



Ethos 73-287 FS

Floor Standing Condensing Boilers

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Ethos FS is a range of gas-fired condensing, high efficiency, Low NOx boilers, specially designed for today's commercial needs of high output with clean emissions, all from a compact unit. This brochure relates to Ethos units that can return outputs from 73kW to 287kW per unit.

Sensibly engineered to allow for quick and easy maintenance without the needs for specialist tools, small foot print for greater siting flexibility, Ethos boilers include a wealth of standard operating features to provide optimum efficiency and low running costs.

Ethos FS boilers use a downward firing pre-mix, water cooled, burner that is fully variable from 25% to 100% which, combined with precise gas to air mixing, results in ultra clean emissions in the range of < 54 mg/kWh NOx (30 ppm DAF), < 19 mg/kWh CO (15 ppm DAF). This coupled with direct-on-boiler weather compensation allows efficiencies in the range of 106.5% nett to be returned.

The high efficiency Ethos boilers can be installed in conjunction with a variety of matched intelligent controls for either an individual appliance or a number of appliances, to optimize fuel consumption and therefore energy conservation.



Standard Features

Compact dimensions

The Ethos FS boilers covered in this brochure offer compact dimensions from 1290mm High to 500mm High x 635mm Deep for the model 73, up to 1290mm High x 800mm Wide x 890mm Deep for the model 287. Weights start from only 120 kg for the model 73, up to 290 kg for the model 287. The Ethos boilers provide high output from minimal dimensions without compromising serviceability.

Ultra high efficiency, fully condensing with ultra low harmful emissions

The heat output is fully variable between 25% to 100%. This ensures the boiler output automatically matches the system demand, with optimum efficiencies of 106.5% nett being returned.

With the use of a 100% Pre-mixed combustion process, flue emissions are kept very low at:
< 54 mg/kWh - NOx (30 ppm DAF)
< 19 mg/kWh - CO (15 ppm DAF)

Building Regulations 'Part L' compliant (Part J Scotland)

Direct-on-boiler weather compensation (optional)

If required, the boiler can operate to give automatic weather variable flow temperature. This ensures optimum operating efficiencies by varying the flow temperature relative to the external weather conditions.

Comprehensive control panel

The boiler control panel includes user friendly controls which manage the entire safety functions of the appliance, simple menu driven programming via a large LCD display.

Room sealed flue

The boiler can be configured to operate as a room sealed appliance, (connection F1) taking the air for combustion directly from outside the building. The case of the boiler is under negative pressure giving added safety.

Stainless steel heat exchanger

The Ethos range of boilers utilises a well proven Stainless Steel Heat Exchanger which is connected in sectional form and has a water cooled Stainless Steel tubular burner.

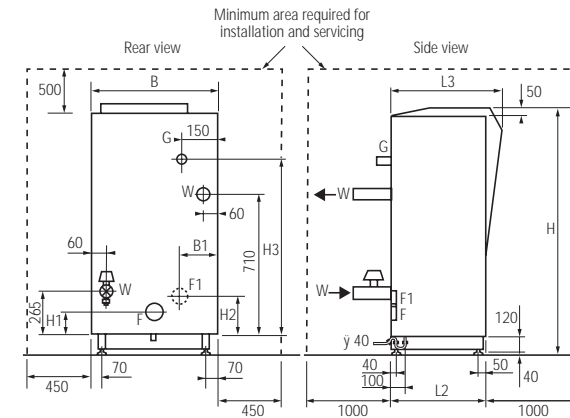
Optional matched controls for optimum efficiency

A versatile range of matched controls are available to work in conjunction with the boilers and can provide not only room temperature control, but also independent heating & hot water time control with individual day programming.

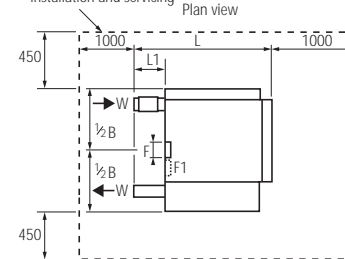
Guarantee

The Stainless Steel heat exchanger carries a 5 year guarantee, all other components carry a 12 month guarantee against manufacturing or material defects.

Dimensions & Clearances



Minimum area required for installation and servicing



All dimensions are in millimeters

Boiler Model	73	90	115	146	192	241	287
Length-L	635	635	635	635	890	890	890
Length-L1	110	110	110	110	155	155	155
Length-L2	445	445	445	445	655	655	655
Length-L3	525	525	525	525	735	735	735
Width-B	500	600	700	800	600	700	800
Width-B1	110	160	210	240	130	154	180
Height-H	1290	1290	1290	1290	1290	1290	1290
Height-H1	160	160	160	176	197	197	197
Height-H2	238	238	325	347	320	330	365
Height-H3	948	943	874	874	900	900	900

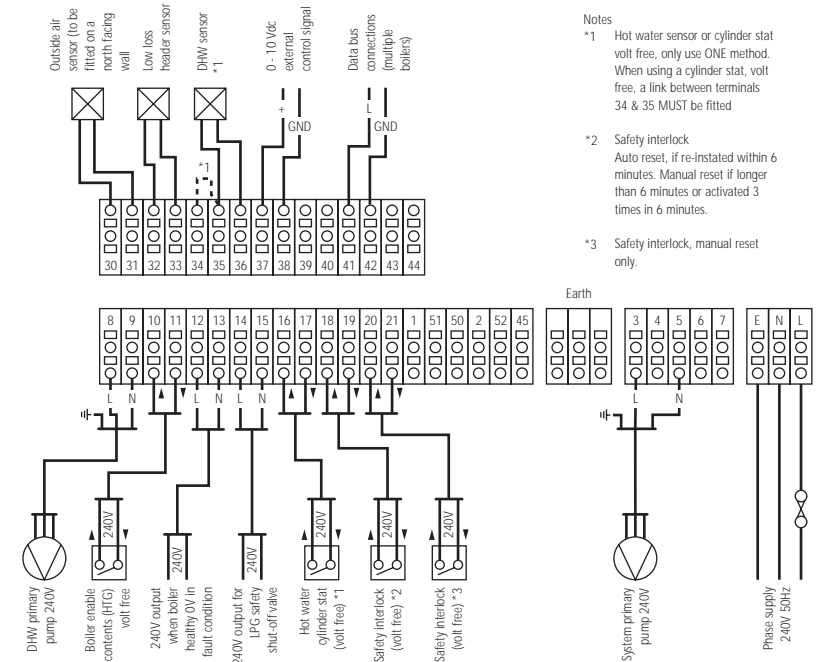
Technical data

Boiler Model		73	90	115	146	192	241	287
Nominal heat input (nett)	kW	74	91	116	147	194	243	289
Max heat output 80°C flow / 60°C return	Max kW	70	86	110	139	185	230	274
	Min kW	15.7	19.6	22.5	28.4	38.2	48	56.8
Max heat output 50°C flow / 30°C return	Max kW	73	90	115	146	192	241	287
	Min kW	17.2	21.5	24.7	31.2	41.9	52.7	62.4
Max flow temperature	°C	90	90	90	90	90	90	90
Max water pressure (hot)	Bar	6	6	6	6	6	6	6
Min water pressure (cold)	Bar	1	1	1	1	1	1	1
Gas inlet press	Min mbar	20	20	20	20	20	20	20
	Max mbar	50	50	50	50	50	50	50
Max gas consumption natural gas	m3/h	6.79	8.35	11.1	13.49	17.8	22.29	26.51
	ft3/hr	239.8	294.9	392	476.4	628.6	787.2	936.2
Max gas consumption liquefied petroleum gas	kg/hr	5.78	7.11	9.45	11.48	15.16	18.98	22.58
Typical noise levels (*1)	Max dB(A)	59	59	59	59	59	59	59
	Min	50	50	50	50	50	50	50
Water content	Litres	13	15	17	19	36	39	42
Weight (dry)	kg	120	140	160	180	250	270	290
Electrical supply (240V - 50Hz)	Amps	10	10	10	10	10	10	10
Water connections (W)	BSP	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"
Gas connections (G)	BSP	3/4"	3/4"	3/4"	3/4"	1"	1 1/2"	1 1/2"
Flue connection (F)	mm	100 ø	100 ø	135 ø	150 ø	180 ø	200 ø	200 ø
Air connection (F1)	mm	100 ø	100 ø	125 ø	125 ø	150 ø	180 ø	180 ø

Note

*1 Typical Noise Level taken at 1 metre away from the appliance in an open surrounding

Electrical Connections



Notes

*1 Hot water sensor or cylinder stat volt free, only use ONE method. When using a cylinder stat, volt free, a link between terminals 34 & 35 MUST be fitted

*2 Safety interlock Auto reset, if re-instated within 6 minutes. Manual reset if longer than 6 minutes or activated 3 times in 6 minutes.

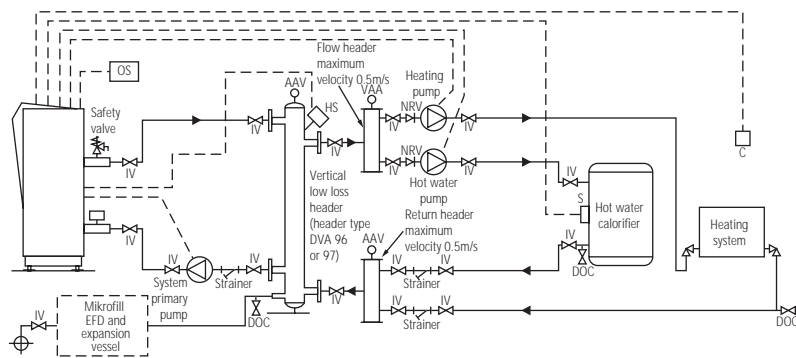
*3 Safety interlock, manual reset only.

Hydraulic System Design

The Ethos range of boilers can operate a system pump directly from the boiler, this enables correct pump over-run to minimise over temperature situations due to residual heat. The pump electrical load must not exceed 3 Amps.

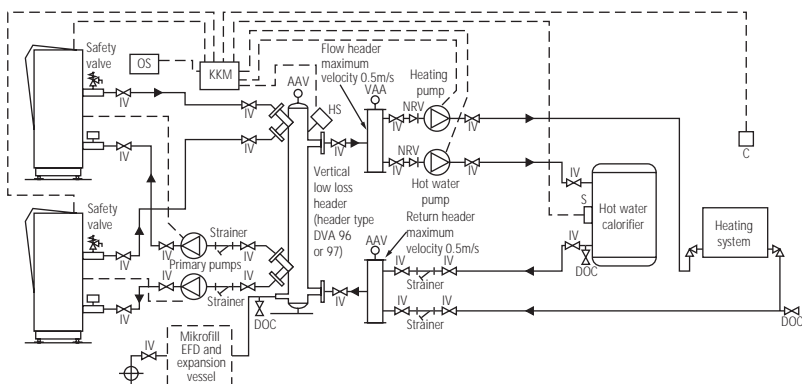
For optimum efficiency a variable speed pump should be used, and both the 80/60°C and 50/30°C flow rates and resistances should be referenced. If however a fixed head pump is being used we would recommend that the 50/30°C flow rates and resistances should be referenced.

Hydraulic layout of single boiler system



OS = Outside air sensor S = Hot water sensor/volt free stat C = Room temperature control HS = Header Sensor

Hydraulic layout of twin boiler system



OS = Outside air sensor S = Hot water sensor/volt free stat C = Room temperature control KKM = Cascade manaer HS = Header Sensor

Hydraulic resistance

The Ethos range of boilers can operate a system pump directly from the boiler, this enables correct pump over-run to minimise over temperature situations due to residual heat. The pump electrical load must not exceed 3 Amps.

Boiler Model	73	90	115	146	192	241	287
Mass flow rate (kg/s) 80° flow / 60° return	0.833	1.024	1.309	1.655	2.202	2.738	3.262
Boiler resistance 80° flow / 60° return	21	28	34	36	24	28	39
Mass flow rate (kg/s) 50° flow / 30° return	0.869	1.071	1.369	1.738	2.286	2.869	3.47
Boiler resistance 50° flow / 30° return	23	30	37	39	26	28	42

For optimum efficiency a variable speed pump should be used, and both the 80/60°C and 50/30°C flow rates and resistances should be referenced. If however a fixed head pump is being used we would recommend that the 50/30°C flow rates and resistances should be referenced.

Vertical low loss header selection

As shown in Fig 3 & 4, a vertical low loss header is required to correctly connect the boiler/s to the heating system, the chart below gives guidance on the size of header required in relation to the boilers output. Where more than one circuit is required, separate Flow & Return headers will be required, these headers must be suitably sized to minimise turbulence, and it is recommended that a design velocity of approximately 0.5 m/s be used.

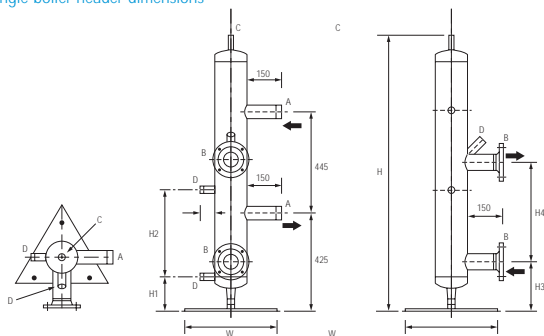
Single boiler headers

Header type	Boiler models	Header size	Connection details (BSP / PN6)			
			Boiler (A)	System (B)	Air vent (C)	Spare (C)
DVA 096	73 to 146	DVA 096	2 x 1 1/2"	2 x 2"	1/2"	3 x 3/4"
DVA 097	192 to 287	DVA 097	2 x 2"	2 x DN65	1/2"	3 x 3/4"

Twin boiler headers

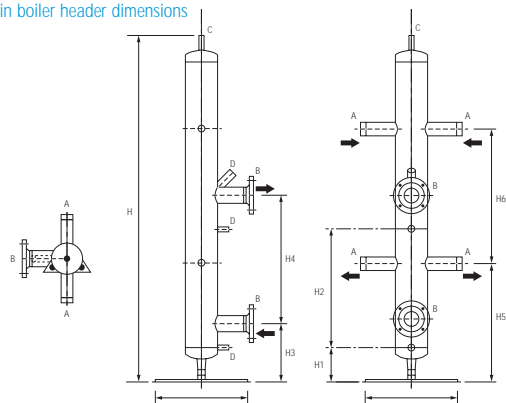
Header type	Boiler models	Header size	Connection details (BSP / PN6)			
			Boiler (A)	System (B)	Air vent (C)	Spare (C)
DVA 101	2x73 to 2x146	DN125	4 x 1 1/2"	2 x DN65	1/2"	3 x 3/4"
DVA 069	2x241 to 2x287	DN150	4 x 2"	2 x DN80	1/2"	3 x 3/4"

Single boiler header dimensions



Header Type	Height H	Height H1	Height H2	Height H3	Height H4
DVA 096	1185	135	395	215	435
DVA 096	1199	150	395	215	445

Twin boiler header dimensions



Header Type	Height H	Height H1	Height H2	Height H3	Height H4	Height H5	Height H6
DVA 101	1158	135	395	215	435	425	625
DVA 069	1834	135	675	310	680	630	720

Flue system design

The Ethos range of boilers must be connected to a flue system designed to overcome its own resistance and provide a draught at the appliance flue connection of between 5 to 15 Pa.

If draught is likely to exceed 15 Pa then a suitable draught reducing / stabilising device MUST be incorporated into the chimney system adjacent to the appliance.

The flue system should be installed in such a manner that the entire flue system is self-supporting. Any horizontal sections MUST be installed with at least a 3° fall to allow for any condensate that may form in the flue system to drain through the boiler. And a slip joint MUST be installed directly above the appliance outlet to allow for the flue to be disconnected from the boiler to facilitate servicing. See Fig 1.

The flue system MUST be constructed of a material suitable for the acidic nature of flue condensate with a typical pH level of 3.0, i.e 316L Stainless Steel, and must not be of a smaller diameter than that of the boiler connection.

The terminal of the flue system should be left open. Universal Terminal Caps or Rain Caps MUST NOT BE USED. Any rain that enters the flue system will help to wash the flue and will drain through the boiler's condensate outlet.

For the appliance to be operated as Room Sealed, taking air for combustion from outside the building, an air duct must be installed to connection F1. The air duct must not be of a smaller diameter than that of the boiler connection.

It is recommended that the air duct and flue be terminated on the same aspect of the building. Alternatively if the flue is to be terminated vertically, the air for combustion can be ducted to outside at low level. See Fig 2.

Due to the nature of forced draught boilers, it is recommended to install modular boilers with individual flues. Where this is not achievable it is possible to connect multiple boilers into a common flue system, however particular care must be taken, and the separate flues from each boiler MUST only connect to the common flue in the vertical and NOT THE HORIZONTAL. See Fig 3.

Flue connection arrangement

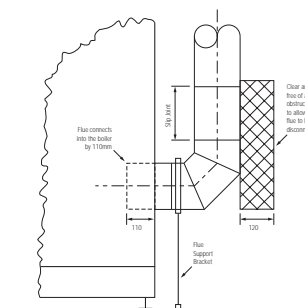


Fig 1

Room sealed application, vertical exhaust, low level vent

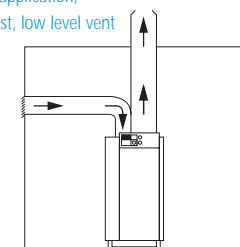


Fig 2

Multiple flue application conventionally flued

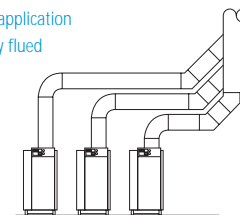


Fig 3

Important consideration

The flue system must be installed to comply with the requirements of BS 6644 - 1991, IGE/UP/10, and where appropriate, the Clean Air Act Memorandum on chimney heights. The flue systems should be insulated to protect the buoyancy of the flue gases.

Further information on flue systems is detailed in the Installation & Maintenance Manual, available from our literature department.

Ventilation

The amount of free area ventilation, direct from outside, that the Ethos range of boilers requires depends on the type of flue system being used. As detailed in BS6644, the natural ventilation required for conventionally flued appliances, for Combustion & Cooling Air is specified as being:

Low level

540cm² Plus 4.5cm² per kW in excess of 60kW of total rated input (Gross)

High level

270cm² Plus 2.25cm² per kW in excess of 60kW of total rated input (Gross)

For Room Sealed appliances, ventilation is only required for cooling purposes. BS6644 stipulates maximum temperatures within the plantroom area as being:

100mm above floor level	25°C
1500mm above floor level	32°C
100mm below ceiling level	40°C

We would recommend that ventilation for cooling purposes for the boilers only, as:

Low level

4.5cm² per kW of total rated input (Gross)

High level

4.5cm² per kW of total rated input (Gross)

For further information on ventilation methods and requirement please refer to:

BS6644 - 1991, installation of gas-fired hot water boilers of rated inputs between 60kW and 2MW (Gross).