Solarbayer®

Future-proof heating systems

PRODUCT INFORMATION

SOLARBAYER WOOD LOG BOILER

Solarbayer control unit „SB4.0” **AK4005S/AK4005LSU**

Instruction Manual

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General information

Installation

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Maintenance

Please pay attention to the correct position of the steel tub in the combustion chamber, as well as to the correct position of the fireclay bricks and plates.
*see chapter **[Maintenance]** Combustion chamber*

Please pay attantion to the „checklist for initial operation" before first operation,
*see chapter **[Installation]** Checklist for initial operation of the boiler*

Principle of operation

The Solarbayer wood log boiler HVS is a state-of-the-art device for heating with solid wood.
It is easy to handle after the installation has been carried out by a professional installer.
All national and local regulations and the requirements stated in this manual (see page 6) have to be fulfilled both during installation and operation by the installer and the operator of the system.

The Solarbayer HVS LC wood log boiler is characterized by a modern and modular control concept which ensures more performance and a low, environmentally friendly pollutant emission due to the serially integrated lambda sensor which permanently observes the exhaust gas value.

With the help of the integrated boiler and exhaust gas logic the intelligent control recognizes the requirements of energy. Due to the modulating air supply the boiler is able to react to a possible power reserve and can therefore ensure an almost perfect exploitation of combustibles. This means the highest possible comfort for you and a steady and even combustion for your wood.

You can only achieve an optimal efficiency factor with a perfectly aligned system. Therefore, we generally recommend our high quality stratification tanks SLS with integrated, patented, stratification system. The produced heat of the wood log boiler can be perfectly stored in this kind of tank. The stored thermal energy is relieved into the heating system when needed.
This keeps your fuel consumption as low as possible and even preserves the environment.

The HVS wood log boiler is easy to handle, it can be refuelled and cleaned without the slightest effort. Just fill in logs, ignite them and everything else is working just by itself. The large fuel chamber provides a long combustion period. The integrated fan guarantees an unproblematic start. The fuel chamber door and its bolt do not give way for smoke emission. Moreover, the combustion is stabilized throughout the whole combustion period by the fan and enables an unproblematic operation.

For planning means please refer to the follwoing pages, especially the calculation example for dimensioning the wood log boiler.

The usage of the Solarbayer wood log boiler HVS in smokeless zones in the UK is **NOT granted** by the DEFRA since the company Solarbayer did not apply for it (dated March 1st 2013)

General information

Regulations

The intended use of the wood log boiler is the exclusive application for hot water heating systems in accordance with DIN EN 12828

Please notice *chapter:* ***[General information]*** *Technical data*

Please read the manual carefully to prevent damages due to improper installation. The installation has to be carried out by a specialized company in accordance with the „generally accepted codes of practice“ as well as with the valid regulations and norms. Country specific norms and regulations have to be paid attention to.
Non-professional installation as well as other than the intended use will lead to the expiration of warranty.

All national and local regulations concerning the installation, operation and maintenance have to be regarded.

The following engineering rules have to be particularly regarded*:

DIN EN 303-5	Heating boilers for solid fuels, manually and automatically stoked
DIN 1988	Codes of practice for drinking water systems
DIN EN 806	Codes of practice for drinking water systems
DIN EN 12828	Heating systems in buildings - Design for water-based heating systems
DIN 4759-1	Process heat installations for more than one kind of energy; one boiler for solid fuel and one for oil or gas and only one chimney; safety requirements and tests
VDI 2035	Prevention of damage in water heating installations
VDE 0100	Erection of power installations
VDE 0105	Operation of electrical installations

* This list is not exhaustive, updates and new releases have to be regarded.

Safety regulations for operation and maintenance

- Observe mounting dimensions and wall spacings *see chapter:* ***[General information]*** *Technical data*
- The boiler must be installed in accordance with the applicable fire protection regulations and standards. Before starting installation, contact the local competent authority
- The boiler must be installed in a closed, suitable (boiler-) room, the floor must be firm an sustainable
- Safety distance to flammable objects must be ensured
- The installation room must be pre-aired trough a permanent wall opening at least 250 cm^2, please observe your valid national and local regulations concerning the operation of wood log boilers
- No removal, bypass or otherwise shutdown of operationally relevant devices for safety and monitoring
- No interventions at the electrical devices and electric conducts are allowed during the operation of the boiler
- Maintenance and repair are only to be carried out by authorized qualified persons.
- Before removing the boiler's casing or any other electrical appliance connected to the boiler it is necessary to disconnect the power supply of all devices.
- Operating the boiler is only allowed in operationally safety condition
- The operator of the system must be familiar with the function and operation of any safety devices and the whole system

Sectional model

1 **Control unit**
graphic display with permanent presentation of the system's operating status

2 **Fuel chamber door**
large-size fuel chamber door

3 **Forced draught fan**
the quantity of air, necessary for a perfect combustion, is supplied by the infinitely variable forced draught fan equipped as standard

4 **Bottom door**
cleaning door for the removal of ash

5 **Fuel chamber**
large fuel chamber (0,5m up to 1m logs, depending on boiler size)

5a **Conical fuel chamber walls***
for a steady inlet of embers to the ceramic nozzle

6 **Primary air duct**
pre-heated primary air is lead into the fuel chamber by the rear air duct

7 **Ceramic nozzle with secondary air duct**
creates the perfect gas mixture and guarantees a clean downward wood gas flame

8 **Slide-in combustion chamber**
with high temperature resistant fireclay bricks for a complete burnout of the wood gases

9 **Exhaust gas heat exchanger with turbulators**
for best possible hand-over of exhaust gas heat to the heating water

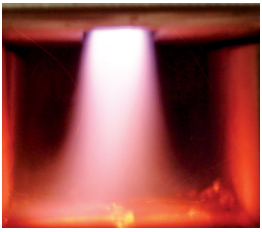
10 **Exhaust gas damper with draft bar**
prevents outlet of flue gas when refueling the boiler

11 **Safety heat exchanger**
for cooling down in case of overheating

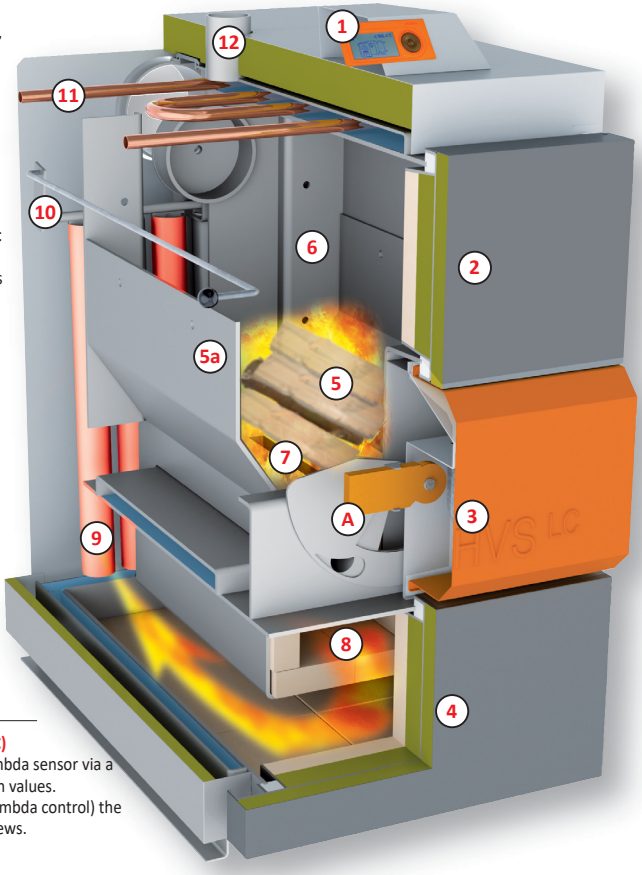
12 **Boiler flow line**

A **Lambda servo motor (only with HVS LC)**
The secondary air is adjusted by the lambda sensor via a servo motor, depending on the emission values.
With the boiler series HVS E (without lambda control) the secondary is adjusted via regulating screws.

Graphic display with pre-defined Solarbayer hydraulic scheme.



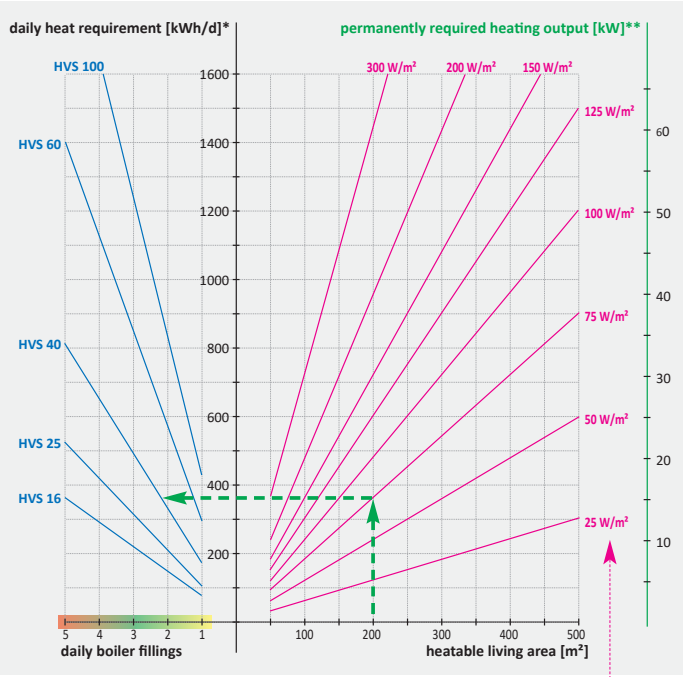
Complete combustion of the wood gases in the lower combustion chamber



sectional model shows HVS LC 25

*only with HVS 16, HVS 25 and HVS 40

Calculation aid for dimensioning the wood log boiler



Dimensioning diagram for calculating the boiler size with the following operating conditions:

outside temperature:	approx. -16 °C (coldest day)
room temperature:	approx. 20 °C
persons:	approx. 4
type of building:	SFD
heat coverage by wood log boiler:	100%
daily fillings with wood (at -16 °C):	approx. 3 times

Differing operating conditions may increase or decrease the heat requirements. Estimate in particular cases and keep reserves.

Building class	Heat load on coldest day (-16 °C)
Existing building until 1977	120 to >160 W/m²
Thermal Insulation Ordinance since 1977	80 to 120 W/m²
Thermal Insulation Ordinance since 1984	60 to 80 W/m²
Thermal Insulation Ordinance since 1994	40 to 60 W/m²
EnEV 2002	20 to 45 W/m²
EnEV 2009	15 to 30 W/m²

source: Tabellenbuch SHK

Please note that with solid fuel boilers the specified output is guaranteed under full load only.

You heat up the boiler and it will take about 30 minutes until the boiler will operate with its maximum output. The stated output will last for approximately 2,5 hrs. Now the burn-off period begins for about an hour with decreased performance. The firebed remaining in the combustion chamber will post-heat for about an hour. Afterwards the combustible is completely used up.
For an easier calculation we presume a burning period of approximately 4 hrs (at nominal output).

Attention: This is imperative for the rating of the boiler to avoid that the boiler output is rated too weak

*daily heat requirement [kWh/d]:
The daily heat requirement of the building in kWh (at an outside temperature of -16°C), when known. This value can be inquired with the architect of the building.

If you don't know the exact value it might roughly be estimated. Thus, you take the heat load of the corresponding building class in the adjacent chart and then the equivalent line in the diagram in order to calculate the heat load for your living area.

**permanently needed heating output [kW]:
The permanently required heating output is for example the nominal heat output of an ordinary oil/gas boiler that produces thermal heat for 24 hrs.

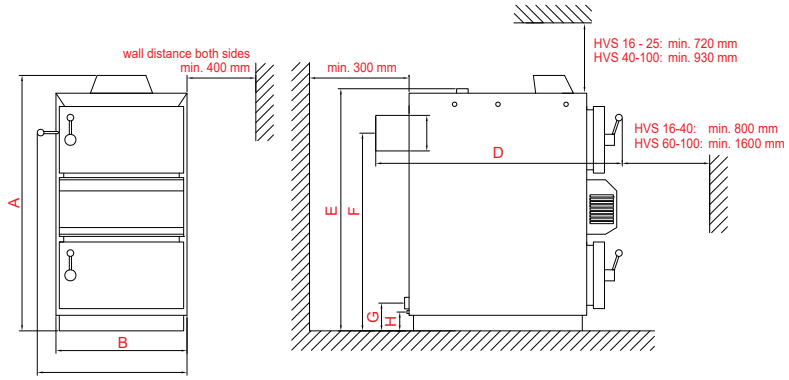
Technical specifications

Dimensions and weight			HVS 16 LC	HVS 25 E HVS 25 LC	HVS 40 E HVS 40 LC	HVS 60 E HVS 60 LC	HVS 100 E HVS 100 LC
height	A	mm	1155	1155	1390	1440	1440
width	B	mm	590	590	590	760	760
width including slider	C	mm	645	645	645	785	785
depth	D	mm	840	1070	1070	1260	1650
height flow line	E	mm	1075	1075	1310	1400	1400
height exhaus pipe (middle)	F	mm	890	890	1110	1170	1170
height return line	G	mm	115	115	125	215	215
heigth draining (at HVS 40 on the left side)	H	mm	55	55	70	135	135
flue spigot	I	mm	Ø 159	Ø 159	Ø 196	Ø 196	Ø 196
boiler inlet / boiler return	Ø	--	DN 50 (2" IG)				
safety heat exchanger	Ø	--	DN 20 (¾ ")				
immersion sleeve for safety heat exchanger	Ø	--	DN 15 (½")				
draining	Ø		DN 15 (½")			DN 20 (¾")	
boiler weight		kg	400	440	525	790	990

Technical facts		HVS 16 LC	HVS 25 E HVS 25 LC	HVS 40 E HVS 40 LC	HVS 60 E HVS 60 LC	HVS 100 E HVS 100 LC
nominal ouput	kW	16	25	40	60	100
efficiency factor	%	92.1	91.4	91.8	90.6	91.2
			92.6	91.9	92,0	92.8
water capacity	l	60	75	93	180	215
max. operating pressure	bar	3	3	3	3	3
pressure drop at nominal load (dt 10 K)	mbar	9,35	9,75	10,48	12,77	11,50
pressure drop at nominal load (dt 20 K)	mbar	1,00	1,05	2,55	3,19	2,82
permissible pressure range discharge safety device	bar	min. 1 to max. 4				
water inlet temperatur discharge safety device	°C	4 to 15				
opening temperature discharge safety device	°C	at 95				
noise level	dB	45,0	45,5	47,7	51,4	54,2
energy efficiency class	--	A+	A+	A+	A+	--
energy efficiency index EEI	--	113	114	113	113	--
			117	115	115	--
room heating -annual efficiency ηs	%	77	77	77	77	--
			80	78	78	--
Dust emission * PM	mg/mn	12,7	14,7	25,9	13,4	--
			16,3	19,6	18,5	--
OGC emission * OGC	mg/mn	16,4	11,8	26,2	17,7	--
			4,8	17,1	10,3	--
CO emission * CO	mg/mn	158,0	147,4	194,0	272,3	--
			60,1	154,1	236,5	--
Nox emission * Nox	mg/mn	146,9	237,6	164,0	145,5	--
			162,7	164,5	148,6	--

Fuel chamber/fuel consumption		HVS 16 LC	HVS 25 E HVS 25 LC	HVS 40 E HVS 40 LC	HVS 60 E HVS 60 LC	HVS 100 E HVS 100 LC
admissible fuel		untreated, split wood log with residual moisture of 16% ± 3%				
max. wood log length	mm	330	500	500	700	1000
fuel chamber depth	mm	370	560	560	750	1085
fuel chamber height	mm	490	490	750	730	730
fuel chamber width	mm	440	440	440	575	575
dimension of the filling hole w/h	mm	435/255	435/255	435/255	575/318	575/318
fuel chamber capacity, volume litre approx.	L	80	116	180	310	455
max. filling weight (beech) approx.	kg	20	30	48	80	120
fuel consumption at rated power (beech) approx.	kg/h	4,5	7,1	11,2	17	25
combustion period at nominal load (beech) approx.	h	4,4	4,2	4,3	4,5	4,5

Installation dimensions



It is necessary that you follow the minimal installation distances.
The maintenace openings have to be accessible,
please pay attention to the fact that the turbulators have to be pulled out for cleaning

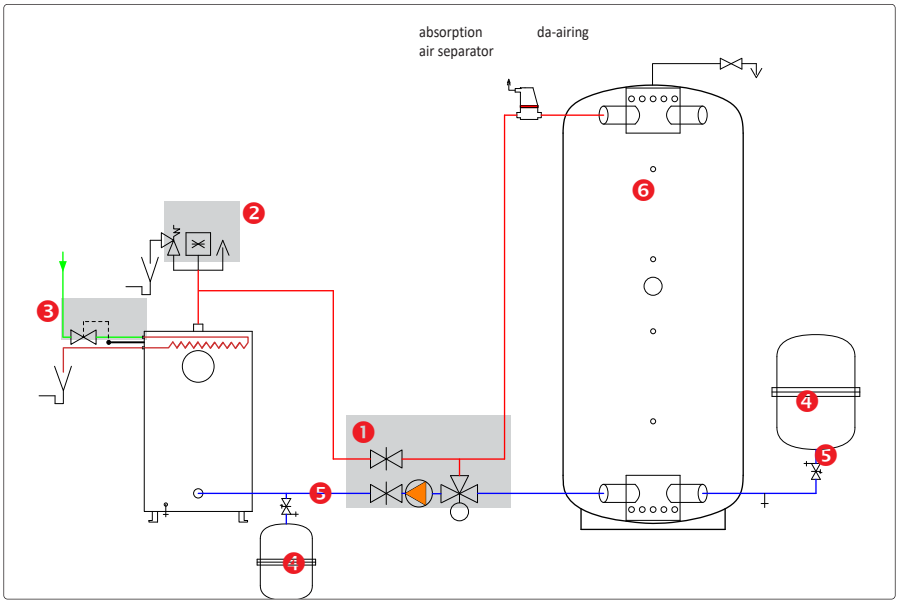
Chimney requirements/ exhaus gas values			HVS 16 LC	HVS 25 E HVS 25 LC	HVS 40 E HVS 40 LC	HVS 60 E HVS 60 LC	HVS 100 E HVS 100 LC
recommended min. chimney cross section Ø	strongly depen-dent on chimney construction	mm	⌀ 150	⌀ 150	⌀ 200	⌀ 200	⌀ 200
draft requirements ± 15%		Pa	-13 ... -15				
recommended effective minimum chimney height		m	approx. 7				
exhaust gas mass flow		g/s	10	16	25	38	64
modulating exhaust gas temperature		°C	approx. 180 (±30)				
recommended exhaust piping length			developed length < 1,5 meter (max. 2 curves)				
barometic damper			mandatory (recommendation: ZUK 180)				

Electrical data		HVS 16 LC	HVS 25 E HVS 25 LC	HVS 40 E HVS 40 LC	HVS 60 E HVS 60 LC	HVS 100 E HVS 100 LC
Mains voltage / frequency / fuse	V/Hz	230/50/10				
power consumption - standby	W	< 0,3				
power consumption - operation [HVS E / LC]	W	55	40/55	40/55	80/95	80/95

Hydraulic		HVS 16 LC	HVS 25 E HVS 25 LC	HVS 40 E HVS 40 LC	HVS 60 E HVS 60 LC	HVS 100 E HVS 100 LC
recommended min. buffer tank volume**	L	1000	1500	2200	3300	5500
manufacture´s recommendation	L	1500	2000	3000	5000	6000
min. tube dimension (Cu-/steel presision tube)***	mm	Ø 28	Ø 28	Ø 35	Ø 42	Ø 54
min. tube dimension (steel tube)***		DN 25 (1")	DN 25 (1")	DN 32 (1 ¼")	DN 40 (1 ½")	DN 50 (2")
required boiler return line temperature (target: boiler inlet temp. 80°C)	°C	70	70	67	65	63

* Emission values according to test report referred to dry flue gas and 13 Vol.-% oxygen;
Product information in accordance with the requirements of Regulation (EU) 2015/1189 on energy labelling of solid fuel boilers
** Regulatory framework and government grants should to be paid attention to.
*** Depending on tube length, number of elbows installed, mixing valves, changeover valves, etc., you might need a bigger dimension.
The above mentioned tube dimensions are only a recommendation and do not replace professional technical planning.

Safety regulations – installation guidlines



The following safety installations are mandatory:

1 **Boiler charging unit***
see chapter: ***[Installation]*** *Boiler charging unit*
The opening temperature of the boiler charging unit should be approx. 70°C in order to prevent condensation and corrosion and to guarantee a sufficient operating temperature.

2 **Boiler safety unit* (safety valve, manometer and quick vent valve)**
The boiler has to be safeguarded by a licensed and type-certified safety valve in accordance with DIN EN ISO 4126-1:2013-12 with a reaction pressure of max. 3 bar.
The connection between boiler and safety valve has to be unlockable.

3 **Thermal discharge safety valve*** according to DIN EN 14597
see chapter: ***[Installation]*** *Thermal discharge safety valve*
The thermal discharge safety has to be unlockable connected to a pressurized mains water system.
When the cold water pressure is 6 bar a pressure relief valve is necessary.

4 **Membrane expansion vessel*** according to DIN EN 13831
The vessel has to be dimensioned according to DIN EN 12828.

5 **Cap valve***

6 **Buffer tank***
We recommend the installation of a strification buffer tank with a tank capacity of at least 55 liters per kW nominal boiler output. General local requirements and criteria for eligibilty have to be regarded.

*The installation notes of the manufacturer have to be regarded.
An annual check of the safety devices by a specialized company is mandatory.

Installation

Buffer tank (mandatory)

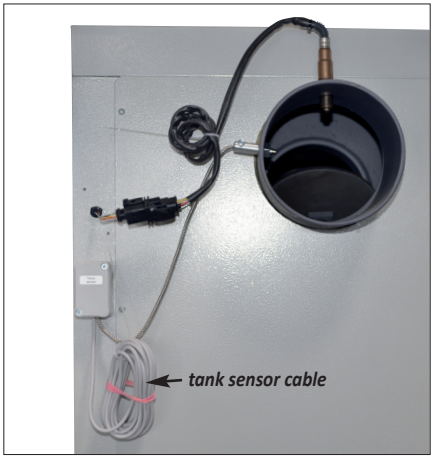
To improve the effificiency of the wood log boiler and to ensure low emission operation it is mandatory to use Solarbayer SLS buffer tanks with their patented SLS®-system.

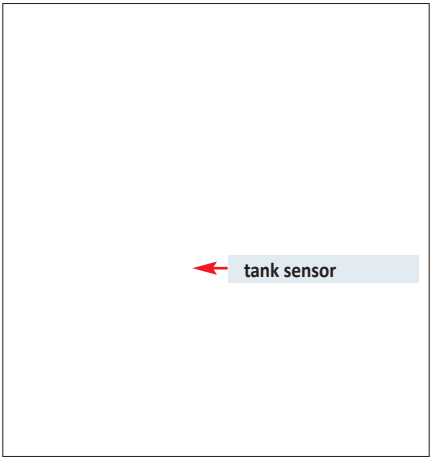
The advantages are:

- immediate availability of heat
- perfect stratification
- rapid achievement of the required return line temperature for a long operating life.

Tank sensor

The buffer tank sensor (PT 1000) has to be installed at the corresponding position in the buffer tank.
The measurement of the tank temperature is for information use only and has no influence on the control of the boiler.





The buffer tank sensor should be installed after ⅔ of the buffer tank volume.

Boiler charging unit (mandatory)

A boiler charging unit is obligatory to achieve the required combustion values as well as to prevent the accumulation of condensing water and thus the corrosion of the boiler body. Only Solarbayer boiler charging units shall be used for that.

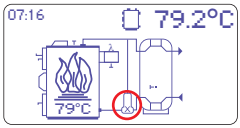
Boiler version HVS LambdaControl (HVS LC):
You have to use the Solarbayer boiler charging unit LaddoTRONIC

Boiler version HVS Economic (HVS E):
We recommend the use of the Solarbayer boiler charging unit LaddoTRONIC

The integrated pump is connected directly to the HVS motherboard (control board),
see chapter: ***[Installation]*** *Electric circut diagram*

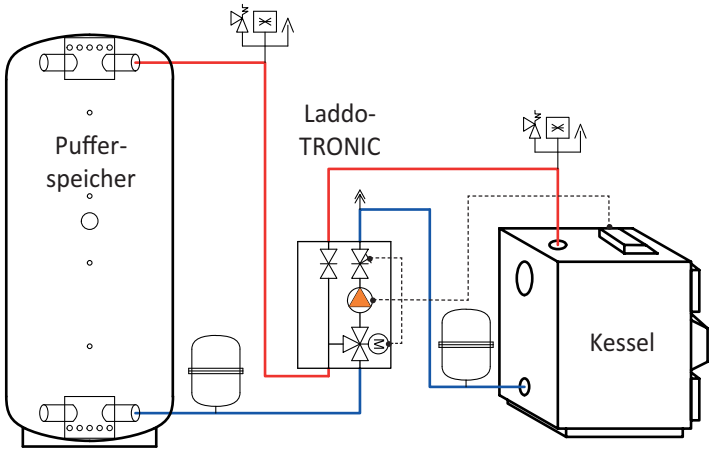
During operation the pump is running at a flow line temperature of approximately 40°C. Independent of the operating mode the pump is running when the maximum boiler flow line temperature set is exceeded (overheat control).

In case of a breakdown/failure of the boiler/exhaust gas sensor the pump is working permanently for safety reasons.



The pump activity is displayed by a rotating line on the control panel.

Technical information and installation manual come with the product and could be downloaded on:
www.solarbayer.de



This connection diagram is only an installation proposal and does not replace technical planning!

Thermal discharge safety valve (mandatory)

In accordance with DIN 4751-2 a thermal discharge safety valve is prescribed for heating systems with solid fuels.

Safety heat exchanger and thermal discharge safety valve:

The safety heat exchanger with the thermal discharge safety valve conduces to the boiler's protection against overheating.

Installation of the thermal discharge safety valve:

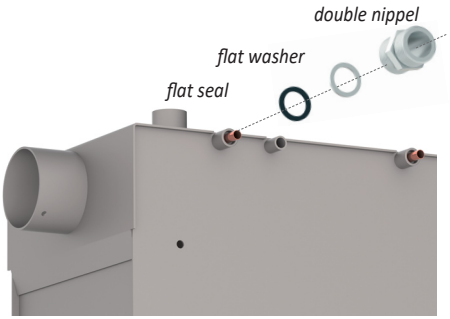
It is important that the thermal discharge safety valve is installed in such a way that the heat exchanger is depressurized during regular operation, meaning that it is not in a closed system. The thermal discharge safety valve has to be connected unlockable to a pressurized mains water network. The drain outlet has to lead free.

Operating mode:

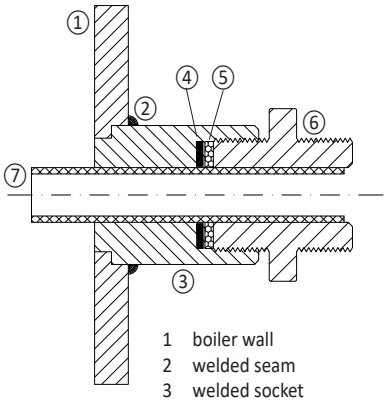
The valve that is independent of pressure opens a waterway at a flow line temperature of approx. 95 °C and thus prevents a temperature increase over a maximum of 110 °C.

The double nipple together with the flat seals and the shims for sealing the safety heat exchanger from the boiler water are already equipped by the manufacturer.

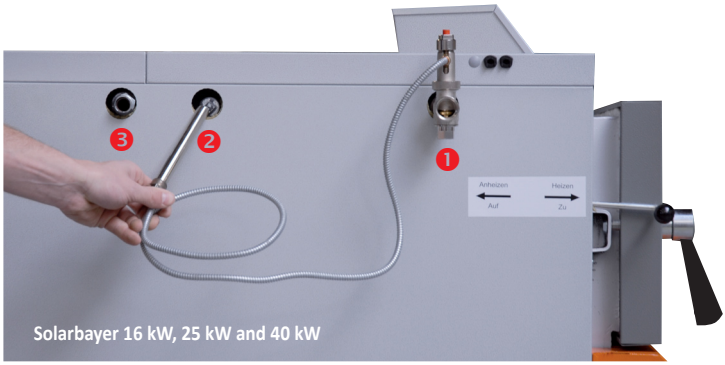
Do not turn the double nipple in order to adjust or to hold in place. In case of a leakage at the safety outlet the double nipple have to be retightened with a pipe wrench.



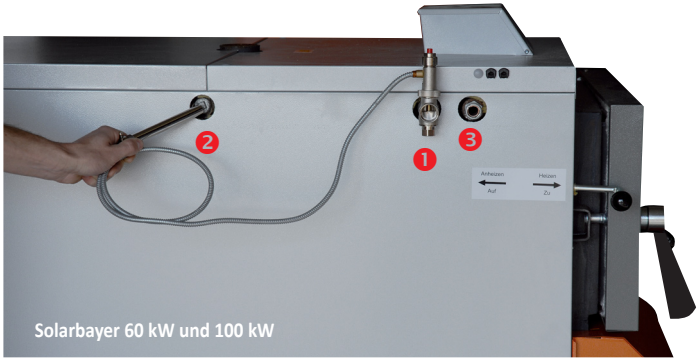
Sealing of the copper tube for the thermal discharge safety valve



1 boiler wall
2 welded seam
3 welded socket
4 flat seal
5 washer
6 double nipple
7 CU tube heat exchanger (18 mm)



Solarbayer 16 kW, 25 kW and 40 kW



Solarbayer 60 kW und 100 kW

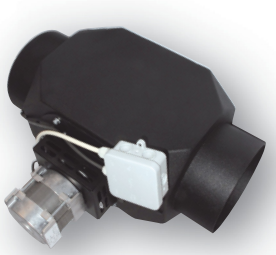
1. thermal discharge safety valve ¾“, cold water inlet
2. Immersion sleeve with double temperature protector
3. cold water outlet

Please check the safety valve’s function when heating up the boiler for the first time by heating up the boiler to opening temperature.

Thermal discharge safety valve

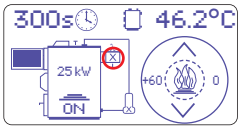
The operator of the system is obligated to get the thermal discharge safety valve checked by a specialist at least once a year.

Exhaust gas fan (optional accessory)



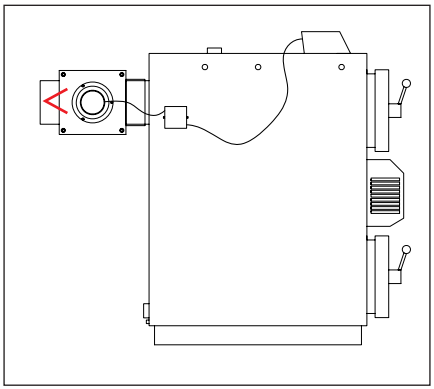
In order to support the fume outlet while putting more fuel into the boiler an exhaust gas fan can be retrofitted.
Thus, the fume outlet is minimized while the fuel chamber door is open.

The exhaust gas fan is directly connected to the HVS control unit,
see chapter: ***[Installation]*** *Electric circuit diagram*



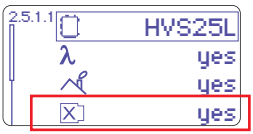
The activity of the exhaust gas fan is displayed by a rotating line in the control panel

Technical information and installation manual come with the product and could be downloaded on:
www.solarbayer.de



When operating the boiler with an exhaust gas fan the corresponding mode has to set in the menu of the control panel

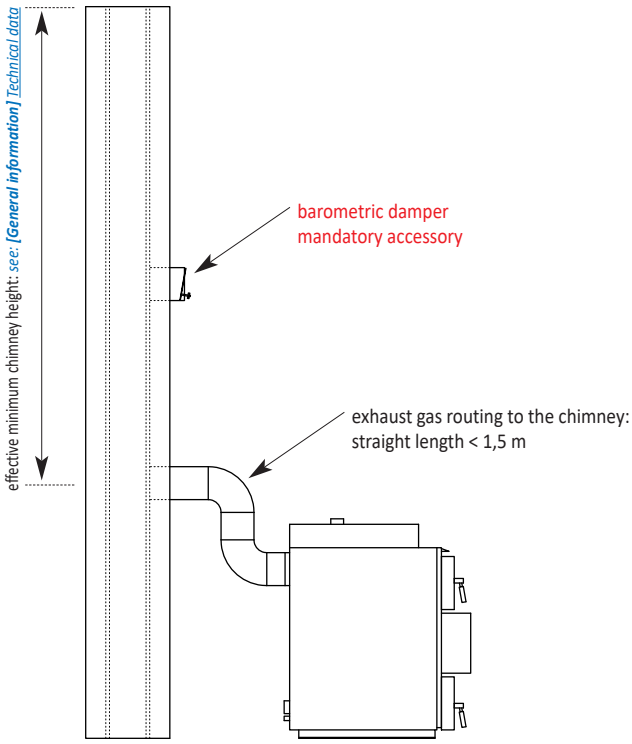
see chapter: ***[Operation]*** *Expert level (2.5: Configuration)*



Flue pipe and barometric damper (optional accessory)

- The chimney has to be designed according to DIN 4705 respectively EN 13384. Please contact the responsible inspecting authority (e.g. chimney sweeper) in case of ambiguities.
- The flue gas pipe has to be ascending from HVS to the chimney, in the correct and **shortest** way.
  A maximum of two bends may be installed, further formed parts cause a higher decrease in pressure.
- When connecting a fireplace to an exhaust gas system a secure exhaust gas outlet has to be provided.
  The exhaust gas systems have to be designed according to clear section, height and thermal resistance in such a way that the exhaust gases are, during all normal operating modes, only lead to the outside through the chimney, no overpressure occurs and that the fireplaces have enough combustion air.
- It is NOT allowed to connect more than one fireplace to the chimney when using a wood gasification boiler due to the forced draft fan.

The application of a barometric damper is mandatory. It is only with a barometric damper that the combustion values and the chimney draft can be guaranteed permanently.
Chimney draft: *see chapter:* ***[General information]*** *Technical data*



Electrical connection

The regulations and standards of the VDE (German Association for Electrical, Electronic & Information Technologies) and of the local power utilities have to be regarded.

The connection has to be carried out by a concessionary electrician.

Disconnect all components from power!
Never touch any current-carrying parts, danger to life exists!

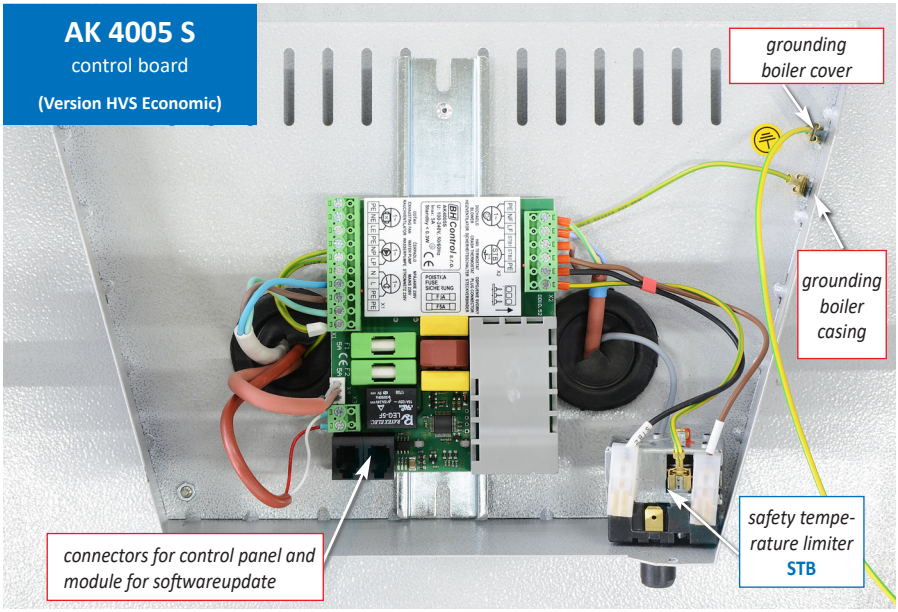
The boiler is equipped with a shockproof plug.

The following components have to be connected at site:
boiler circuit pump (original Solarbayer boiler circuit unit)
cable 3x 1,5 mm²

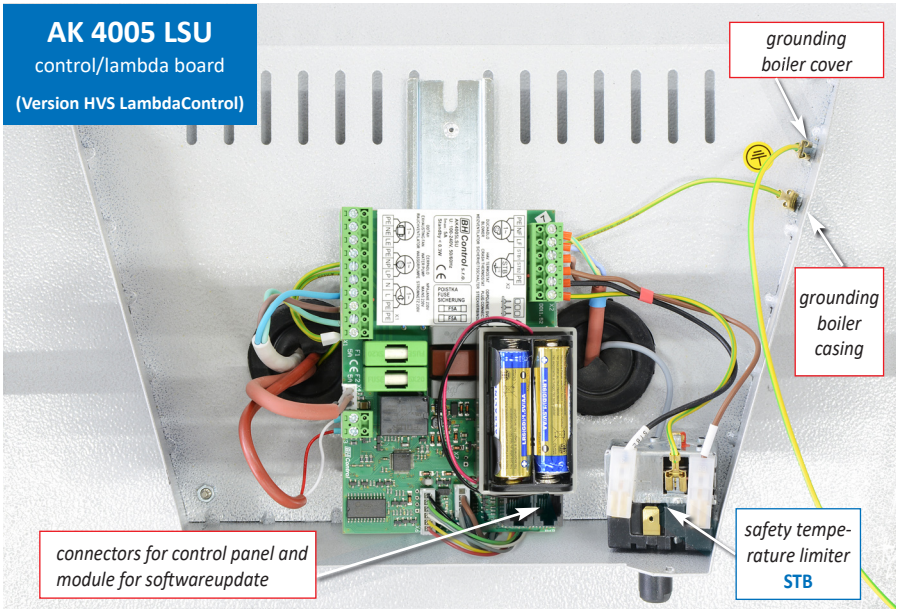
exhaust gas fan (optional)
cable 3x 1,5 mm²

Disconnect power before opening the control unit's casing.
Never touch any system component that is current-carrying – danger to life exists!

AK 4005 S
control board
(Version HVS Economic)

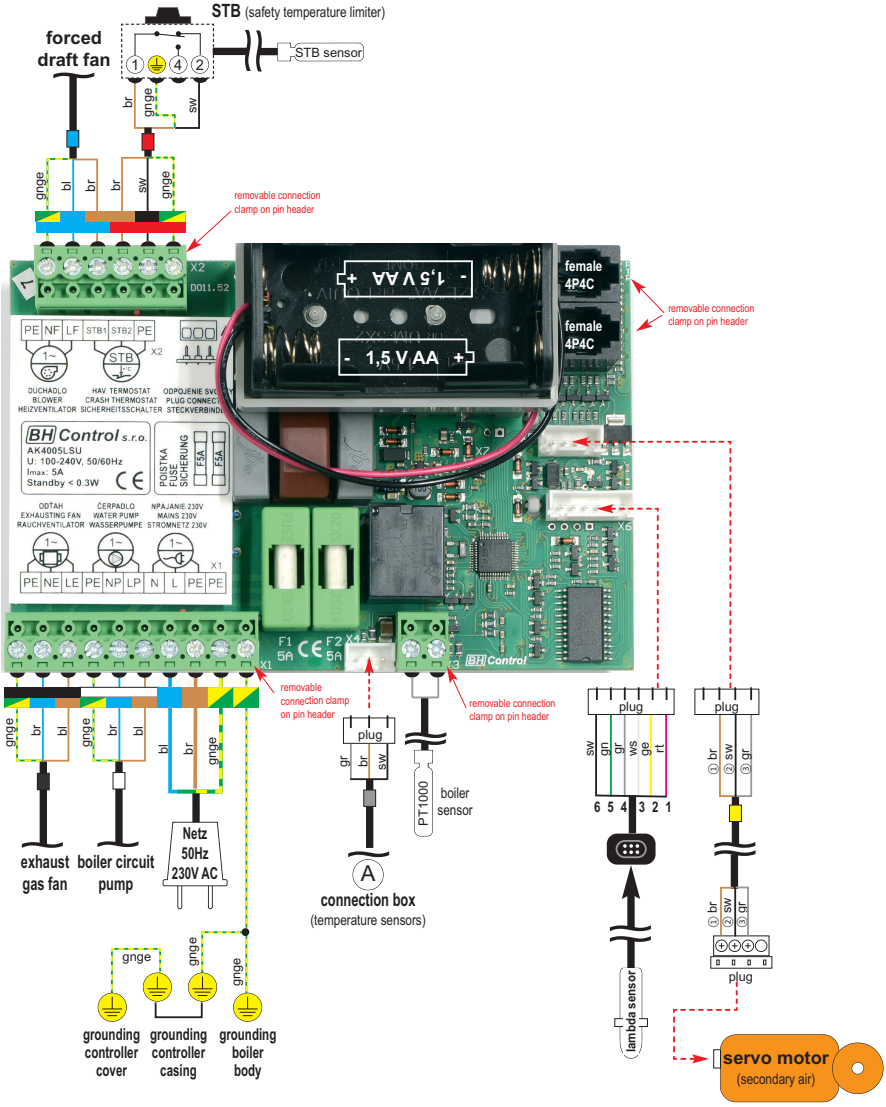


AK 4005 LSU
control/lambda board
(Version HVS LambdaControl)

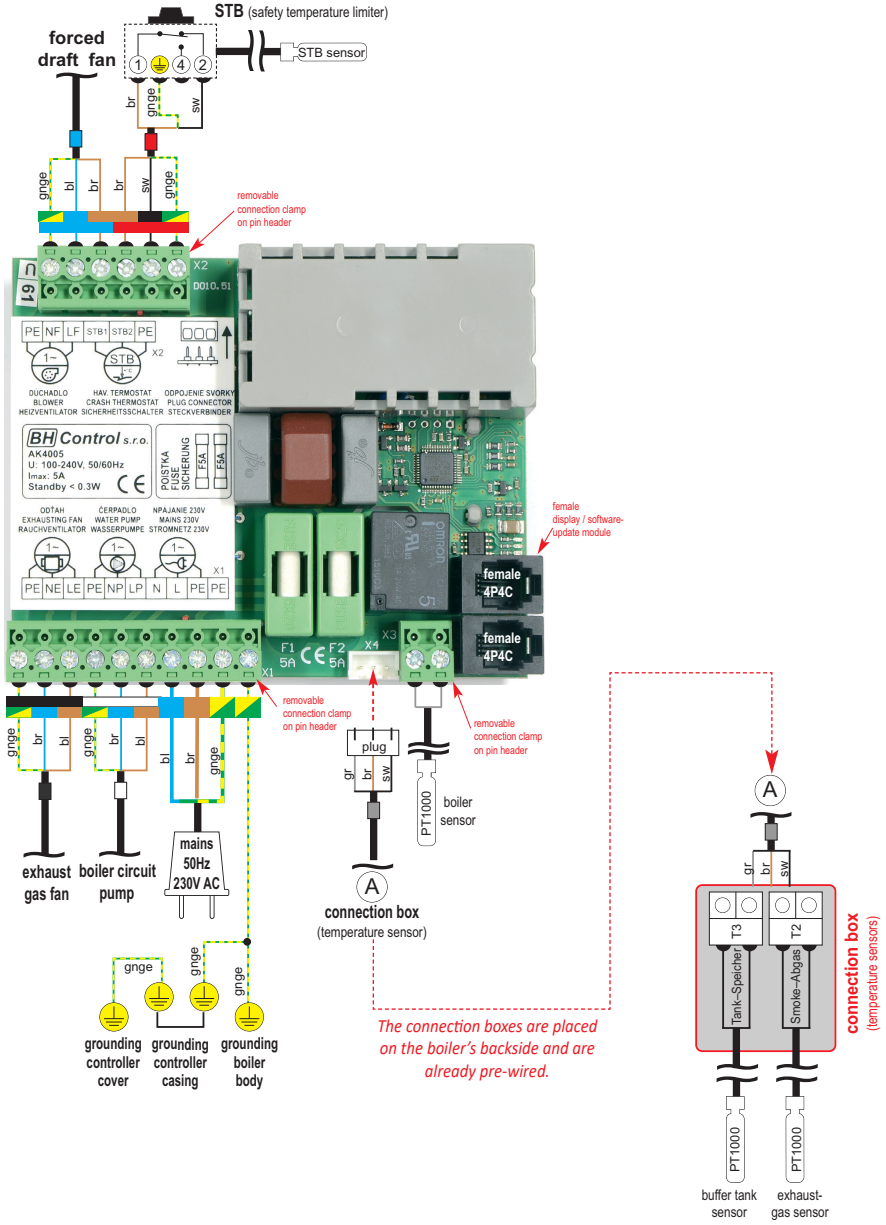


see the following pages for electrical circuit diagrams →

Electric circuit diagram **HVS LC**



Electric circuit diagram **HVS E**



Checklist for initial operation of the boiler

- ☐ applicability test of the system's hydraulic (see brochure *Hydraulic diagrams*)
- ☐ pipes and boiler rinsed thoroughly after installation
- ☐ heating system filled with treated water in accordance with VDI 2035 and de-aerated, (see BDH information flyer n° 8.)
- ☐ operability test of all safety devices of the heating system
- ☐ exhaust gas system check and barometric damper adjusted
- ☐ steel tub, fireclay bricks and plates placed correctly *see chapter:* ***[maintenance]*** *Combustion chamber*
- ☐ start-up flap is flexible and firmly closing
- ☐ checked boiler doors and heat exchanger inspection aperture for tightness and if necessary readjusted
- ☐ place turbulators inside exhaust gas heat exchanger
- ☐ checked secondary air settings (only HVS E)
- ☐ heat consumption of the heating system
- ☐ expansion vessel for heating water: *volume:* _____ *liter* *pre-pressure:* _____ *bar*
- ☐ operating pressure of system: _____ *bar (when system is cold)*
- ☐ briefing of the owener concerning operation and maintenance
- ☐ type of fuel, moisture content and fuel storage checked *see chapter:* ***[Operation]*** *Type of fuel*
- ☐ when operating the boiler with an exhaust gas fan this has to be activated in the control panel *see chapter:* ***[Operation]*** *Expert level (2.5: Configuration)*
- ☐ **operability test of control panel** *see chapter:* ***[Operation]*** *Expert level (2.12: Functional test)*

Record the pressure test and the correct filling of the system in accordance with VDI 2035 and let the customer confirm this.

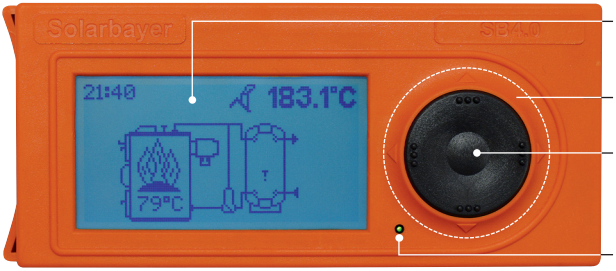
Type of boiler	Manufacturer number (type plate)	Boiler number (above fuel chamber door)

Herewith I confirm the proper initial operation

stamp / date / signature installer

Operation

Description of control panel and display



display (SB4.0 D)

control key [▲►▼◄]

„ENTER"

control LED red/green
(depending on operation mode)

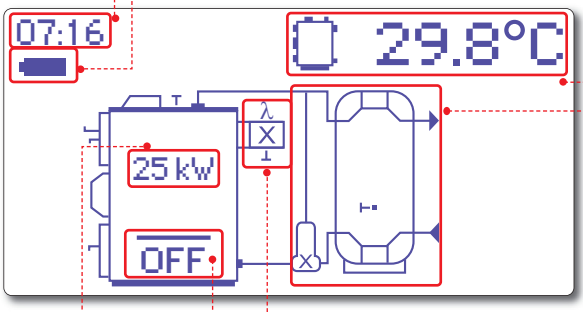
How to use the control keys

confirm (Enter)

escape (ESC)

select

mode of operation



current time

battery (only with LC)

display of current values
[selection with ▲▼]

display of hydraulic scheme

symbols:
exhaust gas fan,
lambda sensor, exhaust gas temperature

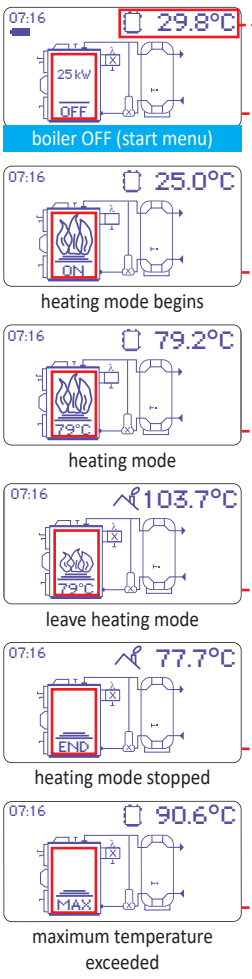
operating mode

operating mode
(when the boiler is „OFF" the nominal boiler output is displayed)

Operation

Description of icons and basic parameters

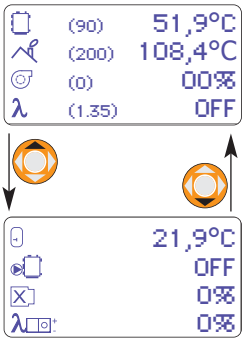
Operating modes



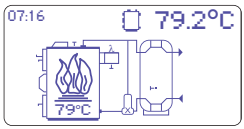
Monitoring the different values

date	Mon 13/03/25
exhaust gas temperature	196.4°C
buffer tank temperature	85.4°C
boiler temperature	82.3°C
performance of forced draft fan	95%
current lambda value of exhaust gas (only with HVS LC)	λ 1.33
position of lambda servo motor (only with HVS LC)	servo 90%

All current values are displayed when pressing the left or the right key

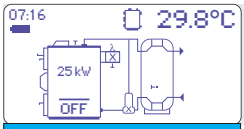


You will return to the current menu when pressing the left or right key again



Operation

Basic menu



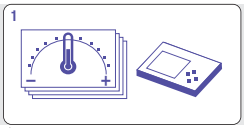
start menu

[long press]

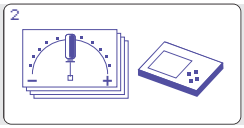
How to use the control keys

- confirm (Enter)
- escape (ESC)
- select
- mode of operation

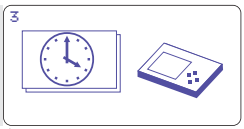
1] boiler max. temperature



2] control panel settings



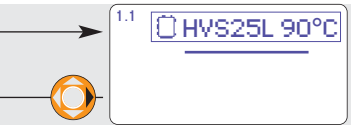
3] time



4] error search

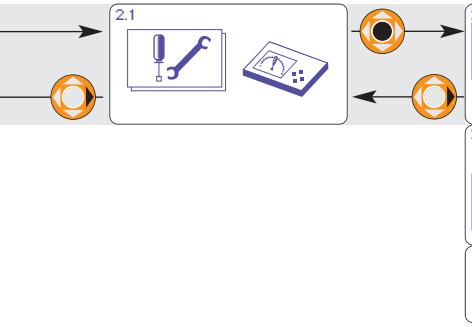
6] software information

Operation

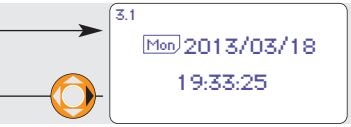


boiler max. temperature

The functional descriptions of the following parameters can be found on page 30.

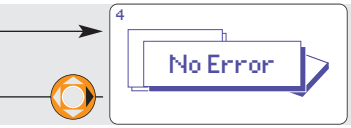


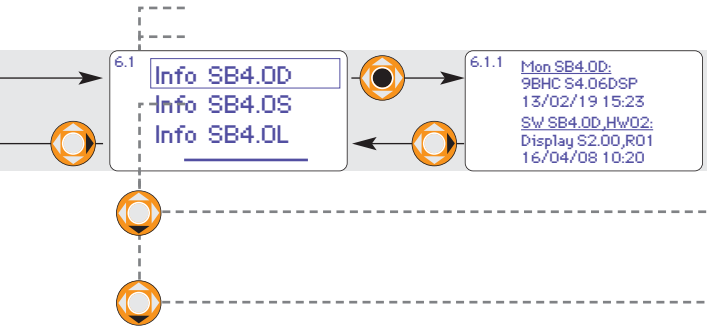
exhaust gas temperature
boiler shutdown temperature
Lambda must value*
max. fan performance
min. fan performance
optional exhaust gas fan
display brightness
display contrast
shifting values
deactivate the standby function*
deactivate the standby function*
*only HVS LC



date YYY/MM/DD
time hh:mm:ss

select value
save
former value
escape





display information

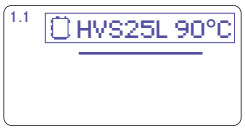
control panel information

lambda board information

Operation

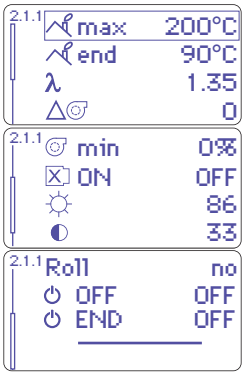
Important parameters

boiler max. temperature



Boiler max. temperature (maximum value): recommendation 90°C
The performance of the forced draft fan is reduced when the set value is approached. The fan will be set to glow preservation 1% when the set value is reached. When boiler temperature is exceeding 93°C the fan will be shut down 0% and the status LED changes colour from green to red, display shows MAX. When the boiler temperature falls below the set value the forced draft fan is starting again.

control panel settings



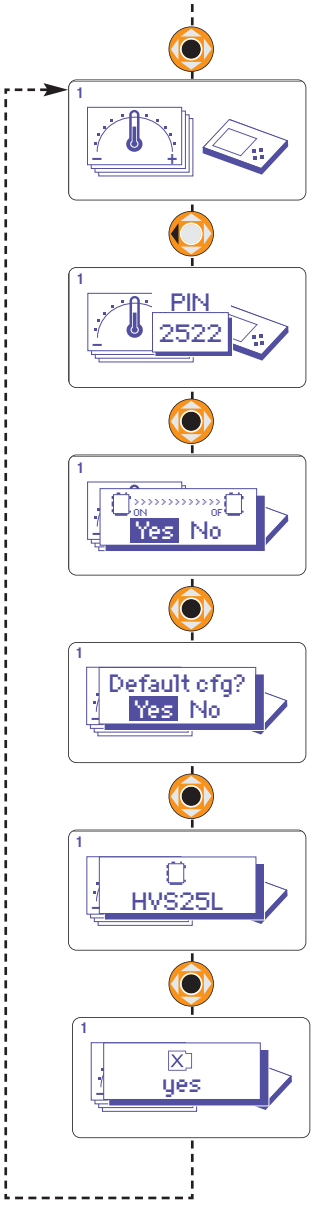
Setting the parameters works in the same way as shown in the example on the page before.

1. **Exhaust gas temperature (maximum value):** recommendation **200°C**
When approaching or exceeding this value the performance of the forced draft fan is infinitely reduced.
2. **Boiler shutdown temp. (exhaust gas temperature):** recomm. **90°C**
The boiler shuts down as soon as the exhaust gas temperature falls below this value during operation.
3. **Lambda must value:** recommendation **1.20**, (only HVS LC)
The boiler should be operated with an optimal oxygen mixture. This is controlled by the lambda sensor in the exhaust gas. On this basis the right amount of oxygen is added by the aid of the servo motor.
4. **Maximum fan performance:** recommendation **0**
This value enables the increase or decrease of the fan performance in 3 levels. Each level corresponds to approx. 14% increase or decrease in performance. Modifications should only be made with difficult chimney conditions.
5. **Minimum fan performance:** recommendation **0%**
The control panel is able to infinitely adjust the motor speed between the minimum performance and the chosen maximum fan performance.
6. **Permanent Exhaust gas fan (optional):**
(Option only visible if exhaust gas fan is activated, see menu 2.5.1.1).
Value: OFF, 1%....100%; power level with which the exhaust gas fan runs permanently parallel to the forced draft fan.
7. **Display brightness**
8. **Display contrast**
9. **Shifting values**
with [yes] the values displayed are shifting automatically
with [no] the values can be inquired manually
10. **Display timeout (if boiler in OFF-mode)**
After the preset time, the display automatically changes from the "OFF" operating state to "STANDBY MODE". Recommendation: We recommend deactivating this function ("OFF").
11. **Display timeout (if boiler in END-mode)**
After the preset time, the display automatically changes from the "END" operating state to "STANDBY MODE". Recommendation: We recommend deactivating this function ("OFF").

See following page for the return to factory settings

Return to factory settings

PIN: 2522



long press

press longer unti PIN request [0000] appears

enter PIN
- choose value
- save
- escape

only when boiler is „ON”:
- choose value [yes/no]
- save
- escape

Yes = shut off boiler, return to factory settings; **No** = escape

confirm return to factory settings
- choose value [yes/no]
- save
- escape

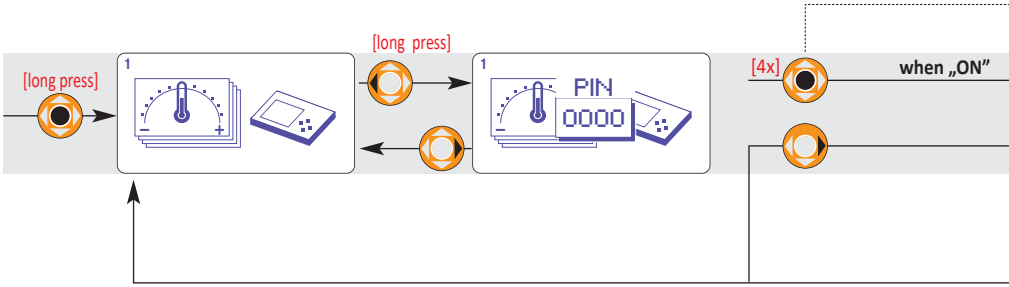
Yes = return to factory settings; **No** = escape

set boiler type
- choose value [type of boiler]
- save
- escape

activate/de-activate exhaust gas fan
- choose value [yes/no]
- save
- escape

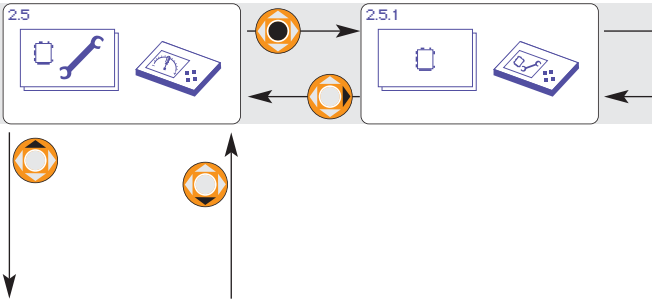
Yes = activate exhaust gas fan; **No** = de-activate exhaust gas fan

Expert level

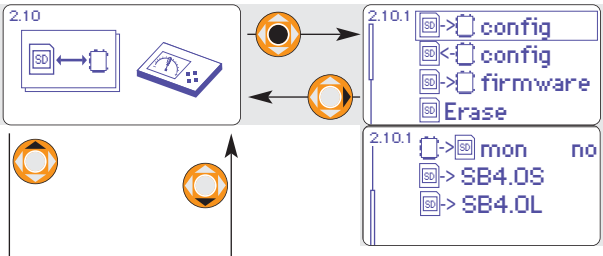


Password area (expert level)

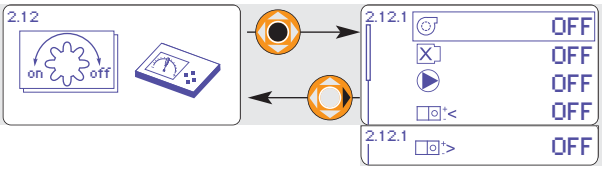
2.5]
configuration



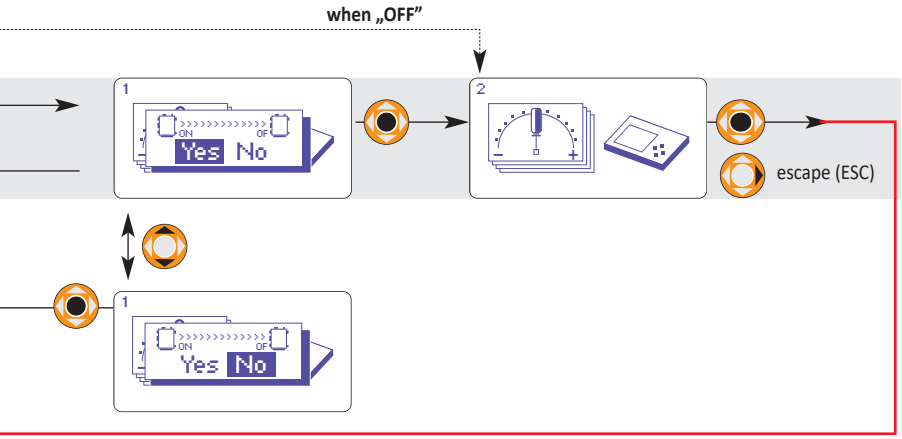
2.10]
SD card reader

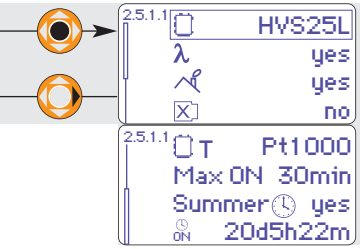


2.12]
functional check



Operation





boiler type[1]
lambda control [yes/no] with HVS LC: yes
exhaust gas measurement [yes/no] recommendation: yes
exhaust gas fan[2] [yes/no] when installed: yes
type of boiler sensor [PT1000/KTY]
max. length of heating up period [30-90min.] recom.: 30 min
automatic switch summer/winter time [yes/no] recom.: yes
operating hours display

upload configuration to HVS control panel
read configuration from HVS control
upload software into display
delete information on SD card

(function not available)
upload software to control board
upload software to lambda board

forced draft fan check
exhaust gas fan check (when activated)
pump check
servo motor check [closed]
servo motor check [open]

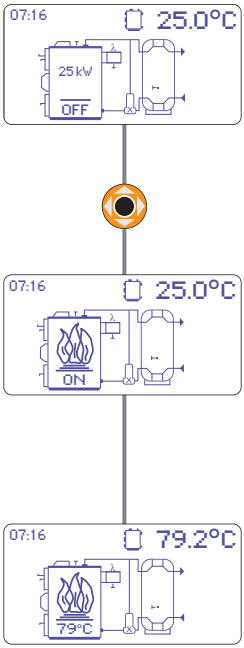
[1]when retrofitting the boiler control from „HVS T” to „HVS E” the boiler type has to be set to **AK2000**.

[2]Activate when exhaust gas fan is installed.

Note for the technician:

The terminals can be switched manually.
Please check before heating on the boiler for the first time!

Heating up the boiler – control panel (without exhaust gas fan)



Boiler off

This is displayed by „OFF" in the display.

The boiler starts when a pressing the „enter" key shortly.

The control LED is green

Heating mode begins

The boiler is in heating up mode as long as the temperature is lower than the pre-set boiler shut down temperature end 90°C plus additional 20°C

Note: If the temperature does not cross this mark in between 30 minutes the boiler will automatically turn to END

Heating mode

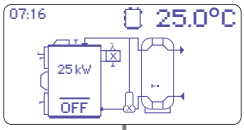
After several minutes the boiler turns to heating mode when the shut down temperature is exceeded by approx. 20°C end 90°C

Note: The pump starts at a boiler temperature of approx. 40°C.

Only version HVS LC: Calibration of servo is carried out at regular intervalls,

Operation

Heating up the boiler – control panel (with exhaust gas fan)

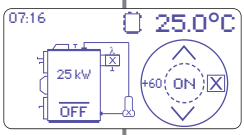


Boiler off

This is displayed by „OFF" in the display.

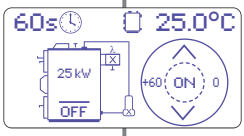
The boiler starts when a pressing the „enter" key shortly.

The control LED is green



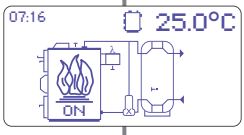
Activate exhaust gas fan

select parameter	
+60	exhaust gas fan is activated for 60 secs / 60 secs elongated
ON	turn on boiler
☒	cancel and stay in modus OFF
▲▼	select the values that are going to be displayed



Exhaust gas fan is activated

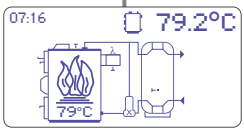
select parameter	
+60	running time of the fan is elongated for 60 s/press
ON	turn on boiler
0	turn off exhaust gas fan
▲▼	select the values that are going to be displayed



Heating mode begins

The boiler is in heating up mode as long as the temperature is lower than the pre-set boiler shut down temperature end 90°C plus additional 20°C

Note: If the temperature does not cross this mark in between 30 minutes the boiler will automatically turn to END



Heating mode

After several minutes the boiler turns to heating mode when the shut down temperature is exceeded by approx. 20°C end 90°C

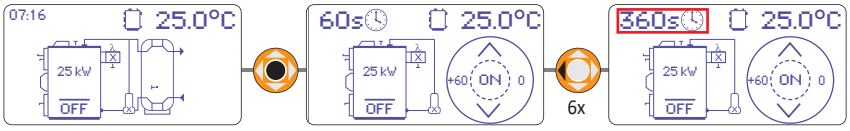
Note: The pump starts at a boiler temperature of approx. 40°C.

Only version HVS LC: Calibration of servo is carried out at regular intervalls, *see chapter:* ***[Maintenance]*** *Lambda servo motor and air blind*

Heating up the boiler – ignite the fire

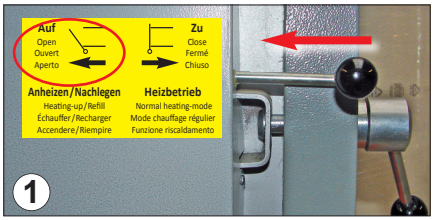
The draft bar of the boiler guarantees a safe opening of the upper door. Before opening the door the draft bar has to be pushed to the correct position: „open“ (see picture 1) in order to open the exhaust gas damper.
Thus, pressure/flue gas can escape through the chimney. The bottom door stays closed

activate exhaust gas fan (only when installed)



start menu — selection menu for exhaust gas fan — exhaust gas is acitvated

The exhaust gas fan is active for 60 s. it is elongated for additional 60 s with each press maximum operating period is 360 s. The exhaust gas fan should be operating until the boiler is started.



*Set the draft bar to position **„open“ / „heating-up“***

The charcoal leftovers are a perfect fuel for heating up the boiler. Place them over the nozzle as shown in the picture

Ignite f.e. a heat tablet

Place the tablet on the charcoal leftovers

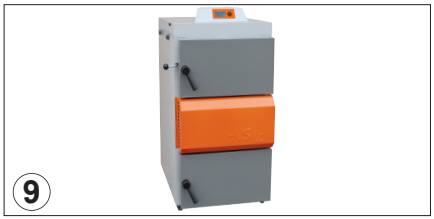
Position 2 wood logs on each side of the boiler wall

Place some splinters on the heat tablet

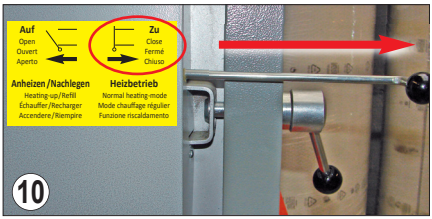
Operation

Open bottom door.
And let it burn for approx. 5 minutes.

Completely close the bottom door and fill upper fuel chamber with logs.

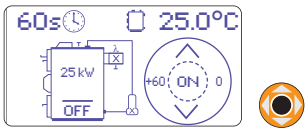


Lock all doors completely

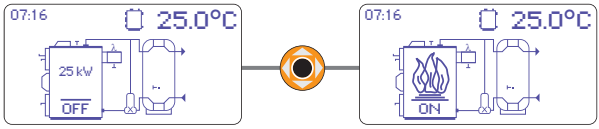


Set the draft bar to position
„close" / „normal heating mode".

11 Boiler start (when exhaust gas fan is installed)



11 Boiler start (without exhaust gas fan is installed)



start menu

boiler starts with heating mode

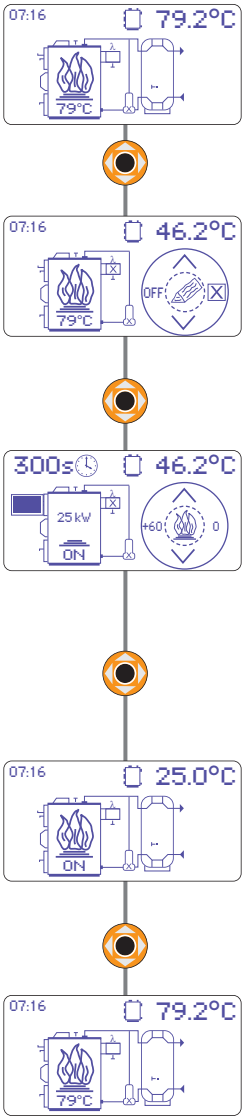
The control LED is green

In the fire bed of the fuel chamber wood gas is created. Thus, there will be clean gas flame downwards into the combustion chamber.

- During the heating on period the owner has to supervise the sytem.
- Pay attention that no flames get from the fuel chamber into the exhaust gas pipe durine heating on and refueling.
- During heating mode the exhaust gas damper and all doors must be closed.

Operation

Refueling



Heating mode

The control LED is green

If you want to switch to the refueling mode you have to press „ENTER"

Refuel – select –

select parameter	
OFF	boiler can be switched off manually
	refuel
☒	cancel and return
▲▼	select the values that are going to be displayed

Refuel

The exhaust gas fan, if one is installed, is activated automatically.
The forced draft fan will be deactivated.
The opening of the boiler door will be displayed on the control panel.

select parameter	
+60	elongate running time of the fan (only when installed)
	start boiler
0	turn off exhaust gas fan (only when installed)
▲▼	select the values that are going to be displayed

Heating mode begins

The boiler is in heating up mode as long as the temperature is lower than the pre-set boiler shut down temperature end 90°C plus additional 20°C

Note: If the temperature does not cross this mark in between 30 minutes the boiler will automatically turn to END

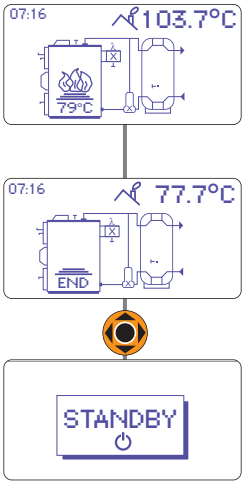
Heating mode

After several minutes the boiler turns to heating mode when the shut down temperature is exceeded by approx. 20°C end 90°C

Note: The pump starts at a boiler temperature of approx. 40°C.

Set the draft bar to the position „open/heating-up" before refueling.
After having closed the boiler door set the draft bar to the position „close/normal heating mode"

Turn-off the boiler (automatically)



Escape heating mode

When the boiler temperature falls below the set turn-off temperature end 90°C plus approx. 20°C the control unit starts escaping the heating mode.

The control LED does not shine.

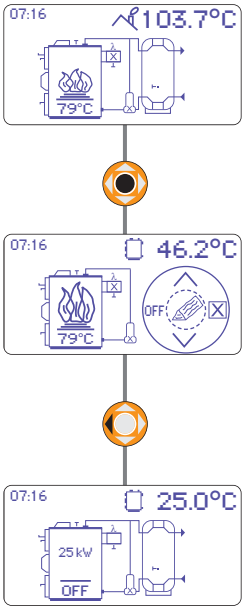
Stop heating mode

When the boiler temperature is falling below the set turn-off temperature end 90°C the heating mode is stopped automatically. Display shows **END**. Pressing the ENTER button changes the menu display to **OFF**

Boiler off

The control panel automatically switches from **END** or **OFF**-mode to **STANDBY**-mode (only version HVS LC) within the set time. Pressing the ENTER button leaves the **STANDBY**-mode and restarts the control. Again, the display shows **END**. To restart the boiler, press the ENTER button

Turn-off the boiler (manually)



Heating mode

The control LED is green

The heating mode can be stopped manually

For this press the „ENTER" key during operation.

The control LED does not shine

The control panel now shows different parameters to select. Press the left key „OFF" to turn-off the boiler.

select parameter	
OFF	the boiler can be turned-off manually
	refuel
☒	cancel and return to current operation mode
▲▼	select the values that are going to be displayed

Boiler off

The control panel automatically switches from **END** or **OFF**-mode to **STANDBY**-mode (only version HVS LC) within the set time. Pressing the ENTER button leaves the **STANDBY**-mode and restarts the control. Again, the display shows **END**. To restart the boiler, press the ENTER button

Operation

Type of fuel

The SOLARBAYER wood log boilers are suitable for the combustion of dry wood (split wood logs with less than 20% residual moisture) with a length that fits the fuel chamber and a maximum edge length of approx. 8x14 cm.

Heat value chart

humidity ratio in %		10 %	15 %	20 %	25 %	30 %
tree species/ density [1]	**unit**	**heat value in kWh**				
spruce	kg	4,61	4,32	4,02	3,73	3,44
379 kg DM/fm	fm	1942	1925	1906	1885	1860
	rm	1360	1348	1334	1319	1302
pine	kg	4,61	4,32	4,02	3,73	3,44
431 kg DM/fm	fm	2209	2189	2168	2144	2116
	rm	1546	1533	1518	1500	1481
beech	kg	4,43	4,15	3,86	3,58	3,30
558 kg DM/fm	fm	2748	2723	2695	2664	2627
	rm	1923	1906	1887	1864	1839
oak	kg	4,43	4,15	3,86	3,58	3,30
571 kg DM/fm	fm	2812	2786	2758	2726	2689
	rm	1968	1951	1931	1908	1882
poplar	kg	4,43	4,15	3,86	3,58	3,30
353 kg DM/fm	fm	1738	1723	1705	1685	1662
	rm	1217	1206	1193	1179	1163

[1] values in kg dry matter (DM) per solid cubic meter (fm)

Conversation table water content/wood moisture

water content *w* in %	5	10	15	20	25	30	35	40	45	50	55	60
wood moisture *u* in %	5	11	18	25	33	43	54	67	82	100	122	150

Resource: Wikipedia, at 17.06.2016

Storing of split timber

Freshly cut timber contains between 45 to 60% water. With log wood boilers, however, you can only use timber with a maximum moisture content of 20%. Therefore, it is necessary to dry (season) the timber before use.

We recommend the following for an optimal storing of split timber:

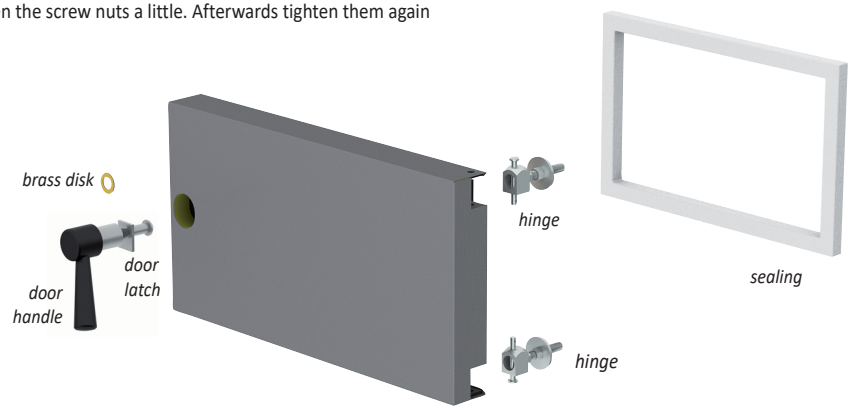
- store stack of woods protected from rain
- split into logs before storing
- create dry ground for storing and keep of the ground to ensure air circulation (e.g. pile on long timbers, etc.)
- store in wind exposed places if possible (e.g. at the edge of the forest not inside it)
- when stored closed to buildings ensure gap is left between buildings and logs,
- try to store logs south facing,
- put daily requirement of logs in heated rooms (e.g. boiler room to preheat the fuel!)

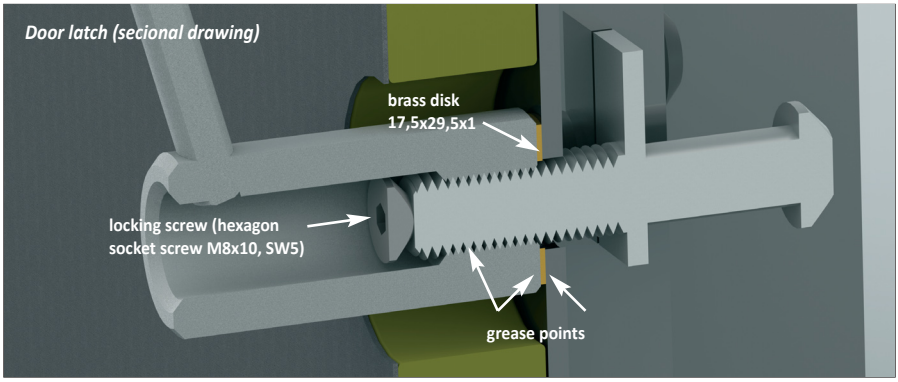
Maintenance

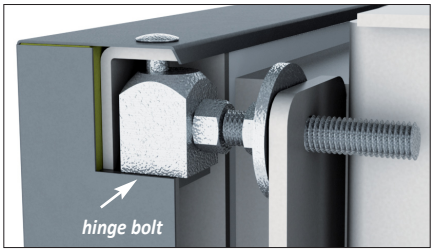
Doors

Adjusting the doors

The boiler doors are fastened at 3 points: with 2 hinges and the closing. In case of leakages the door can be adjusted at the hinge side. The door hinge can be adjusted by turning the hinge screw. Therefore you have to loosen the screw nuts a little. Afterwards tighten them again







adjustable hinge

The threads of the hinge and the closing have to be greased from time to time.

Please check tightness of doors before start-up and during the regular maintenance.

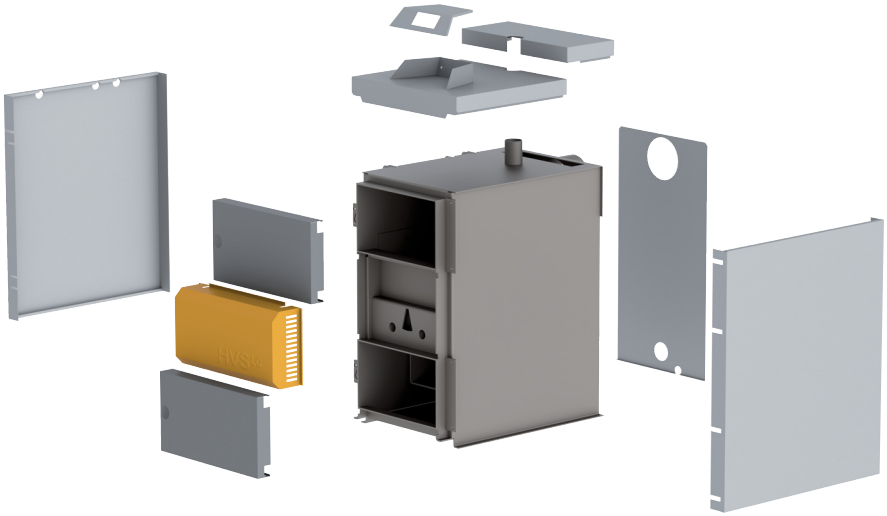
Boiler casing

Upper casing
When removing the front top plate you have to unscrew the 2 self-cutting screws at the front. Afterwards remove the caps which are located in the corners of the front plate with a slotted screwdriver. Underneath the caps are self-cutting screws which only should be loosened. Pull the front plate approx. 2 cm to the front and then tilt it carefully to the front.

Left and right casing
First of all you have to remove the upper front plate as described above. Afterwards the back top plate is going to be removed as well. The upper and bottom boiler doors have to be closed tightly. When removing the top plate at the side of the hinges the screw nuts that are rested against the galvanized support have to be loosened. At the side of the closing you have to remove the two screws that are next to the door closing. Afterwards, remove the casing of the forced draft fan. Unscrew all self-cutting screws at the backside of the boiler casing to free both side plates. Afterwards those can be removed.

Door casing
First off all, demount the complete door by removing the pintle from the hinges. Demount the door handle as well. Place the door with the inner side facing downwards on a stable ground. Now the casing can easily be removed.

Disconnect boiler form the mains supply before removing the casing.
Never touch conducting devices – danger to life exists!

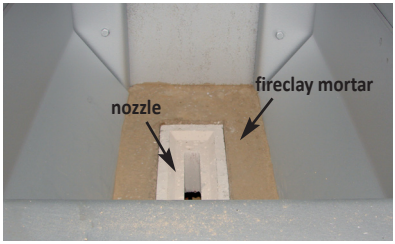


Ceramic nozzle/nozzle brick

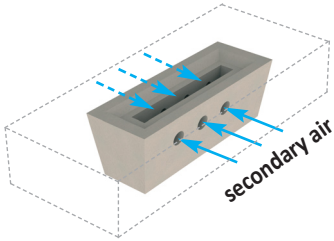
The nozzle is made of heat resistant fireclay and takes care of the mixing of the exhaust gases with the secondary air. This results in an absolute combustion. The operating life of the nozzle is depending on the wood moisture and on mechanical damages which might occur when the boiler is refueled incautiously.
Cracks are no reason for a replacement of the nozzle.

The conical form enables an easy exchange of the nozzles. If the nozzle is damaged it is necessary to replace it. Afterwards you put the new nozzle into the opening. Please check if the nozzle fits in tight. If it does not fit in tight, the opening has to be adjusted NOT the nozzle. After the new nozzle is put in you have to check if its holes for the secondary air are permeable.

The **nozzle** is a wear part and has to replaced when necessary.
Only use original spare parts!



fuel chamber with nozzle



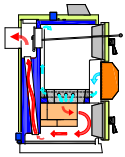
only HVS 16 LC **(5-hole-nozzle)**

one side 2 vent holes, other side 3 vent holes

Please make sure the 2 vent holes point to the left side (seen from above)!

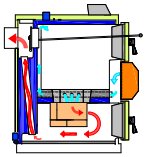
HVS 25 to HVS 100 E/LC **(6-hole-nozzle)**

left and right side each 3 holes



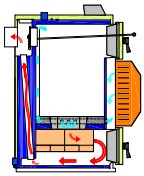
HVS 16 LC

1 nozzle
(5-hole-nozzle)



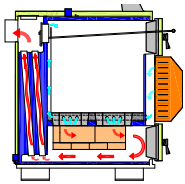
HVS 25 E
HVS 25 LC

1 nozzle
(6-hole-nozzle)



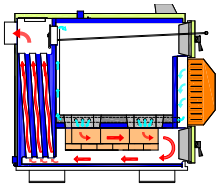
HVS 40 E
HVS 40 LC

1 nozzle
(6-hole-nozzle)



HVS 60 E
HVS 60 LC

2 nozzles
(6-hole-nozzle)



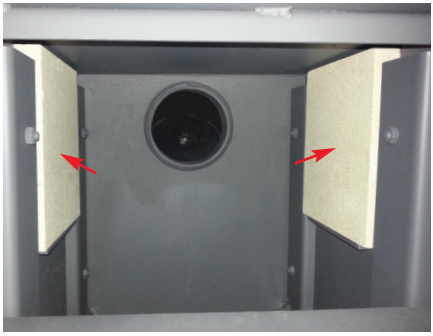
HVS 100 E
HVS 100 LC

2 nozzles
(6-hole-nozzle)

Protection bricks

In order to improve the performance the HVS 16 LC there are placed each one protection brick on the left and the right side of the fuel chamber.

The **protection bricks** are wear parts and have to be replaced when necessary.



Only with HVS 16 LC:
There are placed each one protection brick on the left and the right side of the fuel chamber.

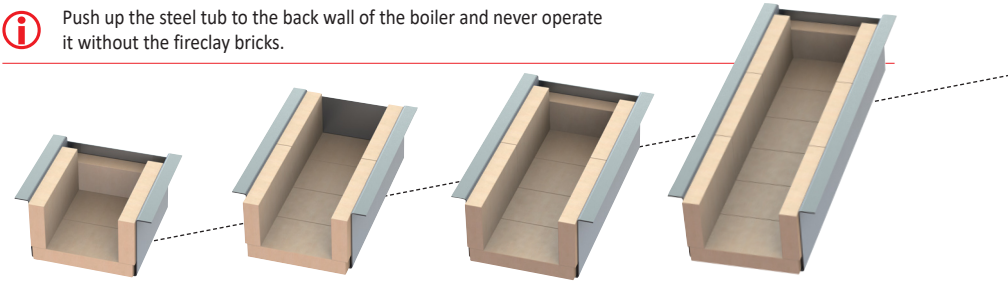
Combustion chamber

Fireclay bricks:
the heat resistant fireclay bricks are loosely placed in the steel tub, as shown in the picture. If the fireclay bricks are arranged incorrectly , the flame may hit the steel tub unhindered and therefore the tub might be destroyed ahead of time.

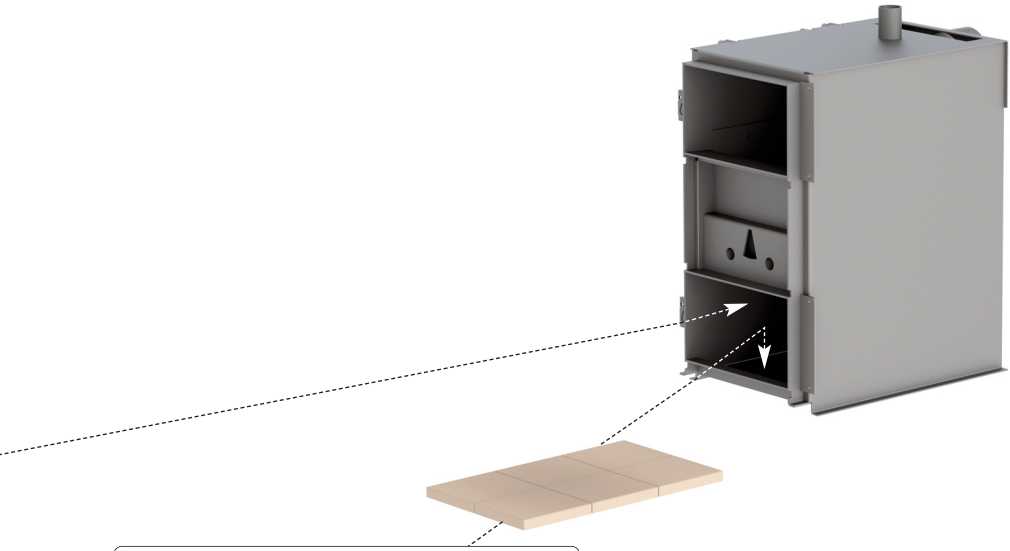
The fireclay bricks have to overlap the front edge of the steel tub approx. 20 mm.

Steel tub (replaceable):
A deformation or an erosive burning of the steel tub do not affect the furnace capacity and are not a defect. This is a normal process.

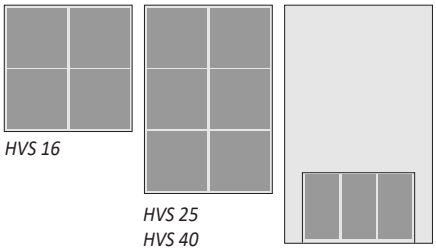
Push up the steel tub to the back wall of the boiler and never operate it without the fireclay bricks.



HVS 16 LC HVS 25 E and HVS 25 LC	HVS 40 E HVS 40 LC	HVS 60 E HVS 60 LC	HVS 100 E HVS 100 LC
5 fireclay bricks	**8 fireclay bricks**	**9 fireclay bricks**	**13 fireclay bricks**



Position of the fireclay plates on the boiler bottom

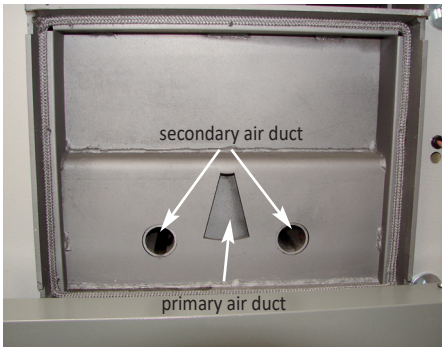


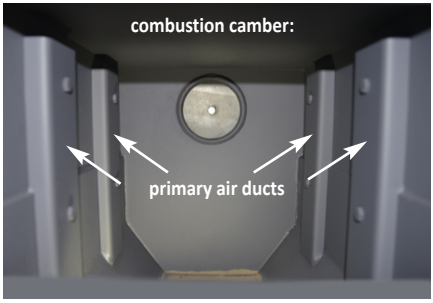
Fireclay plates:
In order to protect the boiler's ash chamber against too much heat impact and possible damages our wood log boilers are equipped with refractory plates that are placed underneath the combustion chamber.

Fireclay bricks, plates and the **steel tub** are wear parts and need to be replaced when necessary.
Only use original spare parts!

Primary and secondary air duct

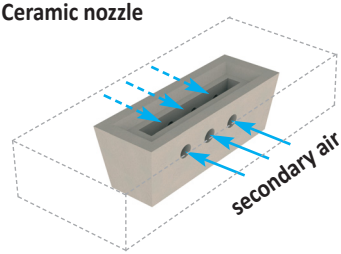
After having removed the assembly group the way to the pipes of the primary and secondary air is cleared. The secondary air ducts lead combustion air towards the nozzle's lateral boreholes. The primary air duct leads the air over the ducts into the fuel chamber.

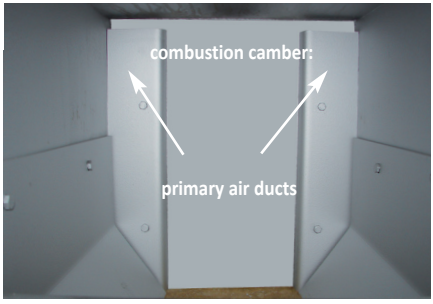




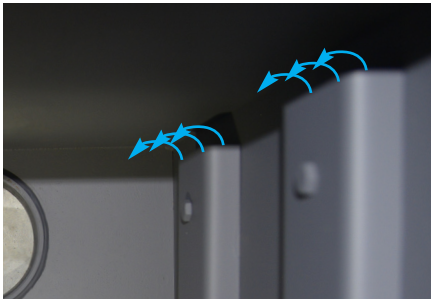
*The primary air ducts of **HVS 16**, **HVS 25** and **HVS 40** are placed on the side (2 on each side, left and right)*

Ceramic nozzle





*The primary air ducts of the **HVS 60** and **HVS 100** are placed on the back (2 ducts)*



The primary air steadily pours into the fuel chamber ober the air ducts.

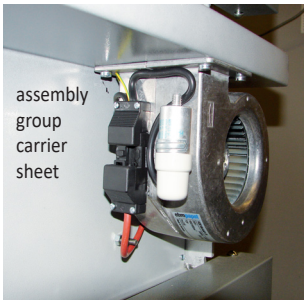
Forced draft fan

The forced draft fan is mounted on the fan carrier sheet.

The boilers HVS 16, 25 and 40 have one forced draft fan, and the HVS 60 and 100 have two fans.

The forced draft fan consists of 4 components: forced draft fan body; motor; capacitor; fan wheel.

Note: A clean and dust-free environment is the basis for a reliable operation of the fan. Dirt on the wings causes loud operation and leads to a changing of the parameters. Thus, a clean combustion is no longer guaranteed. The fan wings should be cleaned from time to time.



Disconnect boiler form the mains supply before removing the casing.
Never touch conducting devices – danger to life exists!

Adjusting the secondary air (only with HVS E)

For a good combustion you should try to achieve an oxygen proportion of approx. 5...7%. This is controlled by secondary air.

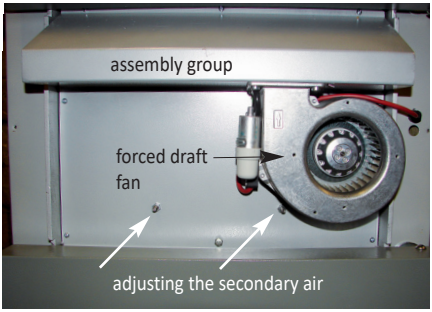
Adjusting the secondary air (only version HVS E):

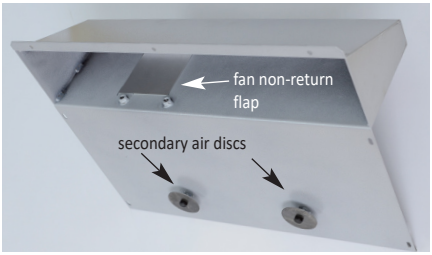
- Loosen the lock nuts at the screws
- turn screws clockwise as far as it is possible
- turn screws anti-clockwise for 2 or 3 turns. (reference values - exact adjustment in accordance with local conditions [chimney draft ...]).

The adjustments have to be repeated after each demounting and remounting of the assembly group!

Fan non-return flap (only version HVS E):

Check the funcionality of the fan non-return flap after each demounting and remounting the assembly group.



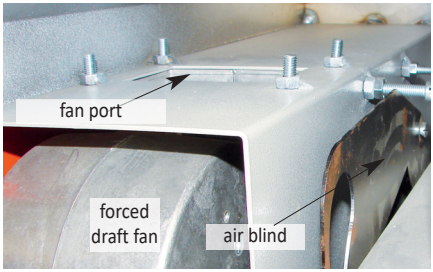


rear view of demounted assembly group

The secondary air has to be adjusted before the boiler's initial operation and, if necessary, adapted to the given chimney conditions (only with HVS E).

Lambda servo motor and air blind (only with HVS LC)

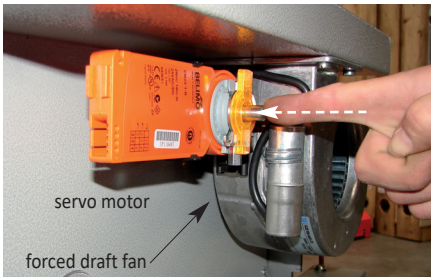
The automatic adjustment of the air supply is carried out electronically. With the aid of the servo motor the lambda sensor measures the air supply via the air blind.



The position of the air blind is found automatically by the servo motor. The final positions in both directions are regulated by the set screws.

When demounting the lambda servo motor with the air blind you have to take care that the air blind is as close to the boiler body as possible when installing it again.

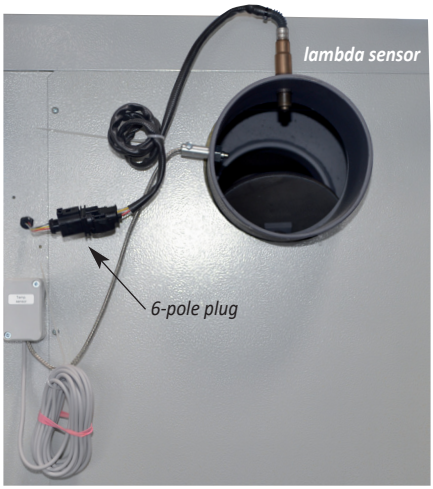
Push the shaft as far as it goes to the boiler body.



During operation, an automatic postition adjustment of the servo is carried out every hour (calibration: open 100%, end stop of air blind)

Lambda sensor (only with HVS LC)

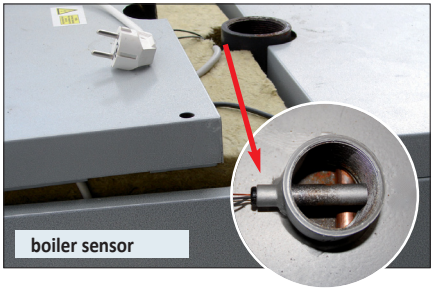
The HVS LC boiler has an integrated lambda sensor (type: BOSCH LSU 4.9) in the flue outlet (connection via 6-pole plug on the back side of the boiler).



Position the draft bar during heating phase is „normal heating mode"/"close".
An open exhaust gas damper may harm the lambda sensor when touched by the flames.

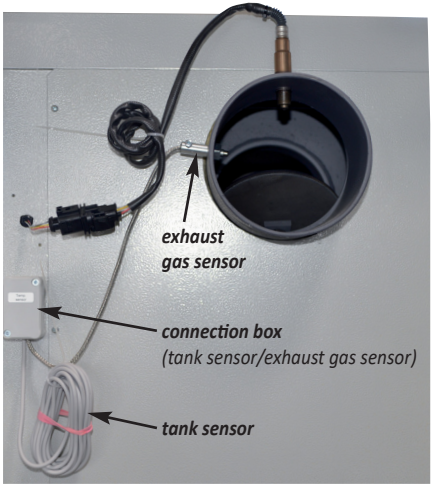
Sensor

PT1000/600 sensors are used for the recording of the boiler, exhaust gas and tank temperature.

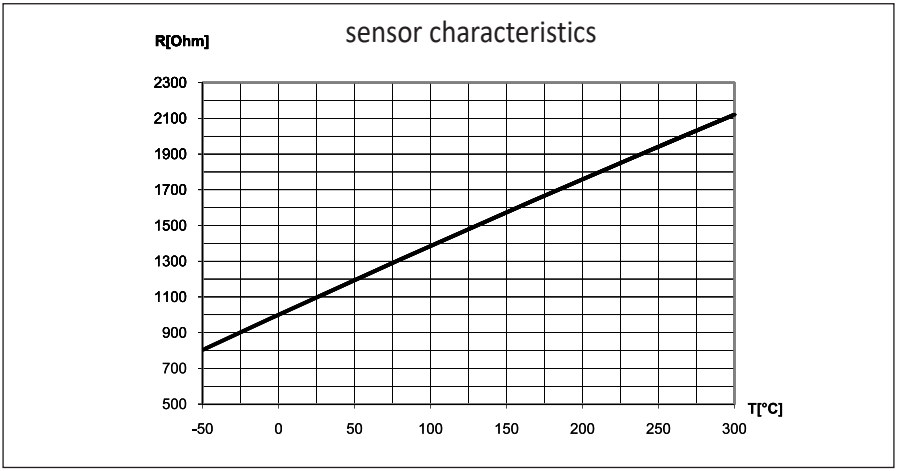


position of the boiler sensor (boiler flow line)

For access to the boiler sensor, take off the cover of the boiler, *see chapter:* ***[Maintenance]*** *Boiler casing*

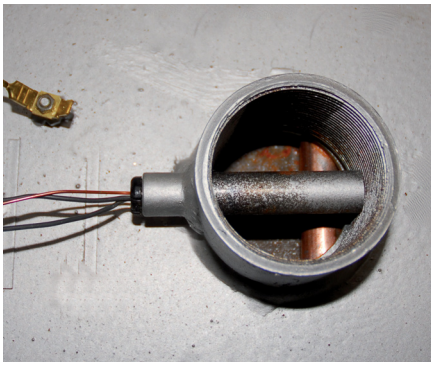


Disconnect mains supply before removing the boiler casing.
Never touch conducting devices – danger to life exists!

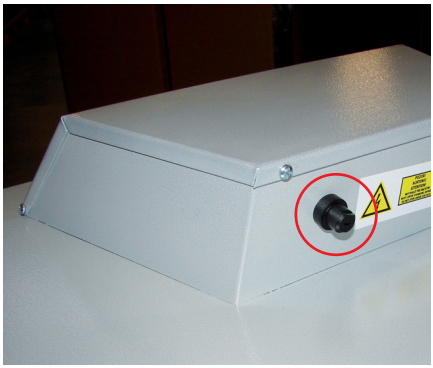


Safety temperature limiter - STB

Der Kessel ist mit einem Sicherheitstemperaturbegrenzer ausgestattet.



sensor of the safety temperature limiter STB in the boiler flow line

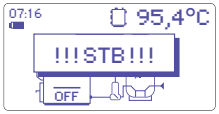


unlocking possibility for the STB

Mode of operation when the boiler is overheated:

The STB is released when the boiler is overheating.

The control panel displays the following warning:



additionally the LED is flashing RED

For additional safety, the safety temperature limiter (STB) interrupts mechanical the electric circuit of the fan to ensure the shutdown of the fan in case of overheating.

The boiler circuit pump is activated, the boiler shuts off [OFF] and a starting of the boiler is impossible.

Mode of operation for starting the boiler again:

The safety temperature limiter can only be unlocked manually after the boiler temperature falls below the set „boiler maximum temperature“. Remove the black safety cap of the STB and press the green release knob.

By pressing the „ENTER” key afterwards the control unit is returning to the main menu again, the error message disappears.

Now the boiler can be operated again.

Exhaust gas turbulators

The exhaust gas turbulators can be inserted into the exhaust gas heat exchangers, like demonstrated in the picture.

Number of turbulators needed:

HVS 16 - 40	6 turbulators
HVS 60	16 turbulators
HVS 100	24 turbulators

When heating with very resinous wood and/or with scrap wood the turbulators has to be checked and cleaned more often to prevent sticking.

To prevent sticking and condensation water in the exhaust gas system, the turbulators should be removed at low exhaust gas temperatures approx. < 150°C.

Cleaning the fuel chamber

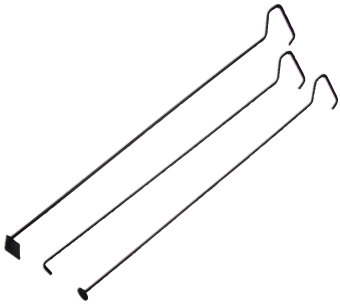
With an optimal combustion and when the minimal temperature of the return line water is kept at 72°C the fuel and combustion chamber and the heat exchangers will be contaminated to a minimal extend.
Only clean the boiler when cooled down.

Cleaning the fuel chamber

The formation of tar in the upper fuel chamber is a normal process. Already after the first heating tar layer forms itself at the walls of the fuel chamber. You do not have to remove this tar layer, it does not affect the boiler performance. Never try to remove this tar layer mechanically (e.g. by scarping with a putty knife, etc.) because this might cause a damage at the boiler walls.

If there is a large amount of ash in the fuel chamber, that cannot slide through the nozzle this as has to be removed.

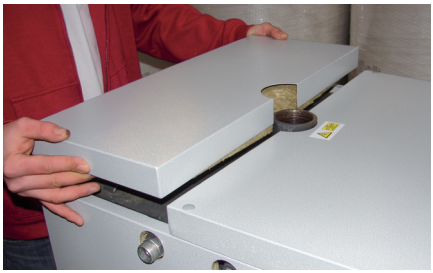
fuel chamber after a couple of days of operation. The formation of tar is absolutely normal and is going to be burned off again during the regular heating.



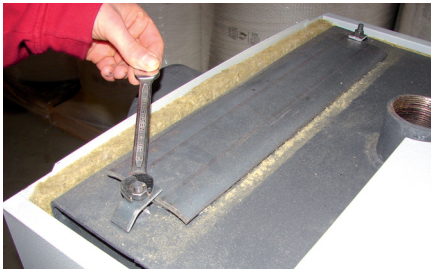
included in scope of delivery: scraper, poker, round scraper

Attention - danger of burns! Only clean boiler when cooled down!

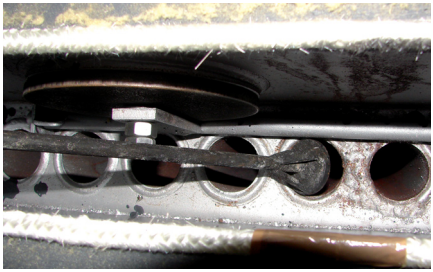
Cleaning the heat exchanger



1 Remove the casing of the heat exchangers *(without tools).*



2 *Loosen the cover of the heat exchangers (flat wrench n°13).*



3 *Clean the heat exchangers with the round scraper. In order to clean the heat exchanger pipes the turbulators have to be removed. Put the turbulators back in place after cleaning.*

A weekly cleaning interval is necessary when operating the boiler with turbulators.
Depending on the degree of dirt the cleaning interval might be extended.

Attention - risk of burns! Only clena the boiler when cooled down!
Take care of good air ventilation during the cleaning process (dust formation).

Check the tightness of the heat exchanger inspection aperture during first start-up and regular inspections

Cleaning the primary and secondary air ducts

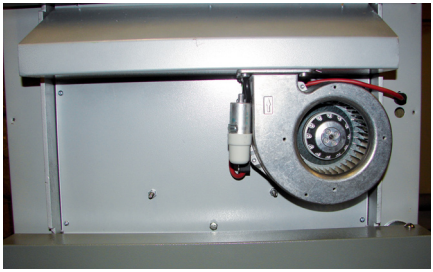
The aeration is one of the most important premises for a perfect combustion. The primary and secondary air ducts should be cleaned at least once a season. By dismantling the fan casing and the fan's assembly group the way to the air ducts is cleared. The air ducts have to be cleaned with a vacuum cleaner. Afterwards the air permeability has to be tested.

After cleaning the HVS LC boiler the position of the air blind has to be checked when installing it again,
see chapter: ***[Maintenance]*** *Lambda servo motor and air blind*

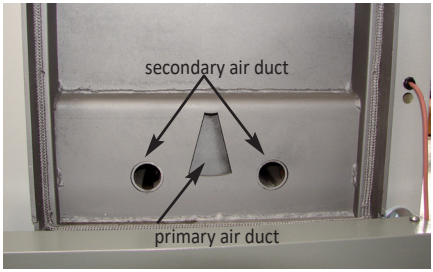
With the HVS E boiler the secondary air settings have to be checked and maybe readjusted,
see chapter: ***[Maintenance]*** *Adjusting the secondary air*

Disconnect boiler from the mains supply before removing the forced draft fan.
Never touch conducting devices – danger to life exists!

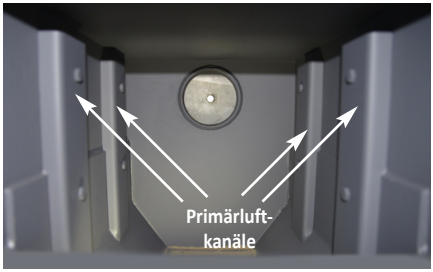
1 *Release the screws of the fan casing and remove the cover.*



2 *Disconnect the electrical connections. Release the screws of the assembly group and remove the plate together with the forced draft fan. Take care that the seals reside correctly when reinstalling it again.*



3 *Clean the primary and secondary air ducts with the vacuum cleaner*



4 *If the mouthpieces of the primary air ducts are blocked they have to set free again. Check if air is coming out of the primary air ducts (with compressed air). If the primary air duct is blocked it can be demounted and cleaned. Test on operability after reinstalling.*

Maintenance plan

Maintenance / Maintenance rate	with every filling (daily)	with every fifth filling (twice a week)	with every 30th filling (every 3 weeks)	annual
Fuel chamber ✓ remove wasted ash when necessary [rough cleaning is enough] ✓ charred wood deposits may stay in the fuel chamber since they make the next heating-up easier ✓ black shining soot deposits on the water-cooled steel wall is normal [but: immoderately thick deposits are a sign for wood with to much humidity or for smoldering fire due to overheating/boiler tunr-off]	●	●	●	●
Combustion chamber ✓ clean [(light) grey dust → okay.; black sticky coating → bad combustion!] ✓ check steel tub & fireclay bricks if all is placed correctly & if there area any signs of damage/wearing	–	●	●	●
Nozzle ✓ make sure all ducts are permeable ✓ check for damages/signs of wearing	–	–	●	●
Flue gas heat exchanger & flue gas turbulators ✓ clean	–	–	●	●
Start-up flap ✓ check if start-up flap is closing tightly [remove deposits on the sealing face]	–	–	●	●
Lambda sensor ✓ check probe in the flue gas pipe for dirt [clean with soft, dry cloth; sensor is heated during boiler operation, could be hot! Risk of burns! Check probe while built-in, otherwise disconnect the cables before removing the lambda sensor!]	–	–	–	●
Primary and secondary ducts ✓ check/clean [the secondary air has to be adjusted anew after re-assmebling (standard: both screws open 2,5-3 turns, only with HVS Economic)]	–	–	–	●
Flue gas pipe ✓ check [when necessary remove deposits/dust so the flow cross-section is not narrowed]	–	–	–	●

Maintenance / Maintenance rate	with every filling (daily)	with every fifth filling (twice a week)	with every 30th filling (every 3 weeks)	annual
Doors ✓ grease moveable parts with copper paste [especially the thread of the door handle; door hinge] ✓ when necessary re-adjust door hinges [in order to compensate ‚fading' of the door sealing]	–	–	–	●
Expansion vesselheating water ✓ check [primary pressure: gas overpressure behind the vessel's membrane if the expansion vessel is depressurized on the water-side; system pressure: water overpressure of the cold system]	–	–	–	●
Safety installations ✓ check operability [the thermal discharge safety valve opens automatically in case of overheating and cools the boiler over the safety heat exchanger with tap water; the manometer shows the recent overpressure of the system; the pressure relief valve opens when necessay and thus limits the overpressure to a max. of 3 bar]	–	–	–	●
Batteries for lambda control board (only version LC) ✓ check batteries (Mignon AA) and renew at least after 2 years. Use only leak safe batteries!				

Sealings, sensors, fireclay and flame-swept parts are wear parts.

Maintenance report

We recommend the annual maintenance to be carried out by a professional HVAC installer in accordance with the valid safety and technical regulations.

Let your installer cofirm the annual maintenance operations.

Bitte kopieren Sie dieses Wartungsprotokoll für weitere Einträge

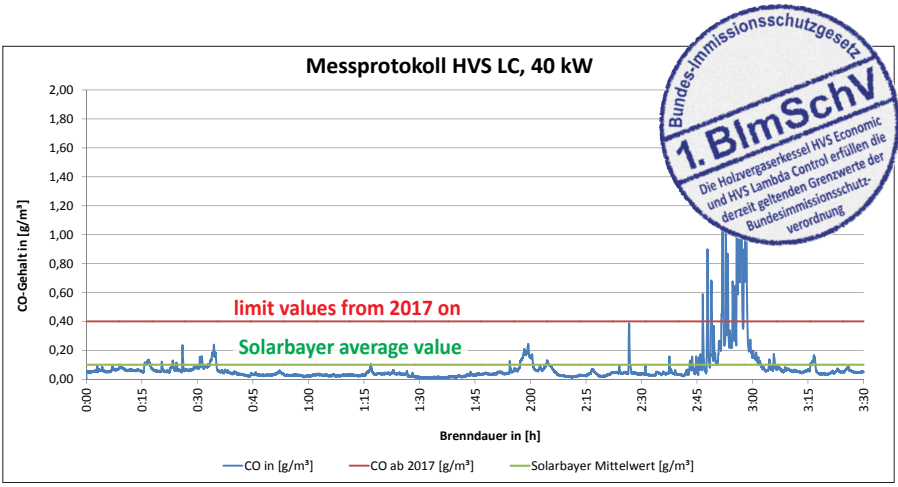
Exhaust gas measurement

Please pay attention to the following aspect for the exhaust gas measurement:

1. clean the boiler approx. 3 days before the measurement
2. maybe increase the exhaust gas temperature (forced draft fan should run on full power, 100%)
3. the buffer tank has to have enough heat capacity, thus, open all mixing and radiator valves
4. use dry, all-natural hard- and softwood in good quality with a max. residual moisture of 10–20%, the log length has to correspond to the length of the fuel chamber, edge length approx. 8x14 cm
5. heat up the boiler approx. 1,5 - 2 hrs before the measurement to create a firebed only fill the boiler half-way and put more logs in when necessary
6. compress the firebed
7. put wood logs on the firebed, fill the fuel chamber
8. wait for about 10 minutes
9. start with the measurement

The exhaust gas measurement has to be carried while the boiler is operating in full load.
The forced draft fan has to run on full power (100%).

The sensory determined value at the boiler corresponds to the average value of the exhaust gas.
Thus, it is possible that the temperature during the measurement in the core stream of the exhaust gas might be higher.



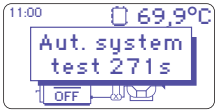
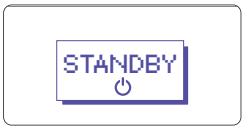
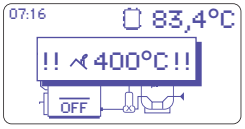
Quelle: Solarbayer-Werksmessung (Messung HVS 40 LC während der Heizphase)

The test record displays the heating phase. Pay attention to the fact the a firebed has been created over a period of 1,5 hrs before the heating phase. The exhaust gas measurement by the chimney sweeper has to take place during the heating phase. During the heating phase the carbon monoxide value is at its lowest point (see diagram above). This is why the measurement has to take place during the heating phase.

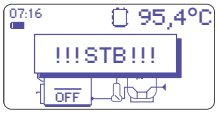
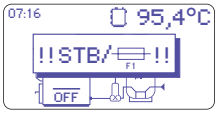
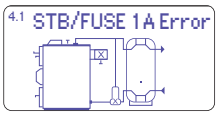
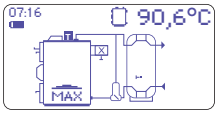
Trouble shooting

Problem	Possible reason	Solution
Power drop of the boiler, boiler does not burn although the fan runs with 100%	Boiler is extremely dirty Nozzle is broken The moisture content of the fuel used is too high, wrong log length Primary air ducts are blocked due to wood that is too moist	Clean the boiler Check nozzle, exchange if necessary Use dry wood, adjust log length Check primary air ducts and clean them *see chapter:* ***[Maintenance]*** *Cleaning...*
After having closed the damper the boiler burns for a little while and then only smokes	Secondary air adjustment is incorrect The moisture content of the fuel used is too high, wrong log length	Check secondary air adjustment Check if the damper (explosion flap) of the forced draft fan opens (only HVS E) Adjust log length
After closing the door smoke escapes through the door sealing	Hinge adjusted incorrectly Sealing is broken	Adjust door *see chapter:* ***[Maintenance]*** *Doors* turn around or replace sealing
The damper does not open	The damper is covered with tar The moisture content of the fuel used is too high, wrong log length	Adjust the boiler, exhaust gas and switch off temperature to the Solarbayer settings. Adjust log length
Smoke comes into the boiler room after opening the damper and the fuel chamber door	Low chimney draft	The chimney has to match the technical requirements (chapter „Technical Data“) Retrofit an exhaust gas fan Install a barometric damper
Deformation of the steel tank Cracks in lining		No defect
Forced draft fan does not work	Starting capacitor is broken STB has released No power supply	Replace capacitor Unlock STB Check operability *see chapter:* ***[Operation]*** *Expert level*
Boiler switches off after heating up	Wrong temperature set as boiler switch off temperature	Set parameters correctly *see chapter:* ***[Operation]*** *Basic menu*
Boiler does not switch off	Boiler switch off temperature is set too high	Set parameters correctly *see chapter:* ***[Operation]*** *Basic menu*
Boiler circuit pump (Laddomat) does not operate	No power supply Fuse F1 on the control board is broken Control board is broken	Check fuse and replace when necessary replace control board

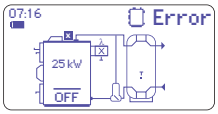
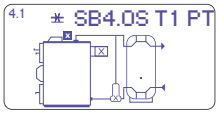
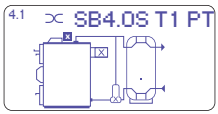
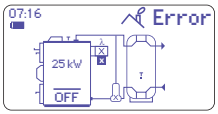
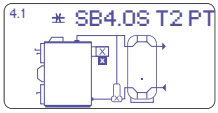
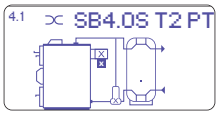
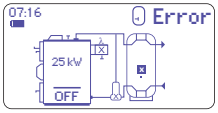
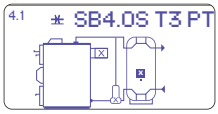
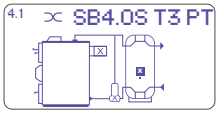
Status-/error messages

status message	cause/solution
no display 	**power supply is interrupted** *(affected parts: fuse F1A/switched-mode power supply; control board AK 4005 S/LSU; control panel including cable)* - check power supply - check both fuses, if fuse defect, no display - check control panel - check display panel SB4.0 D and connection cable
service message 	**routine check (pump protection)** In order to maintain the operability of the electrical components over a longer period of idleness the boiler initializes a service check each Sunday at 11:00 am. This process which only takes a couple of minutes will only take place when the boiler is in mode [OFF/END] at this moment. After having finished the check the control unit will automatically return to the initial function.
	**standby- mode** After the set time, the control changes from mode [OFF/END] to standy mode to safe energy. To wake up, touch the ENTER button.
	**exhaust gas temperature too high** At exhaust gas temperatures above approx. 400°C the control changes to mode [OFF]. The display shows the actual echaust gas temperature. To start-up the boiler manually, press ENTER. This is only possible when exhaust gas temperature falls below 400°C

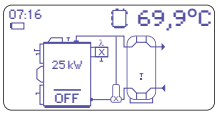
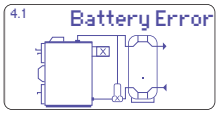
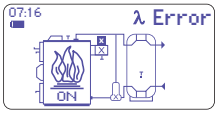
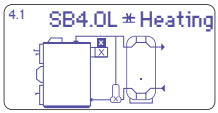
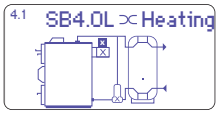
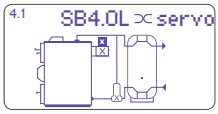
Error messages

error message (HVS E/HVS LC)	error identificationg (menu 4)	cause/solution
safety temperature limiter STB  LED flashes red	**additional protection function:** - boiler circuit pump is activated - forced draft fan is deactivated - boiler turns off [OFF] - boiler start is not possible	**boiler overheated, STB has released or fuse is interrupted** *(affected parts: safety temperature limiter STB)* - the safety temperature limiter has to be unlocked manually after the temperature has fallen below the set maximum temperature *see chapter:* ***[Maintenance]*** *Safety temperature limiter - STB*
STB or fuse F1A  LED flashes red	STB/FUSE 1A Error  **additional protection function:** - boiler circuit pump is activated - forced draft fan is deactivated - boiler turns off [OFF] - boiler start is not possible	**boiler overheated, STB has released or fuse is interrupted** *(affected parts: safety temperature limiter STB; fuse F1A)* **when boiler is overheated:** - STB unlock *see chapter:* ***[Maintenance]*** *Safety temperature limiter - STB* **when fuse is interrupted:** - check forced draft fan and exhaust gas fan including connection cables (short circuit?) - replace fuse F1A (control board AK 4005 LSU)
maximum boiler temperature  LED flashes red	**the boiler temperature has exceeded the maximum temperature** - When the boiler temperature falls below the max. temperature the boiler will automatically return to heating mode again **addentional protection function:** - boiler circuit pump is activated - forced draft fan is deactivated	

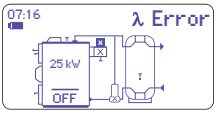
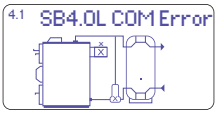
Error messages

error message (HVS E/HVS LC)	error identificationg (menu 4)	cause/solution
boiler sensor  LED flashes red **additional protection function:** - boiler circuit pump activated - boiler switches off - boiler start not possible	SB4.0S T1 PT1000  	**interruption in the boiler sensor circuit** *(affected parts: AK 4005 S/LSU control board; sensor boiler temperature)* - check contacts and sensor resistance
	SB4.0S T1 PT1000  	**short circuit in boiler sensor circuit** *(affected parts: AK 4005 S/LSU control board; sensor boiler temperature)* - check contacts and sensor resistance
exhaust gas sensor  LED flashes red	SB4.0S T2 PT1000  	**interruption in the exhaust gas sensor circuit** *(affected parts: AK 4005 S/LSU control board; connection box temperature sensor;* *exhaust gas sensor)* - check contacts and sensor resistance
	SB4.0S T2 PT1000  	**short circuit in the exhaust gas sensor circuit** *(affected parts: AK 4005 S/AK 4005 LSU; connection box temperature sensor; exhaust gas sensor)* - check contacts and sensor resistance
tank sensor  LED flashes red	SB4.0S T3 PT1000  	**interruption in the tank sensor circuit** *(affected parts: AK 4005 S/LSU control board; connection box temperature sensor; sensor boiler temperature)* - check contacts and sensor resistance
	SB4.0S T3 PT1000  	**Kurzschlussin the tank sensor circuit** *(affected parts: AK 4005 S/LSU control board; connection box temperature sensor; sensor boiler temperature)* - check contacts and sensor resistance

Status-/error messages (only HVS LC)

error (only with HVS LC)	error identificationg (menu 4)	cause/solution
battery  LED flashes red	Batterry Error  	**battery discharged** *(affected parts: AK 4005 LSU; battery box)* - replace battery (1,5 V „AA")
lambda error  LED flashes red **error is only displayed when boiler is [ON]**	SB4.0L ± Heating Error  	**interruption in the lambda sensor circuit** *(affected parts: AK 4005 LSU; connection box lambda sensor; lambda sensor)* - check contacts and connection cable between lambda sensor and control board AK 4005 LSU
	SB4.0L >< Heating Error  	**short circuit in the lambda sensor circuit** *(affected parts: AK 4005 LSU; connection box lambda sensor; lambda sensor)* - check contacts and connection cable between lambda sensor and control board AK 4005 LSU
	SB4.0L >< servo Error  	**short circuit in the servo motor circuit** *(affected parts: AK 4005 LSU; cable servo motor; servo motor)* - check contacts and connection cable between servo motor and control board AK 4005 LSU - if necessary, change control board AK 4005 LSU

Status-/error messages (only HVS LC)

error (only with HVS LC)	error identificationg (menu 4)	cause/solution
communication error  LED flashes red	SB4.0L COM Error SB4.0L LAMBDA COM Error  	**communicatiaon between AK 4000 D display and AK 4005 LSU control board is interrupted** *(affected parts: AK 4005 LSU board, display cable)* - check display cable/connection

Maintenance

Declaration of confirmity

We herewith declare on our own responsibility that the following products answer the momentarily valid European Directives and Regulations

CE

Product: Wood log boiler HVS

Type: HVS 16^{LC},
HVS 25^{E}, HVS 25^{LC}
HVS 40^{E}, HVS 40^{LC}
HVS 60^{E}, HVS 60^{LC}
HVS 100^{E}, HVS 100^{LC}

Manufacturer: SOLARBAYER GmbH

Directives and regulations used:

machinery directive 2006/42/EG
DIN EN 303-5: 1999-06
DIN EN 303-5: 2012
MV directive 2004/108/EG
directive 97/23/EG
directive 2006/95/EG

Pollenfeld, 01.03.2014

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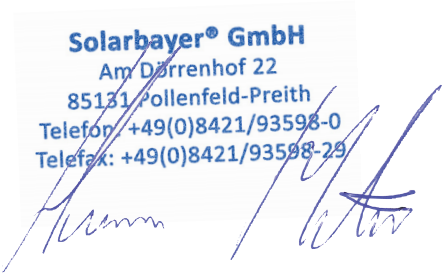
Kraus Martin
CEO Solarbayer GmbH

Manufacturers Declaration

The Solarbayer wood gasification boilers type HVS E Economic and HVS LC Lambda Control are designed solely for the use of timber based biomass fuels. Seasoned logs are the preferred biomass fuel type. The Solarbayer wood gasification boilers are not suitable for the combustion of fossil fuels including oil or solid fuels such as coal or smokeless ovoid coals. The use of any fuels other than timber based biomass fuel will void the manufacturer warranty.



Index

Notes

Solarbayer®

Future-proof heating systems

System technology made in Bavaria

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- Storage systems
- Fresh water systems
- Wood log boiler
- Solar systems
- Heat pumps

The effective one in each case is the current version on our homepage
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