BOSCH
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Efficiency on a large scale

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Steam boilers

Contents

Hot water boilers
Heating boilers

	Uni Condens	UT-L	UT-M	UT-H	UT-HZ
Output MW	0.8–1.2	0.6–19	0.7–19	0.8–18	13–38
Temperature max. °C	110	120	190	210	210
Pressure max. bar	6	16	16	30	30

Steam boilers

	U-ND	U-HD	U-MB	UL-S(X)	ZFR(X)
Output t/h	0.2–3.2	0.2–3.2	0.2–2	1.2–28	18–55
Temperature max. °C	110	204	204	300	300
Pressure max. bar	0.5	16	16	30	30

Efficiency

Heat recovery boiler HRSB	4-pass boiler with burner	3-pass boiler without burner	Recovery and use
Heat recovery steam boiler	Heat recovery boiler steam/hot water		Waste heat

Components

Boiler and system control	Water	Steam/Condensate	Fuel supply
Control cabinet	Modules	Modules	Burner systems

Quality boilers for more than 150 years

Bosch Industriekessel is renowned worldwide as a specialist supplier of boiler systems in all sizes and output categories. For over 150 years we have been providing innovation in industrial boiler construction.

The company, which began in 1865 as a small boiler maker under the Loos family name, has developed in recent decades into a leading global system supplier for industrial boilers. More than 115,000 boiler systems supplied to over 140 countries worldwide confirm the renowned quality, reliability and efficiency of our industrial boilers, which are manufactured in Gunzenhausen (Germany) and Bischofshofen (Austria).

Efficient systems

Our modular boiler systems can reduce operating costs by up to 25 % when compared with conventional boilers. In addition to minimizing fuel consumption, our boiler systems also reduce the consumption of water, chemicals and electric power as well as the work involved in operation and supervision.

Perfectly controlled

Thanks to their intelligent boiler control, the availability and also the efficiency of the systems increase. Automatic control features, such as for example for cold starts or multi-boiler systems, significantly extend the lifespan of the boiler systems.

Whether it is 3D data, technical drawings or documents for tendering and approval, the experts from Bosch offer specialist support at every phase of the project – from conception through to commissioning. Trust and openness between partners ensure that mutual success is achieved. Thanks to the customised dimensioning and equipping of the boiler systems, individual solutions can be created and modules retrofitted easily.

Precision due to welding in ideal position

Thanks to horizontal welding with highly modern welding processes, a more homogeneous structure, a deeper root penetration and notch-free welding surfaces are achieved.

Use of welding robots

Semi-automatic and fully automatic welding robots are used for consistently high quality on highly-stressed welding seams.

Low-stess materials

Modern plasma and laser cutting systems ensure smooth metal processing and cutting. This means that our boilers have higher stress reserves during operation.

In-house manufacture of flame tubes

All smooth and corrugated flame tubes are manufactured in-house and are subject to the most stringent quality requirements. Up to 100 % of the welding seams are X-ray inspected.

Highest level of quality monitoring

Quality has the highest priority with us. Factory inspectors, who are certified by TÜV, together with TÜV's own staff, constantly monitor and document our quality during the entire manufacturing process right up to the acceptance.

Precision and analysis

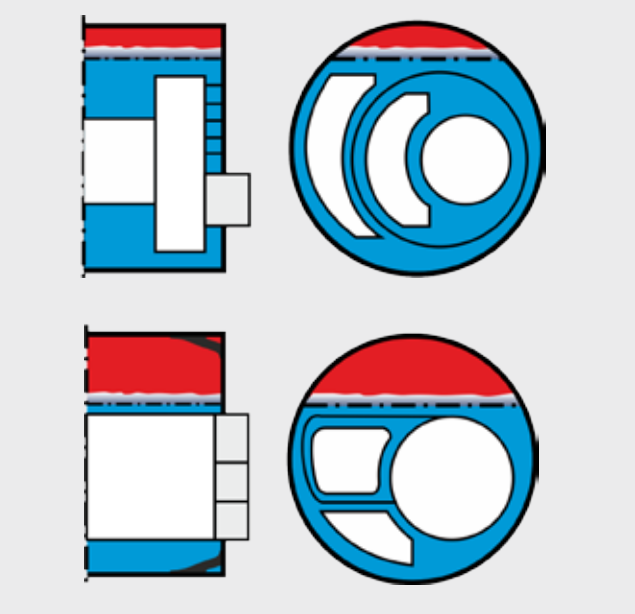
An in-house laboratory inspects welding seams and analyses materials, so that maximum transparency is maintained. Over 25,000 X-rays of welding seams are evaluated every year in our three X-ray chambers.

Optimum design

Thanks to an ideal ratio between water content and steam chamber, Bosch boilers are optimised in their design for rapid heating and a high level of steam quality. Ideal temperature distribution and release of vapour bubbles enables the boilers to be operated very efficiently even during periods of dynamic loads. Compared to other boiler designs, the Bosch design with its high steam chamber minimises high-water shutdowns and water entrainment. Our intelligent 3-component control, combined with pilot signals from large consumers and less frequent pre-ventilation (burner starts), also enables the boiler to react particularly quickly and reliably to load peaks.

High level of durability

The boiler design traditionally used in old steam locomotives has been continuously developed. The design with its fully inserted flame tube and without stud bolts offers the maximum level of robustness and an increased resistance to cold starts.



Boiler designs with flue gas passes side by side (drawing above) and optimized steam chamber from Bosch (drawing below).

Certified quality

Numerous product and quality management certificates enable us to deliver our boiler systems to more than 140 countries worldwide.

Experts with certified knowledge

Our nearly 200 boiler welders have a total of more than 1,000 welding exam qualifications. This means that welding of the highest level in accordance with internationally recognized standards is achieved.

Health and safety

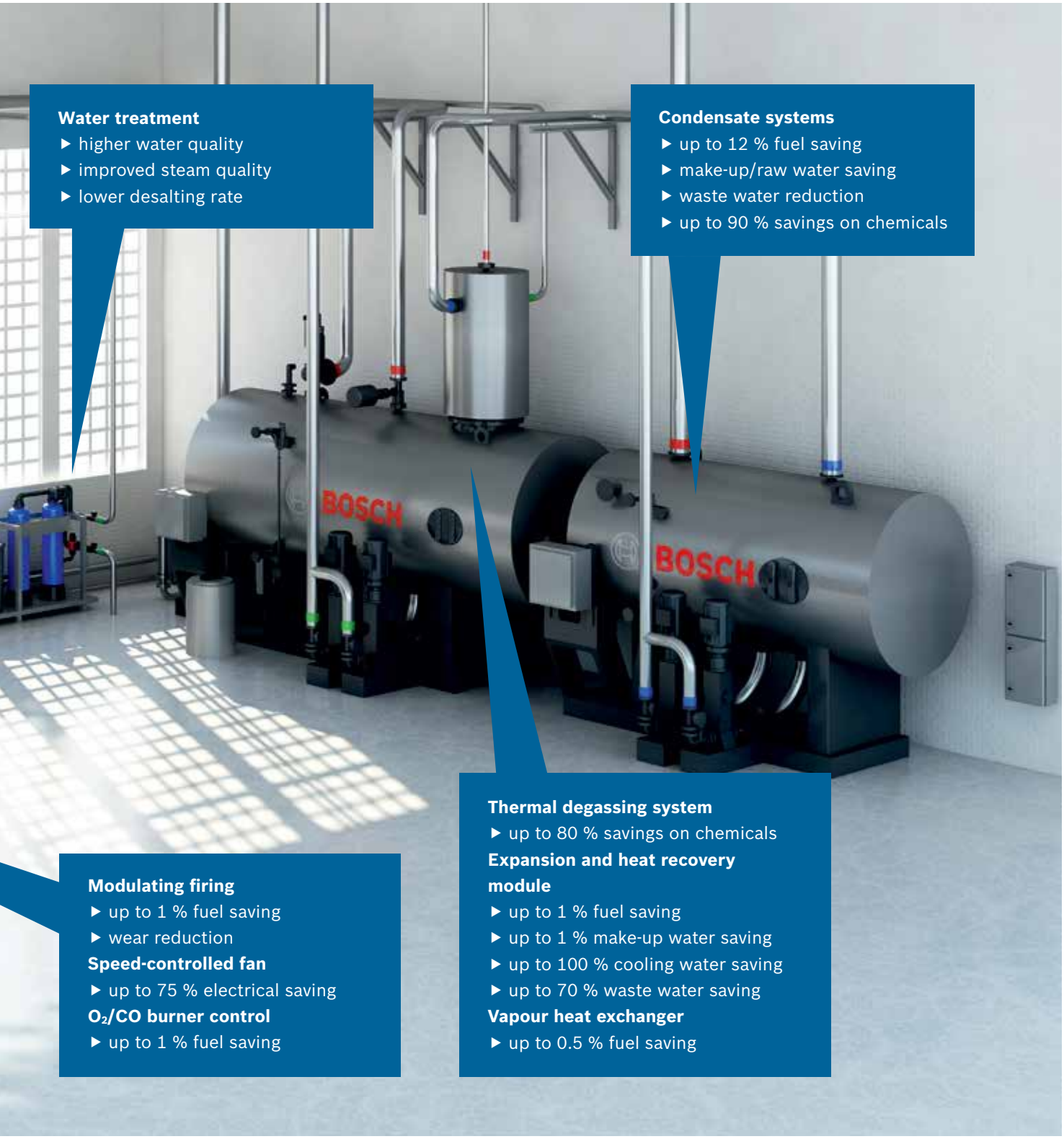
Only happy and focused staff can deliver the highest level of quality. State-of-the-art safety procedures and working equipment are a fundamental part of our entire manufacturing concept.

Promoting the next generation

Whether it is boiler welders or engineers, we constantly train and support our future employees from the start. We have our own apprentice workshop and we cooperate with technical colleges, so that our staff quickly acquire practical experience.

Energy-saving system technology

High-efficiency boiler systems with optimally-matched boiler house components ensure low energy consumption and low emissions.



Water treatment
- ▶ higher water quality
- ▶ improved steam quality
- ▶ lower desalting rate

Condensate systems
- ▶ up to 12 % fuel saving
- ▶ make-up/raw water saving
- ▶ waste water reduction
- ▶ up to 90 % savings on chemicals

Modulating firing
- ▶ up to 1 % fuel saving
- ▶ wear reduction

Speed-controlled fan
- ▶ up to 75 % electrical saving

O_2/CO burner control
- ▶ up to 1 % fuel saving

Thermal degassing system
- ▶ up to 80 % savings on chemicals

Expansion and heat recovery module
- ▶ up to 1 % fuel saving
- ▶ up to 1 % make-up water saving
- ▶ up to 100 % cooling water saving
- ▶ up to 70 % waste water saving

Vapour heat exchanger
- ▶ up to 0.5 % fuel saving

UNIVERSAL steam boiler U-ND/U-HD

This boiler combines the benefits of the shell boiler technology with the effectiveness of the flame tube/smoke tube system. This is a boiler on the reverse flame principle. The typical application areas are in particular smaller manufacturing businesses and processing industries as well as service industries.

Technical data	Type U-ND	Type U-HD
Heat transfer medium	Low-pressure saturated steam	High-pressure saturated steam
Design	Flame tube/smoke tube technology	Flame tube/smoke tube technology
Output in kg/h	175 to 3,200	175 to 3,200
Safety pressure in bar	up to 0.5	up to 16
Max. temperature in °C	110	204
Fuel	Oil, gas	Oil, gas

High level of efficiency for reduced operating costs

For an energy-saving and efficient operating mode, the compact boiler can be equipped with an economizer, with a continuous feed water control and with many other heat recovery devices. The investment in these energy-saving measures ensures a high degree of efficiency of your boiler system, as well as saving our environment and reducing your operating costs on a sustainable basis.

- Effective thermal insulation concept for minimised heat radiation
- High level of efficiency at full and partial load
- Pollutant-reduced combustion thanks to the use of highly developed firing systems and careful matching of the best boiler and burner combination

User-friendly operating concept

- Intuitive boiler control on PLC basis with very high transparency of operating data
- Automatic start-up, standby and shutdown control SUC

Reliable performance and customised equipment

The large-volume flame tube and the smoke tube bundles are perfectly matched to one another. The boiler is characterised by its compact design.

- Available in high-pressure and low-pressure versions
- Design that has been proven thousands of times in practice – durable and reliable
- All high-pressure boiler systems are certified in accordance with the European Pressure Equipment Directive
- The U-HD/U-ND is in country-specific versions for more than 140 countries available
- Suitable for many burner systems

Quick installation and effective maintenance

- Easy to maintain – simple to inspect on both the flue gas side as well as the water side
- Easy subsequent extension and modernisation
- Simple commissioning due to pre-assembled modules and a pre-parameterised boiler control
- Easy wiring on site thanks to plug-in connections

Design

The cost-effective steam shell boiler is impressive in its compact design and technically efficient function. The large, centrally located flame tube ensures that there is excellent combustion of the fuels. The smoke tubes arranged centrically around the flame tube enable optimum heat transfer. By means of the reverse flame principle, the flue gases in the flame tube are diverted to the front and then distributed in the front reversing chamber to the smoke tube sections. The hinged boiler front door (right/left) allows convenient access for boiler and burner inspections. The high-quality mineral wool insulation over the entire boiler body, combined with the special insulating materials in the front door, keep radiant heat losses at a low level. On request the boiler body insulation can be increased up to 20 cm thickness. In contrast to the classic refractory lining, the Bosch insulation composite has superior insulation values. Another benefit is that this insulation composite is designed to last the entire boiler lifetime when operated correctly. The boiler's outer shell is made from a robust aluminium sheet metal. Alternatively this cladding can be realized as stainless steel or galvanised sheet metal, as well as a special version for outside installation.

Associated boiler house components

- Water treatment module WTM
- Water service module WSM
- Condensate service module CSM
- Blow-down, expansion and cooling module BEM
- Expansion and heat recovery module EHM
- Expansion, heat recovery and blow-down module EHB
- Pump module PM
- Flue gas heat exchanger ECO 3, stand-alone
- Vapour cooler VC
- Gas regulation module GRM
- Oil circulation module OCM
- Oil supply module OSM
- System control SCO
- Steam distributor SD

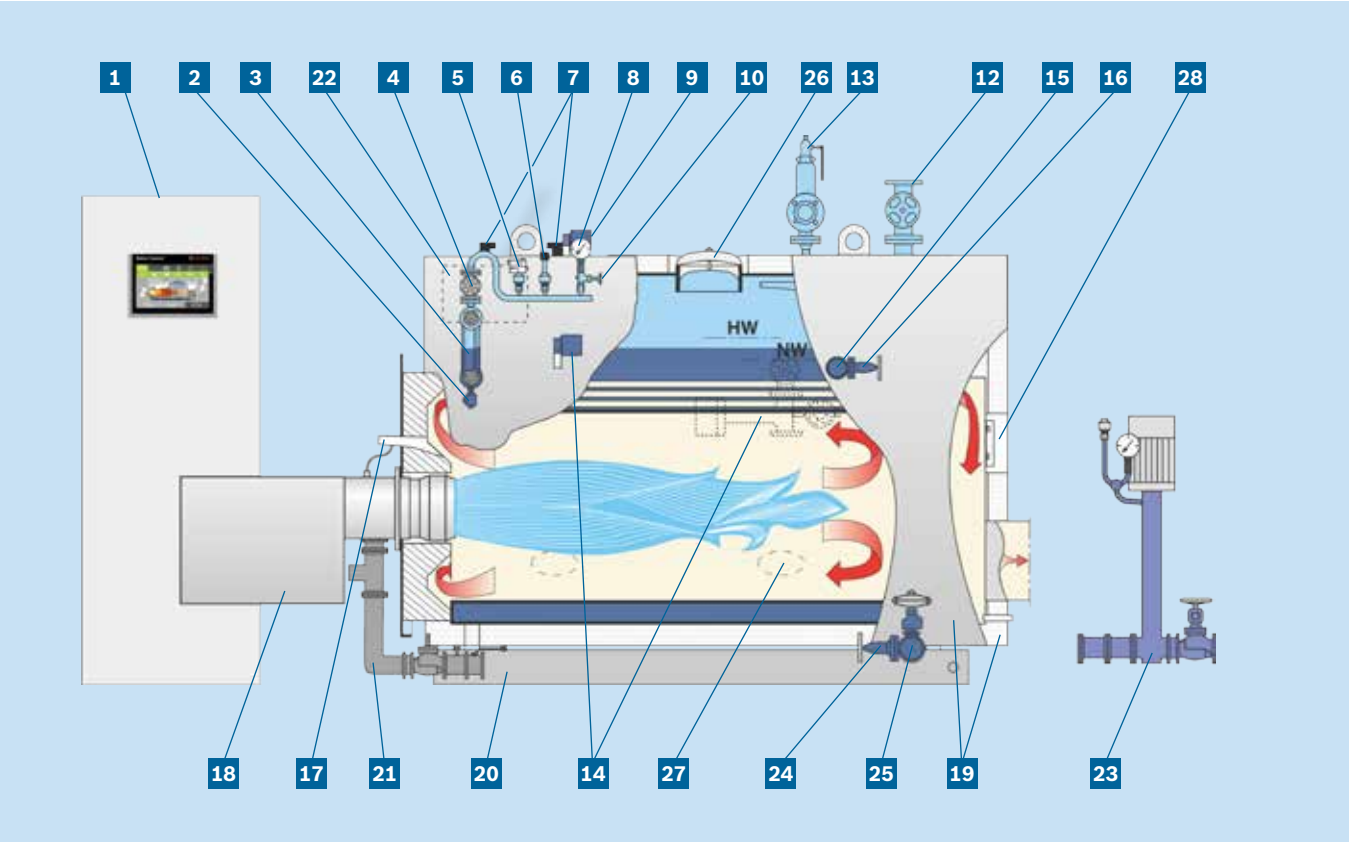
Expansion, heat recovery and blow-down module EHB

For further information please see our brochure 'Boiler house components'.

Equipment

Our shell boilers are supplied inclusive of all equipment* and are therefore fully functional as a unit. The high quality basic equipment includes the boiler pressure vessel, the control and safety components, the burner unit, a pump module, a terminal box and the control switchgear cabinet including the easy-to-operate boiler control BCO. All U-ND/U-HD boilers can also be equipped as an alternative with the affordable CSC control version.

All the sensors and actuators of the boiler are already wired into the integrated terminal box. Pre-assembled, plug-in and coded cable bundles simplify the electrical wiring 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 requirements on site.



1 Control switchgear cabinet with boiler control BCO (also CSC control version as an alternative)
2 Blow-off tap
3 Reflective water level indicator
4 Manostat tube shut-off valve, maintenance-free
5 Pressure limiter
6 Pressure transducer (4-20 mA)
7 Low-level limiter electrode
8 Pressure gauge
9 Level transducer (4-20 mA)
10 Pressure gauge shut-off valve with testing function
12 Steam removal valve
13 Full-lift safety valve
14 Fully automatic conductivity measurement and desalting
15 Feed water non-return valve
16 Feed water shut-off valve, maintenance-free
17 Sight hole
18 Burner
19 Insulation with protective shell
20 Base frame
21 Gas regulation module
22 Terminal box
23 Pump module
24 Drain shut-off valve, maintenance-free
25 Quick shut-off blow-down valve
26 Inspection opening, steam side
27 Inspection opening, water side
28 Inspection opening, flue gas side

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

UNIVERSAL steam boiler U-MB

The product designation U-MB stands for "UNIVERSAL Modular Boiler" (3-pass steam boiler in modular design). The U-MB type consists of several modules, which fulfil your individual requirements perfectly. Typical application areas are the food and beverage industry, laundry and cleaning businesses, as well as smaller industrial companies.

High level of efficiency for reduced operating costs

The boiler components are configured with a focus on low emissions, high steam quality and optimum energy efficiency.

- High level of efficiency due to the integrated economizer
- Maximisation of efficiency thanks to modular heat recovery modules

User-friendly operating concept

- Intuitive touchscreen operation and PLC control
- The steam boiler's control system with optional remote connection and its other equipment are all identical to that of the large industrial boiler series
- Automatic start-up, standby and shutdown control SUC

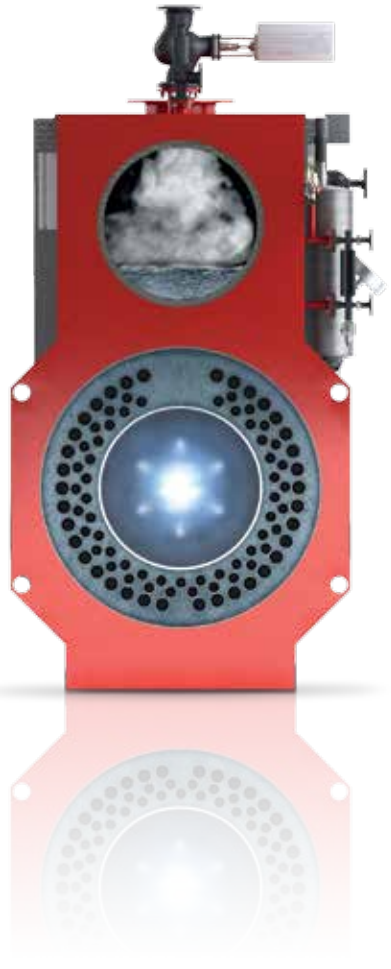
Reliable performance and customised equipment

The 3-pass steam boiler can be used universally for all applications. Naturally it can be combined with all the other available system components from our modular range for fuel and water supply, water disposal, water analysis and heat recovery.

- Comprehensive, series-wide basic equipment
- Shell boiler and 3-pass technology
- Small space requirement due to compact footprint
- The modular design, which is based on the systematic use of design features and parts that are also used in other type series, ensures a particularly attractive price-performance ratio

Quick installation and effective maintenance

- Simple installation thanks to supply as a single unit – the equipment, firing and economizer have already been fitted in the factory
- Compact design for bringing the boiler into site easily if space is limited
- Simple commissioning due to pre-parameterised boiler control
- Easy wiring on site thanks to plug-in connections



Technical data of the type U-MB	
Heat transfer medium	High-pressure saturated steam
Design	Three-pass flame tube/smoke tube technology
Output in kg/h	200 up to 2,000
Safety pressure in bar	up to 16
Max. temperature in °C	204
Fuel	Oil, gas

Design

The steam boiler U-MB is designed as a three-pass flame tube/smoke tube boiler. It consists of several modules, namely the heat generating section in three-pass design, the steam chamber on top of this, and an integrated economizer. Since it is a genuine three-pass boiler, there is no requirement for flow components in the smoke tubes.

The heat generating section of the U-MB is based on the UNIMAT boiler design – proven for decades and many thousands of times in practice. The generously sized flame tube geometry enables an efficient combustion process.

The choice of the steam section has a critical influence on the steam quality. A generous sizing has a very positive impact on the residual steam moisture.

The integrated economizer has a direct influence on the energy efficiency. The heat contained in the flue gases is used for preheating the boiler feed water, meaning that fuel consumption and emissions are reduced.

The steam generator is tested for type examination and is manufactured to the strict guidelines of the Module D Quality Assurance System of the Pressure Equipment Directive.

Associated boiler house components

- Water treatment module WTM
- Water service module WSM
- Condensate service module CSM
- Blow-down, expansion and cooling module BEM
- Expansion and heat recovery module EHM
- Pump module PM
- Expansion, heat recovery and blow-down module EHB
- Gas regulation module GRM
- Oil circulation module OCM
- Oil supply module OSM
- System control SCO
- Steam distributor SD

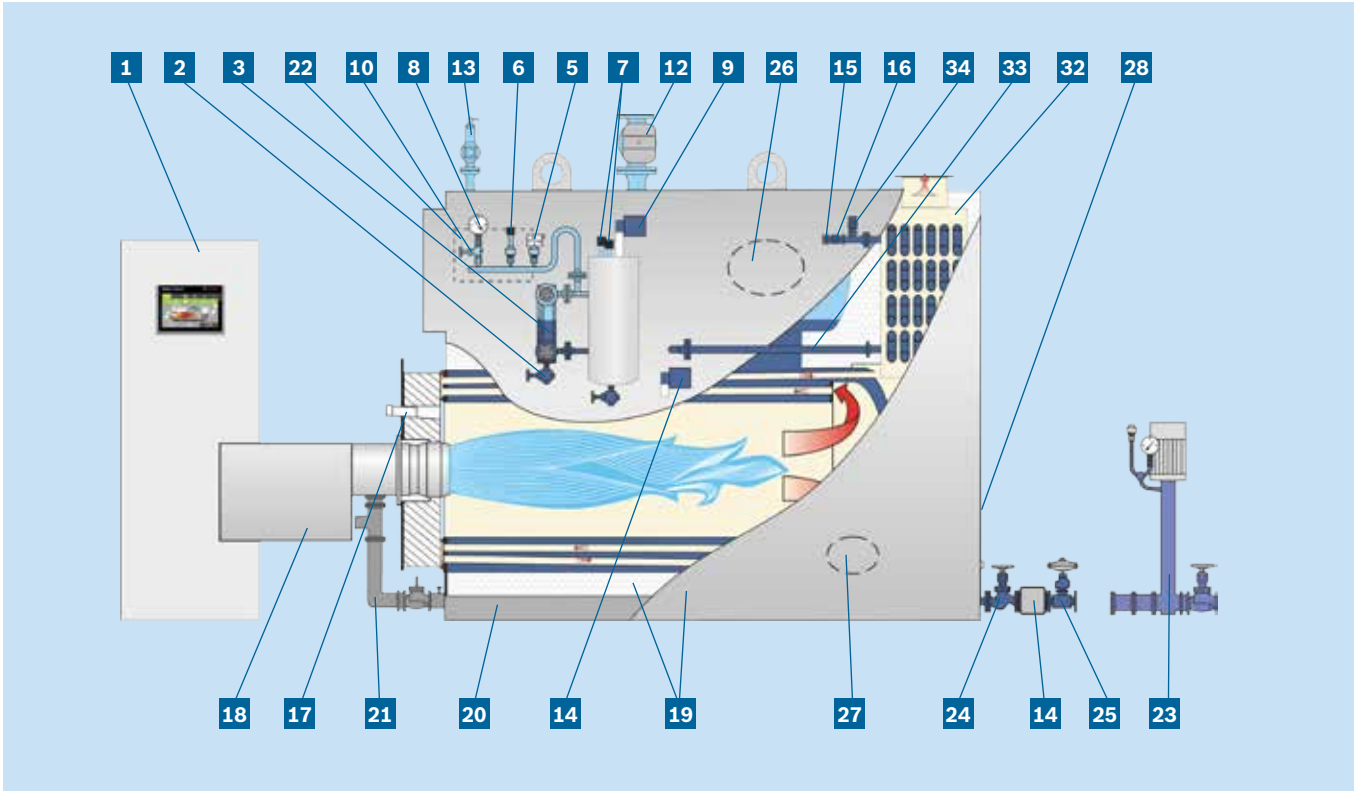
Water service module WSM

For further information please see our brochure 'Boiler house components'.

Equipment

The UNIVERSAL steam boiler U-MB is supplied as a completely equipped unit. This includes the insulated boiler with fitted equipment*, the boiler control cabinet and a low-emission firing unit. The sensors and actuators are already wired into the integrated terminal box.

Pre-assembled, plug-in and coded cable bundles simplify the electrical wiring 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 requirements on site.



1 Control switchgear cabinet with boiler control BCO
2 Blow-off tap
3 Reflective water level indicator
5 Pressure limiter
6 Pressure transducer (4-20 mA)
7 Low-level limiter electrode
8 Pressure gauge
9 Level transducer (4-20 mA)
10 Pressure gauge shut-off valve with testing function
12 Steam removal valve
13 Full-lift safety valve
14 Fully automatic conductivity measurement and desalting
15 Feed water non-return valve
16 Feed water shut-off valve, maintenance-free
17 Sight hole
18 Burner
19 Insulation with protective shell
20 Base frame
21 Gas regulation module
22 Terminal box
23 Pump module
24 Drain shut-off valve, maintenance-free
25 Quick shut-off blow-down valve
26 Inspection opening, steam side
27 Inspection opening, water side
28 Inspection opening, flue gas side
32 Flue gas heat exchanger ECO
33 Connection piping ECO/boiler
34 Vent shut-off valve ECO

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

UNIVERSAL steam boiler UL-S/UL-SX

The UNIVERSAL UL-S boiler type is a 3-pass shell boiler, which fulfils all the requirements in the medium and high output ranges. Typical application areas are processing industries, commercial sectors and public buildings.

Technical data	Type UL-S	Type UL-SX
Heat transfer medium	High-pressure saturated steam	High-pressure superheated steam
Design	Three-pass single-flame tube/smoke tube technology	Three-pass single-flame tube/smoke tube technology
Output in kg/h	1,250 to 28,000	2,600 to 28,000
Safety pressure in bar	up to 30	up to 30
Max. temperature in °C	235	300
Fuel	Oil, gas	Oil, gas

High level of efficiency for reduced operating costs

The flue gas flow from the steam boiler contains significant heat potential. In order to increase the boiler efficiency, this series of boiler is also available with an integrated economizer for flue gas heat recovery. In addition, the optional modules for continuous feed water control, a speed-controlled burner fan and O_2/CO controls should also be used for an even more efficient and environmentally friendly operation.

- High level of efficiency due to 3-pass technology, an integrated economizer and effective heat insulation concept
- Flue gas temperatures below 50 °C are possible with use of condensing technology
- The boiler can be equipped with a separate fourth pass for waste heat use (e.g. from CHP units)
- Low-emission combustion down to below 50 mg NO_X thanks to the use of highly developed firing systems and careful matching of the best boiler and burner combination

User-friendly operating concept

- Intuitive boiler control on PLC basis with very high transparency of operating data
- Automatic start-up, standby and shutdown control SUC

Reliable performance and customised equipment

The flame tube and the internal wetback rear flue gas reversing chamber, together with the 1st smoke tube pass and 2nd smoke tube pass, are all arranged for optimum flow within the horizontal cylindrical pressure vessel. Operating in interaction with each another, the radiant and convection heating surfaces create rapid water circulation, thereby accelerating the transport of vapour bubbles to the steam chamber. Thanks to an even heat transfer, the fuel heat is quickly converted into steam without any material stress.

- High level of pressure consistency and steam quality, even with widely fluctuating steam demand, thanks to a high steam chamber and 3-component control
- Large steam formation surface thanks to asymmetric design
- Suitable for almost all burner systems
- The boiler pressure vessel can also be used as a pure waste heat boiler (without burner) downstream from CHP units or gas turbines
- Design that has been proven thousands of times in practice – durable and reliable

Quick installation and effective maintenance

- Simple commissioning due to pre-assembled modules and a pre-parameterised boiler control
- Easy subsequent extension and modernisation
- Easy wiring on site thanks to plug-in connections
- Easy to maintain – simple to inspect on both the flue gas side as well as the water side

Design

Our 3-pass patent dating from 1952 forms the basis for the outstanding and ongoing success of this type series. The two smoke tube bundles (2nd and 3rd pass) are positioned next to the flame tube (1st pass) and all of them are connected by a fully wetback reversing chamber. This asymmetric design enables their integration into an extremely compact pressure vessel. Furthermore, it allows maximizing the internal heating surface to ensure a high efficiency and maximizing the steam chamber which is particularly advantageous for dynamic steam demand. The floors are anchored rigidly by the large continuous flame tube, and they are connected to the boiler shell by means of the cleverly devised use of corner anchors for even load distribution. In contrast to outdated designs with stud bolts, there is greater robustness and durability (as described on page 5 of this brochure), even at times of dynamic loads.

Associated boiler house components

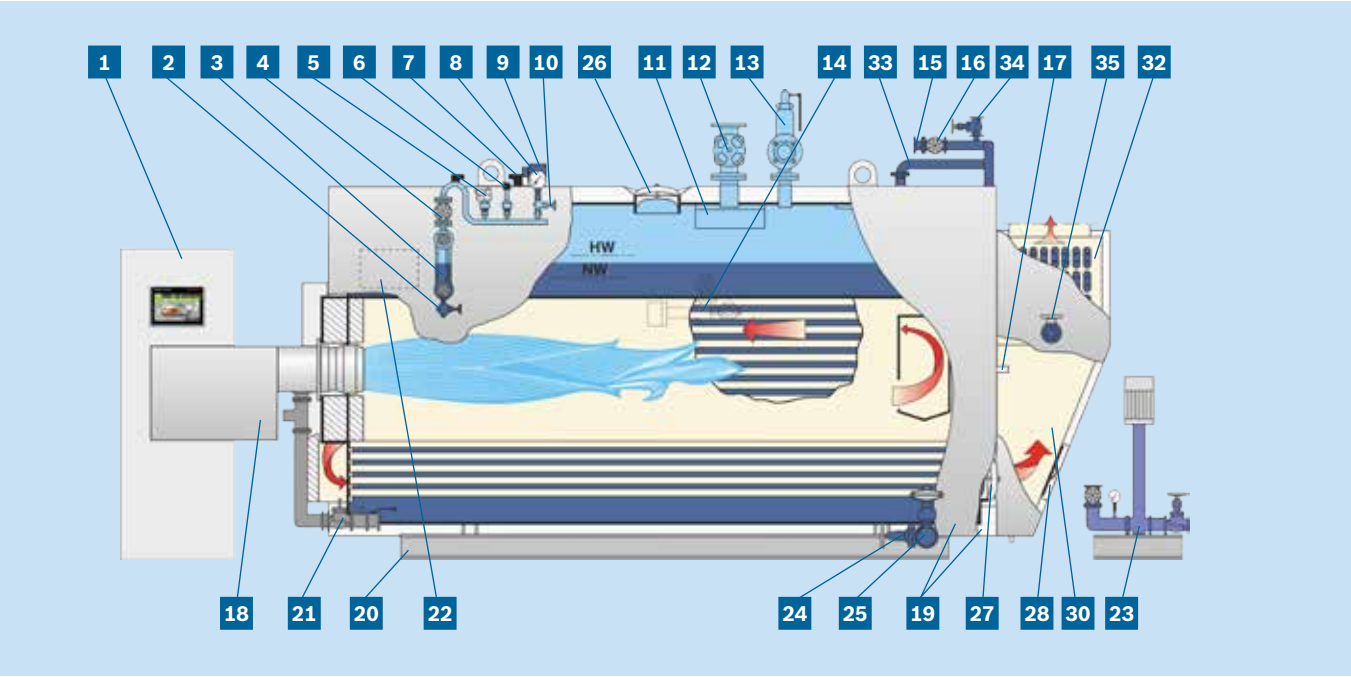
- Water treatment module WTM
- Water service module WSM
- Condensate service module CSM
- Blow-down, expansion and cooling module BEM
- Water analyzer WA
- Flue gas heat exchanger ECO 1, stand-alone
- Flue gas heat exchanger ECO 6 for condensing use
- Expansion and heat recovery module EHM
- Pump module PM
- Expansion, heat recovery and blow-down module EHB
- Vapour cooler VC
- Gas regulation module GRM
- Oil circulation module OCM
- Oil supply module OSM
- Oil preheater module OPM
- System control SCO
- Feed water cooling module FWM
- Air preheating system APH
- Superheater module
- Steam distributor SD

Steam distributor SD

For further information please see our brochure 'Boiler house components'.

Equipment

You can obtain all our shell boilers including equipment* as fully functioning units. The basic equipment includes the boiler pressure vessel, the control and safety components, the burner unit, a pump module, a terminal box and the control switchgear cabinet including our easy-to-operate boiler control BCO. For UL-S boilers with an output up to 4,000 kg/h, the affordable CSC control version can be used as an alternative. The integrated terminal box is already wired. Pre-assembled, plug-in and coded cable bundles simplify the electrical wiring between the boiler control cabinet and the terminal box.



1 Control switchgear cabinet with boiler control BCO (alternatively the CSC control version can be used for boilers with an output up to 4,000 kg/h)
2 Blow-off tap
3 Reflective water level indicator
4 Manostat tube shut-off valve, maintenance-free
5 Pressure limiter
6 Pressure transducer (4-20 mA)
7 Low-level limiter electrode
8 Pressure gauge
9 Level transducer (4-20 mA)
10 Pressure gauge shut-off valve with testing function
11 Steam dryer
12 Steam removal valve
13 Full-lift safety valve
14 Fully automatic conductivity measurement and desalting
15 Feed water non-return valve
16 Feed water shut-off valve, maintenance-free
17 Sight hole
18 Burner
19 Insulation with protective shell
20 Base frame
21 Gas regulation module
22 Terminal box
23 Pump module
24 Drain shut-off valve, maintenance-free
25 Quick shut-off blow-down valve
26 Inspection opening, steam side
27 Inspection opening, water side
28 Inspection opening, flue gas side
30 Flue gas collection chamber
32 Flue gas heat exchanger ECO
33 Connection piping ECO/boiler
34 Vent shut-off valve ECO
35 Drain shut-off valve ECO (draining)

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

UNIVERSAL steam boiler ZFR/ZFR-X

The UNIVERSAL ZFR steam boiler is a shell boiler in 3-pass technology with two flame tubes and completely separate smoke gas paths. It is used wherever a reliable steam and heat supply with high output is required. The typical application areas are energy suppliers, puplic buildings, processing industries and commercial businesses in all sectors of the economy.

Technical data	Type ZFR	Type ZFR-X
Heat transfer medium	High-pressure saturated steam	High-pressure superheated steam
Design	Three-pass double-flame tube/smoke tube technology	Three-pass double-flame tube/smoke tube technology
Output in kg/h	18,000 up to 55,000	18,000 up to 55,000
Safety pressure in bar	up to 30	up to 30
Max. temperature in °C	235	300
Fuel	Oil, gas	Oil, gas

High level of efficiency for reduced operating costs

In the case of the UNIVERSAL steam boiler ZFR, the modulating output regulator for "unrestricted" single-flame or double-flame tube operation and the continuous feed water control are mandatory. In order to use additional potential savings, we can offer you optional modules for increased efficiency, e.g. speed-controlled burner fans or combustion controls through maintaining O_2 and/or CO levels.

- High level of efficiency due to 3-pass technology and integrated economizer
- Effective heat insulation concept
- Pollutant-reduced combustion thanks to the use of highly developed firing systems and careful matching of the best boiler and burner combination and flame tube geometry

User-friendly operating concept

- Intuitive boiler control on PLC basis with very high transparency of operating data
- Automatic start-up, standby and shutdown control SUC

Reliable performance and customised equipment

The double-flame tube/smoke tube boiler with separate smoke gas passages is also suitable for operation with just one burner. The 3-pass principle with a rear flue gas reversing chamber positioned in the water chamber was patented in 1952. Thanks to the modular design, an economizer and superheater can easily be added. The dimensions of the flame tubes, smoke tube bundles, water chamber and steam chamber are thermodynamically optimised. Thanks to the flow fittings installed on the water side, the fuel heat is transferred evenly and converted into steam without any material stress.

- High level of pressure consistency and steam quality even with widely fluctuating steam demand
- Suitable for almost all burner systems
- Extremely high level of control range can be achieved thanks to single-flame tube operation
- Acceptance in accordance with the European Pressure Equipment Directive, so can be used worldwide
- Design that has been proven thousands of times in practice – durable and reliable

Quick installation and effective maintenance

- Simple commissioning due to pre-assembled modules and a pre-parameterised boiler control
- Easy subsequent extension and modernisation
- Easy wiring on site thanks to plug-in connections
- Easy to maintain – simple to inspect on both the flue gas side as well as the water side

Design

Its suitability for the unrestricted parallel or single operation of its firing units is not only due to the stable separation on the flue gas side. The special design measures for neutralising the tension forces in single-flame tube operation are crucial for permanent stability. The flame tubes are pushed through in the front and rear floors and welded tightly all around. In contrast to boiler designs with stud bolts, inadmissible bending stresses are avoided. The integrated rear flue gas chamber thus offers the advantages of the fully wetback cooling while significantly reducing its mechanical stress. Water circulation and heat transport are increased by means of guide profiles on the boiler base. Additionally, flow paths between the flame tubes and the smoke tube areas further accelerate the circulation.

A fully automatic operation with one or both burners is possible without restriction due to the approved single-flame tube operation. Even different fuels in both firing units do not present any barriers. The control range is doubled and each low load phase is run with one burner and with consequent gain in efficiency level.

For further information please see our technical report 'Double-flame tube boilers'.

Associated boiler house components

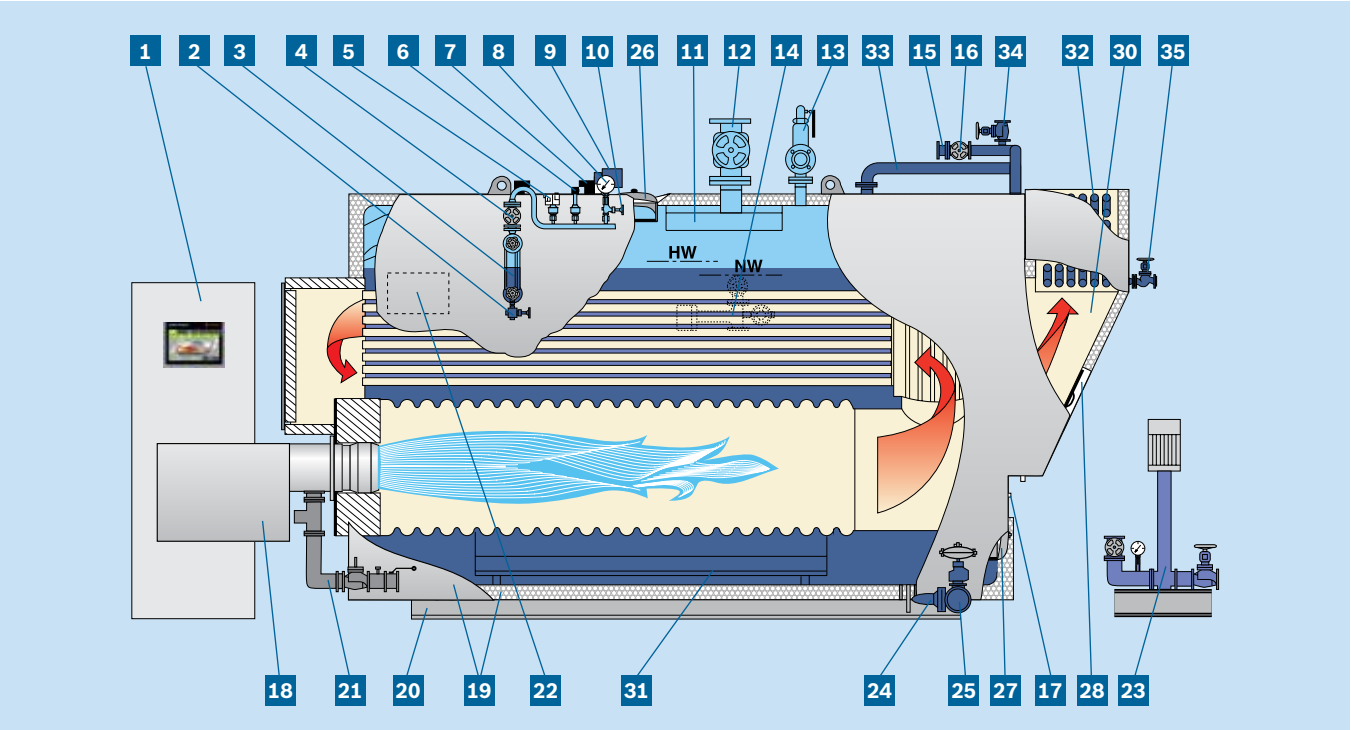
- Water treatment module WTM
- Water service module WSM
- Condensate service module CSM
- Blow-down, expansion and cooling module BEM
- Water analyzer WA
- Flue gas heat exchanger ECO 1, stand-alone
- Flue gas heat exchanger ECO 6 for condensing use
- Expansion and heat recovery module EHM
- Pump module PM
- Expansion, heat recovery and blow-down module EHB
- Vapour cooler VC
- Gas regulation module GRM
- Oil circulation module OCM
- Oil supply module OSM
- Oil preheater module OPM
- System control SCO
- Air preheating system APH
- Superheater module
- Steam distributor SD

Flue gas heat exchanger ECO 6 for condensing use

For further information please see our brochure 'Boiler house components'.

Equipment

You can obtain all our shell boilers including equipment* as fully functioning units. The basic equipment includes the boiler pressure vessel, the control and safety components, the burner unit, a pump module, a terminal box and the control switchgear cabinet including our easy-to-operate boiler control BCO. The integrated terminal box is already wired. Pre-assembled, plug-in and coded cable bundles simplify the electrical wiring between the boiler control cabinet and the terminal box.

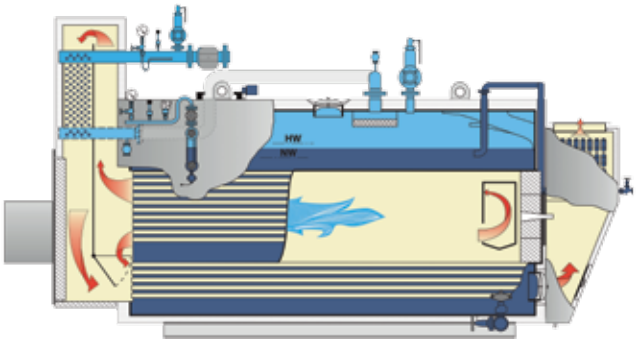


1 Control switchgear cabinet with boiler control BCO
2 Blow-off tap
3 Reflective water level indicator
4 Manostat tube shut-off valve, maintenance-free
5 Pressure limiter
6 Pressure transducer (4-20 mA)
7 Low-level limiter electrode
8 Pressure gauge
9 Level transducer (4-20 mA)
10 Pressure gauge shut-off valve with testing function
11 Steam dryer
12 Steam removal valve
13 Full-lift safety valve
14 Fully automatic conductivity measurement and desalting
15 Feed water non-return valve
16 Feed water shut-off valve, maintenance-free
17 Sight hole
18 Burner
19 Insulation with protective shell
20 Base frame
21 Gas regulation module
22 Terminal box
23 Pump module
24 Drain shut-off valve, maintenance-free
25 Quick shut-off blow-down valve
26 Inspection opening, steam side
27 Inspection opening, water side
28 Inspection opening, flue gas side
30 Flue gas collection chamber
31 Water circulation guide profiles
32 Flue gas heat exchanger ECO
33 Connection piping ECO/boiler
34 Vent shut-off valve ECO
35 Drain shut-off valve ECO (draining)

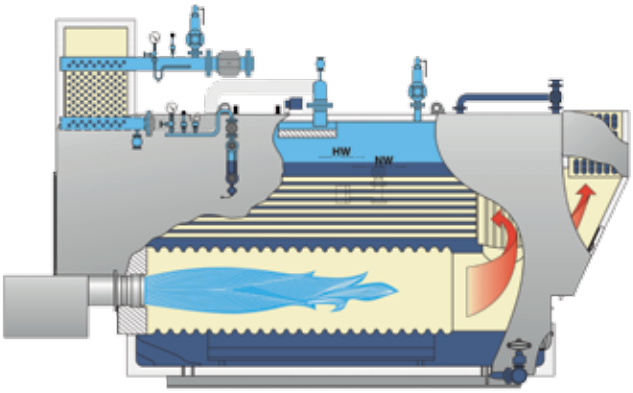
*The equipment level is variable and can be freely configured to customer requirements.

Superheater module

Single-flame and double-flame tube/smoke tube boilers with superheaters for superheated steam generation.



Sectional drawing UL-SX



Sectional drawing ZFR-X

If superheated steam is required instead of saturated steam, a superheater module can be placed on the front reversing chamber. A bypass flap constantly controls the temperature of the superheated steam over a large load range.
The smoke tube areas remain easily accessible thanks to the hinged door of the reversing chamber.

- Modular system, controlled on the flue gas side – no injection water required for temperature control of the superheated steam
- Easy maintenance and installation – simple cleaning possibility of the second and third boiler pass
- Long service life thanks to low thermal loading of the heat exchanger bundle of the superheater

For further information please see our technical report 'Superheater module'.

Reference power plant Ledvice in the Czech Republic

Formidable output for giant power plant: four steam boilers with superheaters generate 167 t/h of superheated steam.

The Ledvice power plant in the Czech Republic, situated between the cities of Teplice and Bílina, is part of the energy company ČEZ. A new power unit with an impressive electricity output of 660 MW has recently been put into operation at this site. Based on the principle of combined heat and power generation, the waste heat produced during power generation is fed into the district heating network instead of simply being released unused into the atmosphere. Heat is supplied to a total of around 300 companies and 20,000 inhabitants.

Result

The four ZFR-X steam boilers with superheater modules can provide up to 167 t/h of superheated steam for starting up the steam turbine (power generation) as well as for supporting the district heating. Extensive safety and automation equipment ensures that a high level of supply reliability is achieved and that operation can be maintained without continuous supervision.

The four ZFR-X steam boilers each have an operating weight of 145 tons.

4-pass boiler with burner

The conventional fired boiler generates thermal heat or process heat while simultaneously utilising the heat potential from waste heat sources.

Technical data of the 4-pass boiler, type UL-S	
Heat transfer medium	High-pressure saturated steam
Design	Three-pass flame tube/smoke tube boiler with integrated fourth smoke tube pass
Output in kg/h	700 up to 28,000
Safety pressure in bar	up to 30
Max. flue gas temperature of the waste heat source in °C	550
Min. flue gas volumes of the waste heat source in kg/h	500
Max. flue gas volumes of the waste heat source in kg/h	23,500
Fuel of the waste heat source	Natural gas (other flue gas types on request)
Output range of combinable CHP units in MWel	approx. 0.2 to 4

Benefits at a glance

- Improved efficiency and environmental friendliness through the use of waste heat sources
- High supply reliability thanks to own firing
- Matched, modular system for easy planning and fast installation
- Complete system including CHP unit on request
- Intuitive boiler control based on PLC with very high transparency of operating data
- Simple commissioning due to pre-parameterised boiler control
- Easy wiring on site thanks to plug-in connections
- Robust, reliable and durable
- Reduced component diversity with regard to spare parts inventory
- Service from a single source

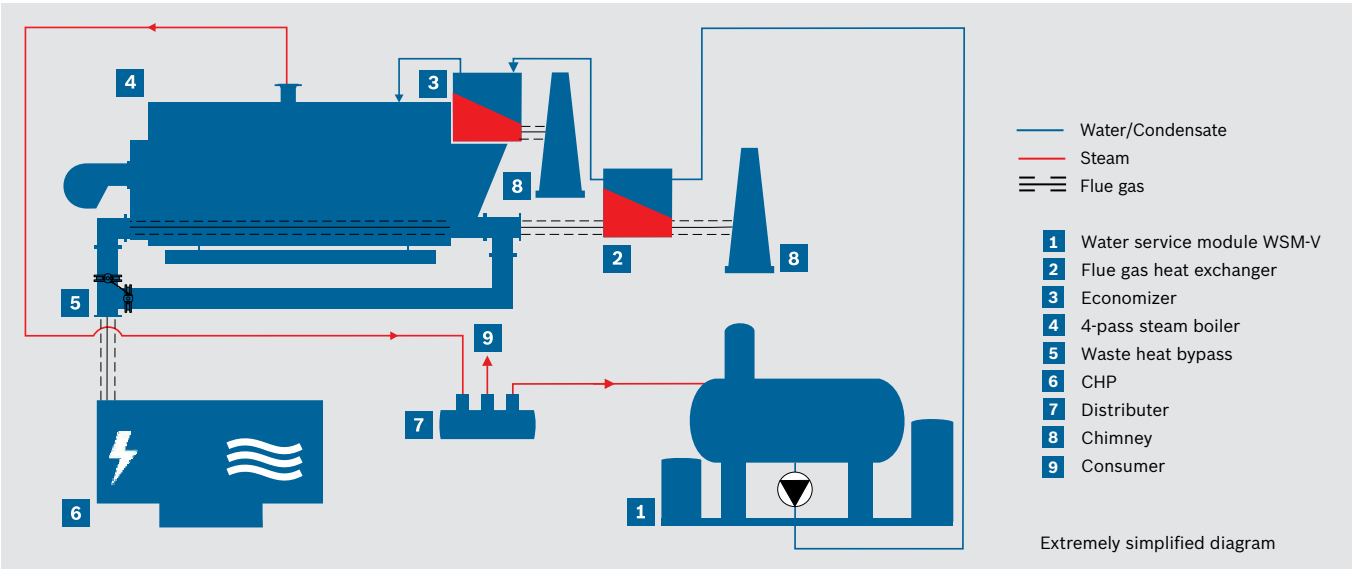
These hot water and steam boilers are conventionally-fired boilers based on the 3-pass design, with an additional integrated smoke tube pass for waste heat utilisation. They are primarily used in combination with CHP units or gas turbines. The 4th pass uses hot flue gases from upstream combustion processes to support the generation of thermal or process heat. Additional peak load boilers are normally required if waste heat boilers without burner are used. It is often superfluous due to the self-firing functionality. This allows huge amounts of money, space and equipment to be saved.

Design

The design of our waste heat boilers with burner corresponds to the basic design of the UL-S or UT-H series. The boilers are fitted with an additional integrated smoke tube (4th pass) for waste heat utilisation.

Equipment

The equipment options are identical to that available for the UNIVERSAL steam boiler UL-S and UNIMAT hot water boiler UT-H series.



UNIVERSAL heat recovery steam boiler HRSB

The heat recovery boiler uses accumulated flue gas heat to generate process steam.

Used in combination with a combined heat and power unit, the heat recovery steam boiler HRSB can play a significant part for using primary energy efficiently. The hot flue gas flows from the upstream combustion processes are passed to the heat recovery boiler and used for steam generation. Thanks to its modular design and compact dimensions, it is the ideal choice for both new plants and modernisation projects alike.

Design

The heat recovery steam boiler, which is certified in accordance with the PED (Pressure Equipment Directive), is available in eight standardised versions. It consists of a highly efficient tubular heat exchanger. An economizer can be integrated as an option, which increases the efficiency even further. A flue gas bypass can be added if required. If no steam is extracted, the boiler will use it for diversion on the flue gas side. This means that the CHP unit or other waste heat sources can continue operating without interruption.

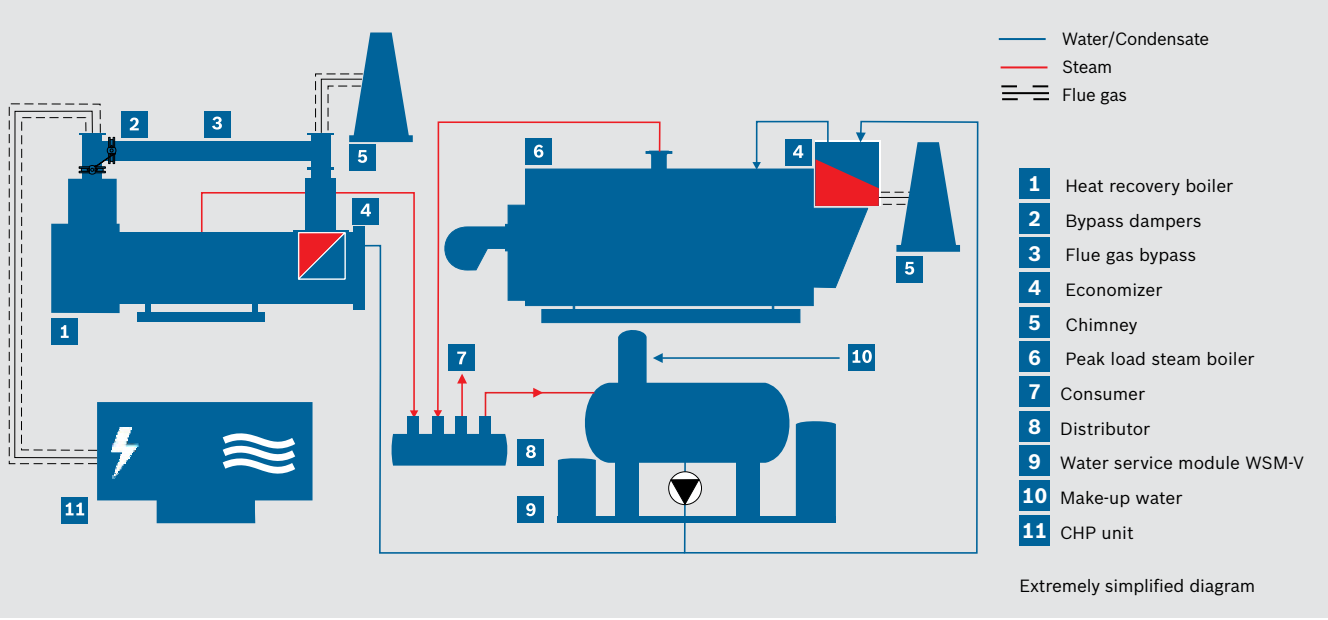
Equipment

The heat recovery steam boiler is insulated and features state-of-the-art safety equipment. The flue gas bypass is supplied separately to facilitate transportation and is fitted and insulated on site. The boiler control BCO, based on PLC, can be controlled via touchscreen and is housed in a separate floor standing or wall mounted control switchgear cabinet.

Technical data of the type HRSB	
Heat transfer medium	High-pressure saturated steam
Design	Heat recovery shell boiler
Output in kg/h	400 up to 4,100
Safety pressure in bar	10 and 16
Max. flue gas temperature of the waste heat source in °C	550
Min. flue gas volumes of the waste heat source in kg/h	500
Max. flue gas volumes of the waste heat source in kg/h	23,500
Fuel of the waste heat source	Natural gas (other flue gas types on request)
Output range of combinable CHP units in MWel	approx. 0.5 to 4

Benefits at a glance

- Increase in efficiency and environmental responsibility through use of waste heat sources
- Matched, modular system for easy planning and fast installation
- Complete system including CHP unit on request
- High efficiency through efficient tubular heat exchanger and good thermal insulation
- Additional efficiency gain thanks to optional integrated economizer
- Intuitive boiler control based on PLC with very high transparency of operating data
- Simple commissioning due to pre-parameterised boiler control
- Easy wiring on site thanks to plug-in connections
- Robust, reliable and durable
- Reduced component diversity with regard to spare parts inventory
- Service from a single source



Series UL-S and UT-H as 3-pass waste heat boilers

- The UL-S and UT-H boiler series can also be used purely as waste heat boilers
- For use in high flue gas temperatures
- For use in combination with combined heat and power units or gas turbines
- Utilization of waste heat for generating steam or hot water

MEC Remote

The new Bosch remote maintenance system MEC Remote (Master Energy Control) replaces the former Teleservice for industrial boilers. In the past, this service offered access for the Bosch service experts only. With the new MEC Remote also operators can now access their steam and hot water boilers convenient and safely from a distance. This enables visualizing the boiler and system control via the browser of all common internet-connected devices.

MEC Remote is thus the ideal solution for all companies:

- where the operator cannot be on site all the time
- that operate multi-boiler systems with mandatory supervision
- with on-call duty e.g. on weekends

Bosch's boiler controls are compatible with all common automation systems. MEC Remote can also be used for boilers that are not connected to building or production automation systems.

Thanks to an overview map several boilers in different sites all around the world can be monitored at the same time. The optional SMS module sends out defined push notifications whenever an error occurs. This reduces the effort for supervision of plants with especially high reliability requirements, e.g. in 24/7 operation.

Another advantage for operators is the optional remote support by the Bosch Industrial Service. The experts can perform extended parametrization, programming (PLC) and failure analysis directly via MEC Remote. In case of malfunction of components the root cause can be analyzed and the service technician can prepare for the specific situation. Boiler down times and service costs thus can be reduced to a minimum.

Highest safety is one of the most crucial requirements to a remote system. The role-based access control concept determines the allowed actions for each user. The remote connection itself is secured mainly by three safety measures: The hardware connection can be activated or terminated at any time via a switch in the boiler house that requires a key. In addition to the login with username and password via a secure connection (https) a mobileTAN system is used. It sends out an one-time access code to the operator, similar to the standards used for online banking.

For privacy reasons, the boiler's operation data is stored locally in the boiler house instead of in a data cloud. The security concept for MEC Remote was established by ESCRYPT. To maintain the high level of security, regular audits are performed by the external company Cirosec.

Boiler control BCO

The intuitive boiler control based on PLC offers very high transparency of operating data for optimum boiler operation.

The boiler control BCO provides all necessary functions for operating steam and hot water boilers according to customers requirements. Extensive information regarding operating states, operating data and measured values can be viewed on its touchscreen display. Diverse system data are analysed, evaluated and transparently displayed via a traffic light model using the 'Condition Monitoring' integrated software. Operating characteristics that could lead to a drop in efficiency, increased wear or unplanned downtimes can be determined at an early stage and thereby avoided. A consistently high efficiency and availability of the boiler systems is achieved. The diagnostics function, which is included as standard, supports the boiler operator or the service technician in quickly localising and rectifying irregularities in operation. This results in a further increase in transparency and operating safety.

The automatic start-up, standby and shutdown control SUC is optionally available for high-pressure steam boilers via the boiler control BCO. When SUC is used, start-up and shutdown processes are performed fully automatically by pushing a button, or in response to an external request signal. The automatic functions protect the system against unnecessary strain during cold starts, in heat maintenance mode, and in normal operation.

Benefits at a glance

- Intuitive operation with graphical symbols and state of-the-art touchscreen displays
- Simple optimisation of all measuring and control functions
- Maximum supply and operating reliability thanks to integrated monitoring and protection functions
- Easy connection to higher-level visualisation and control systems
- Ready for use with remote maintenance system MEC Remote
- 'Condition Monitoring' for consistently high system efficiency and availability of steam, hot water and heating boiler systems
- Start-up, standby and shutdown control SUC allows fully automatic high-pressure steam boiler operation

Equipment

- Output control
- Level control
- Low load control
- 'Condition Monitoring' – preventive condition and efficiency monitoring
- Boiler hours run meter
- Diagnostics function
- Burner hours run meter
- Recording of number of burner starts
- Plain text display of operating signals and fault messages
- Message history
- Intuitive, menu-driven operation via touch-sensitive graphic display
- Display and intermediate storage of all relevant measured values and states

In addition to the basic functions, further options and functions can be added to the BCO control.

Service competence: fast, professional and local

With us you can benefit from a comprehensive portfolio of products and services from a single supplier. In addition to perfectly tailored system solutions, we also offer our customers a wide range of services.

Always there for you: first-class service

Our customer service is there for you around the clock every day of the year. Thanks to our closely knit network of service areas, we can ensure the shortest possible response times.

Beside maintenance services, fault tracing and repairs, we also offer you support with the regular inspection of your system. Not sure whether your system is still state of the art and working efficiently? Here too we will be pleased to assist you, we will analyse your system and modernise it if required.

During normal working hours, please contact your local customer service engineer. The contact details can be found on the control cabinet of your boiler system. We place great value on personal service, direct contact also saves valuable time.

Customers from abroad should please contact our 24 hour Service Hotline. That also applies if a fault occurs outside normal working hours. If you call via a landline, you will be connected to the customer advisor, who is responsible for your country/region. Your problem will be located in the course of professional advice over the phone, or alternatively we will coordinate an on-site visit.

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Reference Beck+Heun in Mengerskirchen

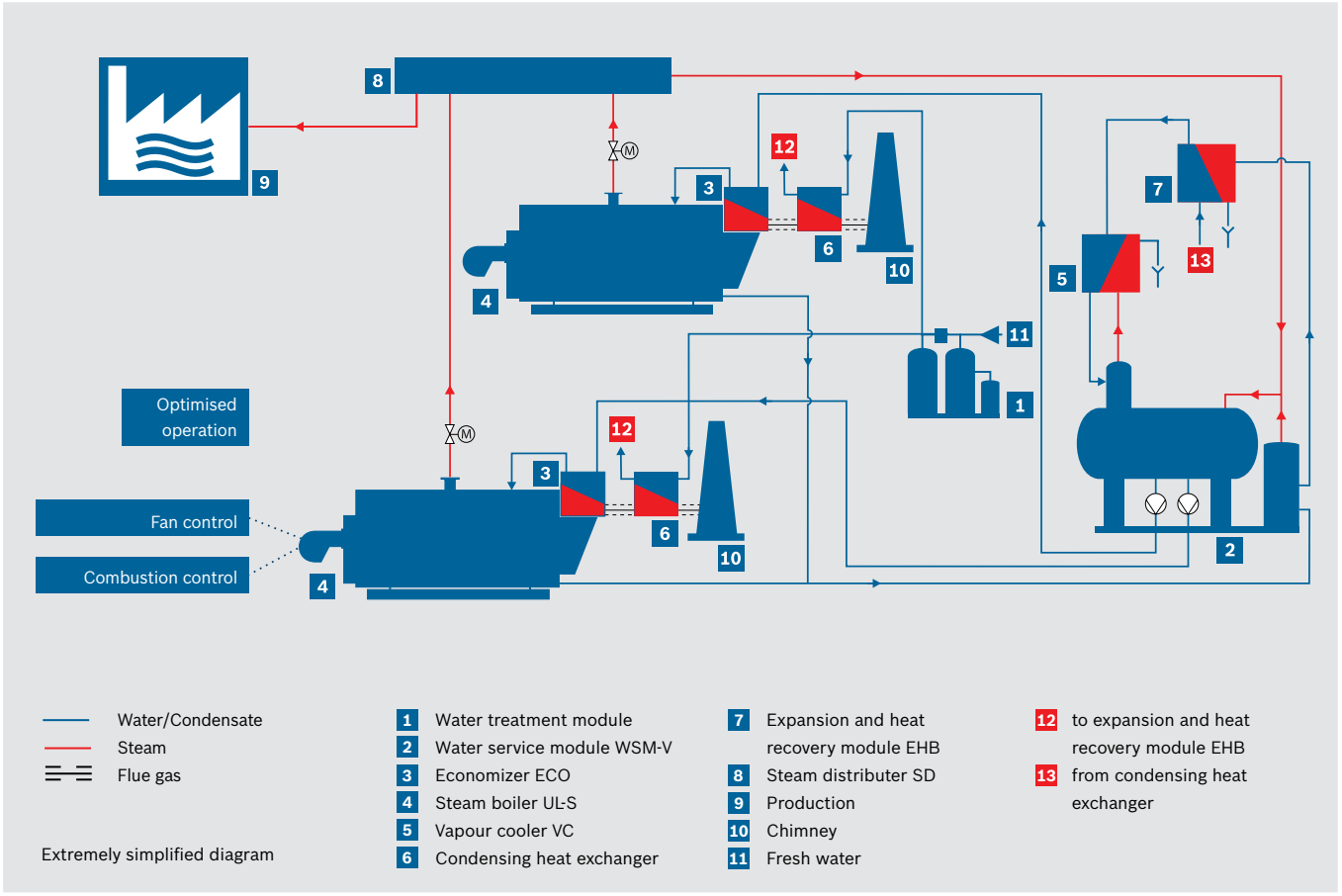
20 % energy savings with new Bosch boiler system.

The Beck+Heun GmbH is a leading manufacturer of roller shutter casings. In 2013/2014 the company had modernised their machine fleet with the objective of increasing production capacities and to produce resource-conserving. The new steam boilers UL-S have been dimensioned with a peak load of 8 t/h of steam. The process heat is used to support the pre-expanding of polystyrene granules which are subsequently processed for the fabrication of roller shutter casings. The previous process heat generation plant comprised three boilers with a total capacity of 5.5 t/h of steam.

The two efficient Bosch steam boilers supply a total of up to 8 t/h of steam.

Result

The new boiler system not only produces 45 % more steam, it is also around 20 % more efficient than the old system. The fuel demand has reduced by nearly 1,900 MWh a year. Furthermore, the minimised CO_2 emissions improves the ecological balance.



Reference Haribo in Hungary

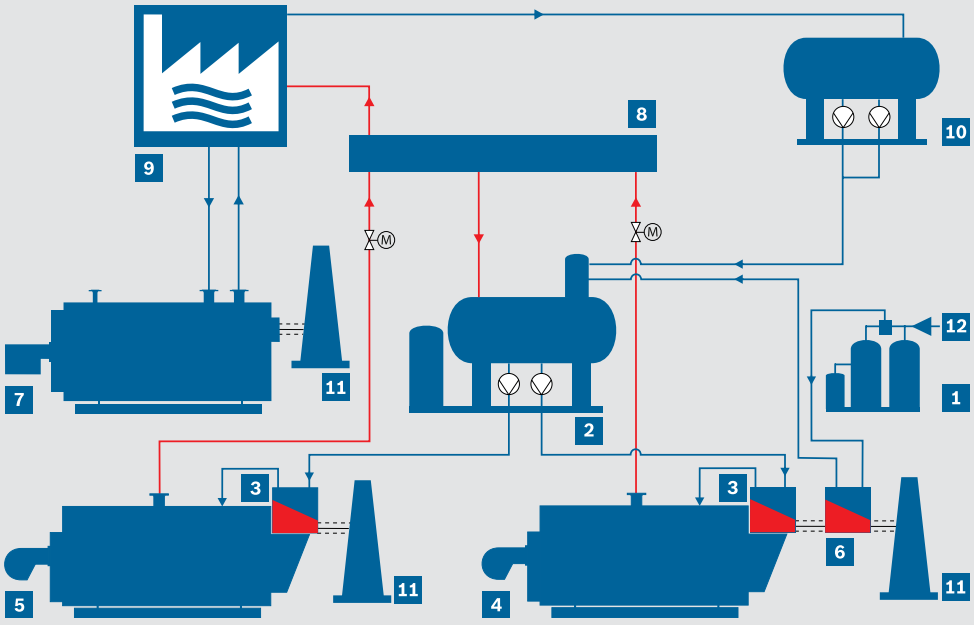
Expansion of the steam supply with modular boiler technology from Bosch.

Due to production extension at the Hungarian location Nemesvámos, the confectionery manufacturer Haribo had a higher process heat demand. For many years, the existing U-HD steam boiler supplied the production with steam and heated the buildings. For the expansion of the steam supply Haribo selected a Bosch steam boiler UL-S with 4 t/h and optimally-matched components. The modular design and the pre-configured system control enabled a fast integration of the existing and new boiler plant into the steam network. 6 t/h of steam are now available for production processes. The heating supply was decoupled and is provided by a separate heating boiler from Bosch Thermotechnology.

Result

The new boiler system from Bosch is intelligently controlled and provides a reliable and energy-efficient operation. Regular maintenance services increase the availability and optimize the fuel consumption. Thanks to its modularity, the energy system can be easily expanded in case of further increases in capacity.

The new, modular steam boiler UL-S with heat recovery equipment for maximum efficiency.



Water/Condensate
Steam
Flue gas

Extremely simplified diagram

1 Water treatment module
2 Water service module WSM-V
3 Economizer ECO
4 Steam boiler UL-S
5 Steam boiler U-HD
6 Condensing heat exchanger
7 Heating boiler
8 Distributor
9 Consumer
10 Condensate service module CSM
11 Chimney
12 Fresh water

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