

New

- Twin return connections
- Wide differential temperature



Hamworthy Varmax

Fully modulating, low NOx,
stainless steel, condensing boilers

Natural Gas or LPG

Outputs 120kW to 900kW



Hamworthy

Heating *at work.*

Varmax

Fully modulating, low NOx, stainless steel, condensing boilers

Varmax floor standing boilers are built around an entirely stainless steel fully welded heat exchanger. This gives exceptional tolerance to a wide range of system water conditions for corrosion resistance and a long life.

The range consists of 8 single boilers with outputs from 120kW to 450kW, and 4 dual models with combined outputs from 550kW to 900kW. Varmax is ideally suited for split temperature systems and projects such as medium sized district heating schemes.

High water capacity of the heat exchanger allows operation with wide differential temperatures. This removes the need for a dedicated primary circuit and enables system pumps with lower energy use to be installed.

Designed for use in sealed hydraulic systems only, all boiler models are pressure tested to 6 bar and have twin return connections for improving operating efficiency with split temperature systems. Generous insulation assures standby losses are kept to a minimum.

Fully pre-mix burners with 5:1 turndown far exceed ErP NOx criteria with emissions across the range lower than 40mg/kWh. A built in flue gas non-return valve simplifies flue system design whilst providing effective protection from re-circulation of flue gases through non-firing boilers.

Featuring comprehensive controls, Varmax boilers are capable of managing heating systems including a domestic hot water cylinder and up to three independent heating circuits operating at different temperatures to one another. Featuring in built sequence control functionality, multiple boilers can be managed without the need for a dedicated sequence control panel.

Where premises are equipped with Building Management Systems, control of the boilers can be set to receive enable and analog signals dictating when boilers should operate and the magnitude of power output they should deliver.

- **Wide differential temperatures**
- **No need for dedicated primary circuit**
- **Efficiency maximised by twin return connections**
- **Close load matching with 5:1 turndown**
- **Easy access for maintenance**
- **Clean and efficient – low emissions**

BENEFITS

Wide differential temperature and simplified hydraulic circuit design.



Varmax boiler

Options

- **Natural Gas or LPG**
- **Choice of flue systems**
- **Multiple boiler controls**

Specification

Varmax Boilers

Boiler Location

A flat and level plinth is recommended for siting the boiler. Any plinth and floor structure must be capable of supporting the boiler installation when full of water and should be non-combustible.

Boilers are provided with adjustable levelling feet for accommodating minor deviations in floor level and ensuring boilers are adjusted to correct level during installation.

The height of the plinth should allow the condensate outlets from the boilers to be connected into a drain that runs continuously downhill towards the discharge point with a minimum 3° slope.

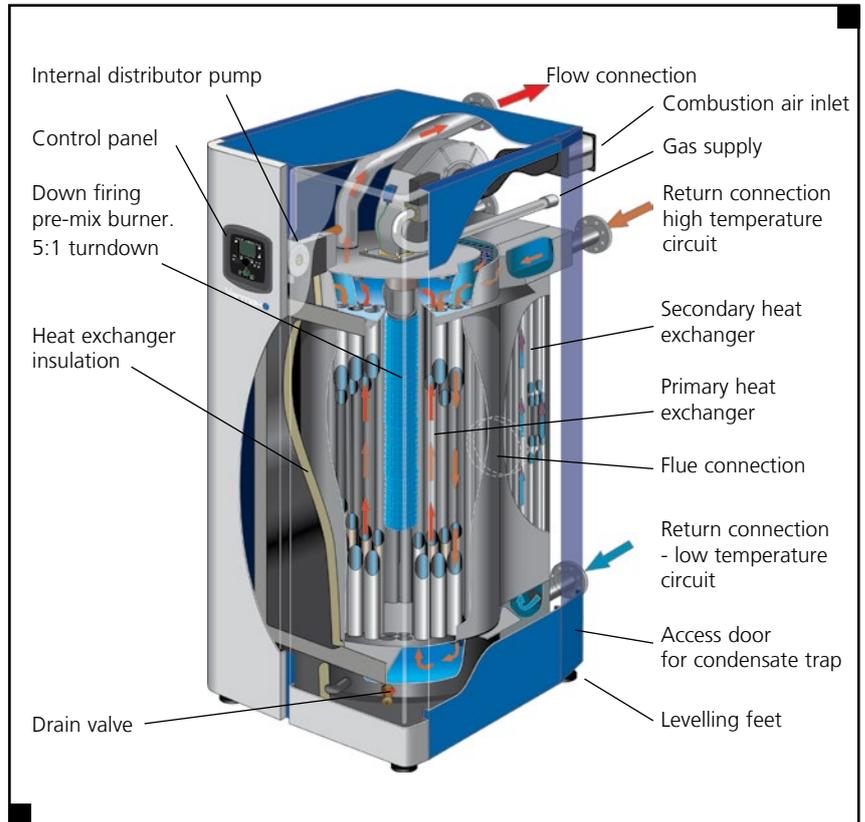
Boiler Casing

Wide opening hinged doors provide generous access to the boiler permitting burner maintenance to be carried out from the front of the boiler. On larger models where the top of the heat exchanger is high, a fold out step is provided easing access to the burner and electrical components located on top of the heat exchangers. Access for removing the burner vertically from the boiler is facilitated by a simple to remove section of the top casing secured using thumbwheel fixings.

For more complex procedures such as cleaning the heat exchanger, side casing panels also use a simple thumbwheel fixing allowing quick and easy removal. Access to the heat exchanger is via removable covers located behind easy to remove sections of insulation to the front and sides of the boiler assembly.

The casing is factory fitted and manufactured entirely from steel panels having a powder coated finish.

Exploded view of Varmax image



Heat Exchanger

Varmax condensing boilers use a fully stainless steel precision engineered heat exchanger at the heart of every boiler. Manufactured from high grade 316l stainless steel the fully welded design uses automated robotic welding for repeated high quality manufacture. Each heat exchanger, once manufactured, is subject to a dedicated 9 bar pressure test assuring hydraulic integrity prior to being assembled within the boiler.



Varmax heat exchanger

The heat exchanger features primary and secondary chambers each with a dedicated return connection allowing direct connection to split temperature systems. Each chamber is equipped with its own low level drain valve.

Generous insulation ensures standby losses at less than 0.15%. The insulation extends the full length of flow and return pipes right up to site connections.

Specification

Varmax Boilers

Primary Circulation – Pump Requirements

Due to the volume of water within the Varmax boiler and the incorporation of an internal circulation loop, it is not necessary to install boilers within a dedicated primary circuit with associated pumps, controls or low loss header.

Having no minimum flow rate requirement, the Varmax boiler can operate with wide differential temperatures. As secondary system circulation is increased through the boiler, the internal circulation loop flow rate is modulated on a reducing basis to ensure high levels of system efficiency.

Secondary heating circuit pumps can be optimised to suit the requirements of the systems they serve without affecting boiler operation.

Operating Efficiency

The heat exchanger uses a twin chamber primary and secondary design delivering exceptional efficiencies, exceeding 108% net part load when favourable system operating conditions exist. With full load net efficiencies exceeding 97% compliance with all known European and UK legislation is assured.

System Connections – system design

All boilers feature twin return connections that improve operating efficiency when installed within split temperature heating system designs. The return to the primary heat exchanger is suitable for high temperature heating circuits such as radiator loops and air convectors and the return to the secondary heat exchanger is suitable for low temperature circuits such as underfloor heating.

Using this method of connection ensures the low temperature circuit delivers condensing operation within the secondary heat exchanger whilst the primary heat exchanger may not be condensing. System operating efficiency gains up to 7% can be achieved by separating high and low temperature system connections to the boiler.

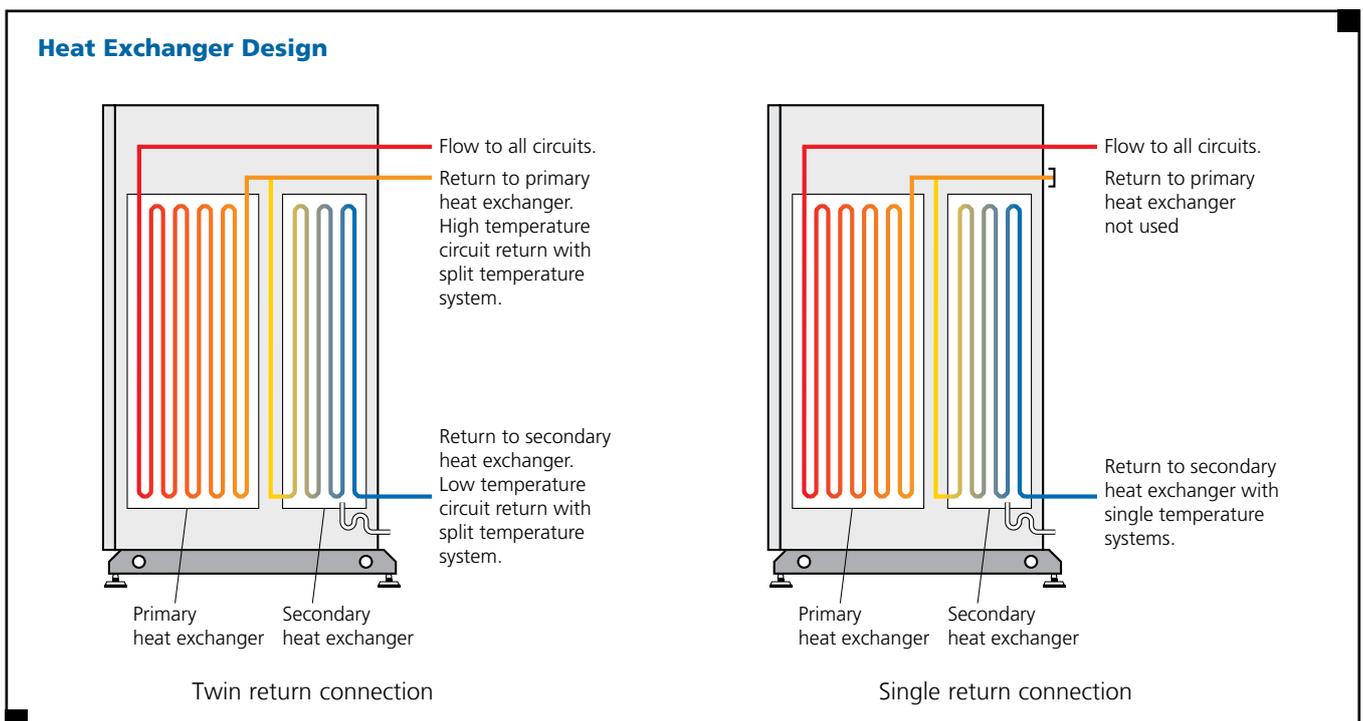
The outlet (flow) from the secondary heat exchanger converges with the return to the primary heat exchanger within the boiler with all flow leaving for the secondary circuits from the one boiler flow connection.

Where the entire heating system operates at just one temperature the return should be directly into the secondary heat exchanger. If operating at low temperatures, condensing operation will be within both secondary and primary heat exchangers.

Water pressure sensor

Boilers are protected from both high and low water pressure conditions. Water pressure within the boiler is monitored by the integral sensor and the boiler prevented from operating under the following conditions:

- High pressure. The burner is prevented from firing should internal boiler pressure reach 6 bar and released for operation once the pressure drops to 5.8 bar.
- Low pressure. The burner is reduced to 20% modulation should internal pressure drop below 1 bar, and prevented from firing should internal pressure drop below 0.8 bar. Once the internal pressure recovers to 1 bar the burner operates at 20% modulation until pressure reaches 1.2 bar when full burner modulation resumes.



Specification

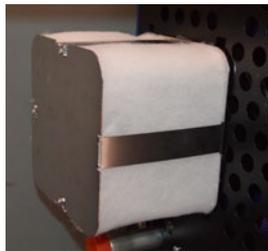
Varmax Boilers

Combustion Air supply

Each boiler has the combustion air supply ducted from a dedicated connection on the rear face of the boiler directly on to the inlet of the fan. Having in built sound attenuation, noise emission associated with the air inlet is kept to a minimum.



Attenuated air inlet



Air filter

Air inlet filter

Each boiler is provided with an air inlet filter accessory for fitting on site where a B23 Type open flue is fitted. This effectively removes and prevents small dirt particles from entering the burner helping to maintain clean and efficient combustion between scheduled maintenance. Filter media is easily washed and replaced.

Fuel Supply

Boilers are certified for operating with Natural Gas and LPG. Factory set to operate with Natural Gas, boilers can be site adjusted for operation using LPG requiring parameter changes and gas orifice replacement as part of the commissioning process. Each boiler is supplied with all required parts to facilitate conversion to LPG firing if required.

Boilers are supplied optimised for use with natural gas, however each can be easily converted for LPG use with a simple set up change during commissioning. Boilers must not be fired using LPG prior to being correctly converted.

Pre-mix Burner

Varmax boilers feature down firing pre-mix burners for clean combustion with low ErP Class 6 emissions. Full modulation from 20% to 100% output is managed from the boiler control varying fan speed and gas input to deliver correct gas air ratio across the range of modulation. With NOx emissions less than 40mg/kWh maximum BREEAM credits are available for contribution towards an 'Excellent' building accreditation. The burner head features spark ignition with flame detection provided by flame ionisation probe. The burner itself is a cylindrical design with woven mesh finish and can be quickly removed and cleaned during scheduled maintenance.

An integrated flue gas non return valve is located between the burner and fan. This prevents any possibility of flue gas recirculating through non firing modules in a multiple boiler configuration for easier installation with common flue headers.

Gas pressure switch

Each boiler is provided with a gas inlet pressure switch to prevent the boiler should the incoming gas pressure drop below 12.5 mbar. Once gas pressure sufficiently recovers, boilers automatically resume operation.



Gas pressure switch



Gas filter

Gas filter

Each boiler has a gas inlet filter to prevent particles from the incoming gas supply as small as 50 microns reaching the gas valve.

Flue Temperature Protection

Each boiler is equipped with flue gas temperature protection to prevent boiler operation should the flue gas temperature rise in excess of 85° C.

Flue Connection

Each boiler is provided with a flue connection on the rear face of the boiler exiting horizontally. The flue connection is provided with an integral seal, gas analysis test point and clamping band for securing the mating flue pipe.

All boilers are compatible with B23 Type open flue systems, with boiler models from 120 through to 320 additionally having room sealed flue options.

Condensate Outlet

Condensate from the combustion process is safely removed from the heat exchanger via a syphon trap to outside of the boiler. This allows condensate to flow safely but prevents the escape of flue gases via the drain. The drain outlet is located on the rear face of the boiler at floor level.

Water Temperature Controls

Each boiler is provided with flow and return temperature sensors and a limit thermostat sensor. The boiler control monitors the sensors and makes adjustments to burner output to ensure a smooth delivery of temperature to the system.

Maximum operating temperature for each boiler is 85°C, with a manually resettable limit thermostat pre-set to 100°C.

Specification

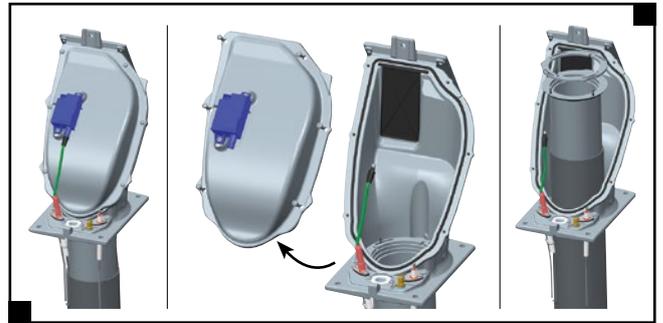
Varmax Boilers

Performance Limits Pre-Commissioning

On delivery the boiler is limited both for maximum flow temperature (70°C) and maximum burner load (approx. 72%). This is to ensure performance is limited until the installation has been approved by the commissioning engineer who will as part of the commissioning procedure adjust both settings as required.

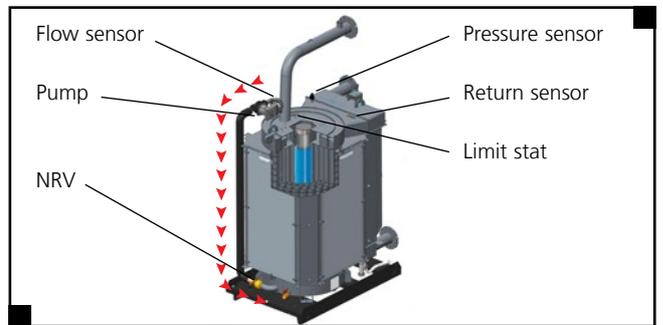
Burner Maintenance

A simple cover is quickly removed providing access for burner removal.



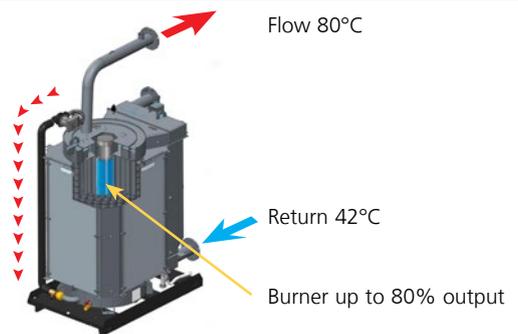
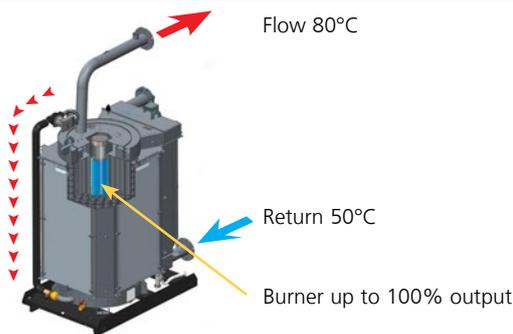
Temperature and power output control

Each Varmax boiler is equipped with an internal flow distribution circuit that optimises circulation through the primary heat exchanger based on differential temperature. With the function of maintaining differential temperature across the primary heat exchanger to 20°C, the internal circulator optimally adjusts volume flow. Additionally, with increasing differential temperature burner output is limited to prevent cycling.

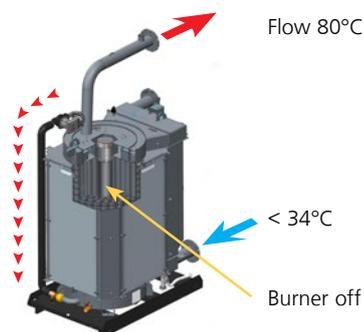
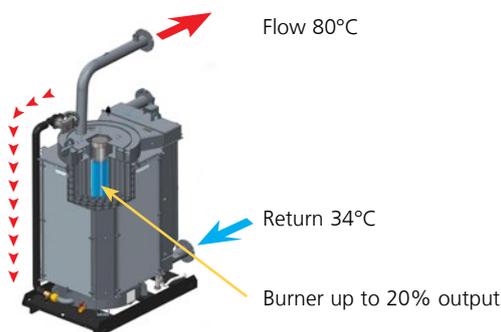


Varmax – Control of internal distribution circuit and burner output

System differential temperature	Up to 30°C	System differential temperature	From 30°C to 38°
Primary heat exchanger flow volume control	Flow optimised for 20°CΔt	Primary heat exchanger flow volume control	Flow optimised for 20°CΔt
Burner output control	Limited to max. 100%	Burner output control	Limited to max. 80%



System differential temperature	From 38°C to 46°C	System differential temperature	Greater than 46°C
Primary heat exchanger flow volume control	Flow optimised for 20°CΔt	Primary heat exchanger flow volume control	Pump over-run period
Burner output control	Limited to max. 20%	Burner output control	Burner off

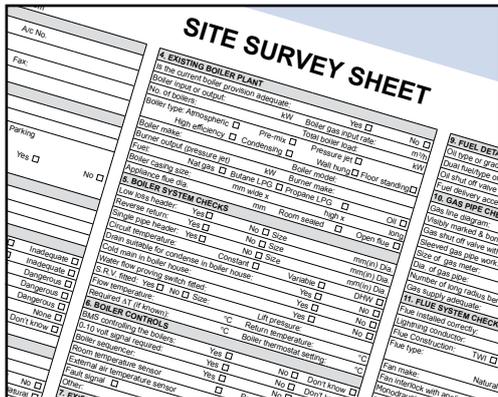




Services and Warranty

Varmax Boilers

Site survey



Our free site survey brings the experts directly to you. If you're not sure which product is right for your project then request a site visit from your local technical sales manager. If it is a refurbishment project they will carry out a thorough review of the plant room and current equipment. They will check for areas of non-compliance and give you recommendations of what boilers or water heaters would be best suited to your building. They can also show you how much fuel and carbon will be saved by making improvements to the system. You will be supplied a record of all checks carried out as part of the survey.

To request a free site survey call our head office or get in touch directly with your local contact online.

www.hamworthy-heating.com/find-your-local-sales-manager

Warranty

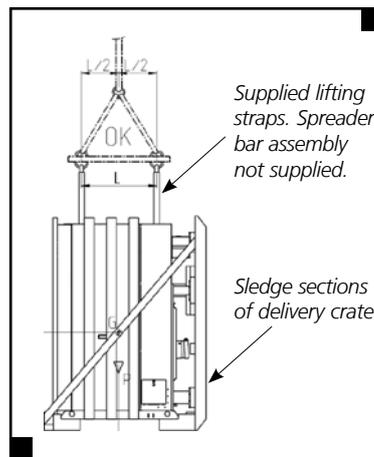
The Varmax boiler comes with a 5 year warranty on the heat exchanger. All other parts carry Hamworthy's standard two years' warranty (except for consumables in line with our Terms and Conditions). Where the product is commissioned by Hamworthy service engineers within 6 months of delivery date, then the two years' warranty covers parts and labour from date of commissioning.

We offer tailored packages to suit individual customer requirements, many of which include extended warranty benefits. Full details of warranty terms and conditions are available on request.



Delivery

Varmax boilers are supplied within a unique pallet that incorporates skids to aid moving the boiler. With the boiler securely fixed to the delivery pallet the assembly can be simply turned onto its skids which aid pulling/pushing the boiler into location.



Supplied lifting straps. Spreader bar assembly not supplied.

Sledge sections of delivery crate.

Additionally every boiler is supplied with lifting eyes on top of the heat exchanger to which straps are factory fitted and correctly located for crane lifts to elevated boiler house locations. A suitable spreader bar must be used when lifting the boiler using the supplied straps to protect the casings and components on top of the boiler. Once located in the boiler house the lifting straps are easily removed. Standard delivery for all Hamworthy products is free of charge. Products are delivered to site on a tail-lift vehicle, and deliveries are closely co-ordinated with the customer, to suit the site construction programme.

To enquire about special deliveries including FORS and time critical deliveries (additional charges apply) please contact our customer services team.

Commissioning and Service

We strongly recommend that all boilers are commissioned by our service department. As well as ensuring your product is set up correctly for maximum efficiencies you will receive extra benefits on warranty (see below). On completion, you will get a report with details of the initial operating settings.

A range of servicing options tailored to your requirements is also available.

For more information on commissioning and service please contact

Hamworthy Heating Service Department:

Tel: 01202 662555

Email: service@hamworthy-heating.com



Technical Data

Varmax Boilers Performance and General Data Information - Single Boiler Models

Varmax Boiler Model		120	140	180	225	275	320	390	450	
Energy	Building regulations Part L seasonal efficiency % gross	96.13	96.13	96.33	96.33	96.24	96.24	96.22	96.22	
	Boiler output - maximum 80/60°C, NG & LPG. 390kW and 450kW models Nat Gas only.	kW Btu/hr x 1000	117.0 399.2	136.0 464.0	175.0 597.1	219.0 747.2	268.0 914.4	312.0 1064.5	381.0 1300.0	439.0 1497.9
	Boiler output - maximum 50/30°C, NG & LPG. 390kW and 450kW models Nat Gas only.	kW Btu/hr x 1000	127.0 433.3	148.0 505.0	191.0 651.7	238.0 812.1	290.0 989.5	338.0 1153.3	415.0 1416.0	478.0 1630.9
	Boiler output - minimum 80/60°C, Nat Gas.	kW Btu/hr x 1000	35.0 119.4	41.0 139.9	53.0 180.8	66.0 225.2	80.0 273.0	94.0 320.7	114.0 389.0	132.0 450.4
	Boiler output - minimum 80/60°C, LPG	kW Btu/hr x 1000	35.0 119.4	41.0 139.9	53.0 180.8	66.0 225.2	80.0 273.0	94.0 320.7	N/A N/A	N/A N/A
	Boiler input (gross) - maximum, NG & LPG. 390kW and 450kW models Nat Gas only.	kW Btu/hr x 1000	120.0 409.4	140.0 477.7	180.0 614.2	225.0 767.7	275.0 938.3	320.0 1091.8	390.0 1330.7	450.0 1535.4
	Boiler input (net) - maximum, NG & LPG. 390kW and 450kW models Nat Gas only.	kW Btu/hr x 1000	120.0 409.4	140.0 477.7	180.0 614.2	225.0 767.7	275.0 938.3	320.0 1091.8	390.0 1330.7	450.0 1535.4
	Standby loss	W	182.0	182.0	213.0	213.0	259.0	259.0	311.0	311.0
Water	Water content	litres	116.0	116.0	151.0	151.0	239.0	239.0	287.0	287.0
	System design flow rate @ 30°C ΔT rise	l/s	0.9	1.1	1.4	1.7	2.1	2.5	3.0	3.5
	Water side pressure loss @ 30°C ΔT rise	mbar	27	33	25	36	36	53	34	43
	System design flow rate @ 20°C ΔT rise	l/s	1.4	1.6	2.1	2.6	3.2	3.7	4.6	5.3
	Water side pressure loss @ 20°C ΔT rise	mbar	60	75	57	81	82	119	77	97
	System design flow rate @ 11°C ΔT rise	l/s	2.5	2.9	3.8	4.7	5.8	6.8	8.3	9.5
	Water side pressure loss @ 11°C ΔT rise	mbar	198	248	188	268	271	393	255	321
	Minimum water pressure	barg	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Maximum water pressure	barg	6	6	6	6	6	6	6	6
	Minimum flow temperature setting	°C	22	22	24	24	20	20	23	23
	Maximum flow temperature setting	°C	85	85	85	85	85	85	85	85
Gas	Gas flow rate, NG (G20) - maximum	m³/hr	12.7	14.8	19.1	23.8	29.1	33.9	41.3	47.6
	Maximum gas inlet pressure, Nat Gas	mbar	25	25	25	25	25	25	25	25
	Nominal inlet pressure, Nat Gas	mbar	20	20	20	20	20	20	20	20
	Minimum gas inlet pressure, Nat Gas	mbar	17	17	17	17	17	17	17	17
	Gas flow rate, LPG (G31) - maximum	m³/hr	4.9	5.7	7.4	9.2	11.3	13.1	N/A	N/A
	Nominal inlet pressure, LPG	mbar	37	37	37	37	37	37	N/A	N/A
Flue	Approx. flue gas volume Nat Gas @ 15°C, 8.8–9.2% CO ₂ @ N.T.P	m³/hr	167.5	195.2	251.8	313.8	383.7	447.0	544.6	627.6
	Maximum flue gas temperature @ 80/60°C Nat Gas	°C	60.8	62.1	61.0	62.3	61.7	63.4	62.5	64.8
	Pressure at boiler flue spigot @ 80/60°C Nat Gas	Pa mbar	200	200	115	165	122	176	180	193
	Approx. flue gas volume LPG @ 15°C, 10.4–10.8% CO ₂ @ N.T.P	m³/hr	153.9	179.0	232.4	288.9	354.9	411.4	N/A	N/A
	Maximum flue gas temperature @ 80/60°C LPG	°C	60.3	62.6	60.3	62.2	63	65.4	N/A	N/A
	Pressure at boiler flue spigot @ 80/60°C LPG	Pa mbar	167	200	103	136	118	157	N/A	N/A
Electrics	Dry NOx emission (0% excess oxygen, mg/kWh dry air free); NG/(LPG)	mg/kWh	30	30	30	30	40	40	35	35
	Electrical supply		230V, 1Ph, 50Hz							
	Power consumption - maximum boiler modulation	W	204	311	179	320	238	352	480	660
	Start current (per module)	Amp	3.5	5.4	3.1	5.6	4.1	6.1	8.3	11.5
	Run current (per module)	Amp	0.89	1.35	0.78	1.39	1.03	1.53	2.09	2.87
Approx shipping weight	kg	340	340	393	393	502	502	592	592	
Noise emission @1m: @max. modulation	dB (A)	65.0	65.0	61.0	61.0	61.0	61.0	68.0	68.0	



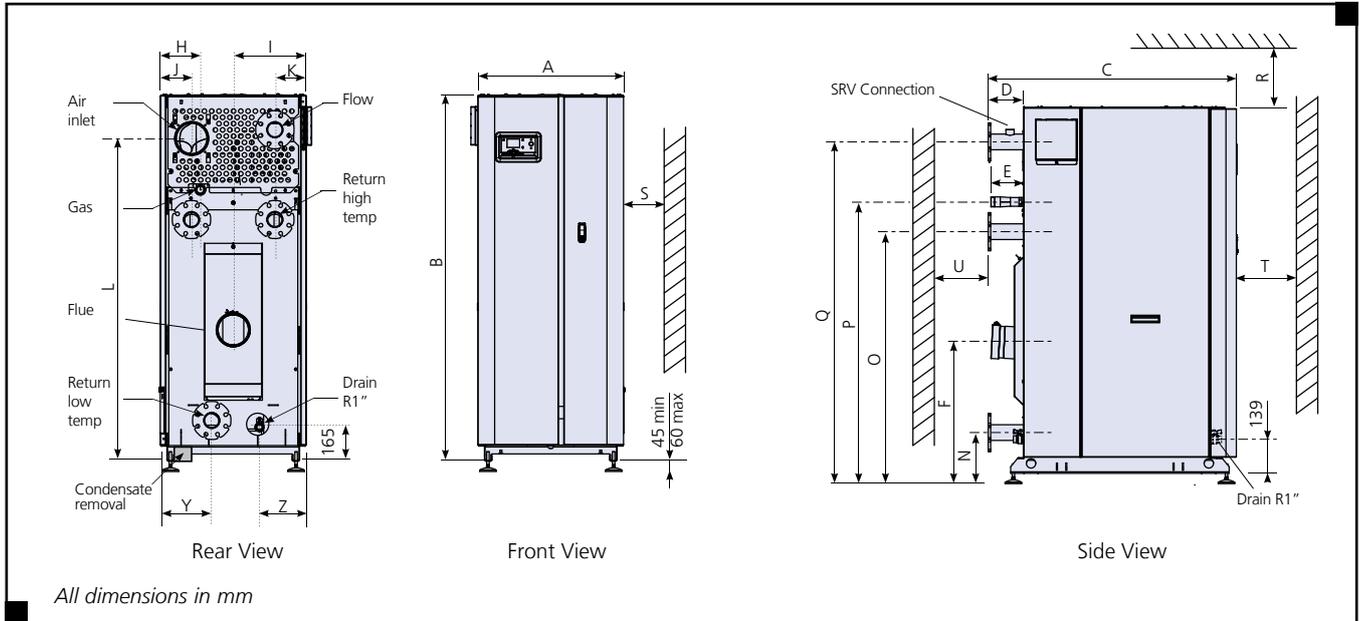
Technical Data

Varmax Boilers Performance and General Data Information - Dual Boilers

Varmax Boiler Model		550	640	780	900	
Energy	Building regulations Part L seasonal efficiency % gross	96.24	96.24	96.22	96.22	
	Boiler output - maximum 80/60°C, NG & LPG. 390kW and 450kW models Nat Gas only.	kW 536.0 Btu/hr x 1000 1828.8	624.0 2129.1	762.0 2599.9	878.0 2995.7	
	Boiler output - maximum 50/30°C, NG & LPG. 390kW and 450kW models Nat Gas only.	kW 580.0 Btu/hr x 1000 1979.0	676.0 2306.5	830.0 2832.0	956.0 3261.9	
	Boiler output - minimum 80/60°C, Nat Gas.	kW 160.0 Btu/hr x 1000 545.9	188.0 641.5	228.0 777.9	264.0 900.8	
	Boiler output - minimum 80/60°C, LPG	kW 160.0 Btu/hr x 1000 545.9	188.0 641.5	N/A N/A	N/A N/A	
	Boiler input (gross) - maximum, NG & LPG. 390kW and 450kW models Nat Gas only.	kW 550.0 Btu/hr x 1000 1876.6	640.0 2183.7	780.0 2661.4	900.0 3070.8	
	Boiler input (net) - maximum, NG & LPG. 390kW and 450kW models Nat Gas only.	kW 550.0 Btu/hr x 1000 1876.6	640.0 2183.7	780.0 2661.4	900.0 3070.8	
	Standby loss	W	518.0	518.0	622.0	622.0
Water	Water content	litres	478.0	478.0	574.0	574.0
	System design flow rate @ 30°C ΔT rise	l/s	4.3	5.0	6.1	7.0
	Water side pressure loss @ 30°C ΔT rise	mbar	36	53	34	43
	System design flow rate @ 20°C ΔT rise	l/s	6.4	7.4	9.1	10.5
	Water side pressure loss @ 20°C ΔT rise	mbar	82	119	77	97
	System design flow rate @ 11°C ΔT rise	l/s	11.6	13.5	16.5	19.1
	Water side pressure loss @ 11°C ΔT rise	mbar	271	393	255	321
	Minimum water pressure	barg	1.5	1.5	1.5	1.5
	Maximum water pressure	barg	6	6	6	6
	Minimum flow temperature setting	°C	20	20	23	23
Maximum flow temperature setting	°C	85	85	85	85	
Gas	Gas flow rate, NG (G20) - maximum	m ³ /hr	58.2	67.7	82.6	95.2
	Maximum gas inlet pressure, Nat Gas	mbar	25	25	25	25
	Nominal inlet pressure, Nat Gas	mbar	20	20	20	20
	Minimum gas inlet pressure, Nat Gas	mbar	17	17	17	17
	Gas flow rate, LPG (G31) - maximum	m ³ /hr	22.5	26.2	N/A	N/A
	Nominal inlet pressure, LPG	mbar	37	37	N/A	N/A
Flue	Approx. flue gas volume Nat Gas @ 15°C, 8.8–9.2% CO ₂ @ N.T.P	m ³ /hr	767.4	894.0	1089.2	1255.2
	Maximum flue gas temperature @ 80/60°C Nat Gas	°C	61	60.8	60.3	62.1
	Pressure at boiler flue spigot @ 80/60°C Nat Gas	Pa mbar	127	151	177	200
	Approx. flue gas volume LPG @ 15°C, 10.4–10.8% CO ₂ @ N.T.P	m ³ /hr	709.8	822.8	N/A	N/A
	Maximum flue gas temperature @ 80/60°C LPG	°C	62.8	64.7	N/A	N/A
	Pressure at boiler flue spigot @ 80/60°C LPG	Pa mbar	121	132	N/A	N/A
Electrics	Dry NOx emission (0% excess oxygen, mg/ kWh dry air free); NG/(LPG)	mg/kWh	40	40	35	35
	Electrical supply		230V, 1Ph, 50Hz	230V, 1Ph, 50Hz	230V, 1Ph, 50Hz	230V, 1Ph, 50Hz
	Power consumption - maximum boiler modulation	W	476	704	960	1320
	Start current (per module)	Amp	8.3	12.2	16.7	23.0
	Run current (per module)	Amp	2.07	3.06	4.17	5.74
General	Approx shipping weight	kg	1050	1050	1240	1240
	Noise emission @1m: @max. modulation	dB (A)	61.0	61.0	68.0	68.0

Dimensional Details

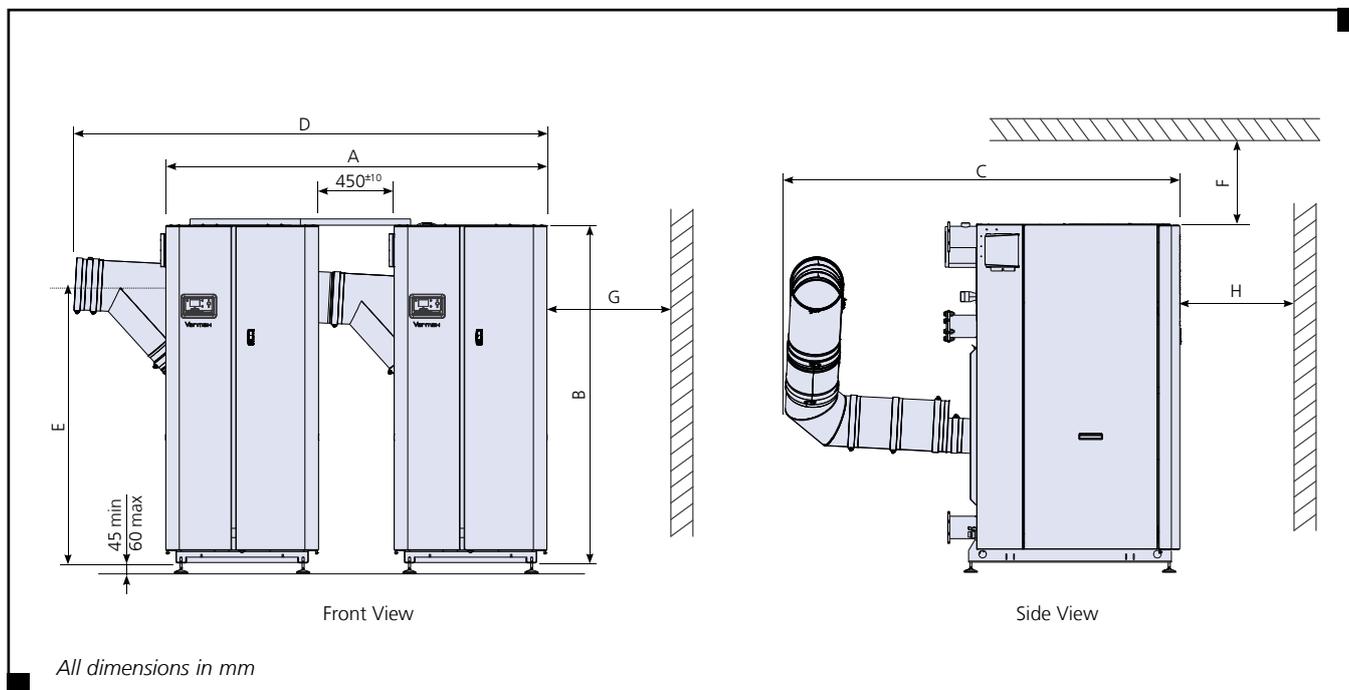
Varmax Boilers Dimensions and Clearances - Single Boiler Models



Ref.	Varmax models							
	120	140	180	225	275	320	390	450
A	Boiler width	mm	734	734	812	912		
B	Boiler height	mm	1530	1780	1877	2023		
C	Boiler depth	mm	1189	1218	1341	1392		
D	Flow and return connection depth	mm	148	169	169	168		
E	Gas connection depth	mm	103	150	109	92		
F	Flue centreline height	mm	510	630	680	750		
H	Gas connection centreline	mm	115	192	241	274		
I	Flue connection centreline	mm	350	350	399	449		
J	Air inlet centreline	mm	150	150	200	209		
K	Flow and high temperature return centreline	mm	166	150	179	192		
L	Air inlet centreline height	mm	1256	1564	1672	1874		
N	Low temperature return centreline height	mm	182	197	196	206		
O	High temperature return centreline height	mm	926	1171	1265	1402		
P	Gas centreline height	mm	1062	1315	1413	1577		
Q	Flow centreline height	mm	1298	1606	1661	1933		
Y	Low temperature return centreline	mm	250	247	276	289		
Z	Drain valve centreline	mm	237	224	270	283		
	Flue connection diameter	mm	150	150	180	200		
	Air inlet diameter	mm	150	150	180	180		
	Gas connection Nat Gas	male	R 1 1/4"	R 1 1/2"	R 2"	R 2"		
	Gas connection LPG	male	R 1 1/4"	R 1 1/2"	R 2"	N/A		
	Flow and return connection - flanges PN06	male/flange	R 2"	DN65 / PN06	DN80 / PN06	DN80 / PN06		
	Safety relief valve (SRV) connection	female	R1"	R1"	R1 1/4"	R1 1/4"		
R	Clearance top (for burner removal)	mm	150	320	263	427		
S	Clearance side (left and right)	mm	450	450	450	450		
T	Clearance front	mm	500	500	600	700		
U	Clearance rear	mm	500	500	500	500		

Dimensional Details

Varmax Boilers Dimensions and Clearances - Dual Boilers



Ref			Varmax models			
			550	640	780	900
A	Overall installed boilers width	mm	2059		2259	
B	Boiler height	mm	1877		2023	
C	Overall installed boilers depth	mm	2032		2114	
D	Overall installed boilers width including flue header	mm	2519		2749	
E	Flue header centreline height	mm	1500		1590	
	Flue header connection diameter	mm	250		300	
F	Clearance top (for burner removal)	mm	263		427	
G	Clearance side (left and right)	mm	450		450	
H	Clearance front	mm	600		700	
	Clearance rear (behind flue header)	mm	150		150	

Note: For all other boiler dimensions refer to the dimensions page for single boilers

Controls For Single Boilers

Varmax Boilers

Single boilers may be used in a variety of situations, often smaller premises without sophisticated controls such as Building Management Systems. Varmax is perfectly suited to such installations having a control system that's expandable. From very basic integral time clock control with fixed temperature operation all the way up to controlling multiple zone systems with full inside/outside temperature compensation and optimised time programming.

Control functions available as standard (no optional extras):

- Time control with 3 programs per day
- Fixed flow temperature control
- Boiler shunt pump control (pump contactor required to suit electrical load of pump – not HHL supply)
- 5 minute over run for shunt pump
- Pump kick for shunt pump to help prevent seizure
- Frost protection based on water temperature, 5°C fixed set point

Optional Outside Air Temperature Sensor QAC34

Whatever the level of control required it is always recommended to fit an outside air temperature sensor allowing enhanced frost protection for both the building infrastructure and the boiler plant. The sensor should be located on a north facing wall.

Control functions available with outside air temperature sensor fitted:

- 2 Stage frost protection – based on water temperature and outside air temperature
 - Stage 1 – Air temperature: starts circulation pumps to move heat around the circuit from within the building protecting the plantroom
 - Stage 2 – Water temperature: starts the boiler to prevent water within the system freezing
- Summer shutdown - Stops boiler operation when outside temperature reaches a pre-determined set-point
- Adaptable weather compensation - Matches boiler flow temperature to building thermal dynamics as outside air temperature fluctuates up and down.

Part number 533901457 – Model QAC34

Optional Heating Circuit Control Kit

Up to 3 independent heating circuits incorporating mixing valves with each circuit operating with a different flow and room temperature requirement to the other circuits is possible. The boiler generates flow water to the highest zone temperature requirement whilst the other zones use mixing valve control to reduce flow temperature into their respective circuits. This allows heating to be maintained throughout any demand and domestic hot water requirement.

An optional heating circuit kit must be fitted to the boiler comprising a clip in controls module AVS 75 which the circuit flow temperature sensor, mixing valve and pump are all wired to. Pumps must be connected via a suitably rated contactor – not HHL supply.

An optional heating circuit control kit is required for each heating circuit.

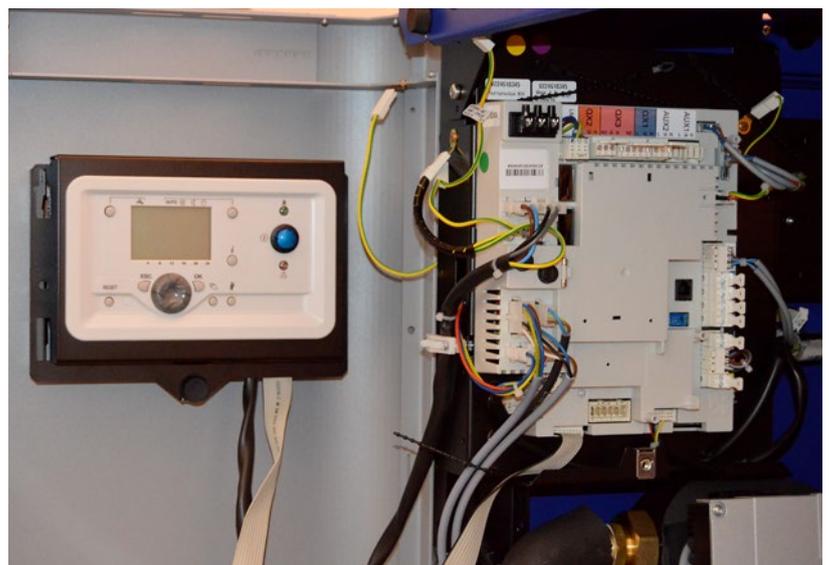
Part number 059751 – for single heating circuit.

Remote interlock

Each boiler can be interlocked to prevent operation when external controls elements are in fault, such as gas solenoid valve closure. A programmable input on terminals H5 can be commissioned to shut down the boiler if the contacts go open circuit. External switches using this circuit must be volt free.

Optional Room Temperature Sensors

Each heating circuit can be equipped with an independent room temperature sensor. There are two types of room sensor; a fully programmable room sensor QAA75, and an offset adjustable room sensor QAA55. When a room temperature sensor is fitted, enhanced control of the heating circuits can be achieved based on both internal and outside air temperatures. This could, for instance, compensate for an unexpected higher internal air temperature allowing the heating system to start later and at a lower flow temperature to save energy.



Controls with reversible fascia display for enhanced usability during servicing

Controls For Single Boilers

Varmax Boilers

Optional Programmable Room Sensor - QAA75

The programmable room temperature sensor communicates with the boiler and allows the user full adjustment of the room temperature, time clock, holiday periods and frost protection settings. The unit also displays fault codes from the boiler plant. Alternatively, offset adjustable room sensors are also available, for installations requiring users to have less access to system settings.

- 3 programmable periods per day
- Reduced temperature/night set back for non occupancy hours
- Holiday period (Frost protection remains active)
- Programme lock to prevent tampering
- Indication of operating parameters and boiler fault condition
- 7 day time clock with automatic summer/winter clock adjustment

Part number 533901587 – Model QAA75



Optional Offset Adjustable Room Sensor – QAA55

For installations where limited control is required by the building occupants, the offset adjustable room sensor may be used. This permits adjustment +/- 3°C from the programmed room temperature set point and communicates room temperature to the boiler.

- Setting the operating mode between automatic operation, continuous operation comfort or night setback temperature, off with frost protection active
- Setting a temporary off condition during an un-programmed non occupancy period that will reset automatically according to following program settings
- Programmable lock to prevent tampering.

Part number 533901589 – Model QAA55

Optional Domestic Hot Water Control

A single domestic hot water cylinder (calorifier) may be controlled from the boiler. Energy loading of the cylinder is achieved by starting and stopping the pump to the cylinder coil. Internal temperature sensing for the stored domestic hot water is achieved by either fitting the cylinder with an optional domestic hot water kit (temperature sensor QAZ36 and pocket) or the boiler can be configured to receive a Normally Open/Normally Closed signal from a standard cylinder thermostat. The high limit thermostat for the cylinder must also be wired to ensure the boiler energy supply is isolated from the cylinder in the event of the high limit thermostat setting being reached.

Part number 563605674 – Model QAZ36

Optional Controls Kits For Single Boilers

Controls option	Part number
Outside air temperature sensor QAC34	533901457
Domestic Hot Water sensor kit (sensor and pocket)	563605674
Mixing valve heating circuit control kit (AVS 75 control module, temperature sensor and pocket) for 1 zone	059751
Programmable room sensor QAA75	533901587
Offset adjustable room sensor QAA55	533901589

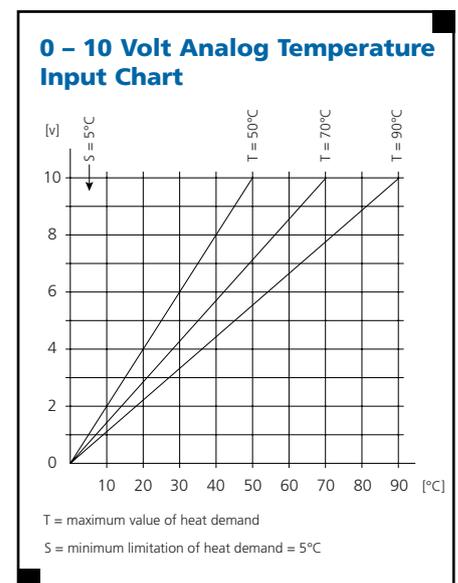
Remote Start Stop

Each boiler is equipped with a remote start stop circuit. On receiving a start signal from, for instance, an outside time clock the boiler will operate according to its internal temperature management program. This level of control simply overrides the boiler's internal time clock program. The boiler may still be equipped with optional controls including an outside air temperature sensor, room temperature sensors and individual heating zone controls whilst controlling also domestic hot water cylinder using the control options detailed above.

BMS Control

Additionally all Varmax boilers may be controlled by more sophisticated controls such as Building Management Systems using the 0-10 volt analog input which can be configured for temperature or load control. Where a Building Management System exists it is recommended that heating circuit and domestic hot water control is managed by this system.

For full details concerning control set up refer to O&M Navistem B3000 ref 500001310



Controls For Multiple Boilers

Varmax Boilers

Multiple boilers are likely to be installed within larger buildings where the controls requirements can be expected to be more complex. Often larger buildings are equipped with Building Management Systems. Where this is the case it is recommended to take advantage of the powerful control capability of these systems to not only manage the various heating circuits within the building but also to control the operation of the boilers.

Where Building Management Systems are not present, or independent control of the boilers is required there are two alternative options available from Hamworthy.

1. Sequencing of up to 15 boiler modules using integral Master/Slave feature of control.
2. Sequencing of up to 16 boiler modules using the Hamworthy Merley boiler sequence controller for mounting remote to the boiler or within clients own control panel. *See Brochure 500002524.*

Key features of both methods of multiple boiler control include:

- Choice of control inputs including:
 - External enable signals
 - 0-10v analog heat demand signal
 - Built in time clock settings
- Choice of cascade or unison sequencing strategies
- Lead boiler rotation
- 7 Day integral time clock – 3 programmable periods per day
- Optimised start and stop based on outside and room air temperatures
- Holiday periods
- Frost protection
- Constant or variable flow temperature based on outside and room air temperatures
- 2 Stage frost protection based on outside and room air temperature
 - Stage 1 – Air temperature: starts circulation pumps to move heat around the circuit from within the building protecting the plantroom
 - Stage 2 – Water temperature: starts the boiler to prevent water within the system freezing
- Summer shutdown
- Reduced temperature/night set back for non occupancy hours
- Pump kick for connected pumps

Using Master/Slave Boiler Sequence Controller

When using Master/Slave sequencing it is important to select which boiler module is going to be the Master. All site wiring associated with the sequence control function must be routed to this boiler and connected to the boiler controller. Programming of the sequence control will also be completed via the interface on this boiler module.

Common Flow Temperature Sensor QAZ36

A flow temperature sensor must be located in the pipework leaving the boilers. The sequence controller responds to signals from this sensor, comparing temperature set-point with actual flow temperature, then manages the number of boilers in operation and modulation rate of each boiler to achieve and maintain the desired flow temperature. A dedicated sensor kit including immersion pocket is available.

The number of boiler modules released to fire is selected according to the programmed sequence control strategy.

Part number 563605673 – Model QAZ36

LPB Bus Communication Kit OCI345

Up to 16 boiler modules may be sequence controlled and communication between boiler modules is facilitated via an LPB bus. Each boiler module must be equipped with an optional LPB bus communications kit.

Part number 563605667 – Model OCI345

Outside Air Temperature Sensor – QAC34

Whatever the level of control required it is always recommended to fit an outside air temperature sensor allowing enhanced frost protection for both the building infrastructure and the boiler plant. The sensor should be located on a north facing wall.

Control functions available with outside air temperature sensor fitted:

- 2 Stage frost protection – based on water temperature and outside air temperature
 - Stage 1 – Air temperature: starts circulation pumps to move heat around the circuit from within the building protecting the plantroom
 - Stage 2 – Water temperature: starts the boiler to prevent water within the system freezing
- Summer shutdown to prevent boiler operation when outside temperature reaches a pre-determined set-point
- Adaptable weather compensation to match boiler flow temperature to building thermal dynamics as the outside air temperature fluctuates up and down.

Part number 533901457 – Model QAC34

Optional controls kits for multiple boilers

Controls option	Part number
Outside air temperature sensor QAC34	533901457
Heating circuit sensor kit (sensor and pocket) QAZ36	563605673
Merley boiler sequence controller, wall mounted	563605672
Merley boiler sequence controller, loose kit for panel mounting	563605671
LPB Bus communication module OCI345, one required per boiler module	563605667
Programmable room sensor QAA75	533901587

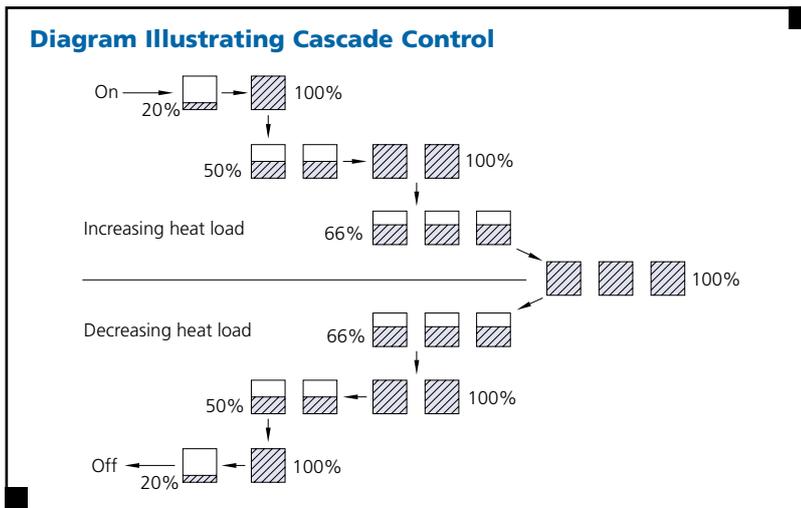
Controls For Multiple Boilers

Varmax Boilers

Boiler Sequence Control Strategies

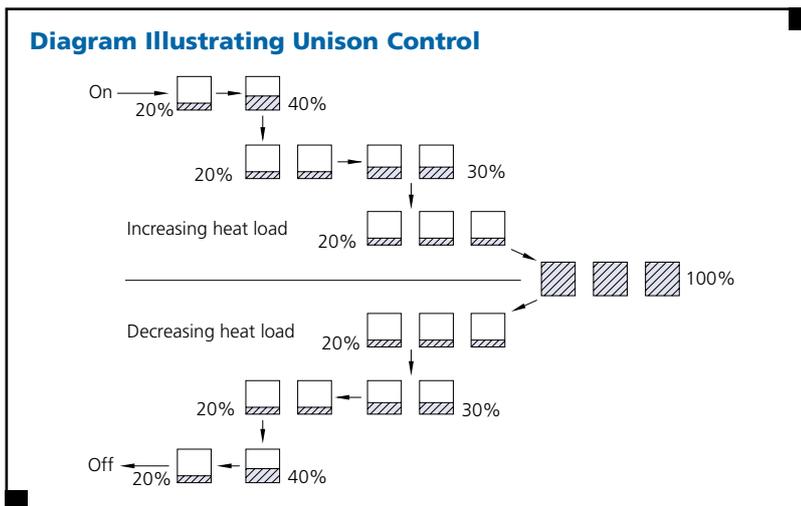
Cascade Control

Steps a boiler module on at its lowest rate and then modulates it to its maximum rate before switching on the next boiler module. Maintains the lowest number of boiler modules in operation for a given heat load.



Unison Control

Steps each boiler module on at its lowest rate until all boiler modules are firing and then modulates all boilers modules simultaneously to higher rates to match the system load. This method of sequencing can offer higher operating efficiencies, taking advantage of the higher part load efficiency of the boiler at lower firing rates.



Time Control

A 7 day time clock with 3 adjustable time periods per day is a standard feature of the sequence controller.

Optimised Start And Stop

The optimiser uses a combination of the actual room temperature and outside air temperature to calculate the exact time at which the heating will be started or stopped to ensure comfort levels at the correct occupancy times.

A self-learning function monitors discrepancies in room temperatures at the pre-defined times allowing the optimiser to fine tune to the building thermal performance.

Manual Over-Ride

Continuous on or off operation can be set during which the time program is over-riden until the over-ride function is manually de-activated. Frost protection and summer shutdown controls remain active.

Remote Enable

The Master boiler can be programmed to receive an enable signal from an outside control system. Whilst the in-built time clock and optimiser are over-riden, frost protection and summer shutdown remain active.

Summer Shutdown

Whenever the outside air temperature exceeds the adjustable programmed setting the heating is turned off.

Using BMS 0-10 Volt Signals

The sequence controller can be configured to accept a BMS analog input to initiate heat generation.

NOTE: When using a BMS to initiate cascade control via a 0-10 volt analog signal, the internal time clock and remote enable circuit functions are disabled.

Input signals to the sequence controller must be temperature configured. The input signal is translated to a temperature set point for the flow temperature, and translation is according to a linear graph from 5°C to an upper limit set during commissioning.

10 Volts corresponds with the upper limit with a maximum 85°C setting.

Electrical details

Varmax Boilers

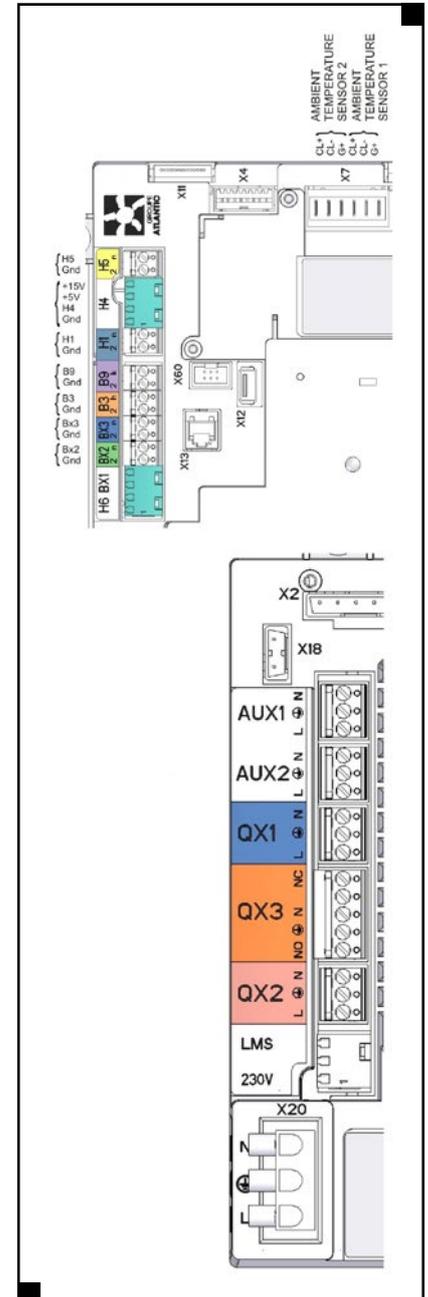
Connections To Boiler

Low Voltage Connections

Terminal reference	Function	Electrical	Max load
H5	Programmable input for: 1 Remote interlock (external vfc switch)	24V DC	
H4	Not for customer use		
H1	Programmable input for: 1 0-10V analog signal 2 Remote enable switch/time clock (vfc switch)	0-10V 24V DC	
B9	Input for outside air temperature sensor	Resistance input	
B3	Programmable input for DHW temperature: 1 QAZ36 DHW sensor kit input 2 Mechanical thermostat input (vfc switch)	Resistance input 24V DC	
BX3	Programmable input - spare		
BX2	Programmable input for: 1 Common flow sensor for master/slave sequence control (Master boiler only)		
BX1	Not for customer use		
H6	Not for customer use		

High Voltage Connections

Terminal reference	Function	Electrical	Max load
AUX1	Not used		
AUX2	Not used		
QX1	Programmable power supply for either: 1 Alarm – common fault 2 Non-Hamworthy boiler shunt pump/circulator	230v 50Hz 1Ph	1 Amp
QX3	Programmable power supply for: 1 Boiler shut off valve - motor open/motor close	230v 50Hz 1Ph	1 Amp
QX2	Programmable power supply for either: 1 DHW pump/circulator 2 Direct uncompensated heating circuit pump	230v 50Hz 1Ph	1 Amp
LMS 230V	Not for customer use		
LNE	Main power supply	230v 50Hz 1Ph	6.3 Amp



Electrical Connections

There are a number of cable entry clamps located at the rear of the left-hand side casing panel. Cables carrying mains voltage (230V 50Hz 1Ph) for electrical supply and pump outputs should be routed via a separate conduit to low voltage cables serving sensors and enable circuits.

Power Supply

An independent isolator and fused electrical supply is recommended for each boiler module. Supply 230 volt, 50Hz, single phase. Wiring external to the boiler must be installed in accordance with IET Regulations and any local regulations which apply. Wiring must be completed in heat resistant 3 core cable, (size 1.0 mm² c.s.a.) Fascia fuse rating is 2 amp. External fuses should be 6 amp for all single boiler sizes.

To prevent drawing excessive current (>1 amp) through the boiler control panel, it is recommended that pumps are connected via contactors.

Electrical details

Varmax Boilers

Domestic hot water control

A single calorifier can be controlled from the boiler. The temperature control can be set to use a standard on/off type thermostat often supplied with a calorifier, or to use a resistance temperature sensor available as an option. Using a temperature sensor in place of a standard thermostat allows the boiler to read the actual hot water temperature providing additional functionality such as optimised start and stop and frost protection.

Temperature control is managed by starting and stopping the calorifier primary pump, connection to boiler terminals QX2.

Temperature sensing using either the manufacturer's thermostat or optional temperature sensor kit is connected to boiler terminals B3.

Optional DHW temperature sensor kit part number 563605674

Heating circuit control – direct heating circuit

A single direct heating circuit can be controlled from the boiler. This circuit can be set for either constant temperature or compensated temperature operation.

Control of flow to the heating circuit is managed by starting or stopping the heating circuit pump for connection to boiler terminals QX2.

If compensated flow temperature is required an external air temperature sensor must be installed and the boiler will optimise the flow temperature accordingly.

Note: If using a DHW calorifier a direct heating circuit cannot be connected. In this situation heating circuits must be connect using the optional heating circuit control kit.

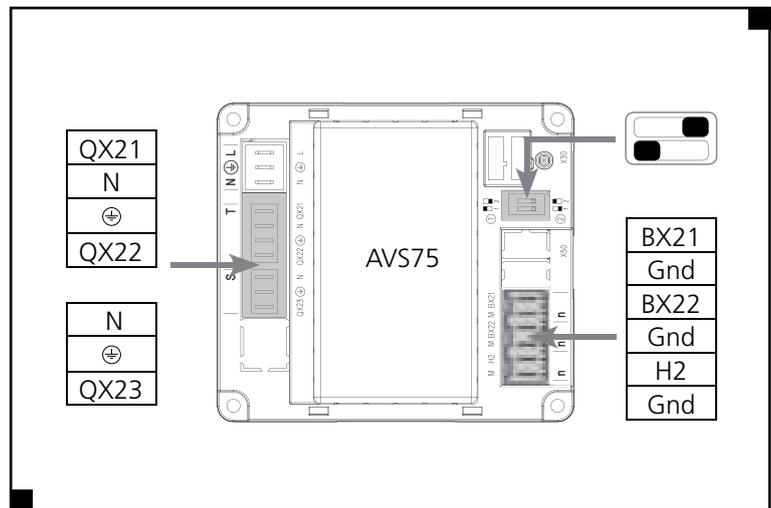
Optional Heating Circuit Control Kit – AVS75

Where the boiler is controlling DHW, or multiple heating circuit control is required with the possibility to operate each heating circuit at a different flow temperature an optional heating circuit control kit must be used for each heating circuit.

Note: Varmax boilers can accommodate up to 3 optional heating circuit control kits.

The heating circuit control kit has the ability to manage control of the heating circuit pump, mixing valve and receive a feedback signal from a flow temperature sensor within the circuit.

Each heating circuit can be set for constant temperature or compensated temperature control with each circuit able to operate at a different flow temperature to the others.



Wiring terminations for optional heating circuit control kit. This diagram applies to each heating circuit control kit used.

Terminal reference	Function	Electrical	Max load
QX21	Power supply for mixing valve – drive open	230v 50Hz 1Ph	1 Amp
QX22	Power supply to mixing valve – drive closed	230v 50Hz 1Ph	1 Amp
QX23	Power supply to heating circuit pump	230v 50Hz 1Ph	1 Amp
BX21	Input for heating circuit flow temperature sensor	Resistance input	
BX22	Not used		
H2	Not used		

Note: The optional heating circuit kits are supplied with the following items:

- Siemens AVS75 controller
- Siemens temperature sensor
- Power supply wiring loom to boiler controller
- Communications wiring loom to boiler controller

Hydraulic Circuit Design

Varmax Boilers

Varmax boilers have a higher water content than more compact modular boilers resulting in high thermal inertia allowing these boilers to operate with wide differential temperature.

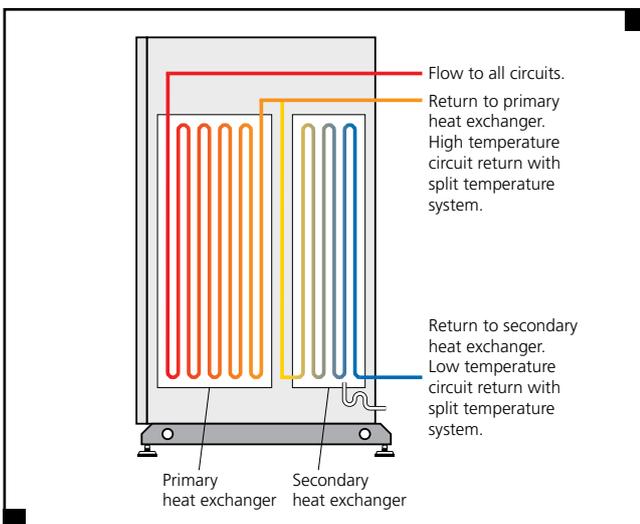
Protection of the heat exchanger is assured through the inclusion of an internal distribution circuit that ensures internal circulation when secondary circuit system pumps reduce flow to the boiler. When system flow to the boiler increases the circulation volume of the internal distribution circuit is reduced and eventually turned off once sufficient system flow through the boiler has been achieved.

Due to the hydraulic design of the boiler, system circuit design can be simplified without the need to install a dedicated primary circuit. This can save space in the plantroom and reduce the cost of installation.

Split Temperature Heating Systems

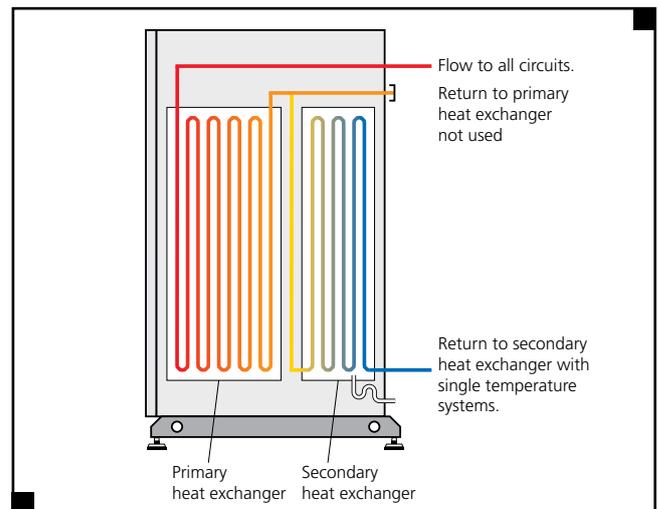
Each boiler is provided with two return connections. The first return connection directs circulation only through the primary heat exchanger and is intended for use where split temperature heating systems are deployed. The higher operating temperature heating circuit should be connected to this return.

The second return connection directs circulation through the secondary heat exchanger and is intended for connection of the lower operating temperature heating circuit where split temperature heating systems are deployed. On leaving the secondary heat exchanger circulation converges with circulation returning from the higher operating temperature heating circuit and then jointly flows through the primary heat exchanger before exiting from the single flow connection. See *Hydraulic Schemes 1, 2 and 3*.



Single Temperature Heating Systems

Heating systems that only operate at a single temperature are accommodated by directing all return circulation through the secondary heat exchanger where it then also flows through the primary heat exchanger before exiting the boiler.



Minimum Flow Rates

Due to the high thermal inertia design of the boiler there are no minimum flow rates for either heat exchanger, both being tolerant of zero system flow conditions.

Multiple Boiler System Connection

For multiple boiler installations it is essential to direct circulation only through boilers in operation to fulfil the heat load. This is best achieved using motorised isolation valves in the flow from each boiler, which if controlled from the respective boiler can be motor open/motor close in operation. Stopping flow through non-firing boilers does not adversely affect operation and serves to ensure variable speed system pumps experience a change in head allowing their speed to adjust accordingly. See hydraulic scheme 3.

Primary Circuit Design

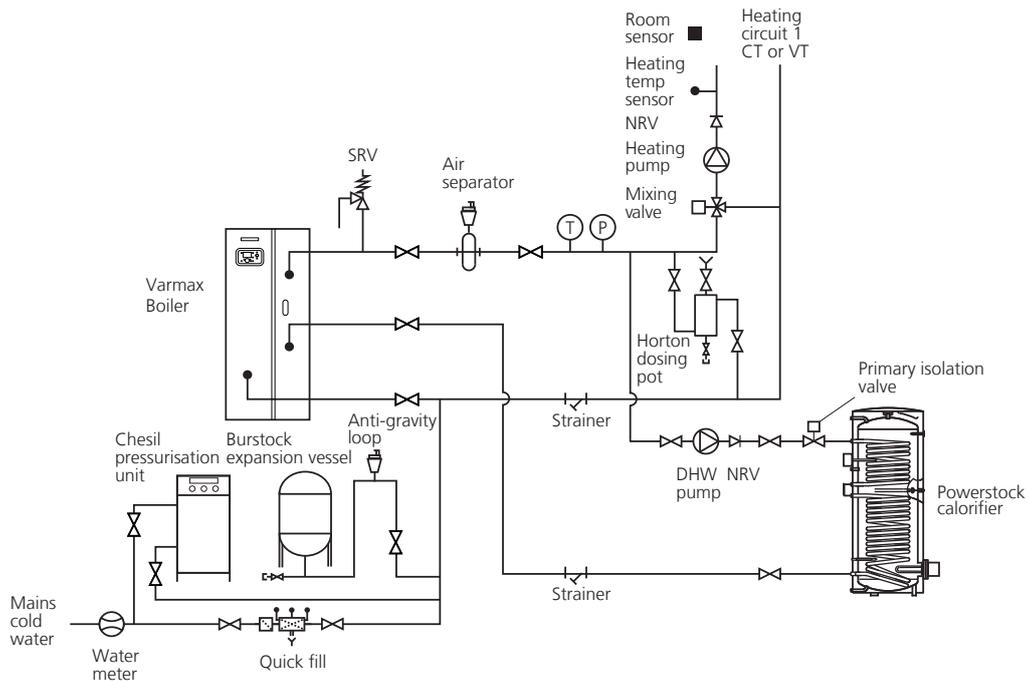
Whilst the inclusion of a dedicated boiler primary circuit for multiple boilers is not essential, Varmax boilers may be installed using such circuits. Where a primary circuit is to be deployed, flow control through the boilers is essential to ensure efficient use of pumps. The recommended form of flow control is the use of individual boiler shunt pumps controlled from the respective boiler. The use of a pump contactor is essential if the electrical pump load is greater than 1 Amp.

When using primary circuit designs, due to the circuit only ever operating a one temperature set point, even if the flow temperature is variable, it is only necessary to direct the return circulation through the secondary heat exchanger return connection. In such installations there is no need to use the second return connection to the primary heat exchanger. See *Hydraulic Scheme 4*.

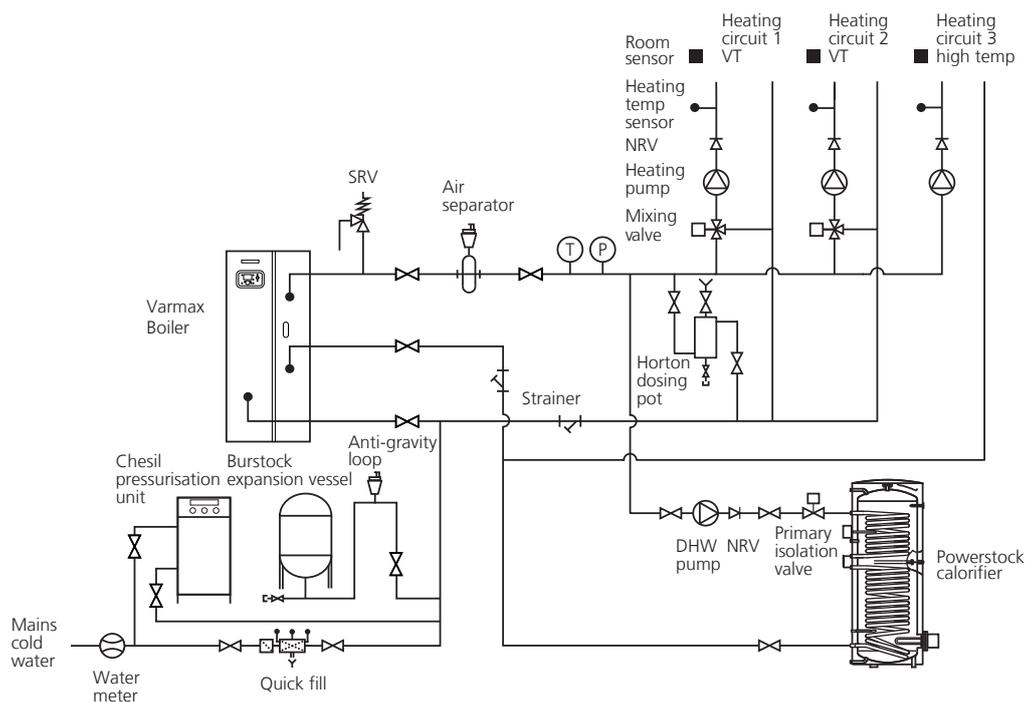
Hydraulic Schemes 1 & 2

Varmax Boilers

Scheme 1: Single Boiler with Split Temperature Heating and Domestic Hot Water Circuit



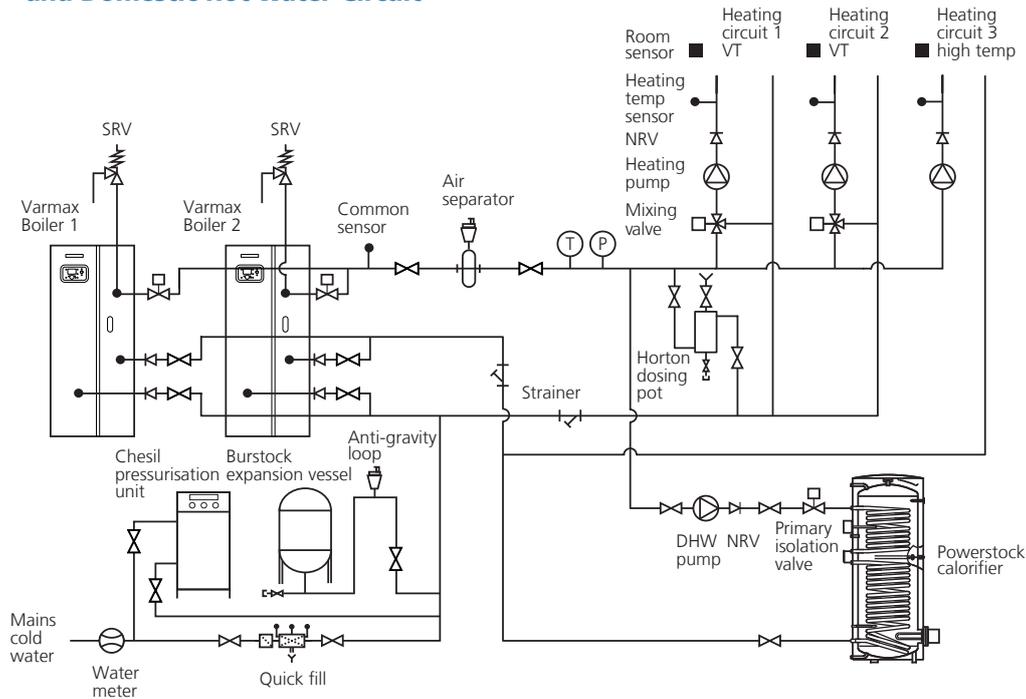
Scheme 2: Single Boiler with Multiple Split Temperature Heating Circuits and Domestic Hot Water



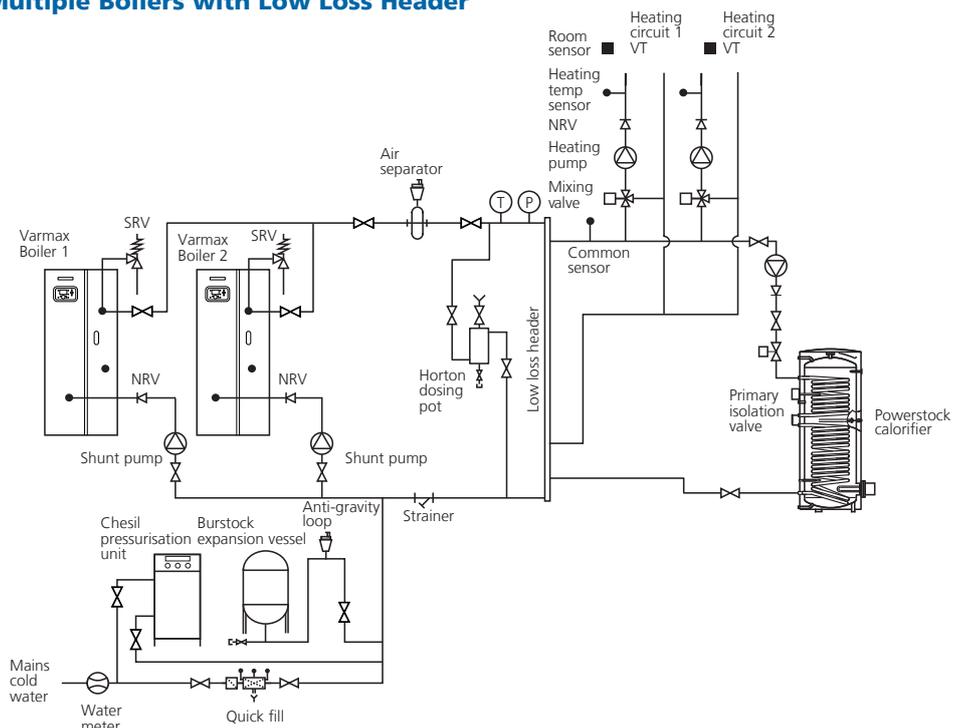
Hydraulic Schemes 3 & 4

Varmax Boilers

Scheme 3: Multiple Boilers with Multiple Split Temperature Heating Circuits and Domestic Hot Water Circuit



Scheme 4: Multiple Boilers with Low Loss Header

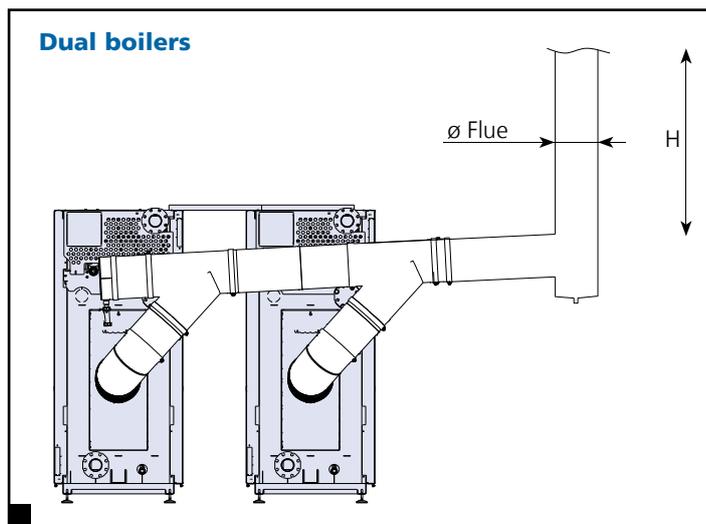
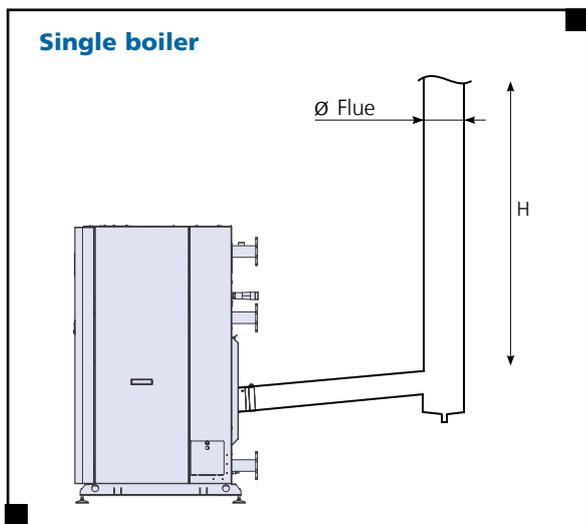


These schematics are available to download at www.hamworthy-heating.com

Flue Design

Varmax Boilers
Single and Twin boilers
B23p Open Flue Systems

B23p pressurised open flues should comprise a dedicated flue pipe for removing the flue gases to outside. Combustion air is drawn into the boiler directly through the air inlet connection on the rear face of the boiler. The air filter supplied with the boiler must be fitted to the air inlet connection.



Single boiler modules									
Varmax Boiler Model		120	140	180	225	275	320	390	450
Flue system dia		150	150	150	150	180	180	200	200
Maximum length H	m	100	100	40	45	60	65	90	65
Equivalent length 90° Elbow	m	5	5	5	5	6	6	7	7
Equivalent length 45° Elbow	m	3	3	3	3	3	3	4	4
Flue system dia		200	200	200	200	200	200	250	250
Maximum length H	m	100	100	100	100	100	100	100	100
Equivalent length 90° Elbow	m	7	8	8	8	8	8	9	9
Equivalent length 45° Elbow	m	4	4	4	4	4	4	5	5

Dual boilers					
Varmax Boiler Model		550	640	780	900
Flue system dia		250	250	300	300
Maximum length H	m	75	75	100	100
Equivalent length 90° Elbow	m	9	9	11	11
Equivalent length 45° Elbow	m	5	5	6	6
Flue system dia		300	300	350	350
Maximum length H	m	100	100	100	100
Equivalent length 90° Elbow	m	12	11	14	14
Equivalent length 45° Elbow	m	6	6	7	7

Flue Design

Varmax Boilers

C13 and C33 Room Sealed Flue Systems

For Varmax boiler models 120, 140, 180 and 225 single boilers

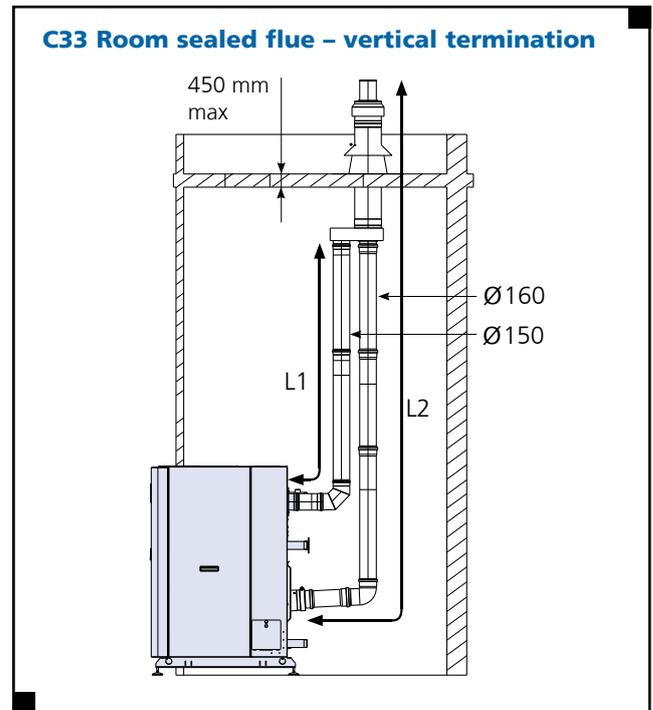
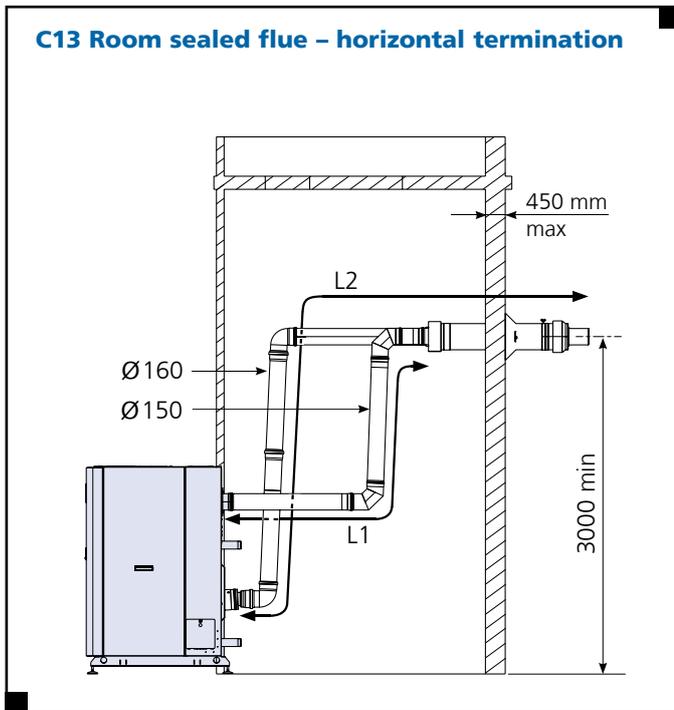
C13 and C33 room sealed flues include a twin pipe air and flue system that converges together into a single concentric flue terminal 160/250mm dia.

The flue terminal kit includes the concentric flue terminal, an adaptor to combine the twin air and flue ducts from the appliance into a concentric connection for the terminal and another adaptor for increasing the flue outlet connection on the boiler from 150mm to 160mm.

The twin pipe system components can be selected to suit the route for the air supply and flue discharge between the boiler and the terminal with the maximum distances for the air pipe and flue pipe provided in the tables below.

Flue components are CE certified EN14471 T120 H1. Flue pressure H1 up to 5000 Pa, and flue temperature T120 up to 120°C.

Flue pipe components are manufactured in polypropylene whilst air supply pipe components are manufactured in stainless steel.



C13 and C33 Room sealed flue performance data for Varmax boilers				
Model	120	140	180	225
Maximum air length L1 (m) 150mm dia	16.5	16.5	13.5	13.5
Maximum flue length L2 (m) 160mm dia	17.5	17.5	14.5	14.5
Equivalent length 90° Elbow (m)	1.5	1.5	1.5	1.5
Equivalent length 45° Elbow (m)	0.8	0.8	0.8	0.8

C13 and C33 Flue components Boiler models 120, 140, 180, 225		
Item		Part number
C33 Flue terminal kit including: Concentric terminal 160/250mm dia. with wall plates. Twin pipe to concentric adaptor Boiler flue adaptor 150mm to 160mm dia.		41421
Flue pipe 160mm dia. 1000mm long	Polypropylene	41425
Flue elbow 90° 160mm dia.	Polypropylene	41426
Flue elbow 45° 160mm dia.	Polypropylene	41427
Wall bracket 160mm dia.	Polypropylene	573407328
Air pipe 150mm dia. 1000mm long	Stainless steel	41428
Air pipe 150mm dia. 500mm long	Stainless steel	41429
Air elbow 90° 150mm dia.	Stainless steel	41430
Air elbow 45° 150mm dia.	Stainless steel	41431
Wall bracket 150mm dia.	Stainless steel	532511033

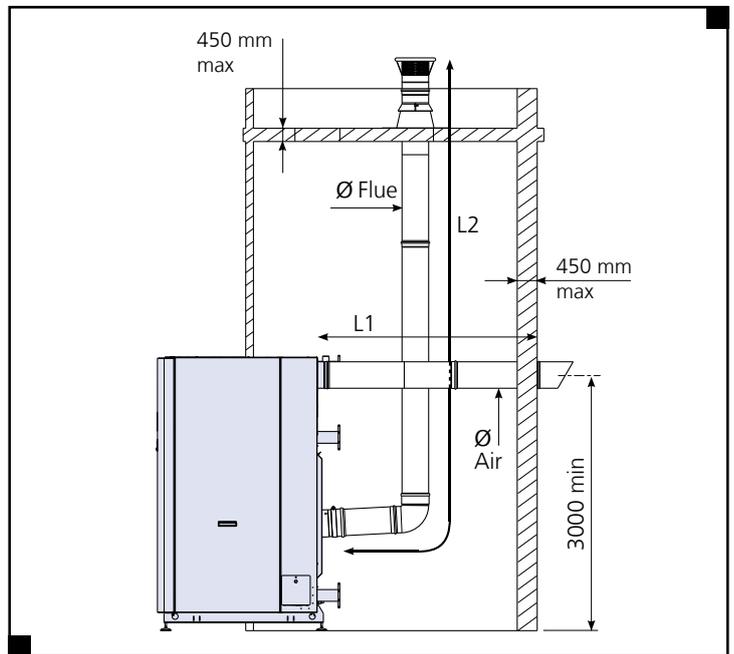
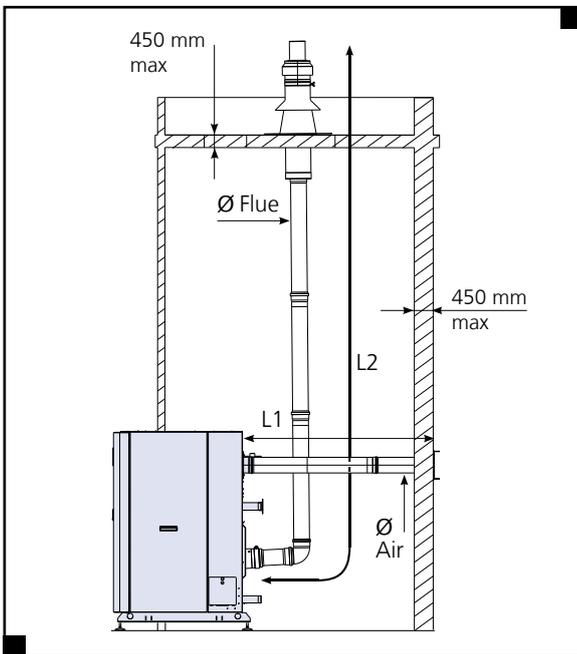
Flue Design

Varmax Boilers C53 Room Sealed Flue Systems

C53 room sealed flues consist of a twin pipe system with separate pipes carrying independently the combustion air and flue gases to and from outside.

Flue components are constructed from polypropylene with EPDM seals for carrying flue gases and combustion air from the boiler to outside.

Flue components are CE certified EN14471 T120 H1. Flue pressure H1 up to 5000 Pa, and flue temperature T120 up to 120°C. Flue components other than terminals are only suitable for installation inside the building.



C53 Room sealed flue performance data for Varmax boilers				
Model	120 & 140	180 & 225	275 & 320	390 & 450
Maximum air length L1 (m)	10	8	10	10
Maximum flue length L2 (m)	40	39	40	40
Equivalent length 90° Elbow (m)	1.5	1.5	2	2
Equivalent length 45° Elbow (m)	0.8	0.8	1.1	1.1

Note: 120 to 225 models use concentric flue terminal which flue connects to inner tube – 160 dia and outer air annulus is not used. Roof flashing must suit 200 dia flue.

C53 Concentric flue components	Boiler models 120, 140, 180, 225		Boiler models 275, 320		Boiler models 390, 450	
	Dia.	Part number	Dia.	Part number	Dia.	Part number
Flue terminal kit including air inlet and flue terminals	160 Flue 150 Air	41422	180 Flue 180 Air	41423	200 Flue 180 Air	41424
Flue pipe 1000mm long	160	41425	180	41433	200	41438
Flue pipe 500mm long	160		180	41434	200	41439
Flue elbow 90°	160	41426	180	41436	200	41441
Flue elbow 45°	160	41427	180	41437	200	41442
Pitched roof flashing	200		180		200	
Flat roof flashing	200		180		200	
Wall bracket	160		180		200	
Air pipe 1000mm long	150	41428	180	41433	180	41433
Air pipe 500mm long	150	41429	180	41434	180	41434
Air elbow 90°	150	41430	180	41436	180	41436
Air elbow 45°	150	41431	180	41437	180	41437



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Hamworthy reserves the right to make changes and improvements which may necessitate alteration to the specification without prior notice.

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