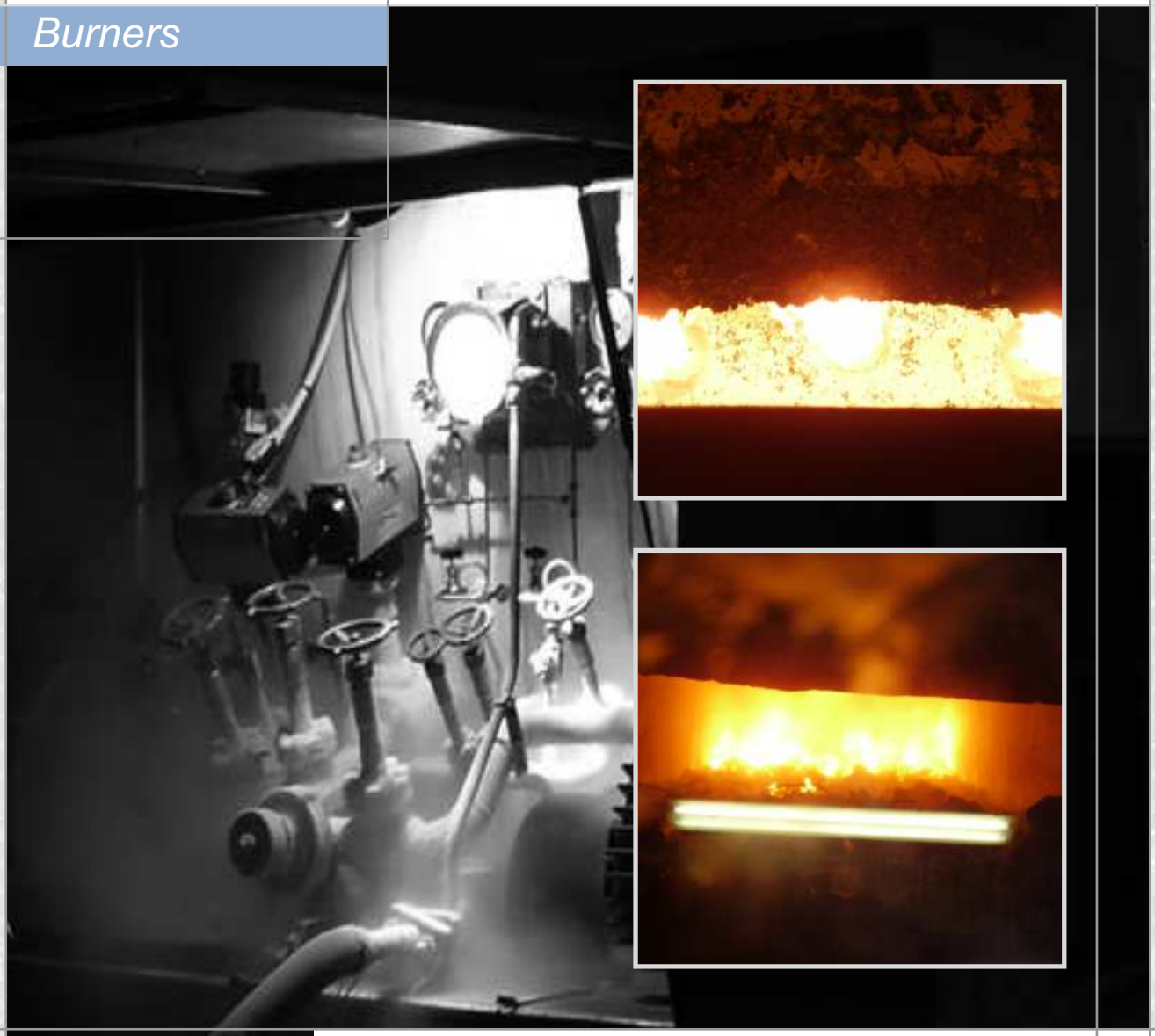
ESA PYRONICS INTERNATIONAL
SIAD Group

Burners



Oxy-fuel air-gas-oxygen

AGO-NxT (E3700AGO rev. 01 - 08/06/2011)

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 perfomances 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.

■ For ESA-PYRONICS, the NxT symbol has the following two meanings which are connected to each other:
NEXT GENERATION, or new generation burners that maintain functionality, reliability and performance.
NOx TECHNOLOGY energy saving and low polluting emissions.

CERTIFICATIONS:

EN746-2

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. These have been designed, produced, controlled and tested in accordance to the company's internal procedures for quality control, certified in conformity with the **UNI EN ISO 9001:2008** Norm by DNV Italia s.r.l.

The products conform to the Russian market requirements according to the **GOST** and **GOSGORTEKHNADZOR** certification.

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The AGO-NxT series identifies a family of lateral long flame combustion air, oxygen and fuel burners. According to the size and conditions of use, the AGO-NxT burners guarantee a substantial decrease in pollutant emissions (CO & NOx) and lower consumption compared with traditional burners and at the same offer considerable advantages in terms of heat process flexibility.

F3700AGOI03

APPLICATIONS

- Frit melting furnaces.
- Bath type melting furnaces.
- Walking beam furnaces
- Walking earth furnaces
- Pusher type furnaces
- Ladle/receiver heating furnaces

CHARACTERISTICS

GENERAL:

- Capacity: from 700 to 4400 kW
- Burner air pressure: 50 mbar
- Gas pressure to burner: 50 mbar min
- O2 pressure to burner: 200 mbar min
- Double combustion mode:
  - **FLAME** with UV detection
  - **FLAMELESS** for ULTRA LOW NOx emission
- Low NOx e CO content with air/fuel functioning
- NOx content O2 purity function (min.90%), process temperature and stoichiometric ratio regulation.
- Flow ratio 5 : 1
- Maximum use temperature: 1600°C

MATERIAL COMPOSITION:

- Burner body: carbon steel
- Gas collector: cast iron G25
- Air diffuser: refractory cement (T.max=1750°C)
- Gas/oxygen tube: AISI304/AISI310S
- O2 collector AISI304/316

F3700AGOI04

CAPACITY PARAMETERS AND FLAME LENGTH

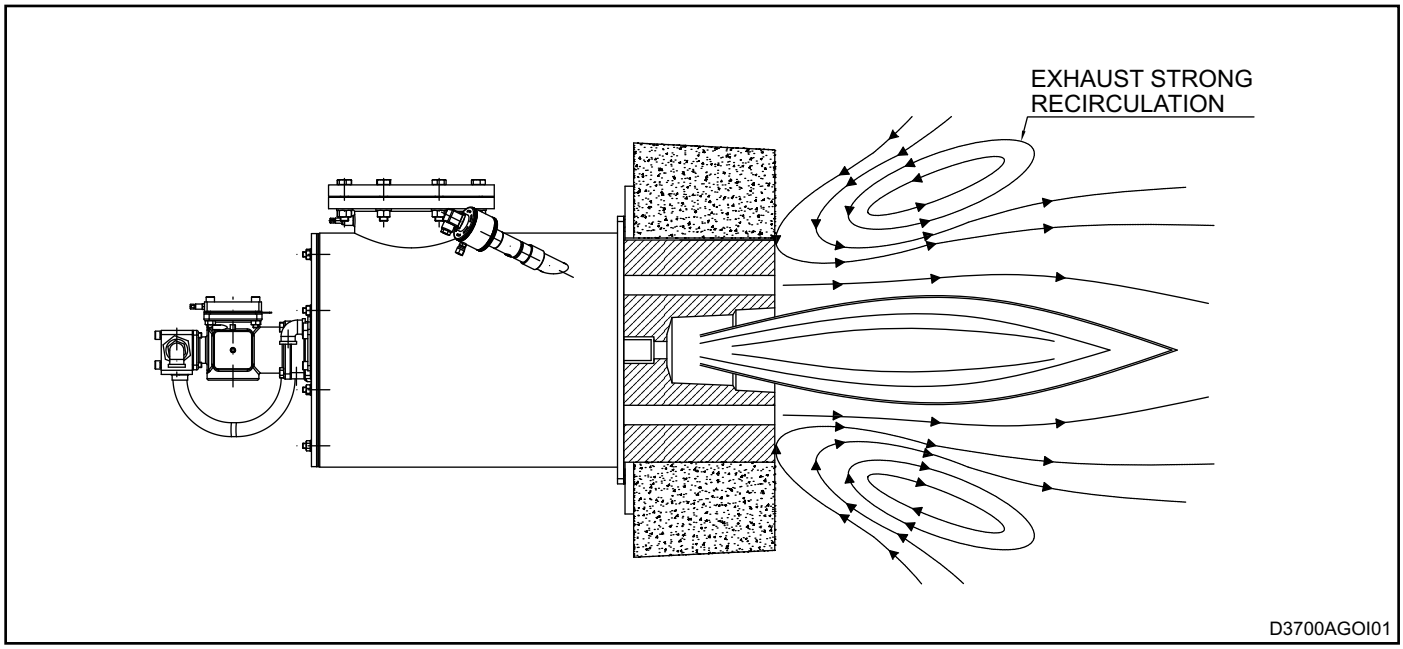
AGO-NxT burner ignition takes place by means of a PBC-FR/X pilot burner. The detection instead, is performed via a UV sensibility probe (not included in the supply). The use of flame control systems is highly recommended in all plants that operate at temperatures lower than 750°C (UNI EN746-2 Norm).

Model	Capacity kW	Flame Length mm	Ignition	Detection
AGO-7-NxT	700	2200	42PBC-FR/X	UV-2
AGO-8-NxT	1000	3000	42PBC-FR/X	UV-2
AGO-9-NxT	1500	4000	64PBC-FR/X	UV-2
AGO-10-NxT	2000	4800	64PBC-FR/X	UV-2
AGO-11-NxT	2800	5800	86PBC-FR/X	UV-2
AGO-12-NxT	3600	6500	86PBC-FR/X	UV-2
AGO-13-NxT	4400	7200	86PBC-FR/X	UV-2

DESCRIPTION

The AGO-NxT burners are LOW NOx for which the most recent technical improvements have been applied to guarantee low NOx and CO emissions, remaining, however, functional even at low chamber temperatures during ignition when the plant is cold. The AGO-NxT air-oxygen-fuel burner series can be used in air-fuel mode, oxygen -fuel mode as well as in “mixed” air-oxygen-fuel mode.

These burners have been conceived for the generation of a lengthened flame and medium/high temperatures both when used as a “traditional” air burner as well as when used in oxygen mode. The burners are solid and robust with limited dimensions and weight, with separate air, oxygen and gas inlets, nozzle mixing (where flame backfire is imposible).



Multistage technology together with high flue gas recirculation, guarantees low NOx e CO emissions.

When it is necessary the FLAMELESS version satisfies the strictest standards in terms of emission, maintaining however, the same air, oxygen and gas feeding pressures as the standard version.

BURNER PERFORMANCE

The capacities, flame lengths and velocites refer to a burner fed by natural gas (8600 Kcal/Nm³), placed in a combustion chamber at zero pressure above sea level.

- MIN/MAX functioning (ON/OFF)
- Chamber temperature1200°C
- O_2 fume content ≃ 2%

MAXIMUM CAPACITY - AIR/NG

Parameter			Burner model						
			AGO-7	AGO-8	AGO-9	AGO-10	AGO-11	AGO-12	AGO-13
Max. capacity	**Burner capacity**	**[kW]**	700	1000	1500	2000	2800	3600	4400
	Combustion air flow	[Nm³/h]	770	1100	1650	2200	3080	3960	4840
	Natural gas flow	[Nm³/h]	70	100	150	200	280	360	440
	Burner inlet air pressure	[mbar]	50						
	Burner inlet gas pressure	[mbar]	50						

MINIMUM CAPACITY - AIR/NG

Parameter			Burner model						
			AGO-7	AGO-8	AGO-9	AGO-10	AGO-11	AGO-12	AGO-13
Min. capacity	**Burner capacity (2% O_2)**	**[kW]**	120	170	250	350	470	600	730
	Combustion air flow	[Nm³/h]	132	187	275	385	517	660	800
	Natural gas flow	[Nm³/h]	12	17	25	35	47	60	73
	Burner inlet air pressure	[mbar]	1.5						
	Burner inlet gas pressure	[mbar]	1.5						

MAXIMUM CAPACITY - O_2/NG

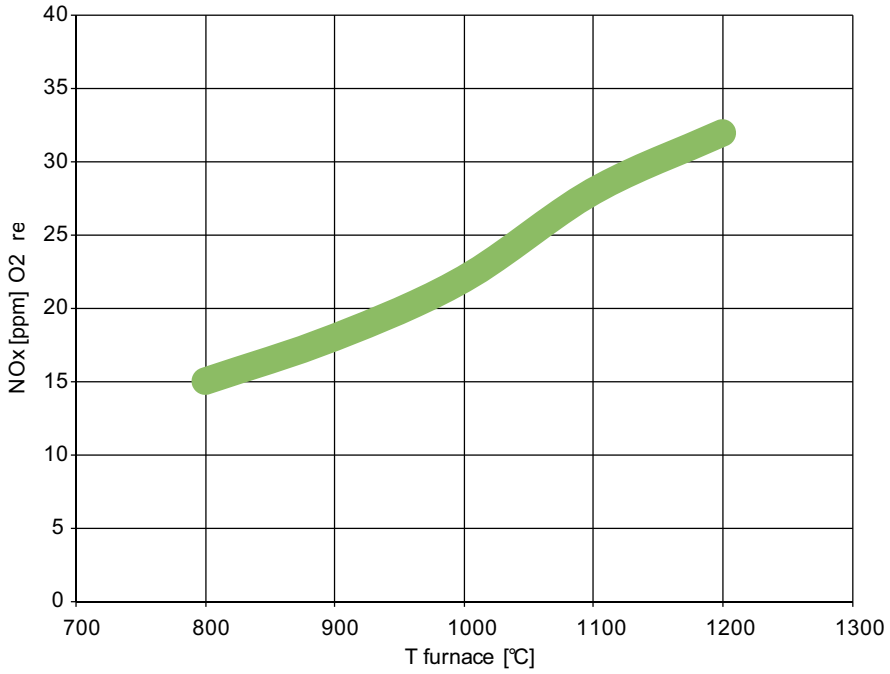
Parameter			Burner model						
			AGO-7	AGO-8	AGO-9	AGO-10	AGO-11	AGO-12	AGO-13
Max. capacity	**Burner capacity (2% O_2)**	**[kW]**	700	1000	1500	2000	2800	3600	4400
	Oxygen flow	[Nm³/h]	143	210	315	420	588	756	924
	Natural gas flow	[Nm³/h]	70	100	150	200	280	360	440
	Burner O_2 inlet pressure	[mbar]	200						
	Burner inlet gas pressure	[mbar]	50						

MINIMUM CAPACITY - O_2/NG

Parameter			Burner model						
			AGO-7	AGO-8	AGO-9	AGO-10	AGO-11	AGO-12	AGO-13
Min. capacity	**Burner capacity (2% O_2)**	**[kW]**	120	170	250	350	470	600	730
	Oxygen flow	[Nm³/h]	25	36	53	74	99	126	153
	Natural gas flow	[Nm³/h]	12	17	25	35	47	60	73
	Burner O_2 inlet pressure	[mbar]	8						
	Burner inlet gas pressure	[mbar]	1.5						

NOx EMISSIONS CHART

STANDARD COMBUSTION (FLAME) - AIR / FUEL



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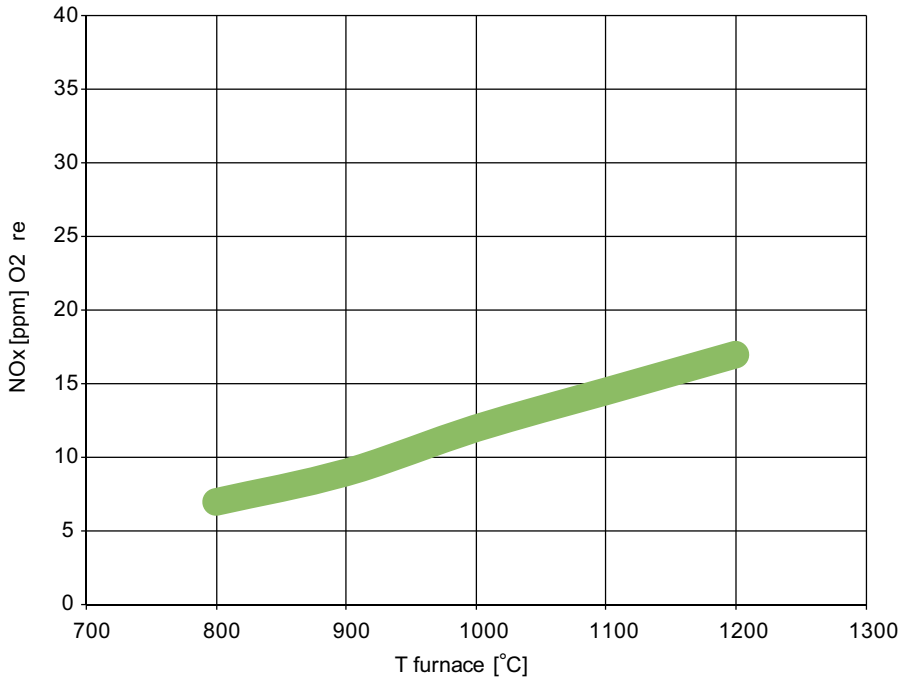
FLAMELESS COMBUSTION (FLAMELESS) - AIR / FUEL



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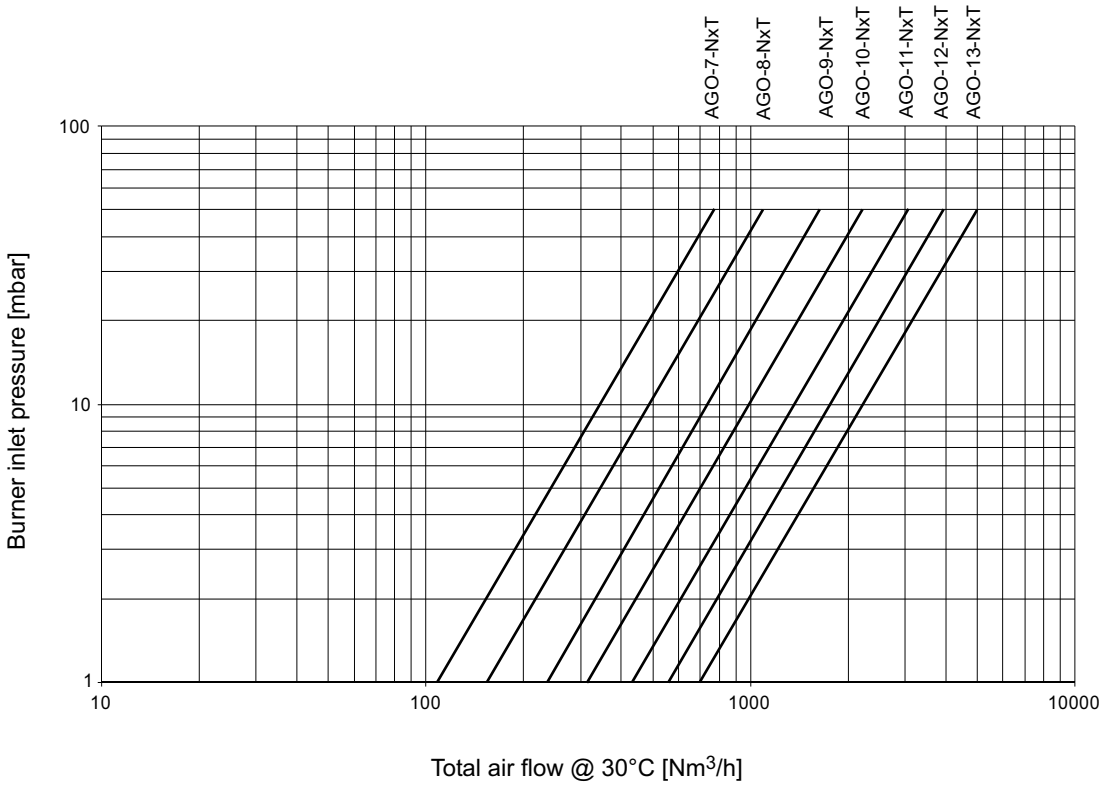
Burner at 100% capacity with 10% excess air
The emission value is subject to cariations depending on certain factors such asi:
- Furnace working temperature.
- Heated air temperature.
- Excess air
- Fuel chemical composition.

The guaranteed value will therefore be established, according to each specific case and depending on indications given by the client.

CAPACITY DIAGRAM



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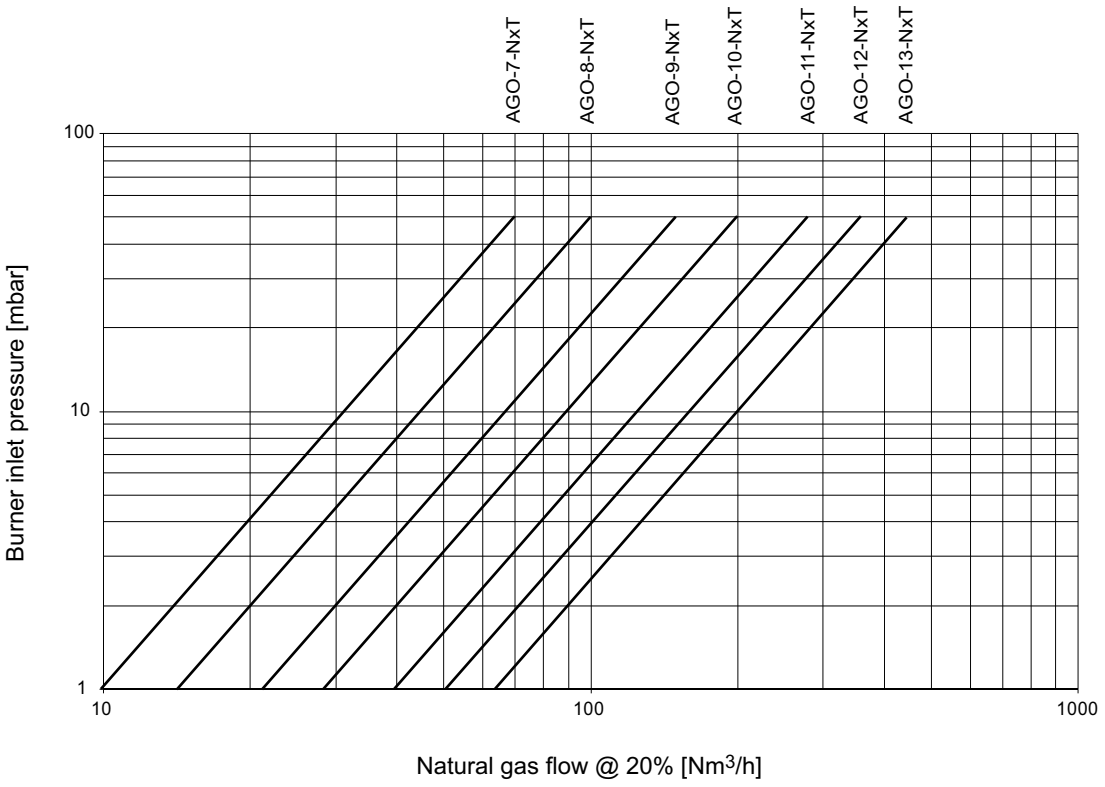

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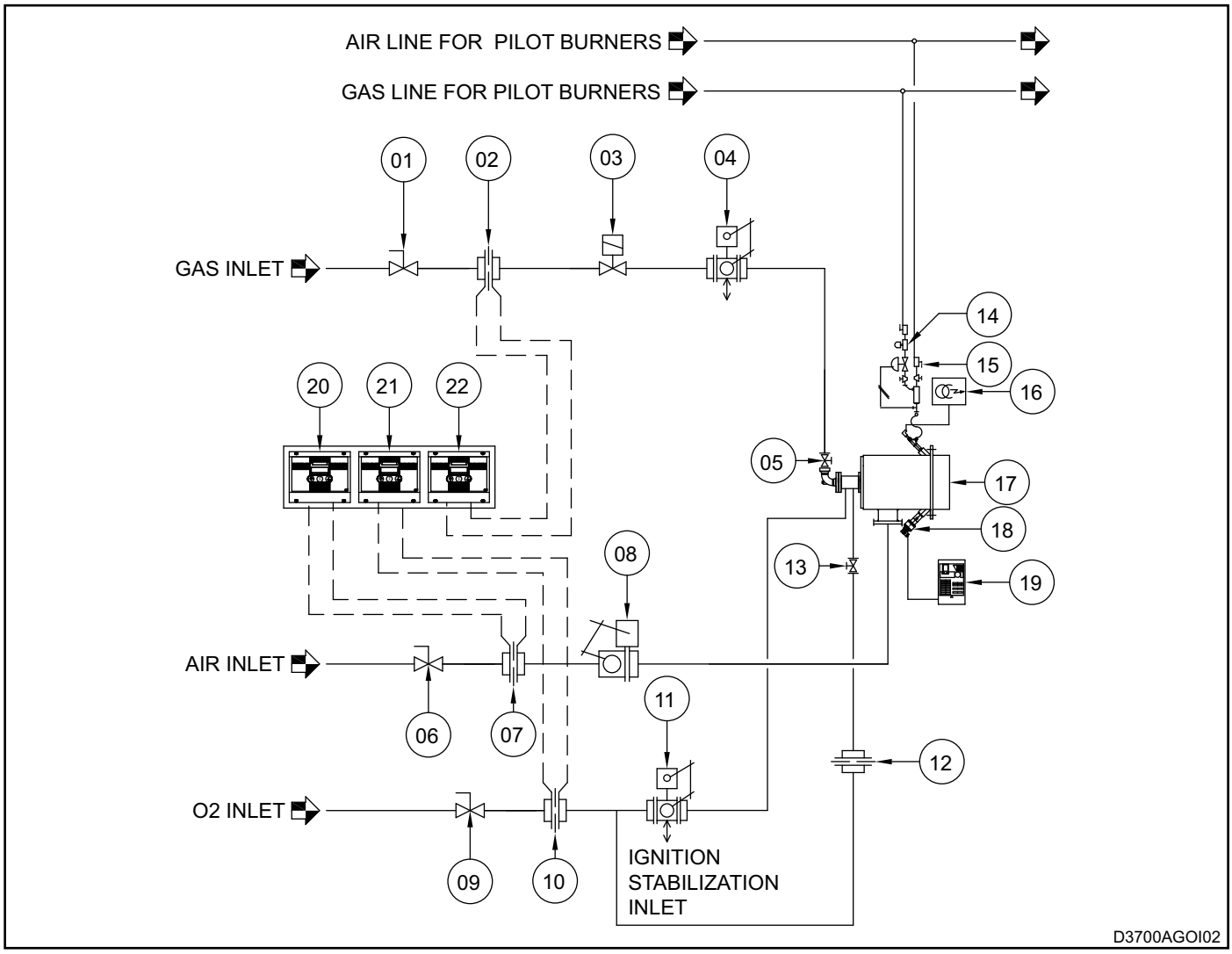
FLOW SCHEME - ZONE REGULATION



Pos.	Description	Incluso	Non Incluso
1	Gas interception ball valve		X
2	ΔP measurement calibrated air flange		X
3	Gas safety solenoid valve		X
4	Modulant gas valve		X
5	Gas passage limiting device		X
6	Air interception valve		X
7	ΔP measurement calibrated air flange		X
8	Modulant air valve		X
9	Oxygen interception valve		X
10	ΔP oxygen calibrated flange		X
11	Modulant oxygen valve		X
12	O_2 reading calibrated flange purge		X
13	O_2 regulation valve purge		X
14	Pilot gas solenoid valve		X
15	Pilot air interception valve		X
16	Pilot burner ignition transformer		X
17	AGO-NxTburner	X	
18	Flame detection probe		X
19	Flame control device		X
20	AIr pressure transmitter		X
21	Oxygen pressure transmitter		X
22	Gas pressure transmitter		X

WARNINGS

■ The AGO-NxT burner series in intended to be used for fixed installations.

■ Burner ignition must always be carried out at minimum power and then modulating towards maximum power, thus facilitating ignitions and reducing outlet overpressure.

■ For all low temperature applications (upto 750°C), burner ignition and the fuel gas solenoid valve commands must be caried out using a certified burner control device.

■ Check that feeding lines are correctly connected after installation. Before switching on the burner check that the oxygen, air and fuel gas pressures are correct.

■ The burner may function within a different power range compared to what has been indicated in the present document, provided that it has been suggested by ESA-PYRONICS according to the known working pressure conditions. Functioning at excessive pressures could compromise the burner performance and its lifespan. In which case the genera warrantee conditions will automatically expire and ESA-PYRONICS will decline any responsibilty of possible damage to persons and objects.

■ If there should be any problems with other devices during the burner start-up phase, for the connection of the high tension cable to the electrode, use the connector with an antidisturbance filter.

■ Avoid burner ignition close to each other so as not to overheat the ignition command system devices (solenoid valves and transformers). Prewash time lapse + first safetytime 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 AGO-NxTburner series is generally wall or crown mounted.

The light made for the burner positioning must leave space around the actual burner which is then to be filled with ceramic fibre cushion. (see special technical data sheet).

The use of flexible pipes in AISI is compulsory for the connectionof the air, oxygen and gas lines to the burner. The inlets have flanges (UNI or ESA-PYRONICS) or threaded according to the burner size.

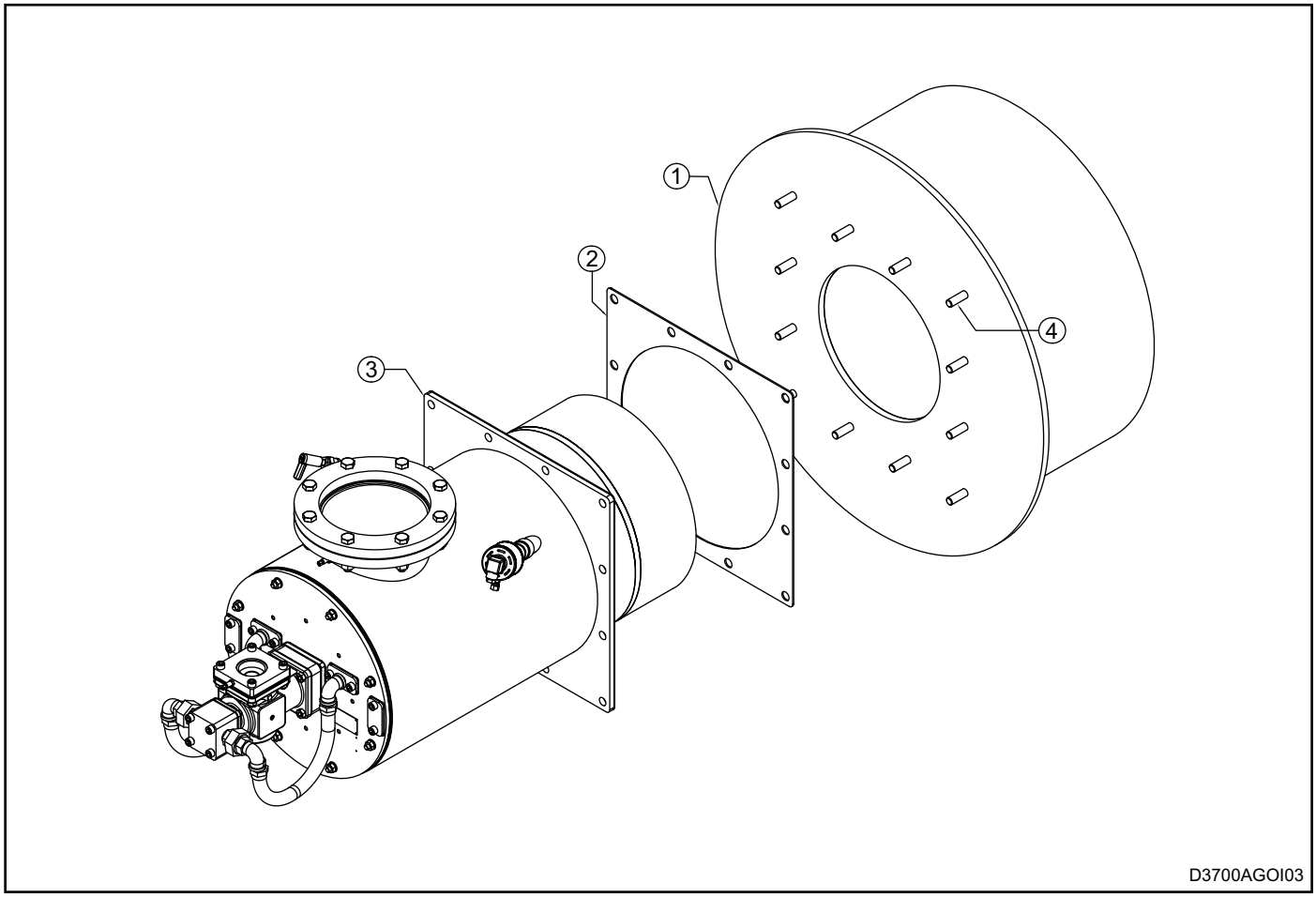
For installation, carefully carry out the following instructions:

1 - insert the burner body gasket **(pos.02)** on the wall of the furnace **(pos.01).**

2 - lift the burner up **(pos.03)** and fix it to the stud bolts **(pos.04**), checking that the gasket **(pos.02)** has not moved and is not deformed.

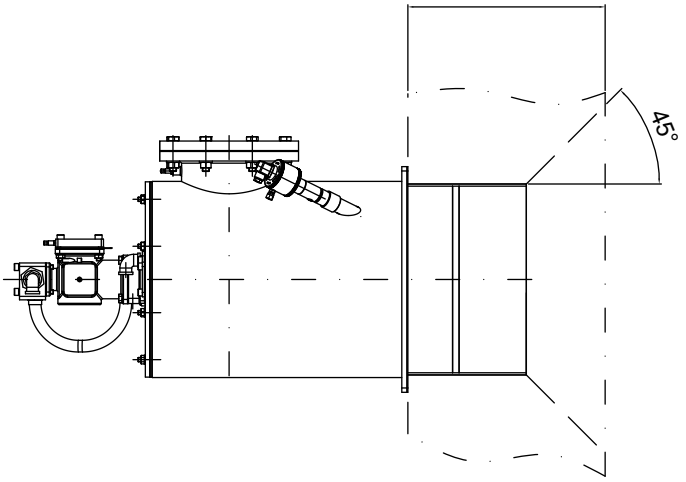
3 - tighten the anchor bolts.

4 - connect the oxygen lines to the burners and weld the air and fuel gas flanges to the piping.

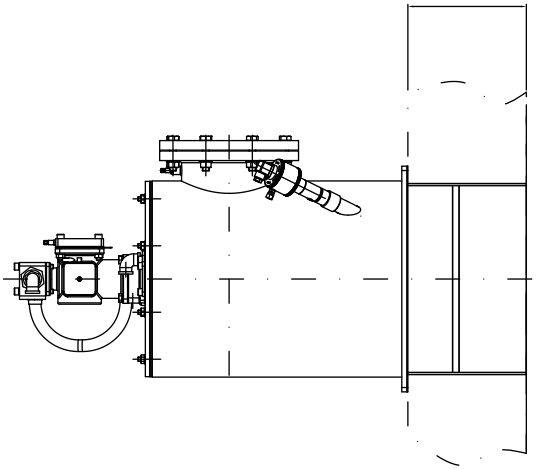


INSTALLATION CARD ON FURNACE WALL

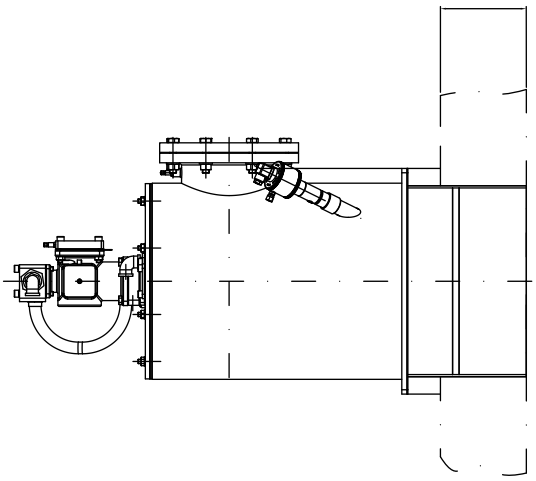
WALL THICKNESS > DIFFUSER LENGTH



WALL THICKNESS = DIFFUSER LENGTH



WALL THICKNESS < DIFFUSER LENGTH



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START-UP - SETTING

The procedures indicated in the following chapter must be carried out by expert technicians or qualified personnel. The non-observance of the instructions given may lead to dangerous conditions.

1 - Check that the air, oxygen and fuel gas feeding pressures are within the allowed range or within the range expected during design phase.

2 - Adjust the working pressure and the safety device pressure of the combustion plant, whether there is one per burner or one for the whole plant i.e. gas pressure reduction gear, block valve, relief valve, pressure switches etc. Simulate the intervention of all the safety devices including the intervention of the safety over temperature, checking that the fuel safety block devices react properly.

3 - Activate the burner control device and attempt the pilot burner (*) ignition until it switches on. While attempting to ignite the burner, act on the gas regulation valve and, starting from the totally closed position, open it gradually until the main burner ignites.

4 - Repeatedly attempt ignition at minimum burner power, with maximum amplitude, to check the ignition reliability and flame stability during regulation.

(*) For pilot burner ignition and setting, please refer to n. E3280 technical data sheet.

GENERAL MAINTENANCE PLAN

Operation	Type	Advised time	Notes
Pilot burner high tension electrode connector	O	annual	check the integrity of the outer plastic and oxidization of the internal connector and of the electrode terminal
Pilot burner ignition electrode	O	annual	replace if the kantal termial is worn
Air diffuser integrity	E	annual	at every maintenance check with furnace turned off, from the inside, make sure there are no cracks in the refractory material. Any cracks must be filled with special refractory material or liquid fibre.
Cleaning of uv-scanner watch glass	O	every semester	reduce to quarterly check in dusty environments.
Uv-scanner replacement	O	10.000 h. of functioning	in any case every two years.
Replacemnet of gas and oxygenside gaskets (*)	O	every two years	see note
Burner setting	O	annual	repeat the steps in the 'START-UP AND SETTING' section.
Oil lance check	O	annual	Check that the compressed air and oil holes are not occluded.

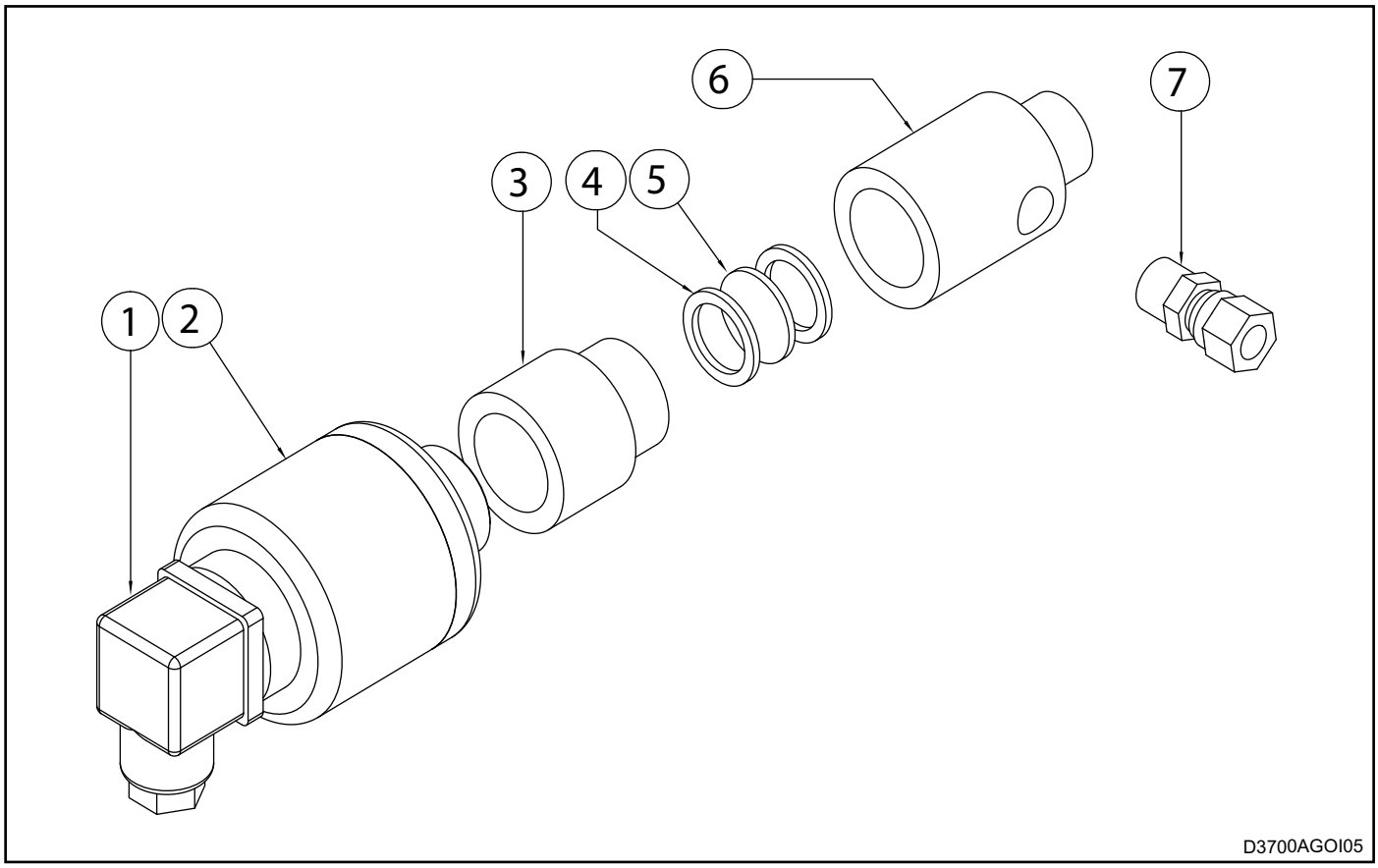
NOTES:
Key: O = ordinary / E = extraordinary
(*) it is suggested that the gaskets on the gas side be replaced each time the gas feeding line is dismantled and that high temperature gaskets be used.

ORDINARY MAINTENANCE

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

CLEANING OF UV-SCANNER WATCH GLASS

1 - Check that the burner control device is not connected.
2 - Disconnect power supply to the uv-scanner **(pos.01)** and the cooling line (where present **pos.07).**
3 - Unscrew the aluminium pipe fitting **(pos. 06)** at the base of the gas collector, removing the uv-scanner with its spacer.
4 - Unscrew the aluminium fitting from the insulation teflon connector **(pos. 03)** and remove the quartz watch glass **(pos. 05).**
5 - Clean the quartz watch glass with a damp cloth and proceed to reassemble everything making sure that both the glass as well as the gaskets are put back in the correct positions **(pos. 04)** between the aluminium teflon spacer, before tightening.
6 - Restore the cooling hoses and power connection.
7 - Check the correct flame detection of the uv-scanner.



EXTRAORDINARY MAINTENANCE

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

BRUCIATORE IN BLOCCO

In burner lockout conditions refer to the indications of the burner control device as well as the relative manual to identify the cause. After this, the main cases have been indicated below:

■ **Illegal flame detection:** lockout due to illegal flame signal detection during the phases that precede the ignition or following the switching off. The causes could be due to the detection system (broken sensor or presence of humidity), or else in the gas drawn by the safety solenoid valve which allows the burner to remain on.

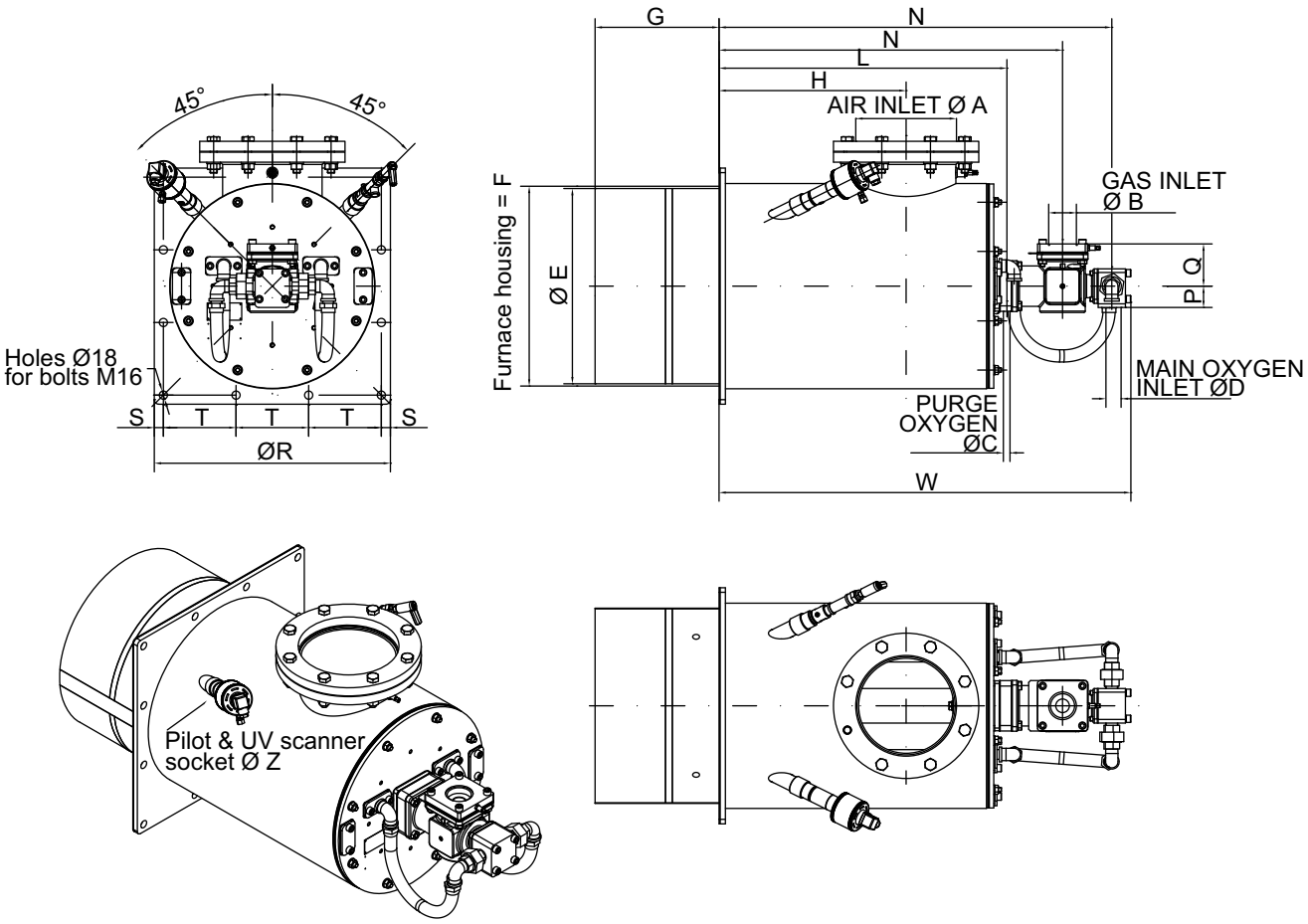
■ **Ignition failure:** lockout due to missing flame formation during start-up. The causes could be due to the ignistion system (missing spark, broken electrodes or electrodes not in correct position), in bad regulation of the flow fuel or combustive agents or in the detection system (broken sensor or interrupted cables). Specifically, in the first two cases the flame does not trigger off, whilst in the last case, the flame forms but the burner control device is unable to detect it.

■ **Flame signal loss:** lockout due to flame signal loss during the normal functioning of the burner. The causes may be found in the regulation of the fuel flow or combustive agents (rapid flow variations, regulation out of allowed range) or in the detection system (broken, dirty or badly positioned sensors).

UV-SCANNER REPLACEMENT

1 - Check that the burner control device is not connected.
2 - Disconnect the electrical flow to the uv-scanner and to the cooling line (where present).
3 - Unscrew the aluminium pipe fitting at the base of the gas collector, removing the uv-scanner with its spacer.
4 - Screw the new component back on, in the same position, after having checked the correct position of the watch glass insulation between the aluminium and teflon spacers.
5 - Restore the cooling pipes and the electrical connection.
6 - Check the correct uv-scanner flame detection..

OVERALL DIMENSIONS - AGO-NxT



Burner model	DN "A"	DN "B"	øC	øD	øE [mm]	øF [mm]	G [mm]	H [mm]	L [mm]
AGO-7-NxT	150	40	Rp 3/8"	Rp 1.1/2"	364	384	263	387	602
AGO-8-NxT	200	50	Rp 3/8"	Rp 1.1/2"	430	450	273	412	657
AGO-9-NxT	250	65	Rp 1/2"	Rp 2"	524	544	348	442	678
AGO-10-NxT	300	65	Rp 1/2"	Rp 2"	580	600	368	472	767
AGO-11-NxT	350	80	Rp 3/4"	DN65	700	720	368	488	790
AGO-12-NxT	400	80	Rp 1"	DN80	760	780	397	563	954
AGO-13-NxT	400	100	Rp 1.1/4"	DN80	865	890	417	613	958

Burner model	M [mm]	N [mm]	P [mm]	Q [mm]	□ R [mm]	S [mm]	T [mm]	W [mm]	øZ [mm]	Massa [Kg]
AGO-7-NxT	695	803	45	71	450	15	140	732	Rp 3/4"	146
AGO-8-NxT	750	858	45	89	520	20	160	785	Rp 3/4"	201
AGO-9-NxT	825	940	65	89	630	30	190	941	Rp 1"	342
AGO-10-NxT	933	1050	65	115	680	25	210	1050	Rp 1"	429
AGO-11-NxT	976	1102	80	115	810	30	250	1135	Rp 1.1/4"	608
AGO-12-NxT	1105	1220	80	115	900	30	280	1317	Rp 1.1/4"	803
AGO-13-NxT	1132	1269	80	115	980	25	310	1335	Rp 1.1/4"	1000

ORDERING CODE - COMPLETE BURNER

AGO - [01] - NxT - [02] - [03] - [04] - [05] - [06] - [07]

01 Model	
AGO-7-NxT	**7**
AGO-8-NxT	**8**
AGO-9-NxT	**9**
... (see capacity chart)	**.....**

02 Fuel	
Natural gas	**CH4 ***
LPG	**GPL**
Poor gas ([1])	**GP**

04 Ignition	
Pilot	**P***
Without Ignition	**NI**

05 Flame detection	
UV flame detection	**UV***
Without flame detection	**ND**

06 Flame mode	
Standard burner	**F***
Flameless burner	**FL**

07 Flangiatura tipo	
According to ESA drawing	**E***
According to CLIENT drawing	**C**

The codes indicated with an asterisc (*) identify the standard items.s

Note:

[1] Special manufacturing according to the characteristics of the type of gas used

ESA worldwide distribution

AUTHORIZED DISTRIBUTION STAMP

If you have any doubt about the qualification or identity of the distributor, please check that they appear on our website ***www.esapyronics.com*** *in the Sales Contacts section, or contact us directly at* ***esa@esacombustion.it***

ESA PYRONICS INTERNATIONAL
SIAD Group

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