

The NOx-Beta burner has been designed to significantly reduce thermal NOx production from the combustion reaction whilst retaining excellent characteristics and without loss of performance.

The range is divided into two versions, a cold air and a preheated air version. All versions exhibit excellent stability from cold light up. The burners are of robust construction and can be applied to a wide range of thermal processes.

All burners are suitable for gaseous or liquid fuel operation except the model 200, which is a gas burner only.

Thermal outputs of 600kW to 6MW are available with oil firing and from 200kW to 6MW on gas firing, with either cold or preheated air.

The burner has been designed to operate with preheated combustion air up to 350°C as standard and up to 600°C as an option.

The NOx-Beta low emission burners use a combination of air staging and partial fuel/air premixing to reduce NOx emissions.

The very low level of NOx, achieved by the NOx-Beta burner, lies predominantly in the relatively low temperatures reached in the combustion zone. The level of air staging is high and, in order to retain good flame characteristics, the staged air is injected at high velocity.

**Combustion Characteristics**

The air staged design of the burner means that the flame characteristics on fuels such as Natural Gas, are unlike a conventional non-staged burner.

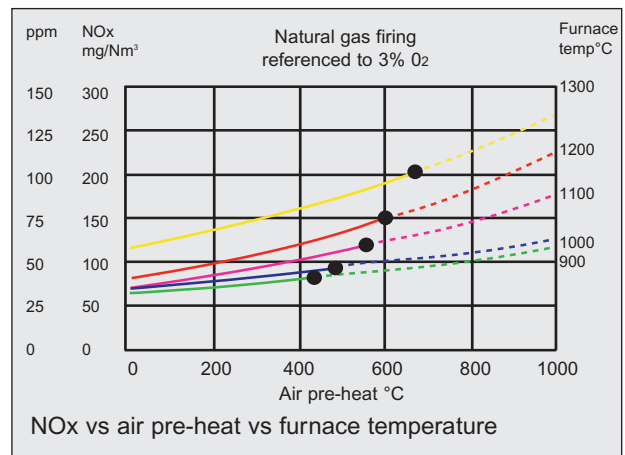
Natural Gas flames are blue to transparent at furnace temperatures below 900°C with oxygen levels in the furnace of less than 4%. Some colouration of the flame becomes apparent at a higher furnace temperature and/or higher O2 levels. Operation on fuel oil gives a flame more closely resembling that of a conventional burner.

**NOx-Beta – Features**

- Ultra low NOx – without any performance loss
- Staged air principle – no external NOx reducing devices or FGR needed
- Robust, well engineered construction
- Cost effective and simple to install
- Application temperatures to 1,600°C
- Standard air preheat temperatures to 350°C
- Option of air preheat temperatures to 600°C
- Multi-fuel options

Flame momentum and convective stirring in the furnace is provided by the high velocity from the staged air jets. Typically, the flame envelope may be larger than that of a conventional burner and this needs to be taken into consideration when selecting the burner for a given application.

**Emissions**



1. Additional factors such as burner location etc can influence NOx emission and therefore the above data should be treated as a guide only.
2. For NOx emissions on light oil and heavy oil firing please refer to FivesNA.
3. For high CV fuel gases, an increase in NOx emission of 20% should be allowed. Low CV fuels will have an emission level close to that of natural gas.

## Specifications and Capacities

### The Fuel/Air Premix

A level of premix is required to achieve good combustion characteristics on cold light-up and on burner turn-down. The premix air temperature is restricted to a maximum of 300°C. Above this temperature, it is necessary to provide a cold air supply – refer to FivesNA.

### Burner Turndown

The burner on ratio turn-down is 6:1.

### Fuel Supply

Fuel is supplied through an axial concentric tube arrangement, located in the burner body – premixing takes place in this tube. Dual fuel operation is provided via a conventional twin fluid atomiser lance located down the centre tube of the concentric tube arrangement. For rapid changeover between liquid and gaseous fuels, the oil lance assembly can be held partially retracted until required. For gaseous fuel only, the centre tube is sealed with an observation port.

### Applications

The burners have been designed for industrial processes such as:

- Walking Beam furnaces
- Roller Hearth furnaces
- Pusher furnaces
- Rotary Hearth furnaces
- Bogie Hearth furnaces
- Kilns
- Aluminium melters
- Aluminium holders
- Copper melters
- Rotary furnaces
- Oxidisers/Incinerators

For applications such as aluminium melting where aluminium splash is a problem, access hatches in the back of the burner can be incorporated for cleaning – as a special version.

### Capacities and specifications

Burner Model No	Nominal capacity (kW)	Gas pressure at burner (mbar)	Ambient airflow rate at nominal capacity (Nm <sup>3</sup> /h)	Maximum pre-mix air flow (Nm <sup>3</sup> /h)	Minimum pre-mix air flow (Nm <sup>3</sup> /h)
200 C (H)	200	15	200	20	10
600 C (H)	600	15	600	60	30
1200 C (H)	1200	15	1200	120	60
2400 C (H)	2400	15	2400	240	120
3600 C (H)	3600	15	3600	360	180
4800 C (H)	4800	15	4800	480	240
6000 C (H)	6000	15	6000	600	300

Note: Values given above are based on a flame temperature of 1400°C and a discharge velocity of 50m/s.

Maximum furnace temperature – 1,600°C.

Maximum excess air – limited to 20% to ensure minimum NOx formation.

Maximum excess fuel – excess fuel should not be employed on this type of burner.

Maximum preheated air temperature – 600°C.

### Air Pressure

At the nominal design capacity shown above, the air pressure required at the burner is 50mbar: reference conditions as follows:

“C” versions – 15°C air    “H” versions – 600°C air

### Natural Gas and Premix Air Pressures

The Natural gas pressure for all versions, required at the burner is 15mbar at the nominal capacity and zero furnace pressure. Similarly, the premix air pressure required at the burner for all sizes is 15mbar.

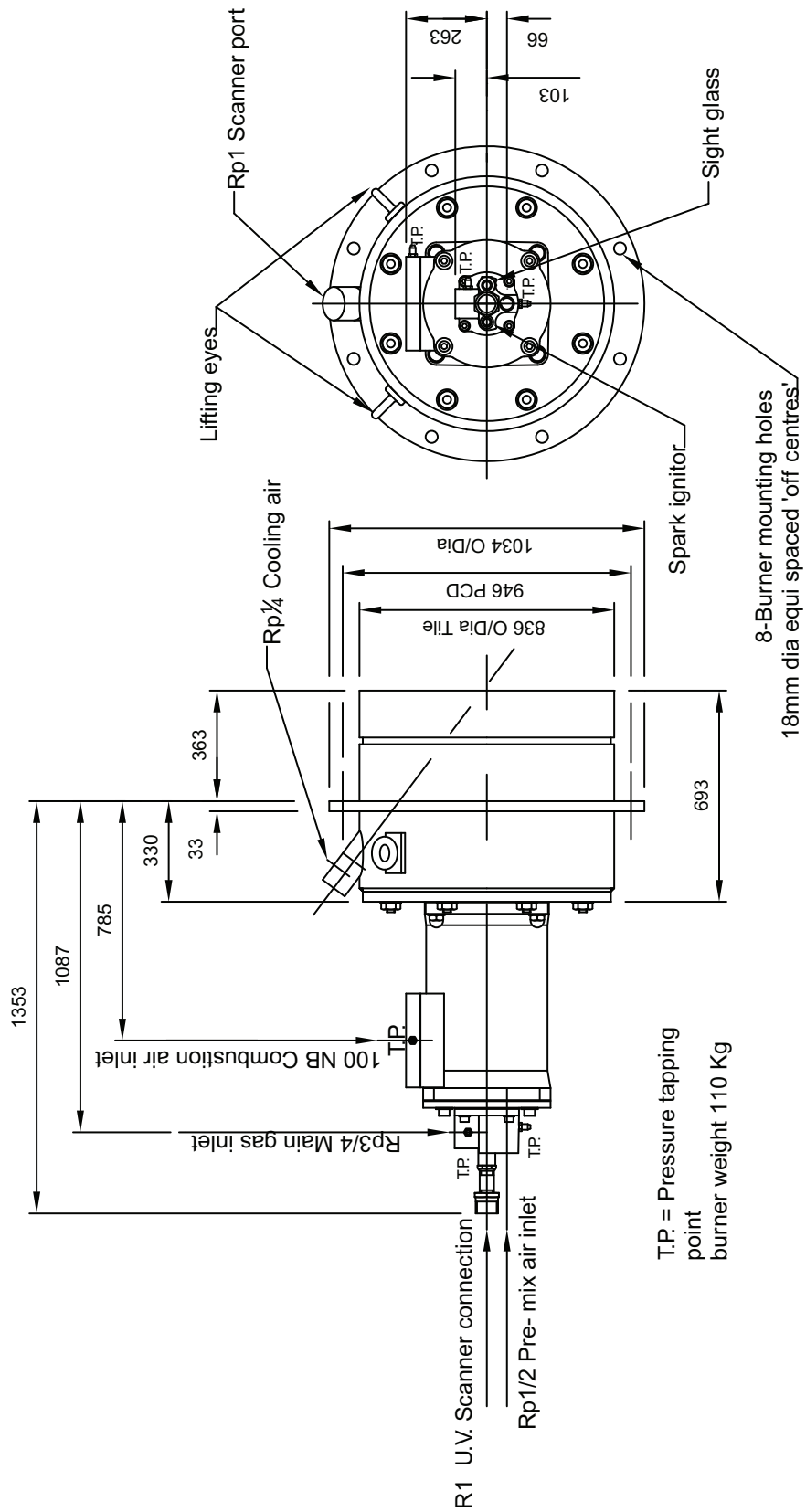
### General Note

The gas pressure and premix air pressure have an influence on each other. In addition, the premix air flow at the maximum levels shown in the above table, will have a velocity pressure component on the inlet pipe for the given pipe diameter – see the dimension sheet. This means that pressures taken at a pressure tapping on such a pipe, will give a low pressure reading. The premix air can be supplied at a temperature up to 300°C (max).

Both the gas and premix air pressures are affected by the aerodynamic effect of the flow through the staged ports; for this reason, the above pressures are given as a guide only to assess the system requirements. For burner setting and adjustment, it is necessary to have flow measurement means installed in the fuel line, premix air line and combustion air line.

# Specifications and Capacities

## NOx-Beta Burner Range Size 200C and H Cold and Pre-heated Air Versions



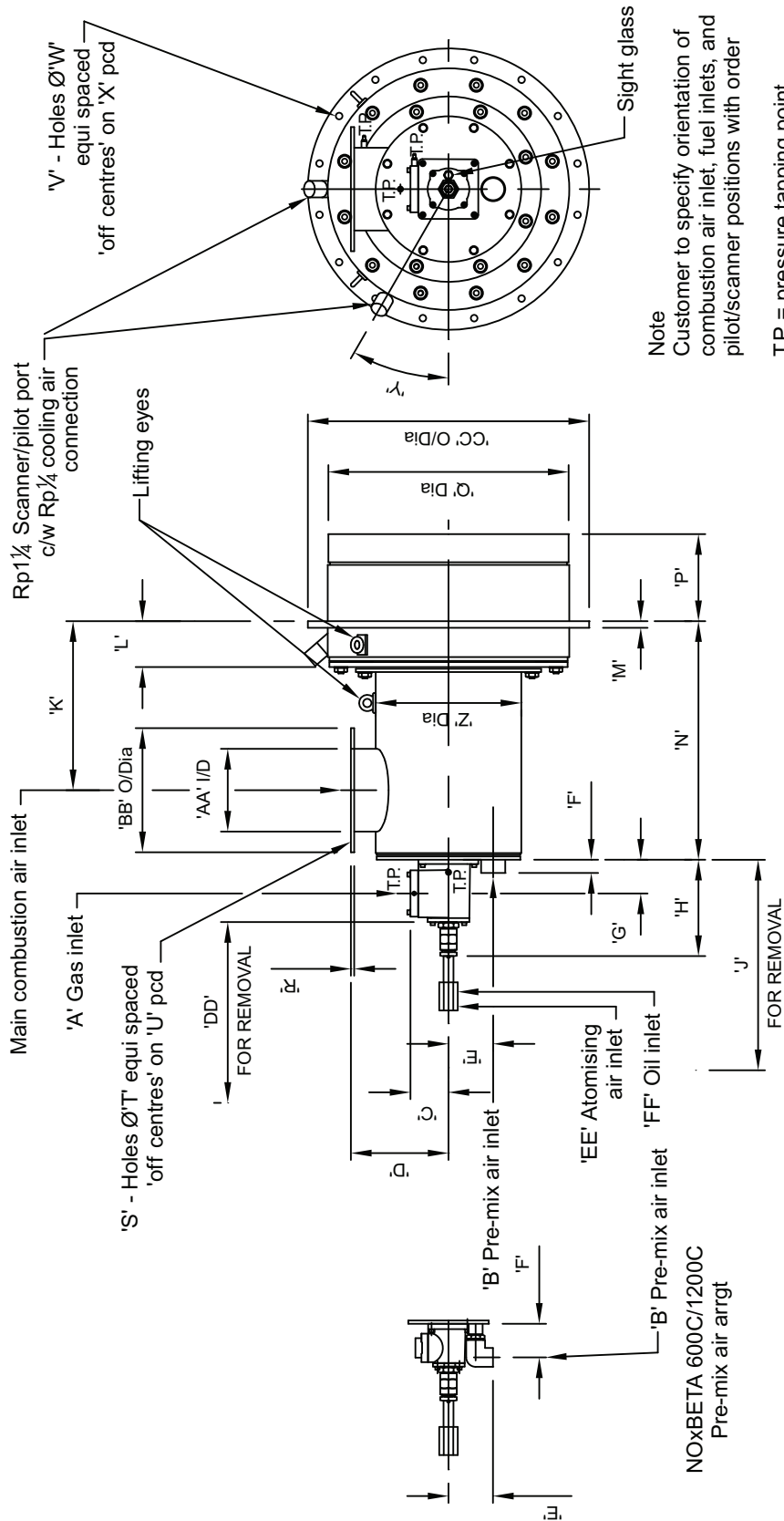
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# Specifications and Capacities

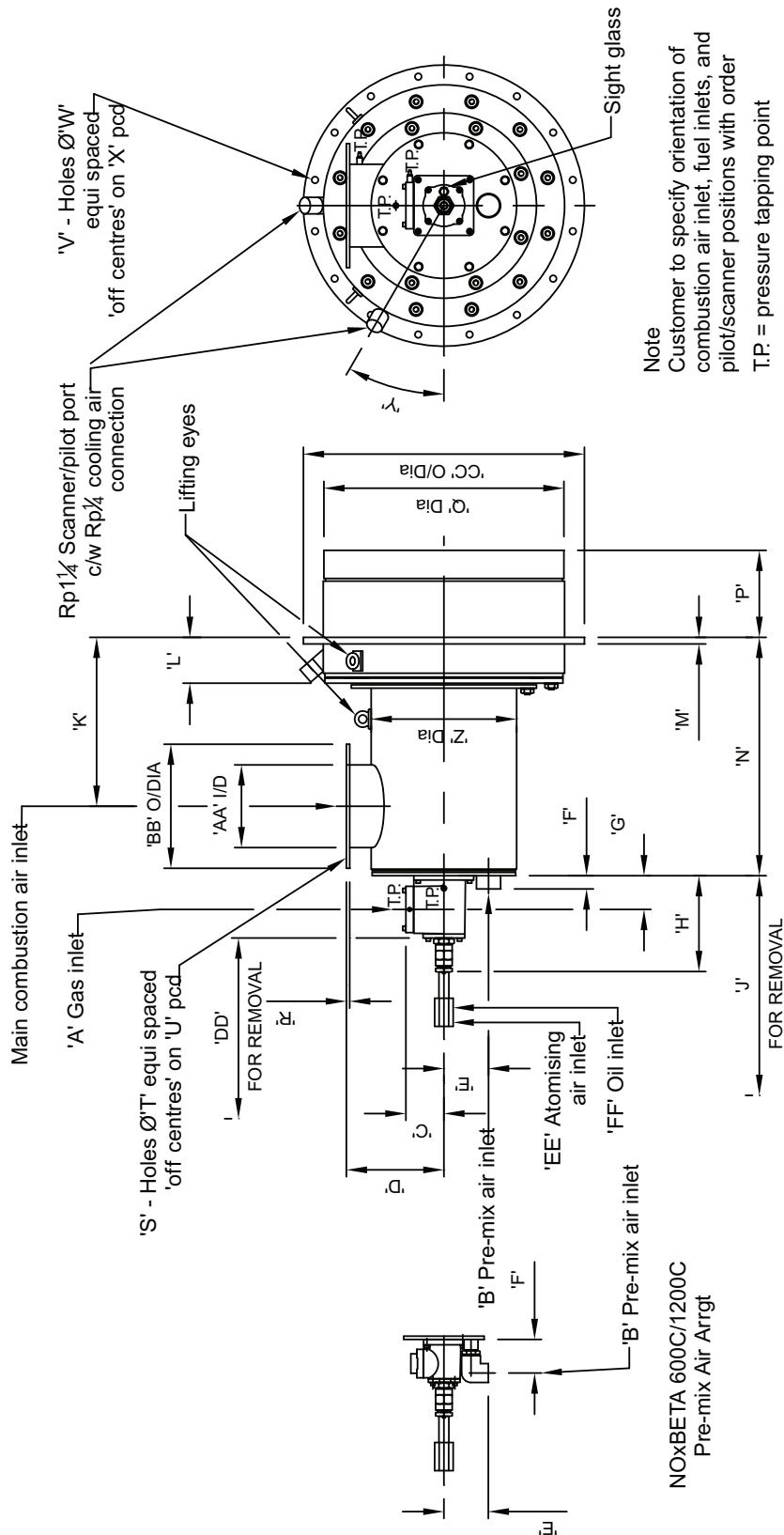
## NOx-Beta Burner Range Cold Air Version 600C to 6000C



Burner Model No	Dimension																				Burner Weight														
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V		W	X	Y	Z	AA	BB	CC	DD	EE	FF				
NOxBETA 600 C	Rp1½	98	200	82	100	70	206	725	380	135	15	490	210	430	10	8	18	225	8	18	225	8	18	480	30°	250	150	265	520	800	800	Rp½	Rp½	156 Kg	
NOxBETA 1200 C	Rp1½	93	200	82	100	85	226	725	380	140	15	495	255	600	10	8	18	225	8	18	225	8	18	665	30°	250	150	265	720	815	815	Rp½	Rp½	340 Kg	
NOxBETA 2400 C	65 NB	Rp2	93	265	115	60	85	264	875	475	140	15	645	260	650	10	8	18	280	16	18	280	16	18	715	30°	385	200	320	770	965	965	Rp½	Rp½	400 Kg
NOxBETA 3600 C	100 NB	Rp2½	112	295	135	70	103	264	950	515	140	20	720	272	730	10	12	18	335	20	20	335	20	20	795	30°	440	250	375	850	1085	1085	Rp½	Rp½	505 Kg
NOxBETA 4800 C	100 NB	Rp3	112	320	160	80	103	264	1025	630	200	20	855	265	800	10	12	22	395	20	20	395	20	20	865	45°	495	300	440	920	1200	1200	Rp¾	Rp¾	800 Kg
NOxBETA 6000 C	100 NB	Rp4	112	320	160	50	103	264	1025	630	200	20	855	265	850	10	12	22	395	20	20	395	20	20	915	45°	495	300	440	970	1200	1200	Rp¾	Rp¾	815 Kg

# Specifications and Capacities

## NOx-Beta Burner Range Pre-heated Air Version 600H to 6000H



Note  
Customer to specify orientation of  
combustion air inlet, fuel inlets, and  
pilot/scanner positions with order  
T.P. = pressure tapping point

NOxBETA 600C/1200C  
Pre-mix Air Arrgt

Burner Model No	Dimensions																										Burner Weight				
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB		CC	DD	EE	FF
NOxBETA 600 H	Rp1 1/2"	Rp1 1/2"	98	200	82	100	70	226	725	380	135	15	490	210	430	10	8	18	225	8	18	480	30°	250	100	265	520	800	Rp1/2"	Rp1/2"	156 Kg
NOxBETA 1200 H	Rp1 1/2"	Rp1 1/2"	98	265	115	50	70	226	875	475	140	15	645	255	600	10	8	18	280	8	18	665	30°	385	150	320	720	955	Rp1/2"	Rp1/2"	340 Kg
NOxBETA 2400 H	65 NB	Rp2"	93	295	135	60	85	264	950	515	140	15	720	260	650	10	12	18	335	16	18	715	30°	440	200	375	770	1050	Rp1/2"	Rp1/2"	400 Kg
NOxBETA 3600 H	100 NB	Rp2 1/2"	112	365	160	70	103	264	1100	595	120	20	850	272	730	12	12	22	445	20	20	795	30°	585	300	490	850	1220	Rp1/4"	Rp1/4"	505 Kg
NOxBETA 4800 H	100 NB	Rp3"	112	405	200	80	103	264	1200	712	180	20	995	265	800	12	16	22	495	20	20	865	45°	660	350	540	920	1350	Rp1/4"	Rp1/4"	800 Kg
NOxBETA 6000 H	100 NB	Rp4"	112	405	200	50	103	264	1200	712	180	20	995	265	850	12	16	22	495	20	20	915	45°	660	350	540	970	1350	Rp1/4"	Rp1/4"	815 Kg

**WARNING:** The data outlined is for information only and does not form part of any contract. Our policy is one of continuous improvement and we therefore reserve the right to modify specifications or dimensions without prior warning. Situations dangerous to personnel and property can develop from incorrect installation and operation of combustion equipment. Fives North American Combustion UK, Ltd urges compliance with International, National and Local Safety Standards and that installation is carried out by properly qualified personnel.