



BOSCH

Invented for life

Generate higher output.

Commercial boilers

Set up a multi-boiler system.
Cascade wall hanging boilers.



Heating and domestic hot water – in commercial buildings

Building complexes usually need heating and domestic hot water (DHW) to cover for the users' requirements. Depending on the time of the year the requirements differ. The different output ranges can be achieved by cascading the Condens 5000 W heating boilers by Bosch. In total 16 single units with 4 individual output sizes can be combined to generate 1 600 kW.

Application of the Condens 5000 W

Typically, the Condens 5000W is used in the light to medium commercial sector which supplies buildings the size of common care homes. In an application of this size an output of around 300–400 kW is provided

by 3 to 4 cascaded boilers. Especially in the social field the redundancy is essential as the heat supply has to be ensured even if one of the boilers is not running properly.



Case study: The Royal Hospital Chelsea, UK

Owners of listed buildings across the UK are often faced with a number of challenges associated with maintenance. The Grade I listed Royal Hospital needed to replace a series of old, inefficient, boilers with a new highly-efficient heating system. Bosch appointed FIN Engineering to install a new heating system for the East and West Long Wards of the Hospital, which was founded by Charles II in 1682 and provides residency for some 300 eligible retired Army veterans.

The Hospital's wards were previously heated by six dual fuel boilers housed within a basement plant room, several of which were out of service. As a result, the entire heating system was at risk of imminent failure, which was something Lieutenant Colonel

Andy Hickling, Quartermaster and Director of Facilities at the Hospital was keen to avoid. Lieutenant Colonel Hickling commented: "Whilst the Hospital has been developed incrementally over the years, it was clear to see that the heating systems in each ward had been somewhat left behind. As well as operating at low efficiency, the unreliability of the systems risked putting the comfort of our residents at risk, which was simply not an option."

Multi-boiler cascade system

Having been initially contacted to survey the Hospital's heating service, Bosch and FIN Engineering, in conjunction with engineering consultants Halcrow Yolles, designed a system which would not only maximise

heating efficiency, but would also safeguard the heating for the residents of the Hospital's East and West wards. This design was subsequently finalised by Lieutenant Colonel Hickling and thanks to a sophisticated bi-directional interconnector between the two cascades of 10 x 100 kW Condens 5000W gas-fired condensing boilers, any future interruption, or failure to, one cascade will automatically result in heat being diverted from the opposite boiler system.

The advantage of using a cascaded boiler system to generate heat and hot water is the reliance upon multiple boilers essentially sharing the workload across each boiler within the system. Each 1 MW Condens 5000W cascade is capable of modulating to as little as 20 kW in line with demand and allows each individual boiler within the cascade to contribute equally to the overall base load. By sharing the load across the cascade, the lifespan of each boiler is maximised to its full potential.

As the combined total output of the two new boiler cascades stands at 2 MW, the new installation has successfully reduced the overall installed capacity of the heating system by a third, which is due to the 95% efficiency levels of the Condens 5000W, coupled with the high degree of flexibility and system resilience afforded by the plant room's interconnector.

Ease of installation

With compact dimensions and a lift weight of just 70 kg, the Condens 5000W boilers proved to be ideal



for the limited access plant rooms, where the potential for disruption to the nearby residents was a concern from the outset. Whilst the collaborative arrangement between the two boiler cascade systems provides a versatile solution to the building's heating requirements, the Hospital's Grade I listed status prohibited adjustments to the existing building fabric. As a result, the stainless steel flue arrangements had to be carefully channelled through the building's existing structure. Phased completion of the installation work over the summer months also meant that the heating was not interrupted.

Versatile solution

Stephen Moore, managing director of FIN Engineering, which carried out the installation said: "Despite its challenges, the installation at The Royal Hospital gave us the opportunity to improve the heating system to benefit the 300 In Pensioners living within the 2 residential wings on site.

"As The Royal Hospital's purpose is to provide a fitting home for retired soldiers, it was essential that the boiler replacement works did not impact on their quality of life. We achieved this by utilising our 3D modelling capabilities to design the heating system to suit modularisation and offsite fabrication which ensured that we accessed the plant rooms directly from outside, avoiding the main circulation areas, and had a minimal on-site presence.

"The versatility of the Condens 5000W proved a perfect solution for the replacement of the Hospital's existing heating system. The clever interconnector between both plant rooms allows heat to flow either direction ensuring that in the unlikely event that one plant room is unavailable; the other can carry the heating load for both the East and West wings. Further to this, we know that the support offered by Bosch postinstallation is something the Hospital can rely on."

"...the installation at The Royal Hospital gave us the opportunity to improve the heating system to benefit the 300 In Pensioners living within the 2 residential wings on the site"

Stephen Moore, Managing Director
at FIN Engineering

Project: Royal Hospital Chelsea, London
Product: 10 x Condens 5000W 100 kW
Contributors: FIN Engineering

Condens 5000 W ZBR-3 – compact power

The Condens 5000 W is an extremely versatile and compact wall hung condensing boiler that can be installed on its own or as part of a multi-boiler ‘cascade’ system. The boiler is available with up to 4 individual outputs of 50, 70, 85 and 100 kW; outputs of up to 1600 kW can be achieved when multiple units are connected as part of a cascade installation.



Available in 4 outputs the Condens 5000W is a condensing commercial boiler. Its compact dimensions make it especially suitable for installations where space is restricted. For larger heat demands, the Condens 5000W can be combined to cascade systems. Our Condens 5000W boiler is perfect for both large domestic and commercial applications.

Multi-boiler cascade systems

For larger heat demands, the Condens 5000W 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 or back-to-back, using the Bosch cascade kits. These consist of all parts required to build up the boiler circuit. This provides an overall condensing output of up to 800 kW 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, evenly spreading out wear and tear.

Benefits

- ▶ Condensing technology with up to 110% net efficiency
- ▶ High turn down with modulation down to 15.6 kW
- ▶ Extremely compact space-saving cascades (400 kW in just 1 m²)
- ▶ Any combination of 1 to 8 boilers can be connected either in-line or back-to-back
- ▶ Modular package providing energy saving flexibility and maintenance backup
- ▶ Cascaded boilers can be sequenced to come into and out of operation when required, ensuring even load matching
- ▶ Compatible with intelligent, modular Energy Management System (EMS) controls and Building Management System (BMS) interfaces
- ▶ Can only be installed in sealed systems – plate heat exchanger for heat extraction available
- ▶ Quick and easy installation
- ▶ Integrates with solar thermal installations and maximises savings from solar hot water
- ▶ Intuitive user controls
- ▶ LPG conversion available



Typical applications

- ▶ Apartment houses
- ▶ Hospitals
- ▶ City halls
- ▶ Schools
- ▶ Swimming pools
- ▶ Sports facilities

Precise energy management

Each boiler in the Condens 5000W series can automatically modulate its output down to 19 kW or even 15.6 kW (depending on version) in order to precisely match the heat demand. This considerably reduces fuel consumption and improves overall system efficiency. The Condens 5000W is fully compatible with the modular controls platforms of Energy Management Systems (EMS). This optimises performance by keeping the boiler in condensing mode for as long as possible. EMS also provides comprehensive heating system functionality and ensures minimal energy usage at all times.

High efficiency, low emissions

The Condens 5000W provides net efficiencies of up to 110% (NCV). Its compact dimensions make it especially suitable for installations where space is restricted, but demand for a modern high output heating solution is high.

Commercial domestic hot water – on demand

Almost all public and commercial private buildings, such as hotels, leisure centres or office buildings, have a high demand of domestic hot water (DHW). This demand often appears in a cyclic sequence and is then required immediately. With our Therm 8000 as a cascading system we provide DHW quickly and reliably – exactly at the time needed.

A high cyclic demand of DHW is the usual case for most applications. For conventional supply a large hot water tank would be needed which often is problematic due to space limitations. The Bosch Therm 8000 provides hot water in an instant. As cascading system of up to 12 units it provides up to 324 ltrs/min. Differences in gas and electricity prices often support the cost-efficiency of the gas-fired condensing instantaneous water heater Therm 8000. The costs decrease significantly in comparison to conventional systems and also reduce your carbon

footprint. Also at already existing electrical systems an exchange with an gas-fired condensing instantaneous water heater Therm 8000 is recommended due to these lower costs and short amortisation times.

Rinsing, washing, showering or bathing – no matter what for the water is used, a quick turn on the tap and you have perfect domestic hot water in an instant. The Therm 8000 provides highest hot water comfort that is a prerequisite for nearly all households or commercial applications of any size.



Higher output with a **cascading assembly**

The Bosch Therm 8000 can fulfil the demand for large and continuous volume output according to the projects' requirements.

The concept of a cascading system is to define the master and slave units:

- ▶ The master unit is the first appliance in the sequence and always activates when hot water is demanded
- ▶ If hot water needs increase, the first slave starts operating: this process is repeated until the last unit is running
- ▶ The inverse sequence is similar – when hot water needs decrease, slave units are disconnected in sequence
- ▶ The master unit shuts off when hot water demand ceases

The cascading system is set with a simple wire connection between the units.

Bosch cascading systems for the Therm 8000 can be set with a maximum of 12 units.

- ▶ A cascading system is able to supply up to 324 l/min of endless hot water at a temperature rise of 25 °C – satisfying the most demanding needs
- ▶ Installation in the smallest spaces and easy logistics, without external accessories or special construction installation sites – optimising installation costs and complexity
- ▶ With a reduction of operational costs by up to 30%, a cascading system is the most efficient solution, presenting no standby energy losses since hot water is heated only as needed
- ▶ A cascading system supplies hot water precisely at the temperature requested by the user, with no fluctuations – ensuring top comfort satisfaction levels



Cascading

Linking up to 12 continuous flow water heaters together in parallel allows a maximum water flow of up to 324 litres per minute with a 25 °C rise. The intelligent cascading software will automatically rotate the lead unit after each 100 hours of functioning, distributing the workload equally across the water heaters in the cascade, increasing the longevity of the appliances.

Therm 8000 instantaneous water heater – hot water in an instant

The Therm 8000 is a high efficiency, high output gas-fired condensing instantaneous water heater for use with renewable energy sources or traditional fuels. It can be cascaded up to 12 appliances to provide a combined flow rate of up to 324 ltrs/min and up to 600 kW.



Modulation range of up to 1:100 in a cascading system of 12 units

Benefits

- ▶ On demand and sustained delivery of instantaneous and continuous hot water
- ▶ Condensing technology for greater energy efficiency of up to 105% (NCV)
- ▶ Direct integration with a solar thermal system and heat pumps possible
- ▶ Accessory to control a cascade of up to 12 units
- ▶ Maximises output up to 324 ltrs/min at a 25 °C rise
- ▶ Redundancy of modules ensures permanent hot water operation even in case of unexpected or planned downtimes of a boiler
- ▶ Creates high volumes of hot water for multiple showers, sinks and baths requiring hot water at the same time
- ▶ Can work on systems with or without a storage tank
- ▶ Compatible with hot water secondary circulation for increased comfort and to reduce water wastage
- ▶ Compact, low-space design with flexible design options
- ▶ Simple to service and maintain
- ▶ Natural gas and LPG versions

Cascading assembly is the best solution for supplying large continuous hot water demands with total comfort and safety in the smallest possible space.

Performance and Design

The water heater achieves condensing efficiency by incorporating a secondary heat exchanger. Heat within the flue gases is used to preheat the inlet water, and so recaptures energy that would otherwise be lost. The Therm 8000's ability to use inlet water pre-heated by renewable heat sources, such as solar thermal plants, supports planning and investment requirements. The Bosch cascade controls provide the ability to deliver up to 324 litres of hot water a minute, on demand, with no need for hot water storage accessories.

Suitable for a wide range of applications

The Therm 8000 water heater has been optimised for use in commercial applications where there are high demands for domestic hot water (DHW). At 50 kW heating output, a single instantaneous water heater provides the following outputs:

- ▶ Up to 20.6 litres of DHW per minute at a 35 °C rise
- ▶ Up to 28.8 litres of DHW per minute at a 25 °C rise
- ▶ Up to 14.4 litres of DHW per minute at a 50 °C rise

Ideal for light commercial applications with:

- ▶ High demands for DHW – e.g. multiple sinks, showers, etc.
- ▶ No or little requirement for space heating – e.g. due to air conditioning, or space heating provided by renewables etc.
- ▶ Availability for pre-heating of DHW, e.g. solar thermal systems, restaurant kitchens, gyms, nurseries, hairdressers, hotels, nursing homes and smaller schools

Suitable for commercial applications with:

- ▶ Consistent high demands for DHW – e.g. laundries, hospitals, etc.
- ▶ Very high cyclic demands for DHW – e.g. hotels, schools, etc.
- ▶ A high temperature requirement for processes demanding up to 84 °C



Case study: Oporto International Airport, Portugal

The catering company that supports the international Oporto Airport recently exchanged the old hot water production system at their facilities for the most recent commercial solutions provided by Bosch.

The previous equipment has been deactivated but remains in its original location. It is impressive to see the space saving that is possible with the new Bosch commercial hot water solutions – four appliances installed in 2.5 m of wall space do the same job as more than 10 m of floor-standing boilers, storage tanks, pumps, regulators and plate heat exchangers.

15,000 litres of hot water per day produced with 4 continuous flow water heaters.

The total daily hot water needs of the company are split across 4 main areas:

- ▶ Industrial kitchen, where food is prepared for flights
- ▶ Washing machinery, where trolleys, dishes and other related equipment are sterilised
- ▶ Production area, where the food is prepared before being delivered to the airplanes
- ▶ Internal use for cleaning facilities and personal sanitary installations

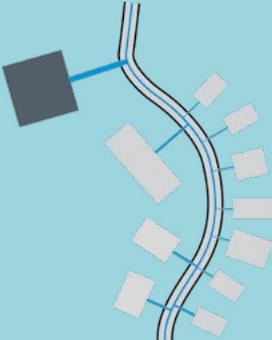
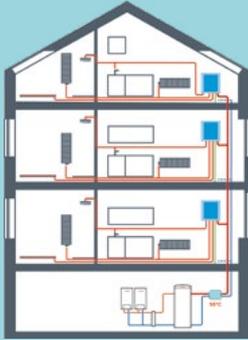


District heating – fit for the future

District heating is fit for the future and commonly used in most newly planned and built neighbourhoods and commercial areas. But also local or in-house central heating systems are often applied nowadays. This is due to more efficient heating and reliable supply as well as the easy handling for the user.



District heating provides higher safety for the user for two main reasons. First, there is no gas-connection needed in-house. The other aspect is in terms of reliability. A centralised heating supply is usually provided with a 24/7 maintenance and service contract. This maximises heat availability and reliability for the user. In addition, it is a more ecological and sustainable solution. Legal requirements are applied and the carbon footprint and CO₂ emissions are reduced.

District heating	Local heating	Central heating system
<ul style="list-style-type: none"> ▶ Heat supply for municipal areas or districts ▶ Apartment buildings, commercial properties ▶ Large district heating boilers with up to 38 MW per unit or CHP systems ▶ Lowest emissions and high efficiency, tailored for residential areas 	<ul style="list-style-type: none"> ▶ Heat supply for municipal areas or districts, e.g. with CHP systems ▶ Apartment buildings, commercial properties 	<ul style="list-style-type: none"> ▶ In-house centralised heat supply with gas or oil condensing boiler with optional use of regenerative energies ▶ Apartment buildings (rental flats)
		

District heating solution for D'Oliveira Court, Great Britain

As a number of social landlords face up to the challenge of maximising their green credentials whilst giving residents the opportunity to control their own levels of heating and hot water comfort, bespoke district heating systems are growing in popularity. One such social housing provider in the North West of Great Britain has embraced this concept with the delivery of a wealth of sustainable benefits.

With over 39,000 properties across the region, Symphony Housing Group is the largest registered social landlord in the North West of Great Britain and is committed to supporting the regeneration and sustainability of the region.

Having been awarded a contract to deliver gas installation upgrades for Contour Homes, British Gas undertook the service and recovery, and central heating installation work for the group's D'Oliveira Court scheme. The heating for the 20 year old building had previously been running via electric heaters, which in some cases had been running 24 hours a day, 7 days a week, due to no control system being put in place.

The project consisted of the specification and construction of a centralised plant room, based around 4 x 100 kW Condens 5000W gas-fired boilers. The Condens 5000W can automatically modulate its output down to less than 20% in order to precisely match the demand for heat, which ultimately reduces fuel consumption and improves overall seasonal efficiency considerably. The newly installed plant room was designed to feed a network of 27 Worcester Greenstar/Flow 8000, which ultimately allow each tenant to control their heating and hot water demand independently.



Project: D'Oliveira Court, Manchester
 Product: 4 x 100 kW Condens 5000W
 27 x Worcester Greenstar/Flow 8000
 Contributors: Symphony Housing Group
 British Gas Business (BGB)

“Working closely with Bosch Commercial and Industrial Heating, we have delivered a high quality solution which provides the tenant with a highly efficient, user friendly system.”

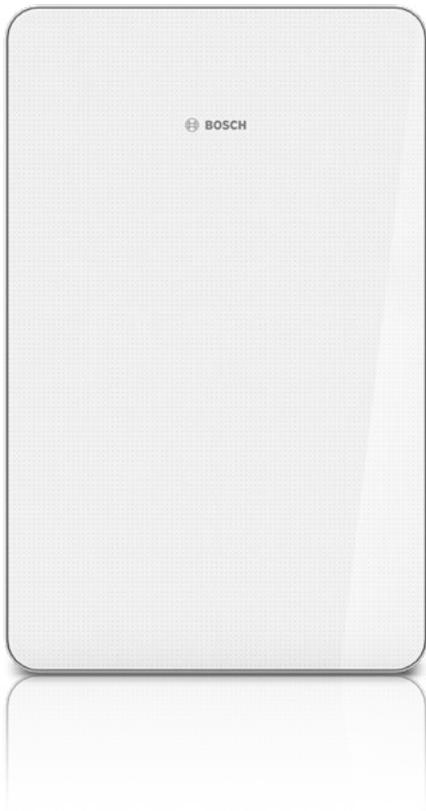
Gary Smallwood
 Sales Installation Manager
 British Gas Services (Commercial) Ltd

Advantages of the Flow 8000

- ▶ The Worcester Greenstar/Flow 8000 is completely insulated. This way, heat losses are reduced to a minimum
- ▶ Steady DHW temperatures due to electronic control
- ▶ Demanding thermal comfort and modern design
- ▶ Perfectly hygienic drinking water with continuous flow principle
- ▶ The prepared installation accessories allow for a quick and simple installation in every assembly situation
- ▶ Bosch offers a complete range of heating and system technology along with the appropriate consulting and planning services

Heat distributor Worcester Greenstar/Flow 8000 – district heating made easy

The Worcester Greenstar/Flow 8000 is the perfect solution for providing district hot water and space heating to properties which are serviced from district heating and applications with a centralised plant room.



This unit is available in two output sizes of 35 kW and 50 kW and comprises of two heat exchangers, one for providing instant domestic hot water (DHW) at a regulated temperature and the second for space heating within the property. The unit is indirect so the primary heating circuit is hydraulically separated from the property space heating by a plate heat exchanger and operates only when DHW or space heating is required.

Flexible installation options

The Worcester Greenstar/Flow 8000 also comes complete with a first fix rail which allows for the system to be pre-plumbed before the actual unit is installed. The unit is available in two versions, with or without a heat meter. The heat meter comes with M-BUS and infrared interface, allowing the connection to a secondary monitoring system or Building Management System (BMS).

How the Worcester Greenstar/Flow 8000 works

If a hot water tap is opened the pressure temperature control valve senses the difference in pressure and opens, allowing the primary heating water to flow through the heat exchanger. At the same time, a hot water priority valve closes the primary feed to the secondary heat exchanger (space heating), thus ensuring maximum temperature is available at the domestic heat exchanger. The temperature of the domestic hot water is controlled by a thermostat*,

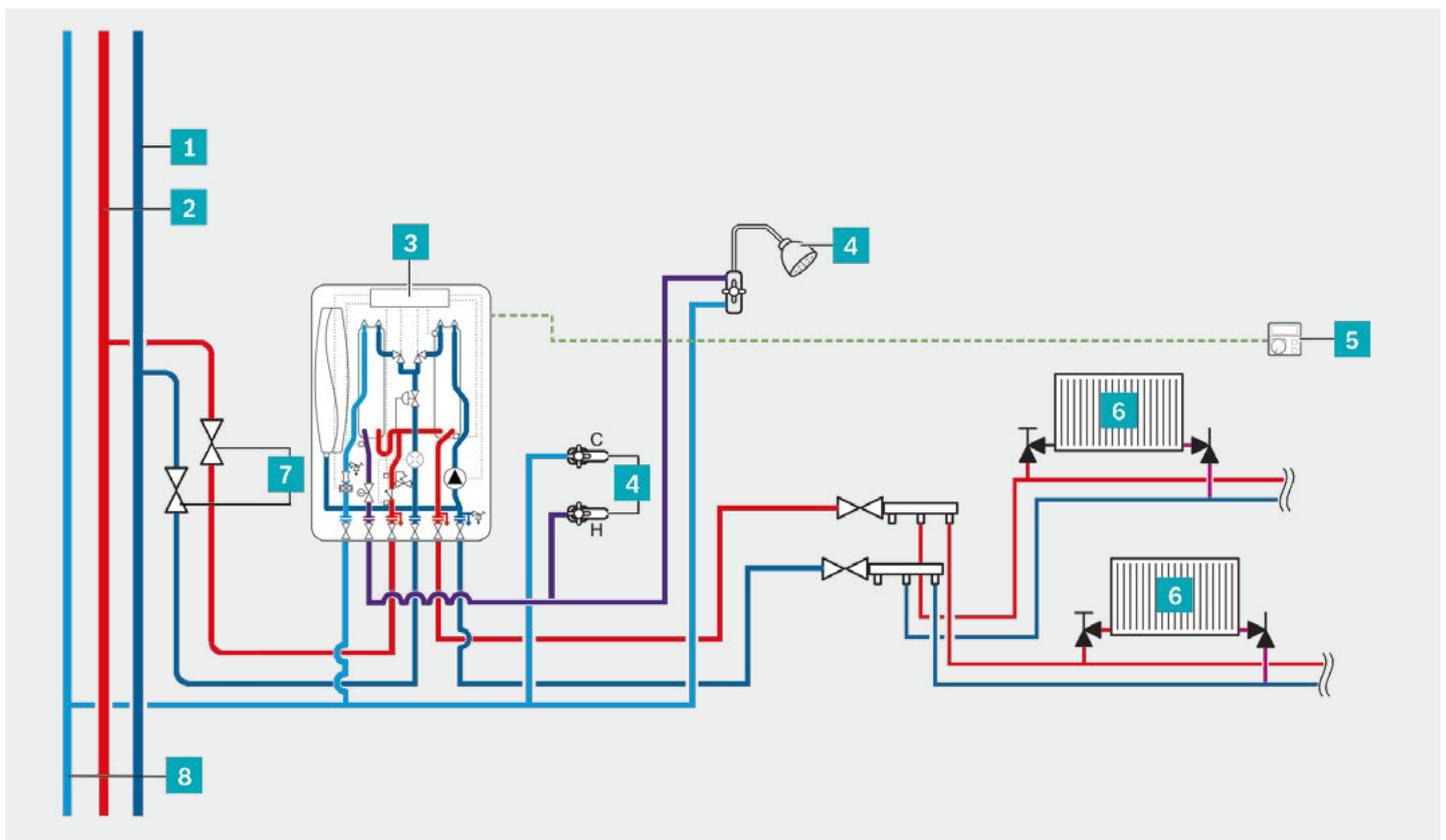
allowing the cold water to flow through the DHW heat exchanger, where it is heated up instantly.

When in stand-by mode with no demand for space heating in the summer, the bypass valve controls the bypass flow in the primary circuit. Thus heating water from the primary circuit is immediately available at the heat exchanger ensuring instant supply of DHW.

*Set to 50°C. Please be aware that the actual outlet temperature on the Worcester Greenstar/Flow 8000 is subject to some fluctuation.

Features and benefits

- ▶ Domestic hot water and heating on demand – hydraulic system separation with two heat exchangers
- ▶ Priority domestic hot water valve – prioritises the temperature at the DHW heat exchanger for maximum DHW comfort
- ▶ Thermostatic DHW temperature control
- ▶ Pressure temperature control valve – allows the DHW heat exchanger to operate on demand only, saving energy
- ▶ Low return temperature in the primary circuit
- ▶ Modulating space heating pump
- ▶ Minimal installation space required
- ▶ First fix rail allowing flexible installation options**
- ▶ One man lift weight
- ▶ Supplied with or without heat meter – suits specific requirement
- ▶ Summer bypass valves ensures instant DHW draw off without wasting thermal energy



NOTE: High differential pressures could affect the performance of some components in the Worcester Greenstar/Flow 8000, if it is likely that primary differential pressures could rise above 55 kPa differential pressure control valves should be installed in the primary circuits to protect the Worcester Greenstar/Flow 8000s.

**The first fix rail can be removed from the end of the carton via a perforated flap so that it can be fitted without having to remove the rest of the appliance from the packaging. This reduces the risk of damage to the rest of the appliance whilst the system is being commissioned. The remainder of the appliance remains in the packaging and can be stored safely until needed.

- 1 District heating return
- 2 District heating flow
- 3 Heat interface unit
- 4 Domestic outlets
- 5 Space heating time/temperature controller
- 6 Space heating (example radiators)
- 7 District heating isolation valves
- 8 Mains cold water supply

District heating solution for new high-rise apartments in South East London, UK

When London and Quadrant Housing Association sought to transform the former car showroom site in South East London into three high-rise apartment blocks, the heating requirement for the residential development was an important consideration. Eager to reap the benefits of the latest district heating schemes, Quadrant had to establish the most suitable Combined Heat and Power (CHP) system design for its Park View development.

Following the appointment of housing construction specialist, Allenbuild Ltd, the proposed CHP system having been both oversized for the development's demand and located inappropriately, it was soon realised that the housing association would struggle to reap its desired efficiency gains. Bosch's insistence that the CHP module should be under rather than oversized ensured that the unit was well-placed to always run to its full potential and avoid being underutilised.

Key to the design was a new plant room equipped with the CE19 NA CHP module, alongside seven 100 kW

“We needed to be able to count on Bosch to be a reliable supplier and help us to implement a bespoke system for the Housing Association.”

Dean Sherrin,
Project Manager at Allenbuild



Condens 5000W gas boilers. The design of the district heating system was such that the central plant room feeds each individual apartment via a heat distributor Flow 8000. Outside the plant room, the installation of more traditional double regulating valves on the pipe work help to balance the systems.

Dean Sherrin, Project Manager at Allenbuild: “As the main contractor for the development, we worked closely with Bosch to ensure the system's performance and efficiency levels were exploited. The outcome suited the new residential development perfectly.”



Project: Park View, South East London
Product: 1 x CE19 NA CHP
7 x 100 kW Condens 5000 W
Contributors: London and Quadrant Housing Association Allenbuild Ltd

“District heating arrangements are becoming invaluable as they not only maximise efficiency gains, but also ensure residents stay in complete control of their heating and hot water.”

Phil Negus, Commercial Technical Manager at Bosch

District heating and instantaneous hot water heaters for 70 flat apartment block in Manchester, UK

Following a detailed assessment of Cundiff Court, a 14 storey apartment block with 70 dwellings and Eastlands Homes' largest single building, it was determined that a more effective and efficient heating and hot water system be sourced as the original was coming to the end of its lifecycle.

After conducting a site review and taking into account the requirements set out by Eastlands, Bosch Commercial and Industrial Heating recommend the use of 6 100 kW Condens 5000W boilers within a small scale district heating scheme to feed the entire apartment block. With net efficiencies of up to 110% and NO_x emissions of less than 40 mg/kWh, the Condens 5000W provides clean, low-carbon heating, making it the perfect solution to meet all of Eastlands requirements. In addition, as the central plant room was located on the roof of Cundiff Court, Bosch advised the use of solar panels to further enhance the energy efficiencies.

Dave Horrocks, Heating and Mechanical Manager for Eastlands Homes, said: "The Decent Homes Standard is a legislation that triggers action. Since its inception, we have been working tirelessly to ensure our building stock meets the minimum requirements and our residents reap the benefits of efficient heating.

"In addition the latest heating and hot water technologies provided by Bosch Commercial and Industrial Heating, the manufacturer was also able to provide us with valuable advice on how we could improve health and safety measures within the property. Each apartment in Cundiff Court utilised a hot water cylinder and Bosch recommended replacing these with instantaneous water heaters."

Richard Rhodes, Commercial Technical Manager for the North of England at Bosch Commercial and Industrial Heating, said: "One of the benefits of a continuous flow water system is that there is no cylinder to cause potential problems because the cold water enters the water heater directly from the mains. A continuous flow hot water system is a process of delivering a flow of hot water at a constant temperature, without the need for storage, minimising the risk of legionella to all Cundiff Court residents.



"But a continuous flow water system offers far more benefits than just no water storage required. From a metering point of view, continuous flow water heaters give the residents of Cundiff Court better control of their energy usage. Previously, many tenants will have been paying a flat rate for their heat, giving them no incentive to start saving energy. Lack of control can lead to overproduction of heat and in this day and age, this is not an option. Through the use of a continuous flow water heater, Cundiff Court residents energy usage can be better monitored and controlled, which in turn can also help alleviate fuel poverty through more accurate charges being made.

"Our continuous flow water heaters also keep installation simple. Each water heater can be connected directly into the district heating network supplied from the central plant room. An additional plus-point is they do not require the installation of flue or ventilation routes within properties, meaning integration into a building can be completed without any unsightly flue pipes protruding out of the side of it."



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