



## Energystream 100 kW-20 MW ES/ESX

### Nozzle-Mix Gas Burner

- High output capacity up to 600 kW per 300mm
- Wide turndown range
- Versions available for fixed air/gas ratios (including stoichiometric) and gas only control
- Modular construction based on nominal 152mm and 305mm increments with tee and cross elements
- Minimum service maintenance
- Available in package forms with or without combustion air fan
- Side or rear air inlet for combustion air fan versions to suit customers' application

The Nu-way ENERGYSTREAM burners represent a new concept in direct fired air heating. They are nozzle mixing line type modules, available in straight or cross pattern that can be built into an infinite variety of patterns to suit duct dimensions and application constraints.

The basic ES burner head comprises burner section, integral pilot assembly, spark ignition and either flame probe or UV flame monitoring.

The ES burner package may also include a combustion air fan and gas control train, and can be mounted onto a sideplate for ease of installation in ducts.

Modulating or high/low control options are available for gas and air control, or gas only control.

Combustion air for the burner would normally be provided by a blower mounted either directly to the burner head or at a position adjacent to the duct.

Stainless steel casings and nozzles are additional options to allow operation at higher temperatures.

## OPERATION MODES

Three modes of operation are available from the basic design concept.

- i. On-ratio or fixed ratio firing, utilising a control system giving on-ratio air/gas turndown throughout the burner output range. The turndown available will be dependent on the selection of the control system and can be up to 30:1. In this mode the ES burner is particularly suitable for recirculation heating systems where it is desirable to minimise excess air input into the system, in the interests of fuel economy and overall plant efficiency.
  
- ii. Gas only turndown, utilising a single flow control gas valve and fixed flow combustion air fan mounted either to the back or side of the burner or external to the duct can provide a turndown in the order of 20:1. In this mode the ES burner is suitable for a wide range of air heating and dryer applications, particularly for fresh air “once through” systems, where the presence of excess air through the burner forms only a small proportion of the total air in the system.

The combustion air fan must be capable of providing a differential pressure of 5 mbar across the burner and a volume output in the order of 11m<sup>3</sup>/min per 305mm length of burner.

- iii. The burner can also be used in “open-back” form without combustion air fan, taking air from the duct system, providing there is sufficient level of oxygen in the process air. In this form, gas only turndown in the order of 20:1 is possible, providing the velocity across the burner is suitable to provide an adequate pressure drop. In this mode the unit is particularly suitable for high temperature fume incineration and make up air heating applications.

The oxygen content in the process air should not fall below 17% without reference to Nu-way. The profile plates adjacent to the burner should be sized such as to give a 3.75 mbar pressure drop over the burner. It is recommended that these plates are made adjustable and set on commissioning of the plant.

## CAPACITY

System capacities are based on an output of 600 kW per nominal 305mm module. The modules available are 152mm and 305mm straight section and a 305mm x 305mm cross-section rated at 1200 kW. The modules may be assembled to match any required rating and to suit the duct cross-section available in most cases.

Note: Module lengths are nominal – see dimension sheet for burner sizes.

## DESIGN CRITERIA

The range of applications for the Nu-way ES burner is considerable and the following data can only provide a guide for the design and selection of an appropriate system. Nu-way engineers are always on hand and will be pleased to assist you to utilise the equipment to its best potential.

- All duct design should follow “good design practice” as for any air movement system.
- A minimum clearance of 200mm should be allowed around the burner/head within the duct section.
- Sufficient clearance downstream of the burner must be provided to prevent flame impingement and to allow for adequate temperature dilution across the duct section. Profile plates (normally required for “open-back” operation) may be desirable to ensure temperature uniformity, although not required for burner operation. Downstream clearance should be a minimum of 1500mm.
- For optimum performance for burners with combustion air fans, duct velocity should be of the order of 10 m/sec. A wide range of duct velocities may be accommodated and references should be made to Nu-way to ensure satisfactory conditions. For “open-back” burner, duct velocity over the burner should be 20 m/sec, ensured by a profile plate.
- For the standard specification ES burner the upstream temperature should not exceed 400°C and downstream temperature 820°C. If the combustion air fan is mounted on the burner within the duct the upstream temperature should not exceed 50°C. Higher temperatures may be accommodated by use of alternative materials, and modified burner design. Nu-way will be pleased to advise on this aspect of equipment selection.

## INSTALLATION

The ES burner system may be mounted either inside the duct section, with integral combustion air fan or “open-back” or with the combustion air fan external to the duct. Versions for face mounting, sealed or gap firing, can also be supplied. In all cases the burner unit can be mounted on a sideplate with the full complement of ancillary controls, to minimise on-site fitting and fabrication.

## SITE SERVICES REQUIREMENTS

Where the ES system is supplied with integral combustion air fan and control ancillaries, i.e. HT transformer, sequence control box, gas control valvetrain, it is only necessary to bring gas and electric services to the burner for operation. If required, the ES burner is available as burner head only, with or without combustion air fan, as the application may require.

For balanced draught duct/chamber conditions, the air and gas pressure requirements are as detailed below. Where a duct/chamber pressure exists, these will be differential pressures.

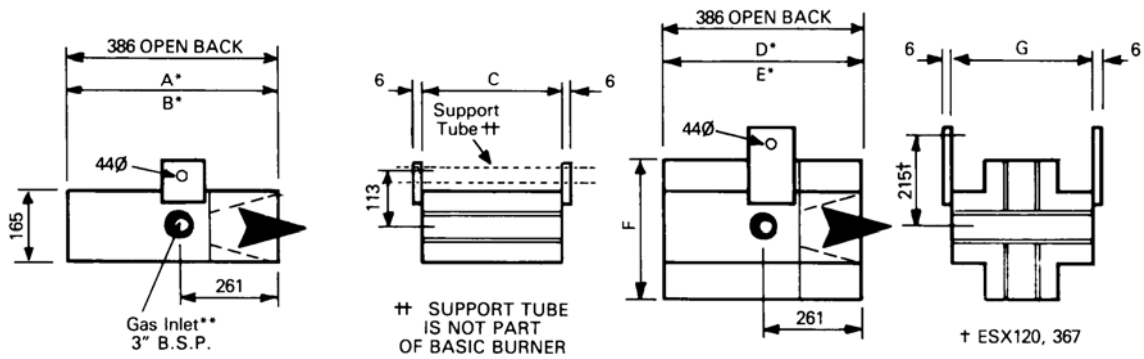
### GAS ONLY CONTROL

GAS PRESSURE AT BURNER MANIFOLD INLET (3 inch BSP)	10 mbar
AIR PRESSURE AT BURNER AIR FLANGE INLET	5 mbar

### GAS/AIR RATIO CONTROL

GAS PRESSURE AT BURNER MANIFOLD INLET (3 inch BSP)	10 mbar
AIR PRESSURE AT BURNER AIR FLANGE INLET	10 mbar

## ES LEADING DIMENSIONS



**SERIES ES**  
 \* DIMENSIONS A and D: SIDE AIR INLET  
 B and E: REAR AIR INLET

**SERIES ESX**  
 \*\* BURNERS WITH CAPACITIES AT AND ABOVE 3000 kW  
 WILL HAVE A MINIMUM OF TWO GAS INLETS

BURNER REF.	DIMENSIONS (mm)							BURNER REF.	DIMENSIONS (mm)						
	A	B	C	D	E	F	G		A	B	C	D	E	F	G
ES10	650	575	230	-	-	-	-	ES80	800	600	1300	-	-	-	-
ES20	650	575	385	-	-	-	-	ESX80	-	-	-	800	600	360	689
ES30	650	575	540	-	-	-	-	ES90	800	600	1450	-	-	-	-
ES40	650	575	690	-	-	-	-	ESX90	-	-	-	800	600	360	840
ESX40	-	-	-	650	575	360	385	ES100	800	600	1635	-	-	-	-
ES50	650	575	840	-	-	-	-	ESX100	-	-	-	800	600	360	1040
ES60	650	575	995	-	-	-	-	ESX110	-	-	-	800	600	360	1185
ESX60	-	-	-	650	575	360	690	ESX120	-	-	-	800	600	665	725
ES70	800	645	1150	-	-	-	-								
ESX70	-	-	-	800	600	510	690								

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