



Bosch Commercial and Industrial

Complete heating, hot water and air-conditioning solutions from a single source



BOSCH

Invented for life



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About the Bosch Group

Leading global supplier

The Bosch Group is active in the fields of automotive technology, industrial technology, consumer goods, and energy and building technology. The Bosch Group has more than 306,000 associates who generate sales of over £45 billion a year.

The Bosch Group comprises of Robert Bosch GmbH and has more than 350 subsidiaries and regional companies in some 60 countries. When sales and service partners are included, Bosch is represented in 150 countries worldwide.



We are a charitable foundation

Ninety-two percent of the share capital of Robert Bosch GmbH is held by Robert Bosch Stiftung GmbH, a charitable foundation, while the majority of voting rights are held by Robert Bosch Industrietreuhand KG, an industrial trust.

The special ownership structure of Bosch guarantees the entrepreneurial freedom of the Bosch Group, making it possible for the company to plan over the long term and to undertake significant up-front investments in the safeguarding of its future.

Robert Bosch Stiftung

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Discover Bosch Commercial and Industrial...

Build the complete solution



Bosch products deliver high levels of fuel efficiency, consistent heating and hot water performance and have a notoriously long product life.

The planning and provision of heating, hot water and air-conditioning solutions will always present certain challenges, however Bosch Commercial and Industrial can offer the complete system solution from a single source.

All our projects are planned from start to finish using an integrated, systematic approach, in order to guarantee that the system will be as energy-efficient as possible.

Thanks to our comprehensive product portfolio, we can find the optimum solution to meet the precise requirements of any facility.

With an extensive history and decades of experience, place your trust in custom solutions from Europe's market leader in heating and hot water systems.

All Bosch products are subject to rigorous quality testing of each and every component, to ensure efficient, reliable and consistent performance throughout their long life. These products are supported by an unrivalled technical support team which is able to provide system design, product specification and installation query resolution.

From initial consultation to final commissioning and on-going, whole-life support, Bosch offers the complete package. Added peace of mind comes from secure guarantees and 10 year spares availability.

For added support, Bosch has BIM level 2 files that cover its entire commercial and industrial boiler range, while providing technical information for a system's lifecycle, including outputs, efficiencies, emissions, weights and dimensions. For more information, please visit bosch-industrial.co.uk/BIM.



Bosch Climate 5000 VRF

The Bosch Climate 5000 VRF range incorporates a host of advanced technologies to deliver exceptional performance for the end user, combined with ease of installation, commissioning and maintenance for the air conditioning engineer.



Thanks to variable refrigerant flow technology, the new Bosch VRF air conditioning systems are convenient and save valuable energy at the same time.

The systems consist of outdoor units and several inside units and can be utilised for both cooling and heating. These new solutions from Bosch therefore play a decisive role in ensuring that people in all areas of large buildings enjoy a comfortable climate, independent of the seasons of the year.

All Bosch Climate 5000 VRF systems incorporate sophisticated technologies to deliver improved performance over and above that of less advanced systems.

The Bosch Climate 5000 VRF family comprises three key models, each available in a range of variants to suit the precise needs of each project. These models are:

SDCI Series – All DC Inverter Heat Pump

An all-DC VRF heat pump system using DC inverter compressors, combined with DC fan motors for added energy efficiency. Also available in capacities from 8 HP/25kW to 72 HP/200kW and capable of operating up to 64 indoor units on one system.

MDCI Series – All DC Inverter Mini VRF

A mini VRF heat pump air conditioning system using DC inverter compressors and DC fans, ideal for small offices and retail premises as well as larger domestic properties. Up to 12 indoor units can be operated in one system, with capacities ranging from 8kW to 26kW.

RDCI Series – All DC Inverter Heat Recovery

All-DC inverter heat recovery three-pipe VRF system, providing simultaneous cooling and heating operation in one system. Capacities range from 8 HP/25kW to 64 HP/180kW and up to 64 indoor units can be operated in one system.

Features and benefits of the Climate 5000 VRF range at a glance:

- ▶ High efficiency DC inverter compressor
- ▶ Smooth 180° sine wave DC inverter
- ▶ High efficiency DC fan motor
- ▶ Multi solenoid valves control
- ▶ Optimised fan grill
- ▶ New profile fan blade
- ▶ Cycle duty operation
- ▶ Backup operation
- ▶ Precise oil control
- ▶ Anti-corrosion treatment
- ▶ Double EXV control
- ▶ Intelligent soft start
- ▶ Quick warm-up and cool-down design
- ▶ Compact design for effective use of space.

High efficiency DC inverter compressor

Bosch Climate 5000 VRF air conditioning system offers high class energy efficiency for cooling and heating by utilising brushless DC compressor control, innovative designed heat exchanger and several high performance parts. High efficiency DC inverter scroll compressor reduces power consumption by 25%.

New profile fan blade

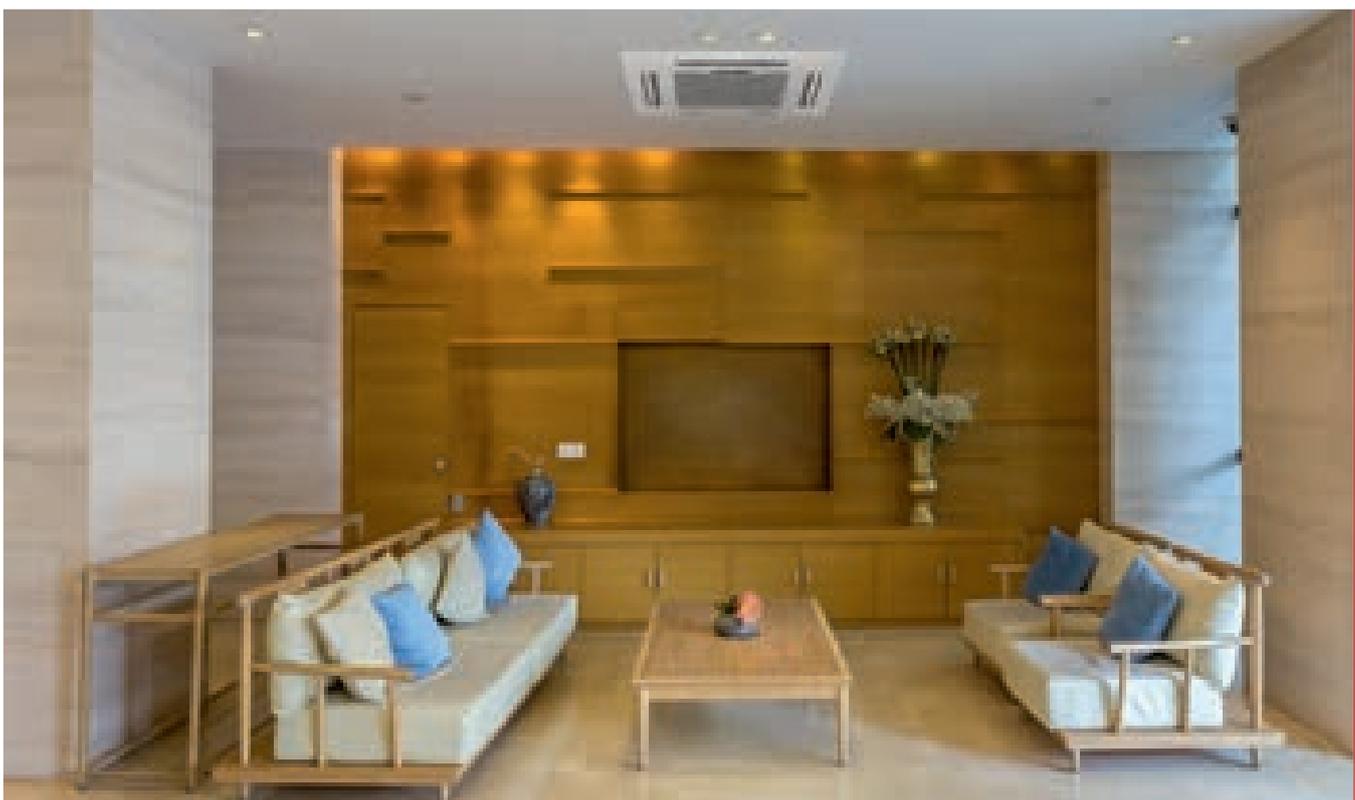
A new blade with sharp edges and a slight curve increases the airflow rate and lowers vibration and airflow resistance.

Quick warm-up and cool-down design

By utilising the benefits of the inverter compressor, the system can reach full load quickly and shorten the warm-up and cool-down times to provide an immediate and comfortable air solution. Less temperature fluctuation will create a better living environment.

Intelligent soft start technology

DC inverter compressor soft start function reduces strike to the electric network. This kind of high performance and low sound scroll compressor operates at a faster rate when starting, reducing start-up time. It also helps the unit to quickly adjust the room temperature to the set level.



GB162 – 50, 65, 80, 100kW (cascade up to 800kW) Compact power

The GB162 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 individual outputs of 50, 65, 80 and 100kW; outputs of up to 800kW can be achieved when multiple units are connected as part of a cascade installation.



Precise energy management

Each boiler in the GB162 series can automatically modulate its output down to 19kW* or less in order to precisely match the demand for heat. This considerably reduces fuel consumption and improves overall system efficiency.

The GB162 is fully compatible with the Energy Management System (EMS) modular controls platform. 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.

Features and benefits of the GB162 at a glance:

- ▶ Condensing technology with up to 110% net efficiency
- ▶ High turndown with modulation down to 15.6kW (50 and 65kW versions) and 19kW (80 and 100kW versions)
- ▶ Cascade outputs up to 800kW
- ▶ Modular package providing energy saving flexibility and maintenance backup
- ▶ Extremely compact cascades (400kW in just 1m²)
- ▶ Award winning ALU-Plus heat exchanger
- ▶ Ultra low emission levels, less than 39mg/kWh NO_x (dry, 0% O₂)
- ▶ New GB plate heat exchangers ensure boiler water and system water never meet
- ▶ Can be installed on open vented systems*
- ▶ Quick and easy installation
- ▶ Integrates with solar thermal installations
- ▶ Maximises savings from solar hot water
- ▶ Intuitive user controls
- ▶ LPG conversion available.

*Or lower, depending on the model.

**ErP energy labelling is not required for 80kW and 100kW boilers.

High efficiency, low emissions

The GB162 provides net efficiencies of up to 110% (NCV) with ultra low class 5 levels of NOx emissions.

Its compact dimensions make it especially suitable for installations where space is restricted, but demand for a modern high output heating solution is high.

The GB162 50kW and 65kW have ErP seasonal efficiencies of 93% and 92% respectively, both A-rated**.

Tax relief with the Carbon Trust

GB162 80kW and 100kW boilers are registered on the Carbon Trust's ECA (Enhanced Capital Allowance) scheme. This will enable businesses to claim 100% of the first year capital allowance on investments in energy saving technology.

Multi-boiler cascade systems

For larger heat demands, the GB162 can be easily combined as part of a multi-boiler cascade system. Any combination of 2 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 800kW 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.



Case study – Wandsworth Town Hall, London

The installation at Wandsworth Town Hall comprises 24 x GB162 100kW output boilers. The result is an ultra-modern and highly efficient heating and hot water system servicing the needs of the 1930s municipal building and the later 7 storey extension council office block.

The Town Hall buildings incorporate a Registry Office and Civic Suite and are used 7 days a week for a wide range of activities and functions. The heating and hot water system therefore has to be flexible enough to provide energy efficient operation whilst meeting the varied pattern of usage. In addition, the building has a large thermal inertia, so once heated only requires relatively low boiler outputs to maintain the required temperature levels. The cascade option particularly suited the usage pattern as each cascade can provide heat output which modulates down to just 19kW, but has a maximum output that can cope with the coldest days and the highest hot water demand.

David Higgins of Wandsworth Design Service says “We opted for a Bosch system for a number of reasons. As well as their expertise in cascade systems, they were able to offer the most complete solution, providing all the necessary components from a single source.”

CWi47 Continuous Flow Water Heater – 50kW (cascade up to 600kW) Hot water in an instant

The CWi47 is a high efficiency, high output gas-fired condensing continuous flow water heater for use with renewable energy sources or traditional fuels. The water heater can be cascaded up to 12 appliances to provide a combined flow rate of up to 247 ltrs/min.



Energy saving condensing design

The use of a condensing appliance contributes to achieving higher efficiency by incorporating a secondary, condensing heat exchanger. Heat within the flue gases is used to pre-heat the inlet water, and so recaptures energy that would otherwise be lost.

Suitable for a wide range of applications

The CWi47 water heater has been optimised for use in commercial applications where there are high demands for domestic hot water (DHW). At 50kW 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 865 litres of DHW per hour at a 50°C rise.

Light commercial

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.
- ▶ Where pre-heating of DHW is available e.g. solar thermal systems, restaurant kitchens, gyms, nurseries, hairdressers, hotels, nursing homes and smaller schools.

Commercial

Suitable for large commercial applications where there is:

- ▶ 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.

Features and benefits of the CWi47 Continuous Flow Water Heater at a glance:

- ▶ On demand and sustained delivery of instantaneous and continuous hot water
- ▶ Condensing technology for greater energy efficiency up to 105% (NCV)
- ▶ ErP water heating energy efficiency of 86% (Class A)
- ▶ Direct integration with a solar thermal system and heat pumps
- ▶ Accessory to control cascade up to 12 units
- ▶ Maximises output up to 247 l/min at 35°C rise
- ▶ 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
- ▶ Pre-mix combustion technology ensures low NOx emissions (<40ppm)
- ▶ Compatible with hot water secondary circulation for increased comfort and to reduce water wastage
- ▶ Compact, low-space design with flexible design options
- ▶ Natural gas and LPG versions.

Secondary circulation

To increase comfort and reduce water wastage, a secondary circulation system will circulate hot water through the pipework of the property to ensure hot water is immediately available when a tap is opened.

A thermostat placed in the pipework at a distant point to the heater activates a pump when the water temperature drops below a set point, thus activating the appliance.

The CWi47 has a durable heat exchanger that allows it to withstand the frequent low-fire rates of a secondary circulation system.

Cascading

Linking up to 12 continuous flow water heaters together in parallel allows a maximum water flow of up to 247 litres per minute with a 35°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.



Heat Interface Unit (HIU)

District heating innovation

The Heat Interface Unit (HIU) provides domestic hot water and space heating to properties that are serviced from a district heating system with a centralised boiler plant.



Space heating and DHW

The HIU 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 ensuring energy efficient operation and providing an additional level of safety to the user.

Flexible installation options

The HIU 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 BMS.

How a HIU 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.

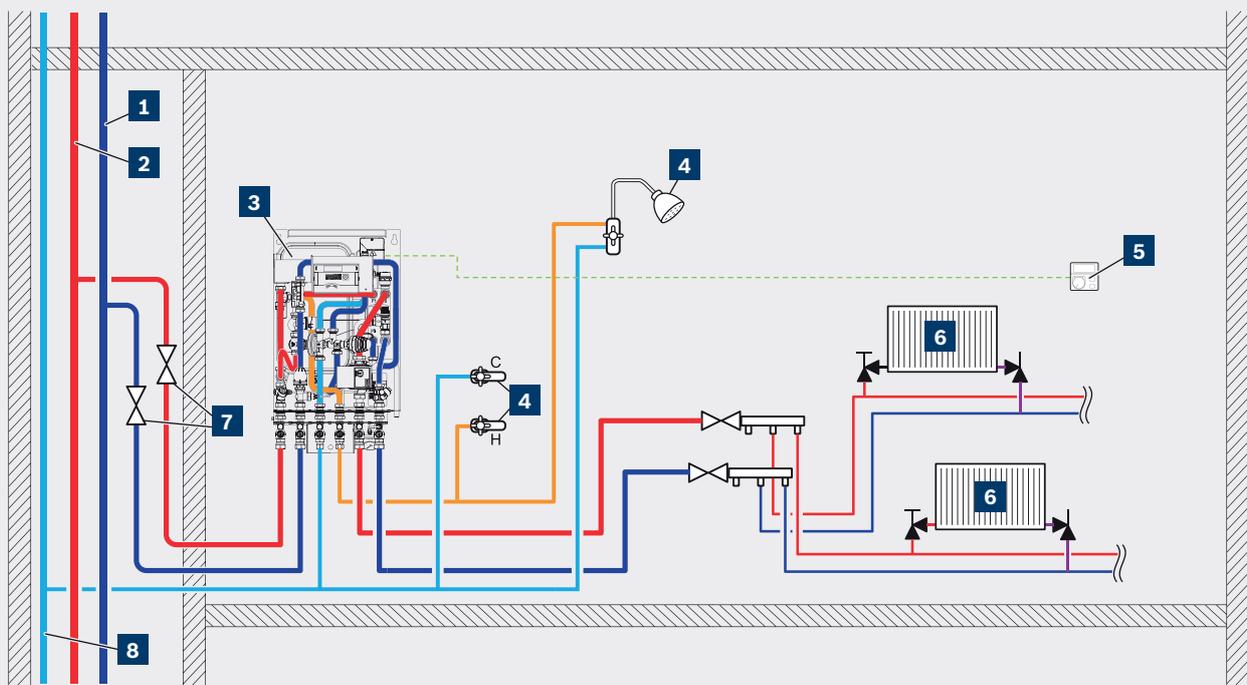
*Set to 50°C. Please be aware that the actual outlet temperature on the HIU is subject to some fluctuation.

Features and benefits of the Heat Interface Unit at a glance:

- ▶ DHW and CH 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.

HIU layout example

(less than 150m², single channel time and room temperature control)



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

Key	Description
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

**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.

GB312 – 90 to 280kW

High quality gas condensing boilers

A compact and modern floor-standing commercial condensing boiler, solidly built to provide reliable and efficient heating performance year after year.



The GB312 is an excellent choice for medium to large buildings, office blocks and commercial installations that require the latest in environmentally friendly heating technology. A high performance condensing aluminium heat exchanger is used in the GB312 range to help maximise heat transfer and maintain efficiency levels, even when demand for heat is low. This results in a very impressive price/performance ratio by reducing fuel consumption and optimising investment pay back periods.

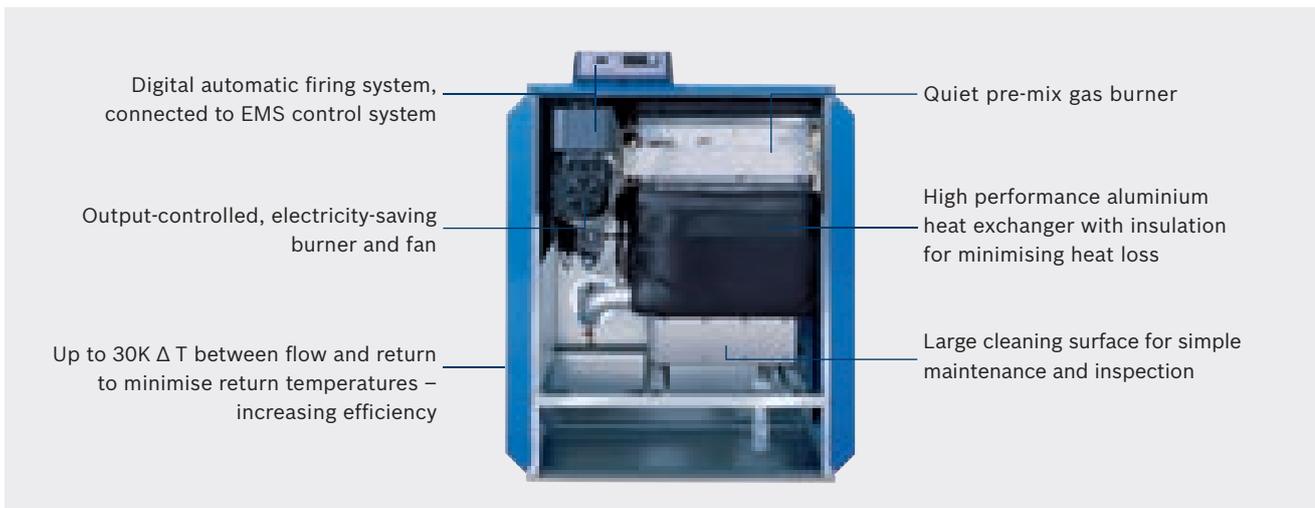
Flexible installation options

The GB312 range provides the design engineer with a high degree of flexibility as it can be operated as a balanced flue or open flue boiler. The compact dimensions of the boiler frame and low weight of the boiler make replacement installations straightforward. At only 612mm wide without the casing, the boiler fits through most doorways. The optimised hydraulic resistance of the boiler means a simple system design is possible.

Features and benefits of the GB312 range at a glance:

- ▶ Quick and simple to install
- ▶ Cascade kit of two boilers up to 560kW
- ▶ Excellent price/performance ratio. High efficiencies of up to 108% (NCV)
- ▶ Modulating pre-mix gas burner for extremely quiet operation
- ▶ Up to 30K Δ T operation – optimising efficiency
- ▶ High-performance aluminium heat exchanger for maximum heat transfer
- ▶ Insulated boiler block to minimise heat loss
- ▶ Compatible with intelligent controls with built-in Energy Management System (EMS)
- ▶ Supplied with BC10 boiler control with digital service diagnostic and status display
- ▶ Burner management technology
- ▶ Lightweight and compact to fit into existing boiler rooms
- ▶ Can have a balanced flue or open flue arrangement
- ▶ Simple to service and maintain
- ▶ Fully compatible with the 4000 controls range – offering system flexibility
- ▶ Low NO_x – <40mg/kWh (dry, 0% O₂)
- ▶ Able to control fully modulating primary pumps – maximising condensing benefits*.

*With PM10 accessory.



100% quality, inside and out

The GB312 is subject to the highest quality checks and standards to ensure reliability, safety and a long service life.

Intelligent burner technology

Bosch carefully select high quality components that work in harmony with each other to obtain even more efficiency from the boiler. The modulating pre-mix gas burner, for example, uses a controlled firing system (SAFe) to exactly match its output to the heating demand. The burner is linked to a digital combustion control that continually monitors the system's heat requirement so that energy is not wasted when demand for heat drops. The burner can operate between 30% and 100%. Burner settings are also factory set so, installed and commissioned, the boiler is ready to operate immediately.

Straightforward diagnostics

The Service Diagnostic System (SDS) is equipped as standard, and is designed to assist the heating engineer in identifying the current operating status as well as any potential irregularities in the heating system.

Simple to service

GB312 boilers are designed so that all components can be easily serviced and maintained from the right hand side.

Cascade: multi-boiler solutions

If demand for heat is high, it is also possible to install the GB312 as a two boiler cascade system offering potential heat outputs of up to 560kW. The cascade system contains all parts necessary for the installation and can be connected to the existing system, saving time and reducing installation costs.

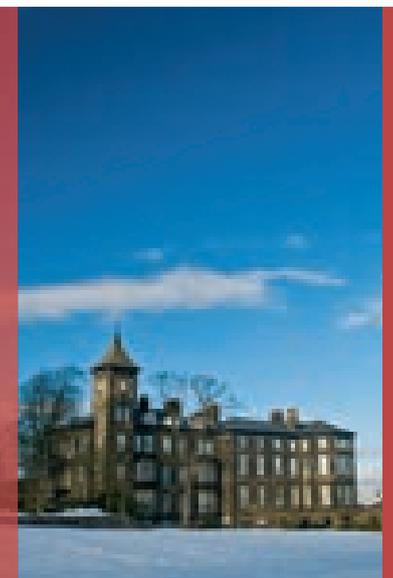
Case study – Ashville College, Harrogate

Two GB312 200kW output, floor standing, condensing boilers were installed at the college to meet all the heating requirements for the second and third floors, which were previously serviced by two 296kW cast-iron boilers.

“The whole system will be so much more efficient” says Neil Parker, Maintenance Manager at Ashville College “We are expecting large fuel savings and a big improvement in the controlled comfort of all rooms. Due to the long history of the school, floor levels vary considerably so we decided to utilise existing pipework

but to replace with new radiators, TRVs and insulation, providing a versatile and well controlled installation.”

The school's building management team, together with their heating engineering consultants, identified the need to renew the old boilers, which were causing problems with servicing and spares availability. Having consulted Bosch for advice on the most suitable replacement, the economic benefits of a new system were apparent and the work was implemented during the school's summer holidays.



GB402 – 320 to 620kW

High performance commercial heating

A high efficiency condensing boiler, perfect for single or multiple boiler installations in medium to large buildings, including schools, hotels, care homes, offices and commercial buildings.



Compact, quiet and perfect for both new build and renovation projects. It combines high efficiency and low emissions with a wide range of practical benefits.

Performance with economy

Available in 5 outputs – between 320kW and 620kW – the GB402 has been developed to provide lower running costs, a reduced carbon footprint and low NOx emissions. This is achieved through the use of a powerful, lightweight cast aluminium heat exchanger and thermally insulated boiler body. The clean burning, pre-mix burner and intelligent combustion controller enable the GB402 to operate in a wide modulation range of between 20% to 100%, with a net efficiency of up to 110%.

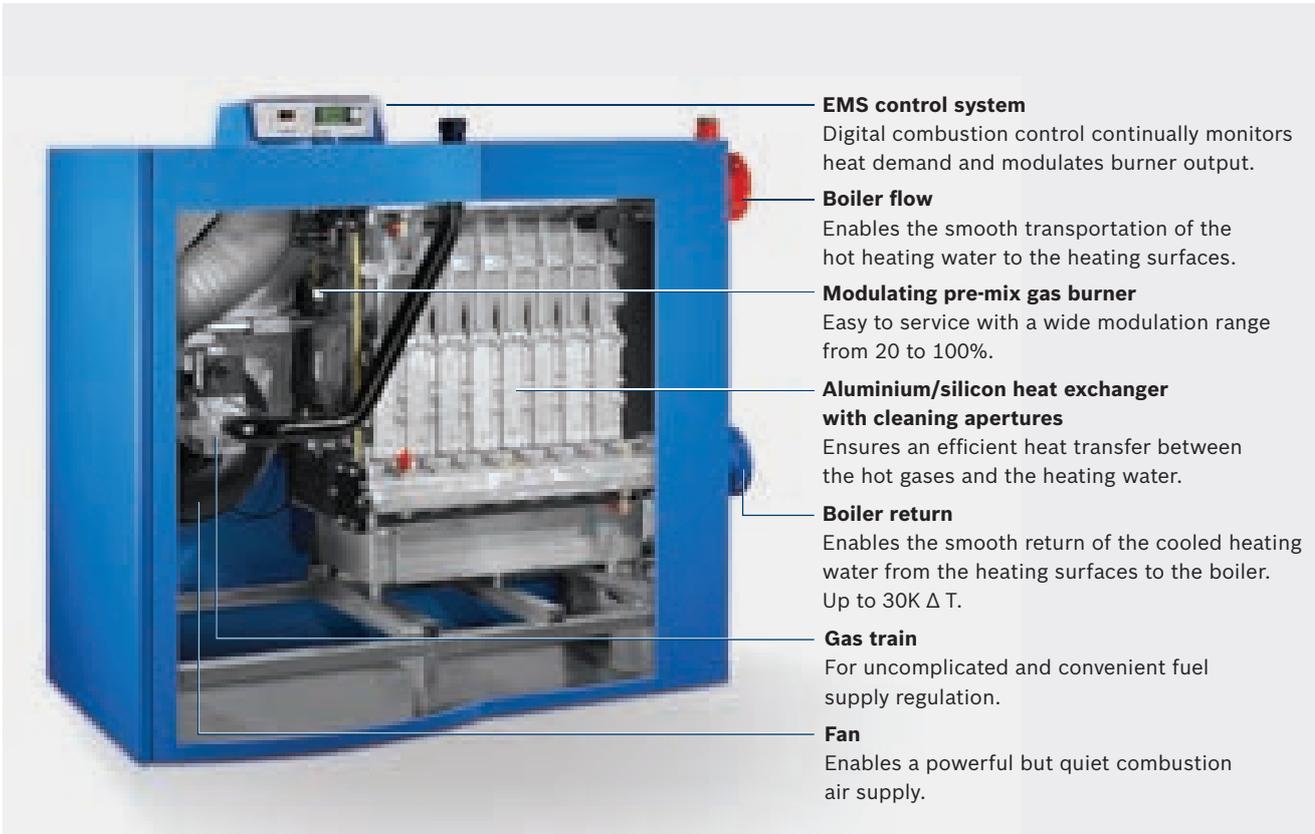
Space-saving design

Despite its compact size, the GB402 boasts an impressive average output to weight ratio of approximately 1kg per kW. This, combined with the ability to be installed in a variety of orientations or as part of a multi-boiler cascade system, makes it a suitable option for all sizes and shapes of plant room.

Features and benefits of the GB402 range at a glance:

- ▶ Suitable for cascading of multiple boilers
- ▶ Suitable for use with a wide range of controllers (RC35, EM10, MCM10, 4000 series)
- ▶ Optimised design of heat exchanger water- and flue- channels for maximum efficiency. Optimised for effective and robust operation
- ▶ Up to 30K Δ T operation – optimising efficiency
- ▶ Simple commissioning and maintenance
- ▶ Fully modulating pre-mix burner
- ▶ Suitable to use with balanced flue arrangement
- ▶ Efficiency (NCV) up to 110.4% at 40/30°C
- ▶ NOx emissions below 40mg/kWhr
- ▶ Maximum operating pressure of 6bar
- ▶ Extremely quiet, operates below 60dB(A) at full load
- ▶ Weight (depending upon output) 410kg to 520kg
- ▶ Able to control fully modulating primary pumps – maximising condensing benefits*.

*With PM10 accessory



- EMS control system**
Digital combustion control continually monitors heat demand and modulates burner output.
- Boiler flow**
Enables the smooth transportation of the hot heating water to the heating surfaces.
- Modulating pre-mix gas burner**
Easy to service with a wide modulation range from 20 to 100%.
- Aluminium/silicon heat exchanger with cleaning apertures**
Ensures an efficient heat transfer between the hot gases and the heating water.
- Boiler return**
Enables the smooth return of the cooled heating water from the heating surfaces to the boiler. Up to 30K Δ T.
- Gas train**
For uncomplicated and convenient fuel supply regulation.
- Fan**
Enables a powerful but quiet combustion air supply.

Easier installation and servicing

During installation and operation the advanced design of the GB402 will save time and money. The factory-fitted gas burner is tested and set up for the plant’s gas type, making it ready for use upon installation. Servicing is also simple. Large inspection apertures make access to components particularly easy and all internal components can be easily cleaned or replaced if necessary.

It’s got everything

Although the GB402 features a top-end technical design, practicality and convenience of operation have not been neglected. In spite of its substantial capabilities, its physical dimensions are such that standard plant room doorways (minimum width 781mm) present no obstacle. The casing can be removed for easy handling and to prevent damage during installation.

Case study – Metropolitan College, Belfast

With over 2,500 full-time students to keep warm, the new Titanic Quarter campus of Belfast Metropolitan College required reliable and efficient boilers. The three GB402 620kW units, installed by C&F Quadrant, met all the unique demands of this sizeable project, delivering not only the reliability required but the efficiency provided by cascade formation.

Two of the key features of the GB402 are the low NOx and noise levels. The unit is light in weight, yet it is extremely powerful thanks to a cast aluminium heat

exchanger and thermally insulated boiler housing. This, combined with a modulating premix gas burner and intelligent combustion controller, enables the system to deliver up to 110% net efficiency and a low NOx of 40mg/kWh or BREEAM 5 rating – which played a significant role in the overall energy efficiency of the project.

Titanic Quarter campus was named as the Environmental Project of the Year in the 2011 Sustainable Ireland Awards.



SB745 – 800 to 1,200kW

The premium condensing boiler for the most demanding commercial heating systems

With efficiencies of up to 108.9%, the SB745 offers more than just first class efficiency. The 3-pass construction provides the most efficient combustion where space is limited.



Patented Kondens+© heating surfaces

With its exclusive Kondens+© heating surface technology, Bosch Thermotechnology Ltd. has introduced yet another innovative idea for even better energy utilisation.

The heat exchanger surfaces are precisely formed to enable the greatest possible quantity of water vapour to condense. The crimped tube design creates micro-turbulence which brings almost the entire volume of hot flue gases into contact with the cold heat exchanger surfaces. This effect is enhanced as the diameter of the heat exchanger tube decreases along its length, therefore maintaining the speed of the flue gases moving through the heat exchanger, resulting in minimal pressure loss and optimum heat transfer. With this unique system, efficiency can be increased by up to 10%

when compared with smooth heat exchanger surfaces. The flow of water through the boiler is also optimised as the main volume of water flows in the opposite direction to the hot flue gases. This means that the flue gas always meets the coldest part of the return water.

High quality in a compact space

The 3-pass construction, with a water cooled combustion chamber, provides the most efficient combustion in the smallest space. Integration of the condensing heat exchanger, after the main combustion chamber, makes the boiler particularly compact. A smaller boiler is easier to transport and install so the SB745 range is ideal for installations where space is limited. Corrosion-resistant stainless steel is used in all parts that come into contact with condensate for added efficiency and durability.

Features and benefits of the SB range at a glance:

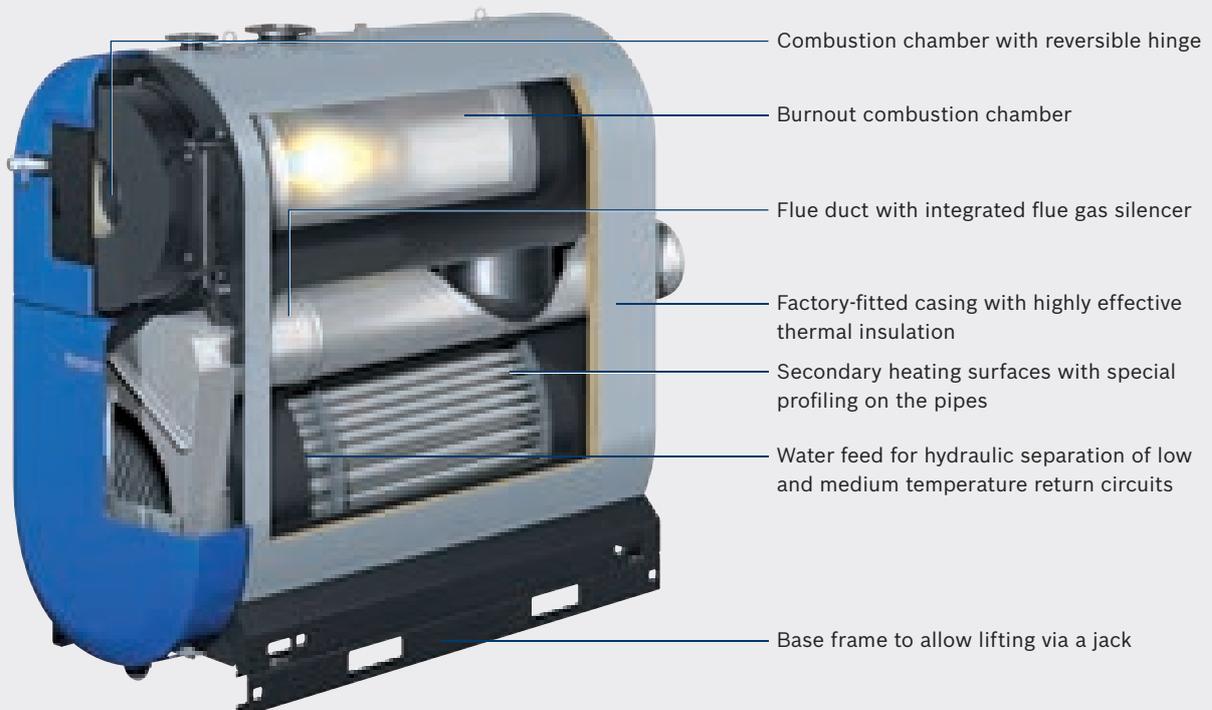
- ▶ Efficiencies of up to 108.9% (NCV)
- ▶ Stainless steel combustion and heat exchanging surfaces
- ▶ 2 return connections for separation of high and low temperature heating circuits
- ▶ Low hydraulic resistance
- ▶ 3-pass construction
- ▶ Combustion chamber optimised for lower emissions
- ▶ For use with a variety of gas pressure jet burners
- ▶ Patented Kondens+© heating surfaces.

Simplification of system design

The SB745 range has no minimum requirements for flow rate, operating temperature or burner output. Heating circuit flow and return pipes can be simply connected as there is no need for additional equipment such as flow proofing devices, mixing valves or shunt pumps. Separate return pipe connections ensure optimum condensing, allowing efficiencies of up to 109% to be achieved. The condensing boiler comes with two return connections as standard, and by separating high and low temperature returns, further energy savings can be made.

Lower emissions

The SB745 offers more than just first class efficiency. In combination with a two-stage or a modulating gas burner, they can also provide very low levels of emissions.



GE range – 455 to 1,200kW Gas, oil or both, high efficiency cast iron boilers

Depending on your project requirements, the versatile GE range of cast iron boilers can be operated with an oil or gas burner. It is also possible to use a dual fuel burner that can be switched over from gas to oil if the gas supply is interrupted.



Cast iron technology – economic and efficient

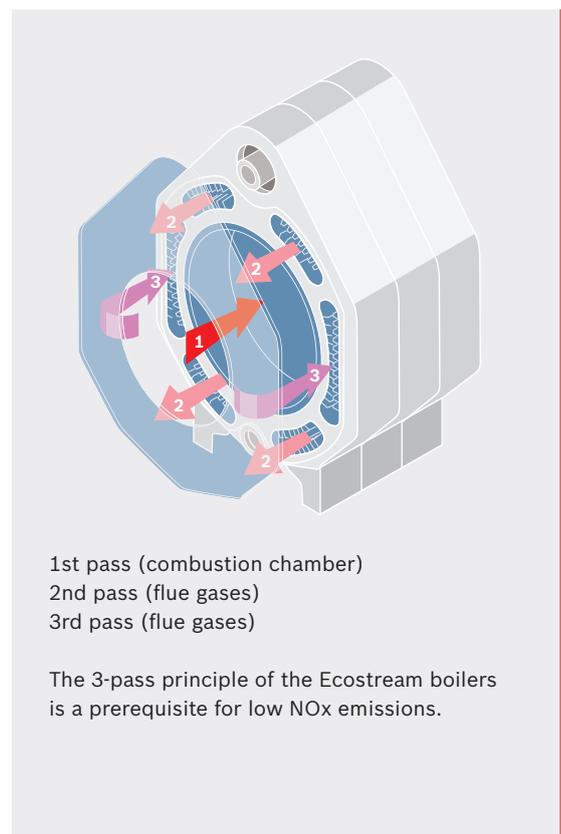
The modern cast iron boiler design helps to create optimum combustion conditions: efficiency rates of up to 97% (NCV) are possible with low flue gas temperatures and effective all-round thermal insulation.

Cleaner combustion

The 3-pass principle and the water-cooled combustion chamber with direct heating surfaces offer ideal conditions for low emissions. This is especially true in conjunction with the advanced pressure-jet oil and gas burners, which are matched to the boilers.

The secondary heating surfaces are arranged symmetrically around the combustion chamber. Some of them have hot gas baffle plates, which optimise the speed of the hot gas flow. This creates more intensive heat transfer to the boiler water. The result is a high standard seasonal efficiency and low flue gas temperatures.

Combustion chambers for all cast iron boilers have a large front door and are therefore easily accessible, making maintenance quick and simple. Combustion gas channels can be easily cleaned from the front.



- 1st pass (combustion chamber)
- 2nd pass (flue gases)
- 3rd pass (flue gases)

The 3-pass principle of the Ecostream boilers is a prerequisite for low NO_x emissions.

Features and benefits of the GE range at a glance:

- ▶ Variable outputs of 455 to 1,200kW
- ▶ High levels of energy efficiency - up to 96% (NCV)
- ▶ 3-pass construction for lower emissions
- ▶ Compact boiler dimensions
- ▶ Easy maintenance and cleaning
- ▶ Flexible choice of fuel: Natural gas, heating oil, bio-fuels*
- ▶ Sectional design allows assembly in the plant room which makes it the ideal choice for places with limited access
- ▶ The thermostream technology provides a simple system which is very reliable in low temperature operation
- ▶ For use with 4000 control units.

Robust and reliable

When the boiler is fired from cold in low temperature conditions, condensate can form initially and attack the surfaces which come into contact with flue gases. This is why a special cast iron is used which is particularly resistant to condensate.

Cast iron is also very easy to cast and shape and allows the combustion chamber and heat surfaces to be designed to ensure optimum transfer of heat and the best possible use of energy.

Compact, flexible and powerful

The compact dimensions of the GE boiler makes the footprint extremely small in relation to its output. The components of GE cast iron boilers can also be supplied in unassembled sections to further assist transportation and installation of the product.

Case study – Coventry University

As legislation continues to drive the education sector to reduce its carbon footprint, it's important for education facilities to seek innovative technologies that help to reduce carbon usage and enhance its green credentials.

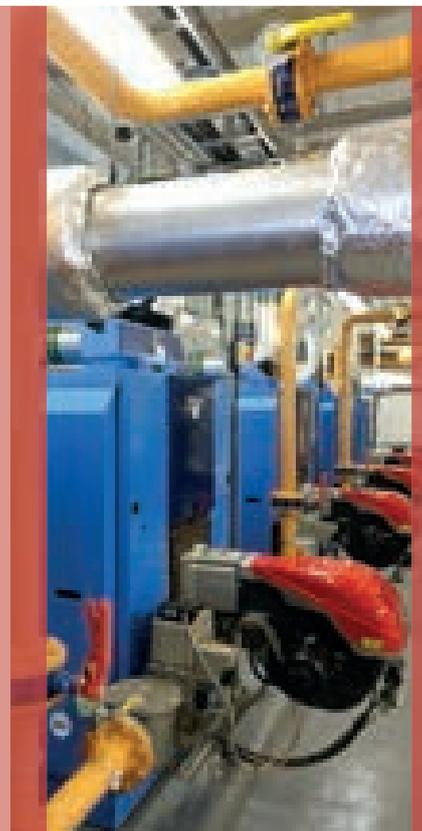
Coventry University operates an extensive asset management programme, which ensures all low carbon technologies are performing at peak performance levels. It was imperative that the new heating system not only contributed to the university's carbon reduction target, but also offered significant energy efficiencies.

Having undertaken a detailed assessment of the plant room, Bosch proposed a system that utilised 5 x GE615 1,200kW cast iron boilers and a 140kWe CHP module. With boiler efficiency levels of 95 percent and CHP technology proving to be one of the most-cost effective solutions to reduce carbon usage, it was determined that the

system would meet all the requirements set out by Coventry University.

Lee Hatton, Senior Mechanical Engineer at Coventry University, said: "Bosch Commercial and Industrial played a key role in optimising the efficiency of the system, advising us of the importance of correct sizing of the CHP module to ensure maximum efficiency levels."

Lee Hatton concludes: "Thanks to the improved boiler efficiency, the correct sizing of the CHP module and the installation of a thermal store, calculations determine that the university should save 489 tonnes of carbon over the next 12 months. To be able to implement a heating and hot water system which has effectively guaranteed we will meet our ongoing commitment to energy efficiency is a testament to the expertise on hand at Bosch Commercial and Industrial."



Combined heat and power (CHP) modules

CHP with high efficiency boilers provides electricity, heat and hot water

With outputs ranging from 12kWe to 400kWe, Bosch combined heat and power (CHP) offers a more efficient way to generate heat and electrical power compared to conventional methods.



Delivers efficiency at a whole new level

A Bosch CHP module consists of a gas engine, a generator and a heat exchange system. The gas engine drives the generator to produce three-phase electrical power, which feeds into the mains low voltage distribution system, where it can be used locally or exported to the national grid.

Heat is produced as a by-product of the power generated, which in a conventional power station would be wasted. However, the heat generated by a Bosch CHP module is used to generate hot water via the integral heat exchangers. This hot water may be used for space heating, process heating or heating of domestic hot water (DHW).

When the hot water is not required immediately, it can be stored in a suitable storage vessel for later use, whilst maximising the generation of useful electricity.

Reduced carbon emissions for both power and heat

According to the Carbon Trust, when compared to using conventional boiler systems and mains electricity, CHP has the potential to reduce carbon dioxide emissions for power and heat generation by around 30%. In utilising the waste heat from the power generation process, Bosch CHP delivers a total efficiency of around 92%, of which around 33% is in the form of higher value electrical energy.

Safe and secure energy supply

The ability to generate electricity on site provides enhanced security against disruption of the mains electrical supply.

Features and benefits of the Bosch CHP range at a glance:

- ▶ High efficiency – overall net efficiencies of up to 91.8%, with the ability to modulate the output between 50% and 100%
- ▶ ErP seasonal efficiency of 124% (A+) and 128% (A++) for the CE 12 NA and CE 19 NA respectively
- ▶ Highest environmental standards
- ▶ Proven quality and reliability
- ▶ Effective BMS interface and remote monitoring router
- ▶ Cost-efficient supply of energy on site
- ▶ Low noise levels of 35 dB(A) can be achieved with optional air and exhaust silencers
- ▶ Cogeneration as standard with Trigereneration accessories available
- ▶ Additional heat load for potential absorption chillers provide greater annual demand, reducing payback periods
- ▶ Choice of Bosch service and maintenance plans.

Energy efficient

Bosch CHP are highly efficient generators of both electricity and heat energy, with overall net efficiencies of up to 91.8%.

Individual Bosch CHP modules can modulate outputs from 50% to 100% to match the building's daily heating requirements.

Low cost of ownership

Bosch CHP modules benefit from a manufacturing quality which ensures a robust product with a long, reliable life in line with the company's strict internal quality processes. This is combined with the best-in-class engines from Volkswagen (CE 12 NA and 19 NA) and MAN (CE 50 NA and above) providing further peace of mind for the end user.

Energy centres

Typically, CHP is combined with other heat sources in an energy centre – an arrangement that enables system designers to achieve maximum energy efficiency. These may include other low-carbon heating technologies as well as industrial boilers.

Optional service contracts

Bosch combined heat and power modules are supported with a choice of optional 10* year service contracts – Premium and Premium Plus – which are designed to offer the user complete peace of mind.

Case study – Shipley Swimming Pool and Leisure Centre, Bradford

Ensuring building stock meets the latest regulations and efficiency standards is an ongoing process for any local authority.

After undertaking an assessment of the Shipley Swimming Pool and Leisure Centre, it was determined, that the existing heating arrangement had neared its designed life expectancy and plans should be put in motion to source a more efficient system.

After conducting a detailed feasibility study, Bosch proposed a system which incorporated two SB615 floor standing condensing boilers. The boilers have efficiency

levels of up to 110%, outputs of 510kW and use minimal plant room due to its compact design, making it the ideal solution to meet the criteria set out by the council.

Chris Mudd, Senior Electrical & Mechanical Surveyor at City of Bradford Metropolitan District Council, commented: "Such was the detail of the feasibility study carried out by Bosch, they advised us to incorporate a 50kWe CHP module instead of the 70kWe unit we requested. Thanks to this recommendation, the system is designed to utilise 100% of the heat generated, thus maximising our efficiency levels."



Uni 3000 F hot water boiler – 420kW to 1,850kW Cost effective steel hot water boiler

The Bosch Uni 3000 F high-efficiency hot water boiler is an extremely reliable, cost effective heating plant solution that provides the flexibility required to be incorporated into a wide range of heating applications.



Extremely reliable and efficient

Available in 9 outputs ranging from 420kW to 1,850kW the Bosch Uni 3000 F high-efficiency steel boiler utilises reverse flame technology to deliver hot water to heating systems with efficiency up to 93% (NCV)*. High-grade materials and meticulous Bosch quality standards ensure exceptional operational reliability, an essential requirement for any commercial or industrial boiler applications.

Flexible solutions

Fuel flexibility is achieved via the compatibility of the Uni 3000 F with oil or gas burners to EN676 and EN267, providing the burner operating range matches the boiler specification.

Applications using Dual Fuel, LPG or Biogas are also possible depending on burner selection. The boiler is approved for open flue operation at a maximum operating pressure of 6 bar.

Ideally suited to systems requiring a peak load boiler, such as District Heating schemes, that can incorporate a condensing base load boiler or CHP module.

Compatibility with specific 4000 controls from Bosch Commercial and Industrial provides familiarity for the contractor and quality to an equal standard across the heating system. Burner, temperature and back-end protection strategy can be controlled via the 4000 control series.

Features and benefits of the Uni 3000 F at a glance:

- ▶ Efficiency up to 93% (NCV)*
- ▶ Fuel flexibility – pre-matched burners from the Bosch design team
- ▶ Certified under the Pressure Equipment Directive for applications requiring up to 120°C maximum safety temperature
- ▶ Supplied with factory fitted shell insulation
- ▶ Installation ease – ability to hinge burner door on both sides to accommodate alternate plant room layouts
- ▶ Modular control technology enhances application flexibility
- ▶ Complete range of accessories
- ▶ Built to stringent Bosch quality standards.

Quick to install, easy to maintain

Bosch quality standards are reflected in the design and manufacturing of the Uni 3000 F. With installation ease maximised and all relevant accessories available, the contractor is at the heart of the design concept.

The boiler shell is fully insulated during manufacturing, ensuring optimum heat retention and minimising installation time on-site.

Burners, burner plates, EN12828 safety equipment, anti-vibration dampers and flue sealing collars are all available for ease of ordering from one manufacturer.

The servicing and maintenance process has been simplified through easily accessible components and readily available genuine spare parts if required. A tailor-made cleaning accessory is supplied with the boiler as standard.

Uni 3000 F range technical data

Heat transfer medium	Low-pressure hot water
Design	Reverse flame technology
Capacity in kW	420 to 1,850
Safety design overpressure in bar	Up to 6
Max. flow temperature in °C	105 (safety cut-out 120°C)
Fuel	Natural gas and heating oil (LPG, biogas and dual fuel burner options available on request)



Close-up of the second pass turbulators

*Efficiency estimation represents partial load at a mean temperature of 60°C (efficiency will depend on fuel, system design temperatures and burner load).

UNIMAT hot water boiler – 650kW to 38,000kW

Highly efficient and proven industrial boiler technology

UNIMAT UT-H, UT-M and UT-L hot water boilers are a further development of the successful UT boiler construction. The UNIMAT UT-M and UT-H is used in plants where medium to high temperatures are required, while the UT-L is the perfect solution for applications with low flow temperature needs.

UNIMAT UT-L series



UNIMAT UT-M series



UNIMAT UT-H series



UNIMAT UT-HZ series



Proven technology

The proven UNIMAT 3-pass design has been used for decades – with overwhelming success. The UT series is offered in various sizes and can also be used as a multi-boiler system. It is CE certified and is designed and equipped in compliance with the European Pressure Equipment Directive.

Flexible solution

The boiler can be configured to meet specific site conditions. It is available for use with a variety of different burners operating with single or multiple fuels. To increase efficiency, the appliance can be supplied with integrated or standalone economisers made from galvanised or stainless steel.

UNIMAT Low NOx industrial boiler option

The UNIMAT Low NOx is specially designed for when extremely low flue emissions are required. The large combustion chamber reduces the flame temperature and subsequently lowers harmful emissions.

Intuitive controls

All boiler systems can be equipped with intuitive controls. The operational functions of the controls guarantee the fully automatic operation and protection of the boiler systems. The efficient communication protocol ensures the intelligent networking of the individual modules, as well as enabling an easy connection to higher level building management systems.

Features and benefits of the UNIMAT range at a glance:

- ▶ Effective 3-pass design
- ▶ Typical efficiency (NCV) without a flue gas heat exchanger is up to 95%, and up to 105% with condensing heat exchanger
- ▶ Highly flexible as manufactured to customer specification
- ▶ Reduced emissions due to the use of a highly developed firing system and carefully matched boiler and burner combination
- ▶ Low return temperatures from 50°C
- ▶ Compatible with most burner systems
- ▶ Easy access for maintenance with the boiler having a fully hinged front door
- ▶ Robust, reliable and durable
- ▶ No limit on minimum burner turndown
- ▶ Smoke tube passes free of flow baffles
- ▶ Large permissible temperature differential between flow and return, up to 50°C.

UNIMAT range technical data

Type	UT-L	UT-M	UT-H	UT-HZ
Heat transfer medium	Low temperature hot water	Medium temperature hot water	High-pressure hot water	High-pressure hot water
Design	3-pass technology with single flame tube	3-pass technology with single flame tube	3-pass with single flame tube/smoke tube technology	3-pass with double flame tube/smoke tube technology
Capacity in kW	650 to 19,200	750 to 19,200	820 to 18,300	13,000 to 38,000
Safety design overpressure in bar	up to 16	up to 16	up to 30	up to 30
Max. flow temperature in °C	up to 110	up to 190	up to 240	up to 240
Fuel	Natural gas and heating oil (additional fuels on request)	Natural gas and heating oil (additional fuels on request)	Natural gas and heating oil (additional fuels on request)	Natural gas and heating oil (additional fuels on request)

Case study – Lancashire Hill, Stockport

A Greater Manchester social housing provider has offered residents of a Stockport development the ultimate in fuel efficient heating, having invested in a green district heating system.

Bosch, in association with civil contractor, William Pye Ltd and installer, CPL Ltd, were commissioned to supply and install three 1,350kW steel shell gas-fired boilers to support a Froling Lambdamat 1MW wood chip boiler, provided by leading biomass provider, Eenergy.

The installation operates by using the Froling biomass boiler to cater for the heating demand of residents. The readily available 4MW total output of three steel boilers then supplements the heating provision when demand from residents is at its peak.

The steel boiler utilises 3-pass flame tube/smoke tube technology and effective design of the heating surfaces to provide the best conditions for low emissions and high efficiency. Effective operation is ensured thanks to its advanced boiler controls package.



UNIVERSAL steam boilers – 175kg/hr to 55,000kg/hr High efficiency industrial steam boilers

We offer shell steam boiler systems for all applications. Our large-scale industrial steam boiler systems, with individual outputs from 175kg/hr to 55,000kg/hr and pressures up to 32bar, are ideal for processed driven sites such as mills, breweries and distilleries, as well as other industrial applications.

UNIVERSAL U-ND
and U-HD series



UNIVERSAL UL-S series



UNIVERSAL ZFR series



UNIVERSAL Modular U-MB series



Global provider

Bosch is established in the global steam boiler market with over 100,000 steam boiler installations in more than 140 countries. Our products can be found at the premises of many global brands such as E-ON, Coca-Cola, BASF, Siemens, Ytong, Heineken, Nestlé and Esso.

Highest levels of efficiency

We were one of the first manufacturers to supply industrial flame tube/smoke tube steam boilers with integrated economisers. This allows the heat contained in the flue gases to be recovered, which increases efficiency by up to 7% in dry running operation and up to 15% in condensing operation. Bosch also supplies a huge variety of plant room components ensuring the system is operating up to its maximum efficiency, this includes water service modules, feed water modules, economisers and plant controls system.

Features and benefits of the UNIVERSAL steam boiler range at a glance:

- ▶ Intuitive boiler control
- ▶ Effective thermal insulation – minimising heat losses
- ▶ Automatic start-up, standby and shutdown control
- ▶ Suitable for a variety of burner systems
- ▶ Low emission combustion thanks to the use of highly developed firing systems and careful matching of the boiler and burner
- ▶ Easy maintenance – simple to inspect on both the flue gas and water side
- ▶ Robust, reliable and durable
- ▶ All high pressure boiler systems are certified in accordance with the European Pressure Equipment Directive
- ▶ Simple extension options due to modular technology – spreading out investment
- ▶ Simple commissioning due to factory set operating parameters
- ▶ Plug-in connections for easy wiring on site – labour saving.

Available as a high or low pressure steam boiler

Bosch Commercial and Industrial can provide the UNIVERSAL steam boiler for high or low pressure steam production. Our large volume flame and smoke tube combination is perfectly matched to each other, providing a compact construction.

Designed for less consumption

Intelligent control systems provide further energy- saving opportunities. In addition, modulating burner fans reduce the electrical power consumption considerably at times of low heat demand. The modern burner systems, controlled by oxygen or carbon monoxide trim systems, provide the optimum combustion efficiency via intelligent fuel/air ratio technology.

Manufacturing – comprehensive and bespoke

Our shell boilers are supplied pre-made* to the requirements of individual projects. The high quality basic equipment level includes the boiler pressure vessel, control and safety technology, burner unit, a pump module, a terminal box and the control switchgear cabinet.

All the sensors and actuators of the boiler are pre-wired into the integrated terminal box, while the pre-assembled plug-in and coded cable bundles simplify the electrical wiring installation between the boiler control cabinet and the terminal box.

The free-standing or wall-mounted switchgear cabinet can be adapted and set up to best suit the on-site requirements.

**Case Study – Magor Brewery, Wales**

Following an extensive asset management programme from one of the world's largest brewers, it was agreed that the brewery's full performance levels could be met through the use of a six tonne UNIVERSAL UL-S steam boiler, almost half the size of the 11 tonne boiler brewery had originally utilising.

The UNIVERSAL UL-S model produces low-carbon clean saturated steam, making it an ideal solution to meet all the requirements set out by the brewery.

The UNIVERSAL UL-S was equipped with flame/smoke tubes, allowing a greater recovery of heat contained in the flue gases.

This increases the energy efficiency of the boiler by up to seven percent in dry running operation, and up to fifteen per cent in condensing operations.

A Project Engineer at the brewery commented, "Bosch provided a high level of aftercare service by visiting the site on multiple occasions to deliver extensive training on the entire workings of the system to our operatives. This ensured that the brewery maintained peak performance levels during the initial post-installation period and has added real value to how our brewery operates."

*The equipment level is variable and can be freely configured to customer requirements

Heat recovery steam boiler (HRSB)

The perfect partner for a steam boiler and CHP plant room

The heat recovery steam boiler (HRSB) is designed to recover the waste heat from flue gases generated by combined heat and power (CHP) plant and converting it into steam for heating as well as process steam.



Boosting efficiency in CHP-based energy centres

The HRSB utilises the waste heat of flue gases from upstream combustion processes, converting it for steam generation processes. When used in conjunction with CHP, the HRSB can play a significant role in using primary energy more efficiently.

Heat recovery and efficiency is maximised through the innovative HRSB design, which combines a highly efficient tubular heat exchanger with an integrated economiser. Heat losses are minimised further by high levels of thermal insulation.

This additional option for using heat means that CHP modules can generally be designed on a larger scale than thermal heat-driven plants. This, in turn, enables the plant operator to run the CHP plant for longer periods, thereby generating more electrical power for use on site or for exporting back to the distribution network.

The result is excellent energy savings and reduced lifecycle costs for facilities using CHP and steam, with a fast return on investment.

Features and benefits of the heat recovery steam boiler range at a glance:

- ▶ Utilises waste heat from CHP
- ▶ Supports optimised primary energy strategies
- ▶ Extends CHP run-times
- ▶ Increases on-site power generation
- ▶ Reduces energy costs and carbon emissions
- ▶ Delivers fast return on investment
- ▶ Suitable for new-build and retrofit
- ▶ Versatile, modular design
- ▶ Easy to install, commission and maintain
- ▶ Compatible with Bosch's extensive steam boiler range.

Versatile range

Thanks to its modular design and compact dimensions, the HRSB is ideally suited for both new installations and for retrofitting to existing energy centres. Designs and calculations are facilitated by an easy-to-use Bosch product configurator.

It can be combined with CHP units with an electrical output ranging from approximately 0.5MW to 4MW and, depending on your needs, will generate between 400 and 4,100 kilogrammes of steam per hour*.

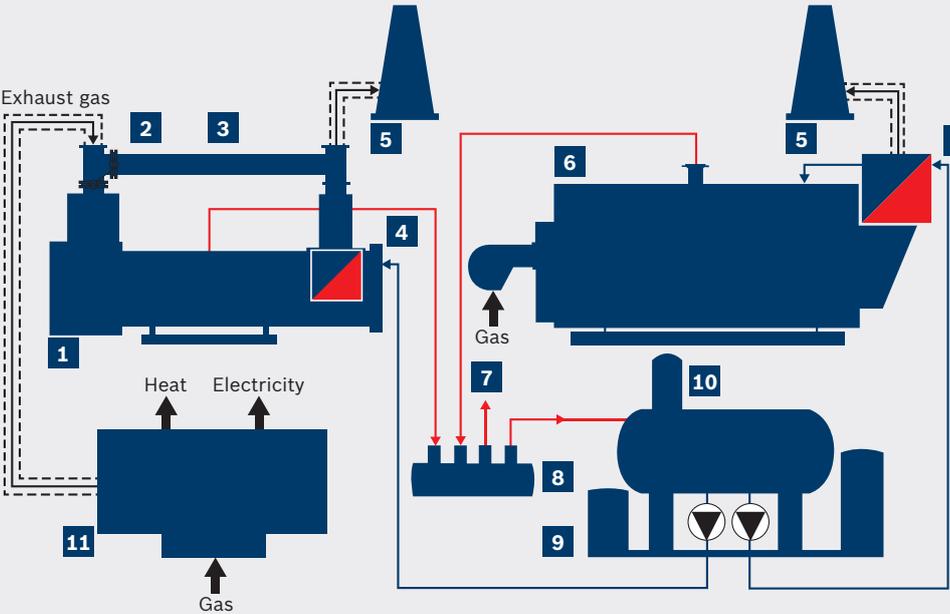
PLC-based touch screen boiler control ensures straightforward and efficient operation.

Peace of mind

All HRSB units are designed for ease of installation, commissioning and maintenance. Additional support services, such as customised maintenance packages, are available to ensure the system will keep running efficiently for years to come.

HRSB units incorporate state-of-the-art safety equipment and are certified in accordance with the Pressure Equipment Directive.

Schematic diagram of a combined HRSB, Peak Load Steam Boiler and CHP system



Key	Description
1.	Heat recovery boiler (basic load)
2.	Bypass dampers
3.	Flue gas bypass
4.	Economiser
5.	Chimney stack
6.	Steam boiler (peak load)
7.	Steam output
8.	Distribution manifold
9.	Water service module
10.	Feed water tank
11.	CHP module

*Based on 550°C flue gas temperature; 8bar operating pressure.

GHP AWO 38 Gas absorption heat pump

High efficiency commercial heating with a lower carbon footprint

Bosch GHP AWO 38 low-carbon gas absorption heat pumps deliver highly efficient, renewable heating solutions for commercial, industrial and residential applications.

GHP AWO 38 cascade



Low carbon solution

The gas absorption heat pump draws energy from the air using heat pump technology and a highly-efficient, low NOx, gas condensing heat generator. By using gas as the primary energy source directly at the point of use, rather than electricity which is generated largely in coal or gas-fired power stations, the gas absorption heat pump has a significantly smaller carbon footprint.

Gas absorption heat pumps also cut running costs because gas is typically only a third of the price of electricity and the heat pump provides up to 65% additional heat by drawing in free energy from the surrounding air.

As such, they also deliver reduced energy consumption and carbon emissions compared to conventional methods of providing heat to buildings.

Multiple heat pump cascade systems

For higher heating demands, the GHP AWO 38 is supplied in a factory-assembled, rig-mounted multi-heat pump cascade system, pre-configured with flow, return and gas manifold. Each unit has its own modulating primary circulation pump to provide optimum flow rates and efficient operation.

Connected in-line, cascades provide outputs up to 205.5kW for five units, and larger cascade systems are available if required. It is also possible to combine multiple cascades to achieve even higher outputs.



Features and benefits of the GHP AWO 38

- ▶ High efficiencies of up to 164% (NCV) at A7W35
- ▶ ErP seasonal heating efficiency of 112%, in average climate conditions
- ▶ Suitable for outdoor installation, no need for a plant room
- ▶ Reduced fuel costs due to high efficiency and use of renewable energy
- ▶ Low maintenance requirements
- ▶ Fast return on investment

- ▶ Zero GWP and low NOx operation provides BREEAM credits
- ▶ Improved Building Energy Certificate rating
- ▶ Low electric power requirement reduces reliance on local electricity supply infrastructure
- ▶ No requirement for a chimney as flues are included
- ▶ Reduced requirements to purchase carbon allowances for those organisations participating in the CRC EES.

The air around us stores solar energy even when the thermometer shows a negative temperature measured in Celsius. In the UK, the average temperature in the peak heating period (October to March) is 7°C, allowing the heat pump to absorb, on average, 0.5kW of free energy for every 1kW of gas consumed. Even when temperatures are as low as -7°C, the gas absorption heat pump works with an efficiency of 125% in a heating system running at 50°C, and 143% in a system designed to operate at lower temperatures of 35°C.

Comparing heat pump performance

The Coefficient of Performance (CoP) of an electric heat pump is higher than the efficiency stated for the gas heat pump which is stated as Gas Utilisation Efficiency (GUE) – however this does not mean that electric heat pumps are more efficient.

The CoPs stated for electric heat pumps often relate to low temperature heating systems and higher air temperatures. In more typical heating systems operating at higher system temperatures in the winter, efficiency rapidly drops off.

The electricity used has typically been generated in the UK from coal or gas fired power stations and then distributed over long distances. This means that typically, less than 40% of the primary energy actually reaches the electric heat pump. The high cost of generating and distributing electricity is reflected in the price which is typically three times more expensive than gas.



Case study – Endike Primary School, Hull

With the previous school building having been on the same site for over 80 years, Endike Primary School was selected for the development of an entirely new school under the Primary Capital Programme (PCP). Endike Primary is a £6million state-of-the-art facility which can host over 420 students and a 26 place full time equivalent nursery.

To ensure the incoming heating system met each of these strict regulations, the principle contractor, Sewell Group, appointed Binks Building Services (BBS) who liaised with Bosch Commercial and Industrial and agreed with the installation of six GWPL38 gas absorption heat pumps in a cascade arrangement meeting all requirements set out by Endike Primary.

Linda Burrows, Head teacher of Endike Primary School, comments: “Endike Primary is a state-of-the-art facility using the latest technologies. It was important to the school’s Governing Body, the Local Authority and myself that we adopted the same approach to the heating system.

“The aftercare provided by Bosch has been second to none. Once the installation was complete they took the time to re-visit the premises on more than one occasion.”

Solar thermal flat plate collectors

The complete solar solution

Capturing and utilising solar energy to provide effective sustainable water and space heating for large-scale commercial installations is now a reality with our versatile solar thermal systems. Our range of flat panel collectors, accessories and controls will not only preserve valuable fuel and help reduce heating costs, but will also help protect our environment.

Lifestyle



Lifestyle flat plate collectors

Lifestyle collectors offer both quality and value for investors wishing to upgrade their heating system with renewable technology. The robust fibreglass collector offers outstanding durability and a superb price/performance ratio. Excellent compatibility with existing heating equipment and straightforward rooftop installation saves time and money, and ensures a hassle-free energy saving solution.

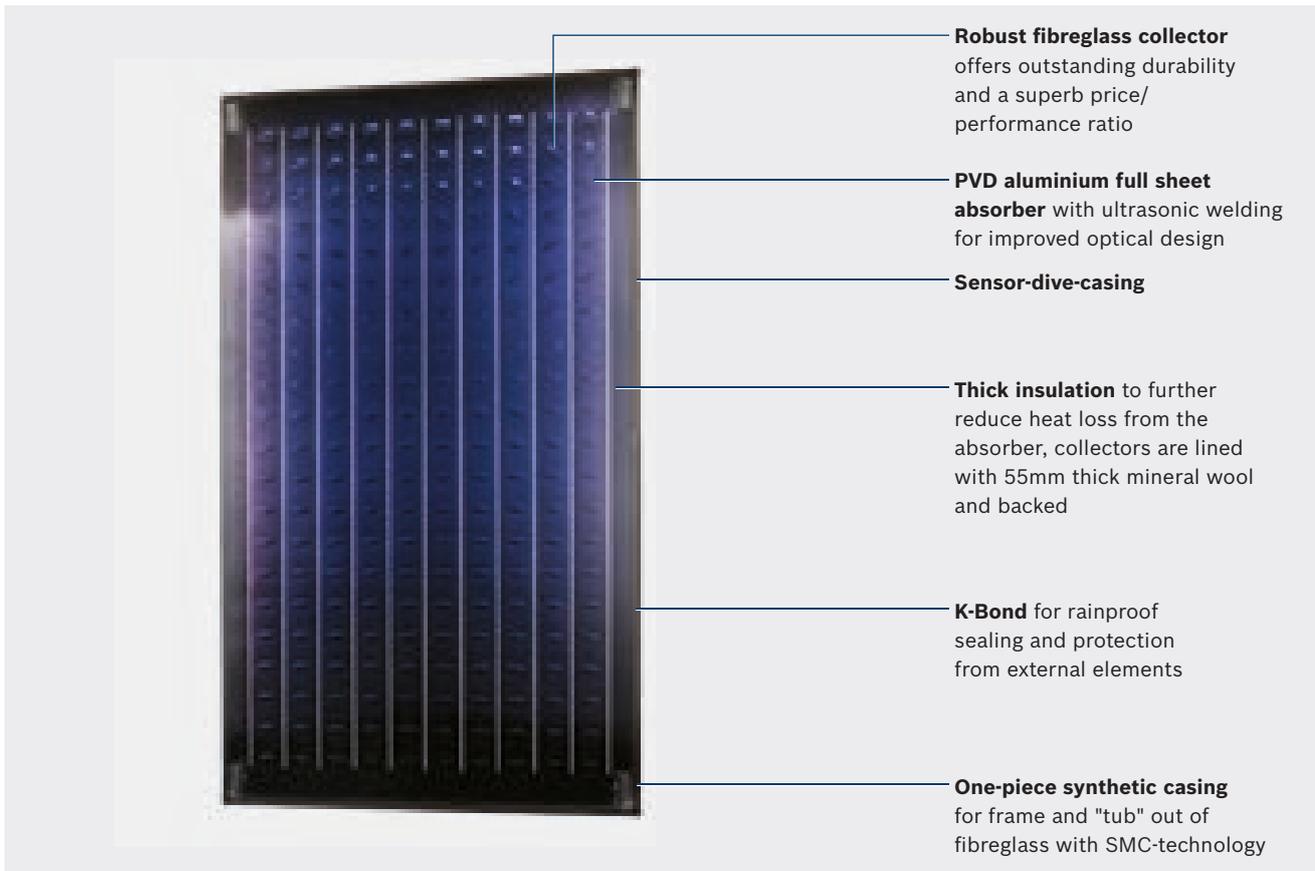
This collector is highly versatile as it can be installed in-roof, on-roof, and as a flat-roof or façade. It is also available in a portrait and landscape format. It provides a high level of efficiency and is the optimum choice for most installations.

Features and benefits of solar at a glance:

- ▶ Free renewable energy
- ▶ Minimum additional space requirements as normally installed at roof level
- ▶ Straightforward modular installation
- ▶ Reduces a property's carbon footprint
- ▶ Less wear and tear on your boiler
- ▶ Visible demonstration of environmental responsibility
- ▶ ErP compliant low energy modulating pump stations.

*Supplied under the Worcester brand.

** Source: Energy Saving Trust



Case study – Cundiff Court, Manchester

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.

Having worked together on previous installations, Eastlands contacted Bosch to provide a solution.

After conducting a site review and taking into account the requirements set out by Eastlands, Bosch recommend the use of six 100kW GB162 light commercial boilers within a small scale district heating scheme to feed the entire apartment block.

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, concludes: "By working closely with Bosch, we now have a heating and hot water system which not only meets current legislation and provides energy efficiencies, but also takes into account the health and safety of our residents."

Intelligent controls

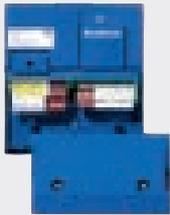
EMS control system

An Energy Management System (EMS) is a state-of-the-art technology that allows the heating engineer quick and easy access to all functions of the boiler and has a standard operating system that works in harmony with our extensive range of controls.

BC10



EM10



BMS interface
unit for GB range
of boilers

EMS controls that adapt to your needs

EMS allows the control system and the automatic firing system in the boiler to communicate with one another. This ensures smooth interaction between the boiler and the burner, and a much smoother and more efficient operation of the system. These control units are designed to control up to two heating circuits in smaller commercial installations. In larger commercial heating systems or where the applications are more complex, EMS communicates directly with the high-performance 4121, 4122 or 4323 control systems. EMS compatible boilers are GB162, GB312 and GB402.

RC35 modular controller

Using the RC35 controller units allows the heating to be conveniently controlled from virtually anywhere. They can be installed in the boiler or remotely where they can also be used as room thermostats. The RC35 can regulate up to 4 heating circuits, in room temperature dependent or weather-compensated modes. RC35 Digital Programmers have a plain text display for the input of heating system operations and for communication of boiler diagnostics and servicing messages. They can be fitted either on the boiler or wired to the boiler from the living or working space.

When using the RC35 for a single heating circuit it must be used in conjunction with a WM10 module to monitor the low loss header. Thereafter, the choice of module is system dependent, being dictated by whether the system has additional mixed temperature heating, unmixed

heating or solar thermal circuits. The RC35 is used on single boiler installations.

Part of the RC35 controls series is the EM10, which acts as a simple interface to an external controls system by providing an input for a 0-10V signal and supplying a volt free fault contact. Please note there is a requirement to install one EM10 per boiler while the external controls systems looks after the sequencing.

MCM10 Cascade Sequencing Controller

Compatible with existing BMS systems, the MCM10 sequences the lead boiler of a cascade to spread the usage. It interprets a 0-10V signal from the BMS and modulates the output of the boilers connected to the system demand in the most efficient way. One MCM10 can control up to 4 boilers and 4 can be linked together, providing control up to 16 boilers.

RC35



WM10



MCM10



4000 series controls

The function of a BMS system at a fraction of the cost

For larger commercial heating projects even greater control possibilities are available with the modular 4000 series. The 4000 series of controllers provides a wide range of control options for single and multi-boiler systems.

Applications for EMS with 4000 series:

- ▶ Cascade switching
- ▶ Extendable – control up to 256 heating circuits
- ▶ Use in conjunction with other heat sources such as solid fuel boilers, heat pumps, etc.

4121/4122



Digital controllers for wall hung boilers and cascades

4211



Digital controller for single boilers

4321



Digital master controller for single or cascaded boilers

MEC2 and BFU

The MEC2 Digital Programmer with its simple ‘press and turn’ operation makes setting and changing options easy.

The BFU is a remote control which allows the boiler to be adjusted from the living or working space. It is supplied with a room temperature sensor.

FM458 Boiler Sequencing Module

The FM458 can control the modulation and sequencing strategy of up to 4 boilers (up to 8 boilers in total when using 2 FM458 controls) and can control one additional unmixed heating circuit. A 0-10V input with provision for a common alarm signal, for use with the BMS control.

Solar controls

B-sol100-2 Controller

The B-sol100-2 provides control for systems with one solar storage cylinder. Collector and cylinder temperatures, pump speed and run hours can all be displayed in real-time, using the simple “push & turn” menu and animated LCD screen. This controller communicates with a fully modulating, low energy pump station, ensuring minimised energy usage at standby to full power, and every stage in between.

CS200 Controller plus MS200 Module

The CS200, installed with an MS200 Module, can control multiple hydraulic systems of variable complexity, central heating and even swimming pools. Different areas of the system can be visualised and monitored on the animated

graphic display. The CS200 and MS200 is also capable of controlling two collector fields with separate pumps mounted in different directions e.g. east/west splits. Control of a fully modulating, low energy pump ensures minimised energy consumption.

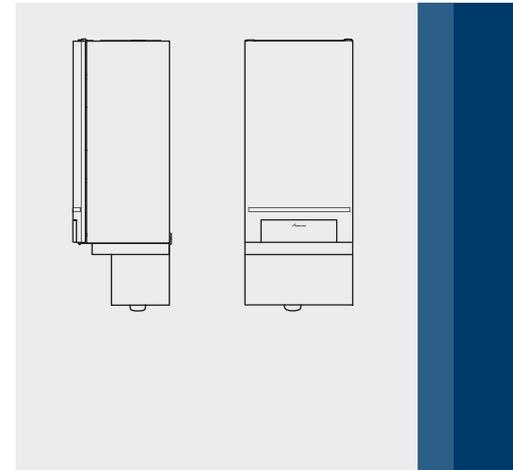
FM443 Solar Module

The intelligent FM443 solar module allows optimum solar and heating functionality. With this fully integrated Energy Management System, the boiler recognises the solar output and delays firing the boiler for as long as possible by continuously monitoring the changes in the heat demand. An additional accessory is available to control the modulation of an ErP compliant pump.

Technical data for GB162, CWi47, HIU and GB312

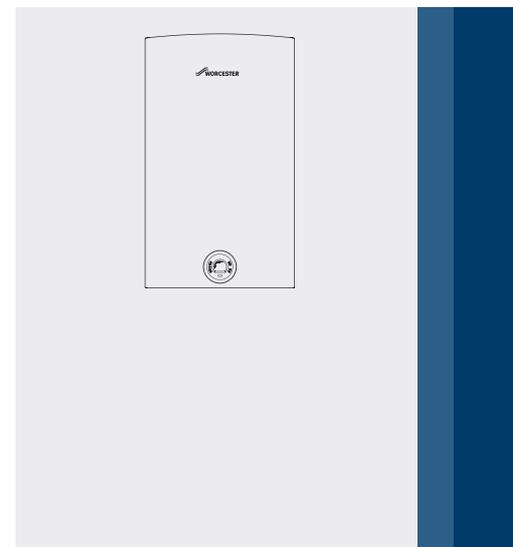
GB162	50kW	65kW	80kW	100kW
Efficiency % (NCV)	110	108	110	110
ErP seasonal efficiency class	A	A	N/A	N/A
ErP seasonal efficiency	93%	92%	N/A	N/A
Seasonal efficiency % (as L2B)	95.9%	95.5	95.7	96.1
Nominal heat output (80/60°C) kW	14.2 - 46.6	14.2 - 60.5	18.9 - 80.0	19.0 - 94.5
Nominal heat output (50/30°C) kW	15.6 - 49.9	15.6 - 65.0	20.8 - 84.5	20.5 - 99.5
Rated heat input (kW)	14.6 - 47.5	14.6 - 62.0	19.3 - 82.0	19.3 - 96.5
Flow temperature (°C)	30 - 90	30 - 90	30 - 90	30 - 90
Maximum working pressure (bar)	4	4	4	4
Weight (without pump group) (kg)	70	70	70	70
Height (with pump group) (mm)	1414	1414	1414	1414
Width (mm)	520	520	520	520
Depth (mm)	465	465	465	465

Cascades of up to 8 boilers available. For full details on cascade system specifications please visit www.bosch-industrial.co.uk

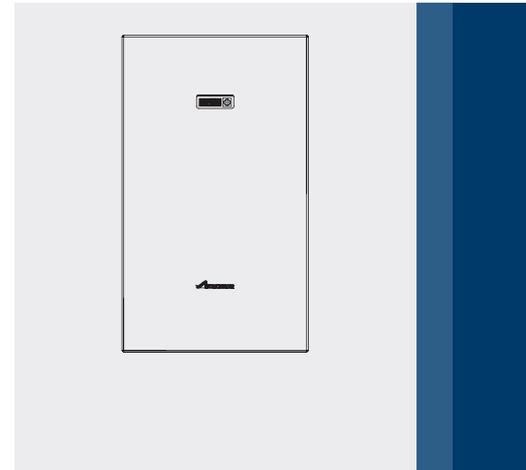


CWi47	50kW
Efficiency (%)	104
ErP water heating energy efficiency class	A
ErP water heating energy efficiency class (declared load profile)	86% (XXL)
Nominal output (kW)	50.3
Maximum output (kW)	50.3
Minimum output (kW)	6
Maximum water pressure (bar)	12
Minimum operating pressure (bar)	0.5
Minimum water pressure for maximum flow (bar)	2.5
DHW flow rate @ 35°CΔT (l/min)	20.6
DHW flow rate @ 25°CΔT (l/min)	28.8
Weight (kg)	34
Height (mm)	775
Width (mm)	452
Depth (mm)	286

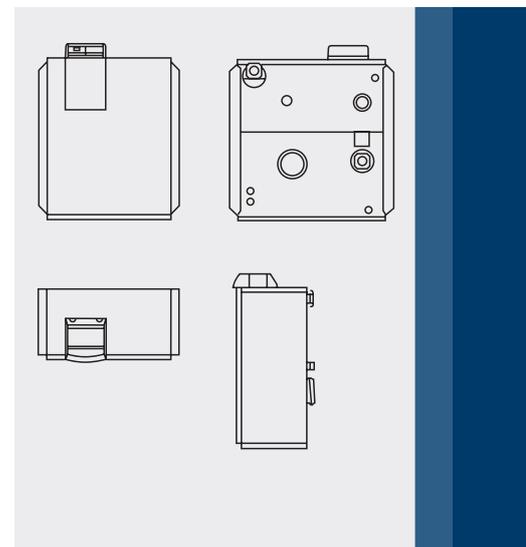
Cascades of up to 12 units available. For full details on cascade system specifications please visit www.bosch-industrial.co.uk



HIU	15kW for space heating, up to 52kW for DHW
Maximum flow temperature secondary heating (°C)	70
Maximum flow temperature DHW (°C)	52
Maximum working pressure district heating side (bar)	10
Pressure release valve setting secondary heating side (bar)	3
Maximum working pressure domestic hot water side (bar)	10
Weight (kg)	24.6
Height (mm)	741.5
Width (mm)	440
Depth (mm)	361



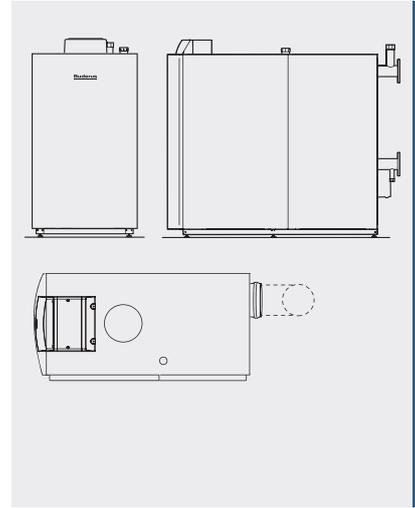
GB312 (single boiler)	90kW	120kW	160kW	200kW	240kW	280kW
Efficiency % (NCV)	108	108	108	108	108	108
Nominal heat output (50/30°C) kW full load	90	120	160	200	240	280
Nominal heat output (80/60°C) kW full load	84	113	150	187	225	263
Maximum flow temperature (°C)	85	85	85	85	85	85
Maximum working pressure (bar)	4	4	4	4	4	4
Flue temperature (80/60°C) part load	58	57	56	58	56	58
Flue temperature (80/60°C) full load	70	78	77	76	75	78
Flue temperature (50/30°C) part load	34	33	30	33	33	33
Flue temperature (50/30°C) full load	50	56	54	55	55	56
Weight (kg)	205	205	240	265	300	330
Height max inc. controls (mm)	1532	1532	1532	1532	1532	1532
Width (mm)	994	994	1202	1202	1410	1410
Width for access (mm)	612	612	612	612	612	612
Depth (mm)	717	717	717	717	717	717



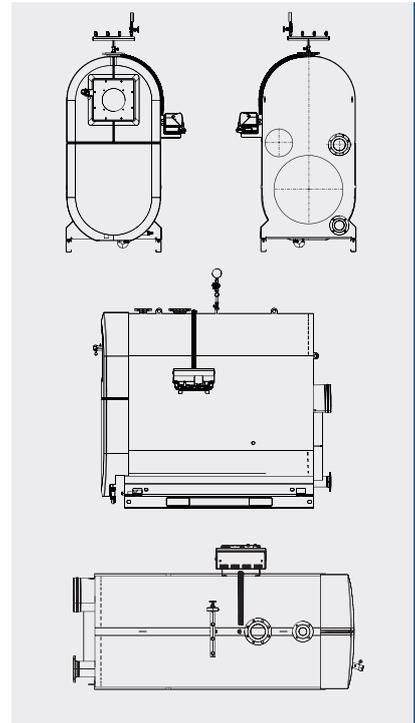
Cascades of 2 boilers available. For full details on cascade system specifications please visit www.bosch-industrial.co.uk

Technical data for GB402, SB745, GE515, GE615 and Uni 3000 F

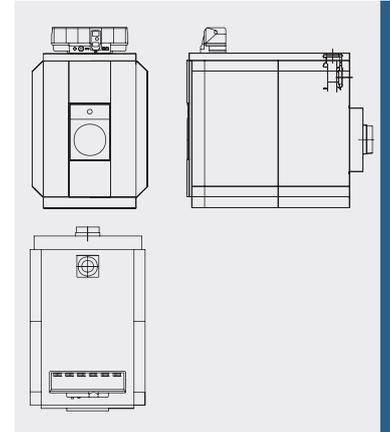
GB402 (single boiler)	320kW	395kW	470kW	545kW	620kW
Efficiency % (NCV)	110	110	110	110	110
Nominal heat output (80/60°C) kW	58.9-297.2	72.6-367.4	85.2-435.8	100.7-507.0	114.9-577.1
Nominal heat output (50/30°C) kW	66.7-320.0	80.5-395.0	95.6-468.2	113.0-545.0	127.6-621.4
Maximum flow temperature (°C)	30-85	30-85	30-85	30-85	30-85
Maximum working pressure (bar)	6	6	6	6	6
Flue temperature (80/60°C) part load	58	58	58	58	58
Flue temperature (80/60°C) full load	65	65	65	65	65
Flue temperature (50/30°C) part load	30	30	30	30	30
Flue temperature (50/30°C) full load	45	45	45	45	45
Weight (kg)	410	438	465	493	520
Height (mm)	1593	1593	1593	1593	1593
Width (mm)	844-938	844-938	844-938	844-938	844-938
Depth (mm)	1744-1869	1744-1869	1744-1869	1744-1869	1744-1869



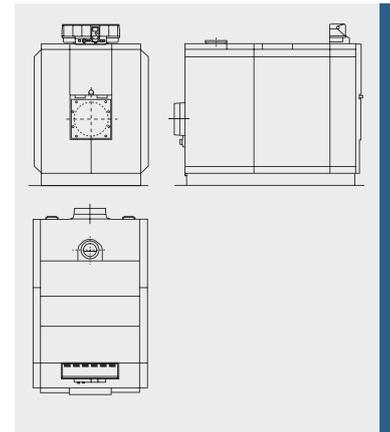
SB745	800kW	1000kW	1200kW
Efficiency % (NCV)	108.9	108.2	108.9
Nominal heat output (50/30°C) kW	800	1,000	1,200
Nominal heat output (80/60°C) kW	725	906	1,090
Maximum flow temperature (°C)	110	110	110
Maximum working pressure (bar)	6	6	6
Weight (without burner) (kg)	1510	1760	1790
Height (mm)	2014	2192	2192
Width (mm)	960	1040	1040
Depth (without burner) (mm)	2545	2580	2580



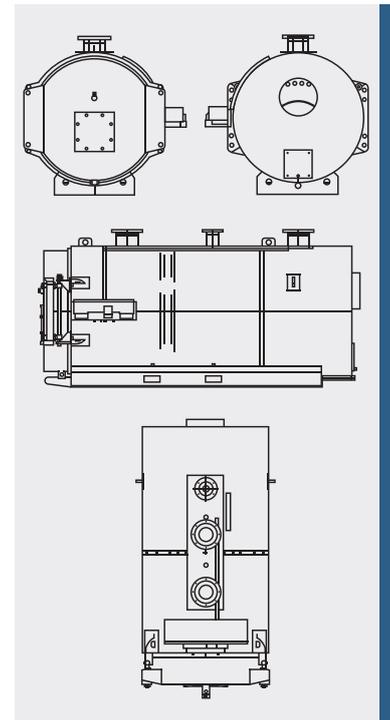
GE515 – supplied sectional	455kW	510kW
Efficiency % (NCV)	96	96
Nominal heat output (kW)	401-455	456-510
Maximum flow temperature (°C)	120	120
Maximum working pressure (bar)	6	6
Weight (without burner) (kg)	1900	2060
Height maximum inc. controls (mm)	1556	1556
Width (mm)	980	980
Depth (without burner) (mm)	2040	2210



GE615 – supplied sectional	570kW	660kW	740kW	820kW	920kW	1020kW	1110kW	1200kW
Efficiency % (NCV)	96	96	96	96	96	96	96	96
Nominal heat output (kW)	511-570	571-660	661-740	741-820	821-920	921-1020	1021-1110	1111-1200
Maximum flow temperature (°C)	120	120	120	120	120	120	120	120
Maximum working pressure (bar)	6	6	6	6	6	6	6	6
Weight (without burner) (kg)	2505	2747	2990	3232	3475	3710	3953	4147
Height maximum inc. controls (mm)	1826	1826	1826	1826	1826	1826	1826	1826
Width (mm)	1281	1281	1281	1281	1281	1281	1281	1281
Depth (without burner) (mm)	1804	1974	2144	2314	2484	2654	2824	2994



Uni 3000 F	420kW	500kW	600kW	730kW	820kW	1040kW	1200kW	1400kW	1850kW
Efficiency % (NCV)	93	93	93	93	93	93	93	93	93
Maximum flow temperature (°C)	105**	105**	105**	105**	105**	105**	105**	105**	105**
Length (mm)	2142	2075	2320	2270	2469	2600	2882	3050	3340
Width (mm)	1040	1040	1040	1040	1040	1250	1250	1390	1510
Total height (incl. control unit*) (mm)	1320	1430	1430	1430	1430	1470	1470	1610	1730
Boiler height (mm)	1100	1210	1210	1320	1320	1475	1475	1612	1730
Flue gas connection (mm)	250	300	300	350	350	350	350	400	400
Boiler flow/return connection (DN)	80	100	100	125	125	125	125	150	200
Installed weight (kg)	1267	1474	1652	1967	2135	2612	3012	3999	5255
Transportation weight (kg)	900	1040	1150	1360	1460	1790	2070	2660	3600



*Control unit on the boiler. **Safety cut-out 120°C.

Training – keeping you up to speed with the latest technology

Bosch Thermotechnology Ltd. is as renowned for the quality of its training as it is for the quality of its products. Training that enables specifiers and installers to keep up to speed with the latest regulations, as well as the most recent products to enter the market.



Many Bosch training courses are LOGIC approved



Bosch offers CHP, District Heating and BIM Fundamental CPD training

Our technical training officers, who have many years' experience as heating technicians, combine practical installation tips with heating theory and legislative requirements, ensuring a thorough understanding of all aspects of the application.

State-of-the-art facilities

The home of our training operations is at our purpose-built training facility in Worcester. The Worcester expanded facility includes life-size single-storey buildings with working appliances to simulate real installations.

Bosch also has Training and Assessment academies at West Thurrock and a brand new £1.2 million facility in Wakefield.

All aspects of assembly, installation, fluing and control options are explained in detail. With our help, you will be equipped with the skills to ensure that both you and your customers achieve the maximum benefit from our product range.

We also run certified commercial ACS courses equipping installers with the relevant qualifications for the changeover from domestic to commercial gas work.

Onsite training

As part of our customer offering, we are happy to deliver one-to-one training onsite for commissioning and setting up of controls.

CPD training

Bosch Commercial and Industrial now offers a CIBSE accredited Continuing Professional Development (CPD) for CHP, District Heating and BIM Fundamentals. The training courses, which count towards your CIBSE CPD requirement, can be held at your premises as well as being tailored to meet your exact requirements.

Apply now

If you would like further information, or to book a place, you can contact our training team on **0330 123 0166** or email training@uk.bosch.com



Training courses	Content	Duration
Commercial ACS course CODNC01	Changeover qualification from domestic to commercial, including CIGA1.	5 days
CHP overview course	Product overview, systems and controls.	1 day
CHP CPD	Product overview, module sizing, installation considerations, legislation incentives	2 hours
GB162	Features and benefits, energy efficiency and legislation requirements.	1 day
Heat Interface Unit	Product overview, systems, controls, installation and commissioning.	1 day
District Heating CPD	Technology overview, design considerations, integration of renewables, grant funding and guidance available for Local Authorities.	2 hours
Continuous flow water heater	Product overview, installation, commissioning, servicing and maintenance.	1 day
Gas Absorption Heat Pump	Product overview, systems, controls, installation and commissioning.	1 day
Solar thermal	Installation of panels, system design, Bosch solar components, commissioning, servicing, basic fault finding.	1 day
Commercial controls	Guide to the varied range of Bosch control options that are available with the commercial boiler range. Controls covered: RC25, RC35, 4000.	2 days
BIM Fundamentals CPD	BIM overview, who it applies to and how to use BIM files	1 hour

Overview of the **complete product range**

With an extensive product range of energy-efficient cast iron boilers, stainless steel boilers, the latest aluminium condensing boilers and an extensive renewable range, we can provide the complete heating and hot water solution. For more information please call **0330 123 3004** or visit **www.bosch-industrial.co.uk**

Condensing wall hung boilers



- ▶ **GB162 (50 - 100kW)**
The GB162 is a stylish and remarkably compact condensing gas boiler. Up to 110% efficiency, quiet and easy to install and maintain.
- ▶ **GB162 Cascades (up to 800kW)**
Boilers can be installed in an innovative in-line or back-to-back cascade system of up to 8 boilers, with just 4 boilers back-to-back giving a 400kW output in just 1m².

Continuous flow water heater



- ▶ **CWi47 (50kW)**
With an output of 50kW, the CWi47 instantaneous water heater is ideal for use in high-end residential, and both small and large commercial applications.
- ▶ **CWi47 Cascades (up to 600kW)**
Up to 12 appliances can be cascaded in parallel, offering a combined flow rate of up to 250 lts/min.

Heat interface unit



- ▶ **Heat Interface Unit (HIU)**
The Heat Interface Unit (HIU) provides domestic hot water and space heating to properties that are serviced from district heating or centralised boiler plants.

The HIU comprises of two heat exchangers, one for providing instant domestic hot water at a regulated temperature and the second for space heating within the property.

Floor standing boilers

Condensing pre-mix aluminium



- ▶ **GB312 (90 - 280kW)**
A compact floor standing, condensing gas boiler, the GB312 is suitable for room-sealed or open flue systems and is fitted with a cast aluminium heat exchanger.
- ▶ **GB312 Cascades (180 - 560kW)**
Available as a two boiler cascade where higher outputs are required.
- ▶ **GB402 (320 - 620kW)**
A floor standing, condensing gas boiler, the GB402 is fitted with a cast aluminium heat exchanger and thermally-insulated boiler body.
- ▶ **GB402 Cascades (640 - 1,240kW)**
Can be used as a multiple boiler cascade where higher outputs are required.

Condensing stainless steel



- ▶ **SB745 (800 - 1,200kW)**
High-performance gas condensing boilers with precision-engineered condensing heat exchangers made of high-quality stainless steel and with compact dimensions for easy installation.

High efficiency cast iron



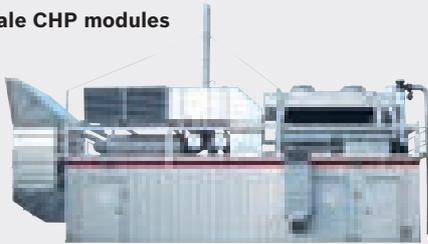
- ▶ **GE515 (455 - 510kW)**
 - ▶ **GE615 (511 - 1,200kW)**
- The GE range is particularly well suited for replacement boilers, or where access to the boiler room is restricted. They offer high efficiency and allow very simple, cost-effective hydraulic system design.

Combined heat and power

CHP modules



Large-scale CHP modules



CHP CE NA (12 - 400kWe)

- ▶ CE12 NA
- ▶ CE19 NA
- ▶ CE50 NA
- ▶ CE70 NA
- ▶ CE140 NA
- ▶ CE240 NA
- ▶ CE365 NA
- ▶ CE400 NA

Combined heat and power (CHP) offers a more efficient way of generating heat and electrical power compared to conventional methods.

CHP modules (600kWe - 2MWe)

Available with outputs up to 2MWe, this bespoke solution can generate heat and electricity by using natural gas, biogas, sewage gas and landfill gas.

Floor standing industrial boilers

High efficiency steel



▶ Uni 3000 F (420 - 1,850kW)

Extremely reliable multi-fuel steel hot water boilers with the flexibility to make them suitable for a wide range of commercial applications, including district heating schemes when used in conjunction with condensing peak load boilers and CHP modules.

▶ UNIMAT UT-L and UT-M (650 - 19,200kW)

A versatile multi-fuel boiler for larger industrial applications. Has an internal/external stainless steel or galvanised steel condensing heat exchanger.

▶ UNIMAT UT-H and UT-HZ (820 - 38,000kW)

The UT-H and UT-HZ boiler type ensures a reliable and efficient heat supply in the high output range.

Floor standing steam boilers

High efficiency steam boilers



▶ UNIVERSAL U-ND (175 - 3,200kg/hr)

▶ UNIVERSAL U-HD (175 - 1,250kg/hr)

▶ UNIVERSAL U-MB (200 - 2,000kg/hr)

▶ UNIVERSAL ULS (1,250kg/hr)

▶ UNIVERSAL UL-SX (2,600 - 28,000kg/hr)

▶ UNIVERSAL ZFR (18,000 - 55,000kg/hr)

▶ UNIVERSAL ZFR-X (18,000 - 55,000kg/hr)

The high efficiency shell boilers of the proven and reliable UNIVERSAL series over the full spectrum of steam capacities from 175 to 55,000kg/hr.

▶ Heat recovery steam boilers (400 - 4,170kg/hr)

Designed to recover the accumulated flue gas heat from combined heat and power (CHP) plant by converting it into process steam.

Air conditioning technology

Variable Refrigeration Flow (VRF) systems



Climate 5000

- ▶ SDCI Series (All DC Inverter Heat Pump)
- ▶ MDCI Series (All DC Inverter Mini VRF)
- ▶ RDCI Series (All DC Inverter Heat Recovery)

Bosch Climate 5000 VRF range incorporates a host of advanced features, including a brushless DC compressor control, an innovative heat exchanger and several high performance parts, to deliver exceptional energy efficiency for cooling and heating.

Renewable technology

Gas absorption heat pumps



▶ GHP AWO 38 (38.3kW)

The GWPL 38 is a low carbon solution for the delivery of highly efficient, renewable heating for commercial, industrial and residential applications.

▶ GHP AWO 38 Cascade System (76.6 - 205.5kW)

For higher heat demands, the GWPL 38 is supplied in a factory-assembled rig-mounted multi heat pump cascade of up to 205.5kW, and larger cascade systems are available if required.

Solar thermal collectors



▶ Lifestyle

Flat plate collectors using high specification solar technology to maximise the amount of heat captured from the sun.

Comprehensive service: Nationwide and close to you

Our aim is to deliver world class customer service ensuring maximum availability and efficiency of your Bosch system. Our highly skilled service technicians are fully trained on all of the products that we supply. Our focus is to ensure that your equipment is operating safely and in accordance with the applicable regulations and manufacturer's instructions.

Nationwide

Our Bosch service engineers are located nationwide and are there to support you should you need us to maintain your boiler or if you have any issues.

Should a technical issue arise we are there to provide immediate technical support minimising downtime.

Contact Centre

Open 364 days per year we have a dedicated UK contact centre team who can handle all of your enquiries ranging from, spare parts, maintenance, breakdowns, commissioning visits or any other general support.

Our contact centre is open 7 days per week, from:

- ▶ 7am till 8pm Monday to Friday
- ▶ 8am till 5pm on Saturdays
- ▶ 9am till 12 midday Sundays
- ▶ 8am till 4:30pm on Bank Holidays.

Training

All of our experienced service technicians are directly employed by Bosch UK. They are trained on all Bosch products and components and hold industry recognised qualifications.

Equipment

As the original manufacturer, we have the facility to capture and record all relevant information relating to your boiler, from point of manufacture, including all service and maintenance activities, and throughout its entire life.





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Bosch Thermotechnology Ltd. has a policy of continuous research and development and this may necessitate alterations to this specification from time to time. Therefore before preparing for the installation of the appliance it is important that the instructions issued with the unit are carefully read and adhered to. The statutory rights of the customer are not affected. Photographs shown are used for illustrative purpose only. All information is correct at time of going to press. Bosch Thermotechnology Ltd. reserves the right to alter any information where necessary. E&OE.