Technical Bulletin

Installation: Combining Two 8000 Life Regular Boilers

GUIDANCE NOTES FOR COMBINING TWO GR8300IW REGULAR BOILERS FOR LARGER INSTALLATIONS

Important! This Technical Bulletin applies only to the GW8300iW 30R, 35R, 40R, 45R and 50R condensing regular boilers, when combined as a boiler cascade.

Commercial property guarantee and system types
The standard appliance guarantee is two years, but can qualify for five years if the following conditions have been met.

- The appliance guarantee is registered as "non-domestic"
- The boilers are serviced every 12 months and the hours run of an individual boiler does not exceed 1300 hrs annually
- Incorporates a low loss header or plate heat exchanger.
- Is controlled via an MC400 cascade controller

Important information for the installer – Permitted use of the GW8300iW Regular boilers in larger buildings

The GW8300iW Regular boilers are suitable for installations within systems that have standard usage and heat demands such as large domestic properties, offices, community centres and other light non-domestic use. They are not suitable for demanding applications with long run hours such as Care homes, Hotels and Leisure facilities. For these applications, we recommend the GB162 V2 range of boilers, which are dedicated commercial appliances, designed to operate for longer run hours.

Scope
The following guidance notes apply to combining two boilers only, which will range in their combined output from 60kW to 100kW. As such, they cross over the threshold of 70kW gas input (net) that determines the competency requirements needed to be held by the installer for commercial applications. For combined outputs below 70kW input, installers must hold domestic ACS qualifications and ensure that the volume of the gas supply falls within the scope of IGE/UP/1B. For higher gas rates where 35mm pipe work is needed, this is likely to exceed the maximum volume allowed under IGE/UP/1B. For combined outputs above 70kW gas input (net), installers must hold relevant commercial ACS qualifications.
Pay particular attention to the gas meter capacity to ensure it can cope with the potential gas rates of all installed appliances in the property. In the majority of cases, U6 domestic gas meters will **not** have sufficient capacity.

Liability
The guidance contained within this Technical Bulletin is not intended to replace the knowledge and design responsibilities of the installer for the system as a whole. Instead, it sets out recommendations for the combined boiler arrangement, which are proven to give reliable results. The final design responsibility remains with the installer to ensure safe and reliable operation of the system as a whole.

Combining two boilers
Joining two boilers together, (also known as a cascaded) allows larger outputs to be accomplished, whilst maintaining good turndown for lower demand periods. It also provides redundancy, where maintaining heat is a priority, if a fault should occur in a single boiler.

Hydraulic arrangements
The examples set out in this Technical Bulletin are based around sealed heating systems. Hydraulic separation between the boiler primary and the system secondary is maintained either through a low loss header or through a plate heat exchanger. Choose a plate heat exchanger where there are concerns about system contamination of the new boilers.

The examples are fully designed layouts with a list of typical fittings valves and other components that will be needed to construct the boiler primary side, up to and including the low loss header or plate heat exchanger.

Pumps, expansion vessels and pipework sizes, have been selected to accommodate typical system requirements for the given output size. If alternative components are used, ensure they are similar duty to the ones listed.

Boiler control
Controlling the two boilers is built around the MC400 cascade controller, which will sequence and modulate the boilers based on the heat demand. MC400 will also rotate the lead boiler periodically to ensure the run hours are even across both boilers.

MC400 has a single temperature sensor strategically placed to sense the flow temperature being delivered to the secondary

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side of the low loss header or plate heat exchanger. The sensor position on the pipe work is indicated in the hydraulic drawing and it is important that this be followed.

Standard heating and hot water controllers can be used with MC400 via 230v enable connection. Circuits with two port valves, time and temperature control, such as extended "S Plan" are suitable, ensuring the system meets the basic requirements of Building Regulations. Example wiring schematics are provided for "S Plan" and "S Plan +" at the end of this technical bulletin.

Water Regulations

The requirements of the Water Regulations are important when considering how to fill sealed heating systems. A house is consider fluid category 3 meaning that a filler loop can be used. All non-house systems are classed as fluid category 4, unless risk assessed by the water supplier. Fluid category 4 requires that the system be filled via a BA device. Small pressurisation units are the simplest method to achieve this and they are shown in all of the layouts. Keep in mind that this will need a power supply.

Flue requirements

The GW8300iW cascades are designed only for use with standard individual Worcester flue kits and components.

Where combinations of the two boilers have a gas input below 70kW (net) and are being installed in accordance to BS 5440, the general guidance for flue clearances contained within the boiler installation manual can be followed.

For combinations of boilers that exceed a gas input of 70kW (net), the requirements of IGE/UP/10 should be followed. This standard has special requirements and considerations for low-level flue terminations. To aid the installer, Bosch have produced a quick reference flue and ventilation guide, which includes the risk assessment procedure required when dealing with these larger outputs with low-level flue terminations. This guidance document can be downloaded from the Bosch Commercial and Industrial website.

Ventilation

Even though the GW8300iW regular boilers are room sealed appliances, ventilation requirements need to be assessed. For cascades where the gas input exceeds 70kW (net) the ventilation requirements of BS 6644 should be followed. For room-sealed boilers this will generally need free area ventilation of $2cm^2$ /kW high level and $2cm^2$ /kW at low level. The temperature within the boiler room must not exceed 25°C at floor level, 32°C at mid-level and 40°C at ceiling level.

Safety (Pressure relief) valves

The GW8300iW require a safety valve to be installed for each individual boiler. A 3 bar safety valve (PRV) should be installed in the flow connection as close as possible to the boiler and before any isolating valves. Safety valves should be terminated as indicated in the boiler installation manual.

Design examples

To aid simple application of two joined GW8300iW Regular boilers to existing or new heating systems, different design examples have been produced, covering the full range of outputs for both low loss header and plate heat exchanger use. Each design is accompanied by a typical component list, which can be used to estimate what will be needed.

Pipe work sizes, pump sizing and expansion vessel sizing suggestions have been made, for use with typical heating system capacity. The installer must assess if these are suitable for the actual installation being undertaken.

Controls, wiring and set up

Installing the MC400 cascade controller is made easier through the accompanied wiring diagrams and set up instructions. This allows connection to typical third party heating and hot water control systems, making integration a simple step. All wiring installation should be completed by a competent electrician.

Refer to the MC400 instruction manual to aid simple set up.

For standard systems using 230VAC third party controls (S Plan and S Plan + systems), setting 8 on the MC400 should be used. The flow temperature set point should be set identical for both boilers i.e. 80°C.

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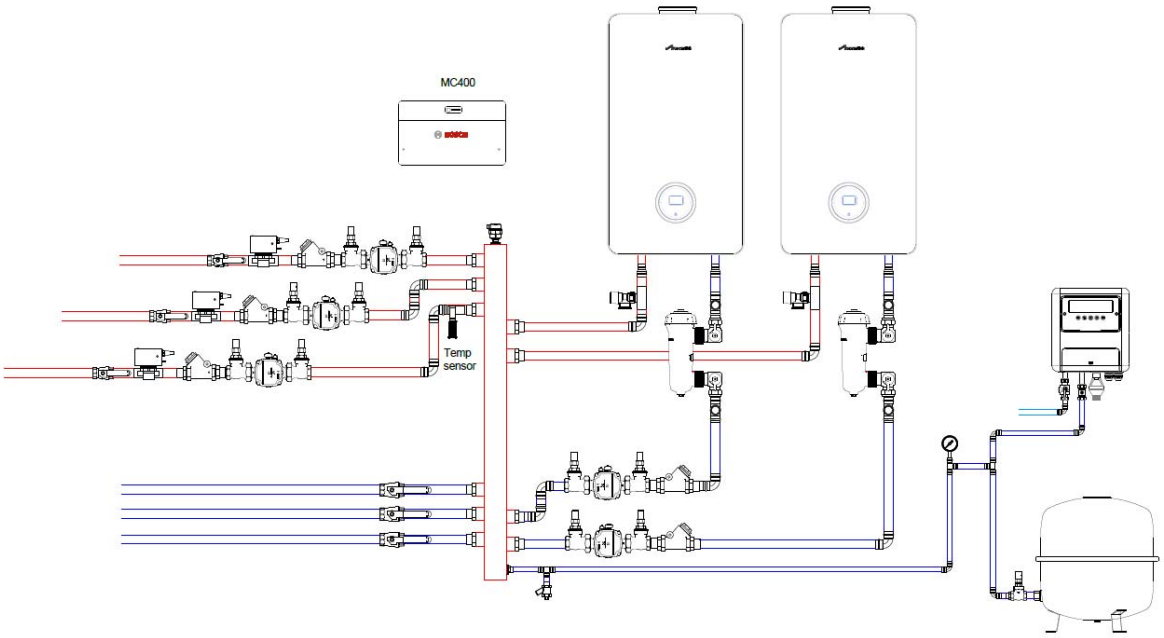
60kW Cascade (using 2 x 30kW GW8300iW 30R with LLH)
70kW Cascade (using 2 x 35kW GW8300iW 35R with LLH)



Quantity	Part number	Description
2	7-738-100-809	GR8300iW 30R NG (for 60kW output)
2	7-738-100-810	GR8300iW 35R NG (for 70kW output)
1	7-716-192-614	Greenstar Low Loss Header
2	7-733-600-237	Greenstar System filter 28mm
1	7-738-111-001	MC400 Cascade Sequencer
1	7-719-001-833	Temperature Sensor
2	7-716-191-082	Standard telescopic flue and terminal

Pipe work and fittings (Boiler primary side only, based on copper tube and fittings)

Quantity	Description
2	Grundfos UPS3 15-50 pumps (or equivalent)
4	28mm pump valves G1½”
2	28mm non-return valves
2	½” 3 bar pressure relief valves (male x female)
4	28mm x 22mm reducers
4	28mm couplings
2	28mm x 28mm x ½” tees
4	28mm elbows
4	15mm x ½” copper to male iron
2	15mm equal tees
1	15mm drain cock
4	15mm elbows
1	15mm lock shield isolation valve
1	¼” pressure gauge (4 Bar)

Quantity	Description
1	¼” x ½” brass bush
1	15mm x ½” x 15mm tee
1	½” Automatic air vent
2	3m of 28mm copper tube
1	3m of 15mm copper tube
1	35 litre expansion vessel (sized for standard 60kW system water content)
1	50 litre expansion vessel (sized for standard 70kW system water content)
1	Pressurisation unit (WRAS approved and suitable for fluid category 4)

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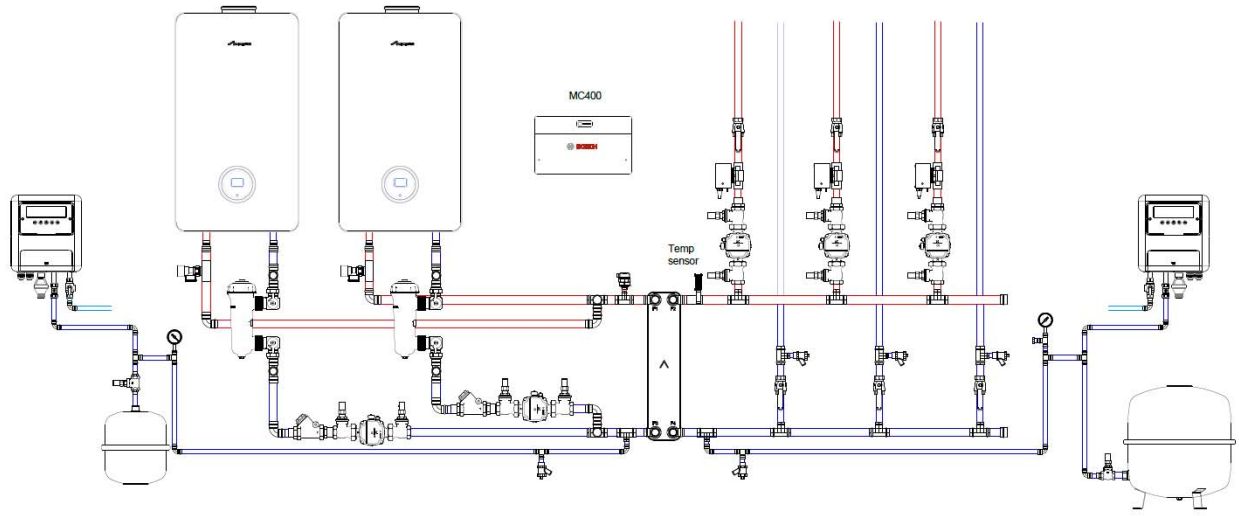
60kW Cascade (using 2 x 30kW GW8300iW 30R with PHE)
70kW Cascade (using 2 x 35kW GW8300iW 35R with PHE)



Quantity	Part number	Description
2	7-738-100-809	GR8300iW 30R NG (for 60kW output)
2	7-738-100-810	GR8300iW 35R NG (for 70kW output)
1	7-733-600-014	65kW plate heat exchanger (for 60kW output)
1	7-733-600-016	80kW -100kW plate heat exchanger (for 70kW output)
2	7-733-600-237	Greenstar System filter 28mm
1	7-738-111-001	MC400 Cascade Sequencer
1	7-719-001-833	Temperature Sensor
2	7-716-191-082	Standard telescopic flue and terminal

Pipe work and fittings (Boiler primary side only, based on copper tube and fittings)

Quantity	Description
2	Grundfos UPS3 15-50 pumps (or equivalent)
4	28mm pump valves G1½”
2	28mm non-return valves
2	½” 3 bar pressure relief valves (male x female)
4	28mm x 22mm reducers
4	28mm couplings
3	28mm x 28mm x ½” tees
14	28mm elbows
1	15mm x ½” copper to male iron
2	15mm equal tees
1	15mm drain cock
4	15mm elbows
1	15mm lock shield isolation valve
1	¼” pressure gauge (4 Bar)

Quantity	Description
1	¼” x ½” brass bush
1	15mm x ½” x 15mm tee
1	½” Automatic air vent
2	3m of 28mm copper tube
1	3m of 15mm copper tube
1	8 litre expansion vessel (sized for primary system water content only)
1	Pressurisation unit (WRAS approved and suitable for fluid category 4)
2	28mm equal tees
1	28mm x 28mm x 15mm tee
4	35mm x 1¼” compression copper to female iron
4	28mm x 35mm reducers

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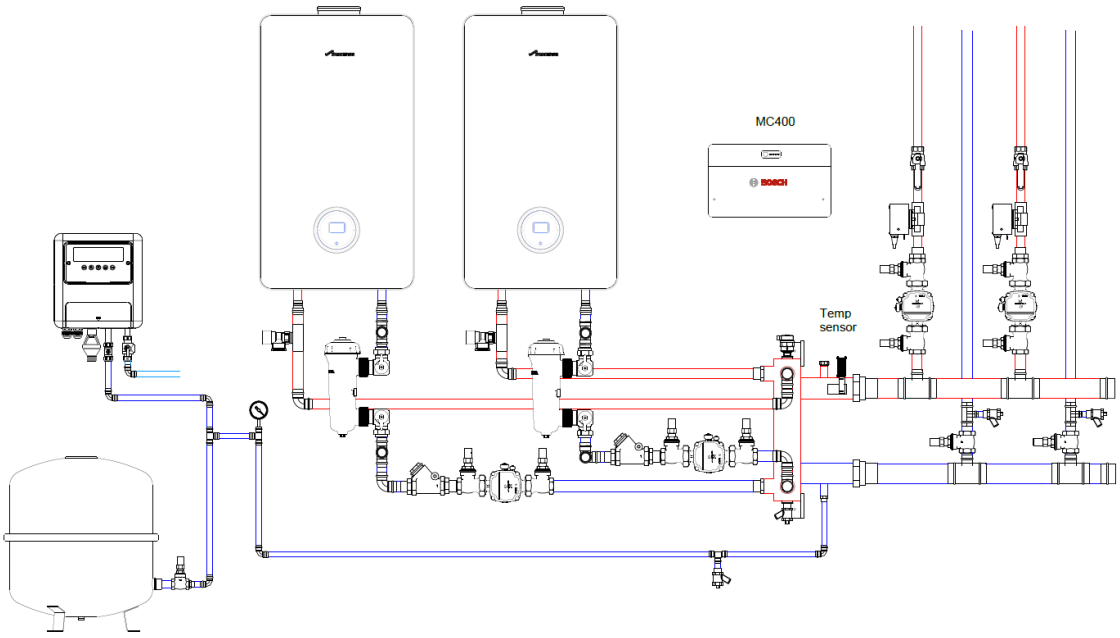
80kW Cascade (using 2 x 40kW GW8300iW 40R with LLH)



Quantity	Part number	Description
2	7-738-100-811	GR8300iW 40R NG
1	8-718-600-545	Twinfit Low Loss Header
2	7-733-600-237	Greenstar System filter 28mm
1	7-738-111-001	MC400 Cascade Sequencer
1	7-719-001-833	Temperature Sensor
2	7-716-191-082	Standard telescopic flue and terminal

Pipe work and fittings (Boiler primary side only, based on copper tube and fittings)

Quantity	Description
2	Grundfos UPS3 15-50 pumps (or equivalent)
4	28mm pump valves G1½”
2	28mm non-return valves
2	½” 3 bar pressure relief valves (male x female)
4	28mm x 22mm reducers
4	28mm couplings
2	28mm x 28mm x ½” tees
18	28mm elbows
2	15mm x ½” copper to male iron
2	15mm equal tees
1	15mm drain cock
4	15mm elbows
1	15mm lock shield isolation valve
1	¼” pressure gauge (4 Bar)

Quantity	Description
1	¼” x ½” brass bush
1	15mm x ½” x 15mm tee
1	½” Automatic air vent
2	3m of 28mm copper tube
1	3m of 15mm copper tube
1	50 litre expansion vessel (sized for standard 80kW system water content)
1	Pressurisation unit (WRAS approved and suitable for fluid category 4)
4	28mm x 1” compression copper to male iron
1	½” drain cock
1	½” plug

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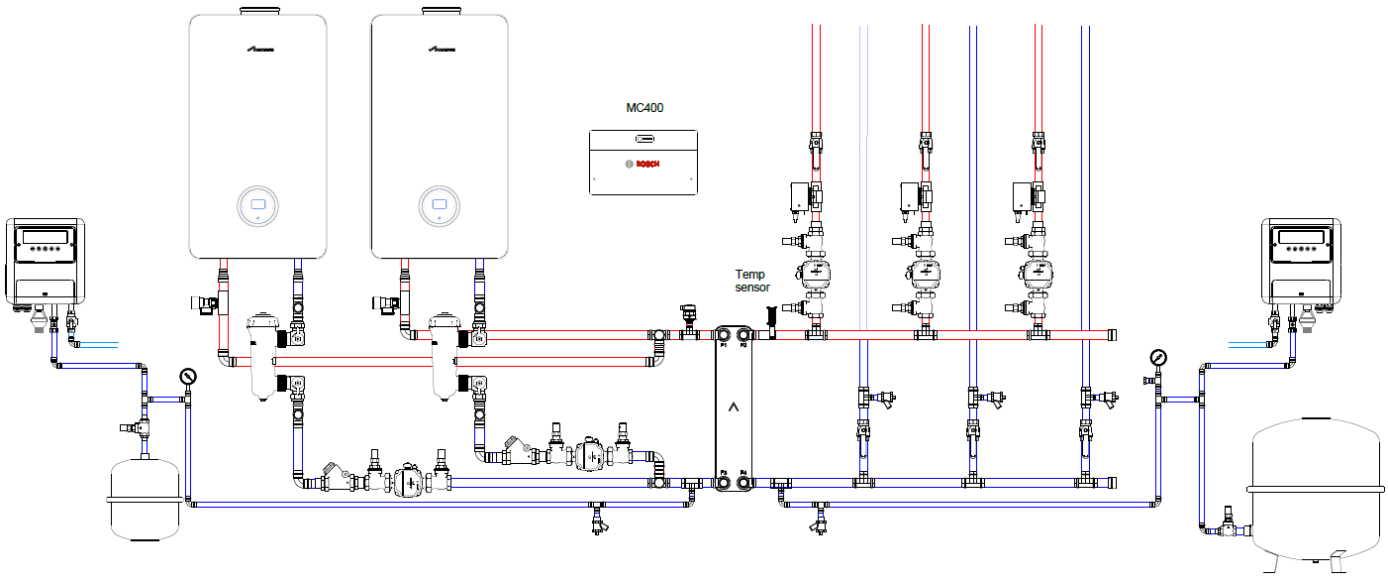
80kW Cascade (using 2 x 40kW GW8300iW 40R with PHE)



Quantity	Part number	Description
2	7-738-100-811	GR8300iW 40R NG
1	7-733-600-016	80kW to 100kW plate heat exchanger
1	7-738-111-001	MC400 Cascade Sequencer
2	7-733-600-237	Greenstar System filter 28mm
1	7-719-001-833	Temperature Sensor
2	7-716-191-082	Standard telescopic flue and terminal

Pipe work and fittings (Boiler primary side only, based on copper tube and fittings)

Quantity	Description
2	Grundfos UPS3 15-50 pumps (or equivalent)
4	28mm pump valves G1½”
2	28mm non-return valves
2	½” 3 bar pressure relief valves (male x female)
4	28mm x 22mm reducers
4	28mm couplings
3	28mm x 28mm x ½” tees
14	28mm elbows
1	15mm x ½” copper to male iron
2	15mm equal tees
1	15mm drain cock
4	15mm elbows
1	15mm lock shield isolation valve
1	¼” pressure gauge (4 Bar)

Quantity	Description
1	¼” x ½” brass bush
1	15mm x ½” x 15mm tee
1	½” Automatic air vent
2	3m of 28mm copper tube
1	3m of 15mm copper tube
1	8 litre expansion vessel (sized for primary system water content only)
1	Pressurisation unit (WRAS approved and suitable for fluid category 4)
2	28mm equal tees
4	35mm x 1¼” compression copper to female iron
4	28mm x 35mm reducers

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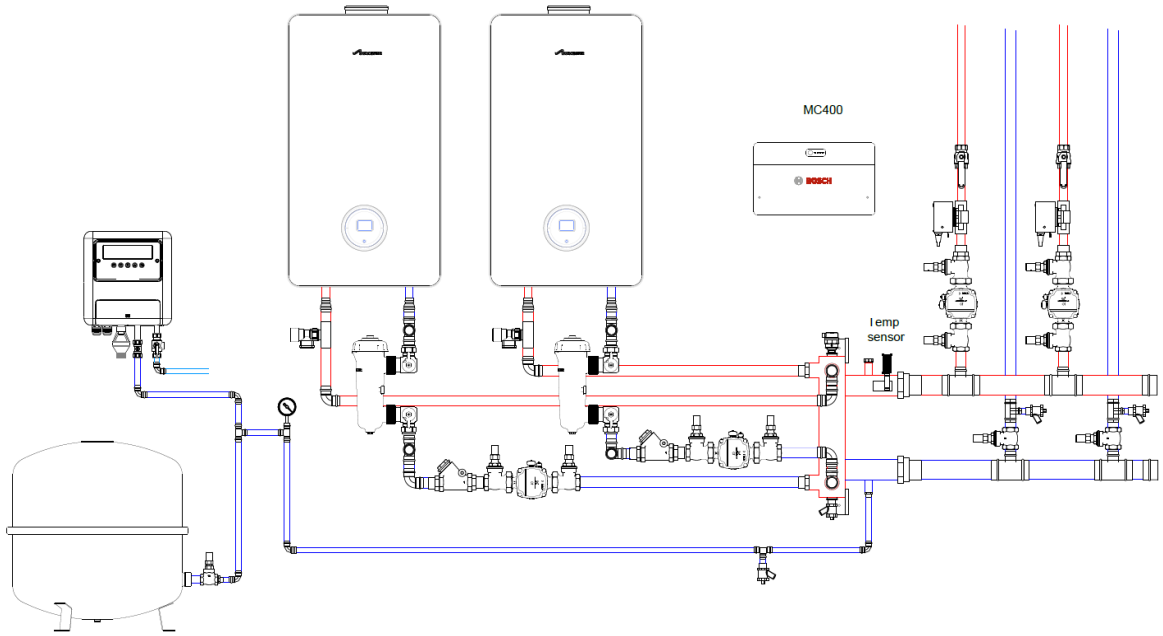
90kW Cascade (using 2 x 45kW GW8300iW 45R with LLH)
100kW Cascade (using 2 x 50kW GW8300iW 50R with LLH)



Quantity	Part number	Description
2	7-738-100-812	GR8300iW 45R NG (for 90kW output)
2	7-738-100-813	GR8300iW 50R NG (for 100kW output)
1	8-718-600-545	Twinfit Low Loss Header
1	7-738-111-001	MC400 Cascade Sequencer
2	7-733-600-237	Greenstar System filter 28mm
1	7-719-001-833	Temperature Sensor
2	7-716-191-082	Standard telescopic flue and terminal

Pipe work and fittings (Boiler primary side only, based on copper tube and fittings)

Quantity	Description
2	Grundfos UPS3 15-50/65 pumps (or equivalent)
4	28mm pump valves G1½"
2	28mm non-return valves
2	½" 3 bar pressure relief valves (male x female)
4	28mm x 22mm reducers
4	28mm couplings
2	28mm x 28mm x ½" tees
18	28mm elbows
2	15mm x ½" copper to male iron
2	15mm equal tees
1	15mm drain cock
4	15mm elbows
1	15mm lock shield isolation valve
1	¼" pressure gauge (4 Bar)

Quantity	Description
1	¼" x ½" brass bush
1	15mm x ½" x 15mm tee
1	½" Automatic air vent
2	3m of 28mm copper tube
1	3m of 15mm copper tube
1	50 litre expansion vessel (sized for standard 90kW system water content)
1	80 litre expansion vessel (sized for standard 100kW system water content)
1	Pressurisation unit (WRAS approved and suitable for fluid category 4)
4	28mm x 1" compression copper to male iron
1	½" drain cock
1	½" plug

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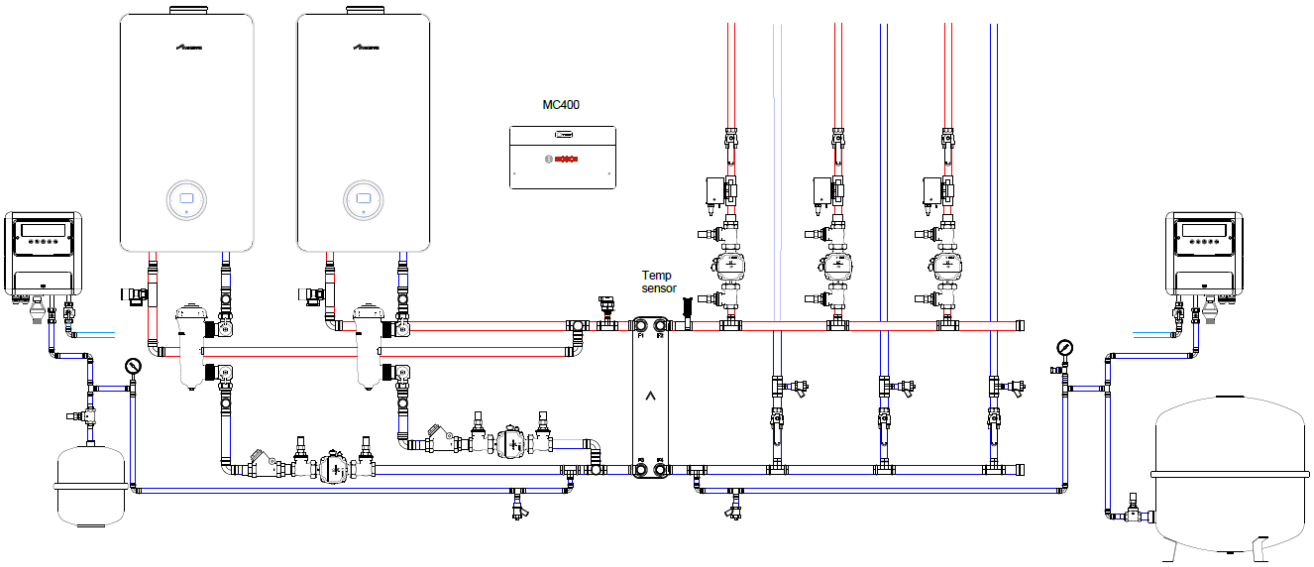
90kW Cascade (using 2 x 45kW GW8300iW 45R with PHE)
100kW Cascade (using 2 x 50kW GW8300iW 50R with PHE)



Quantity	Part number	Description
2	7-738-100-812	GR8300iW 45R NG (for 90kW output)
2	7-738-100-813	GR8300iW 50R NG (for 100kW output)
1	7-733-600-016	80kW to 100kW plate heat exchanger
1	7-738-111-001	MC400 Cascade Sequencer
2	7-733-600-237	Greenstar System filter 28mm
1	7-719-001-833	Temperature Sensor
2	7-716-191-082	Standard telescopic flue and terminal

Pipe work and fittings (Boiler primary side only, based on copper tube and fittings)

Quantity	Description
2	Grundfos UPS3 15-50/65 pumps (or equivalent)
4	28mm pump valves G1½"
2	28mm non-return valves
2	½" 3 bar pressure relief valves (male x female)
4	28mm x 22mm reducers
4	28mm couplings
3	28mm x 28mm x ½" tees
14	28mm elbows
1	15mm x ½" copper to male iron
2	15mm equal tees
1	15mm drain cock
4	15mm elbows
1	15mm lock shield isolation valve
1	¼" pressure gauge (4 Bar)

Quantity	Description
1	¼" x ½" brass bush
1	15mm x ½" x 15mm tee
1	½" Automatic air vent
2	3m of 28mm copper tube
1	3m of 15mm copper tube
1	8 litre expansion vessel (sized for primary system water content only)
1	Pressurisation unit (WRAS approved and suitable for fluid category 4)
2	28mm equal tees
4	35mm x 1¼" compression copper to female iron
4	28mm x 35mm reducers

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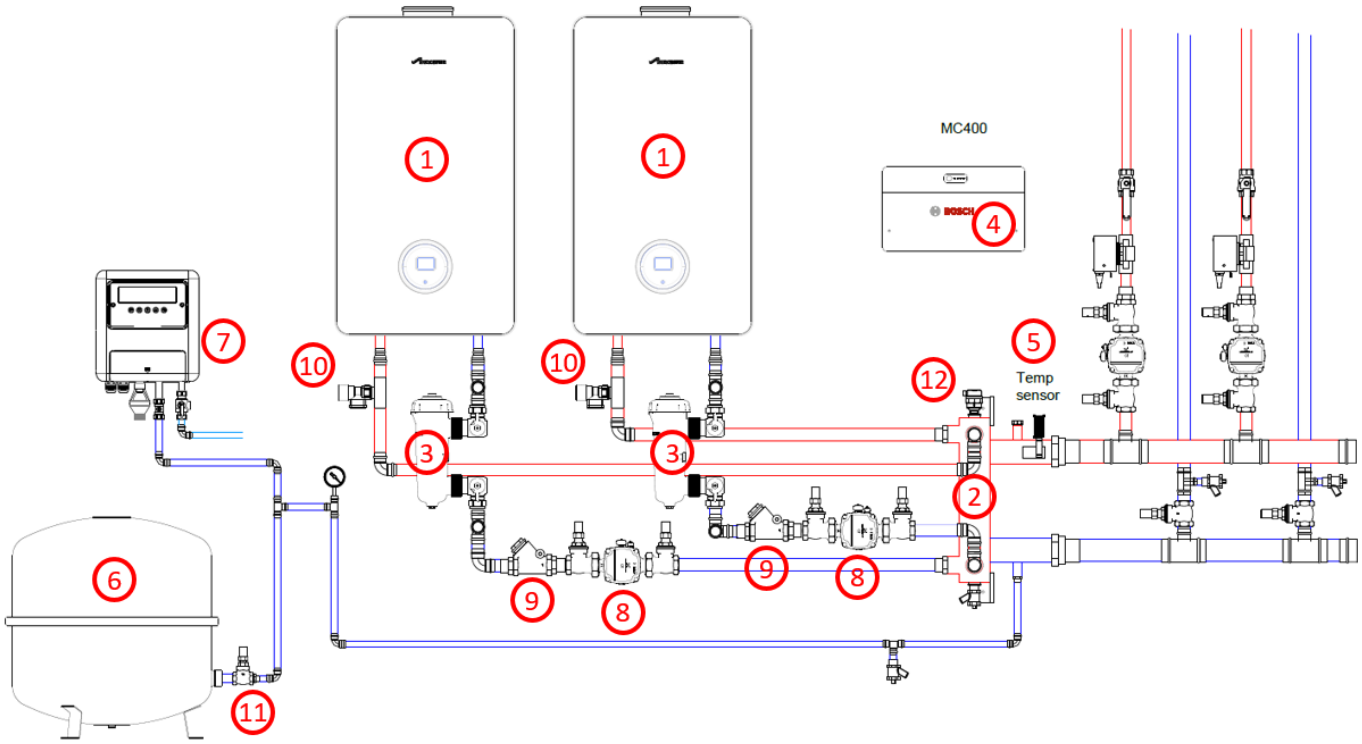
Key component identification



Number	Description
1	GR8300iW Boiler
2	Low loss header (or plate heat exchanger)
3	Greenstar System filter 28mm
4	MC400 Cascade Sequencer
5	Temperature Sensor
6	Expansion vessel
7	Pressurisation unit (WRAS approved and suitable for fluid category 4)
8	Pump
9	Non return valve
10	Safety valve (PRV) 3 bar
11	Lock shield valve
12	Automatic air vent

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