



Wood biomass  
heating for  
commercial applications

[www.zerobiomass.co.uk](http://www.zerobiomass.co.uk)

## The most powerful, natural and sustainable heating for your business

The Compact and M Series biomass boiler ranges are giants in a world of wood biomass heating. The ranges have been developed to provide renewable energy at an industrial scale, whether for offices, hospitals, schools, estates, retail, industrial or commercial applications as well as social and district heating schemes.

Zero Ridge are the UK's leading supplier of wood biomass solutions, supplying split log, wood chip and pellet boilers, for both domestic and commercial applications. We will help you identify the right boiler for your premises.

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# Why choose Zero Ridge?



With over thirty years experience and over a thousand successful biomass installations, we understand that installing a biomass solution can seem a big step. That's why we offer all of the technical advice and support you will need - from choosing a suitable boiler and fuel to suit your needs, to integrating the system with your existing heating and hot water systems.



This guide is here to help give you an introduction to the different biomass fuels and boilers available and explain the benefits of our range of wood chip and pellet boilers for larger heating applications. If you would like to view our biomass boilers first hand, our approved installation partners will happily take you to one of their previous installations, or you are always welcome to visit our Biomass Training Centre.

Once you have seen the many benefits and decided if a biomass solution is right for you, we will work closely with our installation partner to ensure a smooth installation and handover.

We have built up a UK wide network of specialist partner companies who we work closely with throughout your project. Only those companies with extensive technical and financial resources and a passion for biomass are selected to join our partner program. All Zero Ridge partners then undertake a rigorous training and education scheme to ensure installations are of the highest standard and excellent customer service is always provided leaving you feeling secure in the knowledge that our local specialist is always on hand to support your ongoing requirements.



There is no better way to understand how biomass can benefit you than to see real life examples of the boilers in action.



# Wood biomass





### What is biomass?

Biomass is any carbon based biological material derived from living or recently living organisms. In the context of biomass for fuel this is often used to mean plant based material such as trees or crops.

We all know that trees help the planet, especially young trees. During their life, they absorb CO<sub>2</sub> and give out oxygen. When they are cropped and used for fuel, they release the same amount of CO<sub>2</sub> as they absorbed during their life and are therefore classed as being CO<sub>2</sub> neutral. In contrast, burning fossil fuels such as coal, oil or gas, releases CO<sub>2</sub> into the atmosphere that has been stored for many millions of years.



### Wood pellets

Wood pellets are small, typically 6–8mm in diameter and no more than 15mm long. They are made from processed sawdust and wood chips that have been dried, compressed. When exposed to high pressure, lignin, the binding component in wood, softens and allows the wood product to be shaped and pressed into a pellet.

Their consistent form means wood pellets can be delivered by bag for manual feeding or bulk delivered into a hopper for automatic feeding. Whilst the more expensive of the biomass fuels, wood pellets still offer significant savings against other fossil fuels, whilst still providing an automated heating solution.

### Wood chips

Wood chips are again completely natural and are made from both waste wood and sustainable virgin timber. Wood chip biomass systems are more suitable for larger applications and for those who can utilize a local source or their own wood supply to make the chip.

For high efficiency, wood chip needs to be consistent in size and stored in a covered area that allows air to circulate and naturally dry the chip. Wood chips are consistently the cheapest form of automated



# HDG Biomass boilers

Efficient, reliable heating







## Efficient Biomass Solutions

The HDG is an automatic wood heating system for burning wood chips, coppice, briquettes, shavings, pellets and clean wood waste. The boilers are without doubt one of the finest available; a combination of the latest technology, first class engineering and only the highest quality components give them their deserved



reputation as the leading boiler in their class. With outputs from 45kW to 500kW, they are suitable for use in applications with higher heating requirements including commercial businesses, hotels, district heating systems and larger country properties.

The HDG Compacts are built to the highest engineering standards, encompassing advanced technology to provide a reliable and user-friendly heating solution. The boiler features a number of unique options, including patented delivery



## Areas of application for the HDG Compact

- Public buildings
- Country estates
- Commercial businesses
- Housing associations
- Agricultural enterprises
- Hotels
- Care homes
- Process heating

## Key features

- Highest quality German construction - 20+ years lifespan
- High performance stepped grate
- Unique BRT combustion control for maximum efficiency
- Automatic ignition
- User friendly ash removal system
- Patented rotary feeder for energy savings
- Proven pedigree
- Approved to the highest class for biomass boilers (EN 303-5 Class 5)

# Key features at a glance

Why the HDG Compact stands out in its class



## HDG construction

HDG leads the way in providing the highest quality, most robust wood biomass boilers available. Featuring the very highest engineered augers, a boiler body constructed of welded, tension rod re-inforced 4 to 5mm thick boiler plate and only the highest grade refractory combustion chamber, its easy to see why the HDG Compact has quickly become synonymous with quality and reliability.



## Patented rotary sluice

The patented rotary sluice of the HDG Compact features four independent hardened blades, ensuring optimal fuel dosing at all times, whilst simultaneously ensuring oversized fuel is cut down in size

before entering the stoker auger.

This robust design allows the boiler to burn a wide variety of fuels, including wood chip up to P45/G50 in size. Utilising this multi-bladed sluice reduces power consumption of the motor as a result of the reduced surface area in contact with the outer housing. This is particularly beneficial when using fuels with a higher fines content.

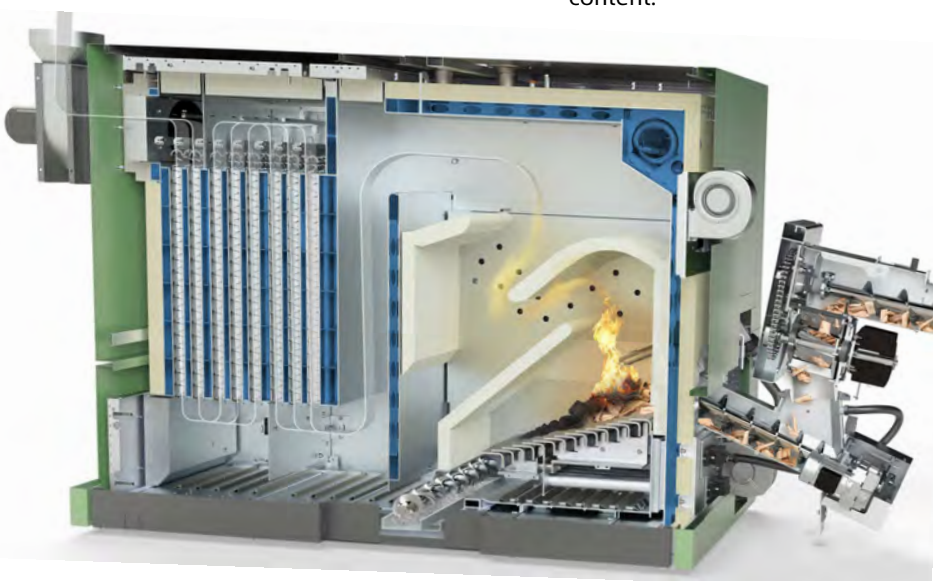


## High performance stepped grate

The moving stepped grate system featured in the HDG Compact insures a continuous operation without periods of reduced output caused by burn-out and start up as required by tipping grate systems. Additionally, the continuous movement of the grate allows for greater fuel variability by keeping the incandescent bed moving. This promotes complete fuel combustion and higher efficiencies, reduced fuel sensitivity and avoids the build up of slag caused by fuels with a low ash melting point.

## BRT combustion control

The HDG Compact features advanced combustion control utilising; lambda sensor, combustion sensor and multiple boilers sensors. With this continuous monitoring, the boiler automatically adjusts fuel rates, primary air, secondary air and fan speeds to ensure optimum combustion efficiency at all times. Importantly, unlike other boilers, the HDG Compact measures combustion temperature in the chamber itself, rather than in the flue way. This leads to a far more accurate reading and negates the effect of incorrect temperature readings as a result of the boiler requiring a service.





### Multifuel boiler

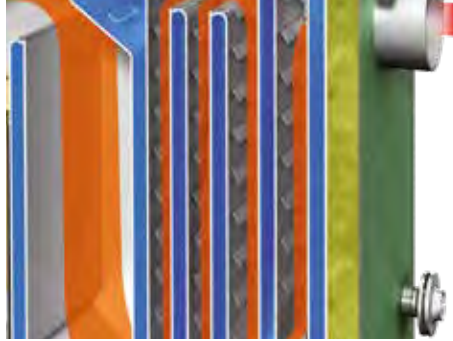
With its variety of feed systems, intelligent combustion control and high performance stepped grate, the HDG Compact can burn a wide variety of fuels including wood chip, wood pellet, shavings, briquettes, coppice and clean wood waste. Each fuel can be pre-saved into the boiler, so a simple press of a button allows the boiler to instantly swap between fuels.

### Variable speed return pump

As standard the HDG Compact provides variable speed control of the return temperature pump. By altering the speed of this pump, the boiler can ensure a wide temperature differential between flow and return to a maximum heat output from the boiler at all times.

### Variable speed flue fan/ cyclone fan

Whether opting for the flue assist fan or the cyclone dust extractor, the HDG Compact features a variable speed fan controller. Featuring a pressure sensor that constantly monitors the flue draught, the boiler alters the fan speed to ensure optimum flue conditions and maximum combustion efficiency at all times.



### Vertical heat exchanger

The vertical cleaning turbulators of the HDG Compact ensure a thorough cleaning of the surface each time the system is operated. Its vertical nature ensures any fly ash buildup is scraped off the exchanger and falls to the base of the boiler where it is augured directly into an ash container for quick and simple removal.



### Modern control

The HDG Compact utilises one of the most advanced combustion control systems available, utilising a programmable logic control (or PLC for short). The PLC controller offers many advantages over the alternatives used, including the ability to withstand vibrations, temperature, humidity and noise, interfaces for multiple inputs and outputs and easy programming for tailored heating solutions.

### Moveable cleaning turbulators

Hinged arm cleaning turbulators provide the most effective means of cleaning the heat exchanger surface.

# A case for a Country Hotel

With over 1,000 installations we have a case study for every scenario

## Country House

Boiler	Compact 200
Fuel delivery	FRA flexiblade
Application	Country House
County	Powys
Fuel Type	Wood chip
Fuel storage	Existing



Penpont House is a Grade I listed house situated in the heart of the Brecon Beacons. Looking for a solution to reduce the high energy costs, move to a greener solution and utilise the estates own woodland, the Hogg family

commissioned Zero Ridge to design a biomass solution. Utilising a Compact 200 wood chip boiler, 4000 litre accumulator and district heating network, the centralised boiler provides a plentiful supply of energy to a number of buildings, including the main house, Dower house and workshops.





## Country Hotel

Boiler	Compact 200
Fuel delivery	FRA flexiblade
Application	Hotel
County	Cumbria
Fuel Type	Wood chip
Fuel storage	Existing

Warwick Hall is a classic country house hotel nestled in the Cumbrian countryside. Previously heated with oil, the owners wanted to remove the existing oil boilers and utilise the estates own woodlands to provide wood chip to provide a greener and more cost effective heating solution.

After an in-depth design consultation with Zero Ridge, a Compact 200 boiler was selected, utilizing a flexi-blade feed system to deliver fuel from the 15 tonne

chip store. The Zero Ridge biomass system now provides heating and hot water for the hotel and leisure facilities.



# A case for a Country House

With over 1,000 installations we have a case study for every scenario

## Care home Danny House

Boiler	Compact 200
Fuel delivery	FRA flexiblade
Application	Country House
County	West Sussex
Fuel Type	Wood pellet
Fuel storage	Purpose built
Previous Heating	Oil



The grade 1 Danny House is one of England's great country houses and prestigious retirement properties. Nestling at the foot of the South Downs within the National Park, this retirement home offers the best of all worlds. Facing rising oil costs and a growing carbon footprint, the owners decided to look for a biomass system to provide the heating and hot water requirements for the property. After much careful research, the owners opted for a wood pellet system from Zero Ridge. The fully turnkey solution utilised a Compact 200 boiler,

encompassing a 15 ton pellet store and integrated with the existing oil boiler to provide for peak heat loads.





## Poultry Farm Herefordshire

Boiler	8 x Compact 200
Fuel delivery	FRA flexiblade
Application	Poultry farm
County	Herefordshire
Fuel Type	Wood chip
Fuel storage	Existing external
Previous Heating	LPG



The owner of this poultry farm in Herefordshire wanted to switch from his existing LPG heating located within the poultry houses, to a wet heating system providing heat to the sheds in the form of water to air heat exchangers and encompassing a wood chip boiler system to provide this heat.

As the number one supplier to this market, the owner opted for a 1.6MW system comprising of 8 Compact 200 boilers due to the boilers reputation for "reliability and boiler longevity" as well as the boilers ability to burn a wide variety of different

fuels.

The result has seen a significant reduction in fuel costs, income under the Renewable Heat incentive and vastly improved performance of the chickens due to the better environmental conditions within the sheds.

# A case for a University

With over 1,000 installations we have a case study for every scenario

## College

Boiler	Compact 200
Fuel delivery	FRA PSS Vacuum
Application	Country House
County	Hampshire
Fuel Type	Wood chip
Fuel storage	Existing external
Previous Heating	Oil



Lord Wandsworth College is one of the countries leading boarding and day schools, set in 1,200 acres in the Hampshire countryside. With heating of the boarding accommodation undertaken by two inefficient and expensive oil boilers, the

School selected Zero Ridge to replace these aging boilers with a state of the art Energy Cabin and district heating network to provide for the boarders heating and hot water requirements. The new boiler has successfully seen a 50% reduction in the heating bills and significant income under the Governments Renewable Heat Incentive.

Following on from the success of this installation, a second boiler has been installed to heat additional buildings on the campus.







District Heating Hartpury College	
Boiler	4 x Compact 200
Fuel delivery	FRA PSS Vacuum
Application	College Campus
County	Gloucestershire
Fuel Type	Wood pellet
Fuel storage	Energy Cabin
Previous Heating	Oil and LPG



Hartpury Agricultural College is one of the countries leading land-based and sports colleges, teaching over 3,000 students on a campus covering over 360 hectares.

biomass installation, the College have also entered into a 6 year energy supply agreement with Zero Ridge.

Zero Ridge successfully tendered for the installation of an 800kW biomass system to replace a large number of the existing oil and lpg boilers across the site. The system comprises of four Energy Cabins, each comprising of a Compact 200 wood pellet boiler, accumulator and integrated 14 tonne pellet store. In addition to the



# A case for a castle

With over 1,000 installations we have a case study for every scenario

## Croft Castle

Boiler	Compact 200
Fuel delivery	FRA flexiblade
Application	Castle
County	Herefordshire
Fuel Type	Wood chip
Fuel storage	Purpose built plant room and store
Previous Heating	Oil



With an historic 18,000 square foot Castle, several additional properties and an antiquated and expensive oil fired heating system, it was no wonder Croft Castle was selected as a pilot project under the National Trusts Renewable Energy Investment Programme. After demonstrating its class leading equipment, knowledge and resources through an extensive tender selection program, Zero Ridge project managed the entire build of a new boiler house and chip store, holding a 200kW HDG

boiler and 6000 litre thermal store. This energy centre now pipes hot water to all of the buildings for space heating and domestic hot water needs. Not only will this save around £20,000 per annum in heating oil, it also allows the estate to self-supply using timber from the parkland around the castle, whilst earning over £20,000 per year in RHI payments. Part

of a green initiative of the National Trust, it is an exemplar pilot project that will be reproduced in many of their properties throughout the UK.





## District Heating Whitewells Farm

Boiler	Compact 150
Fuel delivery	PSZ auger
Application	Holiday Cottages
County	Worcestershire
Fuel Type	Wood pellet
Fuel storage	Existing external
Previous Heating	Direct electric



A rural retreat that suffered from two major issues; an ineffective heating system and very high electric bills. Whitewells Cottages comprises of a 4 bedroom farmhouse with 7 nearby holiday cottages. The cottages are let year round and, as were previously heated with night storage heaters. Consequently, in the mornings, the guests had all the windows open because they were too warm, whilst several hours later the electric fires would all be on because the heaters had gone cold. This presented

the owner with an annual electric bill in excess £30,000. By installing a Compact pellet system to heat all the units, the electric bill has been replaced by a pellet bill of £10,000. This, coupled with a marked increase in return bookings as a result of warm and cosy stays, has resulted in a very successful business through the use of a biomass system from Zero Ridge.



# A case for a garden Centre

With over 1,000 installations we have a case study for every scenario

## Retail Outlet Huws Gray

Boiler	Compact 200
Fuel delivery	FRA flexiblade
Application	Retail Outlet
County	Herefordshire
Fuel Type	Wood chip
Fuel storage	Purpose built plant



Huws Gray are the largest independent builders merchants in Wales and North-West England. After acquiring a new outlet in Hay-on-Wye, they invested heavily to improve and develop the site, including the installation of a wood pellet boiler from Zero Ridge to provide heating for the retail store. Due to space constraints within the existing store and the requirement to maximise the showroom space available, an Energy Cabin solution featuring a Compact 200 wood pellet boiler and integral fuel store was selected as the optimal biomass

solution. The installation has seen vastly reduced heating bills for Huws Gray, over £20,000 receivable each year under the Governments Renewable Heat Incentive and improved the green credentials of the company.





## Garden Centre Dibleys Nursery

Boiler	2 x Compact 200
Fuel delivery	FRA flexiblade
Application	Nursery
County	Denbigshire
Fuel Type	Wood chip
Fuel storage	Existing building
Previous Heating	LPG



Based in Ruthin, Denbigshire, Dibleys Nursery is a multi-award winning specialist in the supply of indoor plants. Faced with continuously rising fuel prices and a desire to improve their green credentials, the owners of the company commissioned Zero Ridge to design and supply a 400kW wood chip system to provide heat to the glasshouses and associated outbuildings. The installation comprises of two Compact 200 boilers, installed in a cascade solution to provide the full range of modulation for the variable heat load required, utilising

locally sourced wood chip. The fuel is delivered by lorry into a purpose built 30 tonne fuel store, ensuring extended run times between refilling the store.



# HDG - from store to boiler

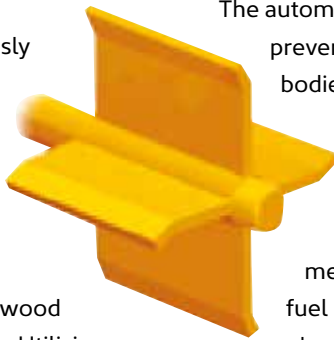
Patented rotary sluice ensure the perfect delivery





## Patented Rotary Sluice

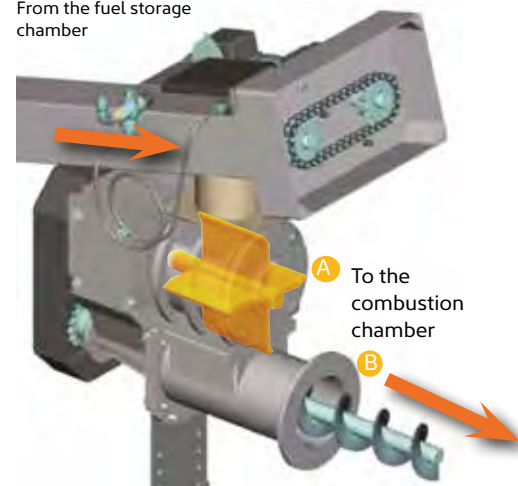
The patented rotary sluice of the HDG Compact features four independent hardened blades, ensuring optimal fuel dosing at all times, whilst simultaneously ensuring oversized fuel is cut down in size before entering the stoker auger. This robust design allows the boiler to burn a wide variety of fuels, including wood chip up to P45/G50 in size. Utilising this multi-bladed sluice reduces power consumption of the motor as a result of the reduced surface area in contact



with the outer housing. This is particularly beneficial when using fuels with a higher fines content. The automatic reversing mechanism prevents damage from foreign bodies by moving the rotary feeder back up to three times when it encounters certain levels of resistance.

The rotary feeder acts a safety mechanism in separating the fuel store from the combustion chamber. In combination with the integrated water extinguisher, it represents operational safety at its highest.

From the fuel storage chamber



The HDG rotary feeder safely separates the combustion chamber from the fuel storage and the fuel transport unit.

### HDG Rotary Sluice



With just four blade tips in contact with the outer sluice casing, resistance is kept to a minimum, resulting in lower power consumption, particularly when burning fuels with a higher fines content.

### Typical Sluice

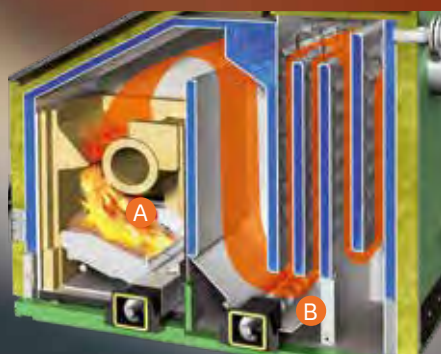


Resistance point

Fines trapped between the horse shoe and the outer casing increase the resistance on the motor and results in increased power consumption.

# Compact moving stepped grate

Ensuring continuous and reliable output



The fuel is continuously walked into the combustion zone by the stepped grate (A) - drying, degassing, and finally burning the fuel in its entirety. The combustion remnants are systematically conveyed into the primary de-ashing auger (B) where they are automatically moved into the ash containers for quick and infrequent emptying.

The stepped grate system provides superior performance in a number of ways, including allowing a sustained and continuous heat output from the boiler. This is in contrast to tipping grate systems that frequently reduces the boiler output due for the need for fuelling to stop and de-ashing to take place.

The continual movement of the grate elements is particularly important when burning fuels with either a high ash content wood chips and coppice and those with low ash melting points (some wood pellets).





### Widest choice of Fuels

The stepped grate technology of the HDG Compact ensures optimum performance is maintained even when the proportion of non-combustible material is increased, making the HDG Compact capable of

burning a wide variety of fuels including wood chip, coppice, pruning, shavings, briquettes, and pellets.



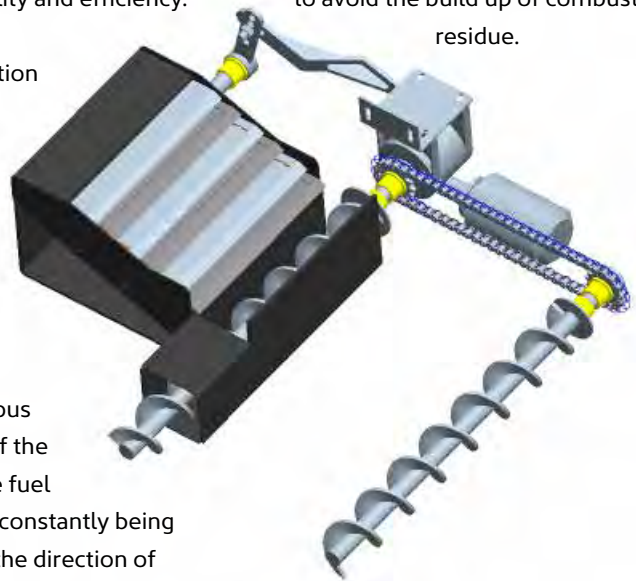
Wood chip, wood shavings, briquettes and pellets,

### The stepped grate is key

To achieve the best efficiency on the widest variety of fuels, the combustion grate is the key component. The HDG Compact incorporates the optimum solution of a moveable stepped grate system to ensure the lowest emissions with the highest reliability and efficiency.

Primary air for combustion is fed underneath the grate to provide both cooling of the grate elements and preheating of the combustion air at the same time, ensuring maximum combustion efficiency. The continuous to and fro movement of the step grate results in the fuel or combustion residue constantly being pushed downwards in the direction of the ash removal system. Unlike tipping

grate systems, the moving stepped grate facilitates a continuous burning cycle and a stable and homogeneous output. This is particularly important when burning fuels with a higher ash content where a tipping grate solution is required to run frequently to avoid the build up of combustion residue.



# Control at your fingertips

The Compact comes complete with a host of advanced technology





### Robust controls

The HDG Compact has a sophisticated control technology through the means of a programmable logic control (or PLC for short).

PLC controllers have many benefits, including:

- The solid state nature of the components gives the ability to withstand tough operating conditions including high temperatures, humidity and vibrations - all particularly important in a biomass plant room.
- Ease of maintenance through the ability to change individual controls rather than change the complete PCB.
- Simple expansion through the use of additional modules.



### Optimal combustion

The precise BRT combustion control system enables the continuous adjustment of the boiler output from 30 to 100%, whilst maintaining optimal combustion efficiencies.

At start up fuel is incrementally fed on to the step grate system and automatically ignited, primary and secondary air is accurately added, ensuring that the fire is quickly established. Once the fire has become established, the controller changes from ignition mode to Lambda control, the controller optimises combustion and emission levels by using information provided by the Lambda sensor. The Lambda sensor continuously samples the flue gas, information gathered from this analysis allows precise primary and secondary air actuator adjustments, this guarantees low fuel consumption and ensures maximum annual efficiencies are achieved.



### Control from anywhere

The HDG Remote Visualisation allows monitoring and control of the system from anywhere in the world on PC, tablet or smart phone. This includes:

- Live real-time monitoring of the boiler
- Adjustment of settings to optimise combustion
- Automatic email of warnings and alerts including automated service requests
- Integration of heat meters and fuel store levels



# HDG M Series

Powerful intelligent heating solution





## Delivering large scale biomass solutions

The HDG M Series boilers have been designed to offer wood biomass heating on an industrial scale. Whether for commercial offices, industrial buildings, country estates or district heating systems, the M Series provides cost effective, clean sustainable energy.

The M Series is capable of burning a wide variety of fuels, including wood chips, coppice, briquettes, shavings, pellets and clean wood waste. Outputs range from 175 to 400kW, with the option of cascading the boilers for larger output requirements.

The boilers have been designed to the latest exacting standards -

meeting the highest classification for a biomass boiler and already achieving future efficiency and emissions standards.

It's impressive box construction is deliberate, offering durable protection for the ingenious heating system within. Combining a number of proven components, together with patented options, such as the delivery system, rotary sluice and electronic combustion control, the HDG M Series is the leading boiler in its class.



### Areas of application for the HDG M Series

- Public institutions
- Municipal bodies
- Commercial businesses
- Housing associations
- Contracting companies
- Agricultural enterprises
- Hotels
- Wood processing
- Process heating

### Key features

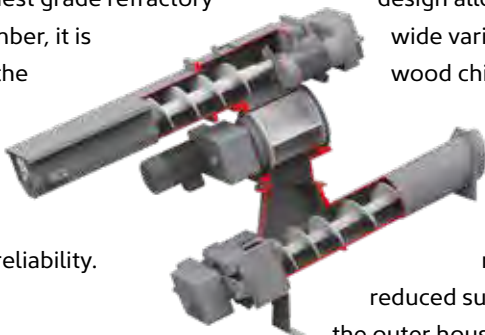
- Up to 60% reduction in energy costs
- 100% reduction in CO<sub>2</sub> emissions
- 100% of heat requirements
- Future proof against carbon tax
- Increased energy efficiency
- Positive green image
- Buildings meet new building regulations "Part L"

# Key features of the HDG M Series



## HDG construction

HDG leads the way in providing the highest quality, most robust wood biomass boilers available. Featuring the very highest engineered augers, a boiler body constructed of welded, tension rod re-inforced 4 to 5mm thick boiler plate and only the highest grade refractory combustion chamber, it is easy to see why the HDG Compact has quickly become synonymous with quality and reliability.



## Patented rotary sluice

The patented rotary sluice of the HDG M Series features four independent hardened blades, ensuring optimal fuel dosing at all times, whilst simultaneously ensuring oversized fuel is cut down in size before entering the stoker auger. This robust design allows the boiler to burn a wide variety of fuels, including wood chip up to P45/G50 in size.

Utilising this multi-bladed sluice reduces power consumption of the motor as a result of the reduced surface area in contact with the outer housing. This is particularly beneficial when using fuels with a higher fines content.



## High performance stepped grate

The two stage moving stepped grate system featured in the HDG M Series insures a continuous operation without periods of reduced output caused by burn-out and start up as required by tipping grate systems. Additionally, the continuous movement of the grate allows for greater fuel variability by keeping the incandescent bed moving. This promotes complete fuel combustion and higher efficiencies, reduced fuel sensitivity and avoids the build up of slag caused by fuels.

The HDG M Series features advanced combustion control utilising lambda sensor, combustion sensor and multiple boilers sensors. With this continuous monitoring, the boiler automatically adjusts fuel rates, primary air, secondary air and fan speeds to ensure optimum combustion efficiency at all times. Importantly, unlike other boilers, the HDG M Series measures combustion temperature in the chamber itself, rather than in the flue way.

This leads to a far more accurate reading and negates the effect of incorrect temperature readings as a result of the boiler requiring a service.





### Multifuel boiler

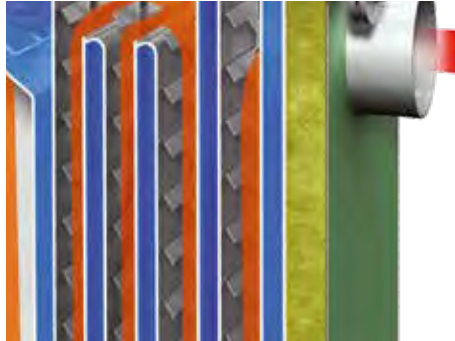
With its variety of feed systems, intelligent combustion control and high performance stepped grate, the HDG M Series can burn a wide variety of fuels including wood chip, wood pellet, shavings, briquettes, coppice and clean wood waste. Each fuel can be pre-saved into the boiler, so a simple press of a button allows the boiler to instantly swap between fuels.

### Variable speed return pump

As standard the HDG M Series provides variable speed control of the return temperature pump. By altering the speed of this pump, the boiler can ensure a wide temperature differential between flow and return to maximum heat output from the boiler at all times.

### Variable speed flue fan

The HDG M Series features a variable speed fan controller. Featuring a pressure sensor that constantly monitors the flue draught, the boiler alters the fan speed to ensure optimum flue conditions and maximum combustion efficiency at all times.



### Vertical heat exchanger

The vertical cleaning turbulators of the HDG M Series ensure a thorough cleaning of the surface each time the system is operated. Its vertical nature ensures any fly ash buildup is scraped off the exchanger and falls to the base of the boiler where it is augured directly into an ash container for quick and simple removal.

Your heating system is available to you anywhere in the world via an internet connection by simply clicking your mouse with HDG Web Visualisation.



### Moveable cleaning turbulators

Hinged arm cleaning turbulators provide the most effective means of cleaning the heat exchanger surface. Unlike spiral turbulators which require a greater distance to the exchanger surface to allow for the higher friction levels, hinged cleaning turbulators clean much closer to the heat exchanger surface and, with their integrated hinge, allow easy maintenance even in rooms with low ceiling heights.

### Control

The HDG Compact utilises one of the most advanced combustion control systems available, utilising a programmable logic control (or PLC for short). The PLC controller offers many advantages over the alternatives used, including the ability to withstand vibrations, temperature, humidity and noise, interfaces for multiple inputs and outputs and easy programming for tailored heating solutions.

# A case for the M Series

The M Series provides heat and hot water on a huge scale

## Country Estate Godmersham

Boiler	2 x M400
Fuel delivery	GRA Rigid Blade
Application	Manor house & estate properties
County	Kent
Fuel Type	Wood chip
Fuel storage	Purpose built



Godmersham Park House, built in 1832, is notable as once being the home of Edward Knight, brother to the novelist Jane Austen. Heated with several oil boilers almost as historic as the house itself, the owners wanted to opt for a more cost effective and environmentally friendly heating system that utilised the estates own woodland to provide chip for the boiler.

wood chip system comprising of two M Series 400kw boilers, 16,000 litres of accumulation, 50 tonne fuel store and 3km district heating circuit to provide heating to all of the properties on the Estate.

Following extensive pre-design discussions and appraisals, an 800kW





## Nursery Deviant Plants

Boiler	M400
Fuel delivery	GRA Rigid Blade
Application	Nursery
County	Gloucestershire
Fuel Type	Wood pellet
Fuel storage	Existing building
Previous Heating	LPG



Based in Gloucestershire, Deviant Plants is a family owned business specialising in the growing of indoor plants. Deviant Plants owners came to Zero Ridge to find a means of reducing their carbon footprint, cut energy bills and provide for a year round growing environment to maximise the yield on the glasshouses. To meet these requirements Zero Ridge specified a 400kW M Series boiler utilising a 25 tonne pellet store to provide extended periods between deliveries and greater economies on fuel purchasing.



# Stepped grate system

Two stage moving grate



The fuel is continuously walked into the combustion zone by the stepped grate (A) - drying, de-gassing and finally burning the fuel in its entirety. The combustion remnants are systematically conveyed into the primary de-ashing auger (B) where they are automatically moved into the ash containers for quick and infrequent emptying.

The stepped grate system provides superior performance in a number of ways, including:

The HDG stepped grate allows a sustained and continuous heat output from the boiler. This is in contrast to tipping grate systems that frequently reduce the boiler output due for the need for fuelling to stop and de-ashing to take place.





## Two stage stepped grate

To achieve the best emission levels on the widest range of fuels, the combustion grate is the key component. The HDG M Series incorporates the optimum solution of a moveable stepped grate system to ensure the lowest emissions with the highest reliability and efficiency.

The combustion air is introduced from underneath the grate, providing air cooling whilst simultaneously preheating the combustion air. For further enhancement, the stepped grate of the M Series is split into two zones to provide the boiler with the ability to effectively reduce output whilst still achieving the highest possible efficiencies.

The continuous to and fro movement of the step grate results in the fuel or combustion residue constantly being pushed downwards in the direction of the ash removal system. Unlike tipping grate systems, the moving stepped grate facilitates a continuous burning cycle and a stable and homogeneous output. This is particularly important when burning fuels with a higher ash content, or where there is increased risk of clinker forming.



## Comprehensive range of fuels to burn

The stepped grate technology of the HDG Compact ensures optimum performance is maintained even when the proportion of non-combustible material is increased, making the HDG M Series capable of burning a wide variety of fuels including wood chip, coppice, prunings, shavings, briquettes and pellets.

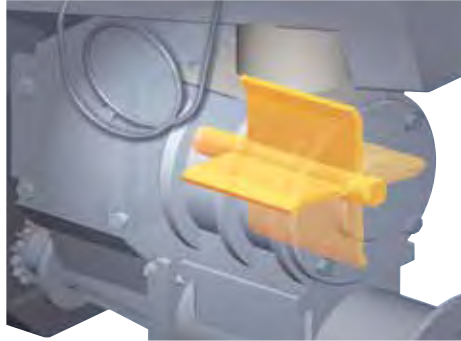


Wood chip, wood shavings, pellets and briquettes.

# Rotary sluice

Ensures optimal fuel dose at all times



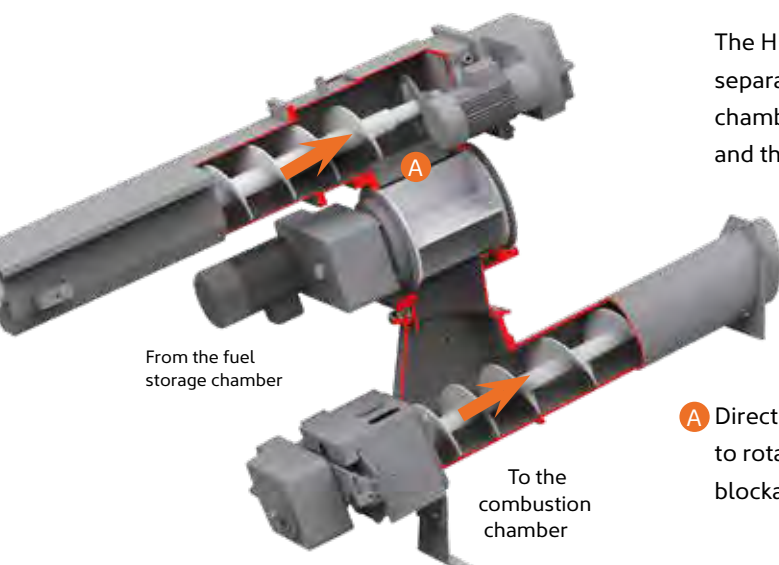


## Rotary sluice

Similar to the Compact series, the The patented rotary sluice of the HDG M Series features four independent hardened blades, ensuring optimal fuel dose at all times, whilst simultaneously ensuring oversized fuel is cut down in before entering the stoker auger. This robust design allows the boiler to burn a wide variety of fuels, including wood chip up to P45/G50 in size. Utilising this multi-bladed sluice reduces power consumption of the motor as a result of the reduced surface area in contact with the outer housing. This is particularly beneficial when using fuels with a higher fines content.

The automatic reversing mechanism prevents damage from foreign bodies by moving the rotary feeder back up to three times when it encounters certain levels of resistance

The rotary feeder acts a safety mechanism in separating the fuel store from the combustion chamber. In combination with the integrated water extinguisher, it represents operational safety at its highest.



The HDG rotary feeder safely separates the combustion chamber from the fuel store and the fuel transport unit.

**A** Direct connection from auger to rotary sluice prevents blockages.

## Benefits of a rotary sluice

### HDG Rotary Sluice



With just four blade tips in contact with the outer sluice casing, resistance is kept to a minimum, resulting in lower power consumption, particularly when burning fuels with a higher fines content.

### Typical Sluice

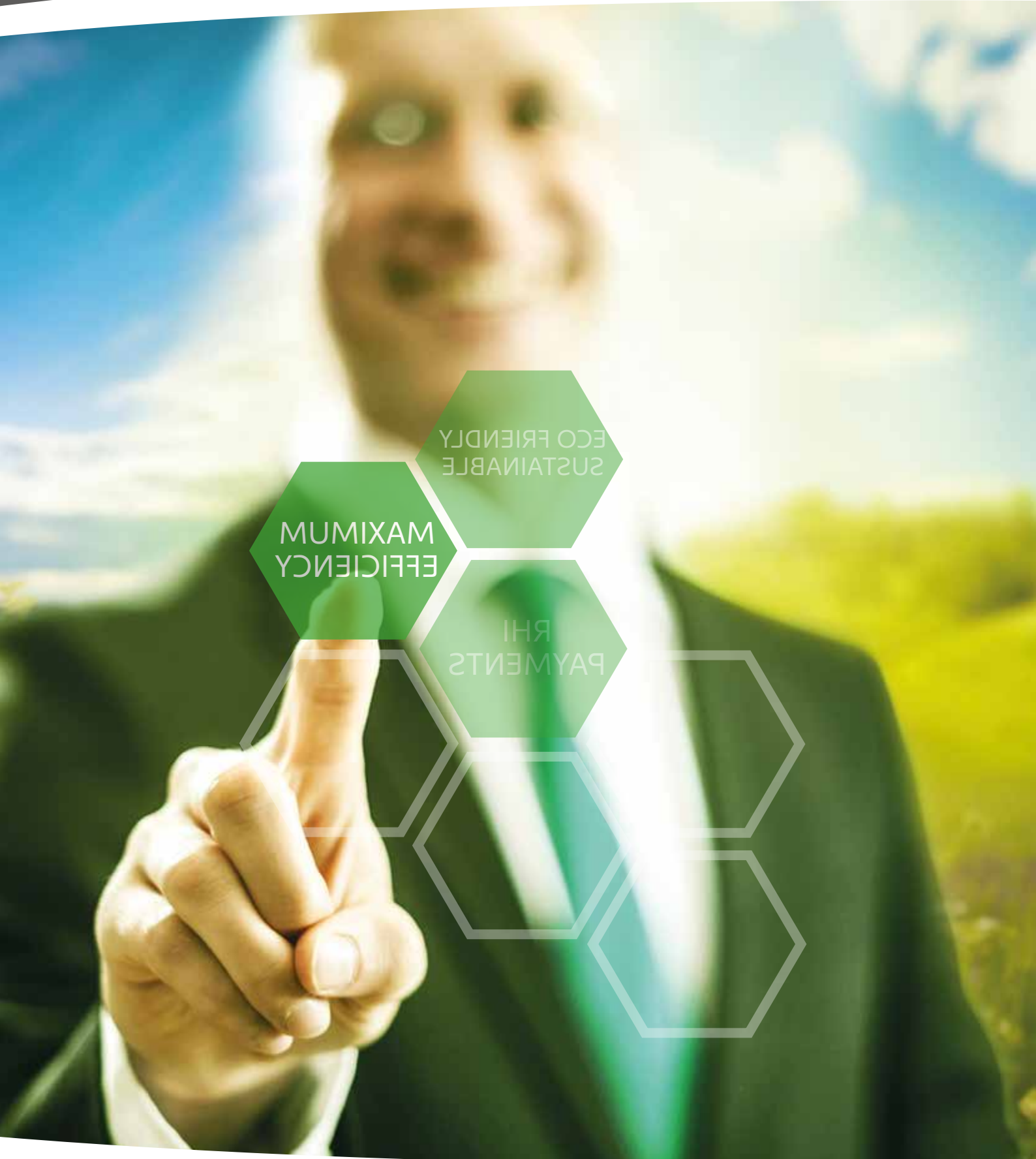


Resistance point

Fines trapped between the horse shoe and the outer casing increase the resistance on the motor and results in increased power consumption

# Maximum efficiency

Natural power and clever design ensures correct burning





## Complete combustion

The M Series combustion chamber has a geometric design that ensures both high turbulence and long retention time of the flue gases to maximise the heat transfer efficiency. Additionally, by retaining the flue gases in the combustion zone for an extended period, the complete combustion of the fuel is achieved and ensures the cleanest of emissions.

Owing to the boiler's unique two stage design, even when operating under partial load, the "hot combustion chamber" provides the necessary temperatures for the lowest possible emissions.



## Combustion in three zones

During combustion of the heating material in the HDG M300-400, targeted air is added by the speed-controlled combustion air fan as well as the controlled airflow cross-sections. There are three different air zones:

### Zone 1 (primary air):

This serves to cool the grate, dries the fuel material in the upper area of the grate in advance, provides for the outgassing of the material and constitutes the main air for the combustion

### Zone 2 (secondary air):

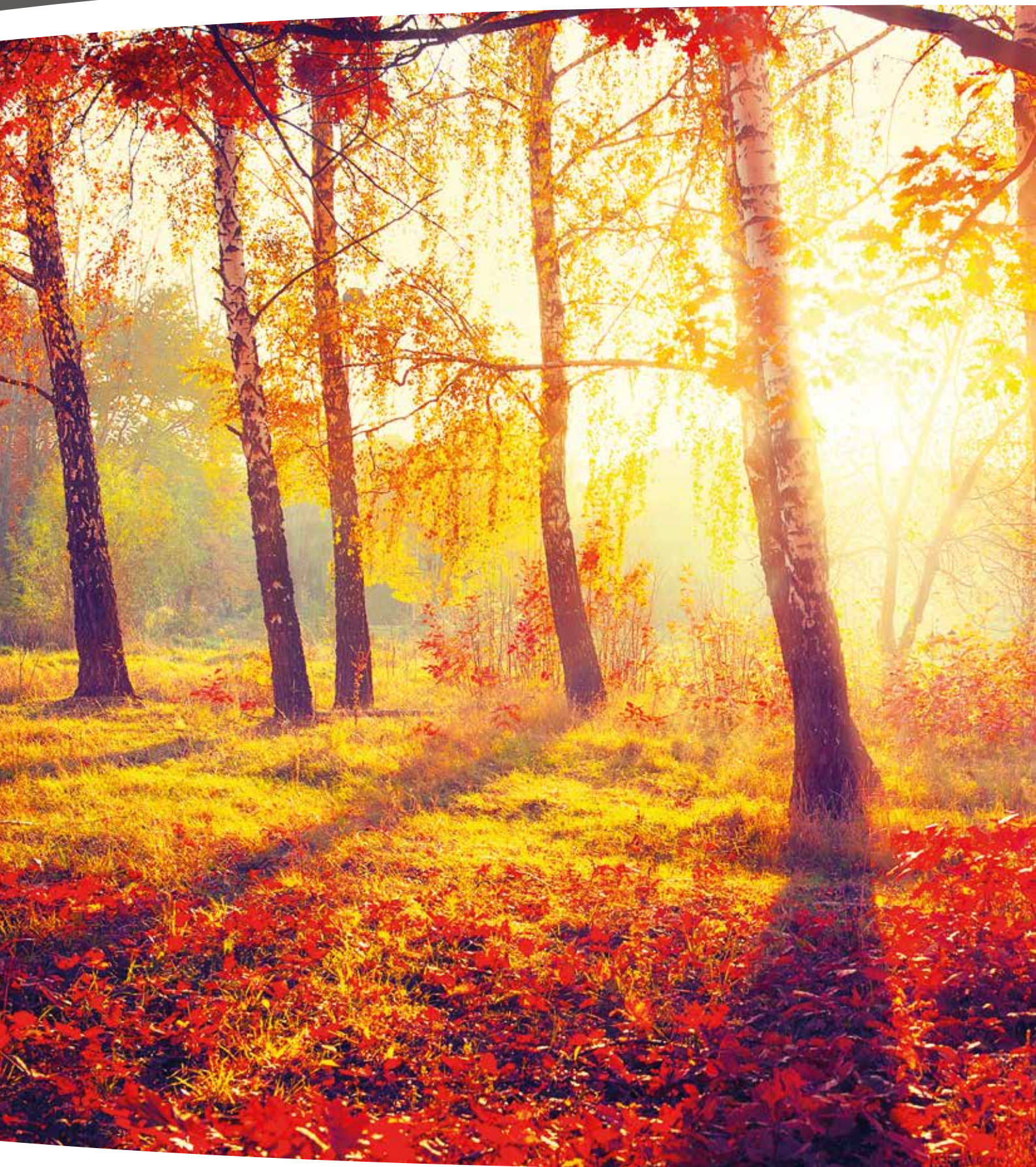
Here air is specifically added to ensure that the combustion is clean and complete. The combustion gases and combustion air are carefully mixed by being redirected in the combustion chamber.

### Zone 3 (tertiary air):

In the last zone, the combustion gases and the pre-heated air are remixed. A very clean combustion with extremely high levels of efficiency is achieved due to the different air zones and the lengthy time that the gases are retained in the combustion chamber.

# Efficient heat transfer

Clean and effective transfer of heat







### Clean heat transfer

After the combustion of the fuel, the M Series is all about the efficient transfer of heat by means of its four-section heat exchanger.

This heat exchanger, connected directly to the combustion chamber is the reason for the clean and effective transfer of heat. Each of the four sections is equipped with vertical heat exchanger tubes, enabling the hot flue gases to pass through these and deliver their heat to the heating water. The cleaning turbulators, which are fitted as standard, ensure that an ideal heat transfer takes place constantly. These clear the vertical heat exchanger tubes at regular intervals, removing fly ash by automatically moving up and down. Moreover, their shape creates further turbulence of the flue gases improving heat transfer and efficiency. The ash scraped off by the turbulators falls towards the bottom of the boiler and is automatically extracted by ash removal augers into the external fly ash containers.

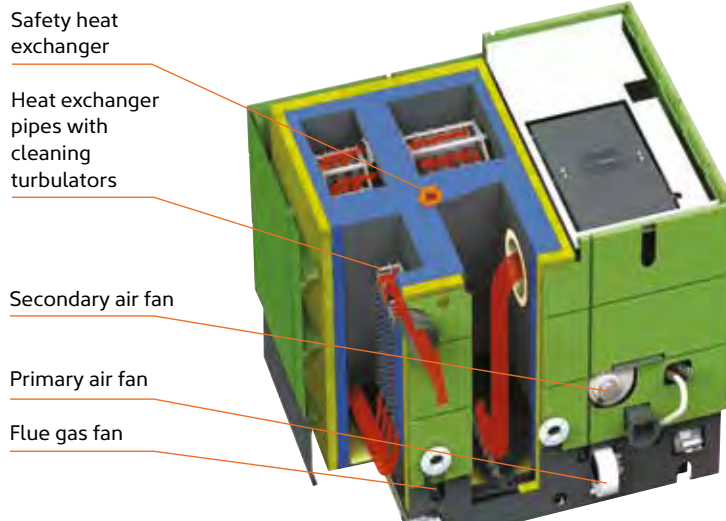
### Out of the boiler – into the bin

The ash produced in the HDG M300-400 is constantly being pushed by the moving step grate towards the ash removal auger. The ash is automatically conveyed into the 240-litre ash bin of the HDG central ash removal system via the ash removal auger and an ascending auger. A second ash removal auger conveys the major part of the fly ash – also automatically – to the central ash removal system. In order to empty the ash bin the locking mechanism is opened and the wheeled bin replaced. This large, independently functioning HDG central ash removal system extends the service and maintenance intervals, even over extended operating hours. Further ash removal systems as well as ash containers can be added to the

system because of its excellent flexibility. Ascending augers with special lengths are also available to suit all boiler room configurations.



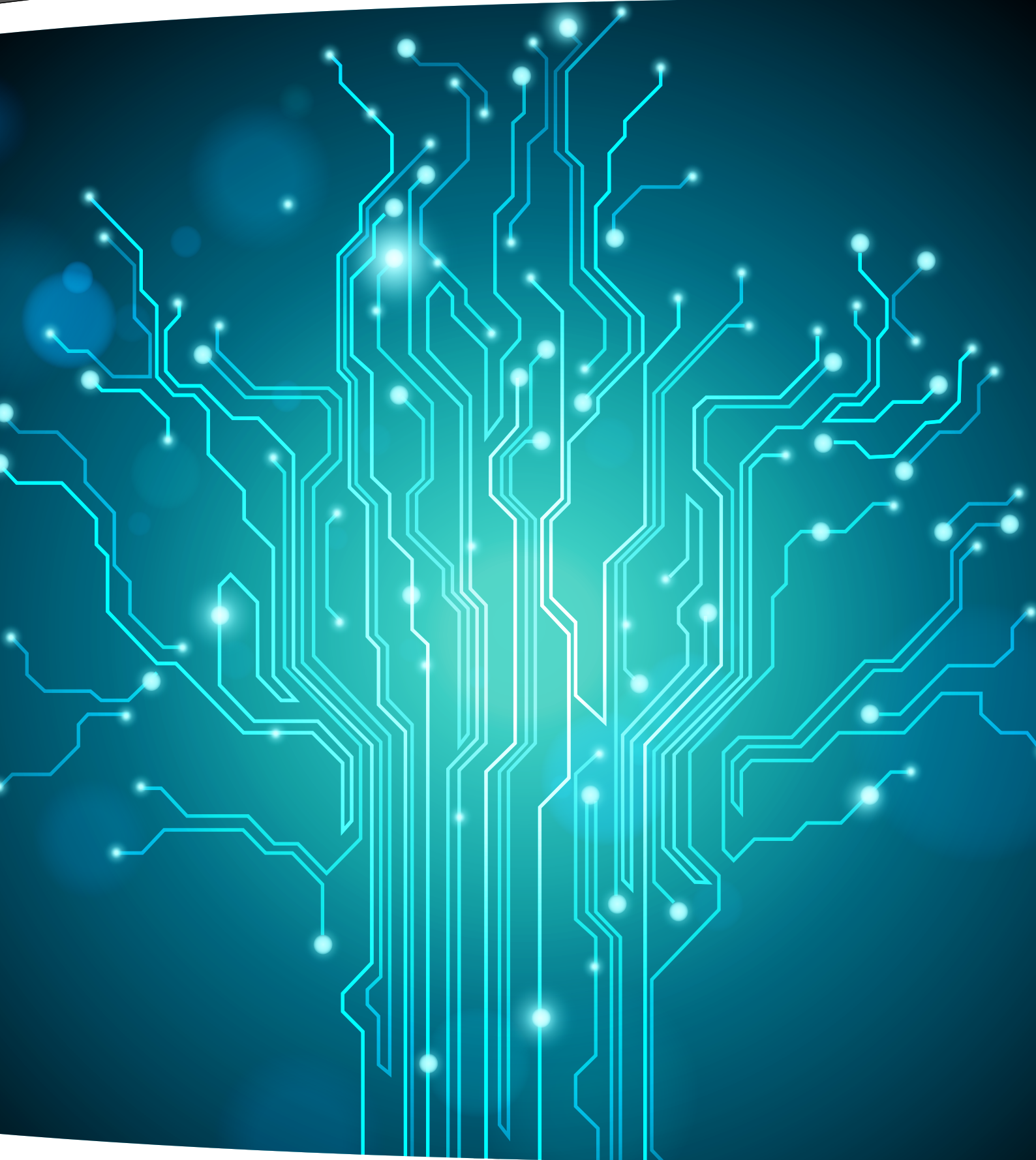
The ash removal augers automatically forward the combustion ash and fly ash into the large ash bin of the central ash removal system.



The fly ash from the heat exchangers is also automatically transported into the two smaller fly ash containers.

# The most advanced technology

Sophisticated technology and communications for perfect control





### Robust controls

The HDG Compact has a sophisticated control technology through the means of a programmable logic control (or PLC for short). PLC controllers have many benefits, including:

- The solid state nature of the components gives the ability to withstand tough operating conditions including high temperatures, humidity and vibrations - all particularly important in a biomass plant room.
- Ease of maintenance through the ability to change individual controls rather than the complete PCB.
- Simple expansion through the use of additional modules.



### BMS integration

In modern building technology, it is essential that the individual components are able to communicate with one another. The PLC controller of the HDG M175-400 is therefore compatible with multiple interface protocols. It can be connected with higher level controllers via Mod-Bus RTU, Profibus at DP Slave or Active-X. A connected fault indicator is furthermore able to send messages per Fax, SMS or E-Mail.



### Remote monitoring

The HDG Remote Visualisation allows monitoring and control of the system from anywhere in the world on PC, tablet or smart phone. This includes:

- Live real-time monitoring of the boiler
- Adjustment of settings to optimise combustion.
- Automatic emailing of warnings and alerts including automated service requests.
- Integration of heat meters and fuel store levels.

### Control and monitoring technology

The best heating system is only able to function if it is equipped with an intelligent control system. HDG therefore relies on combustion chamber temperature sensors, Lambda sensors, as well as a combustion air control system with vacuum sensors and speed-controlled fans, all offering valuable data for you to control.



# The right delivery system

Feed systems for every fuel and application



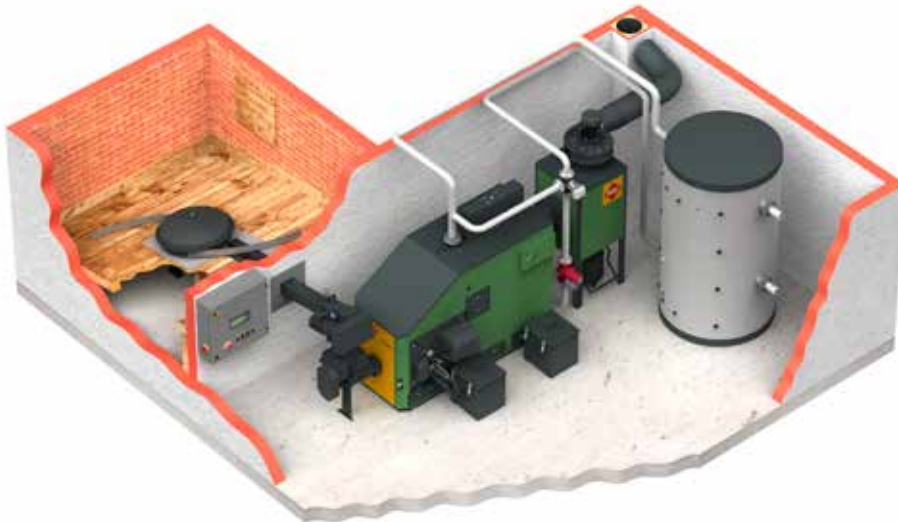


### On-site overview

A key piece of the biomass jigsaw is the fuel storage and feed system. At Zero Ridge, we offer unrivalled technical expertise in providing the best solutions which, provided with the wide range of feed systems available from HDG and Zero Ridge, ensure the very best solution for your needs.

### Solutions for all requirements

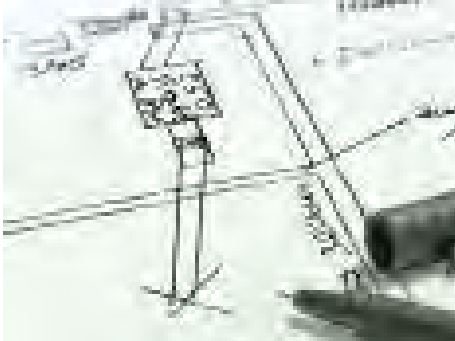
Irrespective of whether the space is located in a cellar, on the ground floor or upper floors, square or rectangular rooms, whatever the heating requirement for the building, or if the location in the building is easily accessible or not – we have the right solution for you in our portfolio – from fuel supply systems to ash removal.



# HDG FRA delivery system

Flexi-blade delivery system





### Tailored solutions

The HDG flexi-blade delivery system is suitable for bunker sizes of between 2.5 to 6 metres in diameter and a filling height of 5 metres. The individual manufacturing of the components allows for a maximum worm length of up to 6 metres. This means that the best solution can always be found – even for the most difficult circumstances.

### De-coupled drive power

The intelligent pipe shaft system de-couples the drive power which acts on the sweeping arms and the conveyor worm. The conveyor worm is driven by the external pipe and the agitator is driven by the internal shaft. This effectively separates the applied drive power and thus protects the components.

### Powerful auger

The heavily engineered conveyor screw provides the robustness required to move even the most coarse of fuels. The flights of the auger are increased along its length, ensuring a fault free delivery of fuel. Wood chips of a specification of P45 can be conveyed, with individual chips up to 5cm<sup>2</sup> in surface area and 12cm in length.



If necessary, for example if a fault occurs due to a foreign body, the conveyor worm can be turned back manually without moving the agitator.

### Twin boiler installations

The HDG dual flexi blade delivery system provides a neat, cost effective means of fuelling two boilers from the same fuel store.

### Choice of fuels

The HDG flexi blade delivery system is capable of transporting a wide variety of fuels such as wood chips, coppice, shavings, pellets and briquettes. Designed to be robust and durable, they offer a trouble-free means of reliably supplying your system with fuel.

# HDG GRA delivery system

Rigid arm delivery system







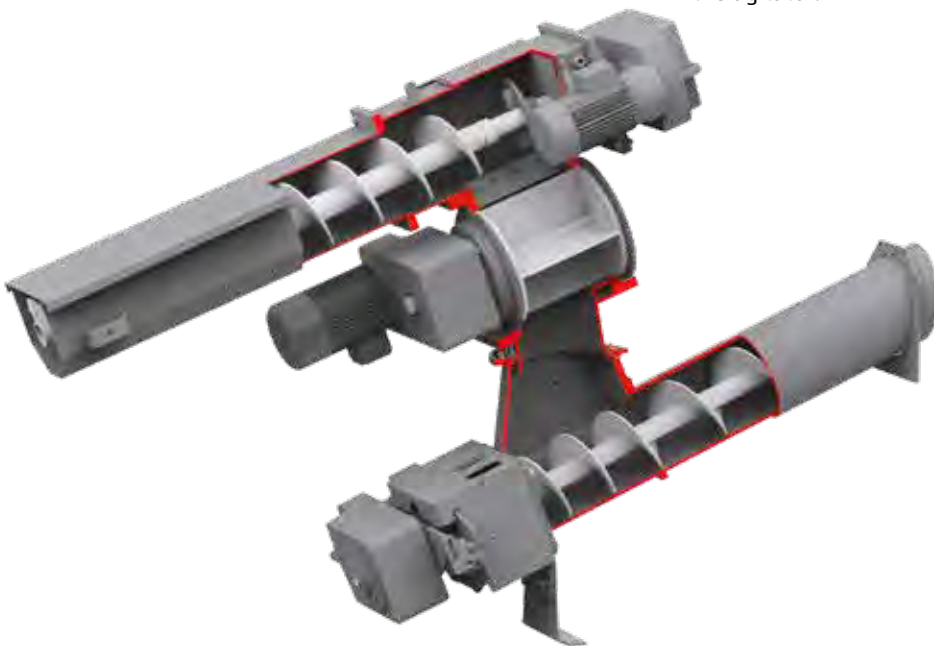
### Larger fuel store solutions

For larger fuel stores, the hinged arm delivery system of the HDG GRA provides the optimum solution. Operating along the same agitating principles of the flexi-blade system, the GRA is suitable for fuel stores up to 5.7 metres in diameter and fuelling heights up to an incredible 7 metres.



### Intelligent solutions

The intelligent pipe shaft system decouples the drive power which acts on the sweeping arms and the conveyor worm. The conveyor worm is driven by the external pipe and the agitator is driven by the internal shaft. This effectively separates the applied drive power and thus protects the components. If necessary, for example if a fault occurs due to a foreign body, the conveyor can be turned back manually without moving the agitator.



### Highly engineered augers

The heavily engineered conveyor screw provides the robustness required to move even the most coarse of fuels. The flights of the auger are increased along its length, ensuring a fault free delivery of fuel. Wood chips of a specification of P45 can be conveyed, with individual chips up to 5cm<sup>2</sup> in surface area and 12cm in length.



### Reliable operation

The HDG GRA delivery system is capable of transporting a wide variety of fuels such as wood chips, coppice, shavings, pellets and briquettes. Designed to be robust and durable, they offer a trouble-free means of reliably supplying your system with fuel.

# HDG walking floor

Storage for high demand





### Larger heating systems

The HDG walking floor delivery system is suitable for larger heating systems. It enables very large quantities of up to 200 m<sup>3</sup> to be stored and simultaneously conveyed to the HDG boiler, making it an excellent choice for larger heating loads or where extended periods between refuelling is required.

Through the action of blades running over the floor of the bunker, the fuel is transported by means of push-pull movements to a conveyor trough. This then conveys it directly to the feeding unit of your HDG. The walking blades are driven backwards and forwards by hydraulic rams.



### Complete usability of the store

Whilst not only providing the largest possible fuel store, the HDG walking floor also ensures that the rectangular store can be completely emptied of the fuel. This ensures that when re-filled that dry fuel is used to feed into the boilers. With widths available from 2.5m to 7.5m wide

### Fuel choice

The HDG walking floor is suitable for wood chips, coppice, shavings and briquettes.

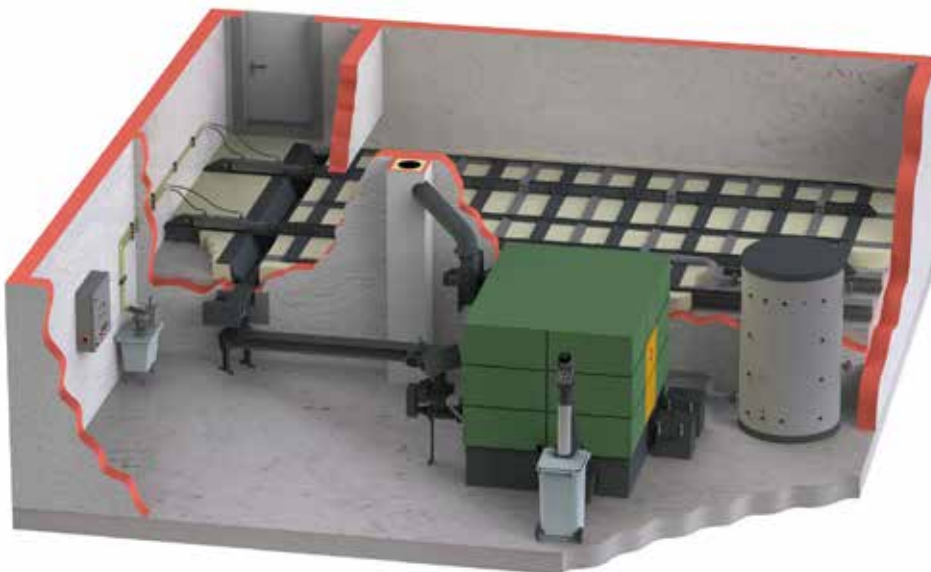
As ever, the storage of seasoned fuel chip in covered buildings is essential to ensure the correct moisture content to guarantee continual supply.



### Who is it for?

The HDG walking floor is an industrial scale fuel delivery system for boilers with high annual running hours. It offers convenient and easy fuel delivery, in bulk, to meet the highest demands. Utilizing HDG's TAK control system it offers:-

- Industrial scale fuel feed.
- Easy to fill.
- Bulk purchase of fuel.
- Choice of walking floor widths.
- Choice of fuels.



# Perfect energy storage

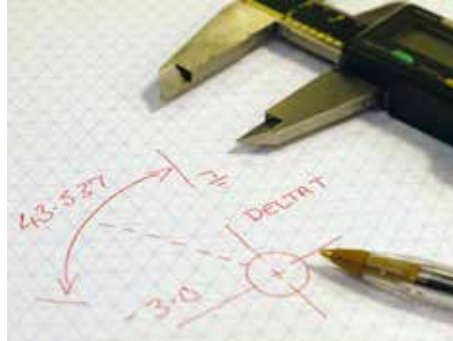




### Accumulation for efficiency

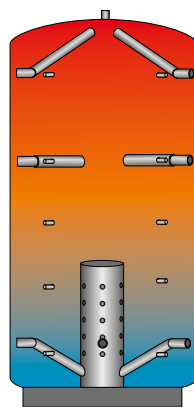
Unlike their fossil fuel equivalents which can quickly achieve full output and then switch off, wood burning boilers take time to feed the fuel, ignite, warm up and achieve their working temperature. It is therefore imperative that energy can be stored to allow for this period between heat being demanded and heat being supplied.

In addition to providing energy during the warm up cycle of the boiler, more importantly a buffer allows the boiler to run for extended periods and achieve a high level of efficiency. Without this ability, biomass boilers will cycle on and off as the heating demands of the property change, leading to incomplete combustion, poor efficiency and increased maintenance on the boiler and flue.



### Optimum stratification

Good stratification is of crucial importance to the efficiency of a biomass heating system, ensuring the hottest and most usable water is stored at the top of the tank, rather than



a tank of cooler water that is the same temperature throughout. Thermal stratification is based on a natural process: Warm water is lighter than cold water and will therefore rise either until it reaches a layer of warmer water or until it reaches the top of the tank. Our range of accumulator tanks feature a number of unique devices to improve the natural stratification, including stratification columns, plates and flow and return snorkels.



### Accumulator insulation

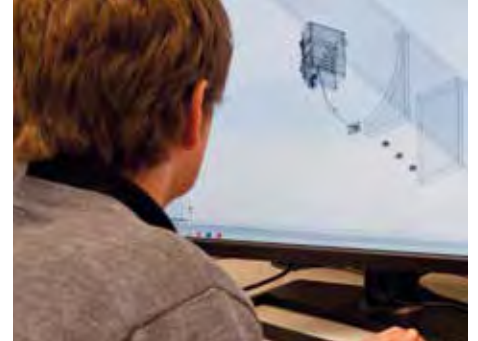
Our range of Zero Ridge accumulators feature the highest levels of insulation, ensuring the heated water stays at a high temperature with minimal heat loss. The insulation made of polyurethane with a density of  $18\text{kg/m}^3$ , with a thermal coefficient of  $0.039\text{ W/mk}$ .



# Design services

Zero Ridge's design team offer a complete service





## From start to finish we are there for you

With over twenty years experience and over a thousand successful biomass installations, we understand that installing a biomass boiler can seem a big step. That's why we at Zero Ridge offer all of the technical advice and support you need - from choosing a suitable boiler and fuel, right through to operating and maintaining your boiler.

An initial discussion will discuss the outline of the biomass options available and what is right for your application. We will give you all of the information needed to make

an informed decision, including estimated fuel savings and RHI income.

We will work alongside one of our specialist installation partners to provide a complete service, including:

- Site surveys and feasibility studies
- Detailed technical designs of the plant room including boiler, feed system, fuel store and hydraulic pipework
- Project management
- Commissioning, servicing and maintenance
- Energy supply contracts



Boiler house



For those who need heat quickly or have space limitations, the Zero Ridge Biomass Energy Cabin is the ideal solution. It comes complete ready to use with boiler, accumulator and feed system already installed. Heat with sustainable, natural energy from the Zero Ridge range of exceptional, eco friendly, wood biomass boilers.

- HDG split log boilers
- HDG wood chip, pellet and split wood systems
- HDG pellet heating systems
- TDA Thermodual wood and pellet boiler
- Buffer tank, accumulators and thermal stores
- System components
- Zero Ridge Biomass Energy Cabins

Speak to one of our HDG team

**01531 584000**

Inspiration and information

**[www.Zerobiomass.co.uk](http://www.Zerobiomass.co.uk)**



Zerobiomass is part of the Zeroridge team.

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