

Burners



Monoblock free flame burners

EPB (E3007 rev. 03 - 14/06/2021)

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 EPB products have been designed, manufactured and tested according to the most correct construction practices and following the applicable requirements described in **UNI EN 746-2-2010** "Industrial heating process equipment - Part 2: Safety requirements for combustion and for the handling and processing of fuels".

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

CERTIFICATIONS:



EPB conforms to the European Directives: 2006/42 / EC Machinery Directive and 2004/108 / EC: Electromagnetic Compatibility.

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The EPB are monoblock metal gas burners for direct heating. These burners allow excess air settings, and stoichiometric excess gas. Depending on the size and conditions of use, this type of burner can be used for combustion of natural gas and LPG (standard version) and other types of gaseous fuels with different calorific values (special versions available on request).

APPLICATIONS

- Ceramic furnaces, or treatment with fiber coatings.
- Tunnel or chariot furnaces
- Dryers
- Textile and dyeing machines (Rameause).
- Stress-relieving furnaces
- Convection furnaces for food
- Direct and indirect air heating machines
- Melting furnaces.

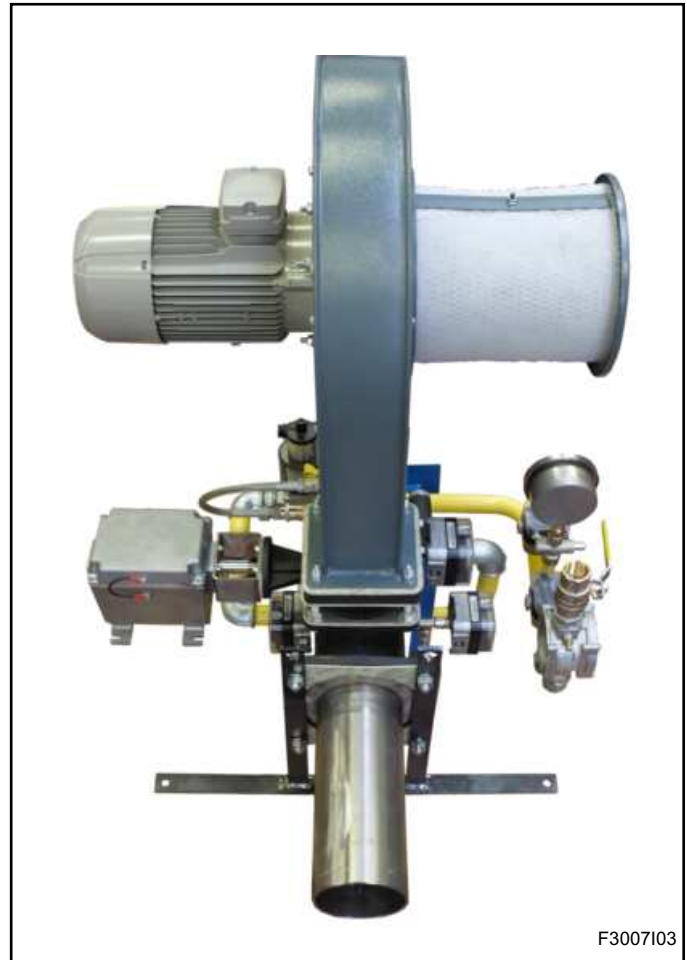
CHARACTERISTICS

GENERAL:

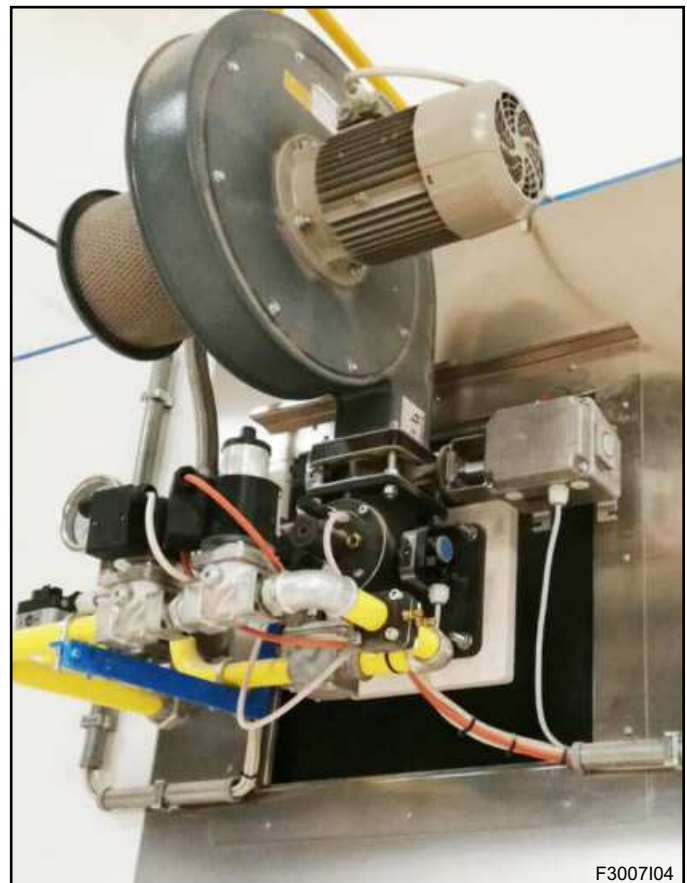
- | | |
|---------------------------------------|-------------------------------|
| ■ Capacity | from 150 to 900 kW |
| ■ Limit temperature | 1.000°C |
| ■ Burner air and gas pressure: | 30 mbar |
| ■ Flow ratio: | BIAS effect upto 1:10 |
| ■ Flame speed: | 50-60 m/s |
| ■ Low CO: | ≤10PPM (@ 3% O ₂) |
| ■ Excess air: | upto 1000% |
| ■ On request UL-CSA version available | |

MATERIAL COMPOSITION:

- | | |
|--------------------|-------------------|
| ■ Mixer body: | Cast iron G25 |
| ■ Gas collector: | Cast iron G25 |
| ■ Baffle tube: | AISI304 / AISI310 |
| ■ Combustion head: | AISI310 |
| ■ Fixing flange: | Fe |



F3007103



F3007104

CAPAITY PARAMETERS AND FLAME LENGTHS - EPB BURNERS

The ignition of the EPB burners occurs by means of a high-voltage discharge obtained through an electrode. the detection is carried out through another electrode, or by a UV light barrier (in the version with refractory block).

The adoption of flame control systems is **strongly recommended** in all systems operating at temperatures below 750 °C (UNI EN746 / 2).

Model	Capacity [kW]	Flame length [mm]	Flame tube output diameter [mm]	Flame speed[m/s]	Flame ignition and detection
EPB-150	150	700 ÷ 1000	94	44	N°2 Electrodes EN
EPB-300	300	1000 ÷ 1250	122	52	N°2 Electrodes EN
EPB-400	400	1200 ÷ 1500	122	69	N°2 Electrodes EN
EPB-600	600	1500 ÷ 2000	160	56	N°2 Electrodes EN
EPB-900	900	1800 ÷ 2400	187	67	N°2 Electrodes EN
EPB-1500	1500	2000 ÷ 3000	210	65	N°2 Electrodes EN

DESCRIPTION - EPB BURNER

The EPB burners are "nozzle mix" type burners, the combustion agent and fuel are mixed at the combustion head to avoid dangerous backfires, also the particular shape of the combustion head allows adjustments in stoichiometric ratio and in excess air or excess gas, calibration is to be

simplified by appropriate differential pressure sockets which allows the measurement of air and gas flow rates. The EPB Monoblock burners are supplied pre-calibrated with factory settings.

BURNER PERFORMANCE

The potential, lengths and flame speed are related to natural gas-fueled burner (8600 kcal / Nm³), placed in

the combustion chamber at zero pressure above sea level, working with the 10% of excess air.

- Chamber temperature 1000°C
- Ambient air temperature

MAXIMUM CAPACITY

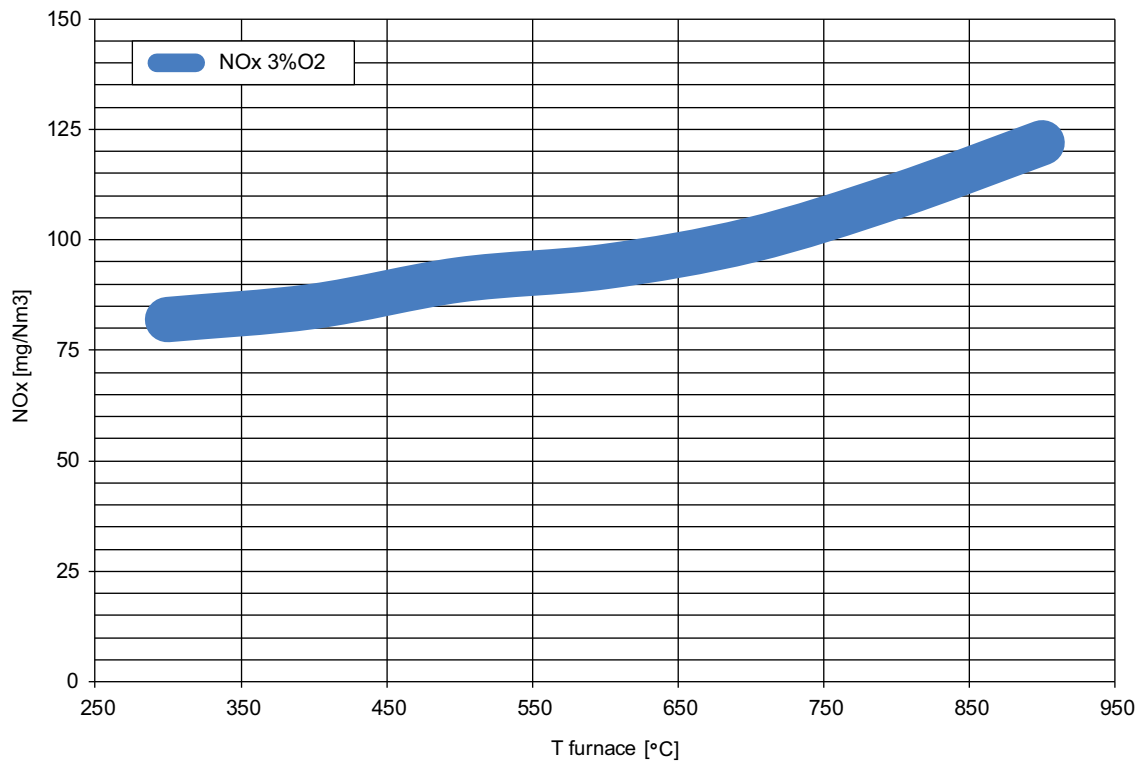
Free flame applications			Burner model					
			EPB-150	EPB-300	EPB-400	EPB-600	EPB-900	EPB-1500
Max capacity	Burner capacity (2% O ₂)	[kW]	150	300	400	600	900	1500
	Combustion air flow	[Nm ³ /h]	165	330	440	660	990	1650
	Gas flow	[Nm ³ /h]	15	30	40	60	90	150
	Burner input air pressure	[mbar]	30					
	Δp gas measurement flange	[mbar]	10					

MINIMUM CAPACITY

Free flame applications			Burner model					
			EPB-150	EPB-300	EPB-400	EPB-600	EPB-900	EPB-1500
Min. capacity	Burner capacity (2% O ₂)	[kW]	19	38	50	75	115	190
	Combustion air flow	[Nm ³ /h]	21	42	55	83	126	209
	Gas flow	[Nm ³ /h]	1,9	3,8	5	7,5	11,5	19
	Burner input air pressure	[mbar]	0,5					
	Δp gas measurement flange	[mbar]	0,15					

NO_x EMISSIONS CHART

STANDARD COMBUSTION



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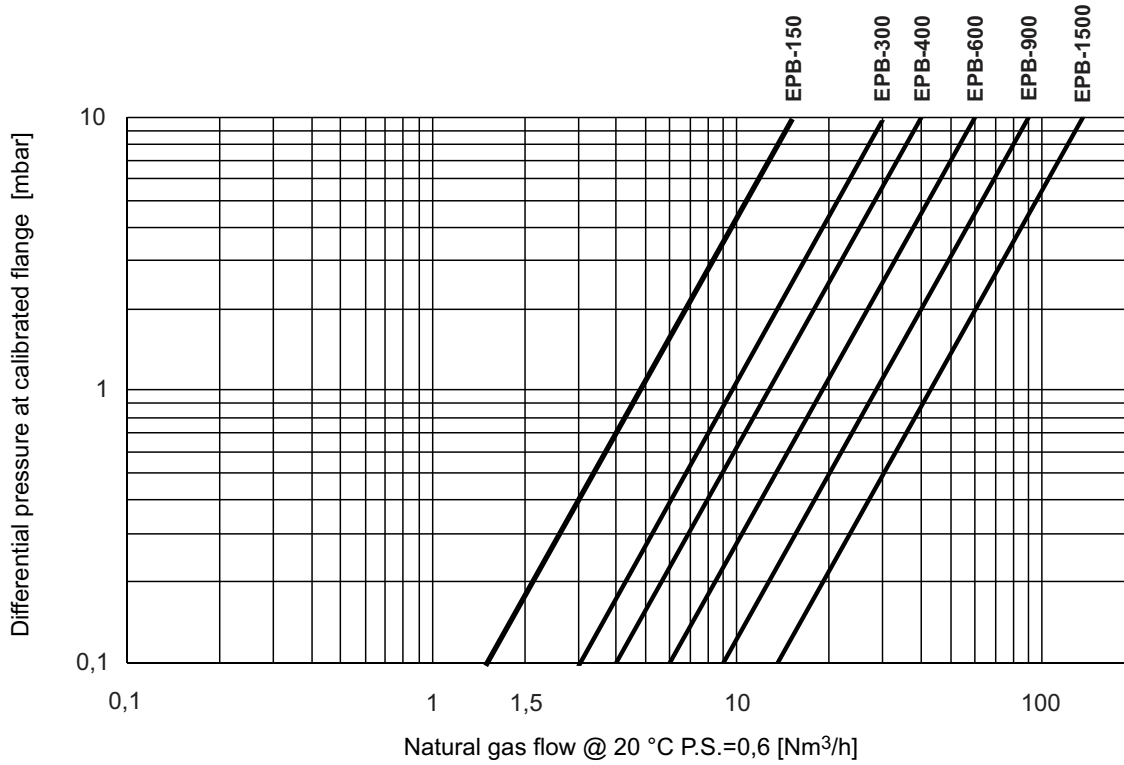
Burner at 100% capacity with 10% excess air

The emission value is subject to variations which depends on different factors such as:

- The furnace working temperature.
- heated air temperature.
- Excess air
- Chemical composition of the combustive agent.

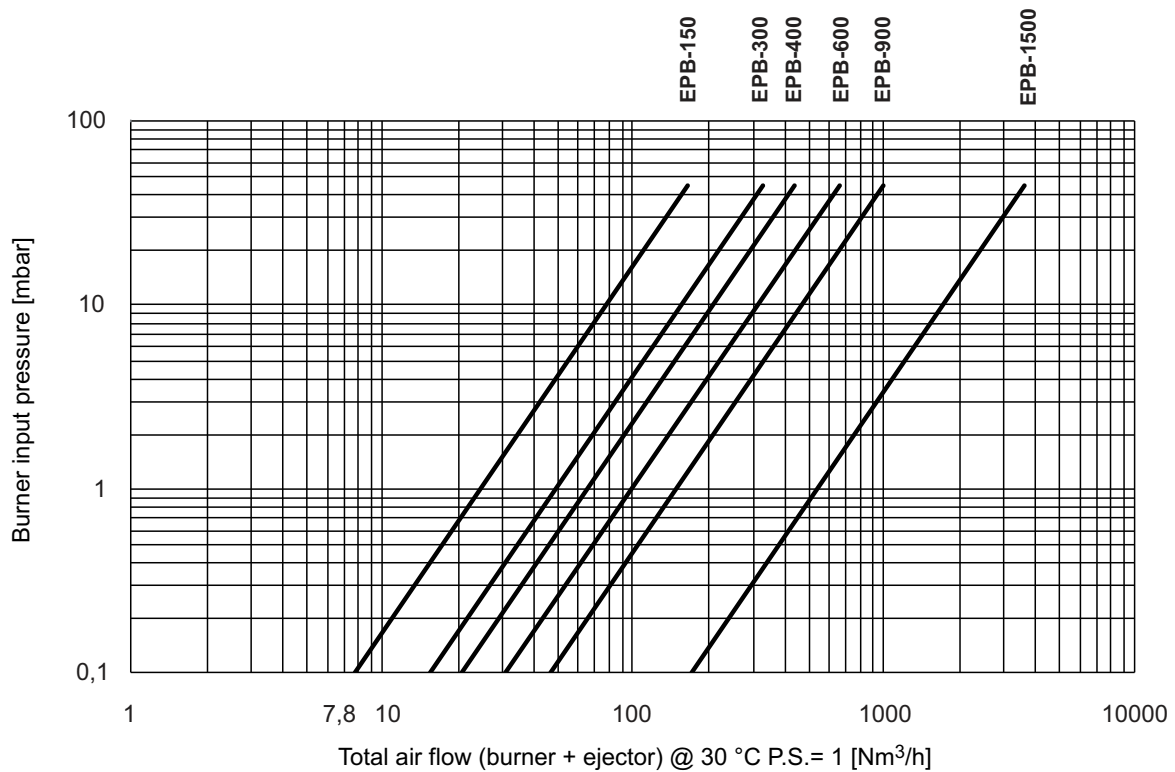
The value guaranteed will thus be determined, case by case, according to the conditions indicated by the customer.

METHANE GAS FLOW CHART



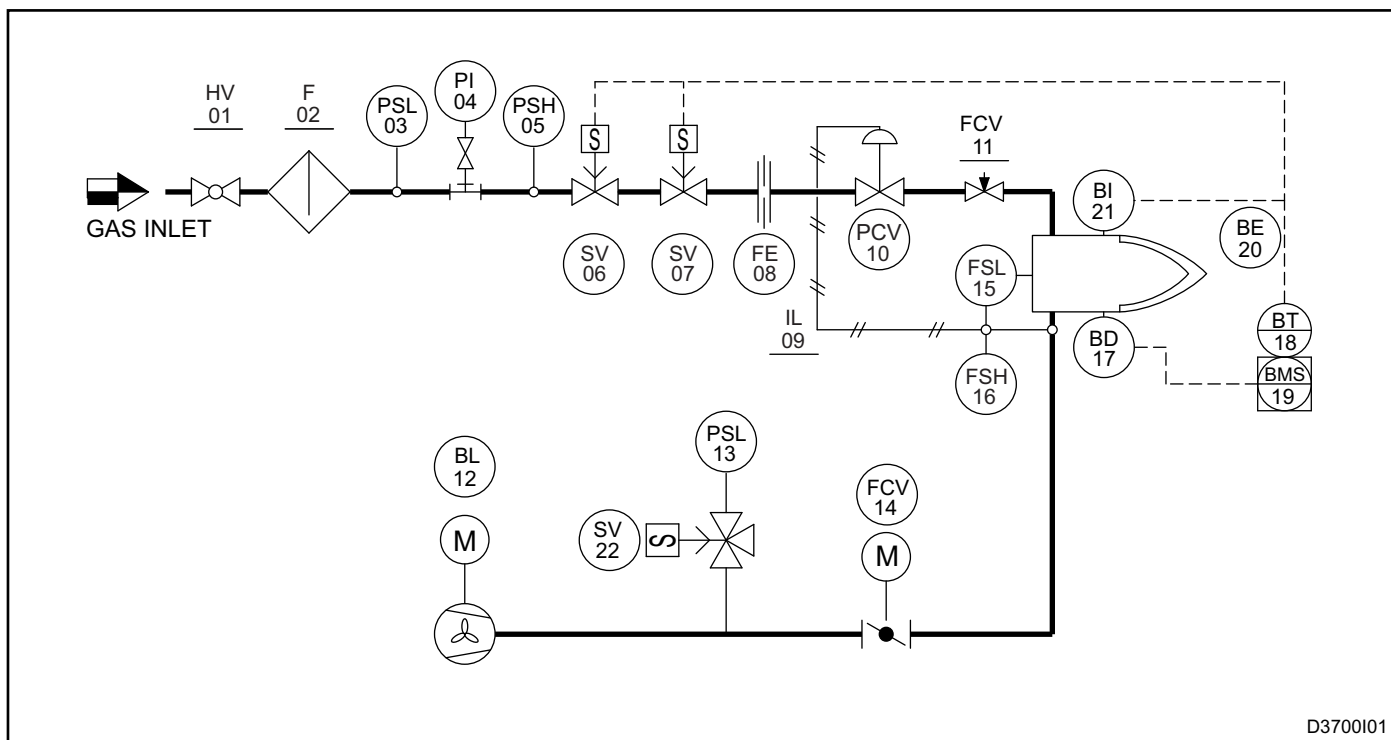
G3007101

AIR FLOW CHART



G3007102

P&ID PREASSEMBLED BURNER



D3700101

Pos.	Description	Included	Not included
HV 01	Gas shut-off valve	X	
F 02	Gas filter	X	
PSL 03	Minimum gas pressure switch	X	
PI 04	pressure gauge	X	
PSH 05	Maximum gas pressure swithc	X	
SV 06	Fast opening gas safety valve	X	
SV 07	Slow opening gas safety valve	X	
FE 08	Calibrated flange	X	
IL 09	Impulse line	X	
PCV 10	Zero governor	X	
FCV 11	Gas adjuster	X	
BL 12	Combustion air blower	X	
PSL 13	Minimum air pressure switch	X	
FCV 14	Air regulation valve	X	
FSL 15	Differential air pressure switch	X	
FSH 16	Maximum air flow switch	X	
BD 17	Flame detection	X	
BT 18	Ignition transformer		X
BMS 19	Flame control		X
BE 20	Burner	X	
BI 21	Burner ignition	X	
SV 22	Three way solenoid valve	X	

WARNINGS

- The ignition of the EPB burners must always be performed at minimum power, then modulating towards the maximum, facilitating the ignition and reducing output overpressure.
- For all low-temperature applications (up to 750 ° C), the burner ignition and the control of the fuel gas solenoid valves must be performed by a certified burner control device.
- To prevent possible damage to the burners, make sure that the blower does not send them stale air from the combustion products, oils, solvents or other substances. To avoid these conditions regularly clean the filter mounted at the blower side. If this is not enough we recommend channeling the blower intake outside the building.
- Check the correct connection of the supply lines after installation. Before lighting the burner, check the correctness of the combustion air and fuel gas pressure values (p. 05).
- The burner can only work within the indicated power range. Functioning with less or more power can compromise the performance and life span of the burner. In that case, the general warranty conditions automatically expire and ESA-PYRONICS is not responsible for any damage to property or persons.
- If there is trouble with other devices during the burner start-up, for the HT (High Voltage) cable connection to the ignition connector, use a connector with noise filter provided with the burner.
- Avoid burner ignition close to each other so as not to heat the ignition command system devices (solenoid valves and transformers). Prewash time lapse + first safety time lapse + min. of 5 sec. = time lapse between one ignition and another. (however, do not attempt more than 2 ignitions during a 30sec. time lapse).
- Make sure the power supply is TURNED OFF when intervening on the burner and its devices. In case of burner malfunctioning, follow the indications in the 'Maintenance' chapter of the present manual or contact ESA-PYRONICS assistance.
- Any modification or repair done by third parties can compromise the application safety and automatically cause the general warranty conditions to expire.

INSTALLATION

The burners of the EPB series are provided with a specific fixing flange to the furnace wall. The light obtained for the housing of the burner, must include a vacant space around it that will then be filled with fibro-ceramic mat. For installation, carefully follow the instructions below:

1 - Arrange the EPB burners far from heat sources and from products such as liquids, solvents or corrosive gases.

2 - Make sure that the housing dimensions and the centre distances of the supply lines correspond to what is specified in the "overall dimensions".

3 - Extract the burner, lifting it from the eyelets provided on the metal support frame.

4 - Remove the support frame via the four screws that hold it to the furnace attachment flange.

5 - Do not lift the burner from the gas pipe, the combustion blower or the air control valve. Provide lifting straps that only wrap the main body of the burner.

6 - Assemble the burner on the furnace wall positioned between the attachment flange and furnace wall seal (**pos. 01**). Tighten screws and / or nuts (**pos. 02**) to the furnace wall flange.

7 - Connect the fuel gas inlet pipe, fitting expansion joints in AISI before the gas cock.

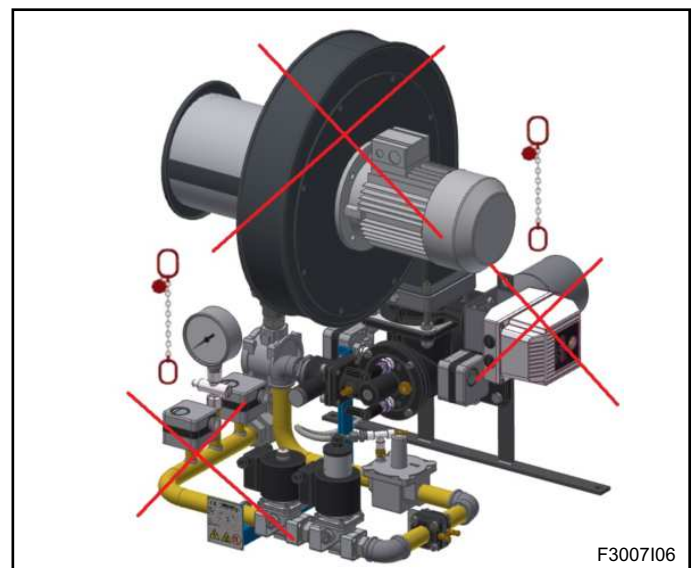
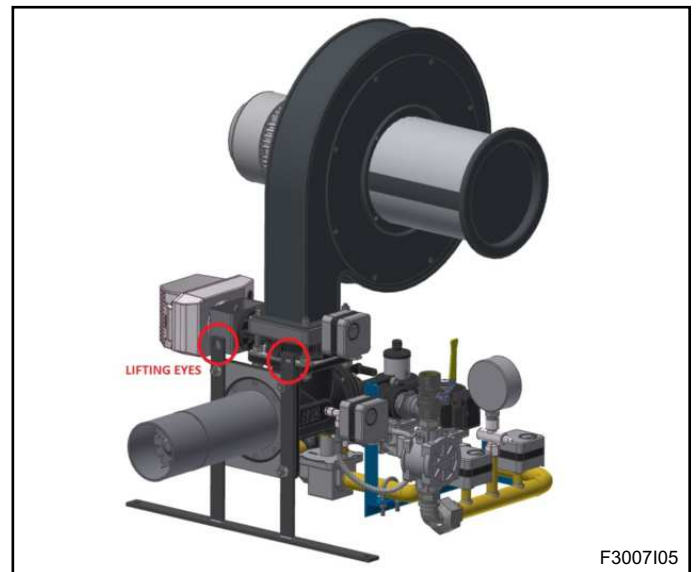
8 - Make the electrical connections of ignition electrode and detection, taking care to pass the wires away from heat sources.

9 - Make sure the burner body and all metal parts connected are connected to the grounding system with suitable conductors.

10 - The connection cable from the ignition transformer to the electrode must be specific for high tension and not shielded. The length should not exceed one meter; otherwise the ignition transformer must be positioned near the burner. The HV cable must be laid away from the power cables and not in metallic conductors, ideally it should be left in the open air.

11 - For more details, see the data sheet related to power transformers.

12 - Make the electrical connections of the ignition and detection electrode, taking care to pass the wires away from heat sources



IGNITION AND SETTING

The operations indicated in the following chapter must be carried out by expert technicians. Failure to follow instructions may cause dangerous conditions. The burner is usually supplied with all the pre-calibrated control organs.

It is therefore possible to use it without the need for adjustment. When hecking burner adjustments follow the data indicated in the testing module.

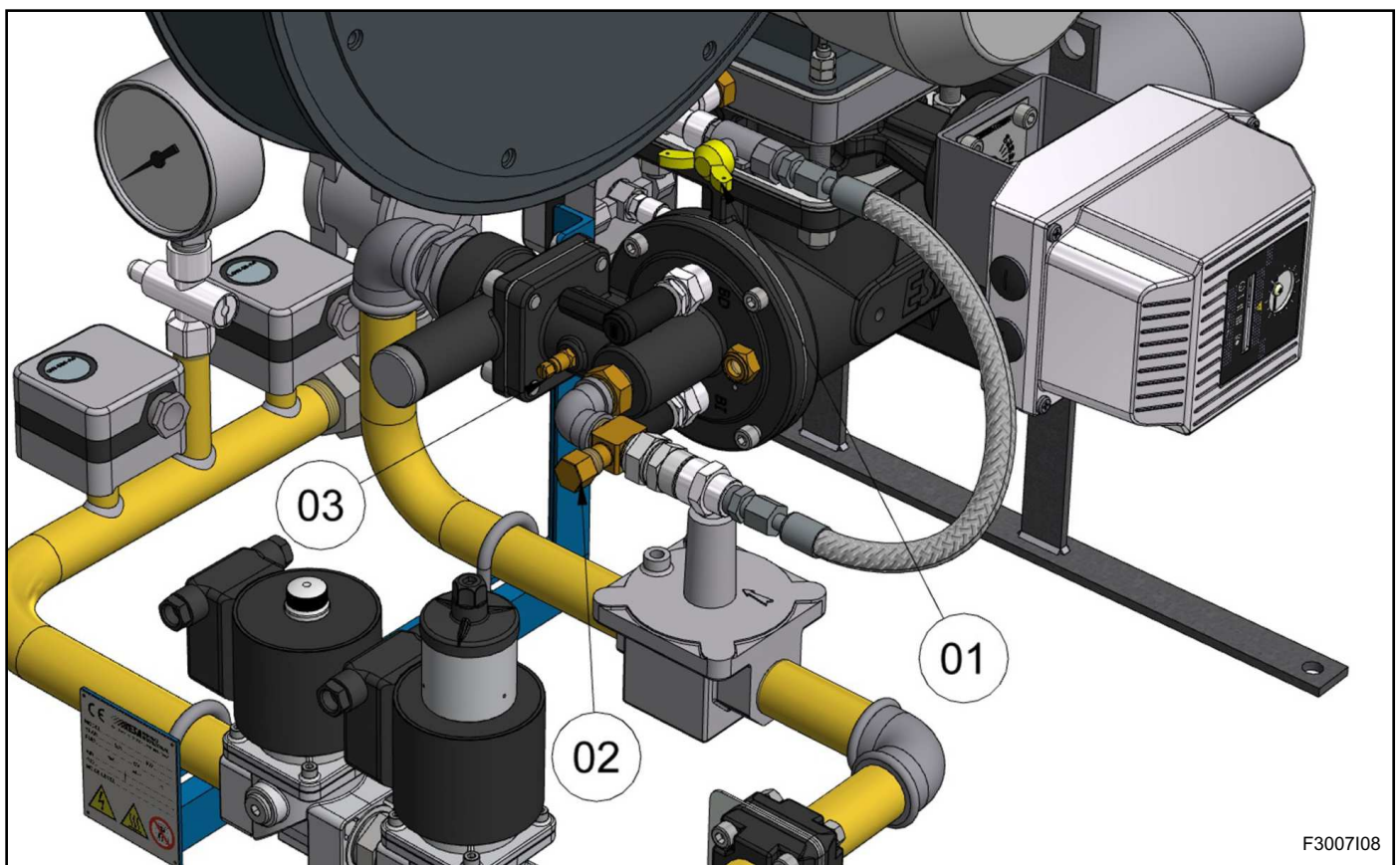
SETTING THE AIR FLOW OF PREMIXTURE WHERE PROVIDED (LPG BURNER)

The premix line is supplied with the burners operating with LPG. Calibration has to be done with the burner off and at minimum flow conditions. The premix line is fed from an outlet necessarily upstream of the air flow rate regulation valve).

- 1 - Place the burner in low capacity combustion air conditions
- 2 - Open the premix air cock (pos. 01).
- 3 - Adjust the micrometer needle valve (pos. 02) according to the following guidelines:

- EPB-150: Gas body pressure (pos. 03) = 2 mbar
- EPB-300: Gas body pressure (pos. 03) = 2 mbar
- EPB-400: Gas body pressure (pos. 03) = 2 mbar
- EPB-600: Gas body pressure (pos. 03) = 2 mbar
- EPB-900: Gas body pressure (pos. 03) = 2 mbar
- EPB-1500: Gas body pressure (pos. 03) = 2 mbar

- 4 - Verify however, that the minimum potential of the burner does not create soot on the combustion head and electrodes. In case it does, increase the premix air calibration.



GENERAL MAINTENANCE PLAN

Operation	Type	Advised time	Notes
High tension electrode connector	O	annual	verify integrity of the outer plastic and oxidation of the internal connector and the electrode terminal.
Ignition / detection electrode	O	annual	replace in case in which the terminal Kanthal is consumed.
Flanged tube combustion head	O	annual	during the stop of the furnace, check that the two parts do not show signs of oxidation due to high temperature.
Blower filter	O	monthly	verify degree of dirtiness, if necessary-clean from residues of dust with compressed air. Replace in case of breakage of the filter material.
Solenoid coils	O	Every two years	check the number of cycles that must not exceed what is stated by the manufacturer.
Pressure switches	O	Every six months	check their intervention simulating an alarm.
Replacement of gasket on the gas side (*)	E	Every two years	verify the absence of rupture or deformation of the material
Burner settings	E	annual	refer to the information in the testing module attached to the burner.
Premix air settings (where needed)	E	annual	see the "Calibration of premix air flow rate" section.

NOTES:

key O = ordinary / E = extraordinary

(*) It is recommended to replace the gas side seals after each disassembly of the gas supply line

EXTRAORDINARY MAINTENANCE

For correct dismantling and better maintenance of the EPB burners, meticulously follow the instructions below with the plant turned off.

REPLACEMENT OF FLAME IGNITION AND DETECTION ELECTRODE

- 1 - Make sure the burner control device is not connected.
- 2 - Disconnect the electrical connection of the electrodes

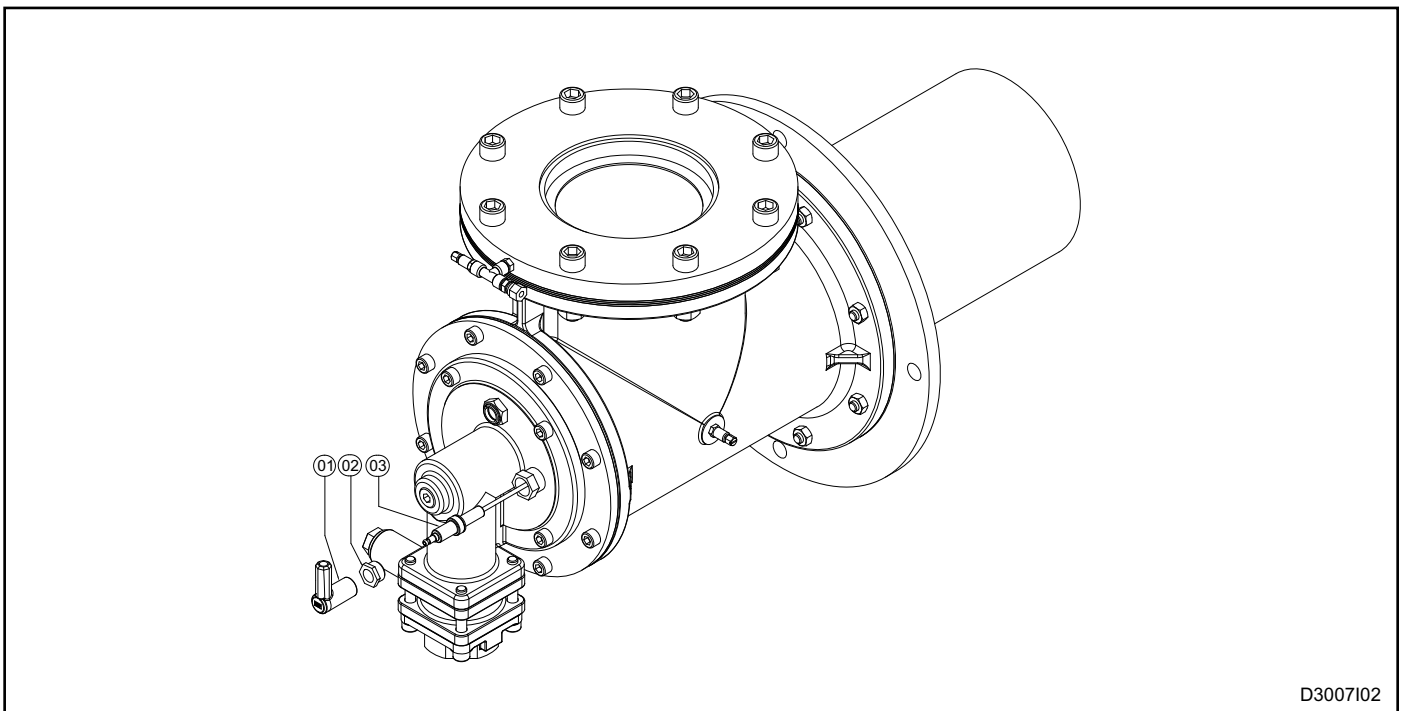
(**pos. 01**).

3 - Unscrew the fitting (**pos. 02**) from the base of the gas collector, removing the electrode (**pos. 03**).

4 - Replace defective electrode (**pos. 03**), paying attention to the correct repositioning of the new electrode.

5 - Restore the electrical connection (**pos. 01**).

6 - Ensure correct ignition / flame detection of the electrode.



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EXTRAORDINARY MAINTENANCE

For correct dismantling and better maintenance of the EPB burners, meticulously follow the instructions below with the plant turned off.

BURNER IN LOCKOUT

For correct dismantling and better maintenance of the EPB burners, meticulously follow the instructions with the plant turned off. In burner lockout conditions refer to the instructions of the burner control device and the relative manual to identify the cause. The following are the main cases

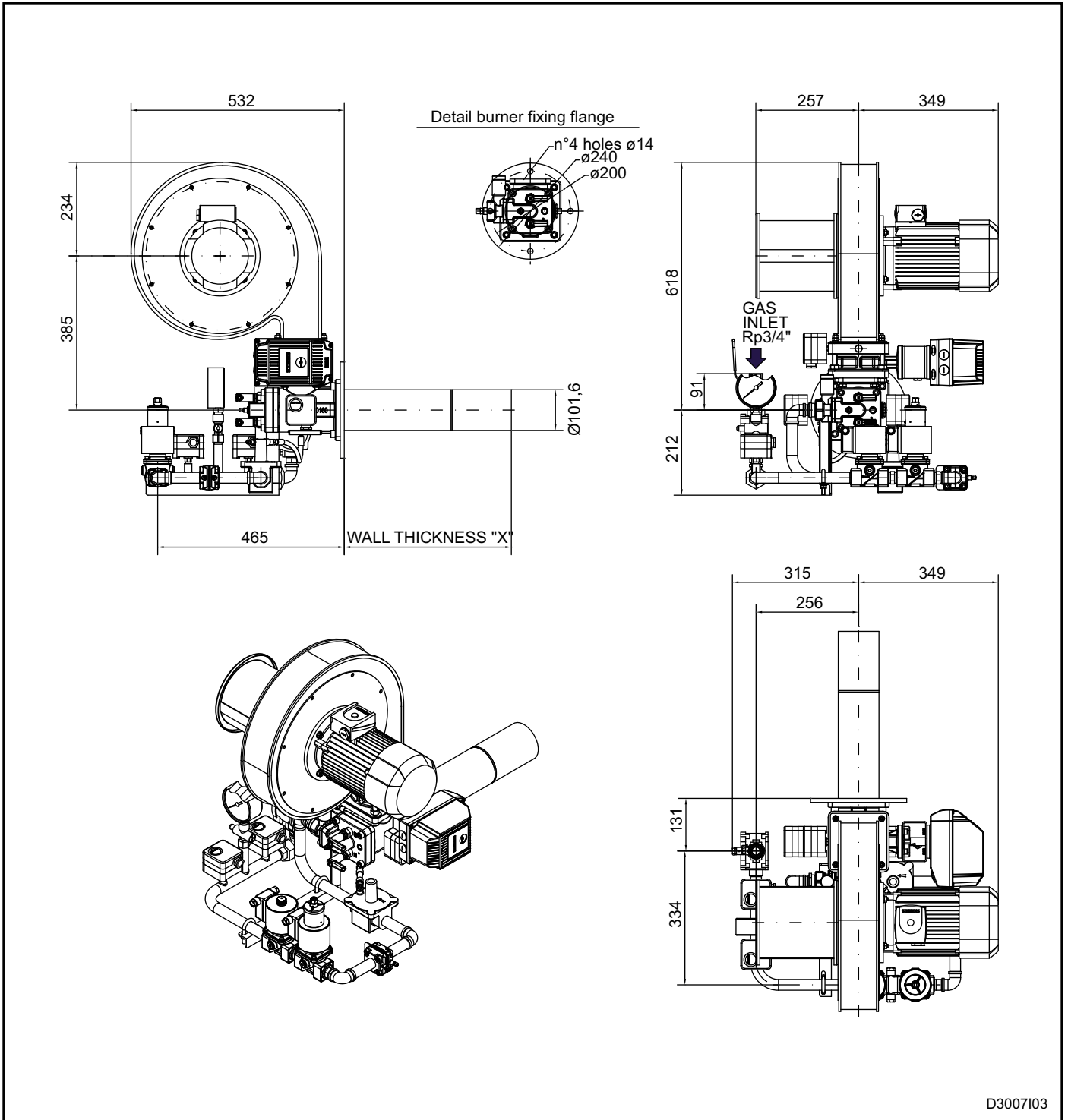
■ **Illegal flame detection:** lockout due to the detection of illegal flame signal during the phases prior to ignition or following the shutdown. The causes are to be found in the detection system (faulty sensor or presence of humidity), or in gas drawn by the safety solenoid valve

that allows the burner to remain turned on.

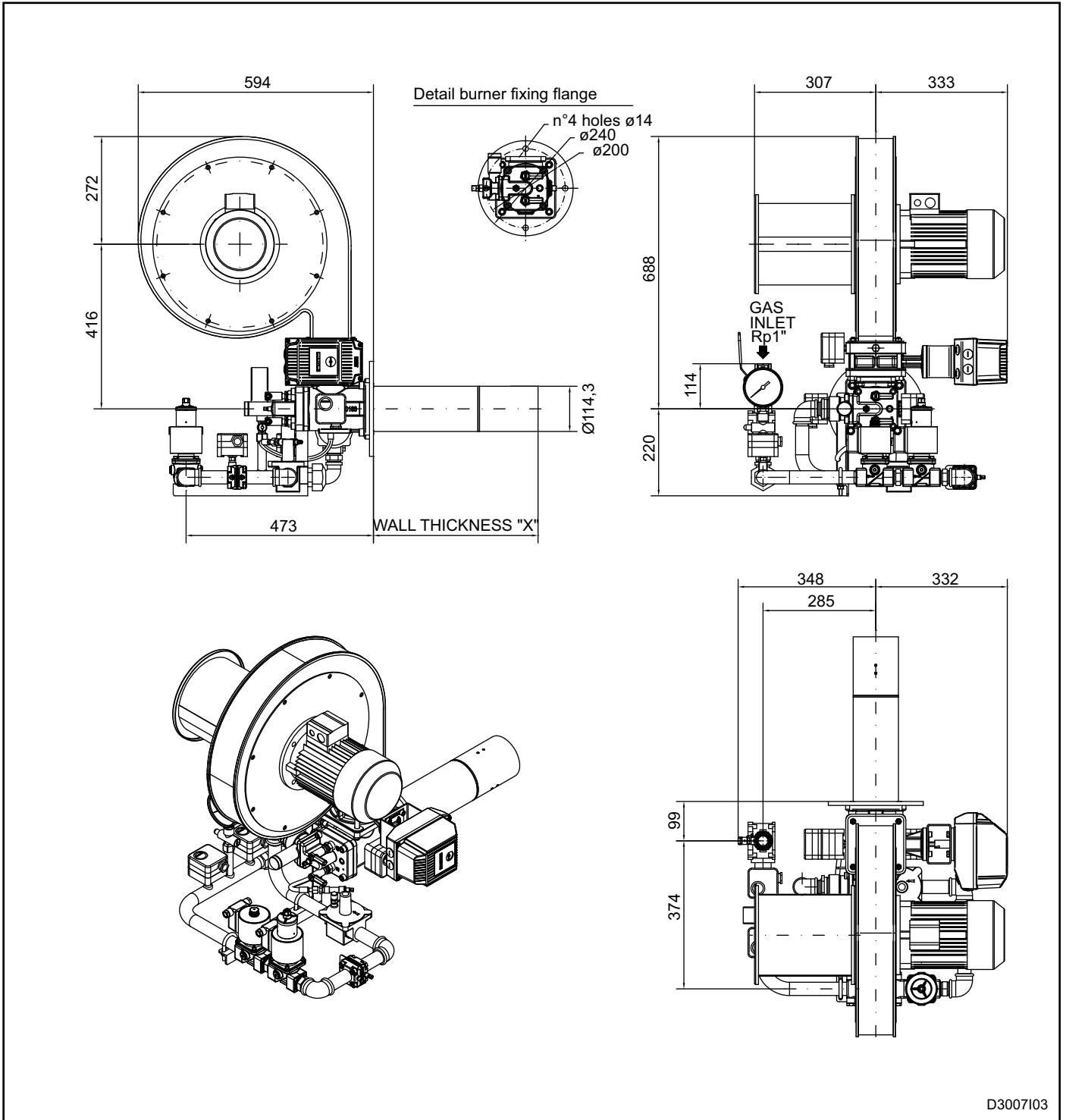
■ **Failed ignition:** lockout due to missing flame formation during start-up. The causes are to be found in the ignition system (spark absence, faulty or not in the correct position) electrodes, the incorrect adjustment of the fuel flow and combustion, or in the detection system (faulty sensor or interrupted cables). Specifically, in the first two cases the flame does not trigger, whilst in the last case, the flame forms but the burner control device is not able to detect it.

■ **Flame signal loss:** lockout due to flame signal loss during the normal operation of the burner. The causes are to be found in the regulation of the combustion air and fuel flows (rapid changes in flow, control out of range) or in the detection system (faulty sensors, dirty or badly positioned).

OVERALL DIMENSIONS - EPB 150

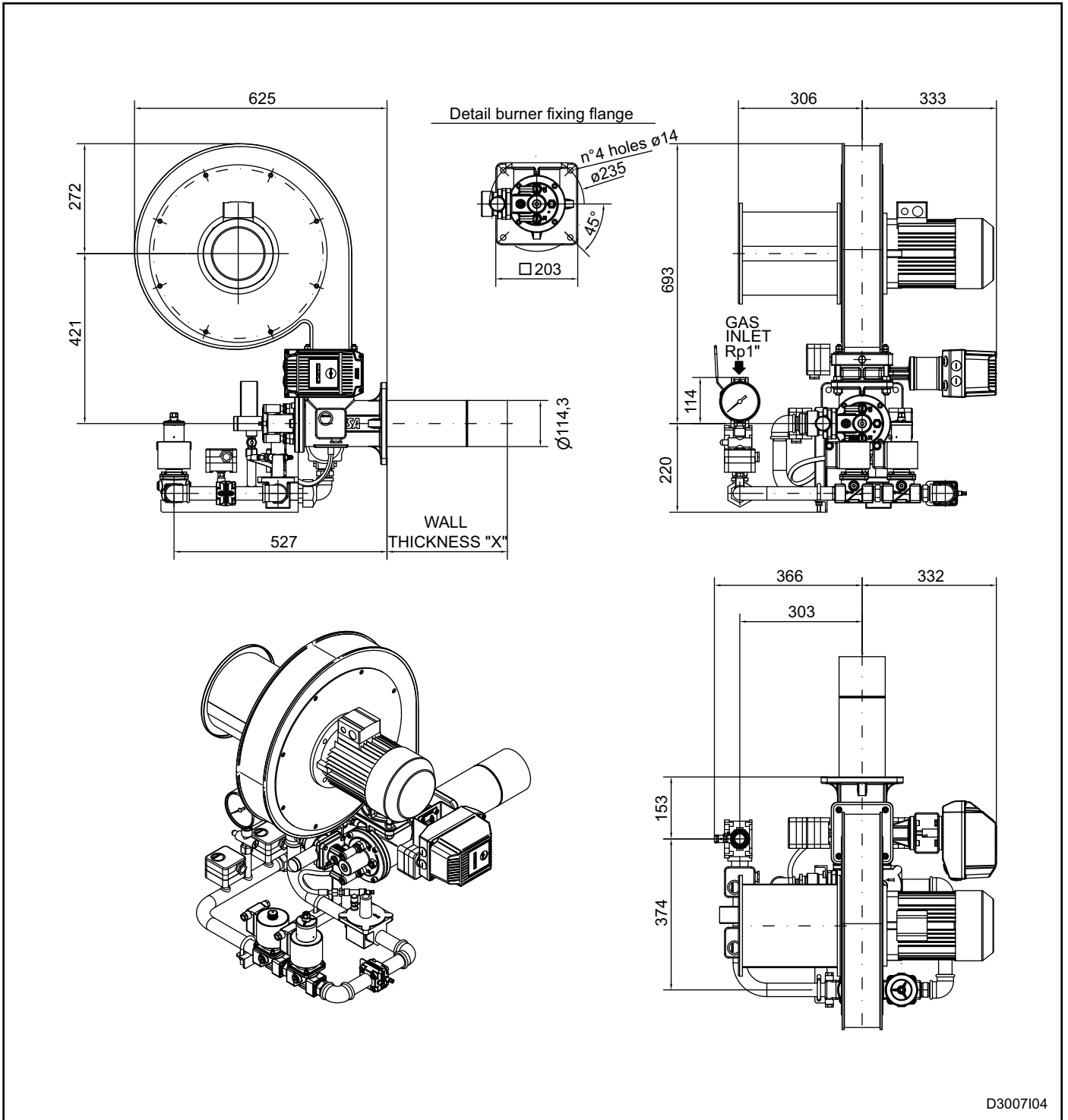


OVERALL DIMENSIONS - EPB 300

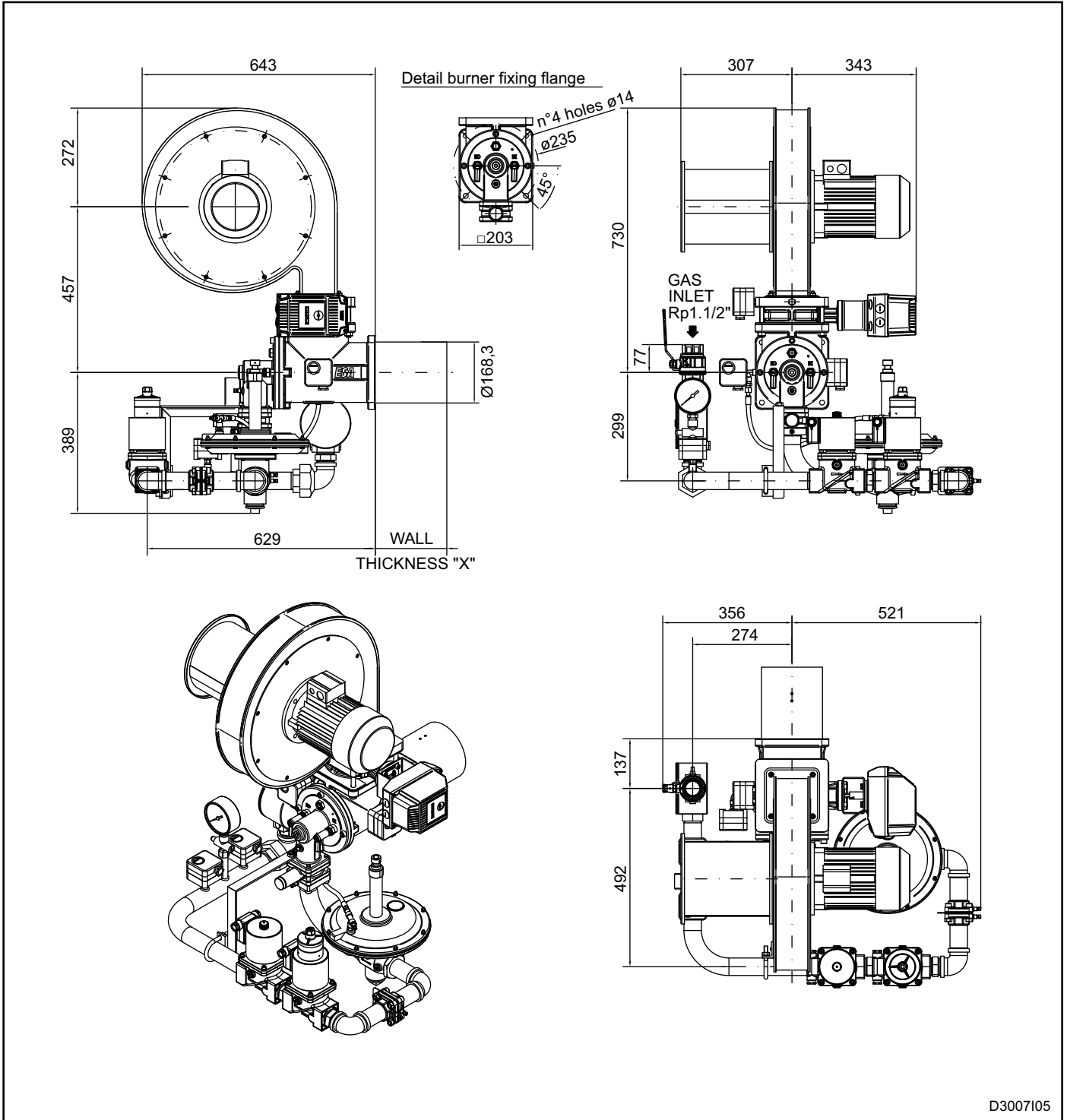


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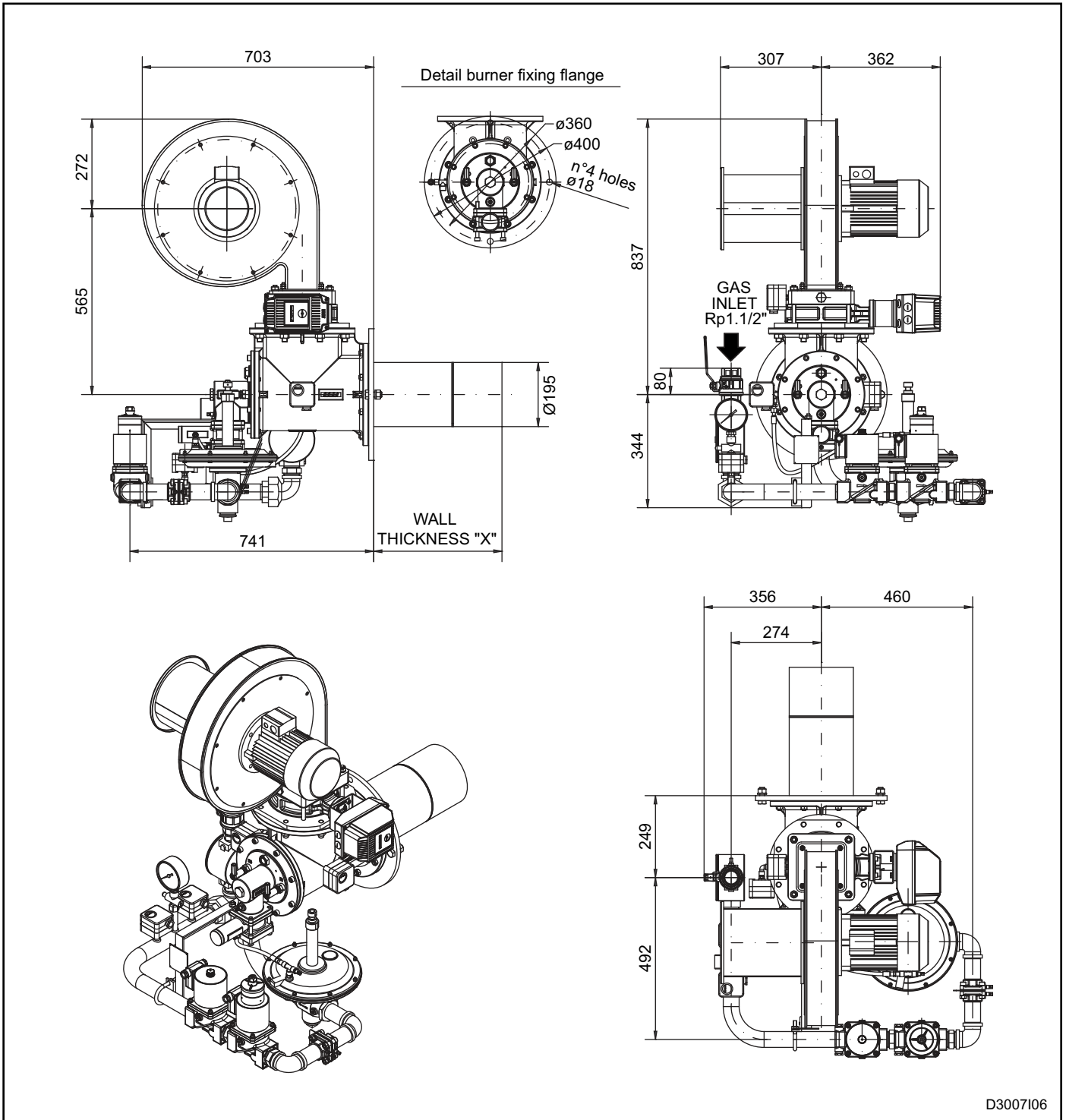
OVERALL DIMENSIONS - EPB 400



OVERALL DIMENSIONS - EPB 600

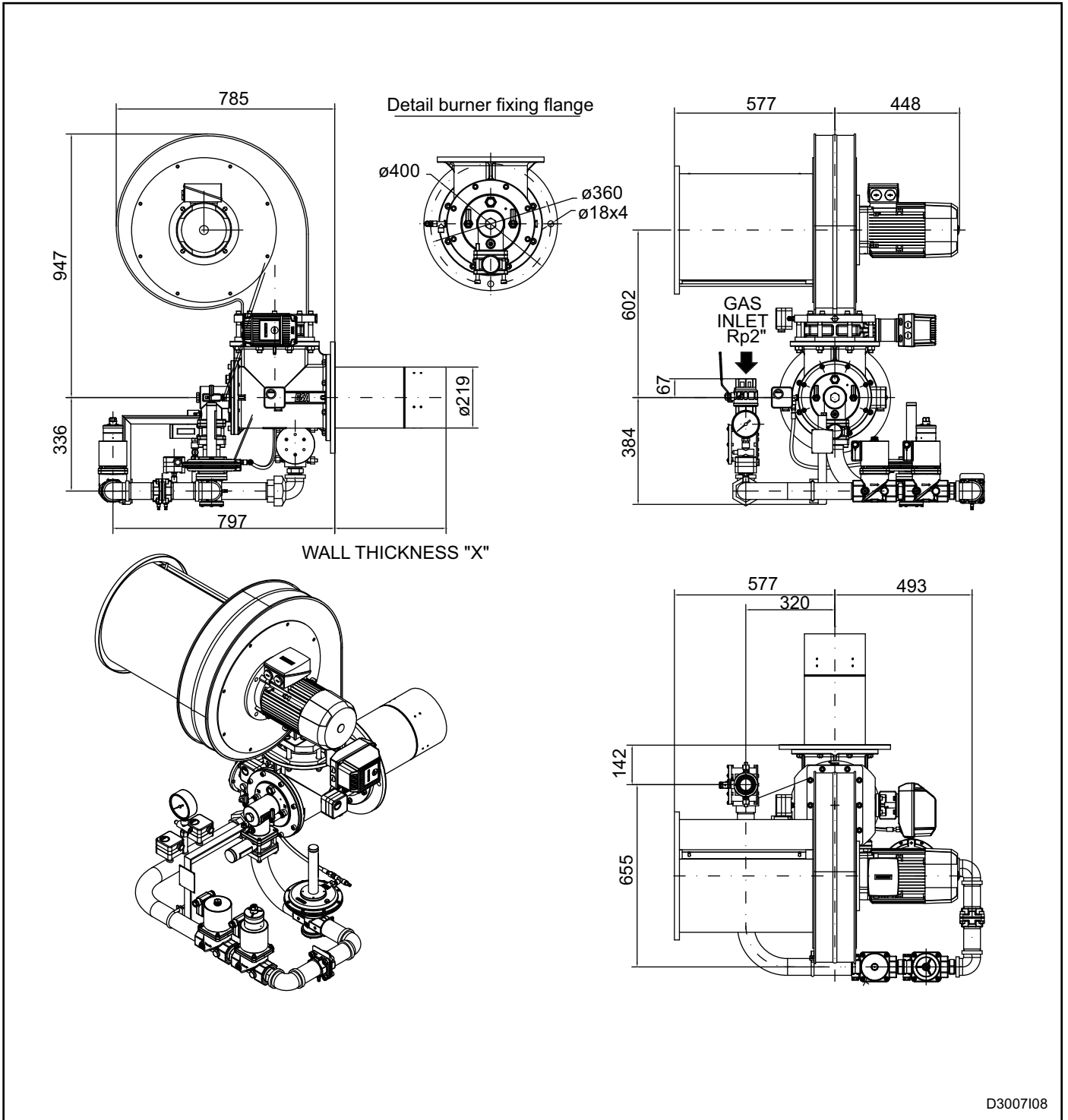


OVERALL DIMENSIONS - EPB 900

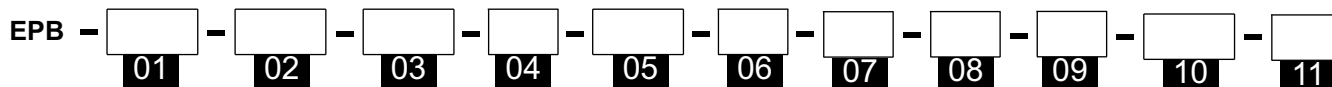


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OVERALL DIMENSIONS - EPB 1500



ORDERING CODES - COMPLETE BURNER



Model		01
EPB-150	150	
EPB-300	300	
EPB-400	400	
... (see capacity table)	

Flame tube type		02
Metallic	/	
Silicon carbide	SIK	

Fuel		03
Methane	CH4	
LPG	GPL	

Ignition and detection		04
Ign. and detec. electrode	E*	
Unirod	M	

Flame tube specification		05
Lenght mm	...	
for metallic version	L..	
Carbide low velocity	M..	
Carbide medium velocity	H..	
Carbide high velocity	C	
Carbide by Client (²)		

Flange type		06
According to ESA dwg	E*	
According to client dwg	C	

Solenoid valve voltage		07
230 Vac	2	
115 Vac	1	

Available parameter		08
//	//	

Available parameter		09
//	//	

Air servomotor type		10
SERIO-TPF	TPF	
SERIO-FLT	FLT	
SERIO-PRP	PRP	
Special version	...	

Servomotor voltage		11
230 Vac	2	
115 Vac	1	
24 Vac	4	

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

Notes:

¹ See "Capacity parameters and flame length" table

² Specify construction characteristics and overall dimensions of the carbide SiC flame tube