MIKROFILL®
ETHOS BOILERS

INSPIRED EFFICIENCY

ETHOS 70 -130

WALL MOUNTED
CONDENSING
BOILERS

INSPIRED | EFFICIENCY

Mikrofill Systems Ltd is a Midlands based British engineering company which specialises in the design and manufacture of high quality products for the commercial heating market.

Renowned for developing innovative products, the company has built its success on quality, reliability and outstanding customer service. As an established market leader and as one of the fastest growing companies in this sector, Mikrofill now manufactures over 70% of its range at its headquarters based in Worcestershire.

The company's rapidly expanding range of products includes gas fired condensing boilers, domestic hot water generators and the well-established Mikrofill Electronic Filling Device.

Ethos, Inspired Efficiency…
Ethos, the latest creation by Mikrofill, consists of a revolutionary range of wall-mounted gas fired condensing boilers, which offer individual outputs up to 130 KW and multiple outputs up to 780 KW.

The Ethos range has been developed to meet today's UK commercial needs of high output, ease of installation, optimum efficiency, ultra low greenhouse gas emissions and low running costs, all wrapped into a compact and elegant design.

This brochure has been designed to enable you to specify Ethos boiler with confidence. If you require any further information see Mikrofill.com or contact our technical department.

Energy efficiency and the environment…a top priority!

Mikrofill is committed to ensuring that all of its products are geared towards energy efficiency and always satisfy and exceed the most stringent environmental requirements.This is why all the Ethos boilers are designed to produce outstanding efficiencies and ultra low greenhouse gas emissions.

Ethos…how you could benefit!

The Ethos range has been purposely designed for the UK market and all boilers offer the following benefits:

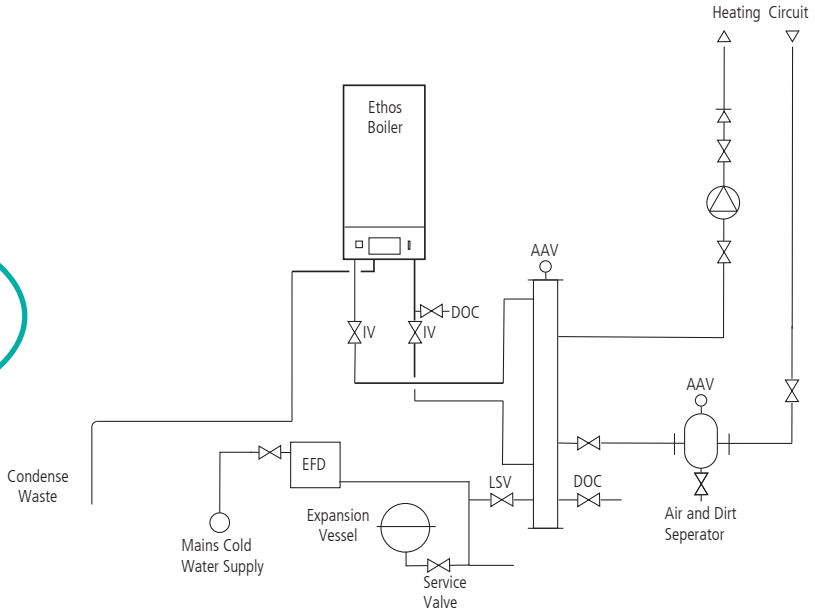
- High efficiency (108% nett)
- Ultra low greenhouse gas emissions
- Very wide modulation range (7:1) ensures very high seasonal efficiency (>95%)
- Quality stainless steel heat exchangers and pipework
- Comprehensive control package as standard
- Integral shunt pump
- Sealed air system ensures very low noise emissions (<48db)
- Compact design
- Single, twin or concentric flue pipe options
- British design and manufacture

MIKROFILL ETHOS BOILERS | 70 | 90 | 110 | 130

APPLICATIONS

SYSTEM 1
ONE BOILER
ONE HEATING CIRCUIT

System 1
External pump
module required
EPM 1



LOW LOSS HEADERS

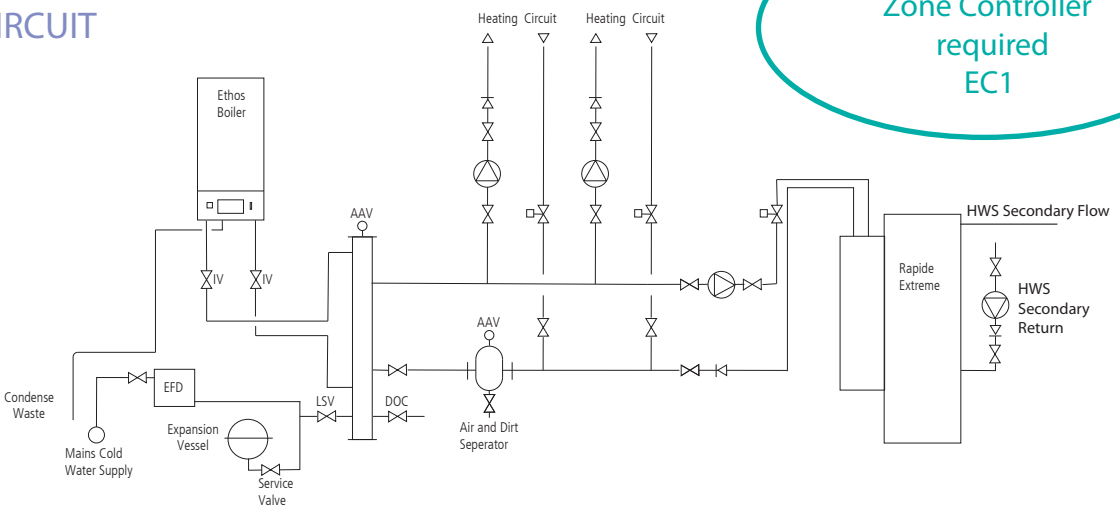
We strongly recommend the use of low loss headers with all of our boilers, single or multiple. The low loss headers serve several important functions and are particularly effective where new boilers are installed into existing systems.

They allow correct design flow rate through the boiler(s), whilst ensuring stable mix flow temperatures, which assists in control, furthermore the modern boiler plant can operate at its optimum temperature differential irrespective of the main system temperature differential.

Additional protection can be afforded to the system by the installation of an air and dirt separator, particularly advisable for older systems, but recommended for all installations. The low loss header can also be used as a connection manifold for expansion, filling devices and control sensors. Due to the lower water velocity, (around 0.5 l/s) the low loss header also allows debris to precipitate out, thus further protecting the system.

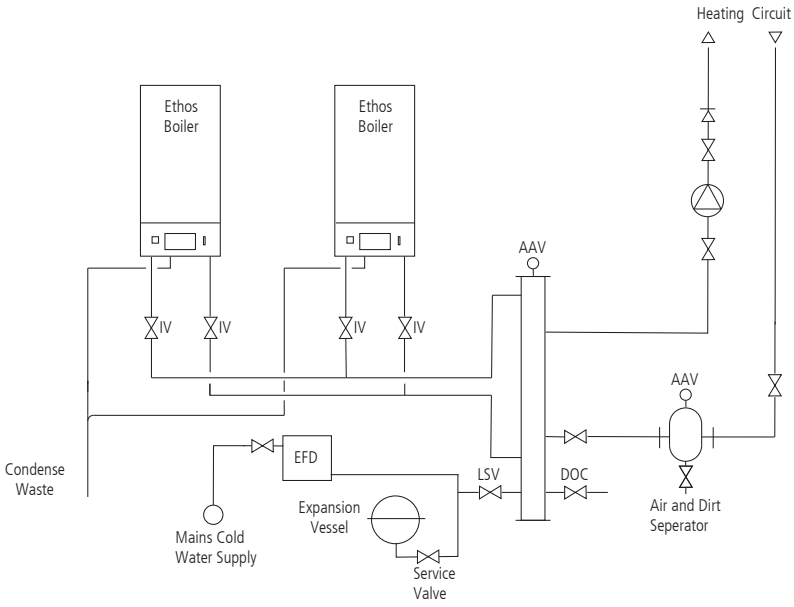
SYSTEM 2
ONE BOILER, TWO HEATING CIRCUITS
ONE DHW CIRCUIT

System 2
Zone Controller
required
EC1



SYSTEM 3
TWO BOILERS
ONE HEATING CIRCUIT

System 3
Cascade controller
required
EC2

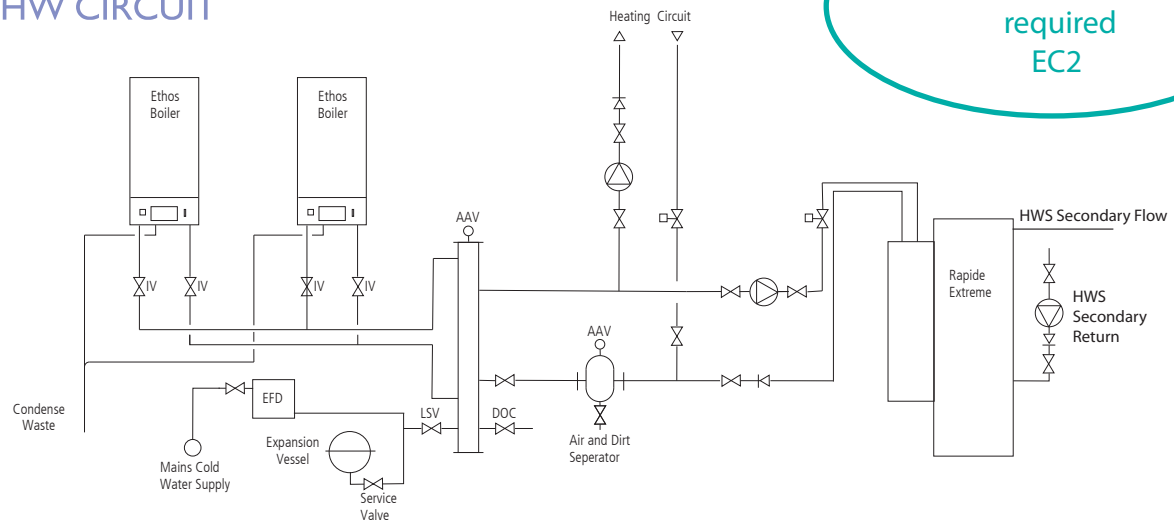


LOW LOSS HEADER SELECTION CHART

Boiler Output kW	Model	Diameter mm	Main Connections	Auxillary Connections
<100	LL50	50	4x 11/4" BSP	2x1 & 2x1/2"
<150	LL65	65	4x2" BSP	2x1 & 2x1/2"
<300	LL100	100	4x2" BSP	2x1 & 2x1/2"
<450	LL125	125	4x DN65	2x1 & 2x1/2"
<750	LL150	150	4x DN80	2x1 & 2x1/2"
<1000	LL200	200	4x DN80	2x1 & 2x1/2"

SYSTEM 4
TWO BOILERS, ONE HEATING CIRCUIT
ONE DHW CIRCUIT

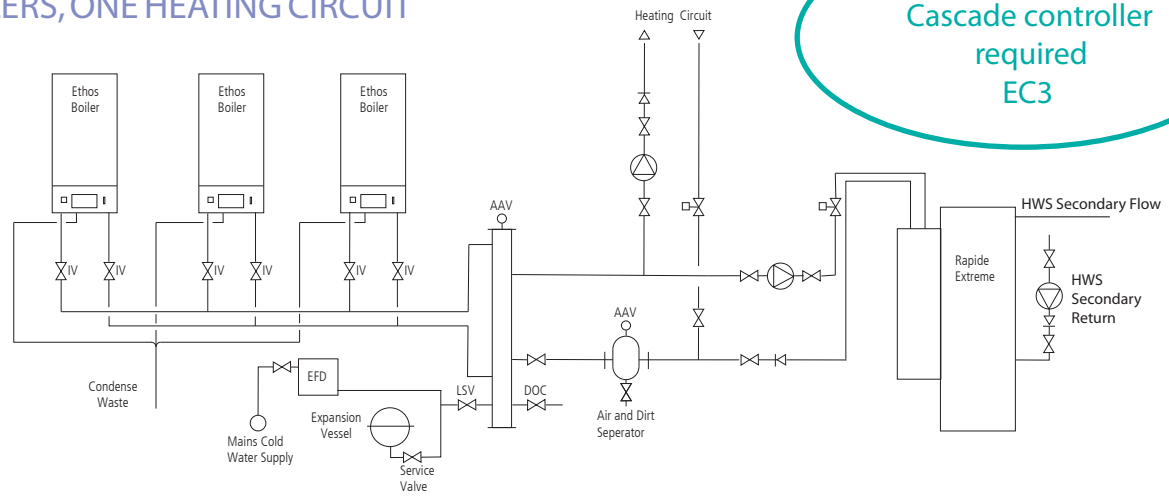
System 4
Cascade controller
required
EC2



SYSTEM 5

THREE BOILERS, ONE HEATING CIRCUIT ONE DHW CIRCUIT

System 5
Cascade controller
required
EC3



FILLING AND PRESSURISING THE SYSTEM

The filling and pressure management of the hydraulic system is essential to the reliability and efficiency of the whole system, and must be by a method approved by the Water Regulation Advisory Service (WRAS).

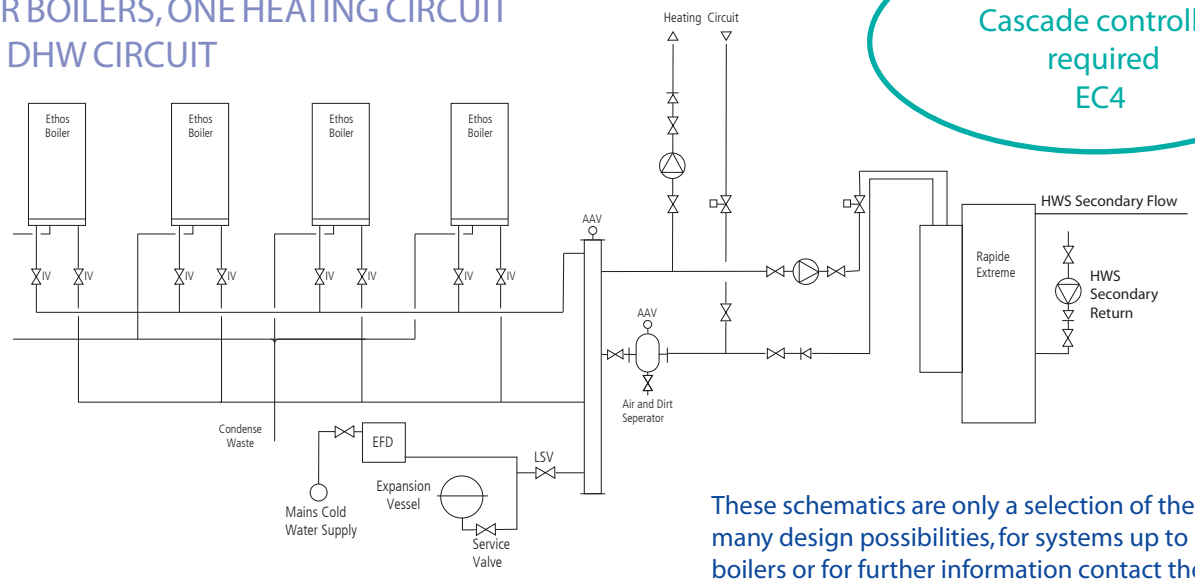
Heating applications other than "single occupancy dwellings" ie domestic housing, are considered to "Fluid r category 4" and as such can only be filled from the cold water supply by way of a back flow prevention devis approved for category 4. A traditional "filling loop" is not acceptable and is illegal. Systems with outputs in excess of 60 Kw will also require an automatic pressurisation unit to maintain and monitor the water pressure within the system (BS6644).

The above requirements can be satisfied by the use of an "RPZ" valve to fill the system , which requires annual service and inspection by an authorised body, a traditional pressurisation unit can be used to maintain and monitor the water pressure, a far superior alternative is the market leading MIKROFILL EFD unit, the only WRAS approved backflow preventor that can both fill any size system from empty, manage the pressure thereafter and offers many extra features including "Flood protection". See our technical literature MSL 1/2008

SYSTEM 6

FOUR BOILERS, ONE HEATING CIRCUIT ONE DHW CIRCUIT

System 6
Cascade controller
required
EC4



These schematics are only a selection of the many design possibilities, for systems up to 16 boilers or for further information contact the Mikrofill technical department

BOILER | MANAGEMENT SYSTEMS

The Ethos range of condensing boilers incorporate the very latest control technology, and standard boiler features include ;

SINGLE BOILER

- Frost protection
- Seven day time clock with night set back
- 12 month holiday programming
- External heating zone timed control
- Domestic Hot Water zone timed control
- Weather compensation
- Optimised start
- Remote alarm facility
- Remote room control
- Solar compatibility

To ease installation some of the remote controls are available in "wireless format".

For most single boiler applications no other external controls will be required

MULTIPLE BOILERS

It is accepted as "best practise" to sequence (cascade) multiple boiler applications to maximise plant efficiency by closely matching boiler output to system demand. Cascade units developed for standard non condensing boilers were relatively simple "step" controllers, have now changed and the cascade controller is required to perform many more tasks, it still has to balance output to load, but in such a way as to keep the boilers in condensing mode as long as possible, the cascade controller becomes the prime mover of the system. The Mikrofill Ethos Cascade unit communicates digitally with each boiler and allows levels of control previously not available in any system, these features include

- Condensing mode optimisation
- Frost protection
- Seven day timeclock with night setback
- 12 Month holiday programming
- Up to 4 external heating timed zones
- Domestic Hot water timed zones
- Weather compensation
- Optimised Start
- Remote alarm facility
- Remote room/zone control
- Solar compatibility
- Biomass compatibility
- Control of up to 16 boiler units
- Equalised operating times for each boiler
- Accepts mixed boiler outputs

The Mikrofill Ethos Cascade unit can recognise each boiler and download information ie output, turndown ratio and boiler seasonal efficiency and thus optimising the operation. To ease installation each boiler is factory set to match the Ethos Cascade Controller (when ordered together) this drastically reduces installation and commissioning on site, and ensures the highest possible boiler efficiency.

FLUE | APPLICATIONS

The Ethos range of boilers is approved for use with both "open flued" and "room sealed" type flue systems and as such are suitable for most applications, please see the flue resistance charts. Flue components are readily available , including standard horizontal and vertical sets, for information on multiple boiler applications please contact the Mikrofill Technical Dept. Care should be taken when siting the flue outlet, condensing boilers produce water vapour in the form of "pluming" which could cause a nuisance. All flue installations must comply with the Gas Act

The Ethos Flue resistance table

By using either concentric or the 2 pipe system, different flue lengths can be achieved. In case a concentric system is used, length should not exceed 12 metres.

Concentric Flue System		mm	Resistance system (Pa)		Resistance system (Pa)	
Part			Ethos 70	Ethos 90	Ethos 110	Ethos 130
Vertical Terminal		80/125	65			
Horizontal Terminal		80/125	79.7			
Straight pipe/m		80/125	9.3			
45° bend		80/125	12.1			
90° bend		80/125	14.6			
Vertical Terminal		110/150		72.6	94.1	143.4
Horizontal Terminal		110/150		70	90.7	138.3
Straight pipe/m		110/150		7.3	9.8	14.5
45° bend		110/150		10.1	13.2	19.9
90° bend		110/150		21.3	29.4	42.7
Two Pipe System						
Air Inlet	Part					
	Straight pipe/m	80		4.9		
	45° bend R=0,5D	80	6.8			
	90° bend R=1,0D	80	8.1			
Flue Gas Outlet	Vertical terminal	80	36			
	Horizontal terminal	80	19			
	Straight pipe/m	80	8.9			
	45° bend R=0,5D	80	12.4			
	90° bend R=1,0D	80	14.7			
Air Inlet	Part					
	Straight pipe/m	110		1.7	2.4	3.4
	45° bend R=0,5D	110		1.9	2.7	3.8
	90° bend R=1,0D	110		8.4	11.7	16.6
Flue Gas Outlet	Vertical terminal	110		29	35	42
	Horizontal terminal	110		12	18	25
	Straight pipe/m	110		3.1	4.0	6.1
	45° bend R=0,5D	110		3.6	4.5	7.0
	90° bend R=1,0D	110		15.4	19.5	30.2

Table 3 Flue discharge resistance

Example of calculation - Boiler type: Ethos 70

Concentric pipe 80/125mm vertical 3m + horizontal 1m = total 4m concentric straight pipe
1 x Concentric 90° bend / 2 x Concentric 45° bend / Vertical terminal 80/125

			Resistance
Concentric pipe 80/125:	3m	3 x 9.3	27.9 Pa
Concentric 90° bends:	1 pieces	1 x 14.7	14.7 Pa
Concentric 45° bends:	2 pieces	2 x 12.1	24.2 Pa
Vertical terminal 80/125*			65 Pa
Total Resistance			138.6 Pa

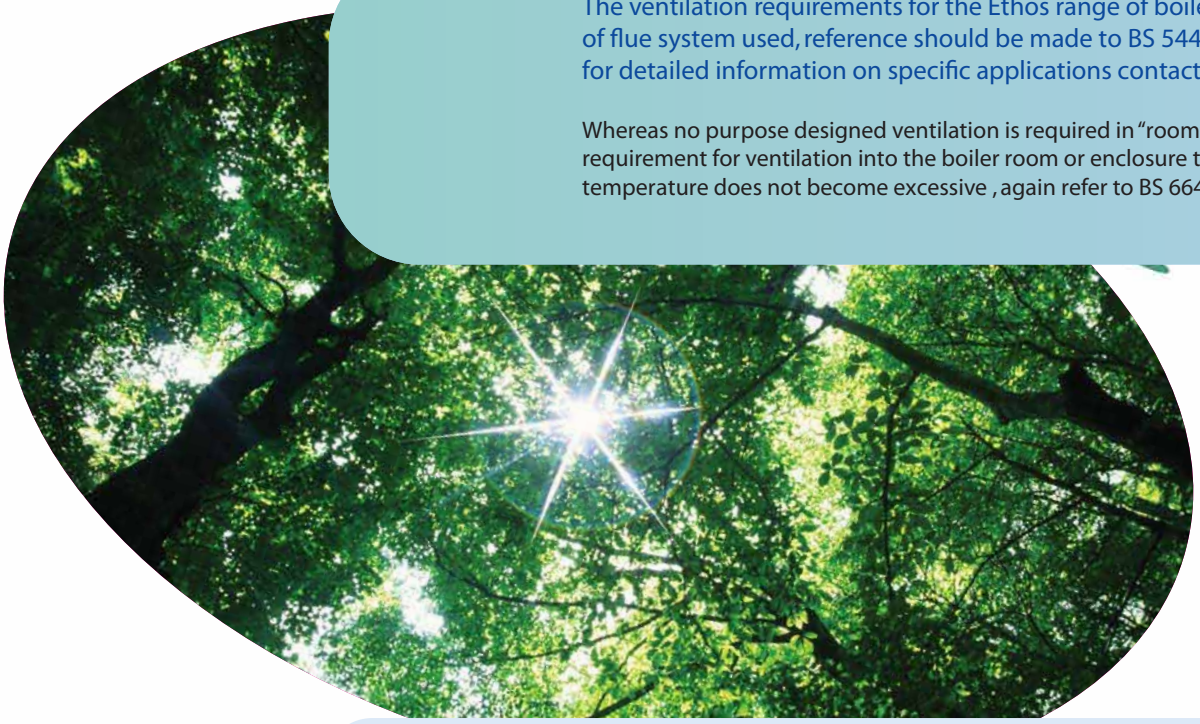
Total resistance is 138.6 Pa, so the boiler output is not changed by the resistance (lower than 140 Pa) and total concentric length is less than the maximum allowed 12 metres.

*Vertical terminal includes 1 metre length

VENTILATION

The ventilation requirements for the Ethos range of boilers is dependant on the type of flue system used, reference should be made to BS 5440 Pt 2 and to BS 6644 , but for detailed information on specific applications contact the Mikrofill technical dept..

Whereas no purpose designed ventilation is required in "room sealed" applications there is a requirement for ventilation into the boiler room or enclosure to ensure that the ambient temperature does not become excessive , again refer to BS 6644.



WATER | QUALITY

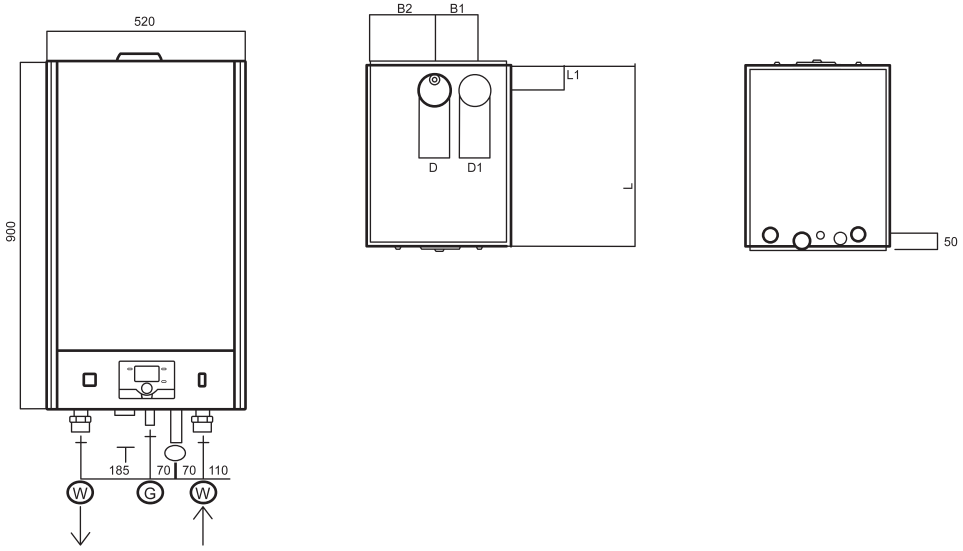
Ethos boilers are only suitable for installation into sealed systems

Upon installation of a new Ethos boiler the whole system should be thoroughly flushed, when connecting new boilers to existing systems then a power flush may be advisable.

All Ethos boilers incorporate stainless steel heat exchangers which are extremely resistant to corrosion and remain chemically inert when exposed to most water borne contaminants, however the rest of the system will almost certainly contain materials which can oxidise and produce debris which may find its way into the heat exchanger and cause problems.

It is strongly recommended that a method of mechanical filtration is installed into the system and that the water hardness is between 8 to 12 grams of calcium carbonate per 100 litres of system water with a pH of between 7 and 8. If in any doubt about the water quality, please contact a water treatment specialist or Mikrofill Technical Dept.

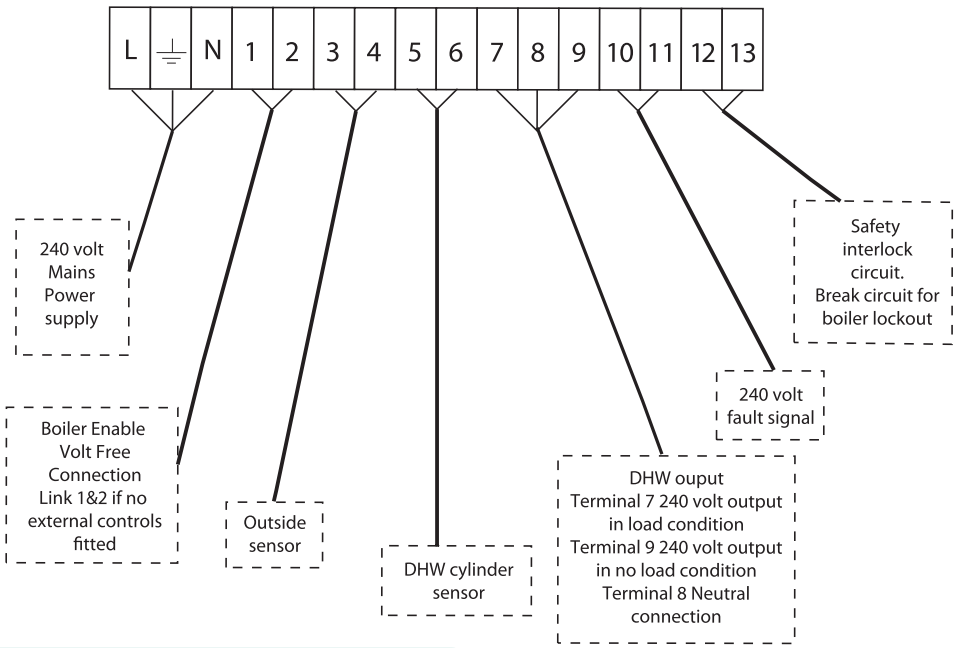
DIMENSIONS



Type	70	90	110	130
B1 mm	120	140	140	140
B2 mm	260	260	260	260
D mm	80	100	100	100
D1 mm	80	100	100	100
G	R ¾"	R ¾"	R ¾"	R ¾"
L mm	475	475	660	660
L1 mm	90	90	90	90
W	R 1 ¼"	R 1 ¼"	R 1 ¼"	R 1 ¼"

(We reserve the right to make changes without prior notification)The data may deviate slightly due to fabrication tolerances.

EXTERNAL CONNECTION DIAGRAM (Schematic)



TECHNICAL | DATA

Dimensions (HxW xD)		mm	900x 520x 475		900x 520x 660	
Model			Ethos 70	Ethos 90	Ethos 110	Ethos 130
W ater contentof appliance		litre	7	8,8	10,7	12,4
W eight (empty)		kg	56	66	85	95
Flow/return connections		BSP	1 1/4"	1 1/4"	1 1/4"	1 1/4"
Gas connection		BSP	3/4"	3/4"	3/4"	3/4"
Flue connection		mm	80	100	100	100
Air supply connection		mm	80	100	100	100
Concentric (optional)		mm	80/125	110/150	110/150	110/150
Power consumption		W	230	255	325	410
Electrical supply		V	230	230	230	230
Frequency		Hz	50	50	50	50
Fuse protection		A	6	6	6	6
Maximum fan speed		RPM	6500	6500	6500	6500
Minimum fan speed		RPM	1000	1000	1000	1000
Heating Performance						
Nominal heat input (nett)		kW	9.0 - 70.0	11.5 - 90.0	14.1 - 110.9	19.6 - 130.0
Nominal heat output at 80/60°C		kW	8.8 - 68.0	11.2 -87.5		
Nominal heat output at 50/30°C		kW	9.2 - 71.4	11.7 - 91.8		
Maximum gas consumption	G20	m3/hr	1.0 - 7.4	1.2 - 9.4	1.5 - 11.5	2.1 - 13.6
Maximum gas consumption	G25	m3/hr	1.1 - 8.6	1.4 - 11.5	1.7 - 13.5	2.5 - 16.0
Maximum gas consumption	G31	m3/hr	0.4 - 2.9	0.5 - 3.7	0.6 - 4.5	0.8 - 5.3
Technical data						
Flue gas dew point	°C		52	52	52	52
Flue temperature at 80/60°C (at ambient temperature of 20°C)	°C		75	75	75	75
Flue material temperature class			T 120	T 120	T 120	T 120
Permitted maximum resistance of flue system*	Pa		140*	140*	140*	140*
Condensation pH value			4 to5,5	4 to5,5	4 to5,5	4 to5,5
Maximum CH flow temperature	°C		90	90	90	90
CH water pressure (min/max)	Bar		0,5 – 6	0,5 – 6	0,5 – 6	0,5 – 6
Minimum/maximum gas pressure	G20	mbar	17 - 20	17 - 20	17 - 20	17 - 20
	G25	mbar	17 - 20	17 - 20	17 - 20	17 - 20
	G31	mbar	30 - 50	30 - 50	30 - 50	30 - 5
Environmental data						
Flue gas CO2 content	G20	%	9.0	9.0	9.0	9.0
	G25	%	9.0	9.0	9.0	9.0
	G31	%	10.3	10.3	10.3	10.3
Seasonally adjusted Nox**		mg/kwh	39.43	37.66	37.55	39.27
Co levels		ppm	<40	<40	<40	<40
Maximum efficiency (nett non condensing)		%	97.2	97.2	97.2	97.2
Maximum efficiency (nett condensing)		%	108.0	108.0	108.0	108.0
Seasonal efficiency		%	95.46	95.46	95.46	95.63

* With this resistance value the heat output will remain within the specifications indicated on the data plate; if the resistance is higher, the heat output will drop.
** When boilers are used in a multiple arrangement with recommended control systems, the seasonal efficiency will increase and the seaesonal Nox levels will decrease

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