



Efficiency on a large scale

Steam boilers



BOSCH

Invented for life



Foreword

Bosch Industriekessel offers you shell boiler systems for all applications. Our boilers are not only used successfully in industrial companies, they also offer many advantages to smaller businesses and service companies, as well as in office buildings and residential blocks.

Today we are part of the worldwide Bosch Group and the expertise centre of Bosch Thermotechnology for large-scale and industrial boiler systems. Up until the

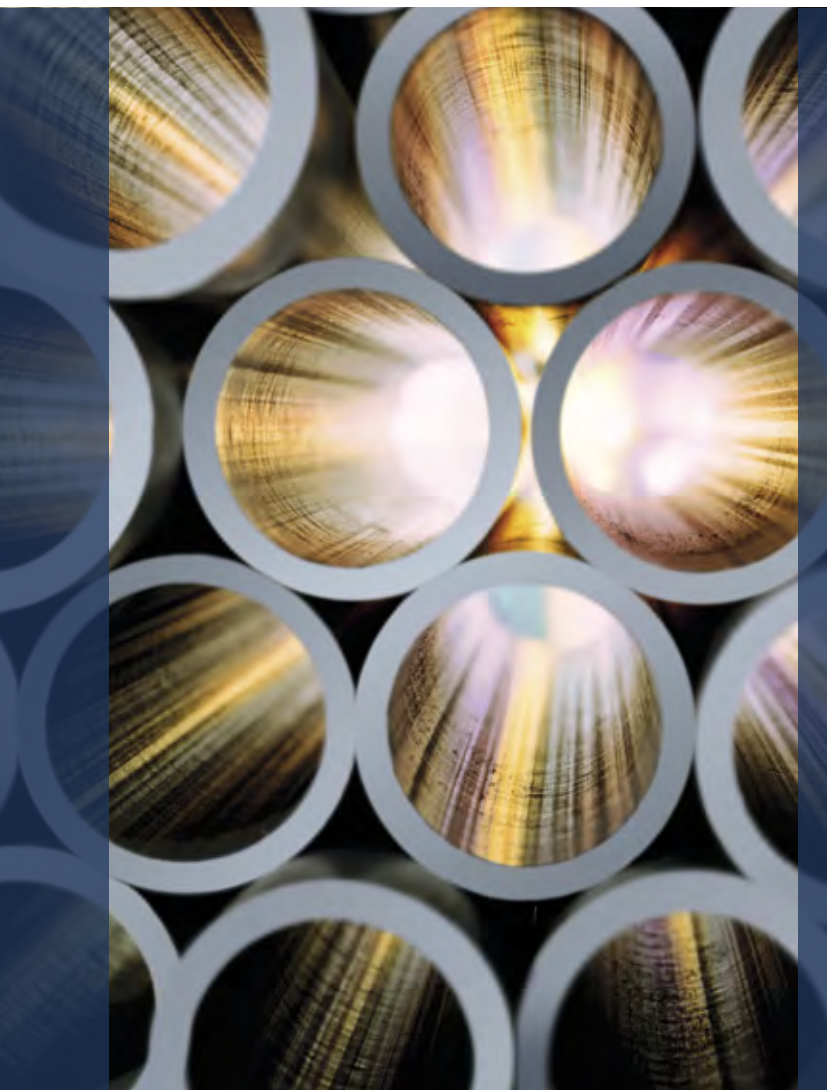
middle of 2012 the systems were sold and distributed under the LOOS brand name, now we have consolidated our strengths and we sell our products under the Bosch brand name.

This brochure gives you a detailed overview of our range of products and services for steam boilers. Above all however, the following pages clarify what is particularly important to us at Bosch Industriekessel: the perfect fulfillment of your individual wishes.

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Up to 1 500 large-scale and industrial boiler systems are produced annually at our highly modern production sites in Gunzenhausen in Germany and in Bischofshofen in Austria.



Expertise and trust

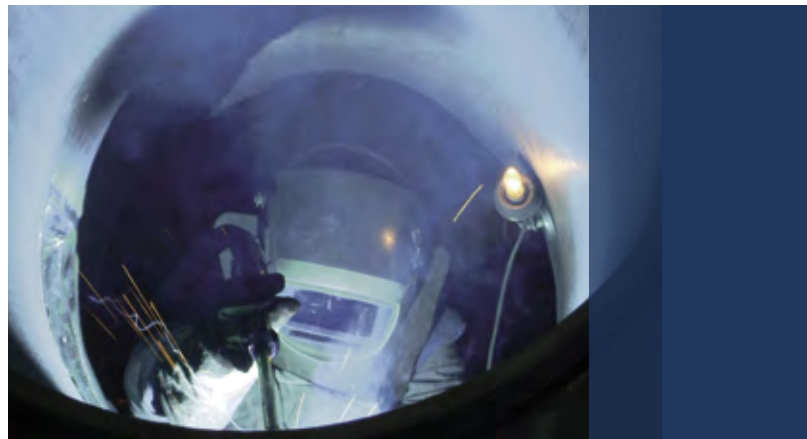
Bosch Industriekessel is a renowned specialist worldwide for boiler systems of all sizes and performance categories. Since 150 years we have been providing innovation in industrial boiler construction.

Technical pioneering spirit which sets standards

Benefit from experience and the power of innovation: since our founding in 1865 we have specialised in industrial boiler construction and achieved extensive specialist know-how. Strength of innovation, quality awareness and efficiency are the benchmarks for our product range and services. We have become a leader on the basis of this high degree of specialisation.

Reliable energy for the whole world

More than 110 000 boiler systems supplied in over 140 countries are clear evidence of the high quality and reliability of our industrial boilers. You will find our systems in practically every branch of industry. We will be pleased to supply you on request details of our numerous references.



Industrial boilers with signature and seal

Our highly modern production facilities ensure that our systems have a quality advantage, which is confirmed by the official quality seals of almost all the approval bodies and certification institutes in the world.

To the optimum solution through partnership

Trust and openness between partners are the most important preconditions for mutual success. As a leading manufacturer of innovative boiler technology, we decided early on to distribute our products through specialised companies. Thanks to close cooperation with your particular specialist company, you achieve the optimum solution for your special requirement.



Industry and business



Private and public facilities



Energy suppliers

Environment and efficiency

As a responsible and innovative boiler manufacturer, we systematically focus on environmental protection and saving of resources. Our sustainable and efficient systems keep CO₂ emissions low and contribute to climate protection.

Highest level of efficiency

We were one of the first manufacturers to equip flame tube/smoke tube boilers of all sizes with integrated economizers in the factory. The heat contained in the flue gases is recovered and the efficiency increased. Additional energy potential can be used with our modular designed boiler house components. Our condensate high-pressure plants keep return-flow condensate up to pressure and temperature, so that it can be fed back to the boiler circuit without loss of energy. Process-related heat loss, which is contained for example in exhaust vapour or desalting water, can be partially recovered by means of suitable solutions such as our vapour cooler or our expansion and heat recovery modules.

Lowest emissions

Our boiler systems are suitable for liquid and gaseous fuels. The modern burner systems comply without any problems with the guidelines in all countries regarding the prevention and reduction of emissions. A completely neutral CO₂ level can be achieved through the use of bio-oils or bio-gases.

Perfectly controlled, less consumption

Intelligent control and regulating systems provide further opportunities for energy saving. The incorporation of our innovative water analyzer not only protects the system from damage caused by insufficient water parameters, but it also achieves additional energy savings in the consumption of fuel and fresh water. Speed-controlled burner fans reduce the electrical power consumption enormously in the partial load range. The modern burner systems, controlled by oxygen or carbon monoxide levels, provide for combustion of the highest possible efficiency thanks to minimal excess air levels.

Investments which pay off

With our highly efficient boiler systems and the appropriate boiler house components it is possible to significantly reduce energy consumption and emissions. Through the reduction in running costs a new boiler system is usually amortised in a very short period of time. You save money and the environment at the same time. Are you already thinking about modernising or replacing your boiler system? We would be pleased to advise you!

Our boiler systems are perfectly matched to your requirements. This saves not only natural, but also your financial resources.



Modular quality

Reliability and long service life are particular characteristics of Bosch boiler systems. The high quality of our systems is guaranteed by the most modern production machines, strict quality controls and by continuous improvements and innovations.

Perfectly matched to each other

A boiler system tailored to your requirements is a foundation stone on which you can sustainably ensure the competitiveness of your company. We offer you modular and universal solutions through our complete boiler delivery programme. The sizing and equipment level of the products are designed to individual customer specification with many different options and variants available. The high manufacturing quality guarantees easy and smooth acceptance.

High performance in a system alliance

Alongside innovative boiler system technology, the ideal energy concept frequently includes additional important components such as combined heat and power, heat pumps or solarthermics. As a company within the Bosch Group we have access to an extensive range of additional system solutions in thermal technology. This enables us to combine different technologies and to implement these for your benefit.



Energy-saving system technology

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

Economizer

- ▶ up to 7 % fuel saving

Flue gas condenser

- ▶ up to 7 % fuel saving

Air preheating

- ▶ up to 2 % fuel saving

Settings and maintenance

- ▶ up to 3 % fuel saving
- ▶ extended service life
- ▶ process reliability
- ▶ improved operation





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

O₂/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 compact boiler combines the benefits of shell boiler technology with the effectiveness of the flame tube/smoke tube system. This is a boiler on the reverse flame principle.



As a high-pressure or low-pressure steam boiler

The large volume flame tube and the smoke tube bundle are perfectly matched to each other. The boiler is characterised by a very compact construction. We can offer you the UNIVERSAL steam boiler as well as high-pressure or low-pressure steam boilers.

Accessories which save energy

For an energy-saving and efficient operating mode the compact boiler can be equipped with an economizer, with 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, it saves our environment and reduces your running costs on a sustainable basis.

The UNIVERSAL steam boiler U-ND/U-HD is ideally suited to small to medium steam volume requirements – an ideal solution in particular for smaller manufacturing businesses and processing companies as well as the service industry.

Benefits at a glance:

- ▶ Intuitive boiler control based on PLC with very high transparency of operating data
- ▶ Effective thermal insulating materials with a high degree of efficiency
- ▶ Automatic start-up, standby and shutdown control SUC
- ▶ Suitable for many burner systems
- ▶ Pollutant reduced combustion thanks to the use of highly developed firing systems and careful matching of the best boiler and burner combination
- ▶ Easy for maintenance – simple to inspect on both the flue gas side as well as the water side
- ▶ Robust, reliable and durable
- ▶ All high-pressure boiler systems are certified in accordance with the European Pressure Equipment Directive – applied almost worldwide
- ▶ Simple extension options thanks to integrated module technology
- ▶ Simple commissioning due to pre-parameterised boiler control
- ▶ Easy wiring on site thanks to plug-in connections

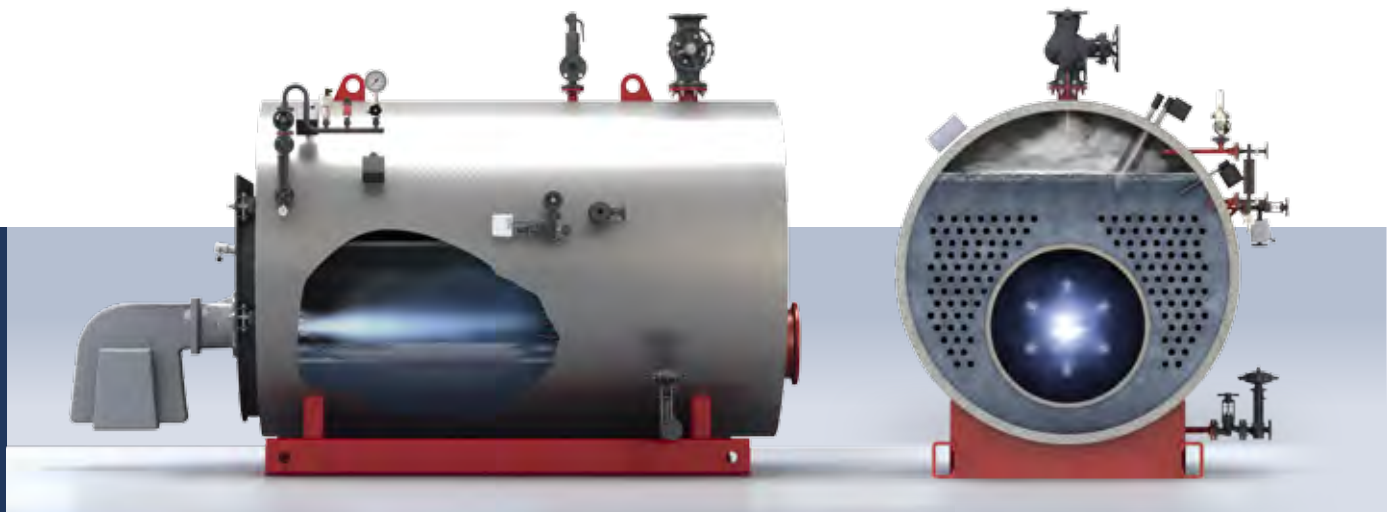
Technical data

Type	U-ND	U-HD
Heat transfer medium	Low-pressure saturated steam	High-pressure saturated steam
Design	Flame tube/smoke tube technology	Flame tube/smoke tube technology
Capacity in kg/h	175 to 3200	175 to 1250
Safety pressure in bar	up to 0.5	up to 16
Max. temperature in °C	110	204
Fuel	Oil, Gas	Oil, Gas

Construction

The cost-effective steam shell boiler impresses due to its compact construction and technically efficient functionality. The large, centrally located flame tube ensures that there is excellent combustion of the fuels. The smoke tubes arranged concentrically around the flame tube provide for an optimum heat transfer.

By means of the reverse flame principle the smoke gases in the flame tube are diverted to the front, and then deflected in the front reversing chamber to the smoke tube sections. The pivoting boiler front door (right/left) opens up convenient access for boiler and burner inspection. The high quality mineral wool matting insulation over the entire boiler body and the special heat insulation material in the front door cut radiation losses to an insignificant minimum.



Associated boiler house components:

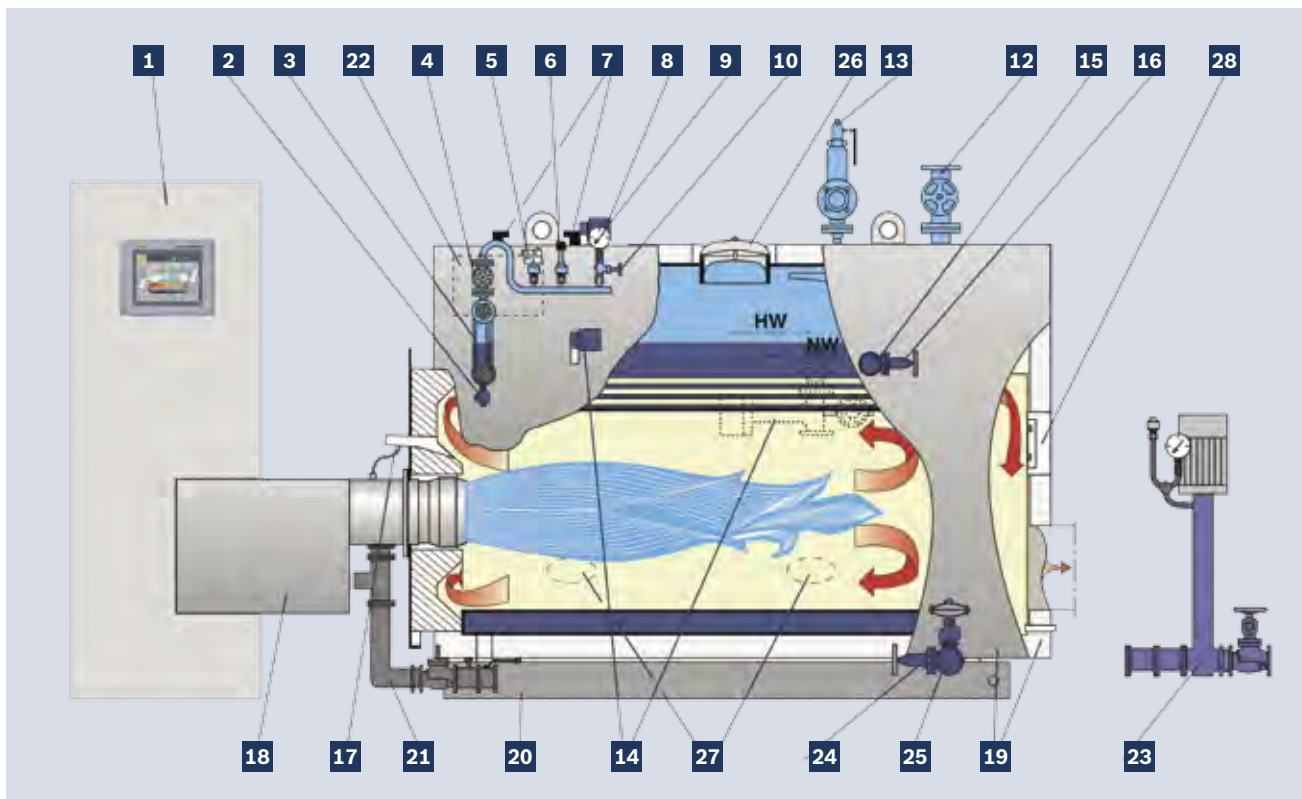
- ▶ Water treatment module WTM
- ▶ Water service module WSM
- ▶ Condensate service module CSM
- ▶ Blow-down, expansion and cooling module BEM
- ▶ Expansion and heat recovery module EHM
- ▶ Expansion, heat recovery and blow-down module EHB
- ▶ Pump module PM
- ▶ Flue gas heat exchanger ECO 3, stand-alone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

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

Equipment level

Our shell boilers are supplied inclusive of all equipment* and are therefore fully functional as a unit. The high quality basic equipment level includes the boiler pressure vessel, the control and safety technology, the burner unit, a pump module, a terminal box and the control switchgear cabinet including the easily operated boiler control BCO.

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 installation between the boiler control cabinet and the terminal box. The free-standing or wall-mounted switchgear cabinet can be adapted and set up to best suit the requirements on site.



- | | |
|--|---|
| 1 Control switchgear cabinet with boiler control BCO | 15 Feed water non-return valve |
| 2 Blow-off tap | 16 Feed water shut-off valve, maintenance-free |
| 3 Reflective water level indicator | 17 Sight hole |
| 4 Manostat tube shut-off valve, maintenance-free | 18 Burner |
| 5 Pressure limiter | 19 Insulation with protective shell |
| 6 Pressure transducer (4-20 mA) | 20 Base frame |
| 7 Low-level limiter electrode | 21 Gas regulation module |
| 8 Pressure gauge | 22 Terminal box |
| 9 Level transducer (4-20 mA) | 23 Pump module |
| 10 Pressure gauge shut-off valve with testing flange | 24 Drain shut-off valve, maintenance-free |
| 12 Steam removal valve | 25 Quick shut-off blow-down valve |
| 13 Full-lift safety valve | 26 Inspection opening, steam side |
| 14 Fully automatic conductivity measurement and desalting | 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' (three-pass steam boiler in modular construction). The U-MB type consists of several modules, which fulfil your individual requirements perfectly.

Flexibility from a modular system

The appropriate elements of the boiler are configured with the focus on low emissions, high steam quality and optimum energy efficiency. Thanks to modular construction with systematic use of design elements and the same parts from other type series, you benefit from a particularly attractive price-performance ratio.

Diversity with system

The three-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, waste water disposal, water analysis and heat recovery. The steam boiler's PLC control via touchscreen, its teleservice capability and its other equipment are all identical with that of the large industrial boiler series.

The UNIVERSAL steam boiler U-MB is to be found wherever small to medium steam volumes are required. Classic areas of application are the food and drinks industries, laundry and cleaning companies, as well as smaller industrial companies.

Benefits at a glance:

- ▶ Cost-effective despite shell boiler and three-pass technology
- ▶ High level of efficiency due to the integrated economizer
- ▶ Comprehensive series-wide basic equipment
- ▶ Intuitive touchscreen operation and PLC control
- ▶ Small space requirement due to its compact base area
- ▶ Simple commissioning due to pre-parameterised boiler control
- ▶ Easy wiring on site thanks to plug-in connections
- ▶ Automatic start-up, standby and shutdown control SUC
- ▶ Simple installation thanks to supply as a unit – the equipment, firing system and economizer have already been fitted in the factory

Technical data	
Type	U-MB
Heat transfer medium	High-pressure saturated steam
Design	Three-pass flame tube/ smoke tube technology
Capacity in kg/h	200 up to 2000
Safety pressure in bar	up to 16
Max. temperature in °C	204
Fuel	Oil, gas



Construction

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 construction, 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 to be carried out.

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 the preheating of the boiler feed water, and it is therefore recovered to a large extent, 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

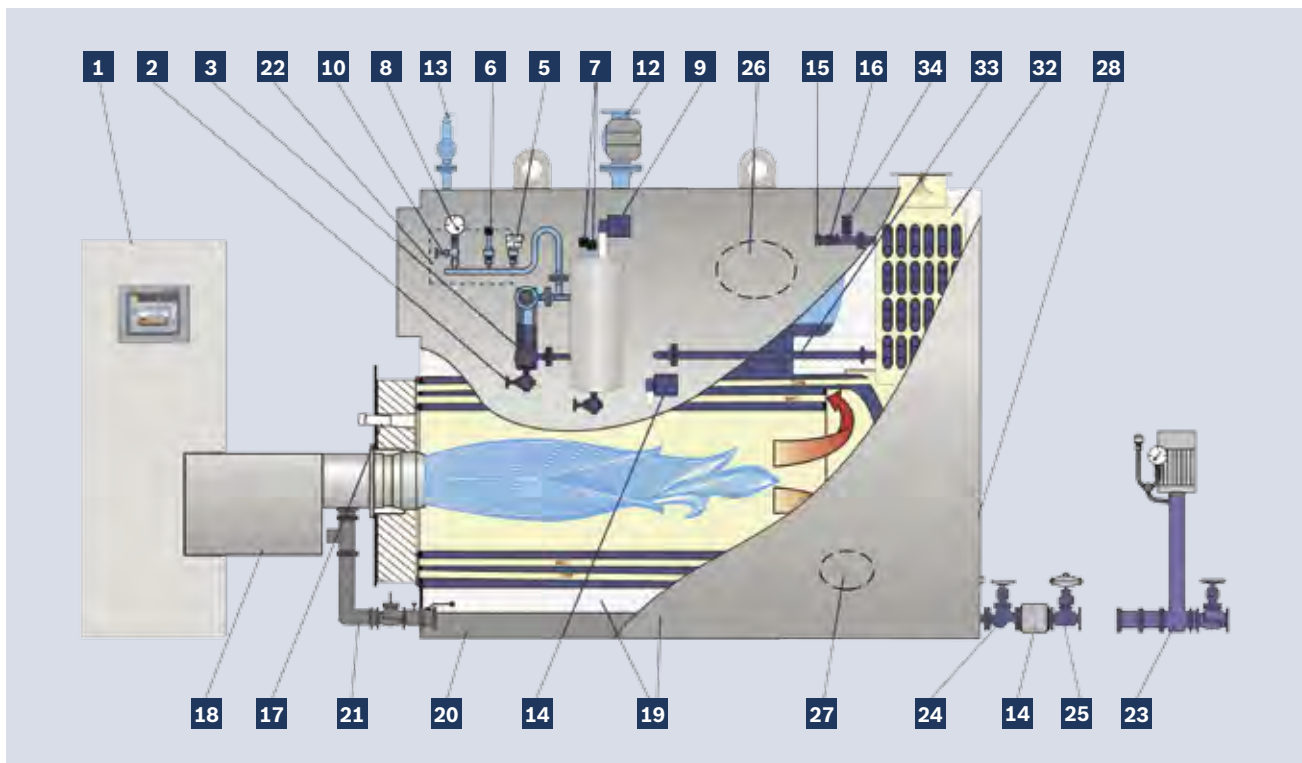
For further information see our brochure on 'Boiler house components'.



Equipment level

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 make it easy to install 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 | 17 Sight hole |
| 2 Blow-off tap | 18 Burner |
| 3 Reflective water level indicator | 19 Insulation with protective shell |
| 5 Pressure limiter | 20 Base frame |
| 6 Pressure transducer (4-20 mA) | 21 Gas regulation module |
| 7 Low-level limiter electrode | 22 Terminal box |
| 8 Pressure gauge | 23 Pump module |
| 9 Level transducer (4-20 mA) | 24 Drain shut-off valve, maintenance-free |
| 10 Pressure gauge shut-off valve with testing flange | 25 Quick shut-off blow-down valve |
| 12 Steam removal valve | 26 Inspection opening, steam side |
| 13 Full-lift safety valve | 27 Inspection opening, water side |
| 14 Fully automatic conductivity measurement and desalting | 28 Inspection opening, flue gas side |
| 15 Feed water non-return valve | 32 Flue gas heat exchanger ECO |
| 16 Feed water shut-off valve, maintenance-free | 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 steam boiler UL-S is a three-pass shell boiler, which fulfils all the requirements in the medium to high output ranges.

Thought out to the final detail

The flame tube, the internal wet-back rear smoke gas reversing chamber, as well as the first smoke tube and second smoke tube, are all arranged for optimum flow within the horizontal cylindrical pressure vessel. Radiant and convection heat surfaces generate in tandem a rapid water circulation, which accelerates the steam bubble transport to the steam chamber. The transferred fuel heat is converted into steam quickly and without material stress through an even heat transfer. The large water chamber offers sufficient storage volume to be able to cover off even sudden peaks in consumption.

Optimized efficiency

The flue gas flow from the steam boiler contains significant heat potential. For an increased 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, speed-controlled burner fan and O₂ or CO control should also be used to give an even more efficient and environmentally friendly operation.

Benefits at a glance:

- ▶ Intuitive boiler control based on PLC with very high transparency of operating data
- ▶ High level of efficiency due to three-pass technology, an integrated economizer and effective heat insulation materials
- ▶ High level of pressure consistency and steam quality even with widely fluctuating steam demand
- ▶ The boiler can be equipped with a separate fourth pass for waste heat use
- ▶ The boiler body can also be used as a pure waste heat boiler behind combined heat and power plants or gas turbines
- ▶ Automatic start-up, standby and shutdown control SUC
- ▶ Suitable for all burner systems
- ▶ Pollutant reduced combustion thanks to the use of highly developed firing systems and careful matching of the best boiler and burner combination
- ▶ Simple commissioning due to pre-parameterised boiler control
- ▶ Easy wiring on site thanks to plug-in connections

The UNIVERSAL steam boiler UL-S can be used wherever steam or heat is required in a medium to high output range, such as for example in processing industries, in the commercial sector or in communal blocks.

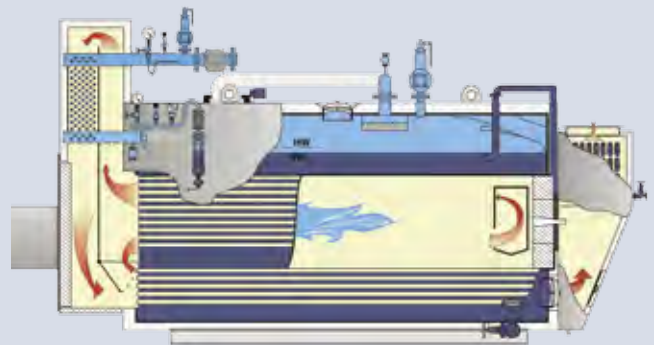
Technical data

Type	UL-S	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
Capacity in kg/h	1 250 up to 28 000	2 600 up to 28 000
Safety pressure in bar	up to 30	up to 30
Max. temperature in °C	235	300
Fuel	Oil, gas	Oil, gas



Construction

Our three-pass patent dating from 1952 forms the basis for the outstanding and ongoing success of this series. The flame tube (first pass) and two smoke tube bundles (second and third pass) are integrated with the wet-back rear reversing chamber in the pressure vessel in an ideal way. The laterally positioned flame tube, and the horizontal rear and vertical front heating gas reversal produce a large radiant and convection heating surface with a large steam chamber, and all of this within the smallest dimensions. The floors are anchored stably by the large continuous flame tube and they are connected with the boiler shell by means of the cleverly devised use of corner anchors for even load distribution.



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 pivoting 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 possible for the second and third boiler pass
- ▶ High service life thanks to low thermal loading of the heat exchanger bundle of the superheater

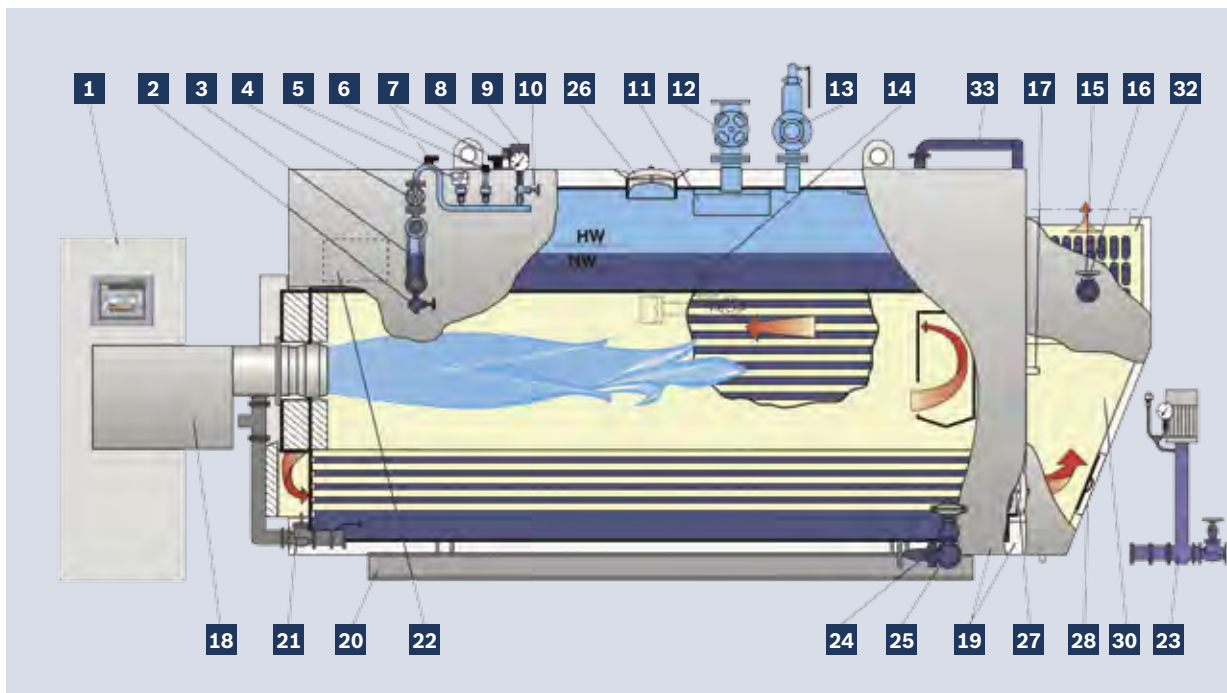
For further information see our technical report on 'Superheater module'.

Equipment level

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

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

- | | |
|--|---|
| 1 Control switchgear cabinet with boiler control BCO | 15 Feed water non-return valve |
| 2 Blow-off tap | 16 Feed water shut-off valve, maintenance-free |
| 3 Reflective water level indicator | 17 Sight hole |
| 4 Manostat tube shut-off valve, maintenance-free | 18 Burner |
| 5 Pressure limiter | 19 Insulation with protective shell |
| 6 Pressure transducer (4-20 mA) | 20 Base frame |
| 7 Low-level limiter electrode | 21 Gas regulation module |
| 8 Pressure gauge | 22 Terminal box |
| 9 Level transducer (4-20 mA) | 23 Pump module |
| 10 Pressure gauge shut-off valve with testing flange | 24 Drain shut-off valve, maintenance-free |
| 11 Steam dryer | 25 Quick shut-off blow-down valve |
| 12 Steam removal valve | 26 Inspection opening, steam side |
| 13 Full-lift safety valve | 27 Inspection opening, water side |
| 14 Fully automatic conductivity measurement and desalting | 28 Inspection opening, flue gas side |
| | 29 Flue gas collection chamber |
| | 32 Flue gas heat exchanger ECO |
| | 33 Connection piping ECO/boiler |



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

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

UNIVERSAL steam boiler ZFR/ZFR-X

The UNIVERSAL steam boiler ZFR is a shell boiler in three-pass technology with two flame tubes and completely separate smoke gas passages. It is to be found wherever a reliable steam and heat supply with high output is required.



Proven for decades and still pioneering

The double-flame smoke tube boiler with separate smoke gas passages is also suitable for operation with only single firing. The three-pass principle with a rear smoke gas reversing chamber lying in the water chamber was patented in 1952. The economizer and superheater can be upgraded in simple modular construction. The dimensions of the flame tubes, smoke tube bundles, water chamber and steam chamber have optimum thermodynamics. Radiant and convection heating surfaces generate a special dynamic in conjunction with the possibility of single-flame tube operation. The fed fuel heat is transferred evenly by means of flow components mounted on the water side, and it is then converted into steam without material stress.

Modules which help you save

The modulating output regulator for 'unrestricted' single-flame or double-flame tube operation and for continuous feed water control is mandatory with the UNIVERSAL steam boiler ZFR. In order to achieve additional savings potential, we can offer you, subject to the system conditions, the following optional modules for increased efficiency:

- ▶ Speed-controlled burner fan
- ▶ O₂ controls
- ▶ CO controls

The UNIVERSAL steam boiler ZFR series is also very well suited to the dynamic pooled output of several boilers. Important areas of use are those of commercial operations in all sectors of the economy, of processing industries and supply industries, as well as of communal buildings.

Benefits at a glance:

- ▶ Intuitive boiler control based on PLC with very high transparency of operating data
- ▶ High level of efficiency due to three-pass technology, an integrated economizer and effective heat insulation materials
- ▶ High level of pressure consistency and steam quality even with widely fluctuating steam demand
- ▶ Automatic start-up, standby and shutdown control SUC
- ▶ Suitable for all burner systems
- ▶ Pollutant reduced combustion thanks to the use of highly developed firing systems and careful matching of the best boiler and burner combination
- ▶ Easy for maintenance – simple to inspect on both the flue gas side as well as the water side
- ▶ Robust, reliable and unsurpassed in its durability
- ▶ Acceptance in accordance with the European Pressure Equipment Directive – applied worldwide
- ▶ Extremely high control range thanks to single-flame tube operation
- ▶ Simple extension options thanks to integrated module technology
- ▶ Simple commissioning due to pre-parameterised boiler control
- ▶ Easy wiring on site thanks to plug-in connections

Technical data

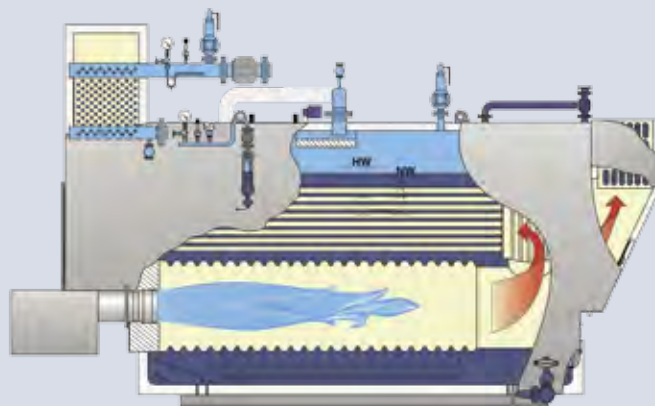
Type	ZFR	ZFR-X
Heat transfer medium	High-pressure saturated steam	High-pressure superheated steam
Design	Three-pass double-flame tube/smoke tube technology	Three-pass double-flame tube/smoke tube technology
Capacity in kg/h	18 000 to 55 000	18 000 to 55 000
Safety pressure in bar	up to 30	up to 30
Max.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

Construction

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 operation are critical for permanent stability. The flame tubes are pushed through in the front and rear floors and welded tightly all around. The wet-back rear smoke gas reversing chamber is separated with a stabilising tube wall, which has water flowing through, and it is fastened to the rear floor. Water circulation and heat transport are given dynamic effect by means of guide profiles on the boiler base, and they are additionally accelerated by flow paths between the flame tubes and the smoke tube areas lying next to each other.

A fully automatic operation with one or both burners is possible without restriction due to the approved single-flame 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 see our technical report on 'Double-flame tube boilers'.



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 pivoting 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 possible for the second and third boiler pass
- ▶ High service life thanks to low thermal loading of the heat exchanger bundle of the superheater

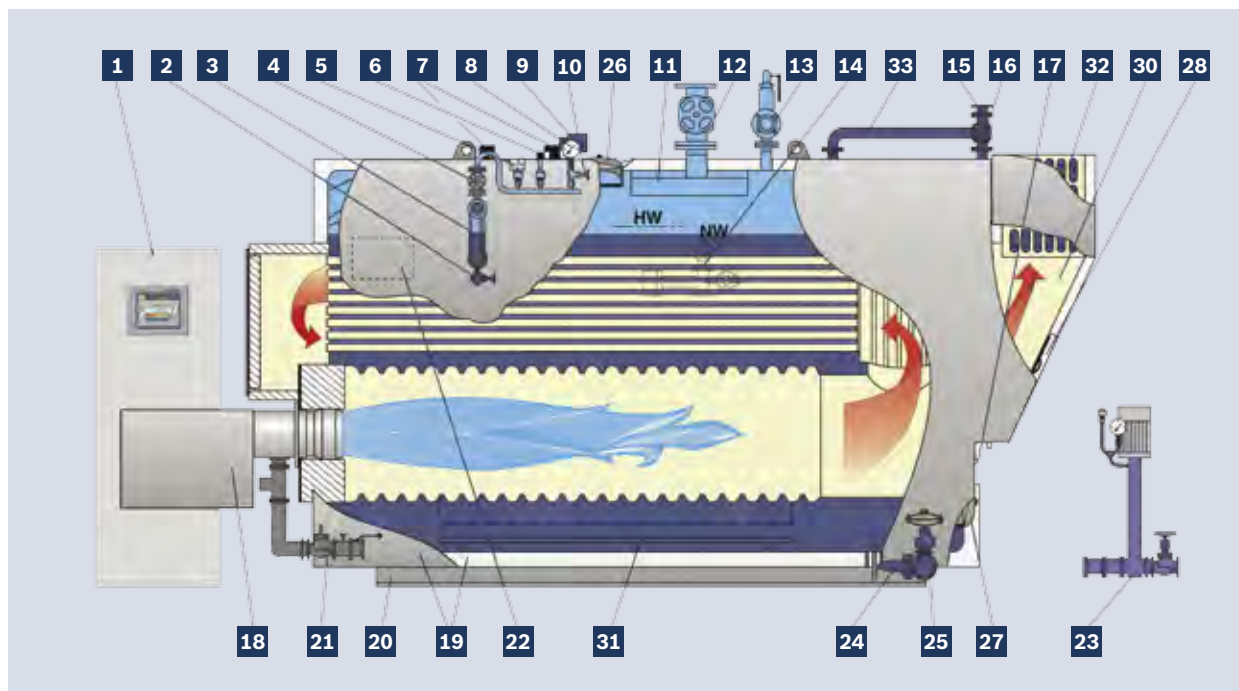
For further information see our technical report on 'Superheater module'.

Equipment level

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

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

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



Associated boiler house components:

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

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

Self-fired waste heat boiler

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

These hot water and steam boilers are conventionally-fired boilers based on a 3-pass design, with an additional separate integrated smoke tube pass for waste heat utilisation. They are primarily used in combination with CHP units or gas turbines. The waste heat system uses hot flue gases from upstream combustion processes to assist in the generation of thermal or process heat.

Additional peak load boilers are normally required if waste heat boilers without an auxiliary 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.

Construction

The design of our self-fired waste heat boilers 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.

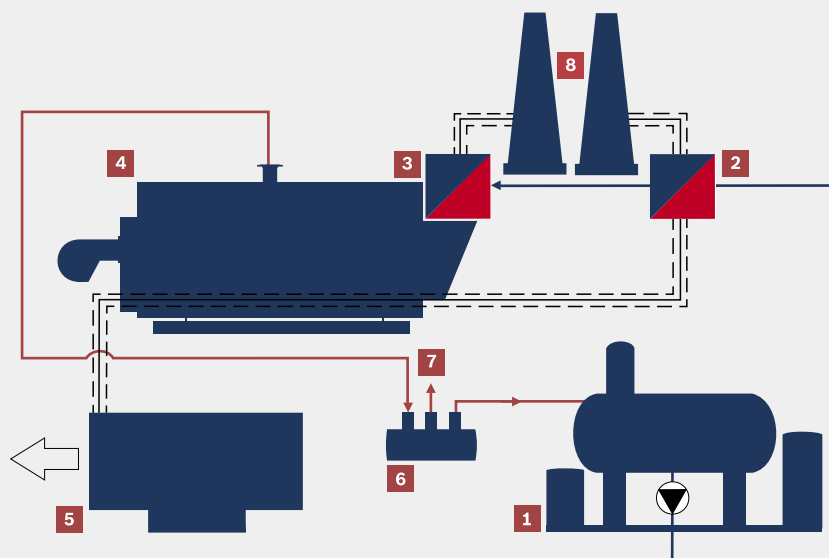
Equipment level

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

Technical data	
Type	UL-S
Heat transfer medium	High-pressure saturated steam
Design	Three-pass flame tube/ smoke tube boiler with integrated fourth smoke tube pass
Capacity in kg/h	700 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
Waste heat source fuel	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 self-firing function
- ▶ 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 availability of spare parts
- ▶ Service from a single source



- 1** Water service module WSM-V
- 2** Flue gas heat exchanger
- 3** Economizer
- 4** 4-pass steam boiler
- 5** CHP
- 6** Distributer
- 7** Consumer
- 8** Chimney

Extremely simplified diagram

UNIVERSAL heat recovery steam boiler HRSB

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

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

Construction

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 of the heat exchanger even further. A flue gas bypass can be added if required. If no steam is extracted, the boiler will use this for diversion on the flue gas side. This means that the CHP unit or other waste heat sources can continue operating without interruption.

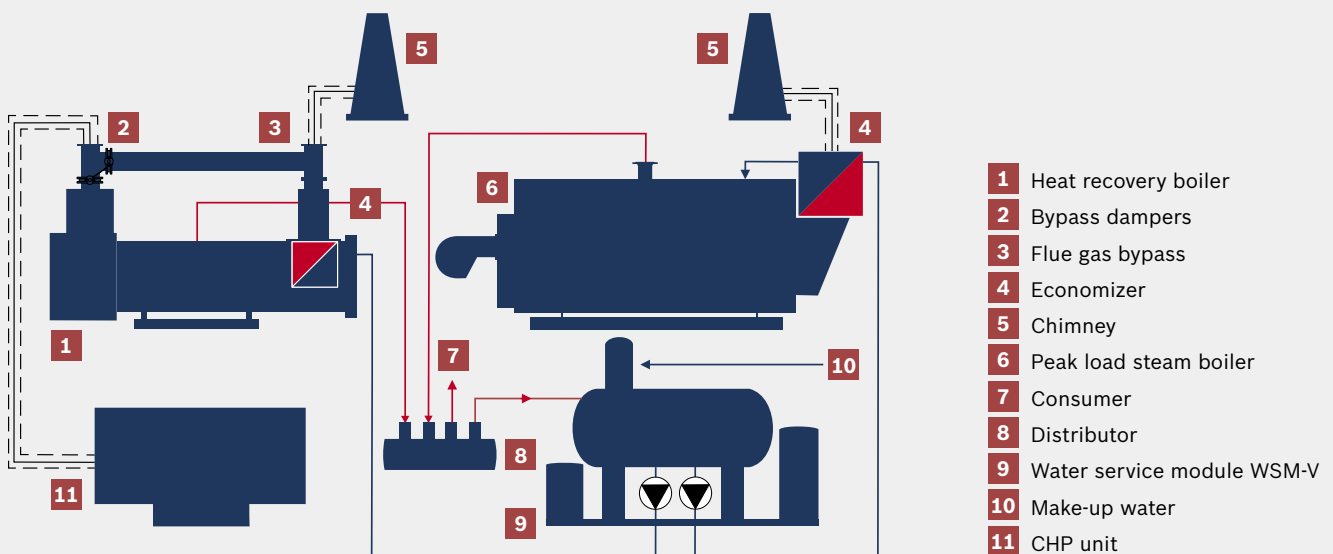
Equipment level

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.

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 availability of spare parts
- ▶ Service from a single source

Technical data	
Type	HRSB
Heat transfer medium	High-pressure saturated steam
Design	Heat recovery shell boiler
Capacity in kg/h	400 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
Waste heat source fuel	Natural gas (other flue gas types on request)
Output range of combinable CHP units in MWel	approx. 0.5 to 4



Extremely simplified diagram

Series UL-S and UT-H as 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



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 comes with all necessary functions for operating steam and hot water boilers according to specialised requirements. Extensive information regarding operating states, operating data and measured values can be viewed on its touch-screen display. Diverse system data are analysed, evaluated and transparently displayed via a traffic light model using the "Condition Monitoring basic" integrated software. Operating characteristics that could lead to a drop in efficiency, increased wear or unplanned stoppages 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 operating company 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 at the press of 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 Teleservice: Operating parameters and messages can be accessed via an optional modem
- ▶ "Condition Monitoring basic" for consistently high system efficiency and availability of steam, hot water and heating boiler systems
- ▶ Diagnostics function for rapid localisation of irregularities in operation
- ▶ Start-up, standby and shutdown control SUC allows fully automatic high-pressure steam boiler operation

Equipment level

Basic functions:

- ▶ Performance regulation
- ▶ Level control
- ▶ Low-load control
- ▶ "Condition Monitoring basic" - predictive 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 customer orientated

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 reaction 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 contact your local customer service engineer direct, the contact details can be found on the switchgear 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 fixed network, you will be connected to the customer advisor responsible depending on the country/region. Your problem will be located in the course of professional advice over the phone, or alternatively the deployment of a customer service engineer will be coordinated.

Service Hotline Germany/International:
+49 180 5667468*

Service Hotline Austria:
+43 810 810300**



Reliable supply of spare parts

Spare parts are available immediately ex ware-house, even those parts which have been in service for many years. Our Spare Parts Hotline is also manned outside business hours and on Sundays and public holidays.

Spare Parts Hotline Germany/International:
+49 180 5010540*
Spare Parts Hotline Austria:
+43 6462 2527-320

For further information see our brochure on 'Services' and under www.bosch-industrial.com

*EUR 0.14/min from German landline

**max. EUR 0.10/min from Austrian landline
Charges for phone calls from mobile networks
and for international calls may vary.

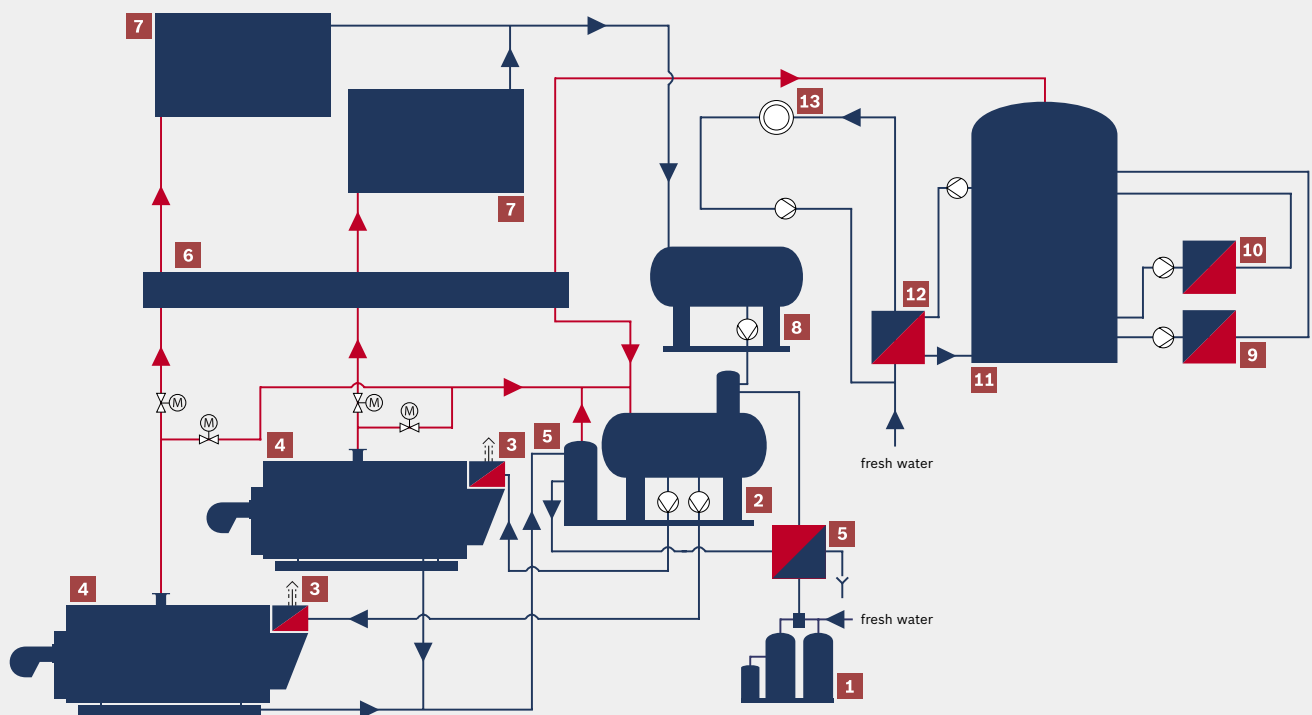
Reference: Valenzi in Suderburg

Heat recovery equipment and heat storage tank ensure optimised efficiency.

Since 2012, two modern Bosch steam boilers with a steam output of 5 000 kg/h each have been in use at the forest fruit preserve producer Valenzi GmbH & Co.KG based in Suderburg in Lower Saxony. Components for heat recovery, water treatment and condensate return permit energy-efficient, optimised boiler operation. The speed-controlled fans of the natural gas burners also ensure low current consumption.

Result:

Through the new boiler system alone, Valenzi is expecting energy cost savings of some 40 000 Euro and CO₂ savings of approximately 300 tonnes per annum. Additional measures, such as utilising the waste heat from the compressors and cold stores, further improve the energy balance.



- 1 Water treatment module WTM
- 2 Water service module WSM-V
- 3 Economizer ECO
- 4 Steam boiler UL-S
- 5 Expansion, heat recovery and blow-down module EHB

- 6 Steam distributor
- 7 Production
- 8 Condensate service module CSM
- 9 Heat exchanger cold stores
- 10 Heat exchanger compressors

- 11 Heat storage tank
- 12 Heat exchanger
- 13 Process water for washing and cleaning purposes

Extremely simplified diagram

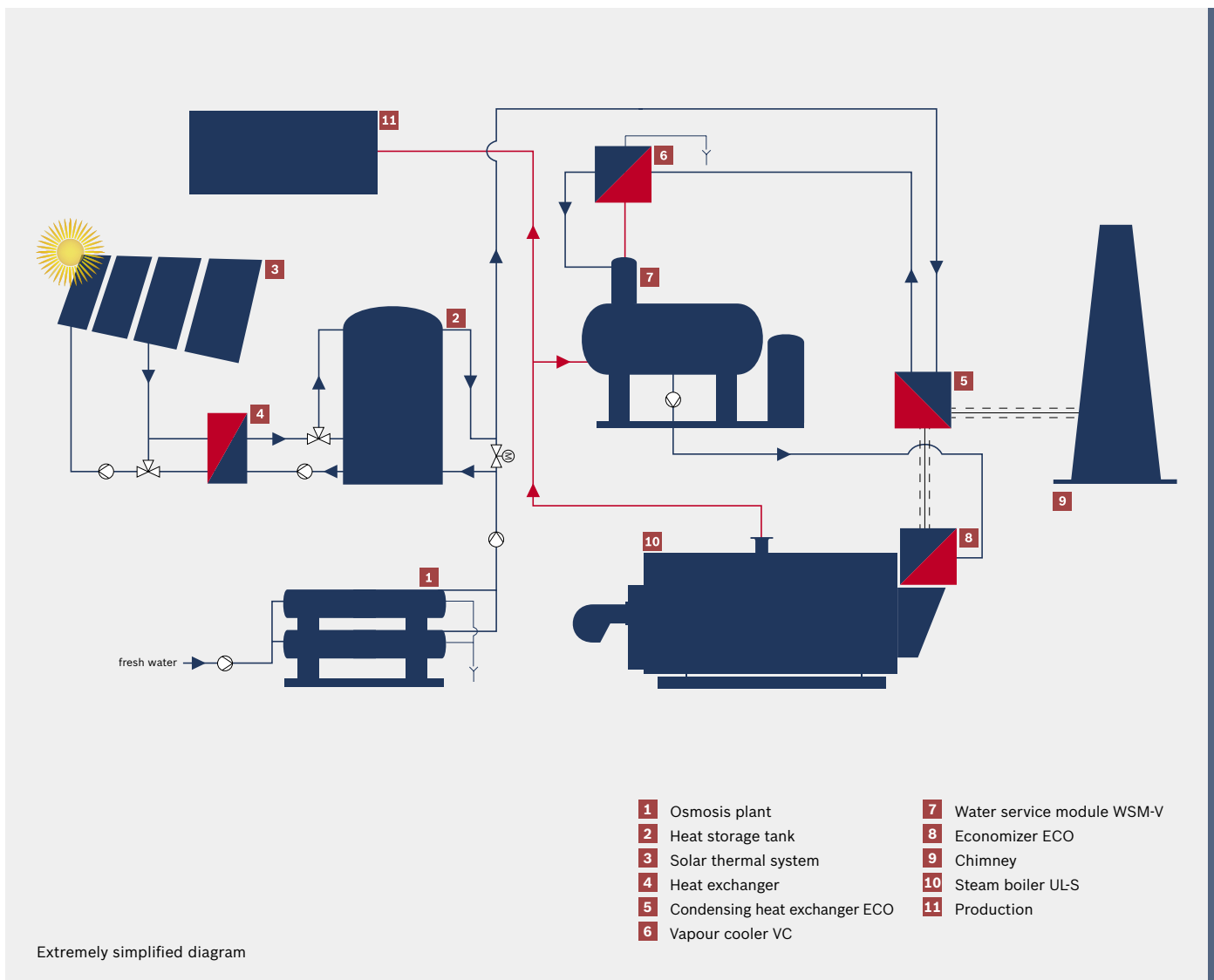
Reference: Fixkraft in Enns


Steam boiler plant cleverly combined with solar heat.

At Fixkraft Futtermittel GmbH in Enns, Austria, a Bosch steam boiler with a steam output of 2 500 kg/h, combined with a solar thermal system, provides the process heat required for animal feed production. The additional water is drawn from the company's own well, treated and pre-heated with solar energy. Heat recovery units supply additional energy and high-pressure saturated steam is generated in the boiler.

Result:

Besides reducing CO₂ emissions by 85 tonnes per annum, an energy saving of 15 % on the old system is achieved.





Production facilities:

Factory 1 Gunzenhausen

Bosch Industriekessel GmbH
Nürnberger Straße 73
91710 Gunzenhausen
Germany

Factory 2 Schlungenhof

Bosch Industriekessel GmbH
Ansbacher Straße 44
91710 Gunzenhausen
Germany

Factory 3 Bischofshofen

Bosch Industriekessel Austria GmbH
Haldenweg 7
5500 Bischofshofen
Austria

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