

*Burners*



## Ribbon linear flame burners

AB & ABM (E3010 rev. 09 - 14/11/2017)

## 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.

## CERTIFICATIONS:



The products conform to the requests for the Euroasia market (Russia, Belarus and Kazakhstan).

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The RIBBON AB and ABM series identifies premixed linear flame burners used in low temperature applications for many different thermal industrial requirements. The special shape of the RLF (Ribbon Linear Flame) guarantees excellent flame stability even in combustion chambers with internal recirculation. The AB series burners must be connected to an air/gas mixer that guarantees the correct combustion ratio. The ABM series burners have an air/gas mixer incorporated inside the furnace wall support flange. The mixing flange has a patent for the type of use (n°259843 - MI2004U000376).

The linear flame burners can also have a special design according to the geometric and potential parameters given by the client.

## APPLICATIONS

- Environment heating.
- Furnaces for food cooking.
- Vial sterilizing machines.
- Industrial packaging machines.
- Flame screens.
- Brazing machines.

## CHARACTERISTICS

### GENERAL:

- |                                 |                 |
|---------------------------------|-----------------|
| ■ Capacity:                     | 10 ÷ 70kW       |
| ■ Temperature limit:            | 350 °C          |
| ■ Air pressure to mixer/burner: | 50mbar          |
| ■ Mixing pressure:              | 0.5÷3 mbar      |
| ■ Fuel gas:                     | CH4/LPG/Propane |
| ■ Flow ratio:                   | 1 : 5           |

### MATERIAL COMPOSITION:

- |   |                        |
|---|------------------------|
| ■ Burner body:                          | Fe / AISI304 / AISI316 |
| ■ Support flange (versions AB):         | Cast iron G25 / Al     |
| ■ Mixing support flange (versions ABM): | Al                     |

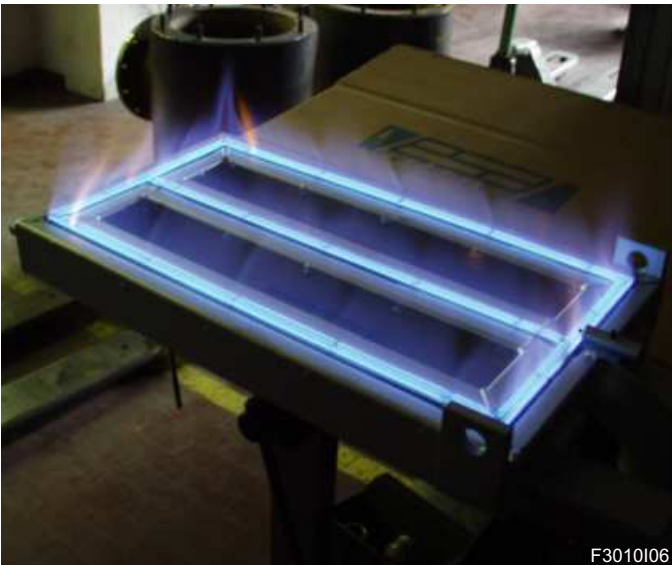


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F3010I05

**EXAMPLES OF SPECIAL DESIGN**



## IGNITION AND DETECTION

The AB/ABM RIBBON burner ignition takes place via a high voltage discharge supplied by special electrode. The standard configuration has mono-electrode flame detection. Flame detection can take place, on request, with separate electrode or UV flame detector.

All the accessories, concerning ignition and detection are not included in the supply. The adoption of flame control systems is highly recommended in all plants operating at temperatures lower than 750°C (Norm UNI EN746/2).

Burner Model	Flame Tube Diameter	Nominal Capacity [kW]	Igniter/Detector
8AB	Ø 1"	20	ESA WAND
10AB	Ø 1.1/4"	25	ESA WAND
12AB / 12ABM	Ø 1.1/2"	30	ESA WAND
16AB / 16ABM	Ø 2"	40	ESA WAND
20AB / 20ABM	Ø 2.1/2"	65	ESA WAND

## CAPACITY PARAMETERS AND FLAME HEIGHT

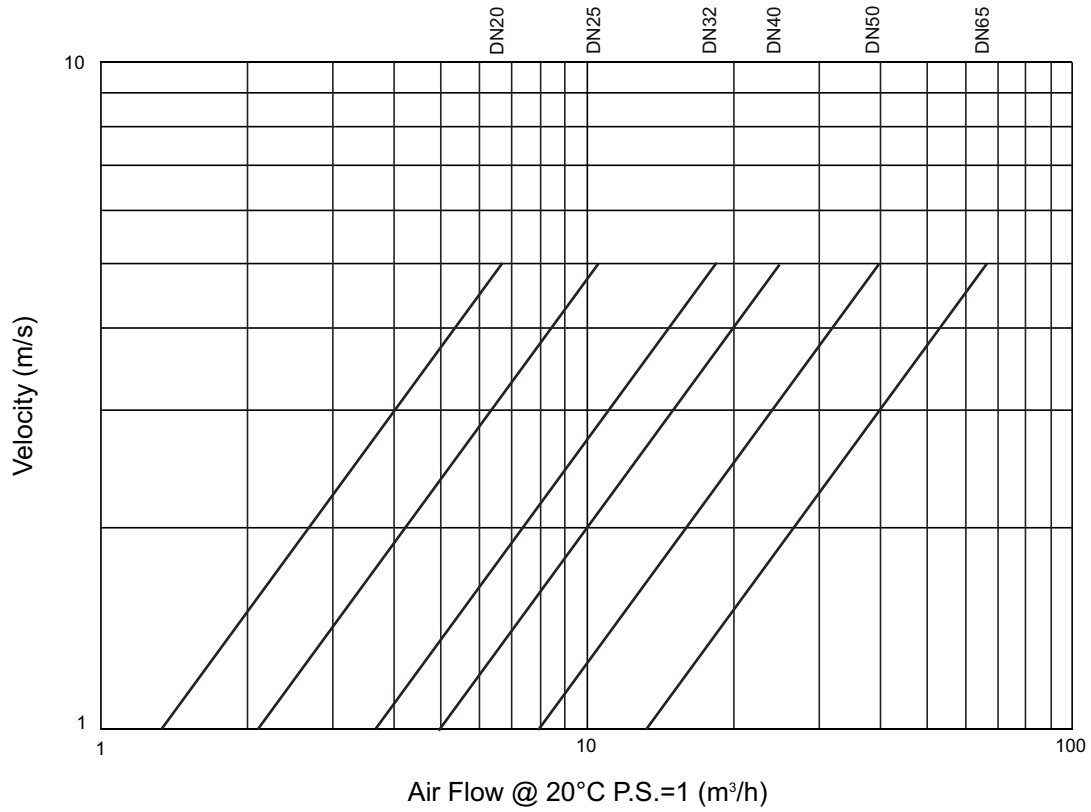
RLF Model	RLF width [mm]	Linear Capacity MAX [kW/mt]	Flame Height [mm]
RLF1	5 mm	15	50÷150
RLF3	8 mm	35	50÷150
RLF5	12 mm	55	50÷200

The table above indicates the maximum capacities produced by an RLF of 1000mm referring to a temperature of about 20°C. The flame heights strongly depend on the

Ribbon Linear Flame length. The table below indicates the same capacities referred to various working temperatures.

RLF Model	Capacities according to the Temperature [kW/mt]					
	100 °C	150 °C	200 °C	250 °C	300 °C	350 °C
RLF1	15	13.2	11.8	10.7	9.7	9.0
RLF3	22	19.4	17.3	15.7	14.3	13.2
RLF5	36.6	32.3	28.9	26.1	23.8	21.9

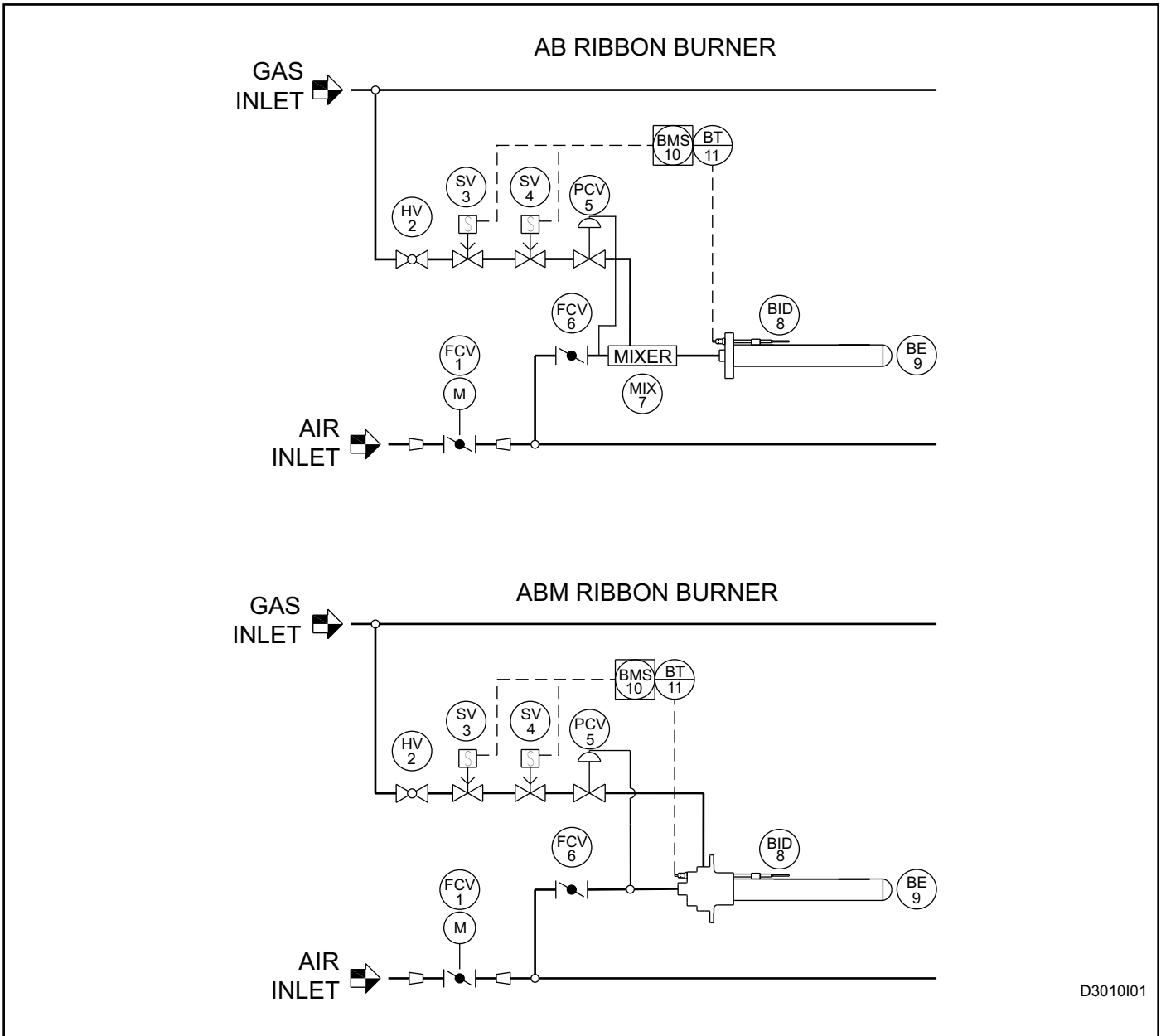
**DIAGRAM OF TUBE VOLUME FLOW**



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To select the correct diameter of the AB burner we advise you to maintain a maximum speed of 5 m/s.

**FLOW SCHEME**



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Pos.	Description	AB		ABM	
		Included	Not Included	Included	Not Included
1	Motorized air regulation butterfly valve		X		X
2	Gas interception ball valve		X		X
3	Gas interception ball valve		X		X
4	Gas safety solenoid valve		X		X
5	Zerogovernor		X	X	
6	Manual air regulation butterfly valve		X		X
7	Mixer		X	X	
8	Ignition and detection electrode		X		X
9	Ribbon linear flame burner	X		X	
10	Flame Control		X		X
11	Ignition Transformer		X		X

## WARNINGS

- The AB & ABM series burners are meant to be used in fixed installations. If mobile installations are required, it is necessary to assess beforehand the possibility of problems caused by the movement of the actual furnace.
- The burner ignition must always be carried out at minimum power and then modulating towards the maximum.
- Passing from minimum to maximum power and vice versa, must take place gradually and not instantaneously.
- For all low temperature applications (upto 750°C), burner ignition and fuel gas solenoid valve control must be carried out via a certified burner control device.
- To avoid possible damage to the burners, make sure that the blower does not send stale air from combustion products, oils, solvents or other. To prevent these phenomena from taking place, preferably install the blower or suction duct outside of the establishment and far from exhaust pipes.
- Check the correct connection of the power supply lines after installation. Before turning the burner on, check that the combustion air and fuel gas pressures are correct.
- If there are problems with other devices during the burner start-up phase, use the connector with suppressor for the connection of the high voltage cable to the ignition electrode.
- Avoid burner ignitions close to each other so as not to overheat the system ignition command 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 two ignitions in a time lapse of 30 sec.)
- Make sure the power supply is OFF when intervening on the burner and its devices. In case of burner malfunctioning follow the indications given in the present manual in the "Maintenance" chapter or contact ESA-Pyronics.
- Any modification or repair done by third parties may compromise the application safety and automatically cause the general warranty conditions to expire.



## INSTALLATION

The AB RIBBON burners can be installed in any position also with flame facing down. To fix the burner in place, flanges with ignition electrodes and flame inspection peepsights can be supplied. For the air and gas pipe connections the use of flexible joints is advised. The connection between burner and mixer must be at least as big as the mixer outlet, do not put place valves or any type of restriction on the piping.

The ABM RIBBON burners can be installed in any position even with flame facing down. To fix the burner in

place the appropriate mixing flange that has ignition electrode and flame spy window is used. For the air and gas pipe connections the use of flexible stainless steel joints is advised.

During the mounting phase, place the gasket between the burner and the opposite flange of the furnace wall taking care while placing the burner inside the furnace to not damage the flame detection/ignition electrode ceramic (if necessary assemble the electrodes after having fixed the burner to the furnace wall).

### MODIFICATION OF FLAME ORIENTATION

The ABM series burners have different flame positioning and gas inlet combinations. The position of the gas inlet does not depend on the flame positioning and the possible combinations can also be obtained during the burner assembly, properly rotating the flame tube flange connection (adapting the position of the flame ignition and detection electrode) and inverting the gas components from one side to the other. To obtain excellent results, the following configuration change manouvres should be carried out by properly trained and qualified personnel.

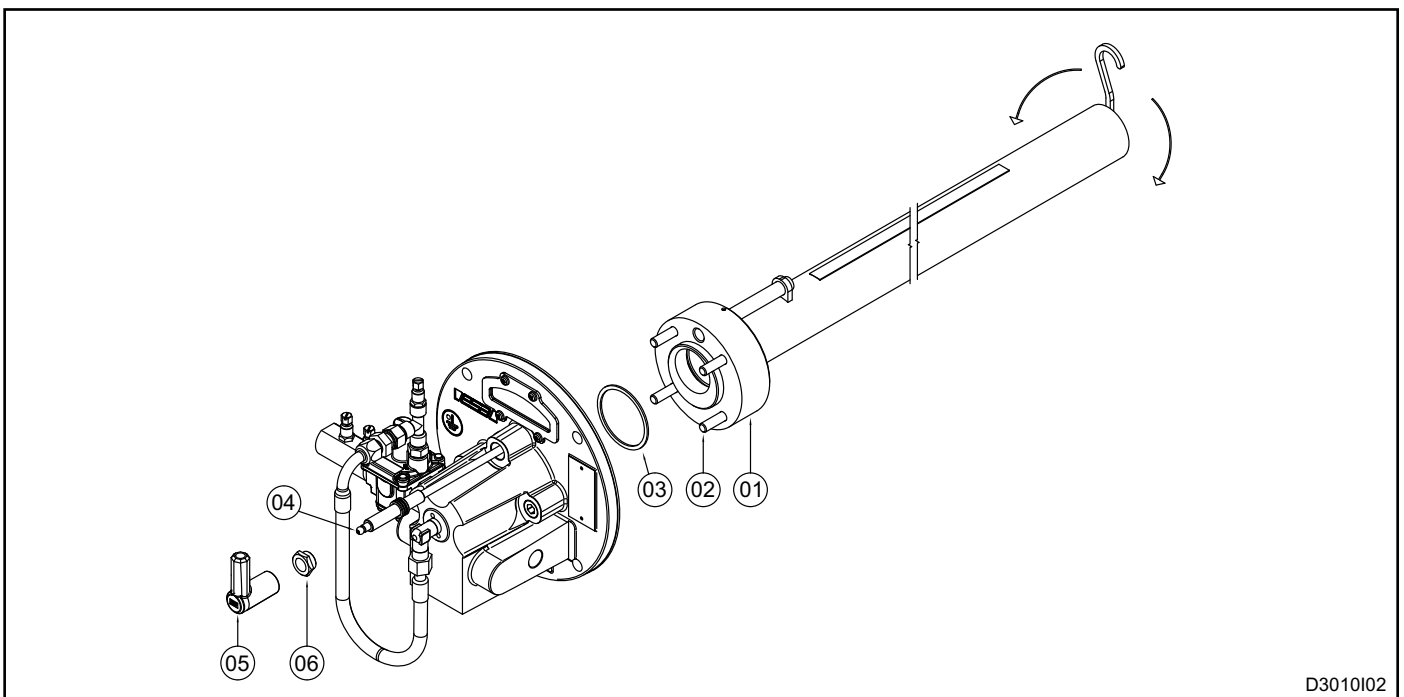
The ABM burner can be supplied with three flame configurations:

- LF: flame towards the left.
- RF: flame towards the right.

- UF: flame facing up.

To change this configuration act as follows:

- 1 - Unscrew the four fixing screws (**pos. 02**) to release the flanged flame tube (**pos. 01**).
- 2 - Remove the electrode cap (**pos.05**), the fixing connection (**pos.06**) and the electrode (**pos.04**) from the seat.
- 3 - Rotate the flame tube in the flame position desired.
- 4 - Fix the flame tube into place, making sure that the gasket is in the correct position (**pos.03**), screwing on the screws (**pos.02**).
- 5 - Place the electrode in the seat corresponding to that of the flame tube, making sure that the electrode gasket is in the correct position.
- 6 - Fix the electrode into place screwing on bleed nipple again (**pos.06**).
- 7 - Place the cap onto the electrode again and check that



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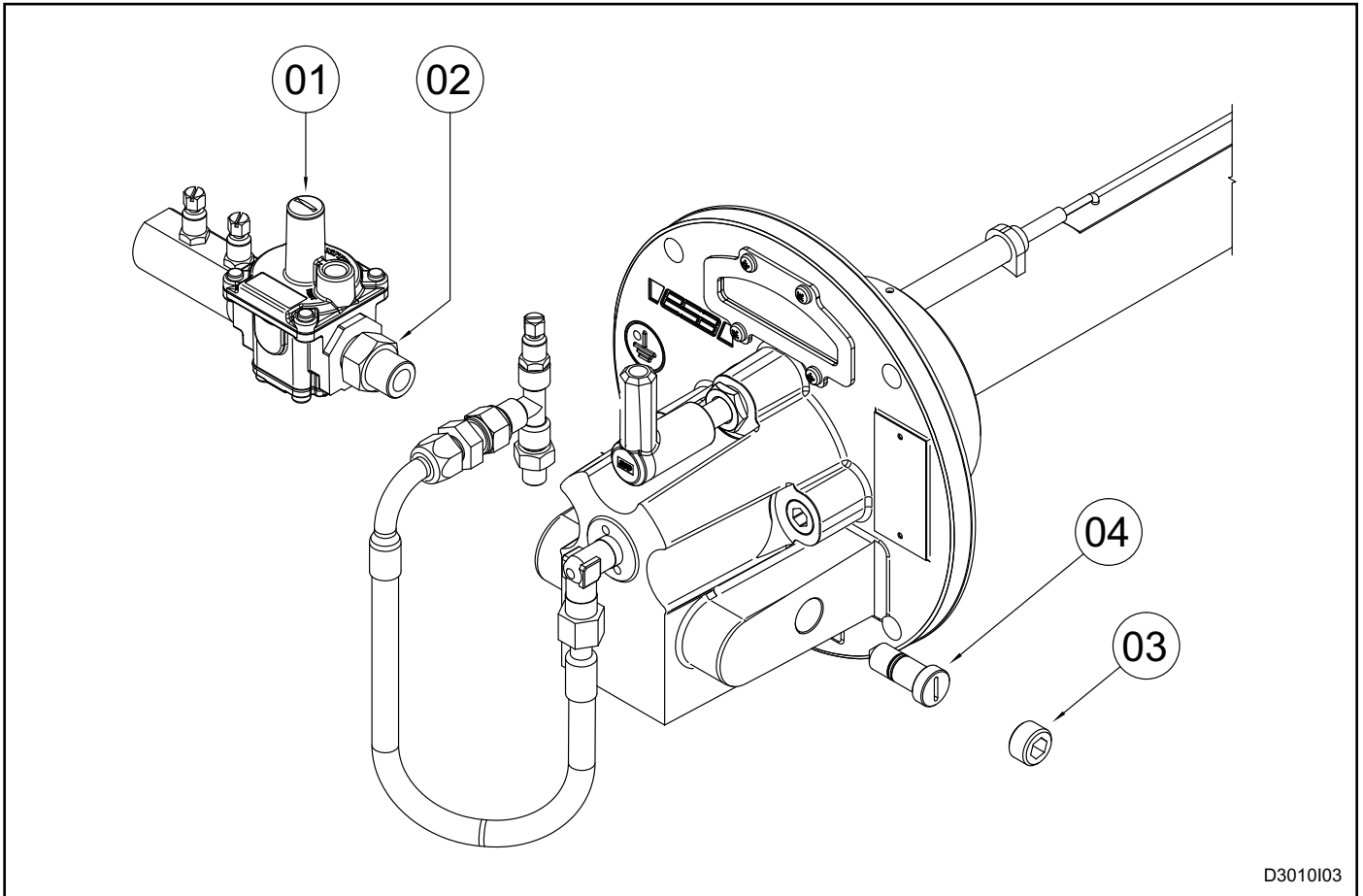
## MODIFICATION OF GAS INLET POSITION

The ABM burner can be supplied with two gas inlet configurations:

- LG: gas inlet on the left.
- RG: gas inlet on the right.

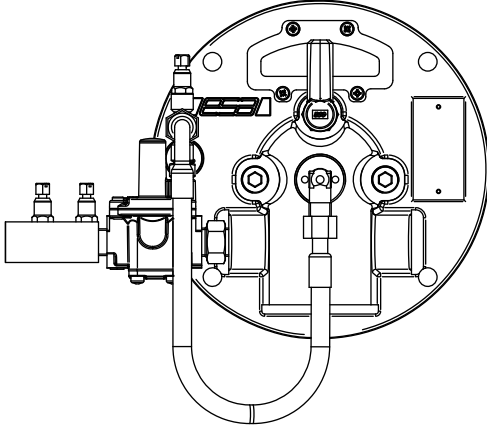
To change this orientation act as follows:

- 1 - Unscrew the grub screw (**pos.03**) and the gas passage regulation screw (**pos.04**)
- 2 - Disassemble the three piece joint (**pos.02**) and the zero-governor (**pos.01**)
- 3 - Swap **pos.03** and **pos.04** with **pos.01** and **pos.02**
- 4 - Put the regulation screw **pos.04** and the grub screw **pos.03** back into the threaded housing.
- 5 - Screw the three piece joint back on (**pos.02**) with thread seal paste and the zero governor (**pos.01**)

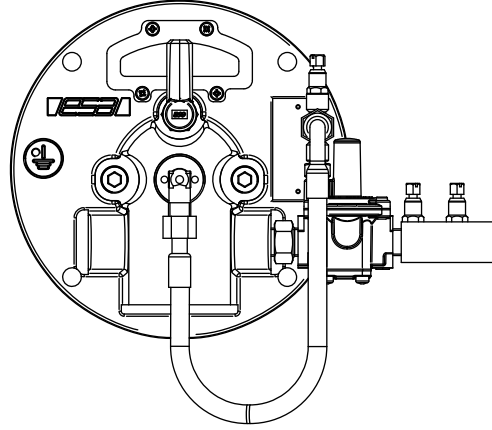


**MOUNTING SHEET - MONO ZONE ABM BURNER**

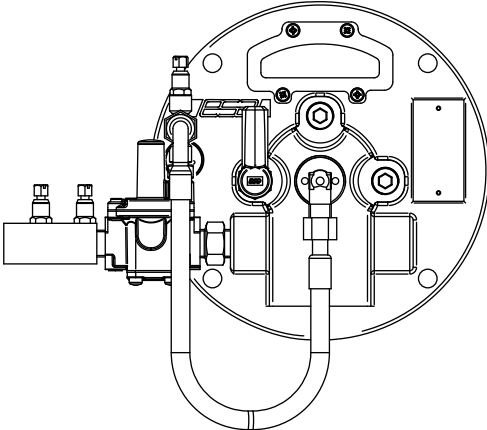
LEFT GAS INLET  
UPPER FLAME



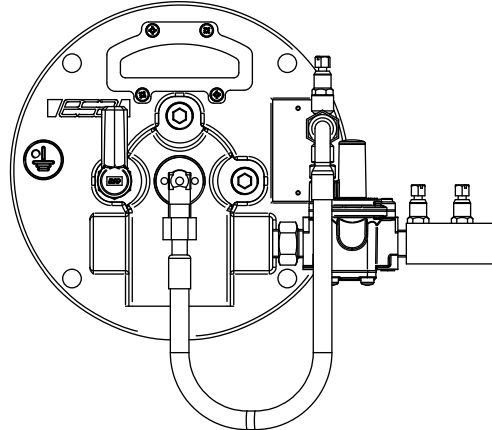
RIGHT GAS INLET  
UPPER FLAME



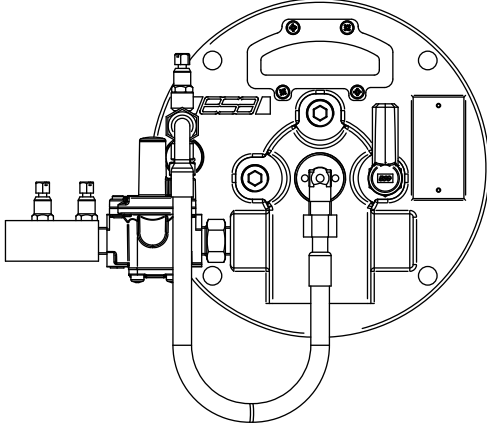
LEFT GAS INLET  
LEFT FLAME



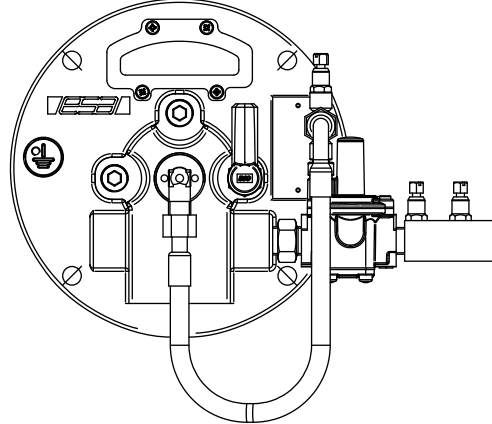
RIGHT GAS INLET  
LEFT FLAME



LEFT GAS INLET  
RIGHT FLAME



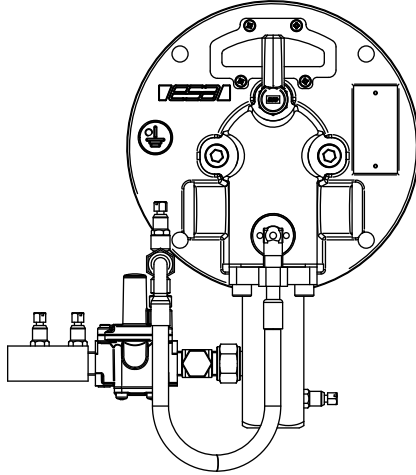
RIGHT GAS INLET  
RIGHT FLAME



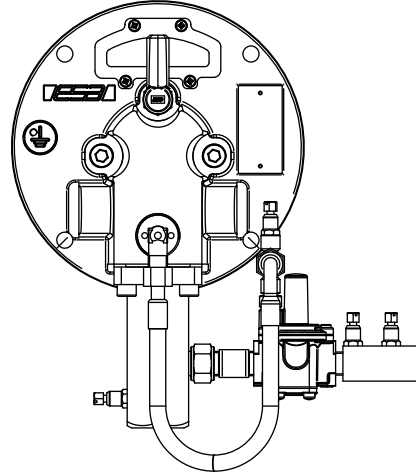
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**MOUNTING SHEET - THREE ZONE ABM BURNER**

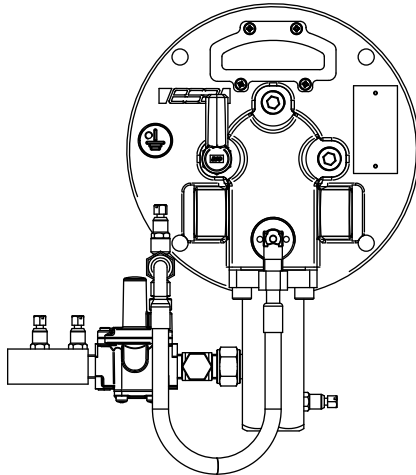
LEFT GAS INLET  
UPPER FLAME



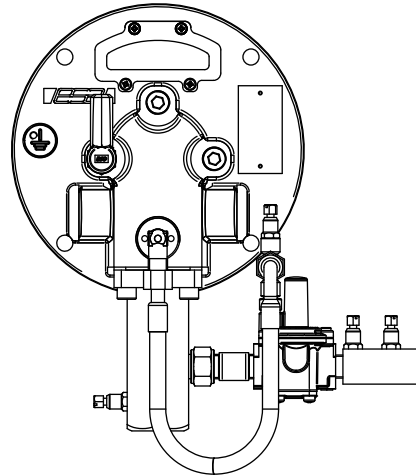
RIGHT GAS INLET  
UPPER FLAME



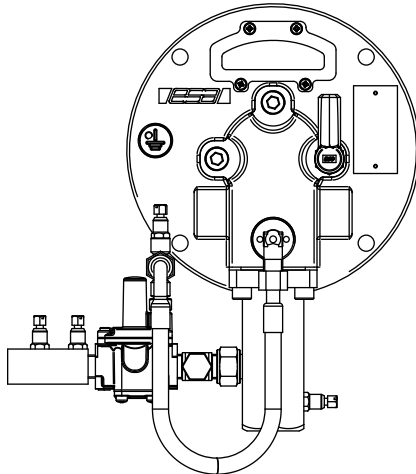
LEFT GAS INLET  
LEFT FLAME



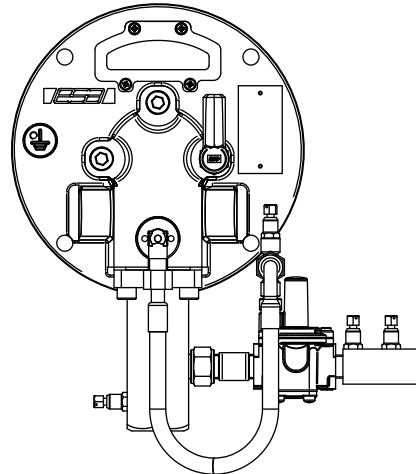
RIGHT GAS INLET  
LEFT FLAME



LEFT GAS INLET  
RIGHT FLAME

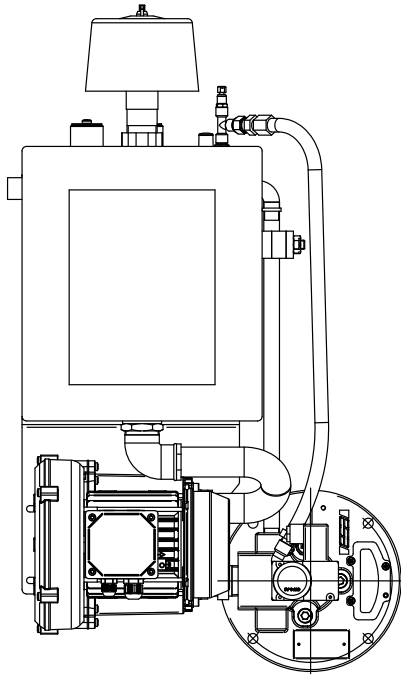


RIGHT GAS INLET  
RIGHT FLAME

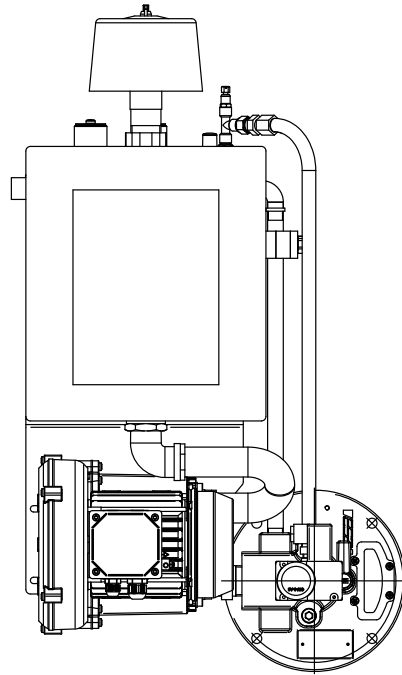


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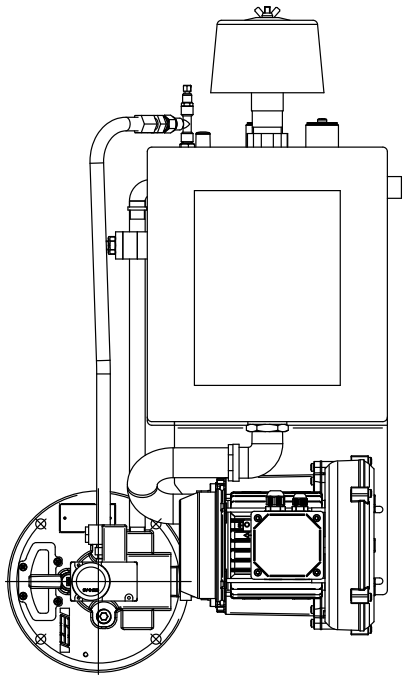
**MOUNTING SHEET -PACKAGED ABM BURNER**



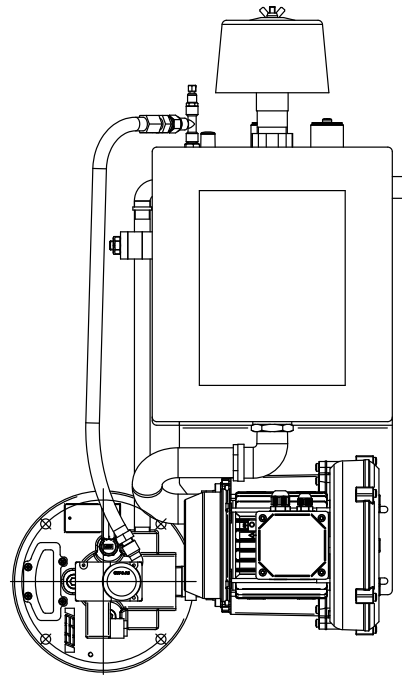
**LEFT BLOWER  
UPPER FLAME**



**LEFT BLOWER  
RIGHT FLAME**



**RIGHT BLOWER  
LEFT FLAME**



**RIGHT BLOWER  
UPPER FLAME**

D3010I06

## IGNITION - SETTING

The operations indicated in the following chapter must be carried out by qualified expert technicians. The non-observance of the instructions could generate dangerous conditions.

**1** - Check that the pressures of the combustion air going out to the blower and the fuel gas supply are within the allowed range.

**2** - Regulate the working pressures as well as the intervention pressure of the devices dedicated to the safety of the combustion plant such as: gas pressure reducer, shut off valve, relief valve, pressure switches etc. Simulate the intervention of all the safety devices including the safety overtemperature intervention, checking that the fuel shut off devices act correctly.

**3** - Place the motorized air regulation valve in the maximum opening position and regulate the inlet burner or mixer pressures (in nominal conditions the inlet pressure is about 50mbar).

**4** - Place the motorized air regulation valve in the minimum opening position and regulate its opening to obtain (in the burner inlet) the pressures regarding the minimum

power (not lower than 2mbar and however to be set with burner running at minimum power).

**5** - Activate the burner control device and attempt several ignitions until the burner ignites. During the ignition attempts, act on the gas regulation valve and, starting from the totally closed position, open it gradually until obtaining burner ignition.

**6** - Place the motorized air regulation valve on the maximum opening position and regulate, via the gas regulation valve, the maximum fuel flow, checking, if necessary, the differential pressure created on the calibrated gas flange, if present. Otherwise carry out burner regulation according to the indications in the pictures shown below.

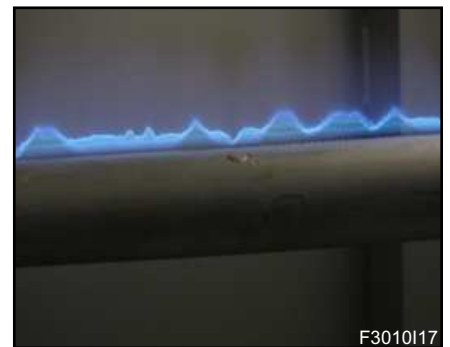
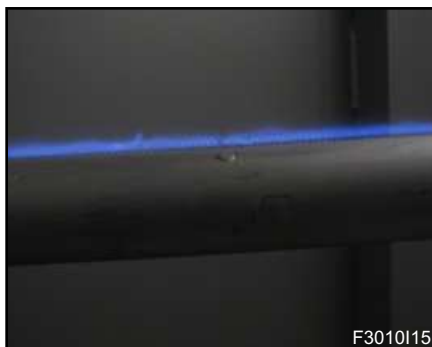
**7** - Place the motorized air regulation valve on the minimum opening position and check that the flame is stable. If necessary regulate the gas flow to the minimum position according to the regulation in the pictures below, acting on the zerogovernor spring.

**8** - Repeat ignition attempts at minimum burner power, with maximum range, to check the ignition reliability and flame stability during regulation.

### MAX



### MIN



Excess of air

Correct ratio

Excess of gas

## TRIPPLE ZONE BURNER REGULATION AND IGNITION

For the Tripple zone burner ignition, follow the instructions below:

**1** - Unscrew the side regulation valves in the completely open position (standard position in which the burners are usually delivered).

**2** - Follow the ignition procedure described on the previous page until obtaining a stable flame both at minimum as well as maximum potential.

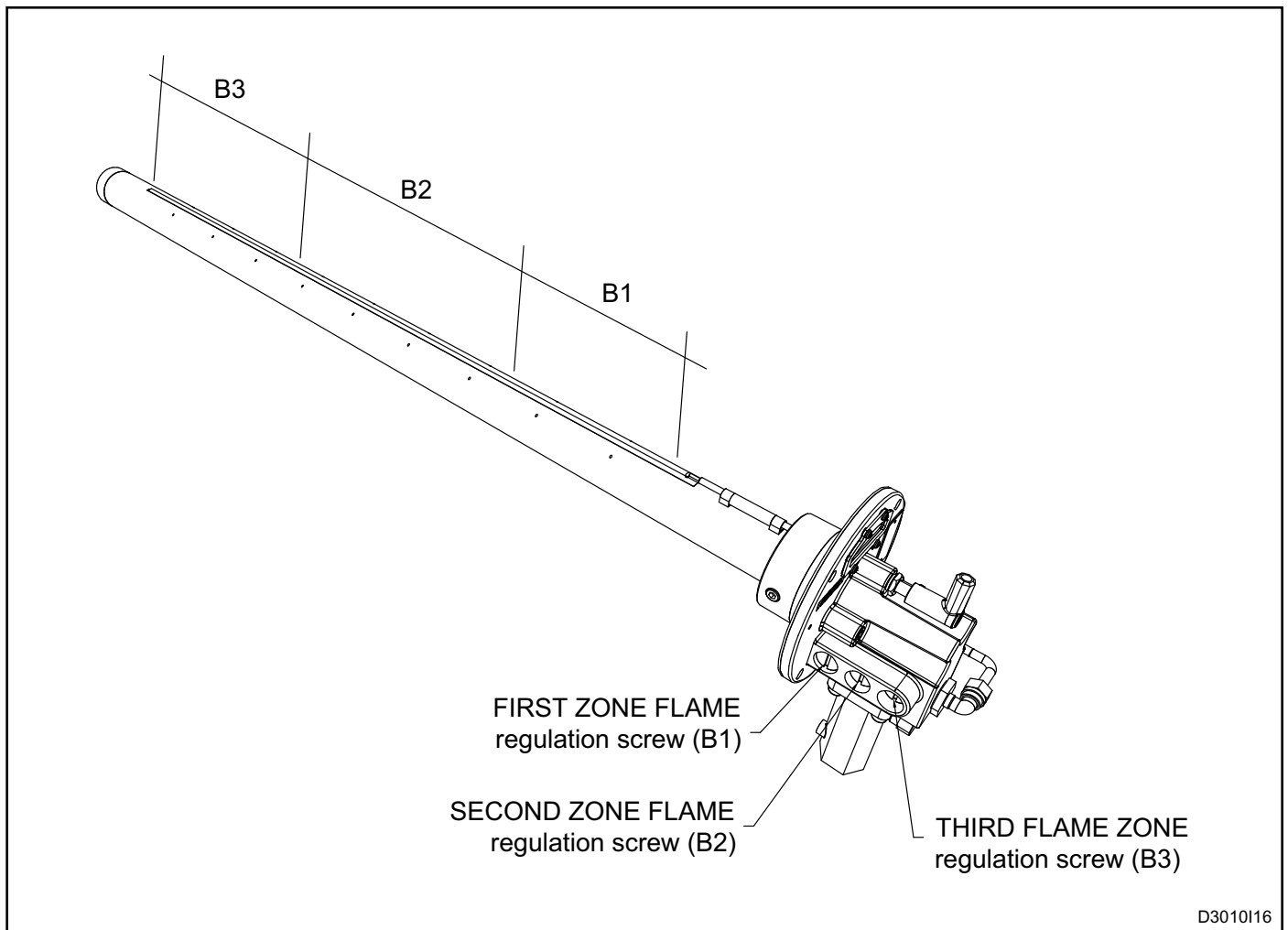
**3** - Adjust the side adjustment screws to change the potential of each individual zone, according to the scheme in the diagram below.

To decrease the power of the individual zone, screw on the adjustment screw, to increase the potential, unscrew the adjustment screw.

**4** - Once the potentials in the singles have been adjusted, check that:

**a)** Modulating from minimum to maximum potential there are no detachments or flame loss in any of the three zones.

**b)** The correct ignition and flame propagation among the three zones is guaranteed.



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## GENERAL MAINTENANCE PLAN

Operation	Type	Advised time	Notes
<b>Pilot burner high voltage electrode connection</b>	O	annual	Check the integrity of the outer plastic and the oxidation of the internal connector and of the electrode terminal.
<b>Ignition / detection electrode</b>	O	annual	Replace if the kantal terminal is worn or if the ceramic is damaged.
<b>Integrity and cleanliness of linear flame tube</b>	O	annual	Check the Ribbon Linear Flame conditions. If necessary clean with compressed air.
	E	N/A	Replace the flame tube in case there is damage to the Ribbon Linear Flame that could jeopardize the normal functioning of the burner.
<b>Cleanliness of the spy window</b>	O	annual	Check the integrity of the HT glass and of the gaskets
<b>Burner settings</b>	O	annual	Repeat all the steps in the section "IGNITION AND SETTING"

**NOTES:**

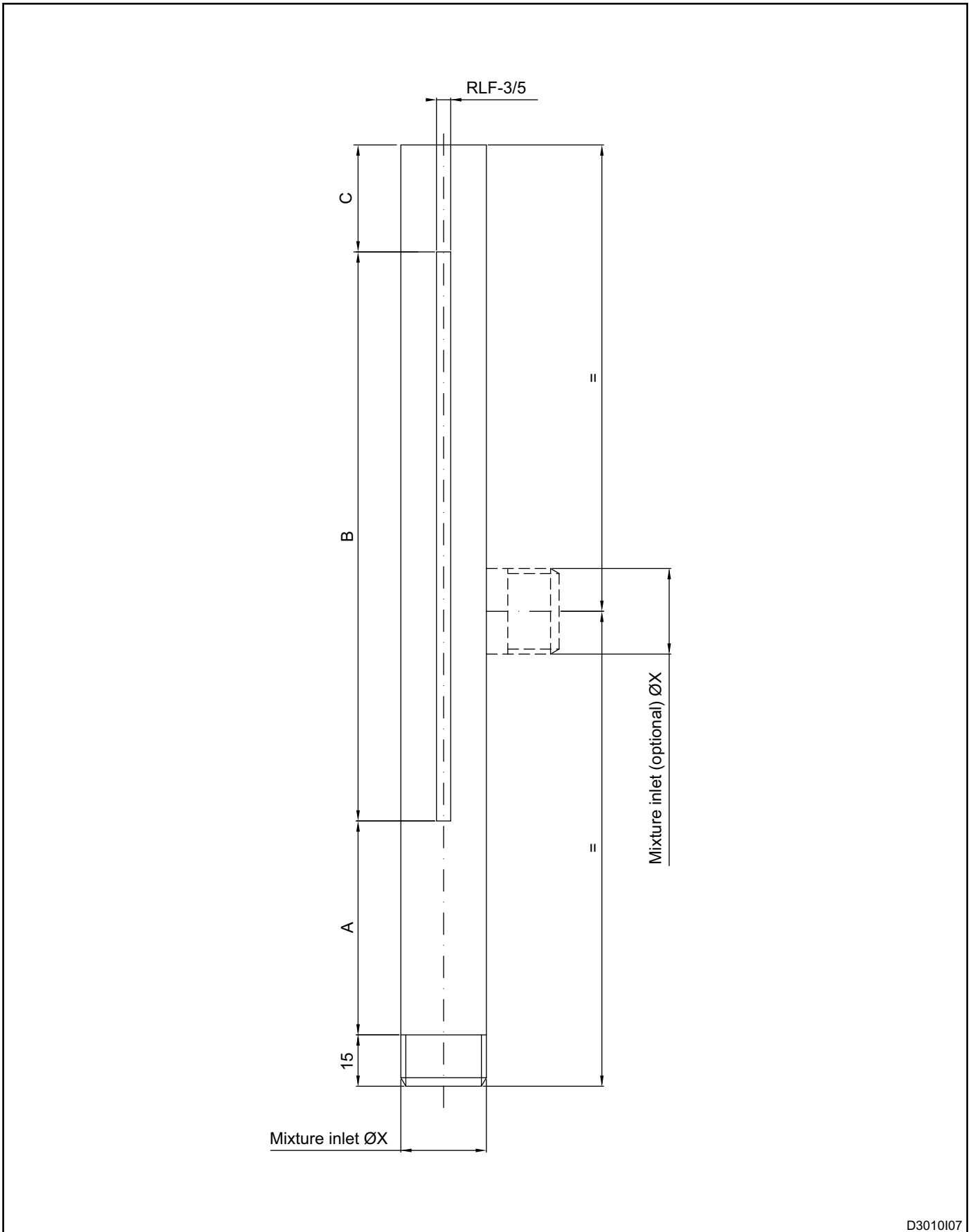
Key: O = ordinary / E = extraordinary

(\*) it is advisable to replace the gaskets on the gas side each time the gas feeding line is disassembled.

(\*\*) use high temperature gaskets.

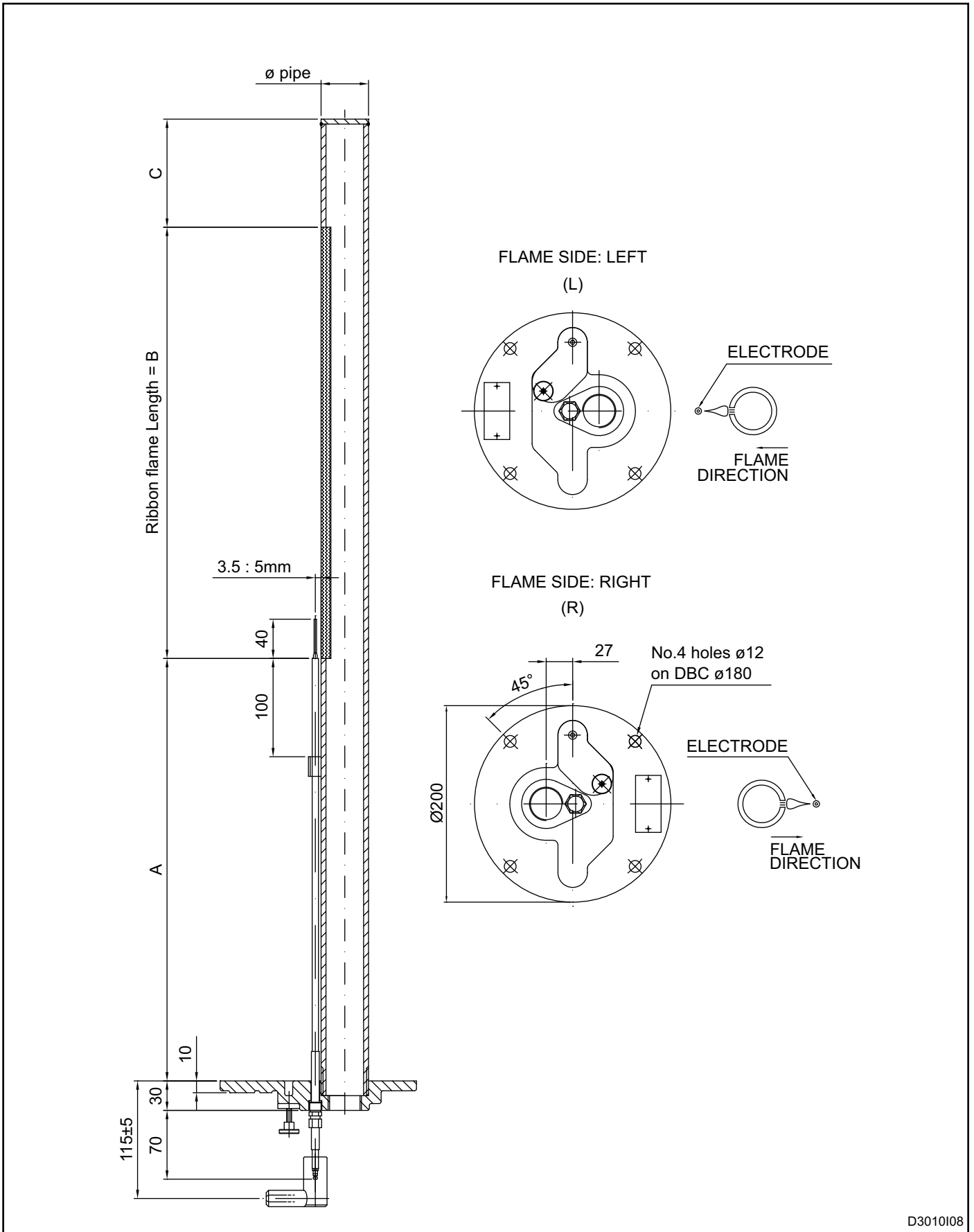


**OVERALL DIMENSIONS - AB (ONLY TUBE)**



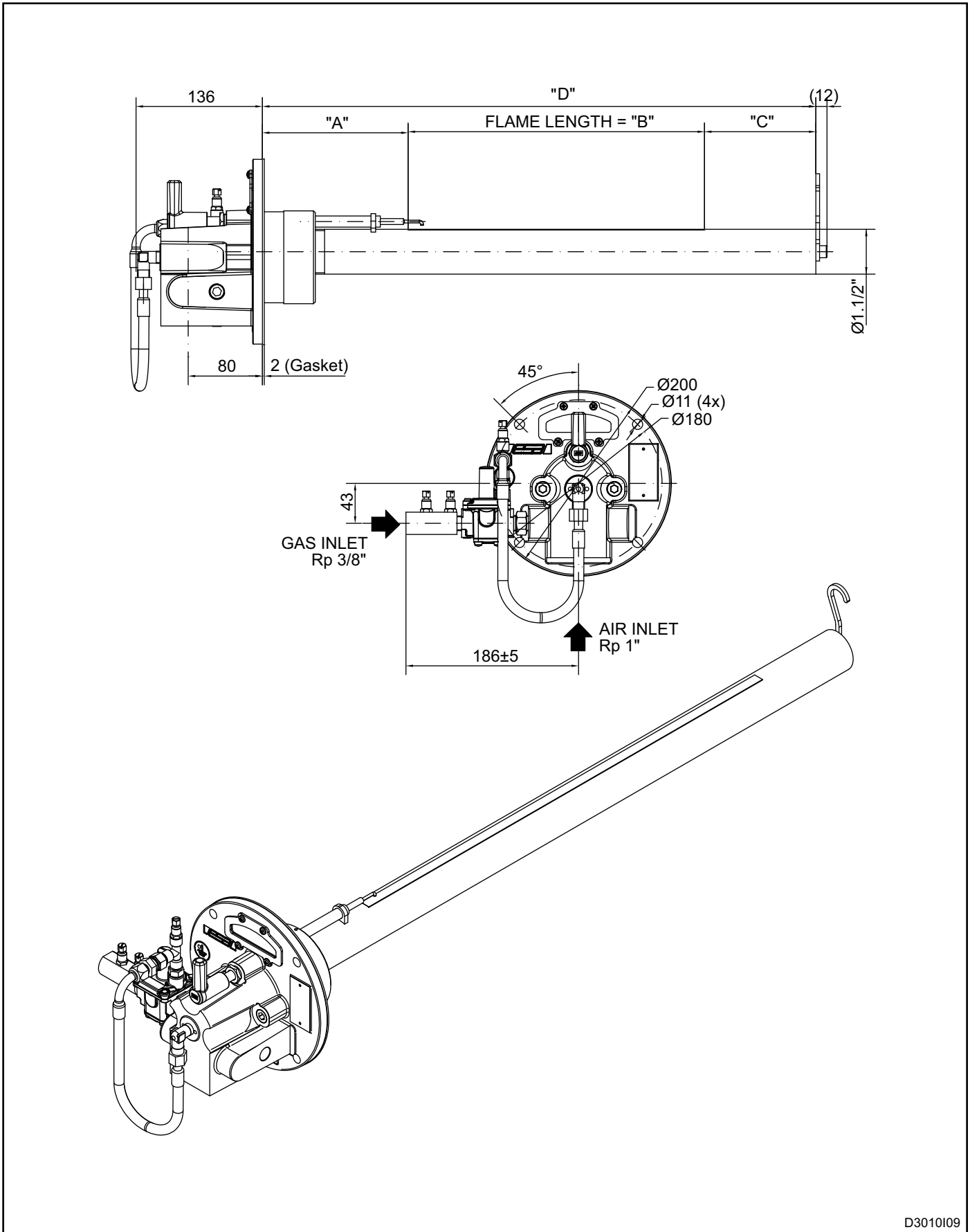
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**OVERALL DIMENSIONS - AB**



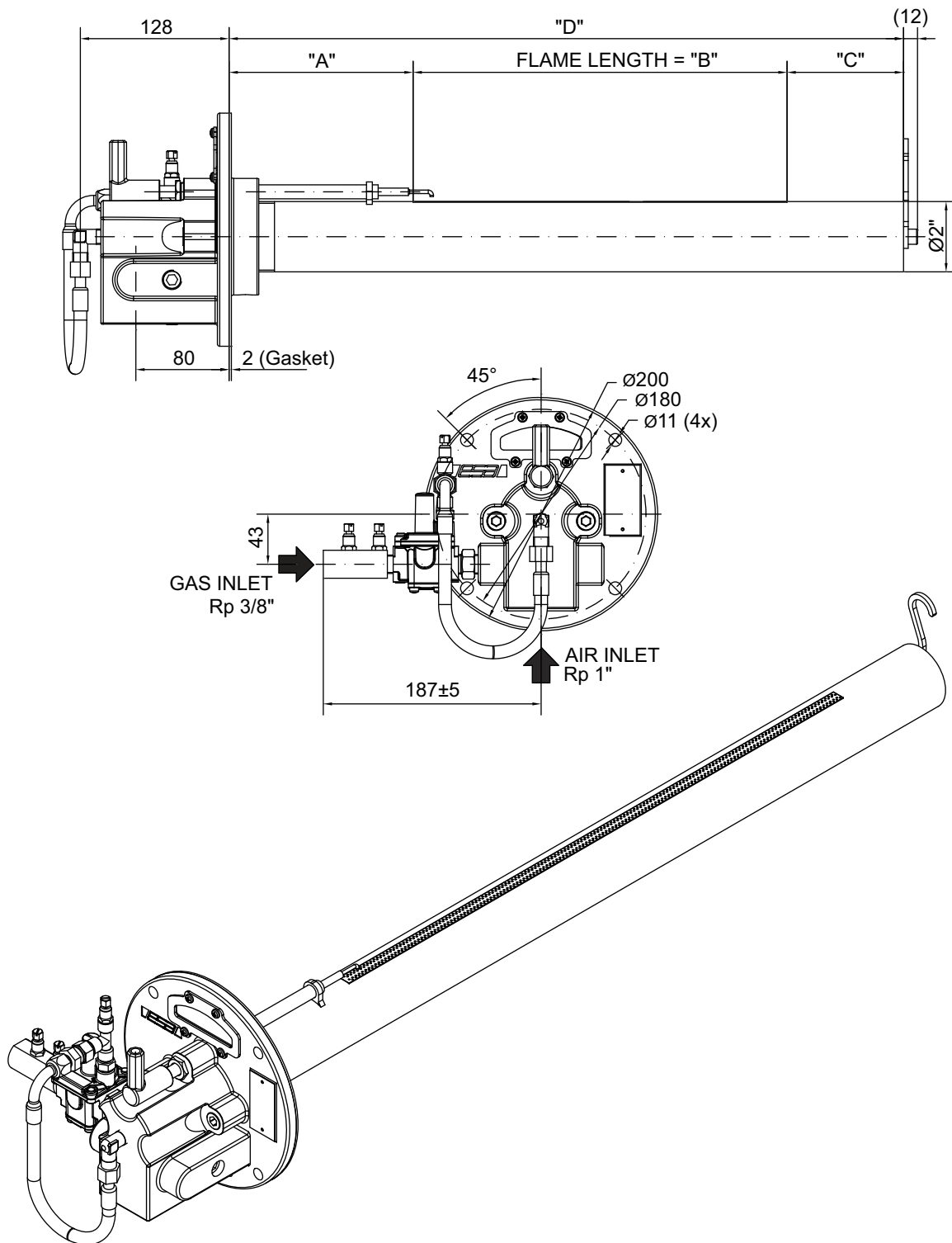
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**OVERALL DIMENSIONS - 12ABM**



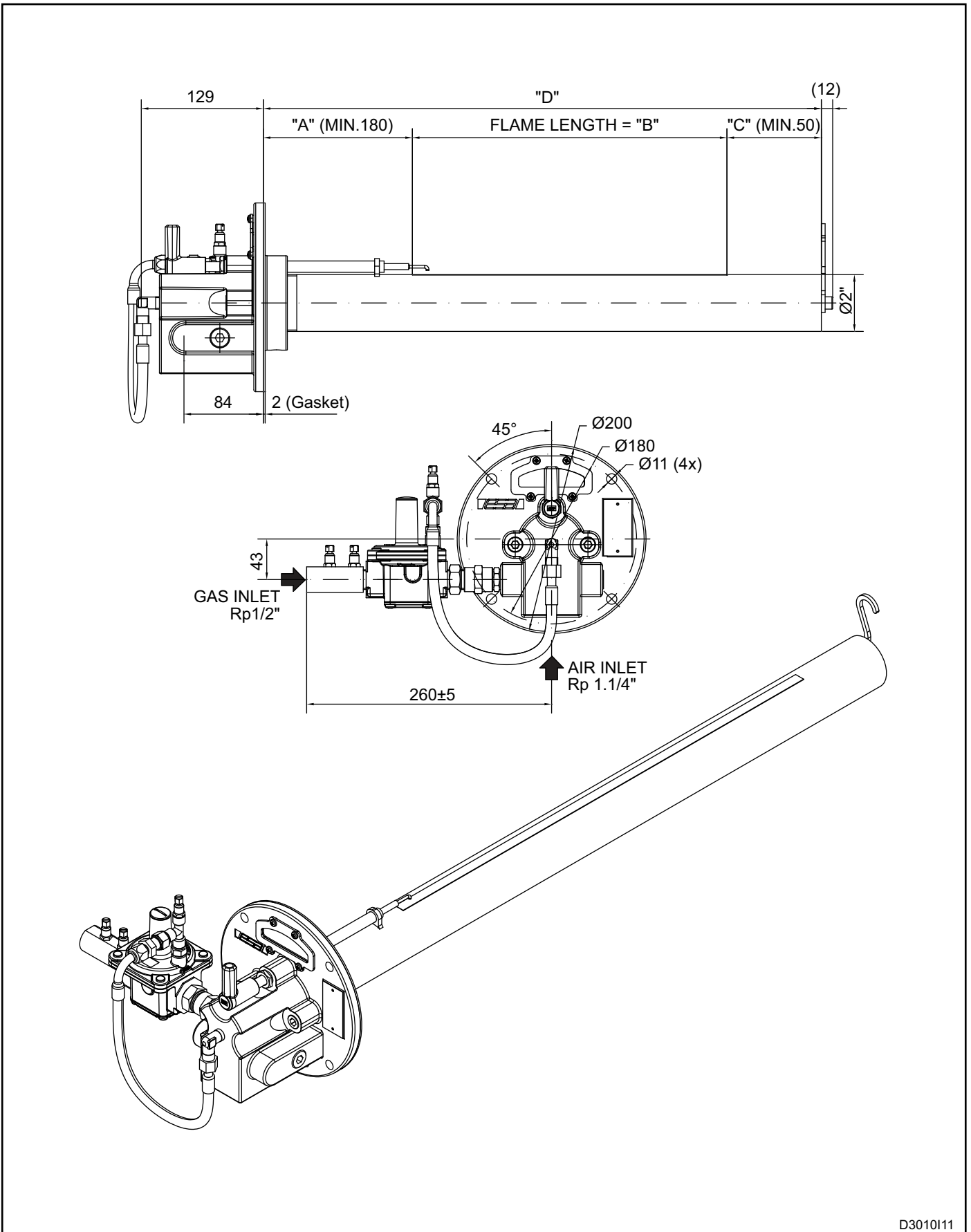
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**OVERALL DIMENSIONS - 16ABM**



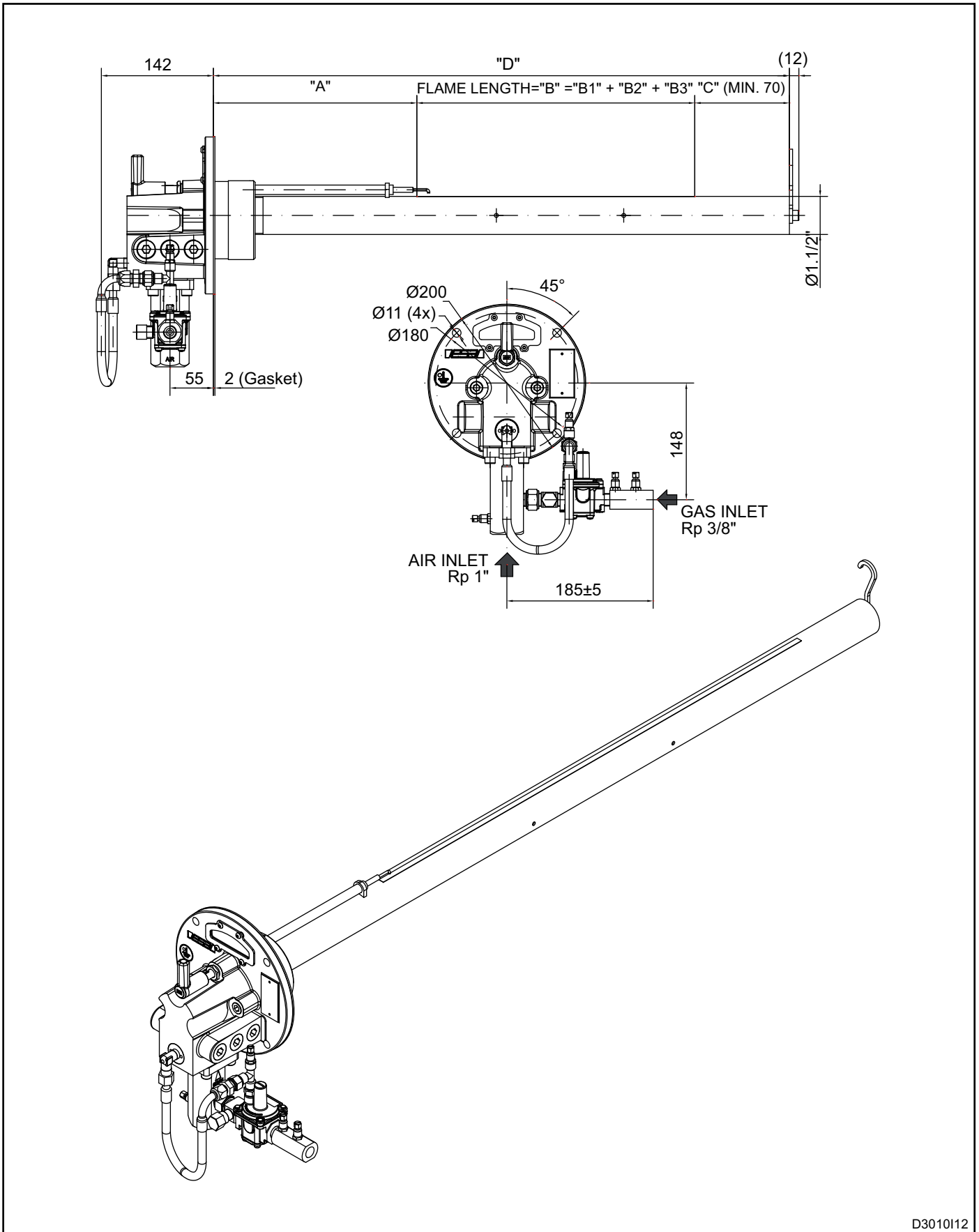
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**OVERALL DIMENSIONS- 20ABM**



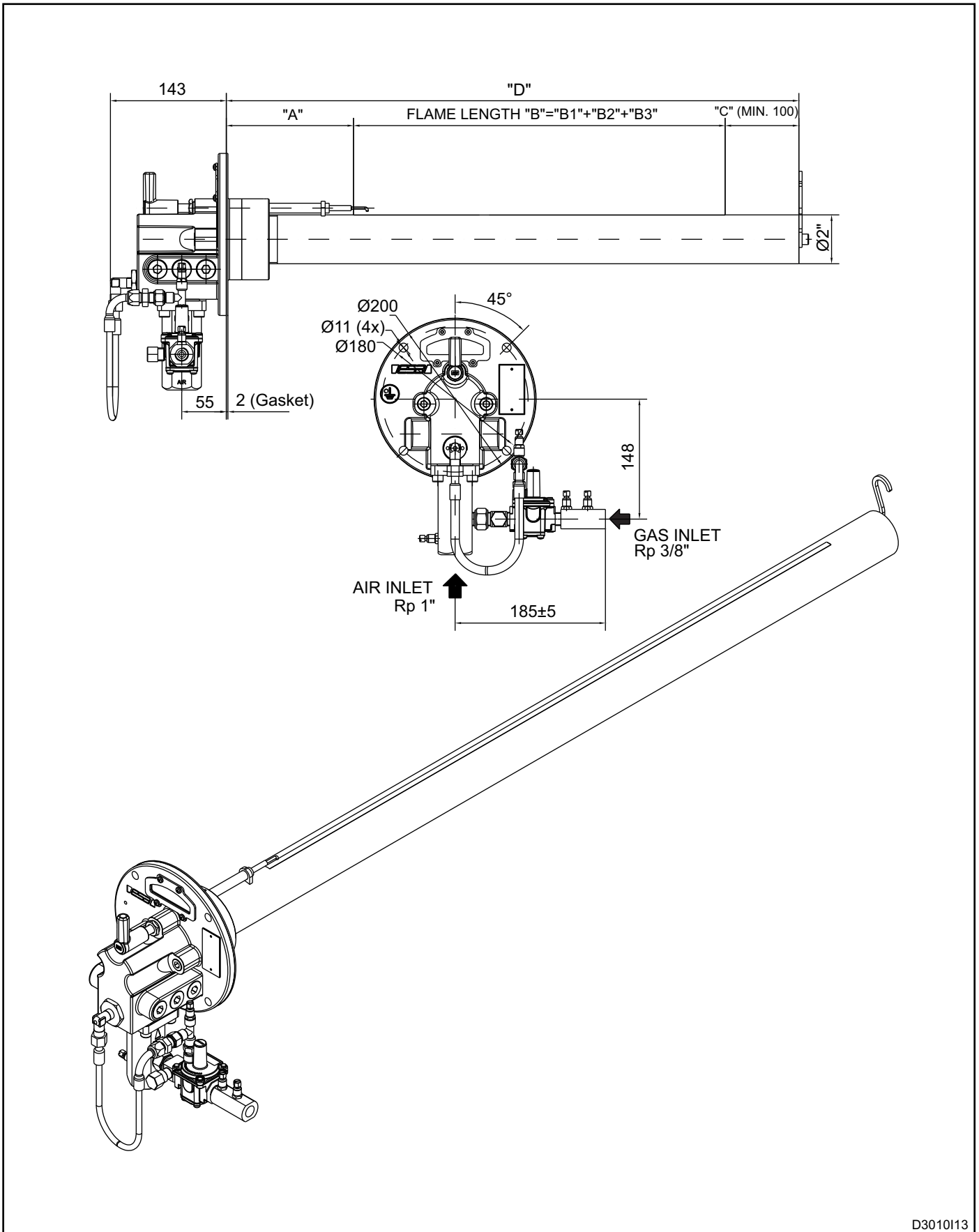
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**OVERALL DIMENSIONS - 12ABM THREE ZONES**



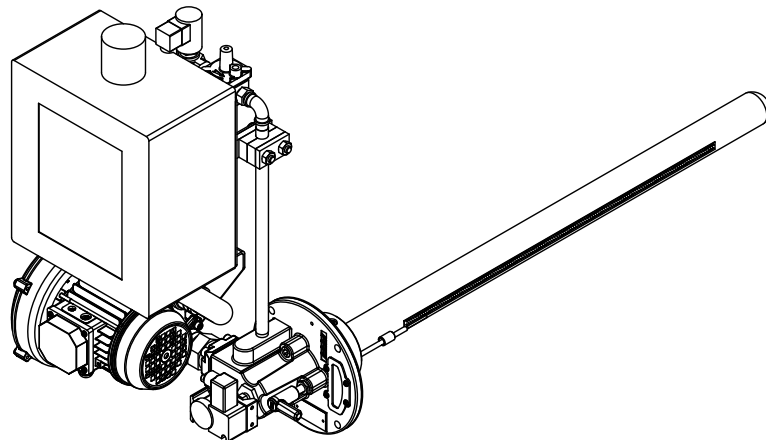
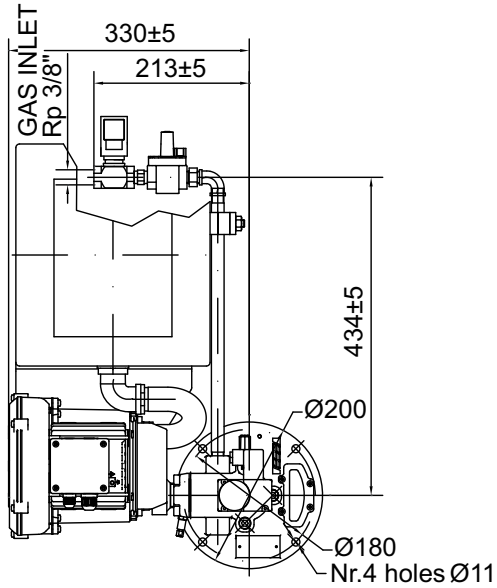
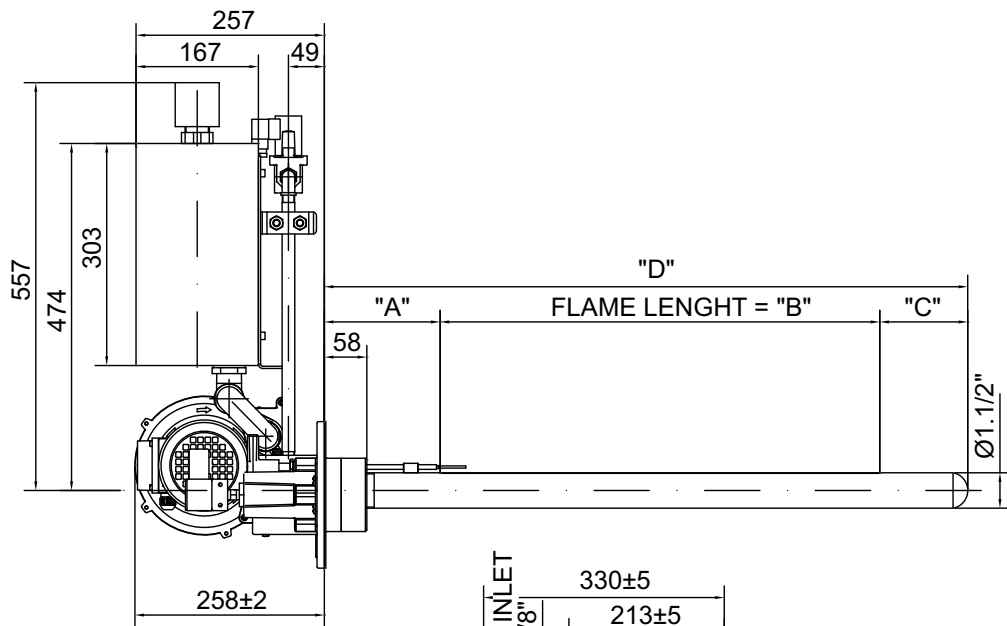
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**OVERALL DIMENSIONS - 16ABM THREE ZONES**



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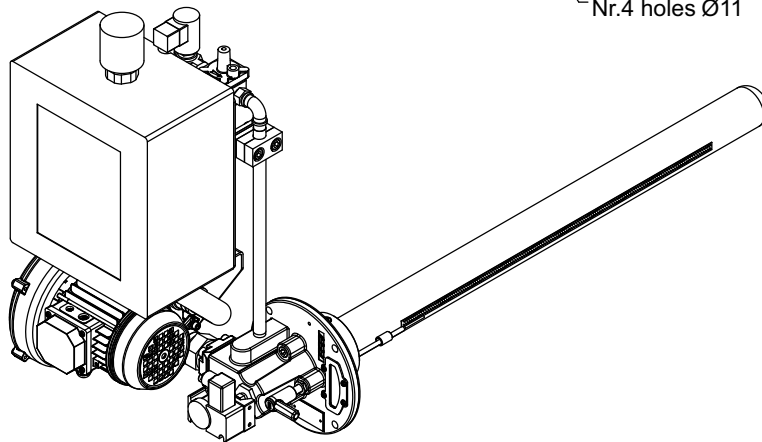
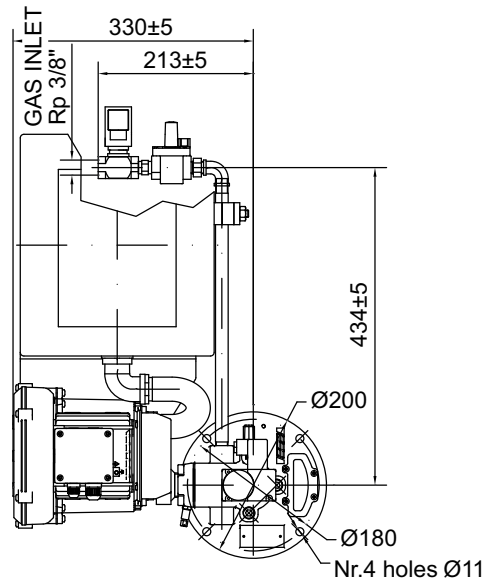
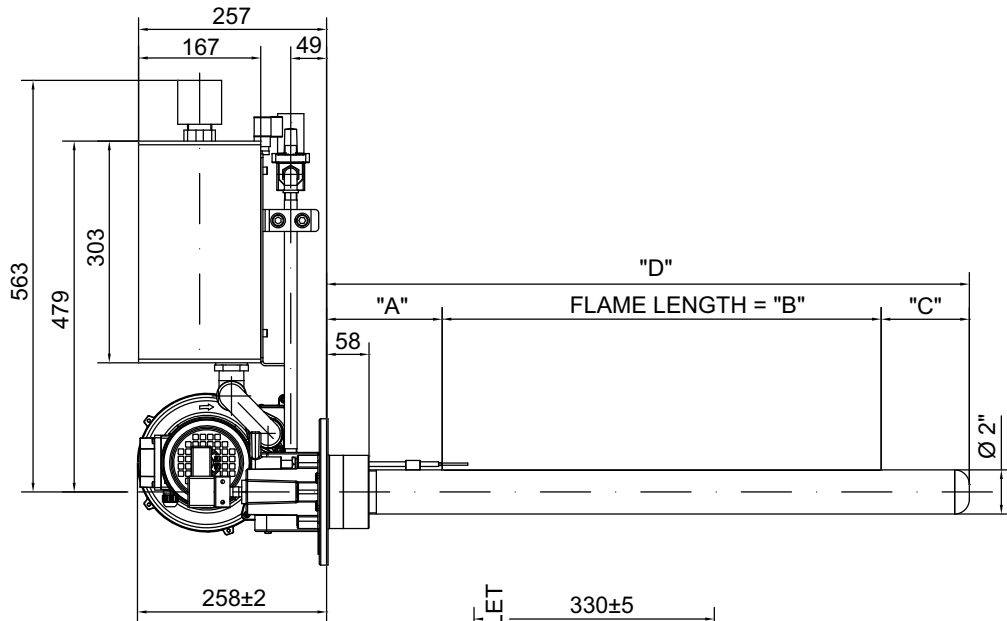
**OVERALL DIMENSIONS - 12ABM PACKAGE**



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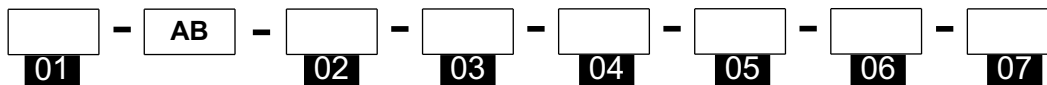


**OVERALL DIMENSIONS - 16ABM PACKAGE**



D3010115

**ORDERING CODE - BURNER SERIES AB (ONLY TUBE)**



Tube Diameter $\varnothing$		01
1"	8	
1.1/4"	10	
1.1/2"	12	
2"	16	
2.1/2"	20	

RLF		02
15 kW / 400÷1600 mm	RLF1	
30 kW / 400÷1600 mm	RLF3	
50 kW / 400÷1600 mm	RLF5	

Inlet zone "A"		03
Length	mm	

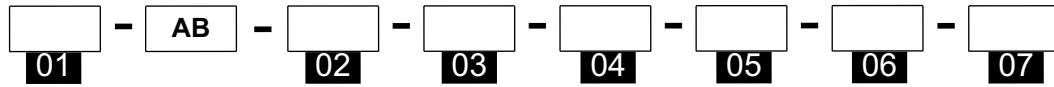
Flame front "B"		04
Length	mm	

Flame front "C"		05
Length	mm	

Material		06
Iron	Fe	
AISI 321	321	
AISI 316	316	

Inlet		07
Lateral	L	
Middle	M	

**ORDERING CODE - BURNER SERIES AB**



Tube Diameter ø		01
1"	8	
1.1/4"	10	
1.1/2"	12	
2"	16	
2.1/2"	20	

RLF		02
15 kW / 400÷1600 mm	RLF1	
30 kW / 400÷1600 mm	RLF3	
50 kW / 400÷1600 mm	RLF5	

Inlet zone "A"		03
Length	mm	

Inlet zone "B"		04
Length	mm	

Final zone "C"		05
Length	mm	

Flange type		06
Right	DX	
Left	SX	

Material		07
Iron	Fe	
AISI 321	321	
AISI 316	316	

**ORDERING CODE - BURNER SERIES ABM**



Tube Diameter $\varnothing$		01
1.1/2"	12	
2"	16	
2.1/2"	20	

Gas inlet		06
Right	RG	
Left	LG	

RLF		02
15 kW / 400÷1600 mm	RLF1	
30 kW / 400÷1600 mm	RLF3	
50 kW / 400÷1600 mm	RLF5	

Flame side		07
Left flame	LF	
Upper flame	UF	
Right flame	RF	

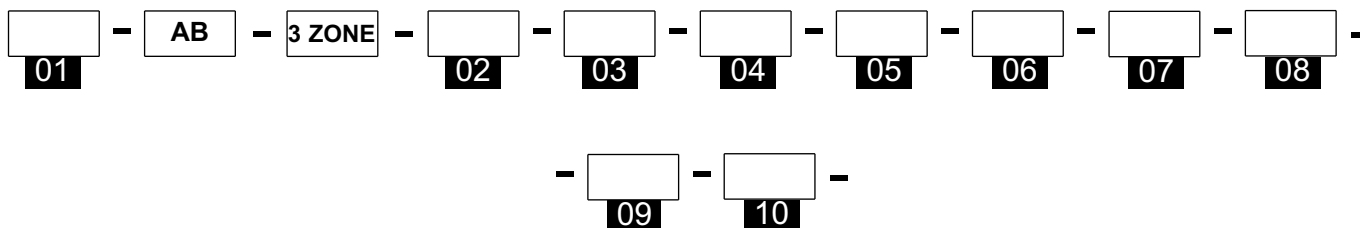
Inlet zone "A"		03
Length	mm	

Flame front "B"		04
Length	mm	

Material		08
Iron	Fe	
AISI 321	321	
AISI 316	316	

Final zone "C"		05
Length	mm	

**ORDERING CODE - BURNER SERIES 3 ZONES**



Tube Diameter $\varnothing$		01
1.1/2"	12	
2"	16	
2.1/2"	20	

Final zone "C"		07
Length	mm	

RLF		02
15 kW / 400÷1600 mm	RLF1	
30 kW / 400÷1600 mm	RLF3	
50 kW / 400÷1600 mm	RLF5	

Gas inlet		08
Right	RG	
Left	LG	

Inlet zone "A"		03
Length	mm	

Flame side		09
Left flame	LF	
Upper flame	UF	
Right flame	RF	

Flame front "B1"		04
Length B1	mm	

Flame front "B2"		05
Length B2	mm	

Material		10
Iron	Fe	
AISI 321	321	
AISI 316	316	

Flame front "B3"		06
Length B3	mm	