLETE BURNER

FC - - - -
01 - 02 - 03 - 04

Model		01
FC-5	5	
FC-10	10	
FC-15	15	

03	Ignition	
	Electrode	E*

Blower		02
with blower	B	
without blower	NB	

04	Flame detection	
	Electrode UV flame detection	E* UV

The codes with an asterisk (*) identify the standard product.