

7.1.19 FAULT FINDING

Boilers

Ref	Fault	Possible Cause	Recommended Action
1.	Boiler does not operate.	Power supply isolated.	Reinstate as necessary.
		Controls holding off boiler.	Check boiler control panel. Refer to manufacturer's literature.
		No gas supply.	Check gas supply is available at boiler.
		Emergency push button activated.	Check and reinstate as necessary.
		Thermal link activated.	Check and replace as necessary.
		Fire alarm activated.	Investigate possible controls fault. Refer to manufacturer's literature.
		Break in control wiring.	Check and repair as necessary.
2.	Boiler goes on and off at frequent intervals.	Check delivery temperature.	Refer to manufacturer's literature.
		Break in control wiring.	Check and repair as necessary.
		No circulation caused by air pockets.	Vent system.
3.	System calls for heat, boiler does not fire.	No circulation caused by faulty pump.	Check pump
		Time clock not set correctly.	Reset.
		Boiler has previously over heated and the over-heat cut-off (high limit stat) has operated, shutting off the pilot.	Establish cause of over heat and re-set.
		Supply fuse blown or supply isolated.	Establish cause of blown fuse.
		Faulty thermostat	Replace.

Ref	Fault	Possible Cause	Recommended Action
		Pilot out, either blown out or faulty thermo-couple, power unit, high limit activated or faulty wiring.	Carry out checks and inspections as necessary and re-light.
		Control valve faulty or sticking.	Replace.
4.	Thermostat is satisfied boiler fires continuously.	Faulty thermostat	Replace.
		Wiring fault.	Check and repair.
		Control valve faulty or sticking.	Replace.
5.	Boiler over heats and system remains cold.	Low circulation caused by air pockets.	Vent system.
		Low circulation caused by faulty pump.	See pump faults
		Faulty main controller or wiring.	Inspect and replace / repair.
6.	Rumbling sound in boiler system remains cold.	Low circulation caused by air pockets.	Vent system.
		Low circulation caused by faulty pump.	See pump faults
		Faulty thermostat	Replace.
		Control valve faulty or sticking.	Replace.
7.	Boiler and system over heat.	System controls faulty.	Replace.
		System controls set too high.	Replace.
		Faulty thermostat	Replace.

7.1.20 MAINTENANCE PROCEDURES

Boilers

FREQUENCY : **TASKS**

Daily	:	None
Weekly	:	None
Monthly	:	1-10
3-monthly	:	None
6-monthly	:	None
Annually	:	1-16

Note: Checks to be carried out by 'Gas Safe' approved engineer.

REF	TASK	DONE
1	Check that position of the air setting control has not altered, due to vibration etc., since annual combustion efficiency test.	
2	Thoroughly clean burner assembly ensuring no dirt enters the gas jets.	
3	Inspect electrode assembly, for cracks and chips, but do not remove the electrodes to do this, as they may alter the setting and could cause problems. However, if they are damaged, their position should be precisely noted before replacing with new ones.	
4	Check the flame setting when burner is back in operation.	
5	Check thermostat setting, so that the burner cuts out at the correct pre set temperature.	
6	Check flame failure function of photoelectric cell. Remove cell from holder, with burner operating, cover the glass bulb to simulate flame failure. Burner should go to lock out.	
7	Check and lubricate as required all motor bearings in accordance with manufacturer's instructions. Remove any surplus lubricant.	
8	Check electric motor in accordance with the manufacturer's instructions.	
9	Check pipe work connections for both gas and water leaks.	
10	Clean down boiler casing.	
11	Make sure that all electric terminal connections are sound and that all lock nuts inside control boxes are secure.	
12	Remove gas burner and clean out covers. Clean out combustion chamber thoroughly by brushing and scraping.	
13	Check and adjust if necessary the gas pressure and flow rate.	

NATURAL GAS

7.1.15 DESCRIPTION

The mains gas supply terminates externally at a gas meter adjacent to the entrance. It is extended underground from the meter in MPDE pipework, before rising in steel externally and entering the building in the west of the hanger support, adjacent to the parts store roller shutter door. The main isolation valves and automatic gas solenoid valves arrangement are located at this point. The solenoid valves are interlinked with the building fire alarm system, emergency knock off buttons at the plantroom entrance/exit and to thermal links installed above the boilers. Should any item become activated the solenoid valve closes.

A gas supply is distributed into the second-floor plantroom to serve the boilers, gas fired water heater and warehouse heating system in the plant rooms.

Gas meters are provided to all items with pulse outputs connected to control panel for the monitoring of gas consumption on the BMS.

Gas pipework internally is installed in stainless steel.



GB162 V2 wall mounted gas-fired condensing boiler series



BOSCH

Contents	Page
GB162 V2 condensing boiler series	1
Features and Benefits	2
GB commercial plate heat exchangers	3 - 4
Technical data	5
Inside story	6
Modulating pump group	7
Installing the GB162 V2 series	8
Installation requirements	9
Typical system arrangements	10
Single boiler installation	11 - 12
GB162 V2 boiler series fluing options	13
Horizontal and vertical flue terminal positioning	14
Horizontal room sealed fluing options	15 - 17
Vertical room sealed fluing options	18 - 20
Cascade technical information	21
Overpressure cascade flue headers	21
Single boiler controls	22
Control modules for use with Sense II and BMS	23
8000 series boiler management	24 - 25
Cascade - quick and simple to install	26
GB162 V2 cascade in-line (TL) systems	27 - 29
GB162 V2 cascade back-to-back (TR) systems	30 - 32
GB162 V2 boiler series and accessories	33

High efficiency heating solutions from 50kW to 1.6MW

The GB162 V2 range of wall mounted condensing boilers builds on the success of its predecessor while adding a number of new features for enhanced performance, greater system control and increased installation flexibility.

GB162 V2 overview

The GB162 V2's versatility and compact size makes it an ideal choice for single boiler systems or as a multi-boiler cascade system for applications where space is restricted but there is a demand for a modern high output, high efficiency heating solution.

The appliance is available with outputs of 50kW, 65 kW, 85kW and 100kW, with outputs of up to 1.6MW possible, in a variety of cascade configurations with site made components.

Precise energy management

Each boiler in the GB162 V2 range can automatically modulate its output down to 30% or less to precisely match the heat demand, reducing fuel consumption and improving overall seasonal efficiency. In cascades, modulation will be from the lowest output of the smallest boiler up to the total load of all the boilers.

High efficiency with lower emissions

The GB162 V2 provides efficiencies of up to 108.2% (NCV) with ultra-low Class 5 levels of CO₂ and NO_x emissions.

Time and cost saving

The combination of compact dimensions, relatively light weight and modular design makes the GB162 V2 the perfect choice where access to the boiler room or plant room is restricted or where floor space is limited. The smaller boiler footprint increases installation flexibility, speeds up installation time and improves access for servicing and maintenance, reducing the need to have larger boiler rooms to achieve higher system outputs.

Unique controls range

A unrivalled range of Bosch smart web-enabled system controls is available for use with the GB162 V2. The Control 8000 series controls and modules have been developed to provide a unique and extremely flexible level of system control using an intuitive, user-friendly menu which is operated via the control's 7-inch touch screen or remotely by PC or smart device. They have been designed to interface with, or be used instead of, Building Management Systems.



The GB162 V2 series at a glance

Boiler		GB162 V2 50kW	GB162 V2 65kW	GB162 V2 85kW	GB162 V2 100kW
Part No.	NG	7 736 701 038	7 736 701 035	7 736 701 036	7 736 701 037
Heat output at 50/30°C	Min.	14.3kW	14.3kW	20.8kW	20.8kW
	Max.	49.9kW	69.5kW	84.5kW	99.5kW
Heat output at 80/60°C	Min.	13kW	13kW	18.9kW	19.0kW
	Max.	46.5kW	62.6kW	80.0kW	94.5kW
Efficiency G20 (37/30 °C) partial load 30% in accordance with EN 15502		108.2%	107.8%	107.9%	107.9%
Efficiency G20 (80/60 °C) full load with EN 15502		97.7%	97.4%	96.7%	97.0%
Seasonal Efficiency (as L2B)		95.7	95.3	95.3	95.4
Natural gas		✓	✓	✓	✓
LPG conversion kit		✓	✓	✓	✓
Single boiler installation		✓	✓	✓	✓
Cascade installation		✓	✓	✓	✓

Features and benefits

- ▶ **Condensing technology with up to 108.2% net efficiency*** - saves fuel compared to standard efficiency boiler
- ▶ **Modulation to just 20% of total output*** - Year round efficiency according to seasonal demand
- ▶ **Cascade frame kits can be combined with site made hydraulic arrangements**
- ▶ **Low emission levels** - Cleaner combustion and increased carbon savings
- ▶ **Quick and easy installation** - Frame kits with mounted boilers typically take between 2 and 4 hours to assemble, depending on size
- ▶ **Integrates with solar thermal installations** - Maximise savings from solar hot water
- ▶ **Individual lift weight only 70kg** - Easy maneuverability with built in handles
- ▶ **Flexible control options, including Control 8000, Sense II, and BMS System** - Increased system functionality and reduced running costs
- ▶ **LPG conversion available** - Ideal for off mains locations

Patented, award-winning ALU-Plus heat exchanger

The precision engineered heat exchanger in the GB162 V2 is constructed from a cast aluminium silicate compound which is lightweight, robust and allows for a rapid transfer of heat. The heat exchanger also uses the very latest ALU-Plus technology that has been developed by Bosch Thermotechnology Ltd. to increase durability and optimise heating efficiency.

Fins on the outside of the aluminium tubes increase the exterior surface area so that more hot flue gas comes into contact with the heat exchanger.

A spiral channel on the inside of the tube increases the internal surface area, bringing more water in contact with the heating surface and ensuring an optimum heat transfer.

The wide channels on the heat exchanger ensure that the flow resistance is minimised and this, combined with its fully insulated case, makes the GB162 V2 incredibly quiet in operation.

Plasma-polymerised heat exchanger

The surfaces of the heat exchanger's tubes are treated using a patented plasma-polymerisation process which leaves the surfaces so smooth that the heat exchanger effectively stays clean as no deposits can adhere to them. Its extremely high efficiency is maintained and there is no need for mechanical cleaning; the heat exchanger can be simply flushed through during servicing.

5 year guarantee heat exchanger

The ALU-Plus heat exchanger in the GB162 V2 is eligible for a 5 year guarantee*.

Multi-boiler cascade systems

For larger heat demands, the GB162 V2 can be easily combined as part of a multi-boiler cascade system. Any combination of 1 to 8 boilers can be connected either in-line (TL) or back-to back (TR). This provides a condensing boiler output of up to 1.6MW when installing 2 banks of 8 boiler cascades with site made components, with the ability to modulate down to as low as 2.5% of the total output. This ensures that high levels of efficiency can be achieved all year round, even when demand for heat is low. Boilers can be sequenced to come into and out of operation

when required.



No minimum flow rate required

GB162 boilers do not require a minimum flow rate, which makes the design and specification of a heating system much simpler, removing the need for additional components and reducing installation time.

Modulating fans and pump groups mean that output is precisely matched to the user's actual requirements at all times and, as such, electricity consumption can fall by up to 40% in some cases.

GB commercial plate heat exchangers

The GB commercial plate heat exchangers are a ready-made solution for separating the boiler from heating systems with old, dirty and poor quality system water and allows our range of GB162 V2 boilers to be fitted on an open-vented system.

Enhanced reliability and efficiency

The GB plate heat exchanger ensures boiler water and system water never meet. The heat exchanger protects the boiler and therefore minimises potential downtime, as well as improving long-term efficiency.

Open-vented system

The GB plate heat exchanger allows GB162 V2 boilers to be installed on an open vented system. The plate heat exchanger separates the primary (boiler) and secondary (heating system), therefore protecting the boiler's heat exchanger from system water as part of a separate sealed system. The plate heat exchanger can also be used to provide boiler protection when installing within an old, sealed secondary system.

Please note that system flushing and treating must still be carried out as best practice. The plate heat exchanger is sized on the basis of a boiler ΔT of 20°C and a system ΔT of 11°C.

Sized to match all boiler outputs

Each GB plate heat exchanger has been sized to match all possible combinations of GB162 V2 boiler single and cascade installations as indicated by the product name. This means that the pump flow rates are suitable and allow heat to efficiently transfer in the plate heat exchanger, while also ensuring that existing pumps can be used in cases of retrofit.

Benefits of GB commercial plate heat exchanger at a glance:

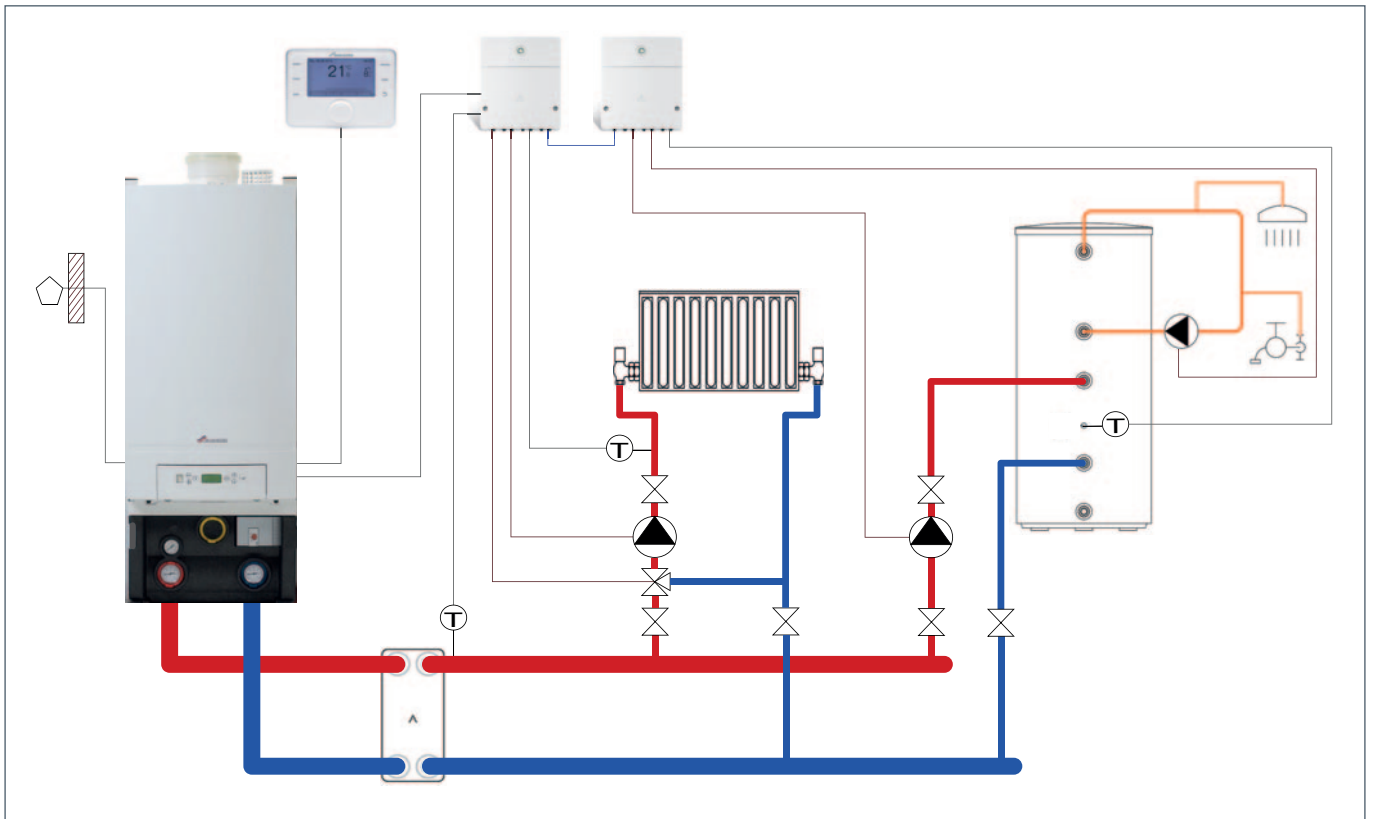
- ▶ Enhanced reliability and efficiency
- ▶ Maximises running hours, overall efficiency and availability of heating and hot water
- ▶ Allows GB162 boilers to be installed on an open vented system
- ▶ Improved installation flexibility
- ▶ Sized and matched for all boiler outputs
- ▶ Time saving when designing the heating system and easy to specify and order
- ▶ Compatible with our range of GB162 boiler controls
- ▶ Precise energy management.



Boiler Model	Connection Size
GB162 V2 50kW (7 733 600 013)	1 1/4"
GB162 V2 65kW (7 733 600 014)	1 1/4"
GB162 V2 80-100kW (7 733 600 016)	1 1/4"
GB162 V2 101-140kW (7 733 600 017)	2"
GB162 V2 141-180kW (7 733 600 018)	2"
GB162 V2 181-230kW (7 733 600 020)	2"
GB162 V2 231-280kW (7 733 600 021)	2 1/2"
GB162 V2 281-400kW (7 733 600 023)	2 1/2"
GB162 V2 401-520kW (7 733 600 025)	2 1/2"
GB162 V2 521-640kW (7 733 600 026)	2 1/2"
GB162 V2 641-800 kW (7 733 600 027)	DN100mm

Standard factory fittings are pre-fitted on all four connections up to 2 1/2", the fittings are BSP parallel threads that require a flat faced seal connection.

The larger plate heat exchangers are pre-fitted with DN100mm compact flange on all four connections, special compact counter flanges and o-rings will be required.



Compatible with existing GB162 V2 boiler controls

As the GB plate heat exchanger can simply be treated as a Low Loss Header our Sense II, MC400 and 8000 controls can still be used to ensure the boiler is operating at the right level of modulation, via flow temperature sensors.

The plate heat exchanger is also supplied with tailor-made insulation in order to ensure minimal heat losses. Standard factory fittings are pre-fitted external (male) threads on all 4 connections (1¼", 2" or 2½" depending on the model). Stud bolts are supplied for when mounting on a skid.

Flow Temperature Sensor must be installed.

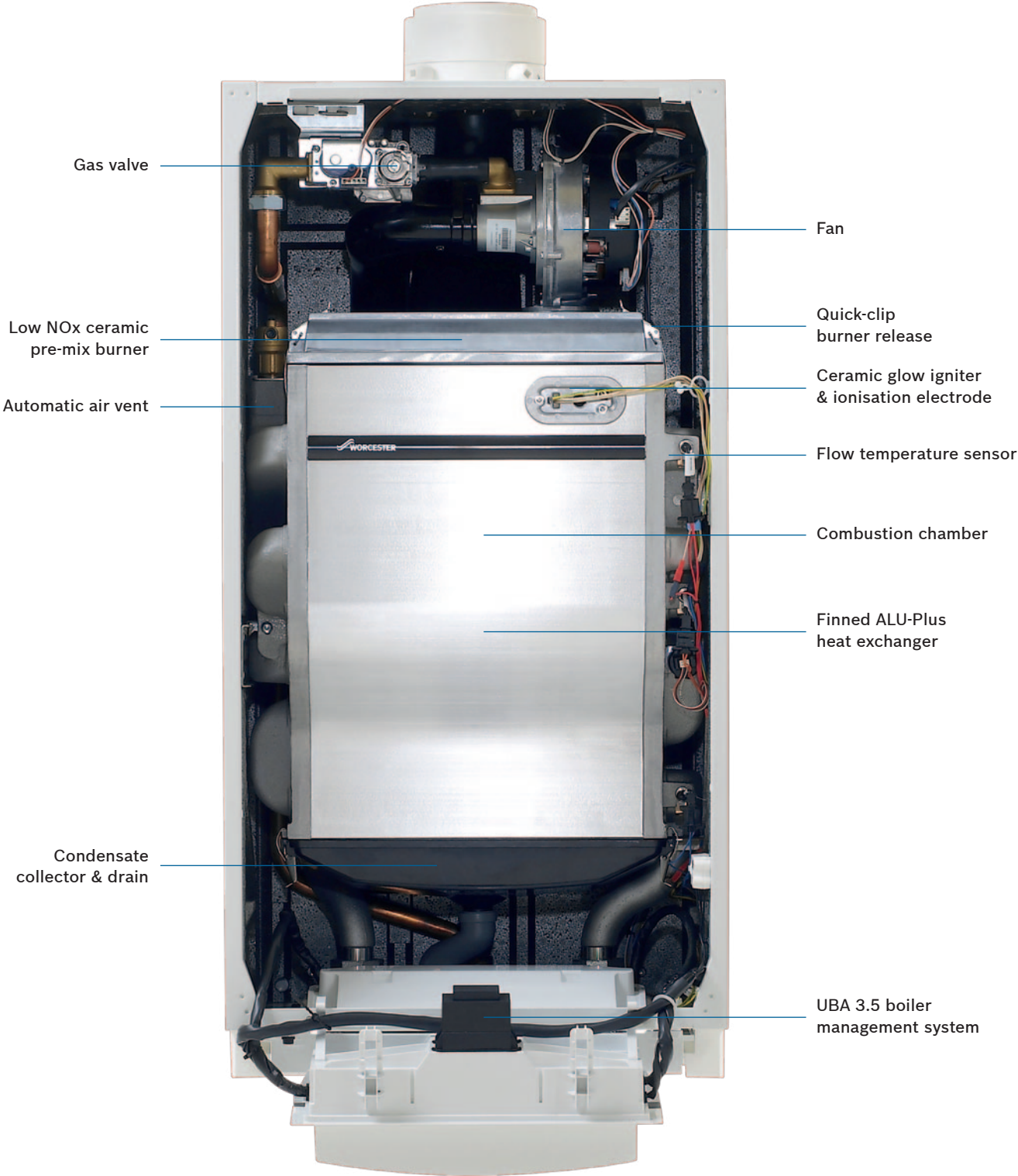
- ▶ With Sense II controls, a MM100 must be installed (provides T0 terminal for wiring of sensor) - sensor included
- ▶ For cascades controlled with the MC400 sequencer, an additional temperature sensor is required, part number - 7 719 001 833 (connection point E in Installation Manual) -
- ▶ With Control 8000 - FK connection to be used - additional sensor not required (CC8313, part number - 7 736 602 245 supplied with sensor)
- ▶ Flow sensor to be strapped on secondary flow pipe.



Technical data

Boiler	GB162 50kW	GB162 65kW	GB162 85kW	GB162 100kW
Height without pump group	980mm	980mm	980mm	980mm
H x W x D (with pump group)	1329x520x465mm	1329x520x465mm	1329x520x465mm	1329x520x465mm
Dry weight (without a pump group)	70kg	70kg	70kg	70kg
Boiler flow and return connections	G1½" union nut free female thread enclosed	G1½" union nut free female thread enclosed	G1½" union nut free female thread enclosed	G1½" union nut free female thread enclosed
Concentric room sealed flue	80/125mm dia. or 100mm/150mm dia.*	80/125mm dia. or 100mm/150mm dia.*	100mm/150mm dia.	100mm/150mm dia.
Gas connection	G1"	G1"	G1"	G1"
Condensate drain	Ø 24mm	Ø 24mm	Ø 24mm	Ø 24mm
Nominal heat output at 80/60°C	13.0 - 46.5kW	13 - 62.6kW	18.9 - 80.0kW	19.0 - 94.5kW
Nominal heat output at 50/30°C	14.3 - 49.9kW	14.3 - 69.5kW	20.8 - 84.5kW	20.8 - 99.5kW
Safety valve connection	R1"	R1"	R1"	R1"
Rated heat input	13.3 - 47.5kW	13.3 - 64.3kW	19.3 - 82.0kW	19.3 - 96.5kW
Net efficiency (NCV) EN 15502	108.2%	107.8%	107.9%	107.9%
Seasonal efficiency (as L2B)	95.8%	95.9%	96.7%	96.7%
ErP efficiency class	A	A	N/A	N/A
ErP seasonal efficiency	93%	92%	N/A	N/A
2009 SEDBUK value – natural gas	88.7%	88.6%	N/A	N/A
Standby heat loss	0.18%	0.14%	0.11%	0.09%
Maximum working pressure	4bar	4bar	4bar	4bar
Flow temperature	30 - 90°C	30 - 90°C	30 - 90°C	30 - 90°C
Water content	5l	5l	5l	5l
Pressure drop rate at T 20K	90mbar	170mbar	225mbar	320mbar
Noise level at 1m, full load	54dB(A)	61dB(A)	63 dB(A)	65dB(A)
NOx rating at 0% oxygen, dry mg/kWh	21	32	39	42
Maximum flue length 80/125mm	7.7m	7.7m	N/A	N/A
Maximum flue length 100/150mm	20m*	20m*	18m*	18m*
Flue gas mass flow rate, full load	22.2g/s	29.8g/s	37.7g/s	43.8g/s
Flue gas temperature 80/60°C, full load	60°C	62°C	66°C	68°C
Flue gas temperature 80/60°C, part load	57°C	57°C	57°C	57°C
Flue gas temperature 50/30°C, full load	39°C	39°C	49°C	53°C
Flue gas temperature 50/30°C, part load	34°C	34°C	34°C	34°C
Free feed pressure of fan	85Pa	130Pa	195Pa	220PA
CO2 content at part/full load, natural gas G20	8.9/9.3%	8.9/9.3%	8.9/9.3%	8.9/9.3%
Condensate water rate natural gas G20, 40/30°C	6.0l/h	7.6l/h	9.3l/h	11l/h
pH value of condensate water	approx. 4.1	approx. 4.1	approx. 4.1	approx. 4.1
Gas pressure (natural gas)	17 - 25mbar	17 - 25mbar	17 - 25mbar	17 - 25mbar
Gas rating at 15°C 1013mbar (natural gas)	5.03m3/h	6.81m3/h	8.68m3/h	10.24m3/h
Current rating	230 VAC, 50 Hz, 10A	230 VAC, 50 Hz, 10A	230 VAC, 50 Hz, 10A	230 VAC, 50 Hz, 10A
Electrical supply, number of phases	1	1	1	1
Maximum fuse rating	10	10	10	10
Electrical power consumption, full load	41W†	82W†	102W†	155W†
Electrical power consumption, part load	18W†	18W	25W	25W
Electrical ingress protection	IPX4D	IPX4D	IPX4D	IPX4D
Maximum gas consumption m³/h (Natural gas E, H, Es – G20)	5.03	6.81	8.68	10.24
Maximum gas consumption m³/h (Propane 3P – G31)	1.80	2.48	3.19	3.76

Inside story



Modulating pump group

The GB162 V2 can be installed with a 4 bar modulating pump group accessory. The high quality pump group ensures quick, easy and reliable connection of the boiler to the main flow, return and gas headers.

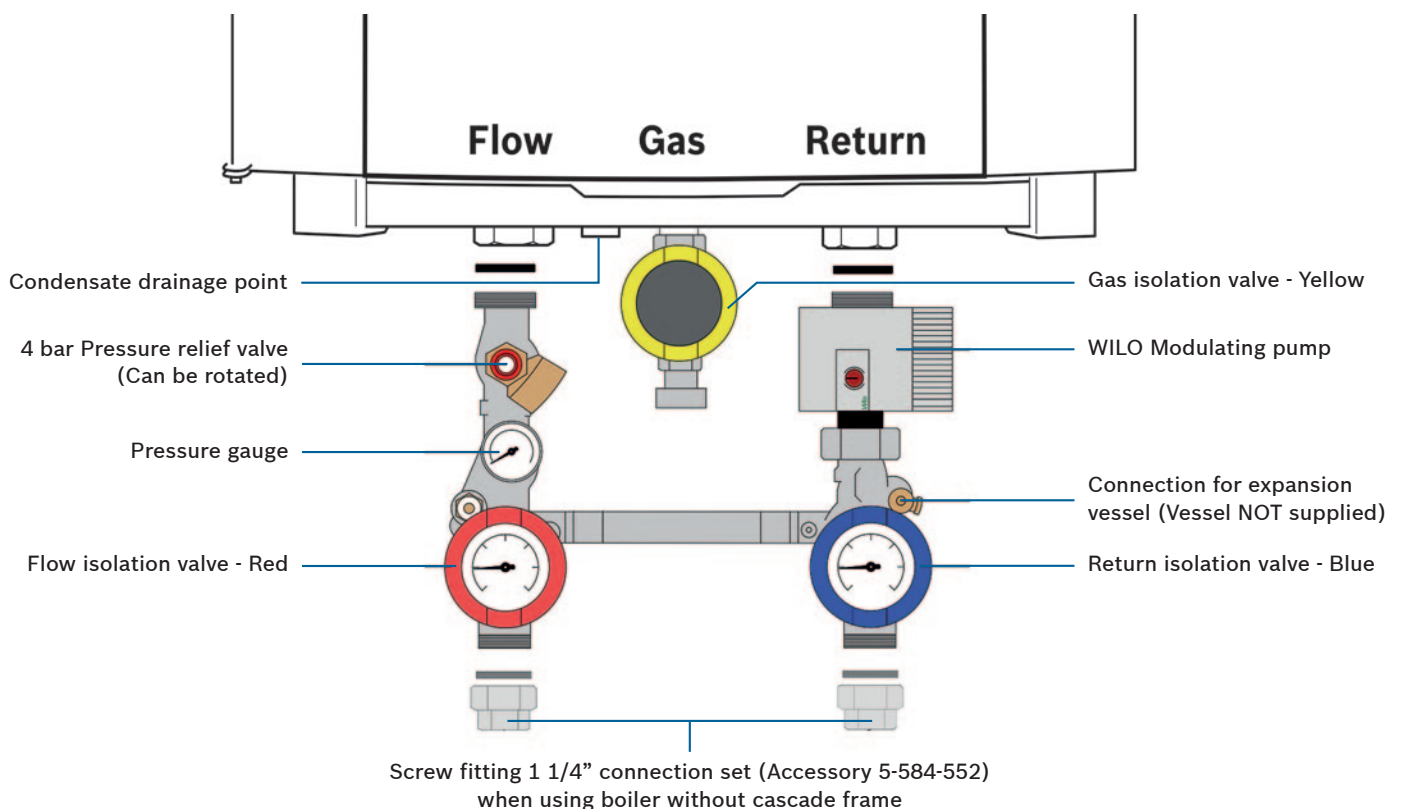
Our pump groups are correctly sized to ensure that the flow rate through the GB162 V2 heat cell never exceeds the limit of 5000l/h @ T 20K. The pump group options will also help to prolong the life of the boiler by minimising wear and tear on its components. As a result, system efficiency is improved and installation time and running costs are reduced. When using our modulating pump group, a low loss header should also be used for cascades to simplify hydraulic design of the heating circuit.

The pump groups are directly mounted under the boiler to feed a low loss header or plate heat exchanger or in the case of a single 50kW and 65kW boiler supply the system directly. As the heating circuits reach their required temperature and the flow is reduced by the thermostatic radiator valves, the WILO modulating pump will respond to the reduced demand. For single boiler applications where the heating circuits comply with the Building Regulations maximum zone size of 150m², the Wilo pump is capable of providing sufficient pump head in all but the most demanding applications. This helps keep a system in balance as well as reducing noise and electrical energy use.

Part	Modulating Pump Group (50-100 kW) 7-736-701-389
WILO modulating pump	✓
Gas isolation valve	✓
Flow & return isolation valves	✓
Pressure gauge	✓
4 bar pressure relief valve	✓
Drain valve	✓
Expansion vessel connection point*	✓
Fully insulated cover	✓
Flow & return thermometers	✓

*Expansion vessel not supplied.

Modulating pump group at a glance



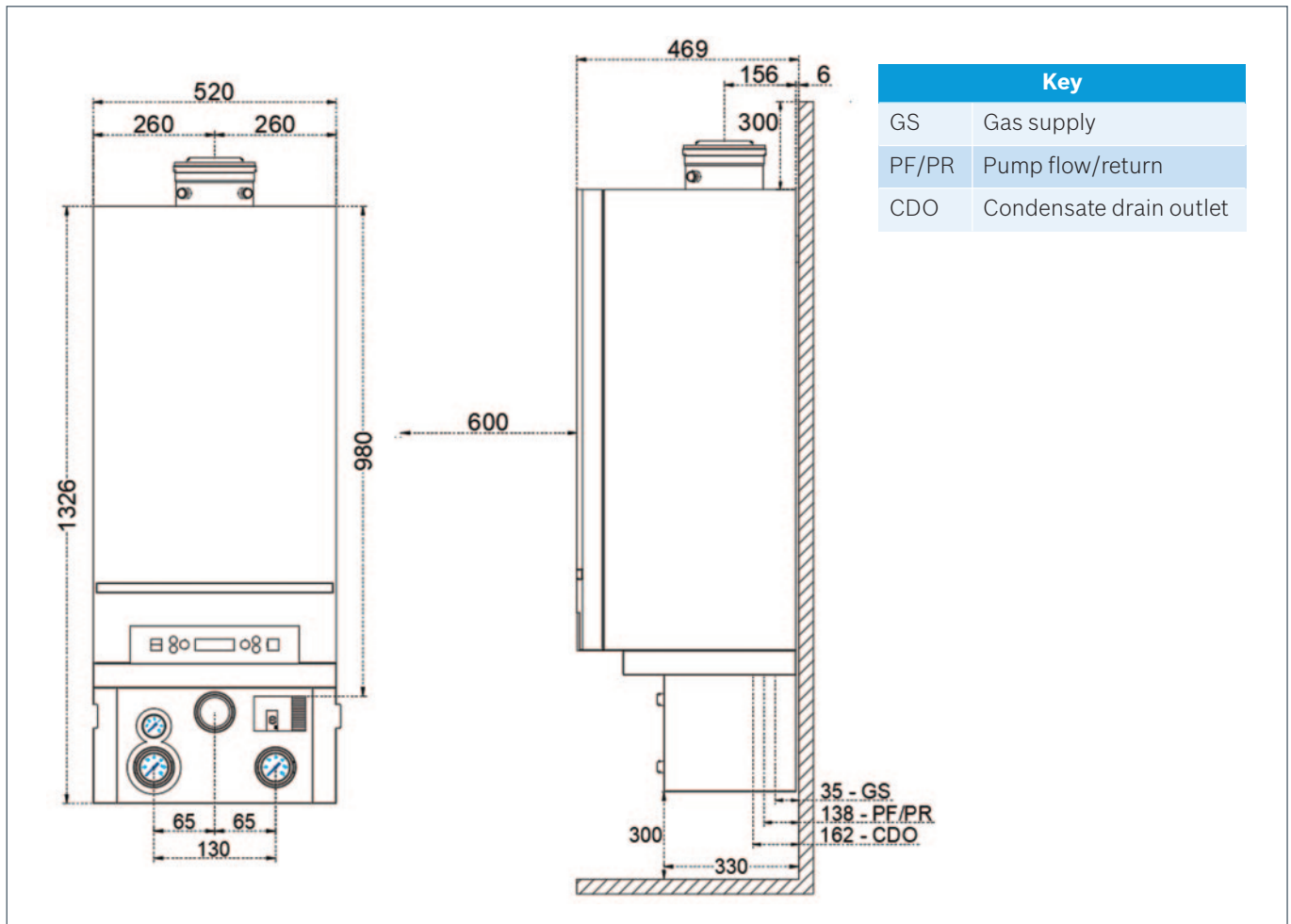
Installing the GB162 V2 series

The GB162 V2 series is the perfect replacement boiler for many installations where old and inefficient heating systems have come to the end of their life.

By investing in condensing technology with a fully compatible controls system, fuel savings can be achieved from day one, and the higher fuel prices go, the bigger your saving will be.

With its compact dimensions, relative light weight and modular design, the GB162 V2 is an excellent choice where access to the boiler or plant room is restricted, or where floor space is limited. A smaller physical footprint for the heating system will increase installation flexibility, speed up the installation process, improve access for maintenance, and reduce the need for large boiler rooms.

Dimensions



Clearances

The minimum clearances shown below should be allowed for installation and servicing.

Installation and service clearances				
	GB162 V2 50kW	GB162 V2 65kW	GB162 V2 85kW	GB162 V2 100kW
In front	600mm	600mm	600mm	600mm
Below	300mm	300mm	300mm	300mm
Right side	25mm	25mm	25mm	25mm
Left side	25mm	25mm	25mm	25mm
Above	300mm	300mm	300mm	300mm

Installation requirements

These pages provide an overview of the main installation and system requirements for the GB162 V2. The full installation instructions supplied with the boiler must be adhered to before any work on the heating system takes place.

Where there is a secondary pump in the heating system, a low loss header should be installed to separate the boilers from the rest of the heating system. Fitting together with the modulating pump group accessory ensures that flow volumes are balanced, efficiency is high and hydraulic performance is optimised.

Regardless of whether a secondary pump is installed or not, 85kW and 100kW models may need to be hydraulically separated.

Hydraulic separation can also be achieved with a plate heat exchanger - see pages 8-9.

Worcester's technical support team is available to offer system design advice or if necessary make site visits. For more details call 0330 123 0165.

Frost protection

The boiler has integrated frost protection which switches the boiler on at a central heating flow temperature of 7°C and switches it off at a central heating flow temperature of 15°C.

Designated use

The boilers may only be used to heat water for sealed heating systems of up to 4 bar in accordance with BS EN 12828. For greater system pressures or open vented systems the boiler must be separated from the heating system with a plate heat exchanger (see page 9).

Quality of the heating system water

We strongly recommend thoroughly flushing the system before filling it and using only untreated tap water when filling the system. The use of dirty water will lead to build-ups of sediment and corrosion, which can result in the boiler malfunctioning and cause damage to the heat exchanger.

DO NOT treat the water with products such as pH-adjusting substances (chemical additives), antifreeze or water softeners. Sentinel X100 or Fernox MB-1 can be used to achieve the desired water quality. The concentration of Sentinel or Fernox should be in accordance with the manufacturers instructions for the volume of the water in the system.

The pH of the heating system water MUST be between 7 and 8.5. If this is not the case, please contact Worcester's technical support team before proceeding.

Artificially softened water must not be used with the GB162.

Quality of the pipe work

When using plastic pipe work in the heating system, e.g. for underfloor heating, it has to be oxygen-tight according to relevant UK Standards. If the plastic pipes do not comply with these standards, the system parts must be separated using a plate heat exchanger.

Maintenance schedule

The activities to be included in an annual inspection and maintenance contract can be found in the service section of the installation manual. If an inspection reveals that maintenance activities are necessary, these activities must be carried out.

Connection of gas and water

The boilers do not contain a factory installed circulation pump. The boiler should be installed together with a GB162 accessory pump group to ensure that the pump is appropriately sized for the boiler. The pump group also allows for an easier and quicker installation.

If the boiler is being wall mounted rather than frame mounted, a connection set is required in order to connect the flow and return.

Pump group part numbers	
Modulating Pump Group (50-100 kW)	7 736 701 389
Connection set (for using pump group without cascade set)	558 4552

LPG conversion

The boiler can be converted to LPG use with the appropriate kit.

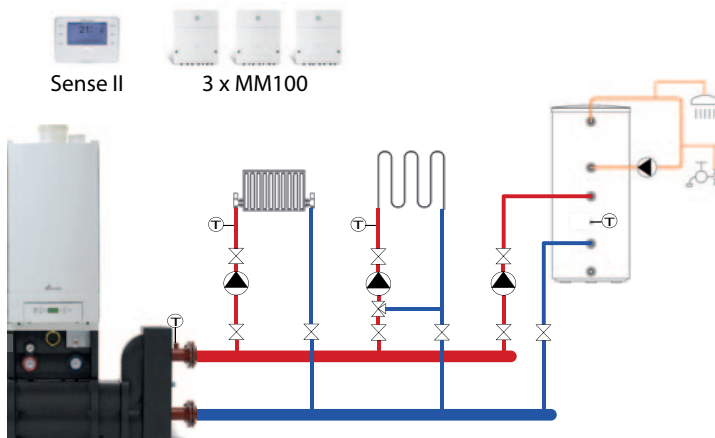
LPG conversion kit part numbers	
LPG conversion Kit GB162 V2 50kW	7 736 701 533
LPG conversion Kit GB162 V2 65kW	7 736 701 528
LPG conversion Kit GB162 V2 85kW	7 736 701 539
LPG conversion Kit GB162 V2 100kW	7 736 701 540

Typical system arrangements

GB162 V2 boilers have been developed to allow specifiers and heating engineers greater flexibility to design heating systems, providing reliability and efficient performance for any project.

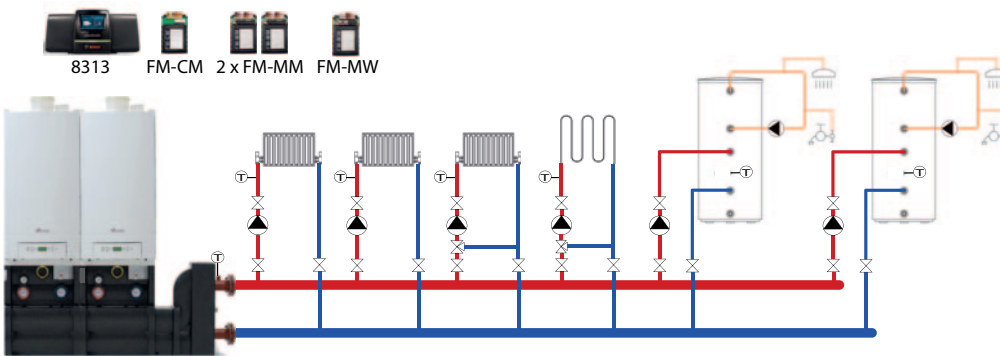
We offer a comprehensive on-site technical service where system specialists can visit and discuss the best heating solutions for your needs.

The following hydraulic schematics show just some of the many options that are available for individual and cascade installations. For support on hydraulics and controls please contact our technical support team on **0330 123 0165** or email us on **technical-advice@uk.bosch.com**.



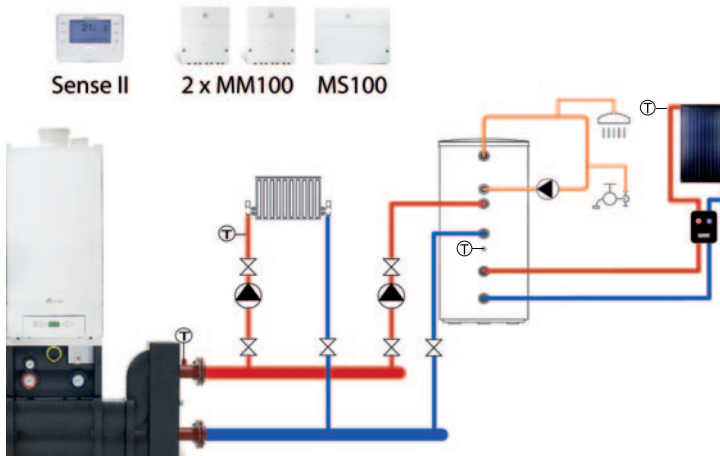
Single boiler

Single GB162 V2 installed with a low loss header. Two heating circuits and DHW are connected to the secondary side of the system. Control is provided completely by Sense II series equipment.



Cascade

Example shows two GB162 V2 boilers installed with a low loss header. 4 Heating circuits and 2 DHW are connected to the secondary side of the system. Control is provided completely by 8000 series equipment.



Solar

Single GB162 V2 installed with a low loss header. One heating circuits and DHW with solar are connected to the secondary side of the system. Control, including the solar system, is provided completely by Sense II series equipment.

Single boiler installation

The GB162 V2 50kW and 65kW boilers, when installed on their own, must use a pump group and connection set. For control of the boiler it can be connected to 230V AC on/off controls via the supplied RTH convertor.

Alternatively, a Sense II control can be used to control the system circuits. Please note this will also require at least a low loss header and a MM100 module.

The GB162 V2 85kW and 100kW boilers also require a pump group and connection set, and should be installed with a low loss header. Third party circulation pumps will also be required for the DHW and heating circuits.

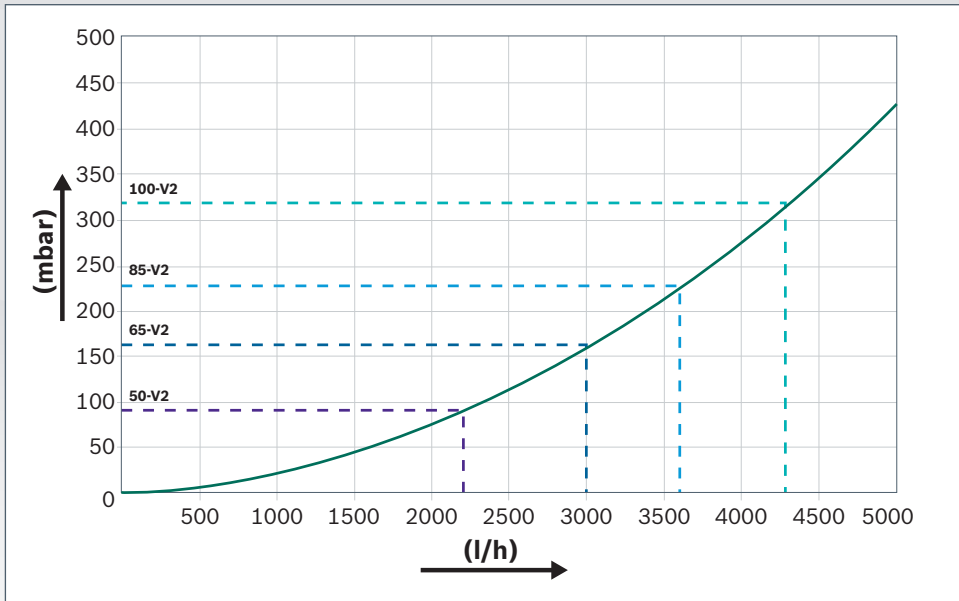
To monitor the temperature at the low loss header, an MM100 module is required with a Sense II controller. DHW circuit will require an MM100 module this will come with the required sensor.

Sense II control for a single heating circuit

Item	Part No.	GB162 V2	GB162 V2	GB162 V2	GB162 V2
		50kW 7 736 701 038	65kW 7 736 701 035	85kW 7 736 701 036	100kW 7 736 701 037
Modulating Pump Group (50-100 kW)	7 736 701 389	✓	✓	✓	✓
Connection set	5-584-552	✓	✓	✓	✓
Low loss header c/w insulation	8-920-097-2	✓	✓	✓	✓
Greenstar Sense II	7 738 111 064	✓	✓	✓	✓
MM100 Mixer and LLH Module	7 738 110 140	✓	✓	✓	✓

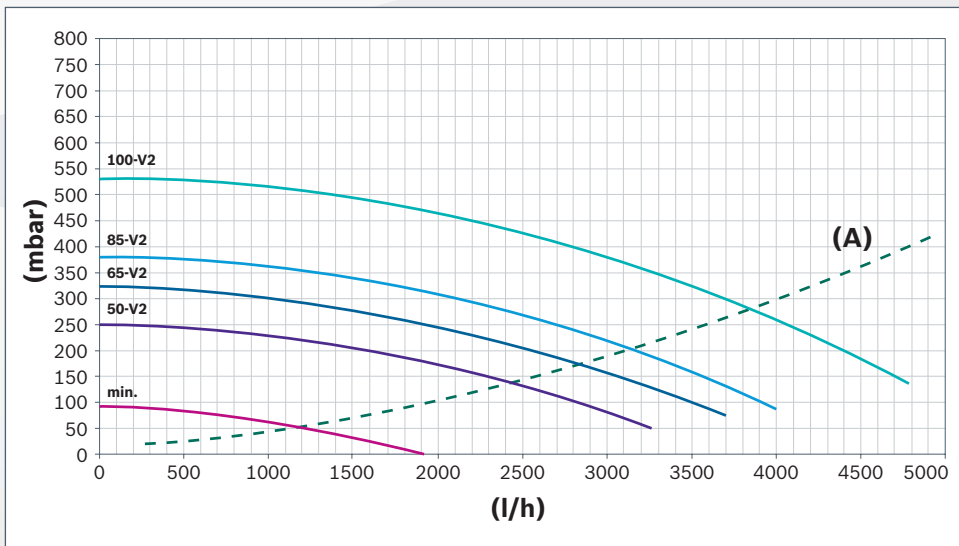
✓ Required accessory.

Resistance graph per output



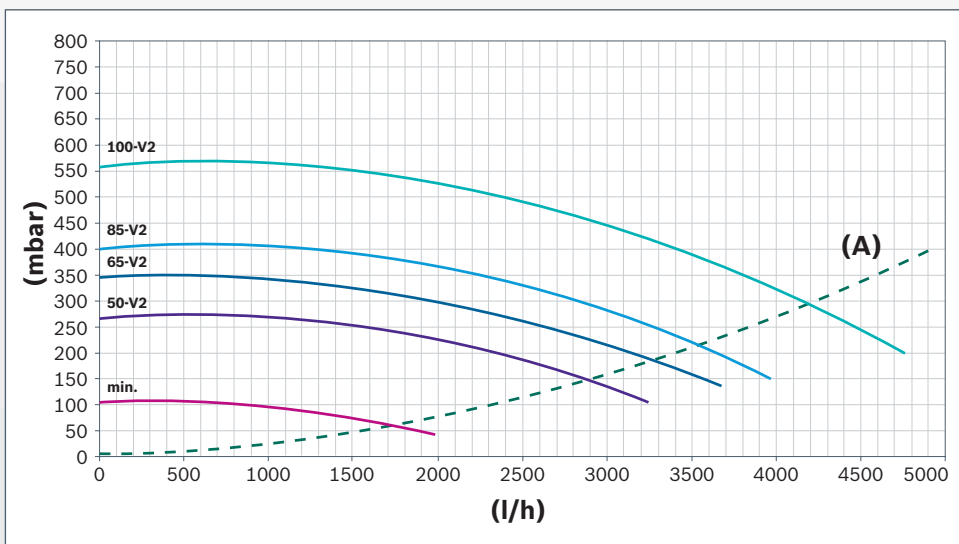
(l/h) Flow rate
(mbar) Pressure drop

Residual head per boiler, with pump group and non-return valve



(A) Resistance of boiler
(l/h) Flow rate
(mbar) Residual head
(Min.) Residual head at minimum pump speed

Residual head per boiler, with pump group



(A) Resistance of boiler
(l/h) Flow rate
(mbar) Residual head
(Min.) Residual head at minimum pump speed

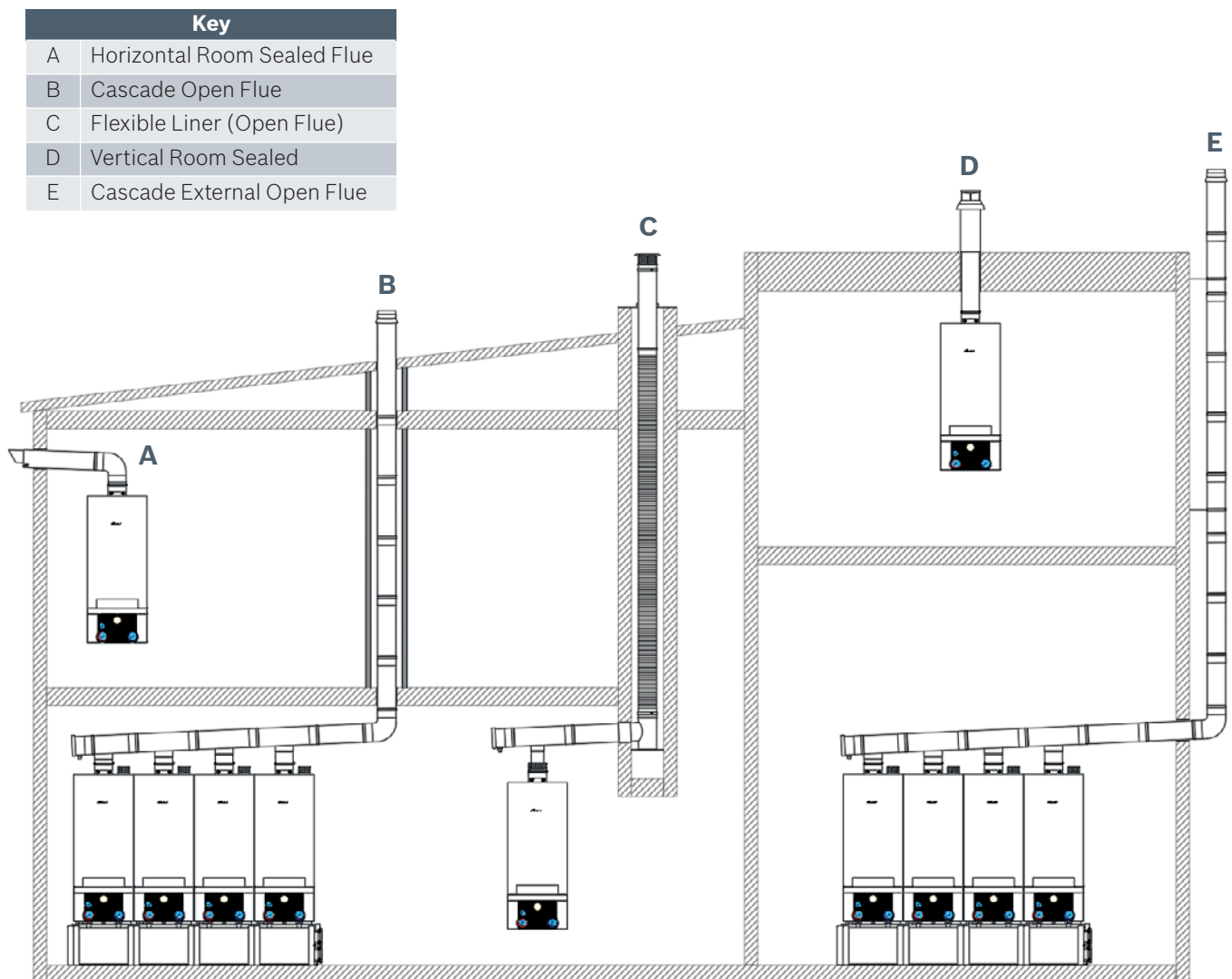
GB162 V2 boiler series fluing options

The flexibility of the GB162 series also extends to the fluing options, as shown in the diagram below, allowing the specifier to site the boiler in a number of different positions. The GB162 is suitable for either room sealed or open flues.

To ensure maximum reliability, quality and safety all Worcester flue gas systems are rigorously tested to the latest industry standards.

The diagram below shows typical standard flue systems that can be used for a GB162 installation. Full installation instructions and relevant building regulations must be adhered to prior to installation of any flue system.

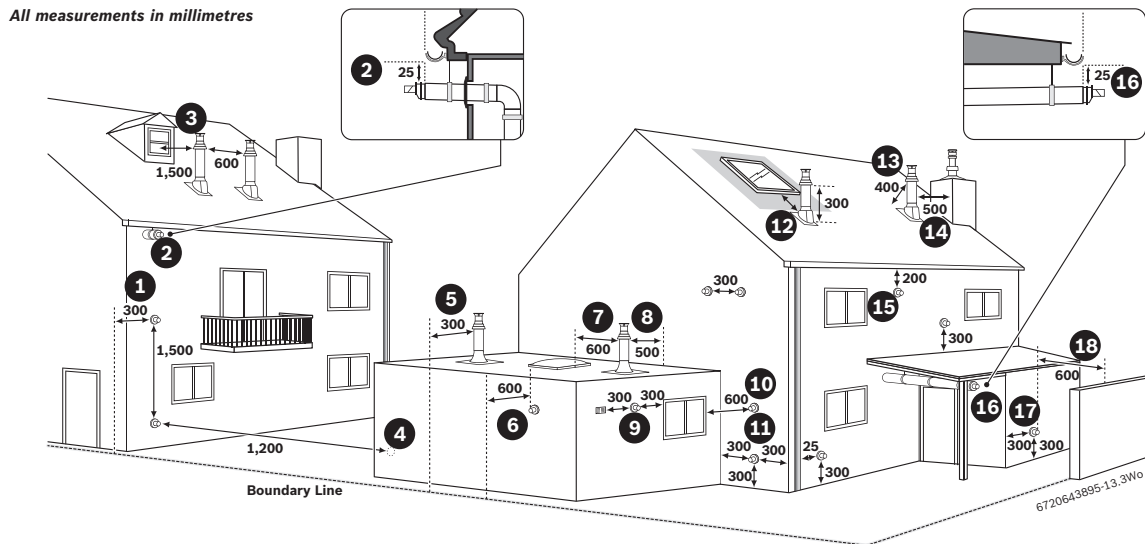
Additional fluing solutions are possible and should be discussed with your fluing specialist.



Please note: Worcester does not currently offer a 'flexible flue' or 'flue liner' for the GB162 V2.

Horizontal and vertical flue terminal positioning

Flue terminal positions for boilers up to 70kW in accordance with BS 5440



Note

- ▶ Installations in car ports are not recommended.
- ▶ The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products.
- ▶ Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.

Boilers less than 70kW

- ▶ Plumbing will occur at the terminal so terminal positions where this could cause a nuisance should be avoided.
- ▶ The air supply and the flue gas exhaust must meet the applicable general regulations. Please consult the instructions provided with the flue terminal kits prior to installation.
- ▶ The boiler **MUST** be installed so that the terminal is exposed to the external air.
- ▶ It is important that the position of the terminal allows the free passage of air at all times.
- ▶ Minimum acceptable spacing from the terminal to obstructions and ventilation openings are specified above, for domestic situations in accordance with BS 5440.

Boilers greater than 70kW

- ▶ The flue must be installed in accordance with the recommendations of IGE UP10.

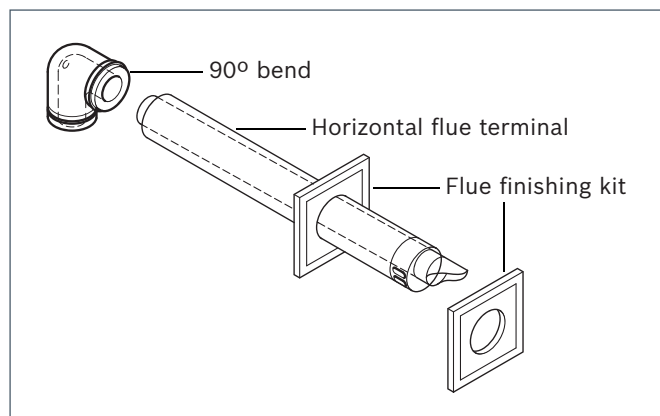
Key to illustration

1. 300mm adjacent to a boundary line.
2. The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. Any external flue joints must be sealed with suitable silicon sealant.
3. 1,500mm between a vertical flue terminal and a window or dormer window.
4. 1,200mm between terminals facing each other.
5. Vertical flue clearance, 300mm adjacent to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
6. 600mm distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
7. 600mm minimum clearance from a skylight to a vertical flue.
8. Vertical flue clearance, 500mm to non-combustible building material, and 1,500mm clearance to combustible building material.
9. 300mm above, below and either side of an opening door, air vent or opening window.
10. 600mm diagonally to an opening door, air vent or opening window.
11. 300mm to an internal or external corner.
12. 2,000mm below a Velux window, 600mm above or to either side of the Velux window.
13. 400mm from a pitched roof or in regions with heavy snow fall 500mm.
14. 500mm clearance to any vertical structure on a roof, 600mm to room sealed flue or 1,500 to an open flue.
15. 200mm below eaves and 75mm below gutters, pipe and drains.
16. The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. Any external flue joints must be sealed with suitable silicon sealant.
17. Flue clearance must be at least 300mm from the ground. Terminal guards must be fitted if the flue is less than 2 metres from the ground or if a person could come into contact with the flue terminal.
18. 600mm distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.

GB162 V2 boiler series horizontal room sealed fluing options

Horizontal room sealed flue

Flue diameter	80/125mm	100/150mm
GB162 V2 50kW		
Maximum flue length	7,700mm	20,000mm
GB162 V2 65kW		
Maximum flue length	7,700mm	20,000mm
GB162 V2 85kW		
Maximum flue length	N/A	18,000mm
GB162 V2 100kW		
Maximum flue length	N/A	18,000mm



Standard horizontal flue kit

80/125mm dia. horizontal flue kit

- 1 x 90° bend
- 1 x horizontal flue terminal
- 1 x flue finishing kit

Part No. 7 716 191 116

100/150mm dia. horizontal flue kit

- 1 x 90° bend
- 1 x horizontal flue terminal
- 1 x flue finishing kit

Part No. 7 716 191 094

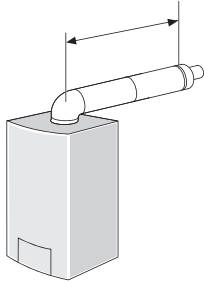
80/125mm horizontal room sealed flue accessories



Components	Part No.	Description
	7 716 191 116	80/125mm dia. horizontal flue kit
	7 716 191 118	80/125mm dia. 1m flue extension (cuttable)
	7 716 191 117	80/125mm dia. 0.5m flue extension (cuttable)
	7 716 191 119	80/125mm dia. 90° bend
	7 716 191 120	80/125mm dia. 45° bends (pair)
	T 000 082 131	80/125mm dia. flue support bracket (3 pack)

100/150mm horizontal room sealed flue accessories

Components	Part No.	Description
	7 716 191 094	100/150mm dia. horizontal flue kit
	7 716 191 096	100/150mm dia. 1m flue extension (cuttable)
	7 716 191 097	100/150mm dia. 1m flue extension (non-cuttable)
	7 716 191 095	100/150mm dia. 0.5m flue extension (cuttable)
	7 716 191 098	100/150mm dia. 90° bend
	7 716 191 099	100/150mm dia. 45° bends (pair)
	7 746 901 750	100/150mm dia. adaptor (GB162 V2 50kW and 65kW only)
	7 716 191 102	100/150mm dia. flue support bracket (3 pack)
	7 716 191 103	100/150mm dia. clamp with EPDM seal

Standard horizontal flue assembly



Components		
Part No. 125mm	7 716 191 116	N/A
Part No. 150mm	7 716 191 094	7 746 901 750

Maximum lengths (mm) & no. of components required

GB162 V2 50kW

125mm	540	1	N/A
150mm	550	1	1

GB162 V2 65kW

125mm	540	1	N/A
150mm	550	1	1

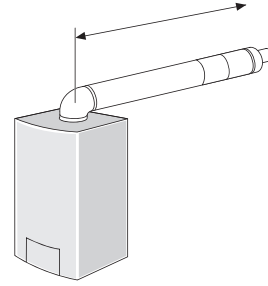
GB162 V2 85kW




150mm	550	1	N/A
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GB162 V2 100kW

150mm	550	1	N/A
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Extension flue horizontal



Components			
Part No. 125mm	7 716 191 116	7 716 191 118	N/A
Part No. 150mm	7 716 191 094	7 716 191 096	7 746 901 750

Maximum lengths (mm) & no. of components required

GB162 V2 50kW

125mm	7,700	1	up to 8	N/A
150mm	20,000	1	up to 20	1

GB162 V2 65kW

125mm	7,700	1	up to 8	N/A
150mm	20,000	1	up to 20	1

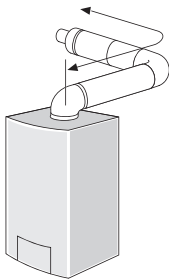
GB162 V2 85kW





150mm	18,000	1	up to 18	N/A
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GB162 V2 100kW

150mm	18,000	1	up to 18	N/A
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Extension flue horizontal using a second 90° bend



Components				
Part No. 125mm	7 716 191 116	7 716 191 118	7 716 191 119	N/A
Part No. 150mm	7 716 191 094	7 716 191 096	7 716 191 098	7 746 901 750

Maximum lengths (mm) & no. of components required

GB162 V2 50kW

125mm	5,800	1	up to 6	1	N/A
150mm	17,900	1	up to 6	1	1

GB162 V2 65kW

125mm	5,800	1	up to 6	1	N/A
150mm	17,900	1	up to 18	1	1

GB162 V2 85kW

150mm	15,900	1	up to 16	1	N/A
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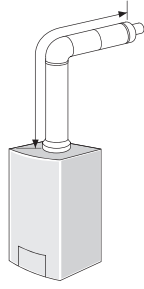
GB162 V2 100kW

150mm	15,900	1	up to 16	1	N/A
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Note: The maximum flue length must be reduced by the following amounts for each bend used.

	GB162 V2 50, 65kW 80/125mm flue	GB162 V2 50, 65, 85, 100kW 100/150mm flue
45° bend	0.9m	1.2m
90° bend	1.9m	2.1m

Extension flue horizontal and upwards

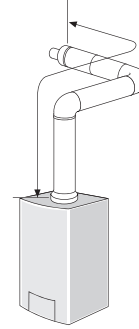


Components					
Part No. 125mm					
Part No. 125mm	7 716 191 116	7 716 191 118	7 716 191 119	N/A	
Part No. 150mm					
Part No. 150mm	7 716 191 094	7 716 191 096	7 716 191 098	7 746 901 750	
Maximum lengths (mm) & no. of components required					
GB162 V2 50kW					
125mm	7,700	1	up to 8	0*	N/A
150mm	20,000	1	up to 20	0*	1
GB162 V2 65kW					
125mm	7,700	1	up to 8	0*	N/A
150mm	20,000	1	up to 20	0*	1
GB162 V2 85kW					
150mm	18,000	1	up to 18	0*	N/A
GB162 V2 100kW					
150mm	18,000	1	up to 18	0*	N/A

*Horizontal flue kit includes a 90° bend.

Note: The short 0.5m flue extension may be used as an alternative to the standard extension.

Extension flue upwards and horizontal using a second 90° bend



Components					
Part No. 125mm					
Part No. 125mm	7 716 191 116	7 716 191 118	7 716 191 119	N/A	
Part No. 150mm					
Part No. 150mm	7 716 191 094	7 716 191 096	7 716 191 098	7 746 901 750	
Maximum lengths (mm) & no. of components required					
GB162 V2 50kW					
125mm	5,800	1	up to 6	1*	N/A
150mm	17,900	1	up to 18	1*	1
GB162 V2 65kW					
125mm	5,800	1	up to 6	1*	N/A
150mm	17,900	1	up to 18	1*	1
GB162 V2 85kW					
150mm	15,900	1	up to 16	1*	N/A
GB162 V2 100kW					
150mm	15,900	1	up to 16	1*	N/A

*Horizontal flue kit includes a 90° bend, therefore only 1 additional bend needs to be ordered.

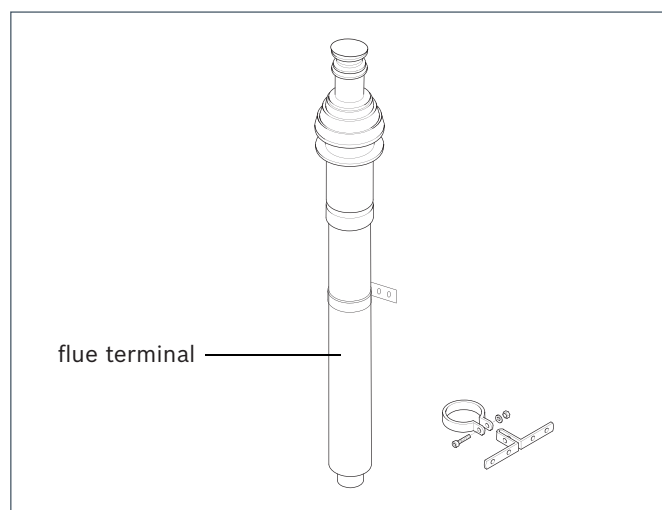
Note: The maximum flue length must be reduced by the following amounts for each bend used.

	GB162 V2 50, 65kW 80/125mm flue	GB162 V2 50, 65, 85, 100kW 100/150mm flue
45° bend	0.9m	1.2m
90° bend	1.9m	2.1m

GB162 V2 boiler series vertical room sealed fluing options

Vertical room sealed flue

Flue diameter	80/125mm	100/150mm
GB162 V2 50kW		
Maximum flue length	7,700mm	20,000mm
GB162 V2 65kW		
Maximum flue length	7,700mm	20,000mm
GB162 V2 85kW		
Maximum flue length	N/A	18,000mm
GB162 V2 100kW		
Maximum flue length	N/A	18,000mm



Standard vertical flue kit

80/125mm dia. vertical flue kit

- 1 x flue terminal
 - 1 x support bracket
 - 1 x sealing clamp
- Part No. 7 716 191 115

100/150mm dia. vertical flue kit

- 1 x flue terminal
 - 1 x support bracket
 - 1 x sealing clamp
- Part No. 7 716 191 093

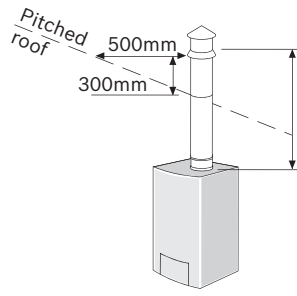
80/125mm vertical room sealed flue accessories



Components	Part No.	Description
	7 716 191 115	80/125mm dia. vertical flue kit
	7 716 191 118	80/125mm dia. 1m flue extension (cutable)
	7 716 191 117	80/125mm dia. 0.5m flue extension (cutable)
	7 716 191 119	80/125mm dia. 90° bend
	7 716 191 120	80/125mm dia. 45° bends (pair)
	T 000 082 131	80/125mm dia. flue support bracket (3 pack)
	7 716 191 090	80/125mm dia. flat roof flashing
	7 716 191 091	80/125mm dia. pitched roof flashing

100/150mm vertical room sealed flue accessories

Components	Part No.	Description
	7 716 191 093	100/150mm dia. vertical flue kit
	7 716 191 096	100/150mm dia. 1m flue extension (cutable)
	7 716 191 097	100/150mm dia. 1m flue extension (non-cuttable)
	7 716 191 095	100/150mm dia. 0.5m flue extension (cutable)
	7 716 191 098	100/150mm dia. 90° bend
	7 716 191 099	100/150mm dia. 45° bends (pair)
	7 746 901 750	100/150mm dia. adaptor (GB162 V2 50kW and 65kW only)
	7 716 191 102	100/150mm dia. flue support bracket (3 pack)
	7 716 191 103	100/150mm dia. clamp with EPDM seal
	7 716 191 101	100/150mm dia. flat roof flashing
	7 716 191 100	100/150mm dia. pitched roof flashing

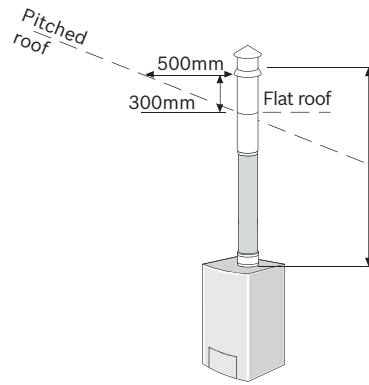
Standard vertical flue assembly






Components			
Part No. 125mm		7 716 191 115	N/A
Part No. 150mm		7 716 191 093	7 746 901 750
Minimum lengths (mm) & no. of components required			
GB162 V2 50kW			
125mm	1,352	1	N/A
150mm	1,545	1	1
GB162 V2 65kW			
125mm	1,352	1	N/A
150mm	1,545	1	1
GB162 V2 85kW			
150mm	1,545	1	N/A
GB162 V2 100kW			
150mm	1,545	1	N/A

Note: The short 0.5m flue extension may be used as an alternative to the standard extension.

Vertical balanced flue system maximum height

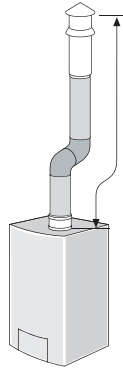






Components				
Part No. 125mm		7 716 191 115	7 716 191 118	N/A
Part No. 150mm		7 716 191 093	7 716 191 096	7 746 901 750
Maximum lengths (mm) & no. of components required				
GB162 V2 50kW				
125mm	7,700	1	up to 7	N/A
150mm	20,000	1	up to 20	1
GB162 V2 65kW				
125mm	7,700	1	up to 7	N/A
150mm	20,000	1	up to 20	1
GB162 V2 85kW				
150mm	18,000	1	up to 18	N/A
GB162 V2 100kW				
150mm	18,000	1	up to 18	N/A

Note: The maximum flue length must be reduced by the following amounts for each bend used.

	GB162 V2 50, 65kW 80/125mm flues	GB162 V2 50, 65, 85, 100kW 100/150mm flues
45° bend	0.9m	1.2m
90° bend	1.9m	2.1m

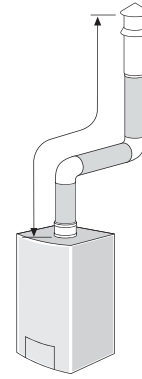
Vertical balanced flue system with two 45° bends







Components					
Part No. 125mm		7 716 191 115	7 716 191 118	7 716 191 120	N/A
Part No. 150mm		7 716 191 093	7 716 191 096	7 716 191 099	7 746 901 750
Maximum lengths (mm) & no. of components required					
GB162 V2 50kW					
125mm	5,900	1	up to 6	2	N/A
150mm	17,600	1	up to 17	2	1
GB162 V2 65kW					
125mm	5,900	1	up to 6	2	N/A
150mm	17,600	1	up to 17	2	1
GB162 V2 85kW					
150mm	15,600	1	up to 15	2	N/A
GB162 V2 100kW					
150mm	15,600	1	up to 15	2	N/A

Note: The short 0.5m flue extension may be used as an alternative to the standard extension.

Vertical balanced flue system with two 90° bends



Components					
Part No. 125mm		7 716 191 115	7 716 191 118	7 716 191 119	N/A
Part No. 150mm		7 716 191 093	7 716 191 096	7 716 191 098	7 746 901 750
Maximum lengths (mm) & no. of components required					
GB162 V2 50kW					
125mm	3,900	1	up to 4	2	N/A
150mm	15,800	1	up to 16	2	1
GB162 V2 65kW					
125mm	3,900	1	up to 4	2	N/A
150mm	15,800	1	up to 16	2	1
GB162 V2 85kW					
150mm	13,800	1	up to 14	2	N/A
GB162 V2 100kW					
150mm	13,800	1	up to 14	2	N/A

Note: The maximum flue length must be reduced by the following amounts for each bend used.

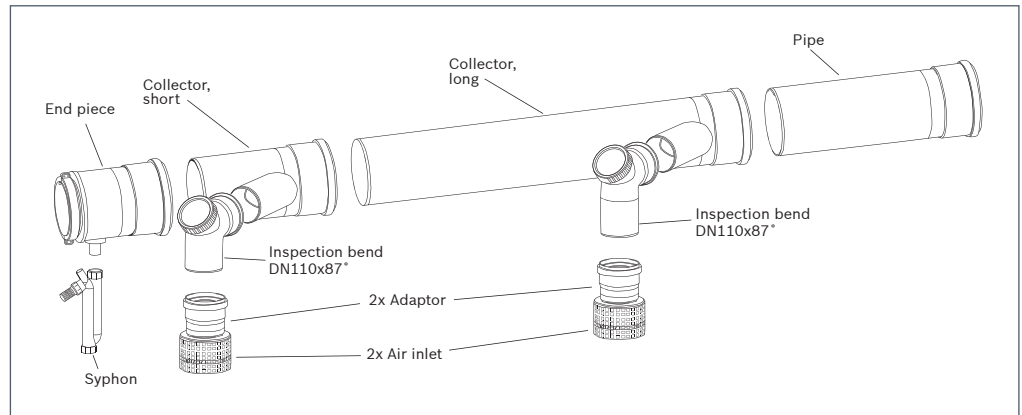
	GB162 V2 50, 65kW 80/125mm flue	GB162 V2 50, 65, 85, 100kW 100/150mm flue
45° bend	0.9m	1.2m
90° bend	1.9m	2.1m

Cascade technical information

Cascade flue systems

Worcester supplies a range of cascade flue kits for GB162 V2 systems of up to 800kW.

For further details on be-spoke flue systems for the GB162 V2 please visit the website or contact our local commercial sales manager.



This example shows a typical Worcester flue header kit for a 2 boiler in-line cascade system.

Overpressure cascade flue headers

The new range of overpressure cascade flue kits are available to suit both in-line and back to back cascade arrangements. They feature built-in flue gas non-return valves for each boiler, which remain in the open position on working boilers but switch to the closed position when any individual boiler in the cascade is not in operation e.g. in part-load conditions, to prevent flue gases from entering the boiler.

As a result, flue sizes are smaller in diameter, eliminating the need for larger cascade flue headers to maintain negative pressure for effective flue gas removal, while at the same time reducing the boiler/flue overall installation height. This provides greater installation flexibility and potential cost savings by enabling GB162 cascades to be installed in boiler rooms or plant rooms with lower ceilings. Additionally, the new kits are suitable for retrofit projects where narrow chimney width is a factor.

Where stainless steel flue systems are to be used, a starter kit is available containing the non-return valve and essential components for use with third party systems.

Features and benefits:

- ▶ Available in 160mm, 200mm and 250mm diameters and suitable for cascades of up to 800kW.
- ▶ Comes with flue sensor and in-built software to maintain safety
- ▶ Flues supplied with built-in flue gas non-return valves.
- ▶ Smaller diameter flue sizes reduce overall installation height and save cost by providing greater installation flexibility.
- ▶ Suitability for retrofitting to narrower chimneys.

Single boiler controls

It is vital when fitting any energy efficient heating equipment that controls are not overlooked. The controls are designed to maximise system efficiency and allow the heating engineer quick and easy access to all functions of the boiler and heating system. For the end user, selection of the most appropriate controls for the installation will result in greater functionality of the system and more efficient operation.

EMS (Energy Management System)

EMS is a state-of-the-art intelligent control system that uses a standard operating structure to ensure smooth and continuous communication between the automatic firing of the boiler and the heating system controls. This improves overall efficiency and gives the heating engineer a large degree of flexibility and control over the heating system, allowing individual circuits and zones to be effectively managed. EMS is equipped as standard in the GB162 V2 and is fully compatible with the high performance range of the 8000 modular controls as well as the Sense II digital programmer.



UBA 3.5

The boiler is also equipped with a UBA 3.5 digital, automatic burner control which monitors and controls all the electronic components of the appliance to ensure the most efficient combustion.



Sense I

The Sense I can be used in conjunction with the Sense II as a remote room or zone control. It allows precise setting and programming of room temperature as well as acting as a thermostat. The unit is very simple to use and removes the need to visit the boiler to change the temperature. Where two Sense I controls are used in conjunction with an Sense II control installed as a room temperature sensor then ErP controls classification VIII is achieved and a subsequent 5% can be added to the space heating efficiency (see Worcester website tool).



Sense II

The Sense II is the latest generation of digital controls for single boilers. It offers comprehensive functionality for single boiler systems operating with EMS, and takes full advantage of the control modules that can be added to the GB162 V2. The Sense II has a detailed text display that uses an intuitive push-and-turn system to navigate users through the various functions and menus. The Sense II is also compatible with the Sense I room controllers* and enables separate heating circuits to be fine tuned to ensure optimum fuel efficiency, straightforward servicing and rapid fault diagnosis.

Sense controls series

GB162 50kW and 65kW	Sense I	Sense I + Sense II (Weather compensation with room influence from Sense I)	2 x Sense I + Sense II (Weather compensation with 3 room sensors for multi-zones)	Sense II (Weather compensation with room influence when used as a room controller)	Sense II (Weather compensation only - when installed in the fascia of the GB162 V2)	Sense II (When used as a room controller)
ErP efficiency class	-	VI	VIII ¹	VI ²	II ³	V ⁴
Efficiency benefit	-	+4%	+5%	+4%	+2%	+3%

¹Class VIII can only be achieved when the Sense II is used as a room thermostat. ²Class VI can only be achieved when the Sense II is used as a room thermostat.

³Class II when Sense II is mounted within the GB162 V2 fascia. ⁴Class V is only be achieved when the Sense II is used as a room thermostat and the weather sensor is not connected.

*Contract Technical Support for details.

Control modules for use with Sense II and Building Management Systems (BMS)

Sense II control modules

The Sense II is compatible with several individual control modules that are easily wired into the connections in the tray located underneath the GB162 V2. These modules extend the functionality of the Sense II and GB162 V2 considerably, providing control for low loss headers, solar and additional mixed heating circuits. All wiring has colour coded plugs for quick installation into the main control unit.

MM100 low loss header module

For use with GB162 V2 boilers and heating systems with a low loss header, the MM100 is used to control either an unmixed heating circuit, mixed heating circuit or domestic hot water circuit. A minimum of 1 is required when using the Sense II control.

The flow temperature can be determined by a weather compensation heating control in conjunction with the Sense II, which would be mounted external to the boiler and can act as a room controller. The MM100 comes supplied with a low loss header temperature sensor and a wall mounted bracket.

For heating systems with additional mixed or unmixed heating circuits, this module can control a 230V AC 3 port valve and has a sensor to control flow temperature when used in conjunction with an Sense II controller. It is also possible to connect to an Sense I remote control for room temperature compensation, please contact technical support for further information. Up to 4 modules can be used per heating system.

MS100 solar circuit module

The MS100 fully controls a solar thermal system for DHW purposes. This module is linked into the boiler control and automatically monitors the available solar energy. When there is heat available from the solar collectors, the controller will prevent the boiler from firing in order to optimise the use of the free solar energy.

Single boiler or cascade installations with BMS

MU100 BMS interface module

The MU100 module interfaces with an existing BMS. It can create a fault report, 230V fault signal, and has a 0-10V contact for signals from the BMS to control the boiler flow temperature. Fig. 1 shows control options compatible with BMS.

MC400 cascade sequencer

The MC400 simplifies the optimum running of a cascade system when interfacing with an existing BMS. By sequencing the lead boiler it eliminates excessive wear in any one unit and also interprets the 0-10V input signal from the BMS to modulate the heat output of the cascade. This is all achieved without the need for programming or

complex set up and is a true 'Plug & Play' control. An individual MC400 can control up to 4 boilers and up to 16 boilers can be achieved when 5 MC400 units are linked together, up to 1.6MW. Fig. 1 shows control options compatible with BMS.

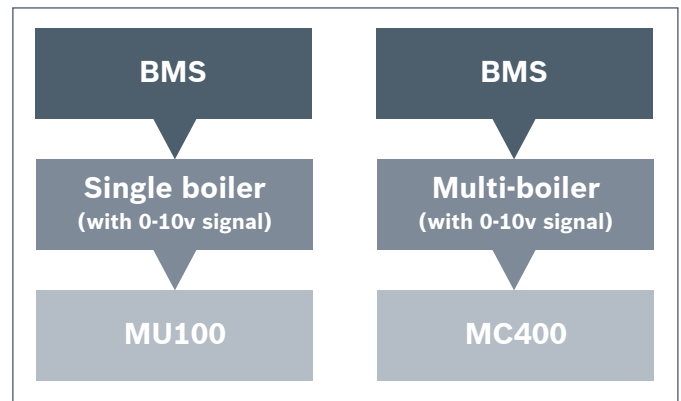
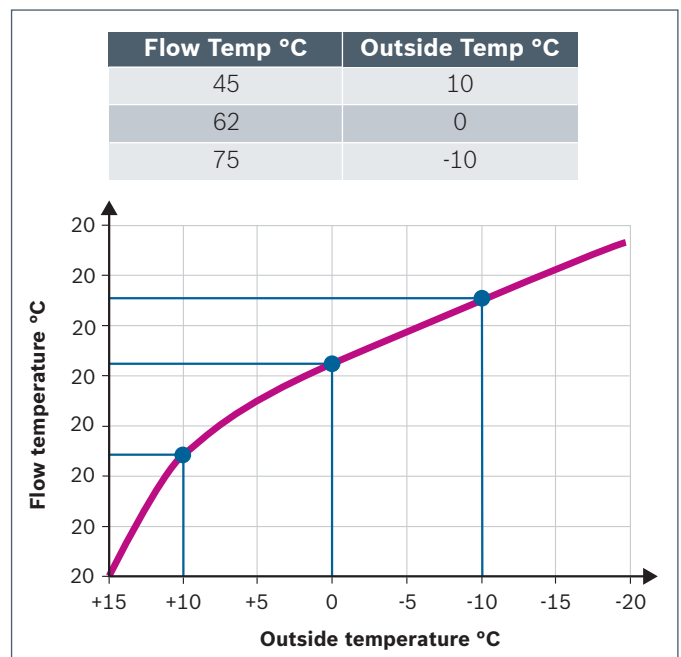


Fig. 1. Compatible BMS controls

The benefits of weather compensation

The Sense II controller can change the required temperature for different heating circuits according to the outside temperature and is measured using a small external sensor. With mixed heating circuits this means that each individual circuit has its own characteristics and the boiler will supply only the heat needed for certain parts of the system. This is particularly effective in Spring and Autumn as temperatures for the heating circuits can be reduced significantly, saving fuel and allowing the highest efficiency from the condensing process.



The graph above shows how the heating curve can be modified at any time using the Sense II controller, providing maximum comfort for the user.

8000 series boiler management

Cascade/multi-boiler control options

The 8313 is an intelligent commercial control offering Internet connected remote access and weather compensation as standard.

The 8313 control unit has the ability to work alongside or independent of a BMS system. With the addition of plug in function modules the 8313 can be expanded to cascade boilers, add multiple heating circuits and provide control of two separate DHW circuits.



The 8313 can control a DHW circuit as standard, additional function modules will be required for mixed or unmixed heating circuits. The 8313 has the space available for up to four additional function modules..



BFU Room Thermostat

The BFU is a remote control which allows the temperature to be adjusted from the end user's living or working space. This includes a room temperature sensor.

8000 controls series

GB162 50kW and 65kW	4121 (Weather compensation of up to 2 mixed HCs)	4121 + BFU Room Thermostat (Weather compensation with room influence)	4121 + MEC2 (MEC2 installed remotely) (Weather compensation with room influence)
ErP efficiency class	II*	VI	VI
Efficiency benefit	+2%	+4%	+4%

*No room influence as standard.

FM-MW Heating and DHW Control Module

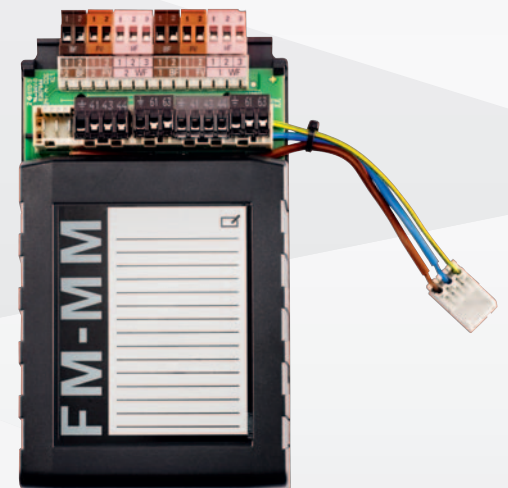
For use in 8000 series controls, this module controls one mixed heating circuit (with circulation pump and mixing valve) or an unmixed heating circuit and one DHW circuit (with cylinder load and circulation pump). All wiring has colour coded plugs for quick installation into the main control unit (BFU as accessory).



FM-MM Heating Circuit Control Module

For use in 8000 series controls, this module controls up to two mixed heating circuit (with circulation pump and mixing valve) or two unmixed circuits. Comes supplied with one FV/FZ temperature sensor.

All wiring has colour coded plugs for a quick installation into the main control unit (BFU up to 2x as accessory). An additional FV/FZ sensor is required if using two mixed circuits.



FM-CM Cascade Control Module

The FM-CM can control the modulation and sequencing strategy from 2 to 4 boilers. A 0-10V input, for use with the BMS control.



Cascade - quick and simple to install

The innovative, low weight cascade design used with the GB162 V2 series means it is installer-friendly, reducing fitting time and costs.

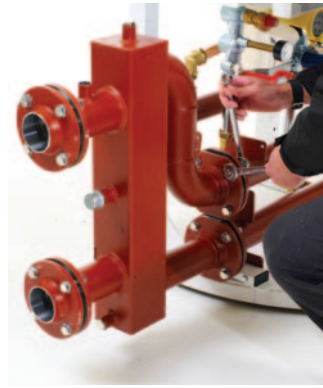
The cascade boiler connection kit is supplied with all the necessary fittings and accessories, all of which can easily be transported to the boiler room.

The installer builds the framework and constructs the pipe system in a few simple steps as shown below.

After the installation everything fits together perfectly, the pipe work is tidy, and the boilers are connected to the main heating system without the need to install additional hydraulic equipment.



Step 1
The sturdy floor standing cascade framework is bolted together.



Step 2
Low loss header, flow, return and gas pipes are fitted.



Step 3
Individual GB162 V2 boilers are mounted securely on the framework.



Step 4
Pump groups (additional accessory) and valves are connected to boilers and flow and return pipe work attached to the headers.



Step 5
Custom-fit insulation is added to pipe work and fitted around each pump group to minimise heat loss.

Cascade features at a glance:

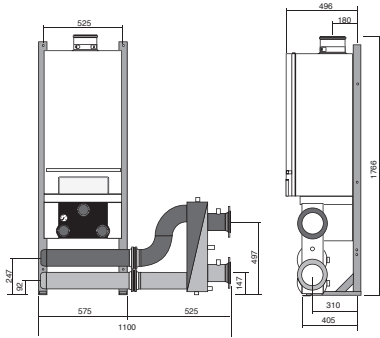
- ▶ Fixed to the floor freestanding assembly
- ▶ Boilers hung directly on the frame
- ▶ Uses the GB162 V2 pump group
- ▶ Complete unit with high quality, custom fit robust insulation
- ▶ Integrated gas pipe, flow and return with low loss header
- ▶ Up to 8 boilers with one control
- ▶ The cascade will modulate from the lowest output of the smallest boiler within the cascade, up to the total load of the boilers
- ▶ Suitably designed and sized low loss header
- ▶ Frame supports for condensate pipework.

For assistance in specification of GB162 V2 cascade systems please contact your local commercial sales manager.

Note: ErP system labels and fiches do not need to be provided to the end user if any combination of GB162 V2's are cascaded.

GB162 V2 cascade in-line (TL) systems

TL1 configuration



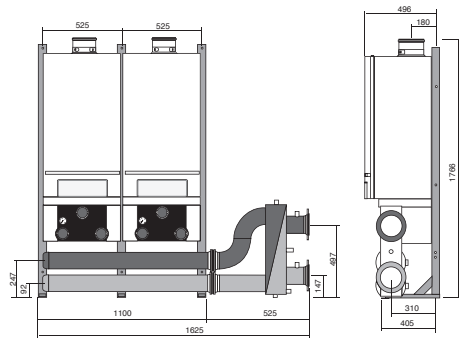
Specification	Value
Cascadable outputs (max.)	50 to 100kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	1,100mm
Depth	496mm

Parts list	Quantity
Main flow & return pipe TL1 NW100	1
Main gas pipe	1
Boiler piping set TL configuration	1
2.5" Low loss header	1
TL configuration supports	2
Connecting frame	6

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	1

Controls and fluing as required.

TL2 configuration with pump groups



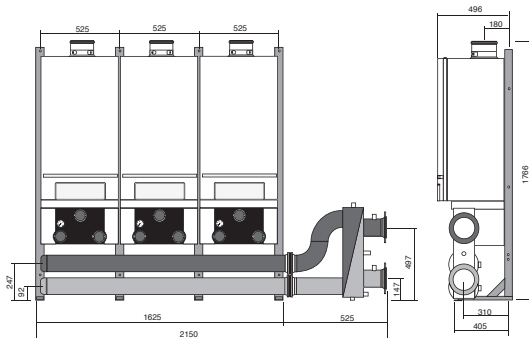
Specification	Value
Cascadable outputs (max.)	100 to 200kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	1,625mm
Depth	496mm

Parts list	Quantity
Main flow & return pipe TL2 NW165	1
Main gas pipe TL2 - 2"	1
Boiler piping set TL configuration	2
2.5" Low loss header	1
TL configuration supports	3
Connecting frame	2

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	2

Controls and fluing as required.

TL3 configuration with pump groups



Specification	Value
Cascadable outputs (max.)	150 to 300kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	2,150mm
Depth	496mm

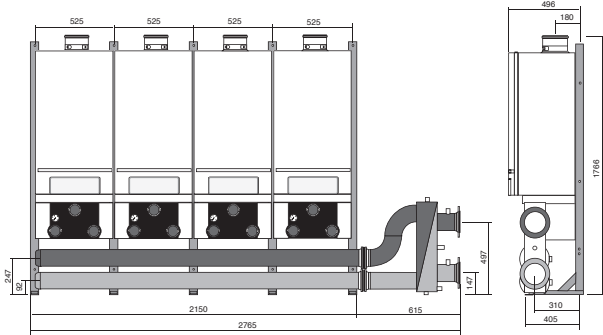
Parts list	Quantity
Main flow & return pipe TL3 NW165	1
Main gas pipe TL3 - 2"	1
Boiler piping set TL configuration	3
2.5" Low loss header	1
TL configuration supports	4
Connecting frame	3

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	3

Controls and fluing as required.

GB162 V2 cascade in-line (TL) systems - continued

TL4 configuration with pump groups



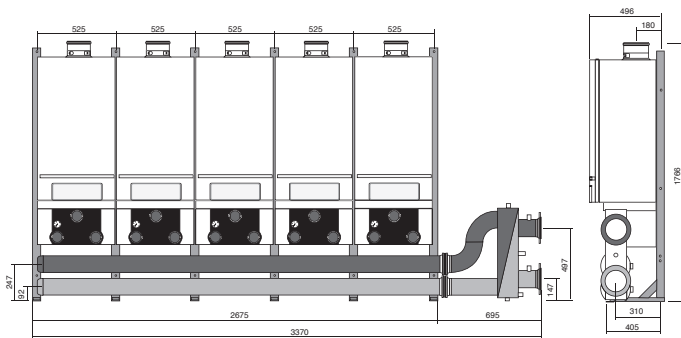
Specification	Value
Cascadable outputs (max.)	200 to 400kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	2,765mm
Depth	496mm

Parts list	Quantity
Main flow & return pipe TL4 NW80	1
Main gas pipe TL4 - 2"	1
Boiler piping set TL configuration	4
3" Low less header	1
TL configuration supports	5
Connecting frame	4

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	4

Controls and fluing as required.

TL5 configuration with pump groups



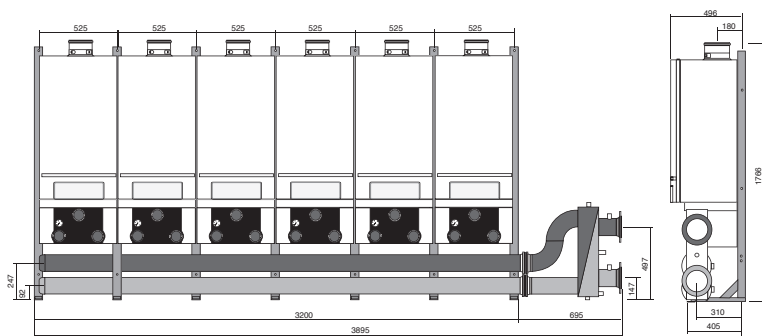
Specification	Value
Cascadable outputs (max.)	250 to 500kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	3,370mm
Depth	496mm

Parts list	Quantity
Main flow & return pipe TL5 NW100	1
Main gas pipe TL5 - 2"	1
Boiler piping set TL configuration	5
4" Low less header	1
TL configuration supports	6
Connecting frame	5

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	5

Controls and fluing as required.

TL6 configuration with pump groups



Specification	Value
Cascadable outputs (max.)	300 to 600kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	3,895mm
Depth	496mm

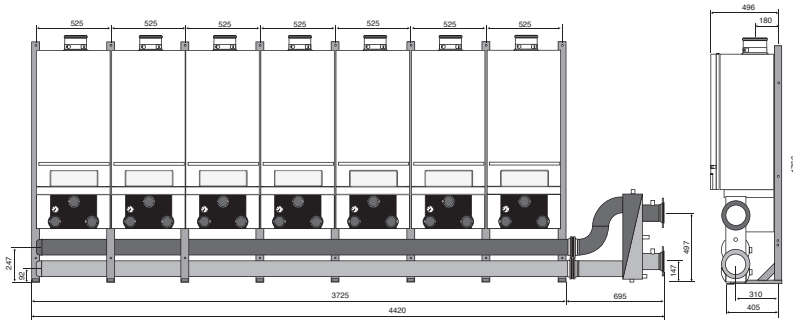
Parts list	Quantity
Main flow & return pipe TL6 NW100	1
Main gas pipe TL6 - 3"	1
Boiler piping set TL configuration	6
4" Low less header	1
TL configuration supports	7
Connecting frame	6

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	6

Controls and fluing as required.

GB162 V2 cascade in-line (TL) systems - continued

TL7 configuration with pump groups



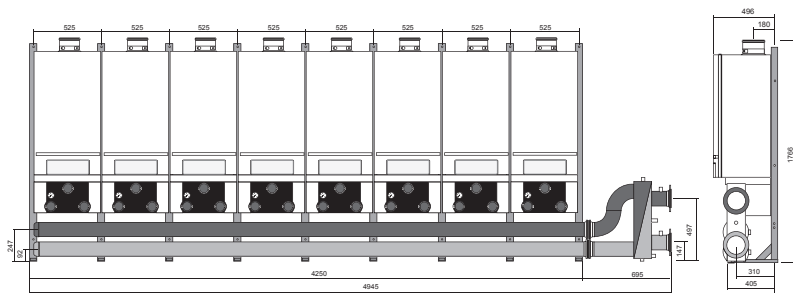
Specification	Value
Cascadable outputs (max.)	350 to 700kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	4,420mm
Depth	496mm

Parts list	Quantity
Main flow & return pipe TL7 NW100	1
Main gas pipe TL7 - 3"	1
Boiler piping set TL configuration	7
4" Low loss header	1
TL configuration supports	8
Connecting frame	7

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	7

Controls and fluing as required.

TL8 configuration with pump groups



Specification	Value
Cascadable outputs (max.)	250 to 500kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	4,945mm
Depth	496mm

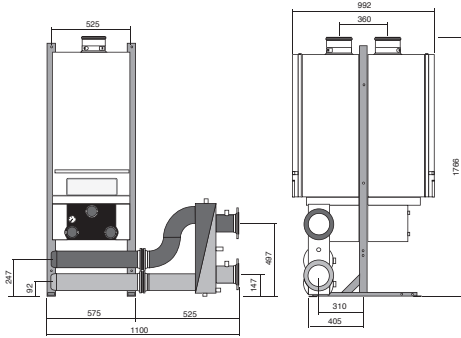
Parts list	Quantity
Main flow & return pipe TL8 NW100	1
Main gas pipe TL8 - 3"	1
Boiler piping set TL configuration	8
4" Low loss header	1
TL configuration supports	9
Connecting frame	8

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	8

Controls and fluing as required.

GB162 V2 cascade back-to-back (TR) systems

TR2 configuration



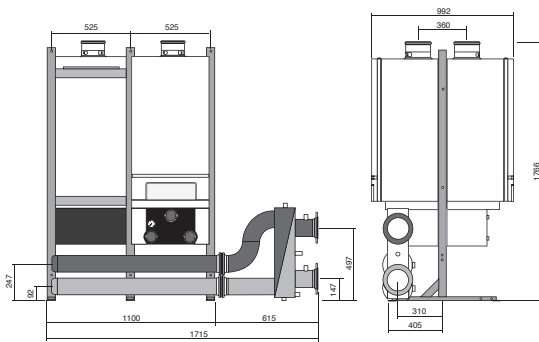
Specification	Value
Cascadable outputs (max.)	100 to 200kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	1,100mm
Depth	992mm

Parts list	Quantity
Main flow & return pipe TR2 NW165	1
Main gas pipe TR2 - 2"	1
Boiler piping set TL configuration	1
Boiler piping set TR configuration	1
2.5" Low loss header	1
TR configuration supports	2
Connecting frame	1

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	2

Controls and fluing as required.

TR3 configuration with pump groups



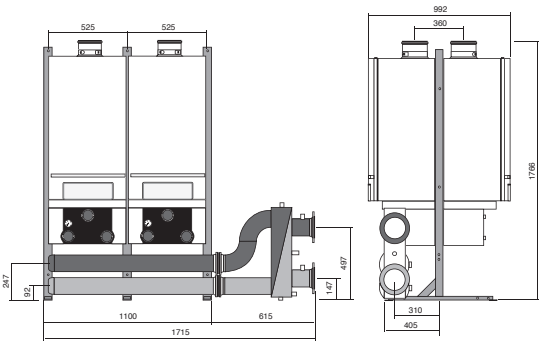
Specification	Value
Cascadable outputs (max.)	150 to 300kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	1,715mm
Depth	992mm

Parts list	Quantity
Main flow & return pipe TL4 NW80	1
Main gas pipe TR4 - 2"	1
Boiler piping set TL configuration	1
Boiler piping set TR configuration	2
3" Low loss header	1
TL configuration supports	3
Connecting frame	2

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	3

Controls and fluing as required.

TR4 configuration with pump groups



Specification	Value
Cascadable outputs (max.)	200 to 400kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	1,715mm
Depth	992mm

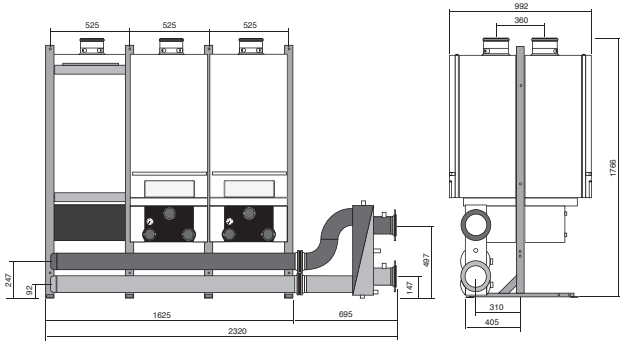
Parts list	Quantity
Main flow & return pipe TL4 NW80	1
Main gas pipe TR4 - 2"	1
Boiler piping set TL configuration	2
Boiler piping set TR configuration	2
3" Low loss header	1
TL configuration supports	3
Connecting frame	2

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	4

Controls and fluing as required.

GB162 V2 cascade back-to-back (TR) systems - continued

TR5 configuration with pump groups



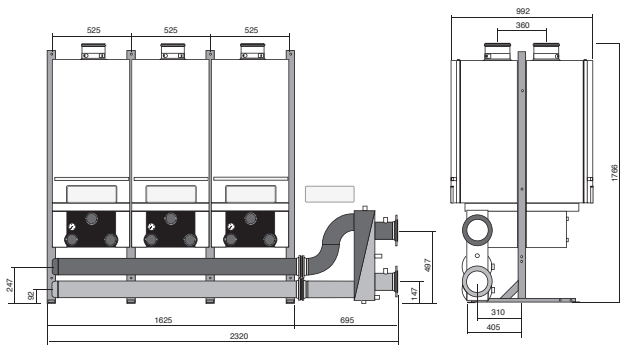
Specification	Value
Cascadable outputs (max.)	250 to 500kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	2,320mm
Depth	992mm

Parts list	Quantity
Main flow & return pipe TL5 NW100	1
Main gas pipe TR6 - 3"	1
Boiler piping set TL configuration	2
Boiler piping set TR configuration	3
4" Low loss header	1
TR configuration supports	4
Connecting frame	3

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	5

Controls and fluing as required.

TR6 configuration with pump groups



Specification	Value
Cascadable outputs (max.)	300 to 600kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	2,320mm
Depth	992mm

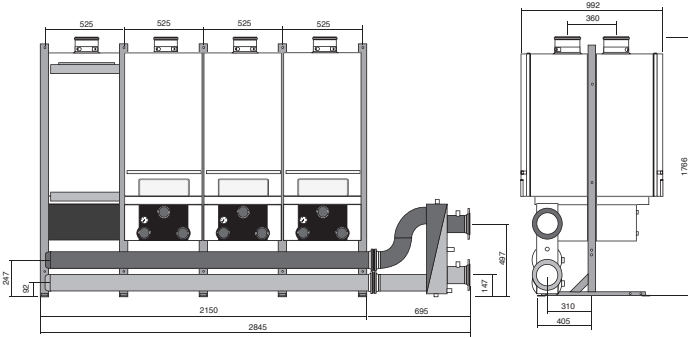
Parts list	Quantity
Main flow & return pipe TL6 NW100	1
Main gas pipe TR6 - 3"	1
Boiler piping set TL configuration	3
Boiler piping set TR configuration	3
4" Low loss header	1
TL configuration supports	4
Connecting frame	3

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	6

Controls and fluing as required.

GB162 V2 cascade back-to-back (TR) systems - continued

TR7 configuration with pump groups



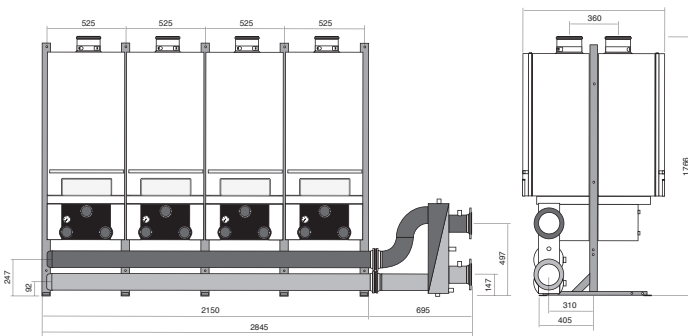
Specification	Value
Cascadable outputs (max.)	250 to 700kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	2,845mm
Depth	992mm

Parts list	Quantity
Main flow & return pipe TR8 NW100	1
Main gas pipe TR* - 3"	1
Boiler piping set TL configuration	3
Boiler piping set TR configuration	4
4" Low loss header	1
TR configuration supports	5
Connecting frame	4

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	7

Controls and fluing as required.

TR8 configuration with pump groups



Specification	Value
Cascadable outputs (max.)	400 to 800kW
Height (excluding flue adaptor)	1,710mm
Length (inc. straight low loss header)	2,845mm
Depth	992mm

Parts list	Quantity
Main flow & return pipe TR8 NW100	1
Main gas pipe TR8 - 3"	1
Boiler piping set TL configuration	4
Boiler piping set TR configuration	4
4" Low loss header	1
TL configuration supports	5
Connecting frame	4

Required accessories	Quantity
Sensor pocket	1
Pump group (50/65/85/100kW)	8

Controls and fluing as required.

GB162 V2 boiler series and accessories

GB162 V2 boilers	Part Number
GB162 V2 50kW	7 736 701 038
GB162 V2 65kW	7 736 701 035
GB162 V2 85kW	7 736 701 036
GB162 V2 100kW	7 736 701 037
Sense II series boiler and system controls	Part Number
Sense II digital boiler control	7 738 111 064
Sense I room thermostat (max 2 per system)	7 738 110 054
MM100 heating and DHW circuit module	7 738 110 140
MS100 solar module	7 738 110 144
MU100 BMS interface for single boilers	7 738 110 119
MC400 cascade sequencing control for up to 4 boilers	7 738 111 001
8000 series boiler and system controls	Part Number
8313 control unit	7 736 602 245
FM-MW heating and DHW control unit	8 718 598 831
FM-MM heating circuit control module	8 718 598 828
FM-CM four boiler cascade sequence module	7 736 602 098
BFU remote control and room thermostat	30 002 243
Hydraulic accessories	Part Number
Modulating pump group - low energy 50, 65, 85 & 100kW models	7 736 701 389
Connection set when using pump group without cascade frame	5 584 552
Low loss header for single boiler installations (50, 65, 85 & 100kW)	89 200 972
GB plate heat exchanger 50kW	7 733 600 013
GB plate heat exchanger 65kW	7 733 600 014
GB plate heat exchanger 85/100kW	7 733 600 016
Threaded flange set	7 736 700 487 (2") 7 736 700 963 (3") 7 736 700 964 (4")
80/125mm room sealed concentric flue - 50kW and 65kW models	Part Number
Vertical flue kit (80/125mm dia.)	7 716 191 115
Horizontal flue kit (80/125mm dia.)	7 716 191 116
0.5m flue extension - cutable (80/125mm dia.)	7 716 191 117
1m flue extension - cutable (80/125mm dia.)	7 716 191 118
90° bend (80/125mm dia.)	7 716 191 119
45° bends - pair (80/125mm dia.)	7 716 191 120
Flue support bracket - 3 pack (80/125mm dia.)	T 000 082 131
Flat roof flashing for vertical flue kit (80/125mm dia.)	7 716 191 090
Pitched roof flashing for vertical flue kit (80/125mm dia.)	7 716 191 091
100/150mm room sealed concentric flue - 50, 65, 85 and 100kW models	Part Number
Vertical flue kit (100/150mm dia.)	7 716 191 093
Horizontal flue kit (100/150mm dia.)	7 716 191 094
Adaptor for GB162 50kW and 65kW only (100/150mm dia.)	7 746 901 750
0.5m flue extension - cutable (100/150mm dia.)	7 716 191 095
1m flue extension - cutable (100/150mm dia.)	7 716 191 096
1m flue extension - non-cuttable (100/150mm dia.)	7 716 191 097
90° bend (100/150mm dia.)	7 716 191 098
45° bends - pair (100/150mm dia.)	7 716 191 099
Flue support bracket - 3 pack (100/150mm dia.)	7 716 191 102
Clamp with EPDM seal (100/150mm dia.)	7 716 191 103
Pitched roof flashing (100/150mm dia.)	7 716 191 100
Flat roof flashing (100/150mm dia.)	7 716 191 101

Useful numbers

Service Enquiries

Email: service-enquiries@uk.bosch.com
or telephone 0330 123 9559

Guarantee Registration

Your installer should always undertake the registration of your boiler on your behalf.
If you have a query please call 0330 123 2552



www.worcester-bosch.co.uk/support/customer-support

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Worcester Bosch Group

Worcester Bosch

Cotswold Way
Warndon
Worcester
WR4 9SW

worcester-bosch.co.uk

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Plant Commissioning / Service Record (Non Domestic)

Page No: 1 of 2
 Ref: _____
 Gas Safe Reg No: 537444



Inspection Date: 25 May 2022 Unique Serial No: PCS-1653-4632-14308

Customer / Agent Details	
Name:	Phase Mechanical Projects
Address:	39 Chattergate Quarry Park Close Northampton
Postcode:	NN3 6QB
Telephone:	01604630502 Mobile: _____

Site Details	
Name:	Winvic
Address:	Segro Park Wilders Way
Postcode:	DE74
Telephone:	_____ Mobile: _____

Registered Business Details	
Name:	Simon Gladstone Heating and Plumbing
Address:	6 Lounts Crescent Great Easton Market Harborough
Postcode:	LE16 8 SX
Telephone:	01536772620 Mobile: 07977924679

Appliance Details				
Appliance No	1	2	3	4
Location	Plant Deck			
Type	System Boiler			
Manufacturer	Worcester Bosch			
Model	GB162 V2 50KW			
Serial No	3290-176-000054-7			
Burner Manufacturer (If different)				
Flue Type				

Additional Safety Checks				
Appliance No	1	2	3	4
Flue flow satisfactory?	Yes			
Spillage test satisfactory?	Yes			
Ventilation satisfactory? (Refer to ventilation section)	Yes			
Air/gas pressure switch operating correctly?	Yes			
Flame proving/safety devices operating correctly?	Yes			
Burner lock-out time (seconds)				
Temperature and limit thermostats working correctly?	Yes			
Appliance serviced?	N/A			
Gas booster(s)/compressor(s) operating correctly?	N/A			
Gas installation tightness test carried out?	Yes			
Gas installation pipework adequately supported?	Yes			
Gas installation pipework sleeved, labelled & painted?	Yes			
Chimney system installed in accordance with standards	Yes			
Fan-flue interlock operating correctly?	N/A			

Combustion Checks								
Appliance No	1		2		3		4	
Firing Mode	Low	High	Low	High	Low	High	Low	High
Heat input rating (kW)		49.9						
Gas burner pressure (mbar)		21.6						
Gas rate (m³/hr)								
Air/gas ratio control setting								
Ambient (room) temperature (°C)								
Flue gas temperature (°C)								
Flue gas temperature net (°C)								
Flue draught pressure (mbar)								
Oxygen (O ₂) %	6.9	5.0						
Carbon Monoxide (CO) ppm	0	16						
Carbon Dioxide (CO ₂) %	8.0	9.0						
NOx %								
Excess air %	49.9	31.9						
CO / CO ₂ Ratio	0.0000	0.0002						
Gross efficiency %								
CO flue dilution ppm								

Ventilation	
Boiler room / Enclosure / Room	
Free area low-level (cm²)	
Free area high-level (cm²)	
All ventilation grilles clear and unobstructed (Y / N)	

Mechanical ventilation flow rate	
Inlet (m³/s)	
Extract (m³/s)	
Mechanical ventilation interlock operating correctly?	
All ventilation grilles clear and unobstructed (Y / N)	

Plant Commissioning / Service Record (Non Domestic)

Page No 2 of 2

Ref:

Gas Safe Reg No: 537444



Inspection Date: 25 May 2022

Unique Serial No: PCS-1653-4632-14308

No	Faults / Issues	Remedial Work
1		
	Warning Notice Number	Warning Notice raised and label attached N/A
2		
	Warning Notice Number	Warning Notice raised and label attached
3		
	Warning Notice Number	Warning Notice raised and label attached
4		
	Warning Notice Number	Warning Notice raised and label attached

Work Carried Out	Remedial Work Required

Warning Notice (General Installation)

Has a Warning Notice been raised and label(s) been attached?

Warning Notice No.

Has responsible person been advised? Responsible Person:

Declaration of Gas Safety

I confirm that all of the above work described on this form has been satisfactory completed with the current Gas Safety (Installation and Use) Regulations, industry standards and procedures.

Gas operative's signature

SG Ladotua

Received By

Name:

Position:

Date:

Operative ID No: 3957105

Date: 25 May 2022