

LOG WOOD BOILERS

Wood gasification boilers

Solid fuel boilers

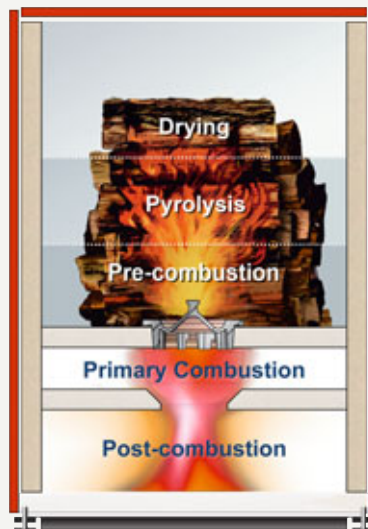
Plant systems



KUNZEL

Basic principle of the wood gasification boiler

The combustion of wood takes place primarily in three stages: drying, degassing (pyrolysis) and the actual combustion. In the development of the **KÜNZEL** wood gasification boiler, careful attention was paid to create a system in which these stages each take place in a separate part of the boiler designed for that stage rather than together in an uncontrolled manner as is the case with a campfire or fireplace. The wood is dried and degassed in the various layers of



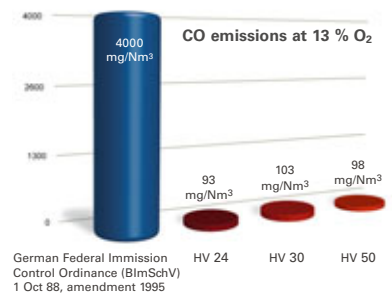
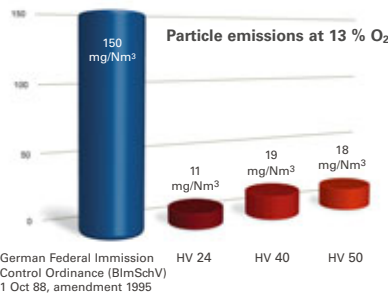
the wood load in the filling chamber. The gas produced is then mixed with pre-heated secondary air using a forced or induced draft (ID) fan in the **KÜNZEL** turbo burner, the actual core of the boiler, and subsequently burned at high temperature in the combustion chamber designed especially for this purpose until few emissions remain. This combustion technique is referred to as "bottom combustion". All **KÜNZEL** wood gasification boilers apply this principle consistently.

The result



The wood gas enters the hot combustion chamber as a concentrated flame jet and is burned completely there. The consistent separation of the individual stages of wood combustion guarantees the exceptionally high combustion quality of the **KÜNZEL** wood gasification boiler.

The charts below show the high technical standard of our boiler, documented by recent measurements by the quality organization TÜV Rhineland.

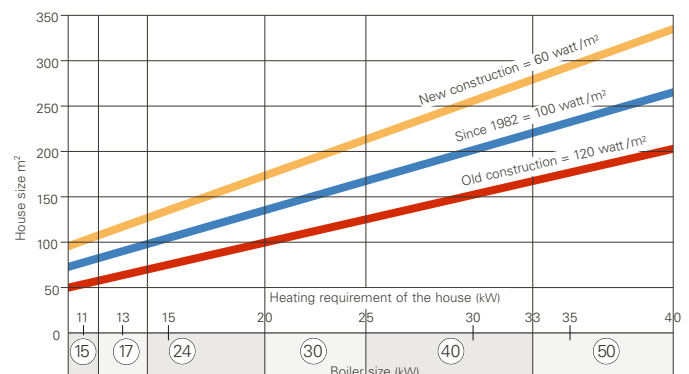


Boiler capacity

In contrast to oil or gas boilers, a wood boiler does not function at its rated capacity 24 hours per day. Depending on the type used, a load of wood load lasts from three to five hours at full capacity. However, in practice the load is not refilled continuously, and during the night or if unattended the fire goes out entirely.

During this time the accumulator tank takes over the heat supply for the house. Therefore wood boiler must be able to meet the heating requirement of the house and have enough reserve capacity to be able to recharge the accumulator tank even on cold winter days.

The boiler should thus be dimensioned 30 to 50% larger than the heating requirement of the house. The chart on the right shows non-binding reference values for single family homes with ceiling heights of approximately 2.5 meters.



The technology of KÜNZEL wood gasification boilers



The **large loading door** facilitates easy filling of the boiler. The door is equipped with a safety lock and a soft silicone gasket to prevent smoke escaping.



The speed of the **two BT type fans** for primary and secondary air is controlled separately by the lambda processor control panel. This ensures optimal combustion all the time.



The **combustion chamber tray** is fireproof and also serves as the ash pan. It can be pulled out easily for emptying. The ash sieve (not shown) optimizes the post-combustion. The access door is sealed with a heat-proof fiberglass cord gasket.

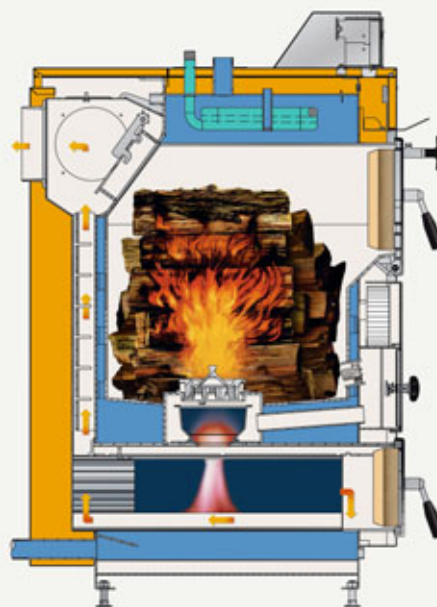


The compact design of the **whirl chamber burner** enables exceptionally effective, low emission combustion in a very small space. The turbo plate on top ensures good mixing of oxygen and combustible gases. **No ceramic parts are used in the burner!**



Induced draft fan

The HV-S boiler model series works with an ID fan instead of a forced draft blower. It can be installed optionally on one of the three connection options for the exhaust adapter.



The **exhaust adapter** has three connection options to enable space-saving installation. The standard integrated draft limiter stabilizes the combustion (except HV-S).

Wood gasification boiler HV / HV-S

The **KÜNZEL** wood gasification boiler is designed for the efficient, clean combustion of pieces of natural wood (German Federal Immission Control Ordinance [BlmschV] fuel no. 4). The generously dimensioned hopper holds logs up to half a meter long or one third of a meter for boilers of lesser capacity. A space-saving forced draft blower supplies combustion air to the boiler separately as primary and secondary air. The primary air is channeled via two lateral rows of air vents into the filling chamber. The pre-heated secondary air is directed straight to the ceramic-free stainless steel burner. This specially developed turbo burner enables the boiler to be very compact in design and thus easy to install without sacrificing high efficiency and low emission combustion. A standard integrated electric ignition increases the heating comfort considerably. The **KÜNZEL HV** is also available as the **HV-S model with an ID fan**.

KÜNZEL wood gasification boilers have been tested by TÜV Rheinland and meet the requirements of the current German Federal Immission Control Ordinance (BlmSchV) and its forthcoming revision.

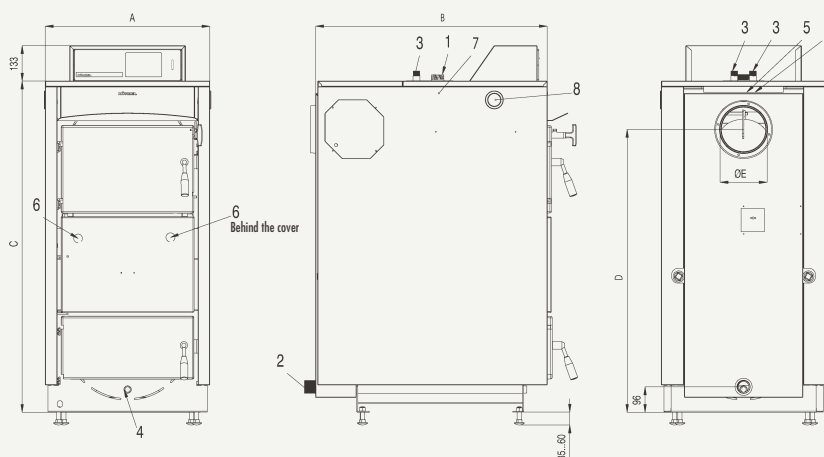


HV 24 – shown with microprocessor control panel 614

Typ		15	17	24	30	40	50
Rated capacity (wood)	kW	14,9	16,6	25	30	37,5	47
Overall efficiency	%	91	91	92	92	92	92
Filling chamber capacity	litre	83	83	122	162	162	225
Filling chamber depth	mm	415	415	565	615	615	620
Filling opening W x H	mm	380 x 255		450 x 300		450 x 350	
Exhaust gas mass flow (during heating)	kg/s	0,011 (0,022)	0,012 (0,024)	0,018 (0,036)	0,023 (0,047)	0,028 (0,057)	0,035 (0,070)
Draft required	Pa	min. 10 up to max. 18					
Water capacity	litre	67	67	90	128	128	180
Fan	watt	35	35	35	88	88	88
A Width	mm	620	620	620	690	690	680
B Depth	mm	740	740	890	950	950	1000
C Height	mm	1245	1245	1245	1405	1405	1630
D Exhaust gas connection height	mm	1065	1065	1065	1210	1210	1430
E Exhaust gas connection Ø	mm	150	150	180	180	180	200
Transport weight	kg	290	290	350	450	450	520

Key

- 1 = Supply 1½" a.
- 2 = Return 1½" a.
- 3 = Heat exchanger 2 x ¾" a.
- 4 = Coupling for filling/emptying tap ½"
- 5 = 2 Couplings for sensors ½"
- 6 = 4 Lifting holes 1" (HV 50 1½")
- 7 = Lifting bracket under cover
- 8 = Cable guide



Wood gasification boiler Biturbo BT

The **KÜNZEL** Biturbo BT wood gasification boiler is a further development of the **KÜNZEL** HV wood gasification boiler, which maintains all the advantages of this proven model. The BT is suited for logs over half a meter long and burns these at temperatures over 1000 °C, achieving degrees of efficiency as high as 92%.

With the Biturbo, the primary and secondary air are each fed by a dedicated fan. The speed of the two fans is regulated by the control panel 821 as a function of the fuel quality and the boiler capacity. The control panel receives the necessary information for this from a temperature sensor and a lambda probe in the boiler's exhaust duct. This modulating mode of operation decreases the pollutant emissions and increases the annual use efficiency and the combustion time.

The BT also maintains the required emission values under partial-load conditions.

An electric ignition is standard for the Biturbo. Ignition occurs automatically and can be selected immediately, at a specified time or for when the tank is empty.

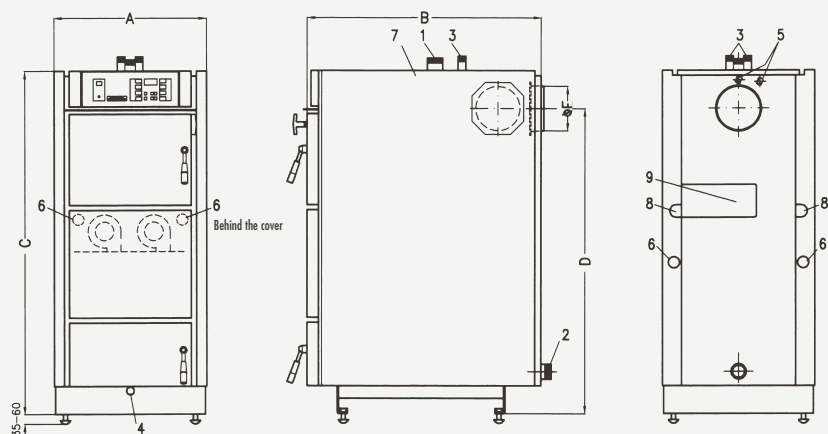


BT 2030

Typ BT		2030	2050
Rated capacity range	kW	23–31	40–47
Overall efficiency	%	90,6	92
Filling chamber capacity	litre	136	225
Filling chamber depth	mm	550	620
Filling opening W x H	mm	380 x 300	450 x 350
Exhaust gas mass flow (during heating)	kg/s	0,022 (0,045)	0,037 (0,075)
Draft required	Pa	min. 10 up to max.18	min. 10 up to max.18
Water capacity	litre	90	180
Fan	watt	2 x 21	2 x 21
A Width	mm	600	680
B Depth	mm	910	1000
C Height	mm	1355	1630
D Exhaust gas connection height	mm	1170	1430
E Exhaust gas connection Ø	mm	180	200
Transport weight	kg	400	520

Key

- 1 = Supply 1½" a.
- 2 = Return 1½" a.
- 3 = Heat exchanger 2 x ¾" a.
- 4 = Coupling for filling/emptying tap ½"
- 5 = 2 Couplings for sensors ½"
- 6 = 4 Lifting holes 1" (HV 50 1½")
- 7 = Lifting bracket under cover
- 8 = Cable guide
- 9 = Lambda probe and exhaust sensor

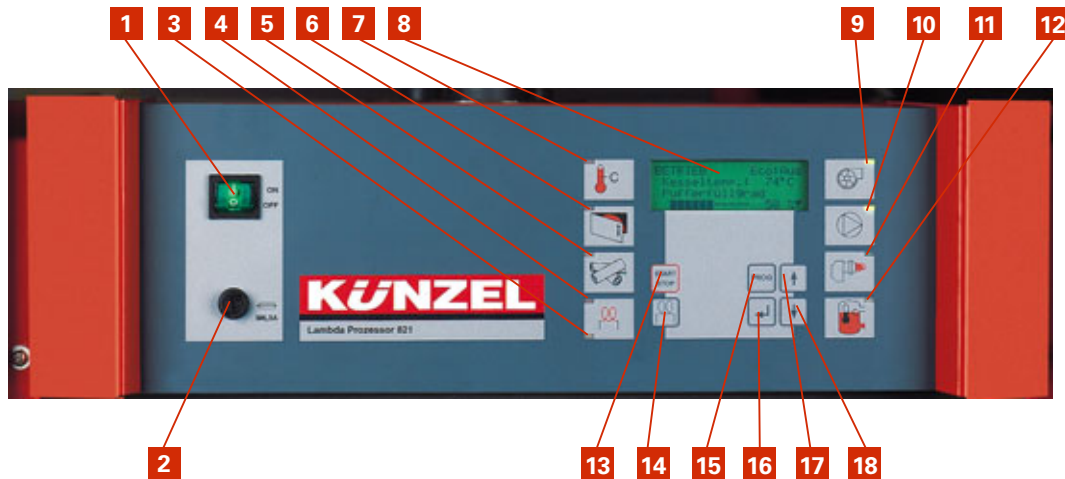


Lambda processor control panel 821 with accumulator tank regulation

A special control panel was developed for the **KÜNZEL** Biturbo BT. An anticipatory fuzzy logic controller in the control panel regulates the primary air fan as a function of the boiler capacity and the secondary air fan as a function of combustion quality. This achieves particularly good combustion results. Probes for boiler temperature, exhaust temperature, the top and bottom temperatures in the accumulator tank as well as a lambda probe (oxygen sensor) supply the control panel with the necessary information.

The output of the boiler adjusts automatically to the heating requirement of the heating system. The BT's automatic ignition device can be activated not only with the ignition button but also by a time setting or the tank temperature.

With just a few button presses, the illuminated display can be used conveniently to check or input all values. Furthermore, important events are indicated by operation and indicator lights. The control panel 821 has the following functions:



- | | |
|--|--|
| 1 ON/OFF switch | 10 "boiler circulation pump" |
| 2 Main fuse | 11 "external burner" |
| 3 Indicator light for "ignition programmed" | 12 Indicator light for "tank full" |
| 4 "ignition in operation" | 13 start and stop button for the program |
| 5 "burnout" | 14 "Immediate ignition" button |
| 6 "loading door open" | 15 "PROG" button to open the program menu |
| 7 "excess temperature" | 16 "ENTER" button for confirming entries |
| 8 Illuminated liquid crystal display
(4 lines for displaying all operating data) | 17 "Up" button for moving the cursor |
| 9 Operation light for "primary and secondary fan" | 18 "Down" button for moving the cursor |

Electronic control panel 214

for the HV boiler with forced draft blower and HV-S boiler with induced draft blower



The electronic control panel 214 provides the basic functions for controlling a **KÜNZEL** HV wood gasification boiler with forced draft blower or an HV-S model with ID blower. It has an independently functioning fan control based on exhaust and boiler temperature, which increases the efficiency of the boiler and avoids unnecessary emissions.

In addition to boiler and fan control, the fully electronic control panel also handles the electric ignition and boiler circulation

pump for the return flow increase. It is switched on automatically as soon as an exhaust temperature of 90 °C is exceeded.

The boiler temperature is configured for a setpoint of 87 °C in the factory. The boiler temperature display, main switch, start and ignition button, operating lights for the fan and pump as well as loading door and exhaust temperature display are integrated in the front of the control panel in a well-organized manner.

Electronic control panel 414

with tank control and automatic power regulation for the HV boiler with forced draft blower and HV-S boiler with induced draft blower



The electronic control panel 414 is a fully electronic control panel with numerous functions. In addition to the functions of the electronic control panel 214, it includes control of tank filling and discharge. Two tank temperatures can be monitored.

The control panel includes the relay for controlling an external burner, the electric ignition and the change-over valve. It is suited for both the model HV boiler with forced draft blower and the HV-S boiler with induced draft.

Microprocessor control panel 614

with touch screen, tank control and 2-stage-power-regulation for the HV boiler with forced draft blower and HV-S boiler with induced draft blower



The fully electronic boiler control panel TS 614 for **KÜNZEL** wood gasification boiler models HV and HV-S provides all the functions for controlling the wood boiler, boiler circulation pump, external burner and change-over valve.

- Touch screen, full text menu
- Tank monitoring, automatic fan control, burnout detection, safety functions for excess boiler temperature
- Error message for sensor failure
- Power regulation via boiler or exhaust temperature

- Function monitoring and connection for electric ignition (accessories, see page 9)
- Accessible statistics (operating hours, temperatures, etc.)
- Delivery includes boiler sensor, two tank sensors, plug-in connections and operating instructions
- Also suited for older boiler models without exhaust sensors
- Weather-actuated heating controller together with module BD 600 (see page 10)

Solid fuel boiler FO

The **KÜNZEL** model FO solid fuel boiler works according to the principle of «upper combustion» and is suited for the following approved solid fuels:

Wood: coarse wood chips, wood briquettes, logs

Coal: brown coal (briquette) or black coal

Coke: grain III

The FO works independent of electricity and is thus outstandingly suited as an emergency heater. A safety heat exchanger for closed systems is standard equipment.

Unusual for a boiler of its class is the post-combustion using hot, adjustable secondary air. The non-water-cooled cast grating is also advantageous for good combustion quality.

The FO has a boiler thermometer as well as two ½" couplings for thermal discharge safety and filling/emptying tap. A ¾" coupling is provided for the combustion regulator and a welded immersion sleeve for a pump/switching control.

Exclusively rising drafts and the hot plate re-heater make this direct flame boiler insensitive to low chimney drafts and creosote build-up.

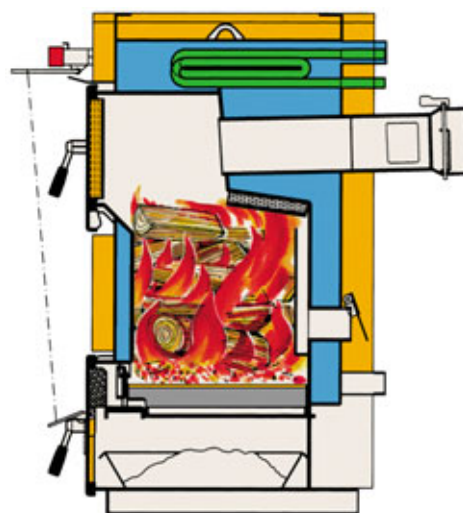
With a rated capacity of 12 or 14.9 kW, the FO is not subject to pollutant control measurements under German law (as of 7/2005).

The standard delivery includes a combustion regulator which operates without electricity, a pump/switching control and an operation and cleaning set.

A lifting bracket is located under the removable cover of the FO 15. Two holes in the front and two in the back for inserting pipes as carrying aids facilitate moving the unit. The boiler cover of the FO 15 is prepared for an oil or gas boiler to be placed on top.



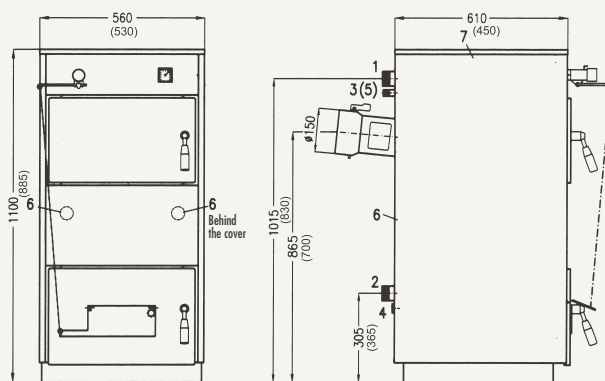
FO 15



Typ FO		12	15
Rated capacity	kW	12	14,9
Filling chamber capacity	litre	40	70
Filling chamber depth	mm	235	400
Filling opening W x H	mm	375 x 175	380 x 255
Draft required	Pa	16	16
Water capacity	litre	40	68
Transport weight	kg	165	230

Key

- 1 = Supply 1½" a.
- 2 = Return 1½" a.
- 3 = Heat exchanger 2 x ¾" a.
- 4 = Coupling for filling/emptying tap ½"
- 5 = 2 Couplings for sensors ½"
- 6 = 4 Lifting holes 1" (HV 50 1½")
- 7 = Lifting bracket under cover



Dimensions refer to the FO 15, in parentheses to the FO 12

Hydraulic quick assembly

This assembly is ready to plug into the BD 600 ambient temperature controller. It comprises the entire hydraulic system for a wood/oil heating system with one or two mixed heating circuits. This includes the high-quality, energy-saving heating circulation pump, boiler charging pump, boiler circulation pump, change-over valve and heating mixer. Everything is already assembled and wired. (Figure: hydraulic quick assembly for 1 mixed heating circuit)



Thermomix valve 1½" (with check valve)

Raising the return temperature to at least 60° C is a requirement for long service life of the wood gasification boiler. The Thermomix valve facilitates this in an effective manner. A thermally actuated expansion cartridge moves a sliding shutter. Controlled by the mixed water temperature of the boiler return, the sliding shutter either opens the bypass line, the heating return or in the mixed phase both partially. The valve can be used with up to 50 kW capacity. The ball tap set is the ideal accessory for the Thermomix valve. It enables everything to be shut off for convenient maintenance and at the same time contains the necessary thermometer for ongoing function monitoring.



Automatic mixing battery

The KÜNZEL automatic mixing battery provides effective scald protection: A setting dial is used to select a desired temperature between 35°C and 60°C so no water is delivered at higher temperatures. The high flow capacity of the automatic mixing battery enables it to be installed centrally at a hot water source such as a water heater.



Circulation pump controller ¾"

The ZPS circulation pump controller is an intelligent electronic controller which contributes actively to saving energy. The circulation pump is only switched on when it is actually needed. The water tap functions as a remote control for it. Briefly actuating it causes the pump to run. After 4 to 8 minutes the pump shuts off again. Temperature monitoring prevents unnecessary switching operations. The installation of the ZPS is as easy as it gets. With the ZPS up to € 75 per year in energy costs can be saved with practically no loss of comfort.



The Automix compact controller 1"

The Automix is a weather-dependent flow temperature controller for radiators or radiant floor heating systems. All electrical feed lines between the regulating unit, servo motor and sensor are equipped with Western plugs (24V). The electrical connection takes place via a normal socket. The regulating unit and mixer motor can be mounted easily on the base plate using a plug-in connector system. The compact controller consists of: electronics, quartz clock with power reserve, day and week program (configurable with mechanical sliders), LED operation display, servo motor, flow and external temperature sensor. Accessories: pump logic PC 230 V 2A. The pump stops automatically if the external temperature has reached the set value. AM30RB room sensor for remote setting of the room temperature.



Ambient temperature controlled regulators

Weather-actuated heating regulation module BD 600

The supplemental module for the new control panel series TS 600 (606 and 614) enables weather-controlled regulation of up to two mixer circuits* and one domestic hot water heater. The TS 600 control system optimizes system operation with logic developed especially for heating systems with accumulator tanks. This significantly increases the efficiency and ease of use.

All settings are configured using the connected boiler controller (such as a TS 614 on a wood gasification boiler). The ambient temperature controller is automatically recognized by the boiler control panel after installation. Parameters are entered using the English or German full text menu.

Up to three heating intervals per day can be configured for the

mixing circuits and water heating. Special programs such as vacation or party mode or the fast provision of 60 °C hot water, for example for washing up, are also available. In a combined wood/oil heater (system package C), the BD 600 module also handles weather-actuated regulation of the oil boiler. The setting of the switch-over temperature from wood to oil operation is performed automatically, since the regulation system has all the relevant information from the boiler and heating system. If the electric ignition of the wood gasification boiler is activated, this condition is recognized by the TS 600 regulation system and started before the oil boiler is activated. The module can be installed up to 100 meter away from the boiler control panel.



Standard delivery includes:

- BD 600 with housing for wall mounting
- Operating and installation instructions
- Outdoor temperature sensor with housing (without cable)
- Flow sensor
- Boiler sensor
- Domestic water sensor
- All necessary plug connections for a heating circuit*

Weather-actuated regulation system BD 600 A

The BD 600 A is a universal heating controller which is also suited for boilers without control panels, those of the 600 model series or units from manufacturers other than **KUNZEL**.

In addition to the features described above for the BD 600, the BD 600 A additional has its own touch screen display, which can be installed up to 100 meter from the heating system.

This allows convenient operation of the heating system as well as reading the outside temperature and room temperature from inside the living space.

The standard package is the same as the BD 600 with the substitution of a BD 600 A (control unit with display, controller software and wall mount).



*For a second heating circuit (such as for floor heating) the F 600 expansion kit is required.

Electronic regulating unit E 23 B

Outdoor temperature regulating unit with 3-step output for the mixer motor and 2-step output for the burner as well as time- and temperature-controlled boiler regulation with a priority circuit. It is suitable for all systems.

The electronic regulator is equipped with an outdoor temperature sensor, a flow sensor, a boiler sensor and a hot water tank sensor. It controls the flow and boiler temperature as a function of the outdoor temperature. The integrated clock lowers the temperatures at night and permits time-dependent regulation of the boiler.

A special wall mount housing is available for installing the regulator.

E 23 B (2- and 3-step regulator with boiler regulation)



With two mixed heating circuits (floor and radiators) the E 233 B regulator with two flow sensors is recommended.

FROM SCANDINAVIA TO SOUTHERN EUROPE

Künzel enjoys a leading market position in the technology of alternative heating systems. The company excels by virtue of its high level of technical innovation, resulting from nearly 100 years of experience, and its broad presence in the market, with sales and support centres across Germany and Europe.

We can meet your individual needs locally, with future-orientated solutions.

Simple and comfortable heating systems, beneficial to the environment. We are committed to energy for our future.



002000_03/2009 (Technical changes reserved)

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