



## Ethos 318-1018 FS

Floor Standing Condensing Boilers

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Ethos FS 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 318 kW to 1018 kW per unit.

Sensibly engineered to allow for quick and easy maintenance without the need 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 < 53 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 104.5% 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 1115mm High x 830mm Wide x 1918 Deep for the model 318, up to 1155mm High x 1253mm Wide x 2658mm Deep for the model 1018. Weighing from only 525 kg for the model 318, up to 1200 kg for the model 1018. 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 104.5% nett being returned.

With the use of a 100% Pre-mixed combustion process, flue emissions are kept very low at:

< 53 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

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 (optional)

The boiler control panel includes user friendly controls,

which manages the entire safety functions of the appliance, simple menu driven programming via a large LCD display.

#### Room sealed flue

As a special order, the Ethos boilers covered in this brochure can be supplied to operate as a room sealed appliance, taking the air for combustion (connection F1) 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 and hot water time control with individual day programming.

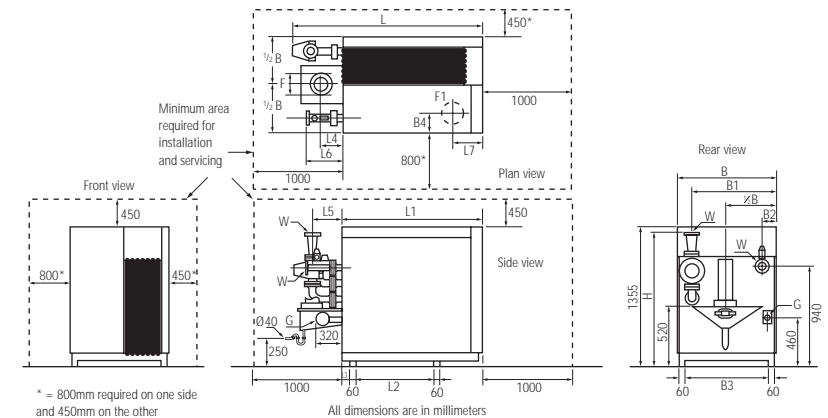
#### Safety valve & system pump

The Ethos range of boilers detailed in this brochure all come supplied with 3 Bar Safety Valve, System Pressure Gauge and Grundfos System Circulation Pump, factory fitted as Standard.

#### 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



Boiler Model	318	378	443	508	559	624	730	826	923	1018
Length-L	1918	1908	1908	1908	1958	2265	2653	2653	2653	2658
Length-L1	1362	1362	1362	1362	1362	1670	2043	2043	2043	2043
Length-L2	700	700	700	700	700	700	1166	1166	1166	1166
Length-L3	108	108	108	108	108	103	88	88	88	88
Length-L4	231	231	231	231	231	250	250	250	250	250
Length-L5	330	330	330	330	330	350	350	350	350	350
Length-L6	385	385	385	385	385	400	400	400	400	400
Length-L7	220	220	240	240	240	359	266	266	266	266
Width-B	830	930	1130	1130	1230	1330	1130	1130	1330	1330
Width-B1	710	810	960	1010	1110	1210	1003	1053	1203	1253
Width-B2	120	120	170	120	120	120	127	77	127	77
Width-B3	646	746	946	946	1046	1146	946	946	1146	1146
Width-B4	160	160	240	185	185	240	290	240	290	234
Height-H	1115	1205	1205	1205	1120	1125	1400	1400	1155	1155

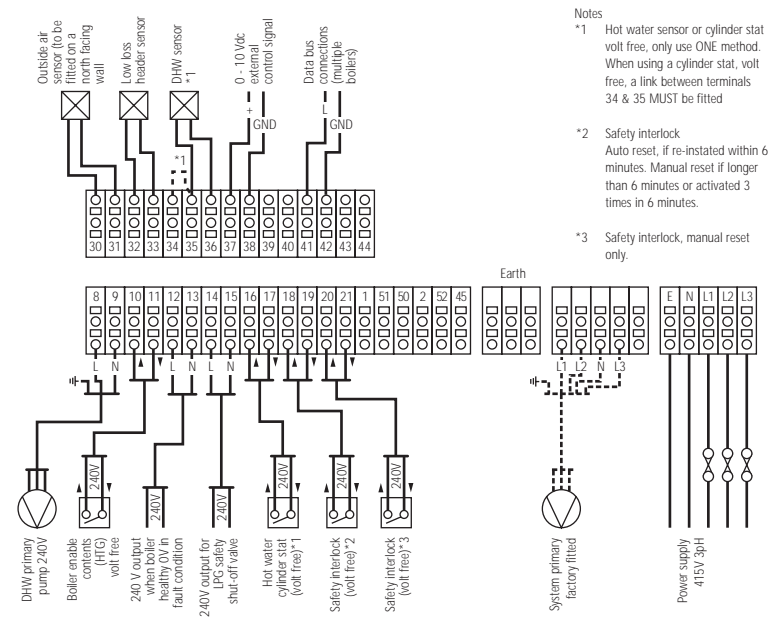
## Technical data

Boiler Model		318	378	443	508	559	624	730	826	923	1018
Nominal heat input (nett)	kW	333	396	464	532	585	653	764	856	966	1066
Max heat output	Max kW	315	374	438	502	553	613	717	811	906	
80°C flow / 60°C return	Min kW	80	96.4	108	120.2	149.7	180.3	210.2	238.1	266.1	290
Max heat output	Max kW	318	378	443	508	559	624	730	826	923	1018
50°C flow / 30°C return	Min kW	87.9	105.5	110.2	140.2	154	197.3	230	260.6	291.2	321
Max flow temperature	°C	90	90	90	90	90	90	90	90	90	90
Max water pressure (hot)	Bar	6	6	6	6	6	6	6	6	6	6
Min water pressure (cold)	Bar	1	1	1	1	1	1	1	1	1	1
Gas inlet press	Min mbar	20	20	20	20	20	20	20	20	20	20
	Max mbar	100	100	100	100	100	100	100	100	100	100
Max gas consumption	m <sup>3</sup> /h	30.5	36.6	42.6	48.8	53.7	59.9	70.1	79.4	88.6	97.8
natural gas	ft <sup>3</sup> /hr	1077	1293	1504	1723	1896	2115	2476	2804	3126	3454
Max gas consumption	kg/hr	26	30.9	36.2	41.5	45.7	51	59.7	67.6	75.5	83.3
liquefied petroleum gas											
Typical noise levels	Max dB(A)	59	59	59	59	59	64	64	64	64	64
(*1)	Min	51	51	51	51	51	50	50	50	50	50
Water content	Litres	38	41	44	47	50	53	70	75	80	85
Weight (dry)	kg	525	560	615	645	675	740	840	950	1070	1200
Electrical supply (415V, 3pH)	Amps	10	10	10	10	10	16	20	20	20	20
Water connections (W)	PN6	DN65	DN65	DN65	DN65	DN65	DN65	DN80	DN80	DN80	DN80
Gas connections (G)	BSP/PN6	1 1/2"	1 1/2"	2"	2"	2"	2"	2"	2"	DN65	DN65
Flue connection (F)	mm	250 ø	250 ø	300 ø	300 ø	300 ø	300 ø	350 ø	350 ø	400 ø	400 ø
Air connection F1)	mm	200 ø	200 ø	250 ø	250 ø	250 ø	250 ø	300 ø	300 ø	355 ø	355 ø
Safety valve outlet (3 bar)	BSP	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"

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.

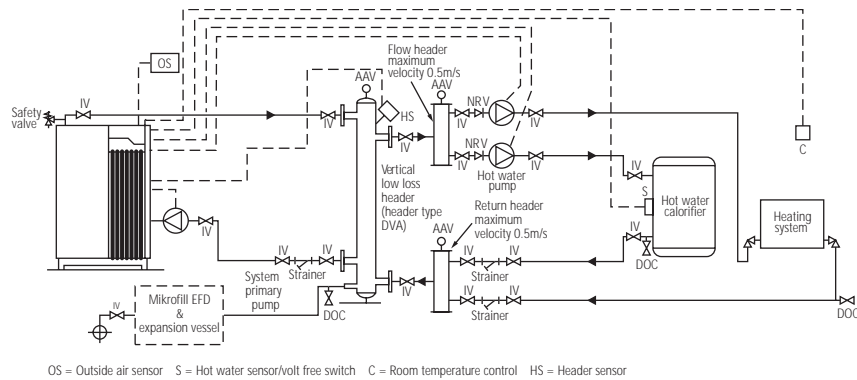
\*3 Safety interlock, manual reset only.

## Hydraulic System Design

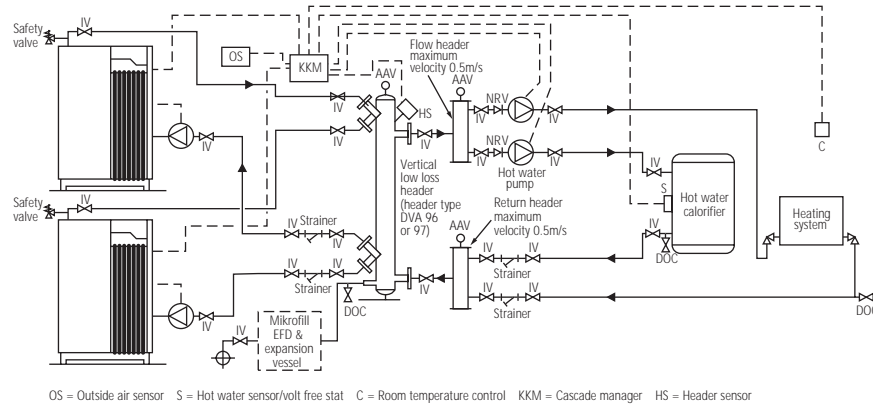
The Ethos FS range of boilers are fully condensing boilers and are designed to operate around a system  $\Delta T$  of 20°C. It is imperative that all circuits, both heating & hot water are design for a 20°C  $\Delta T$ , otherwise problems may be experienced, a reduced  $\Delta T$  will result in a reduction of the outputs quoted.

The heating system must be sealed and pressurized, the Ethos range of boilers MUST NOT be used on Open Vented systems. The heating system must be treated in accordance with BS 7593 - 1992, Code of practice for treatment of water in hot water central heating systems.

### Hydraulic layout of single boiler system



### Hydraulic layout of twin boiler system



## 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 boilers covered in this brochure are supplied, as standard, with a Grundfos circulating pump (415 V, 3 Phase) to overcome the resistance of the boiler and the residual head pressure available to overcome the pipework resistance between the boiler and the header is detailed in the table below.

Boiler Model	318	378	443	508	559	624	730	826	923	1018
Grundfos pump type	UPS 40-120F	UPS 50-120F	UPS 50-120F	UPS 50-120F	UPS 65-120F	UPS 65-120F	UPS 65-120F	UPS 65-120F	UPS 80-120F	UPS 80-120F
Pump Speed	3	3	3	3	3	3	3	3	3	3
Head press available @20°C $\Delta T$ (kPa)	25	41	43	27	46	38	42	25	35	23
Flow rate @20°C $\Delta T$ (Kg/s)	3.785	4.500	5.274	6.047	6.655	7.428	8.690	9.833	10.988	12.095

Available as an optional extra, a variable speed pump can be supplied factory fitted, on certain models, for optimum efficiency.

## 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.

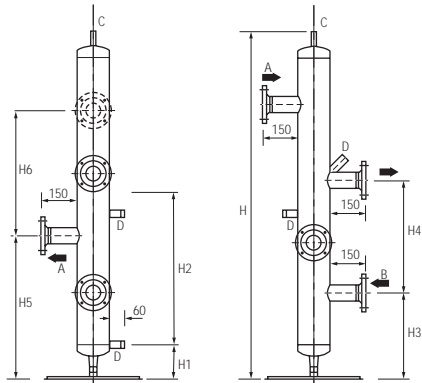
### Single boiler headers

Header type	Boiler models	Header size	Connection details (BSP / PN6)			
			Boiler (A)	System (B)	Air vent (C)	Spare (C)
DVA 055	318 to 378	DN125	2 x DN65	2 x DN65	1/2"	3 x 3/4"
DVA 060	443 to 624	DN150	2 x DN65	2 x DN80	1/2"	3 x 3/4"
DVA 065	730	DN150	2 x DN80	2 x DN100	1/2"	3 x 3/4"
DVA 085	826 -923	DN200	2 x DN80	2 x DN100	1/2"	3 x 3/4"
DVA 087	1018	DN200	2 x DN80	2 x DN125	1/2"	3 x 3/4"

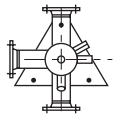
### Twin boiler headers

Header type	Boiler models	Header size	Connection details (BSP / PN6)			
			Boiler (A)	System (B)	Air vent (C)	Spare (C)
DVA 070	3 to 318	DN150	4 x DN65	2 x DN80	1/2"	3 x 3/4"
DVA 075	2x378 to 2x624	DN200	4 x DN65	2 x DN125	1/2"	3 x 3/4"
DVA 079	2 x 730	DN250	4 x DN65	2 x DN125	1/2"	3 x 3/4"
DVA 080	2x826 to 2x923	DN250	4 x DN80	2 x DN150	1/2"	3 x 3/4"
DVA 095	2 x 1018	DN300	4 x DN80	2 x DN200	1/2"	3 x 3/4"

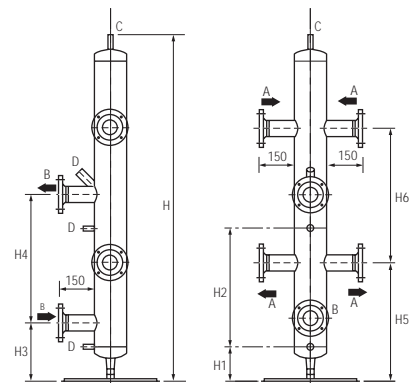
### Single boiler header dimensions



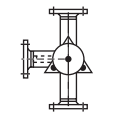
Header Type	Height H	Height H1	Height H2	Height H3	Height H4	Height H5	Height H6
DVA 055	1480	150	610	364	528	630	790
DVA 060	1570	140	655	310	640	630	880
DVA 065	1570	135	655	310	640	630	880
DVA 085	1570	125	655	310	640	630	880
DVA 087	1570	130	655	310	640	630	880



### Twin boiler header dimensions



Header Type	Height H	Height H1	Height H2	Height H3	Height H4	Height H5	Height H6
DVA 055	1834	135	675	310	680	630	720
DVA 060	2010	165	540	310	760	630	880
DVA 065	2400	128	575	310	850	630	1080
DVA 085	2400	128	575	310	850	630	1080
DVA 087	2400	125	575	310	850	630	1080



## 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 boilers 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.

Note: To connect the boiler as Room Sealed, the boiler **MUST** be ordered as Room Sealed for Connection F1 to be provided. Unfortunately a boiler delivered for conventional flue, **CANNOT** be converted to a Room Sealed appliance.

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 multiply 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

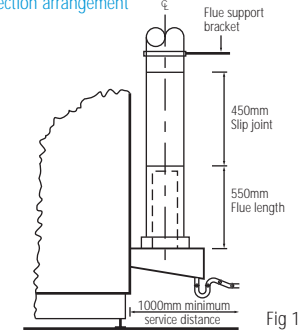


Fig 1

### Room sealed application, vertical exhaust, low level vent

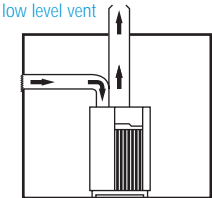


Fig 2

### Multiple flue application conventionally flued

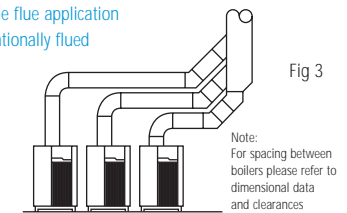


Fig 3

Note:  
For spacing between boilers please refer to dimensional data and clearances

### 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

540cm<sup>2</sup> Plus 4.5cm<sup>2</sup> per kW in excess of 60kW of total rated input (Gross)

### High level

270cm<sup>2</sup> Plus 2.25cm<sup>2</sup> 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

4.5cm<sup>2</sup> per kW of total rated input (Gross)

### High level

4.5cm<sup>2</sup> 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).