Planning and
Installation Guide

Comfortable
Heating. With Wood!

HDG Euro V3.0 with HDG Lambda Control 1

hdg-bavaria.com

Content

1 Notes on this guide

1.1 Introduction

Safe and simple conversion

This Planning and Installation Guide contains important information on planning and installing the following components properly and safely:

- HDG Euro V3.0 with HDG Lambda Control 1

Following these instructions helps to avoid dangers, prevent repair costs and downtimes, maintain reliability and extend the service life of the HDG Euro

Reading the Planning and Installation Guide

The Planning and Installation Guide must be read and applied by everyone who plans or carries out the installation of the HDG Euro V3.0 with HDG Lambda Control 1 boiler.

Technical changes

We continuously develop and improve our boilers. The information in this version was correct at the time of going to press.

We reserve the right to make changes which may then deviate from the technical details and illustrations in this Planning and Installation Guide.

Copyright

Symbols used

In this Planning and Installation Guide the following denotations or symbols will be used for particularly important information:

1. Instructions to the operator
2. Work through the steps in the sequence specified.

✓ Result of the action described

✎ Cross reference for more explanation

- List

1.2 Structure of the Planning and Installation guide

The Planning and Installation Guide is structured as follows:

Chapter	This explains ...
1 Notes on this guide	... how to use this Planning and Installation Guide.
2 Safety notes	... everything on the subject of safety that you should consider when using the HDG Euro.
3 Planning the HDG Euro	... what you need to consider when planning the HDG Euro.
4 Installing the HDG Euro	... what you need to consider when installing the HDG Euro.
5 Appendix	... how to properly connect the HDG Euro.

Table 1/1 - Structure of the Planning and Installation Guide

1.3 Glossary

Term	Explanation
Actuator	This is a component which carries out a certain function in the HDG Euro, e.g. the thermal safety device (TAS).
Display	Display on the HDG Lambda Control 1 unit.
Flue fan	Creates a negative pressure inside the boiler and supplies the boiler with air for combustion.
Flue gas by-pass flap	Facilitates the extraction of flue gas when the fuelling chamber is opened and during refilling.
HDG Euro V3.0 with HDG Lambda Control 1	Boiler for burning split logs and wood briquettes.
HDG Lambda Control 1	Microprocessor controller to regulate combustion and the heating of the accumulator.
Oxygen sensor	Electronic component which monitors residual oxygen levels in the flue gas.
Plug board	Pre-fabricated connection strip for connecting electrical components (charging valve Y2).
Refill button	Button that must be pressed before the boiler is opened for refilling, or lighting a fire..
Refill signal	Electrical signal (in the form of an LED on the HDG Lambda Control 1 microprocessor control unit) which serves as a prompt to refill the system with fuel.
Sensor	Monitors certain parameters (e.g. temperature) and forwards them to the control system for analysis.
Thermal safety device	Safety device which allows cold water to flow through the safety heat exchanger if the boiler becomes too hot.

Table 1/2 - Glossary

2 Safety instructions

2.1 Intended use

Please note that it is a legal requirement under England and Wales Building Regulations that the installation of the appliance is either carried out under Local Authority Building Control approval or is installed by a Competent Person registered with a Government approved Competent Persons Scheme. HETAS Ltd operate such a Scheme and a listing of their Registered Competent Persons can be found on their website at www.hetas.co.uk.

IMPORTANT

The installation of this appliance must comply with all local regulations, including those referring to national and European Standards before it can be operated.

This appliance is not suitable for a shared flue.

Improper adjustment, alteration, maintenance or the fitting of replacement parts not recommended by the manufacturer can cause injury or property damage. Do not operate the appliance with faulty seals or components.

Ensure all manuals are kept safely and are available for the user at all times.

Do not store or use petrol or other flammable vapours and liquids in the vicinity of this or any other heating appliance. Do not burn anything but natural wood.

Due to high operating temperatures of this appliance it should be located away from pedestrian traffic Advise all persons as to the appliances high surface temperatures, including visitors. If it is possible for children or infirm adults to come into contact, fit a suitable guard. Never let children “help” with the appliance in any way, even when cold.

It is imperative that all air passageways into, out of, and within the appliance are kept clean. All permanent ventilation into the room provided must remain clear and unobstructed at all times. Consideration must be given to the need for extra ventilation if another heating source needing air is to be operated simultaneously. If an extraction fan is proposed to be fitted to a connecting area of the house, after the stove has been installed, professional advice should sought from a qualified engineer.

If a flue blockage or adverse weather conditions cause the appliance to emit smoke, do not treat it as merely a nuisance, this smoke will indicate that carbon monoxide is being emitted into the room.

In the event of a chimney fire the appliance should be turned to its minimum setting and the fire brigade informed. Do not re-light until the complete installation has been inspected by a qualified engineer.

The appliance should be inspected regularly and the chimney cleaned at least annually. More frequent cleaning may be required and the advice of a qualified chimney sweep should be sought. Always check for any flue blockage before lighting the stove after a prolonged shut down.

This appliance has been carefully designed and constructed to give clean burning with optimum efficiency and safety, but as with all appliances these standards will not be achieved unless it is installed and maintained regularly by qualified engineers. It must also be operated strictly with the procedures given in this manual.

If you are unsure about anything concerning your appliance please seek professional advice.

Useful Organisations

Name	Phone	Web
Solid Fuel Association	0845 601 4406	www.solidfuel.co.uk
The National Association of Chimney Sweeps	01785 811732	www.chimneyworks.co.uk
HETAS Ltd.	0845 634 5626	www.hetas.co.uk

Table 2/1 - Useful Organisations

Basic principles for the construction of the system

Basic principles

The heating system was built using state of the art technology and conforms to recognised safety regulations. Nevertheless, there are still risks of injury or death of the user or a third party or of adverse effects upon the heating system itself or upon other material goods. **Have your specialist heating company provide you with detailed instructions on the operation of the HDG Euro**

Using the heating system

Only use the heating system if in perfect condition. Use it properly, as intended, and be aware of safety concerns and the dangers involved under observance of the Planning and Installation Guide. Have any faults which could impair safety fixed immediately.

Proper and improper manner of operation

Application of the heating system

The HDG Euro V3.0 with HDG Lambda Control 1 is designed to burn untreated wood in the form of split logs up to 500 mm (19"), pressed briquettes and coarse wood chips, coarse grade, cross section of maximum 1000 mm^2 and not less than 600 m^2). Varnished, coated or impregnated wood should never be used for fuel.

Any other use is improper. The manufacturer will accept no responsibility for any damage resulting from improper use. The operator will bear sole responsibility.

Proper use includes maintaining the installation, operation and maintenance conditions specified by the manufacturer.

You may only enter or change the operating values specified in this manual. Any other entries will affect the heating system's control program and could lead to a malfunction.

RECOMMENDED FUEL

HDG Bavaria recommends split logs in lengths of 500 mm (19"), with a max. edge length of 120 mm (4 3/4") and a residual moisture content of 20 %.

When preparing or purchasing your fuel, make sure you are obtaining fuel of the highest available quality.

✎ Further information on split logs can be found in section "3.4 Fuel quality requirements" in chapter "3 Functional description" in the operating instructions.

2.2 Residual risk

Despite all precautions, the following residual risks remain:

Caution!

Hot surface

Contact with the hot surfaces of the boiler can lead to burns.

Wait until the boiler has cooled down before touching uninsulated components.

Warning!

Danger of asphyxiation due to carbon monoxide

If the boiler is operating, carbon monoxide can be emitted through the doors.

Do not leave the boiler doors open any longer than necessary.

Caution!

Danger of fire

Working in areas marked with this symbol can lead to a fire.

Do not leave the doors open any longer than necessary.

Caution!

Hand injuries

Working in areas marked with this symbol can lead to hand injuries.

Danger!

Danger from electrical current or voltage

Work in areas marked with this symbol may only be performed by a qualified electrician.

Danger!

Danger of explosion

Work in areas marked with this symbol may only be performed exactly as specified by HDG Bavaria.

Improper operation can lead to explosions.

2.3 Warnings and safety symbols used

The following warnings and safety symbols are used in this Planning and Installation Guide:

Danger!

Danger from electrical current or voltage

Work in areas marked with this symbol may only be performed by a qualified electrician.

Warning!

Warning of a hazardous area

Working in areas marked with this symbol can lead to serious injuries or to extensive material damage.

Caution!

Hand injuries

Working in areas marked with this symbol can lead to hand injuries.

Caution!

Hot surface

Working in areas marked with this symbol can lead to burns.

Caution!

Danger of fire

Working in areas marked with this symbol can lead to a fire.

Caution!

Frost danger

Working in areas marked with this symbol can lead to frost damage.

Danger!

Danger of explosion

Work in areas marked with this symbol may only be performed exactly as specified by HDG Bavaria.

Improper operation can lead to explosions.

Notes on disposal

Additional information for the operator

2.4 Duty to inform

Reading the Planning and Installation Guide

Every person performing any tasks on the system is required to read the Planning and Installation Guide prior to beginning work, particularly the chapter “2 Safety instructions”. This applies in particular to persons who only occasionally work on the heating system, e.g. who perform cleaning, installing or servicing work.

The Planning and Installation Guide must always be kept readily accessible at the heating system's installation site.

3 Planning the HDG Euro

3.1 Sectional view

The boiler contains the following components:

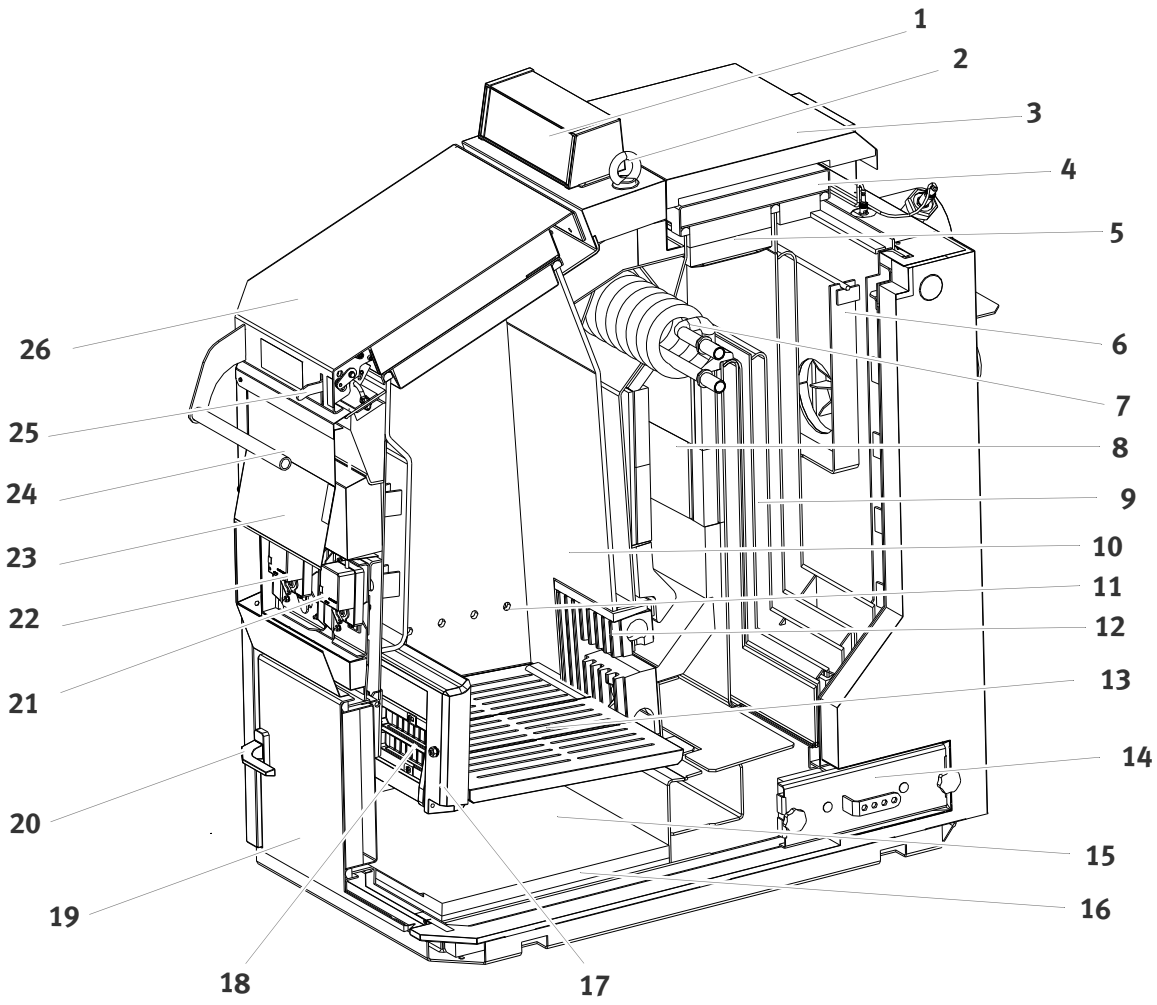


Figure 3/1 - Overview

1 HDG Lambda Control 1 control unit
2 Eyebolt for crane transport
3 Cleaning lid cover
4 Cleaning lid
5 Cleaning lid with heat shield
6 Flue gas deflector plate
7 Safety heat exchanger
8 Secondary combustion chamber with chamber stones
9 Flue gas heat exchanger (downstream heating surfaces)

10 Fuelling chamber
11 Primary air inlet
12 Burner nozzle
13 Grate
14 Cleaning opening of fly ash compartment
15 Ash compartment
16 Ash compartment cladding
17 Fixed grate portal
18 Cleaning flap
19 Cleaning door
20 Cleaning door handle
21 Air adjustment flap for primary air with servo motor
22 Air adjustment flap for secondary air with servo motor
23 Front cover
24 Filling hatch handle
25 Filling hatch unlocking device
26 Filling hatch

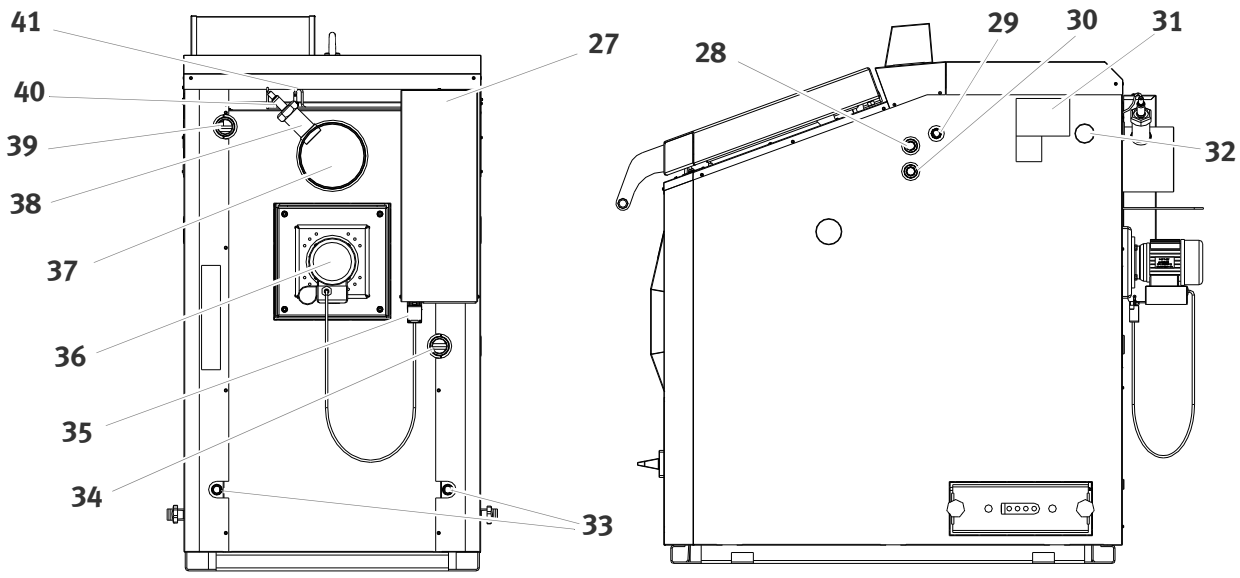


Figure 3/2 - Overview

27 Circuit board for HDG Lambda Control 1

28 Safety heat exchanger inlet 1/2" BSP (DN 15 IG)

29 Connection for immersion bushing on thermal safety device 1/2" BSP (DN 15 IG)

30 Safety heat exchanger outlet 1/2" BSP (DN 15 IG)

31 Nameplate

32 Cover cap of safety temperature limiter sensor

33 Filling/draining 1/2" BSP (DN 15 IG)

34 Return connection 1 1/4" BSP (DN 32 IG)

35 Plug for flue fan

36 Flue fan

37 Flue connection

38 Lambda sensor connection nozzle

39 Supply connection 1 1/4" BSP (DN 32 IG)

40 Lambda sensor

41 Flue gas temperature sensor

3.2 Mode of operation

HDG Euro V3.0 with HDG Lambda Control 1

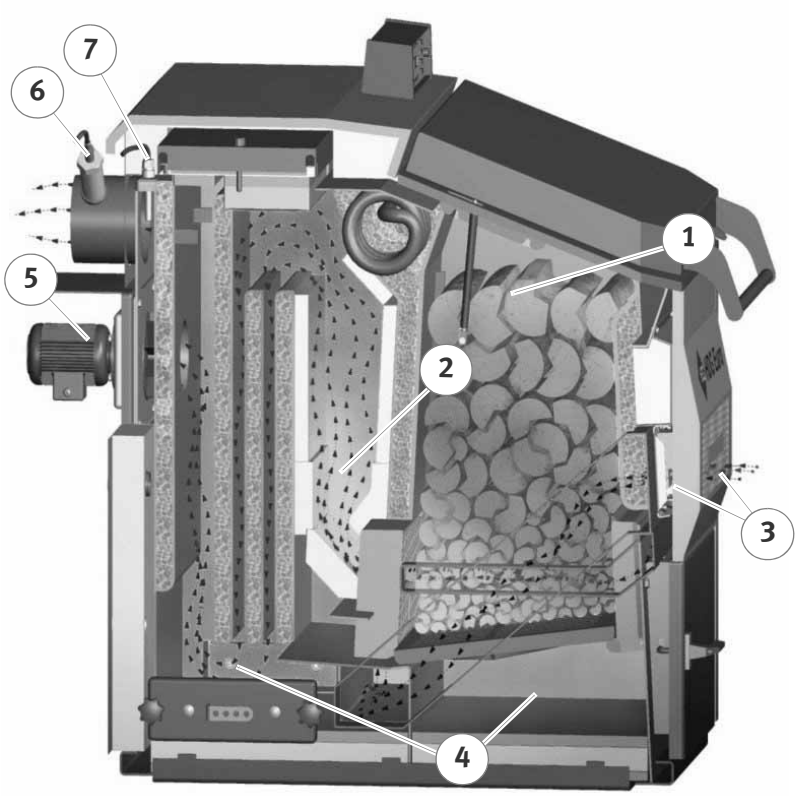


Figure 3/3 - HDG Euro V3.0 with HDG Lambda Control 1

Inside the HDG Euro V3.0 with HDG Lambda Control 1, fuel which has been manually placed in the fuelling chamber (1) and ignited is degassed through the addition of primary air.

The resulting wood gas is mixed with secondary air in the combustion chamber (2) where it is burnt off.

Ashes are collected in the large ash compartments (4) for combustion ash and fly ash.

The air necessary for combustion is supplied as required via the suction fan (5) and two servo drives with metering mechanisms (3).

Via the lambda sensor (6), the boiler temperature sensor and the flue gas temperature sensor (7):

- the firing is permanently monitored,
- the boiler output is adjusted,
- emissions are minimised and
- boiler efficiency is optimised.

HDG Lambda Control 1

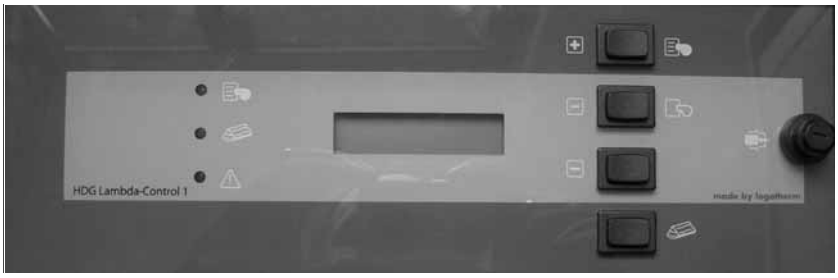


Figure 3/4 - Control panel for HDG Lambda Control 1

The HDG Lambda Control 1 boiler control unit is the electronic hub. Using the control panel, you can regulate the HDG Lambda Control 1 system and call up information on the current operating status.

3.3 Technical data

Type of boiler	HDG Euro V3.0	HDG Euro V3.0	HDG Euro V3.0
Minimum power	-	29 kW	29 kW
Nominal power for wood	30 kW	40 kW	50 kW
Boiler class	3	3	3
Weight	979 kg	979 kg	979 kg
Max. operating pressure	3 bar	3 bar	3 bar
Max. supply temperature	95 °C	95 °C	95 °C
Water content	178 l	178 l	178 l
Flue draught requirement	20 Pa	20 Pa	20 Pa
Exhaust mass flow • Nominal load • Partial load	 0.0180 kg/s 0.0172 kg/s	 0.0240 kg/s 0.0172 kg/s	 0.0303 kg/s 0.0172 kg/s
Exhaust temperature (approx.) • Nominal output • Minimum output	 140 °C 120 °C	 160 °C 120 °C	 180 °C 120 °C
Fuelling chamber capacity	220 l	220 l	220 l
Burning duration per filling, in accordance with fuel recommendations	Up to 7 h with beech, up to 6 h with spruce	Up to 6 h with beech, up to 5 h with spruce	Up to 5 h with beech, up to 4 h with spruce
Boiler efficiency	90.6 %	90.3 %	89.9 %

Table 3/1 - Technical data HDG Euro V3.0 with HDG Lambda Control 1

Type of boiler	HDG Euro V3.0	HDG Euro V3.0	HDG Euro V3.0
Electrical connection • Voltage • Current consumption for continuous operation	230 V 0.76 A	230 V 0.76 A	230 V 0.76 A
Required auxiliary energy • Constant operation at nominal power	175 W	175 W	175 W
Diameter of flue outlet	180 mm external	180 mm external	180 mm external
Height of flue connection	1106 mm	1106 mm	1106 mm
Safety heat exchanger connections (bushing)	2 x 3/4" BSP (DN 20)	2 x 3/4" BSP (DN 20)	2 x 3/4" BSP (DN 20)
Supply and return connections (bushing)	1 1/4" BSP (DN 32)	1 1/4" BSP (DN 32)	1 1/4" BSP (DN 32)
Drain (bushing)	2 x 1/2" BSP (DN 15)	2 x 1/2" BSP (DN 15)	2 x 1/2" BSP (DN 15)
Water-side resistance at $\Delta\vartheta$ 10 K	24 hPa	24 hPa	24 hPa
Water-side resistance at $\Delta\vartheta$ 20 K	6.4 hPa	6.4 hPa	6.4 hPa
Air inlet cross section	15.000 mm²	15.000 mm²	15.000 mm²

Table 3/1 - Technical data HDG Euro V3.0 with HDG Lambda Control 1

3.4 Dimensions

Rear and side views

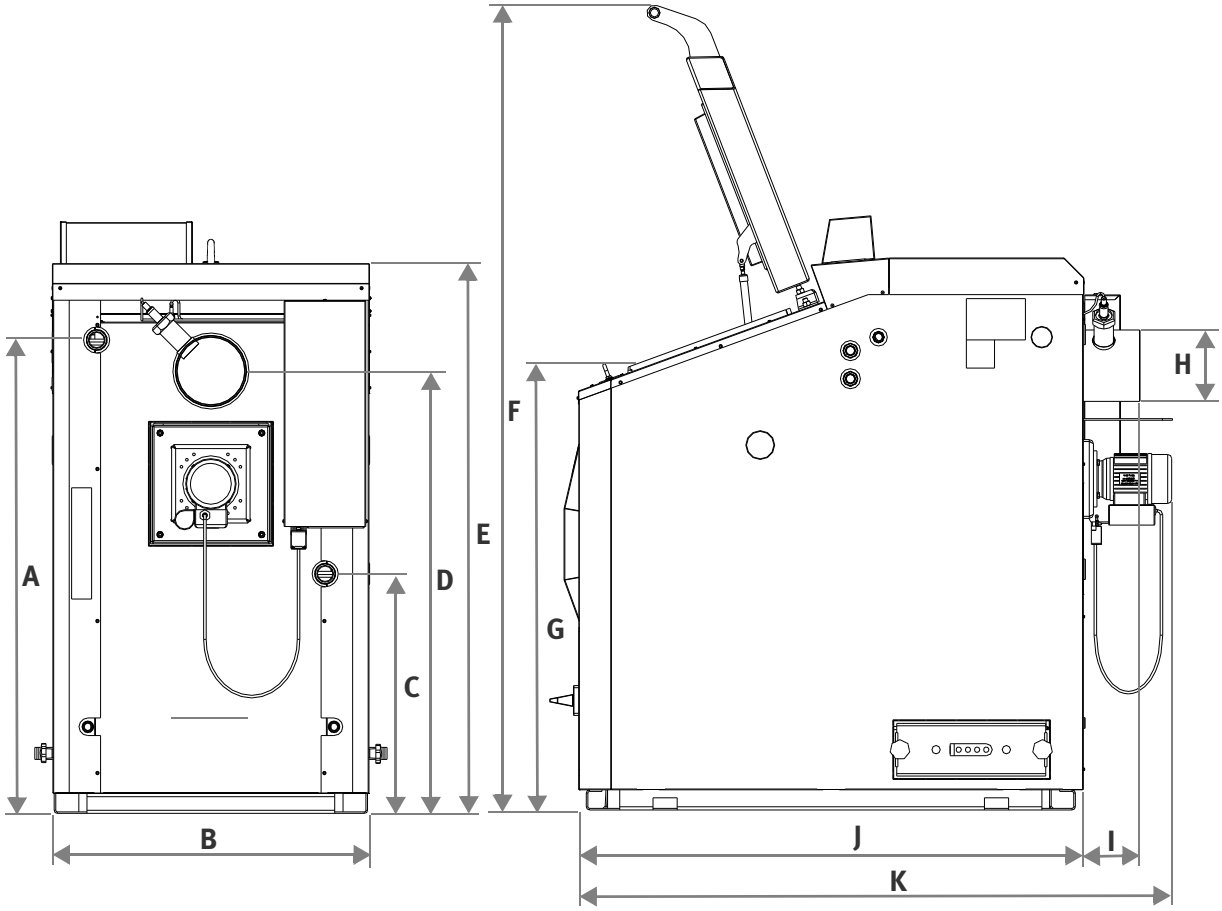


Figure 3/5 - Side and rear views

A) Supply connection height 1183 mm

B) Boiler width 794 mm

C) Return connection height 599 mm

D) Flue pipe connection height 1106 mm

E) Boiler height 1374 mm

F) Overall height with filling hatch open 1990 mm

G) Fuelling chamber edge height 1106mm

H) Flue pipe connection Ø 180 mm external

I) Flue pipe connection length 141 mm

J) Boiler length 1255 mm

K) Boiler length incl. suction fan 1477 mm

3.5 Fuel quality requirements

Residual moisture content

When selecting fuel, it is important to understand that the thermal value of the wood is primarily dependent upon the moisture content. For the purpose of simplifying cost calculations, you can assume that 1 kg of wood (all types) with a moisture content of 20 % has a thermal value of approx. 4 kWh. Firewood must be split and its size must be adapted accordingly to fit in the fuelling chamber.

Unsplit logs and square boards are not suitable for burning.

Moreover, logs should be split before they are prepared for drying. This is done in order to achieve a moisture content which is suitable for burning within a reasonable amount of time (approx. two years).

Moist, unsplit wood has a negative impact on the combustion efficiency of the boiler and results in higher fuel consumption.

Recommendation from HDG Bavaria GmbH

HDG Bavaria recommends split logs in lengths of 500 mm (19"), with a max. edge length of 120 mm (4 3/4") and a moisture content of 20 %.

3.6 Structural requirements

Boiler room

General advice

Approved Document B, of the Building Regulations states that boiler houses are classed as “places of special fire hazard”.

Requirements

- The requirements for a designated compartment is that the responsible person must carry out a risk assessment for the location and take into account the requirements of the Building Regulations Approved Document B1 and B2 (For larger dwellings over 200 m^2 per storey).
- As a “Places of Special fire Hazard” there must be a separate fire compartment constructed. This means that if an existing room is altered, such as a utility room or garage, it must be fireproofed to make it a special compartment as well as in the case of a new construction.
- This compartment should not form a part of one of the exits from the property that will have to be used as a fire exit. There can be a door between the boiler house and the rest of the property and there can be a door that from the boiler house to the outside but this cannot be classed as one of the property exits.
- As a “Places of Special Fire Hazard” it has to be treated as a separate compartment and the materials used for the lining of the walls and ceilings for fire protection must meet the National Class1 or European class C-s3,d2.
- Any wall or floor between a garage and a house must have 30 minutes fire resistance with a self closing door and must be classed as smoke sealed along its jambs and head.
- Any services that pass through the wall between the boiler house and the dwelling should have adequate fire stopping as ADB1 section 7, paragraphs 7.6-7.9 i.e. if the pipe is none combustible and has an internal diameter less than 160 mm.
- If the boiler house, plant room or fuel store is in the basement of a property then this must have its own separate natural smoke and heat outlet.

Combustion air supply

Combustion requires oxygen to burn ,so a permanent air supply into the room of installation is required. Requirements are detailed in Building regulation Approved Document J.

Placement

The heating system can be placed on any level, firm floor.

To ensure unhindered operation and maintenance of the heating system, it is imperative that the heating system is installed in accordance with the specifications of HDG Bavaria GmbH and that the minimum spacing requirements are observed.

We recommend that objects which are **not** needed for the operation or maintenance of the heating system, are **not** stored in the boiler room.

Space and dimensional requirements

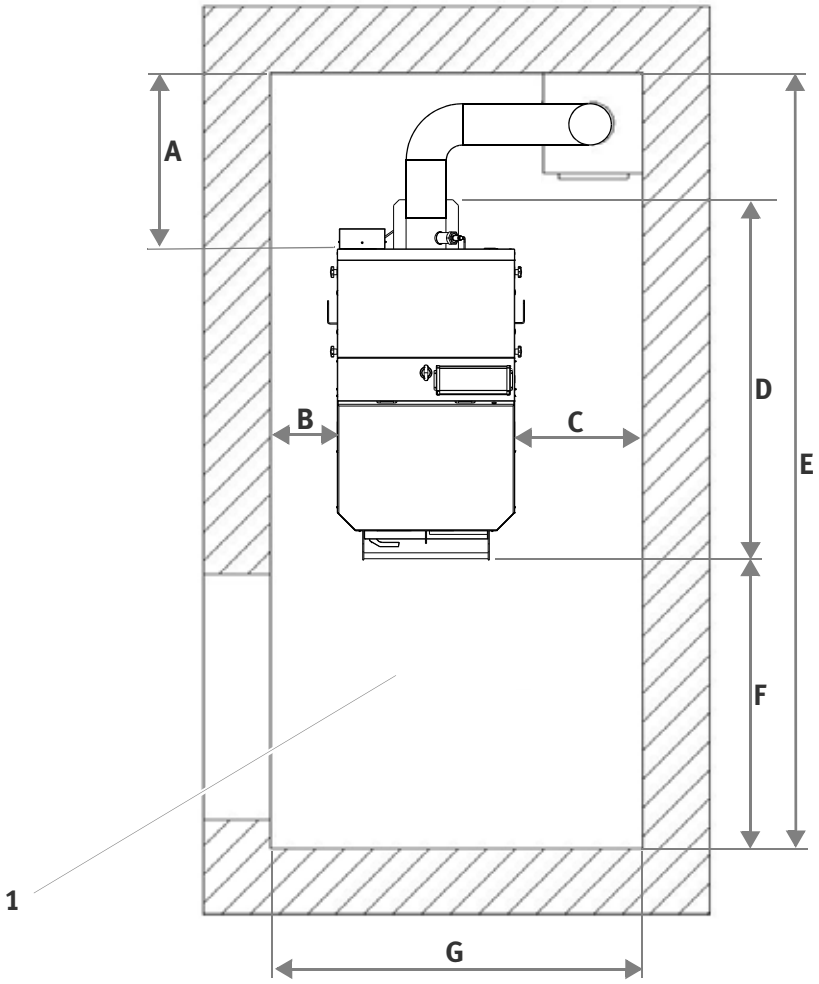


Figure 3/6 - Space and dimensional requirements

1 Boiler room

A) Min. 400 mm

B) Min. 200 mm (or 800 mm)

C) Min. 800 mm (or 200 mm)

D) 1,606 mm

E) 2,800 mm

F) Min. 1,000 mm

G) Min. 1,800 mm

Room height

Min. required room height 2,000 mm, recommended 2,300 mm.

required for installation

Clearance dimensions: L x W x H: 1,470 mm x 800 mm x 1,374 mm

3.7 Connections

Chimney

The benefits of the HDG Euro V3.0 with HDG Lambda Control 1 can only be enjoyed if all of the prerequisites for good combustion are ensured. The heating system and chimney form a single functional unit and must be adapted to one another in order to guarantee fault-free and economical operation.

The boiler can be operated with a partial load, in these circumstances the flue temperature may be below 100 °C. The chimney should be constructed whereever possible to operate with low flue temperatures.

Another essential criterion is to achieve the correct working pressure (chimney draught).

This depends on three major factors.

Chimney characteristics

The requirements for maximising the chimney draught are:

- Good thermal insulation
  - This is to avoid the flue gasses cooling down too quickly.
- A smooth inner surface
  - This is to reduce the flow resistance.
- A well sealed chimney
  - This is to avoid outside air leaking in. Outside air will speed up the cooling of the flue gases.

Chimney installations should conform to requirements in building regulations approved document J and standards referred to in document J.

Insulated chimneys of twin or multi wall prefabricated construction utilising ceramic or stainless steel inner walls are suitable or use when correctly calculated and installed.

Uninsulated chimneys made of bricks or similar material and are unsuitable.

If existing brick/stone or clay lined flues are to be utilized, they must be at least lined with a flexible liner suitable for solid fuel and insulated.

Free-standing chimneys require particularly good insulation.

BS EN 13384-1 “Thermal and fluid dynamic calculation methods” should also be observed with regard to chimney characteristics.

We would recommend that all chimney installations are calculated to ensure correct flue installation. Many flue manufactures offer this service.

Chimney dimensions

The system may only be connected to a chimney which has been correctly dimensioned and taking into account of the fuel planned and of the expected load, and it must meet local and national building regulations (BS EN 13384-1 “Thermal and fluid dynamic calculation methods”).

A chimney can only be designed when the local circumstances are understood. This includes taking into account the following factors:

- The location of the house
  - Hillside situation
  - Wind direction
- Location of the chimney in the roof
  - Detailed information of flue termination is given in Building regulation approved document J.
- The effective height of a chimney is measured from the entrance into the flue to the end of the chimney.
- The chimney needs to be of sufficient height to achieve the required negative pressure in the flue system. Before installation a chimney calculation is required to ensure correct operation. Failure to provide correct flue conditions will result in poor performance and/or the ability for the appliance to operate.

Chimney Draught Stabilization

Control of draught within a chimney system is important. It is recommended that in all installations a draught control stabilizer is fitted.

The flue needs to operate on both a mild and cold day where the density differences between the atmosphere and the flue gasses are greater. Mix this with a strong wind to our cold day the result would be far too much flue draught. The device for sorting out this is called a “barometric damper” or “flue stabilizer”, which can be fitted to the flue. It consists of a hinged flap with the hinge point above the centre point so the flap always tends to adopt the closed position. As the air pressure within the flue falls, the air on the outer side of the flap pushes the flap open, spilling air into the flue way, this immediately reduces the excessive air flow and because the air allowed into the flue is relatively cold slows the flue’s thermally induced flow. An adjustable counterbalance weight allows the flap to be held closed until the necessary pressure difference has been reached.

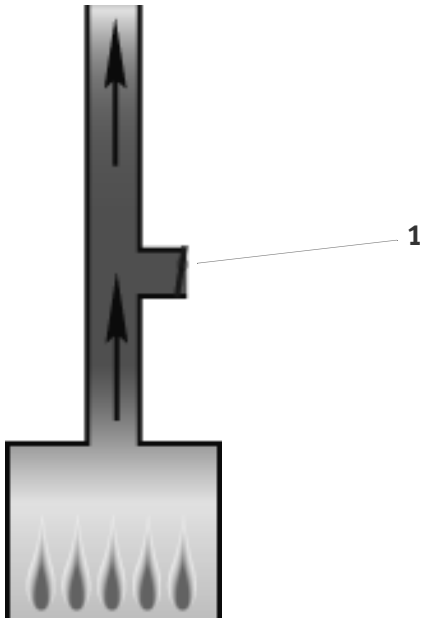


Figure 3/7 - Stabilizer closed

With the draught pressure below its set point the stabilizer (1) remains closed.

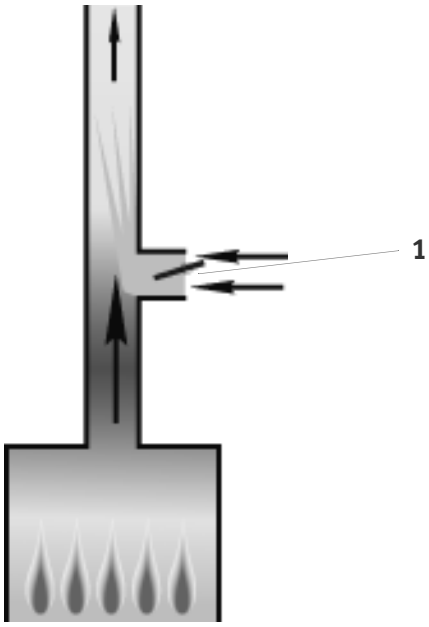


Figure 3/8 - Flap opens

When the draught pressure exceeds its maximum the flap (1) opens to spill in cool air

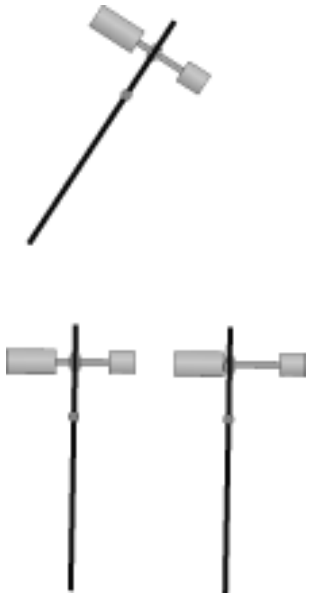


Figure 3/9 - Adjustable counter

The adjustable counter balance allows the damper to be set correctly for a wide range of flues.

A range of draught stabilizers of multiple sizes are available from HDG Bavaria.

Electrical system

The EC 73/ 23/EEC - L 77/73 (low voltage guidelines) must be followed for the electrical connections to the system.

✎ The required connection values are listed under 3.3 Technical data in this chapter.

Water

The heating system must be filled with water which conforms to BS 7593:2006. Code of practice for treatment of water in domestic hotwater and central heating systems or the VDI guidelines 2035 sheets 1 and 2 “Avoiding damage in hot water heating systems”.

Raising return temperature

The following equipment/specifications **must** be employed in order to prevent the temperature from dropping below the dew point: 3-way mixer with servo drive 230 V, runtime of 120 - 240 sec. and a circulation pump.

Recommendation

- **30 kW** nominal thermal output: Wita U55-32, 3-way mixer 1 1/4" BSP (DN 32)

- **40kW** nominal thermal output: Wita U 55-32, 3-way mixer 1 1/4" BSP (DN 32)
- **50 kW** nominal thermal output: Wita U 75-32, 3-way mixer 1 1/4" BSP (DN 32)

Pipe dimensions are to be adapted to meet site-specific requirements.

For HDG Euro V3.0 with HDG Lambda Control 1 series boilers, the installation of a hydraulic system is compulsory as specified by HDG Bavaria GmbH. Without a hydraulic system, the proper performance of the controller cannot be guaranteed. In general, operating temperatures which are too low significantly shorten the service life of the boiler. Water vapour contained in the flue gas could be released in the form of condensation if the temperature drops below the dew point, especially in the area around the water-cooled top heating surfaces. This condensation causes corrosion and reduces the service life of the boiler. The raising of the return temperature is controlled by the HDG Lambda Control 1 controller, which is included in the scope of delivery for the boiler.

The hydraulic system is to be installed in accordance with specific technical principles of the heating construction industry.

The hydraulic system is not prepared for the integration of a gravity brake.

Accumulator

The use of a accumulator

When calculating the thermal requirements of buildings, e.g. to BS EN 12831 “Method for calculating the normal heating load”, the lowest outdoor temperature for the climate zone concerned (e.g. -1 °C) is used. This condition only applies a few days per year so that the thermal performance of the heating system is overdesigned for most of the days when heating is needed.

As the boiler for this system is rated for a nominal load, the use of a accumulator is required.

The size of the accumulator depends on the nominal thermal power of the boiler, the thermal requirement of the building and the fuelling chamber volume of the boiler. As a rule of thumb, the following formula can be used to make a rough calculation based on the volume of the fuelling chamber:

V_{buffer}=fuelling chamber volume x 13

The product should be rounded up.

EXAMPLE CALCULATION

The HDG Euro V3.0 with HDG Lambda Control 1 has a fuelling chamber volume of 220 litres.

V_{buffer}= 220 litres x 13

(The factor is dependent on the fuel type. Spruce is assumed as the fuel for this example. For beech or wood briquettes, a factor of 15 should be used in the formula.)

V_{buffer}= 2,860 litres

When rounded up, the resulting volume should be at least 3,000 litres.

For a more exact calculation of the accumulator volume, refer to DIN EN 303-5 “Boilers for solid fuels, manually and automatically fed firings, nominal thermal output up to 300 kW.”

3.8 Hydraulic connection

There are hydraulic solutions for every application. Here you can see just two examples. Your local plant representative will be happy to help you.

HDG HYDRAULIC SYSTEM 3.0 WITH ACCUMULATOR, HOT WATER TANK AND ONE HEATING CIRCUIT AS A STAND-ALONE WOOD-FIRED SYSTEM

Intelligent buffer management according to the patented Logotherm principle (charging the buffer based on the reduction of boiler output, e.g. load-matching buffer)

Prioritised heating of the buffer or energy store, with load-dependent charging output (charging power automatically adjusted based on the preset target value for boiler temperature)

Residual heat extraction down to minimum boiler temperature (differential control)

Refill signal when buffer temperature drops below preset minimum value.

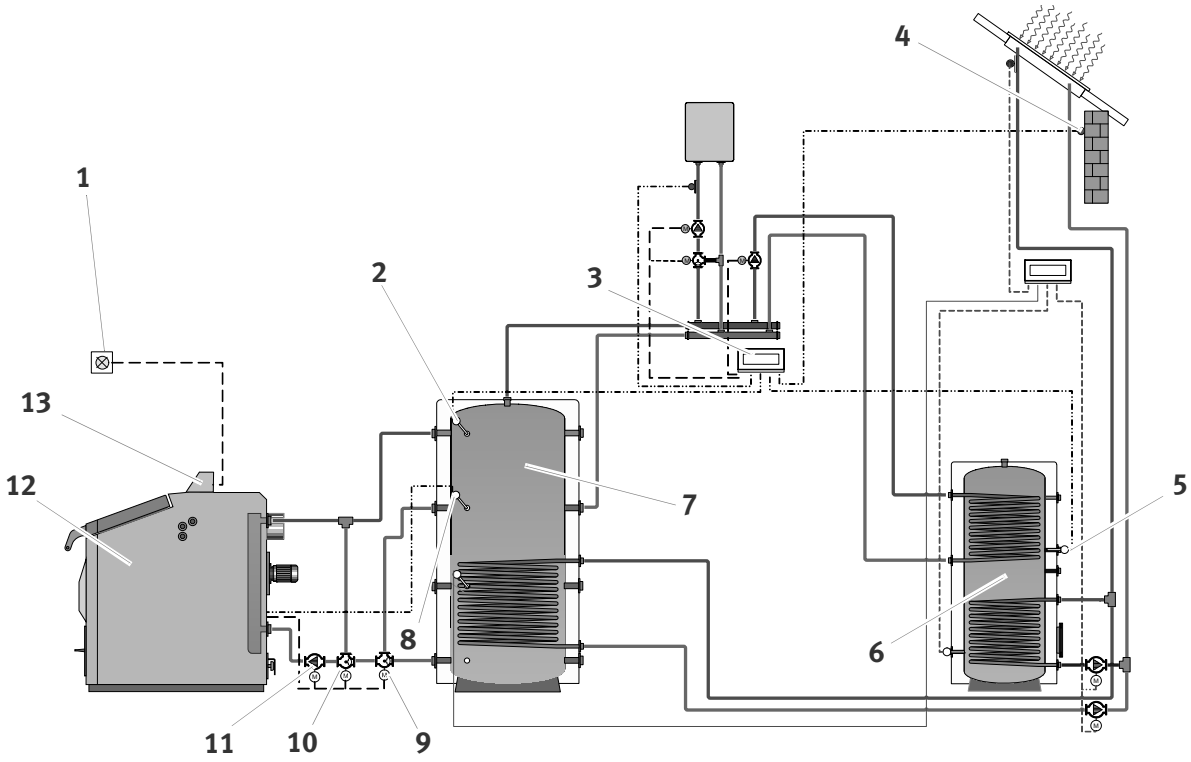


Figure 3/10 - Example 1: HDG hydraulic system 3.0

1 Refill signal H1
2 Boiler sensor KF
3 Heating circuit and hot water control
4 Outdoor temperature sensor AF
5 Hot water tank sensor BRF
6 Hot water tank
7 Accumulator (buffer)
8 Accumulator sensor SF
9 Buffer charging valve Y2
10 Return valve Y1
11 Primary pump M1
12 HDG Euro V3.0 with HDG Lambda Control 1
13 HDG Lambda Control 1

Functional description of hydraulic system 3.0

- When the solid fuel boiler switches to heat production mode, reload indicator H1 goes out.
- When the boiler temperature reaches 50˚C, the M1 primary pump switches on. The return temperature of the solid fuel burner is raised via return valve Y1.
- When the boiler temperature reaches 55 ˚C, return valve Y1 is opened (return temperature continues to be raised) and heat is transferred to the upper part of the accumulator.

- When the boiler temperature reaches 72 °C, the accumulator is switched on via buffer charging valve Y2 and charged accordingly, depending on the heat intake capacity and the preset target temperature for the boiler.
- When all the fuel has been consumed, heat production is switched off. Depending on the temperature differential (boiler temperature and buffer temperature), the remaining heat in the boiler is transferred to the accumulator. After the boiler temperature has dropped below the preset minimum value TK (adjusted in the installation menu), the extraction of residual heat from the boiler is stopped.
- The stored heat can now be transferred to the heating system and/or the hot water tank as needed.
- When the accumulator temperature has dropped below the preset minimum value TS min (adjusted in the installer menu), reload indicator H1 will light up.

Important information on charging the buffer!

- By setting the target boiler temperature (TK S) to 82 °C, the buffer will be charged at the same time as heat is transferred to the HDG Euro. This means that boiler output will only be reduced after the buffer has been completely charged.
- By setting the target boiler temperature (TK S) to 78 °C, charging will begin only after the heating system no longer requires the partial load from the boiler. Charging capacity is derived by subtracting the heat transfer load for the heating system from the partial boiler load.

HDG hydraulic system 3.1 with accumulator, hot water tank and an additional oil or gas boiler

Incorporate the potential-free switching contact of the HDG Lambda Control 1.

(WK - RK) / (WK = root contact / RK = break contact) Burner is initiated if the boiler is in heat production OFF mode and TS l is lower than TS min.

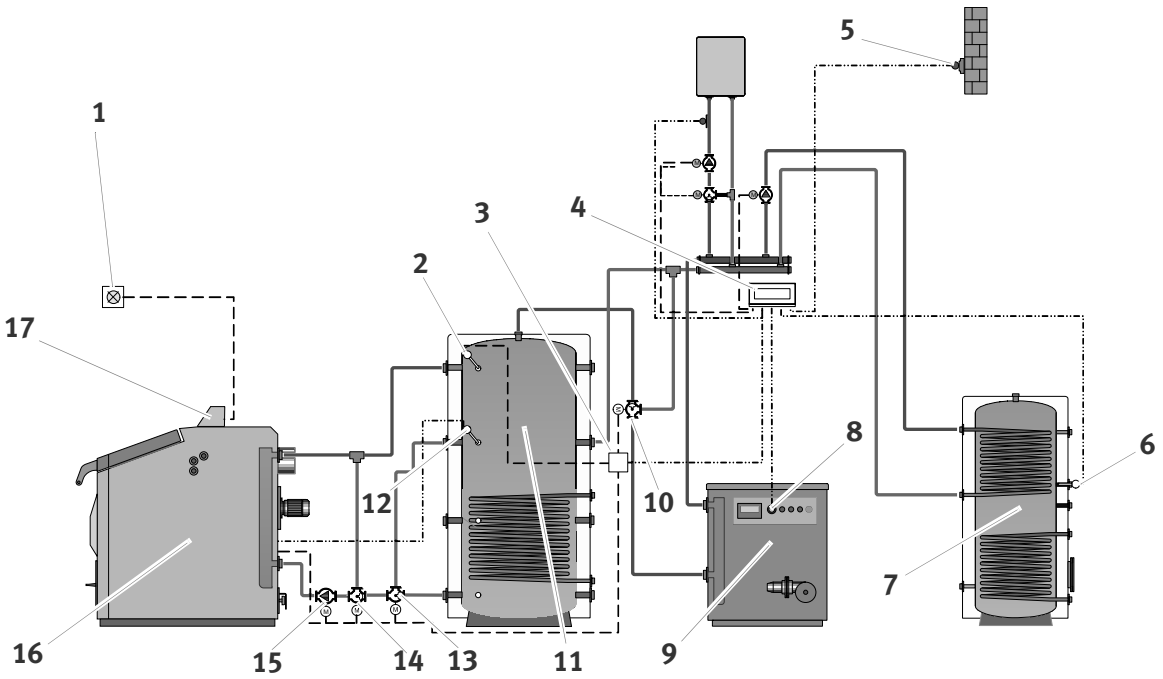


Figure 3/11 - Example 2: HDG hydraulic system 3.1

1 Refill signal H1
2 Boiler sensor KF
3 Prewired contactor ÖKU 3.1
4 Heating circuit and hot water control
5 Outdoor temperature sensor AF
6 Hot water tank sensor BRF
7 Hot water tank
8 Boiler sensor 1 KF1
9 Oil or gas boiler
10 Change-over valve Y3
11 Accumulator (buffer)
12 Accumulator sensor SF
13 Buffer charging valve Y2
14 Return valve Y1
15 Primary pump M1
16 HDG Euro V3.0 with HDG Lambda Control 1
17 HDG Lambda Control 1

Functional description of hydraulic system 3.1

- When the solid fuel boiler switches to heat production mode, reload indicator H1 goes out.
- When the boiler temperature reaches 50 °C, the M1 primary pump switches on. The return temperature of the solid fuel burner is raised via return valve Y1.
- When the boiler temperature reaches 55 °C, return valve Y1 is opened (return temperature continues to be raised) and heat is transferred to the upper part of the accumulator.
- When the boiler temperature reaches 72 °C, the accumulator is switched on via charging valve Y2 and charged accordingly, depending on the heat intake capacity and the preset target temperature for the boiler.
- When all the fuel has been consumed, heat production is switched off. Depending on the temperature differential (boiler temperature and buffer temperature), the remaining heat in the boiler is transferred to the accumulator. After the boiler temperature has dropped below the preset minimum value TK (adjusted in the installer menu), the extraction of residual heat from the boiler is stopped.
- The stored heat can now be transferred to the heating system and/or the hot water tank as needed.
- When the accumulator temperature has dropped below the preset minimum value TS min, the change-over contact is triggered. The ÖKU 3.1 is activated. Change-over valve Y3 is closed and the accumulator is bypassed in the heating circuit. Boiler sensor KF2 in the accumulator is bypassed and boiler sensor KF 1 in the oil boiler is switched on. The oil/gas burner phase is patched through and the oil/gas burner takes over the production of heat.

4 Installing the HDG Euro

4.1 Requirements

The heating system will initially be commissioned by specialists from HDG Bavaria or from an authorised HDG partner and a qualified electrician.

Danger!

Material damage and injury due to incorrect installation.

Installing the system requires comprehensive specialist knowledge. If installed by untrained persons, the heating system can be damaged and persons may be injured due to subsequent damage.

Only allow authorised specialists to perform the installation.

Danger!

Danger from electrical current or voltage!

Switch off the power supply and isolate the mains cable to the heating system during the installation.

Caution!

Danger from suspended loads!

Working in areas marked with this symbol can lead to serious injuries or to extensive material damage.

4.2 Specification of delivery

The heating system is delivered with the following components on pallets:

Scope of delivery for HDG Euro V3.0 with HDG Lambda Control 1

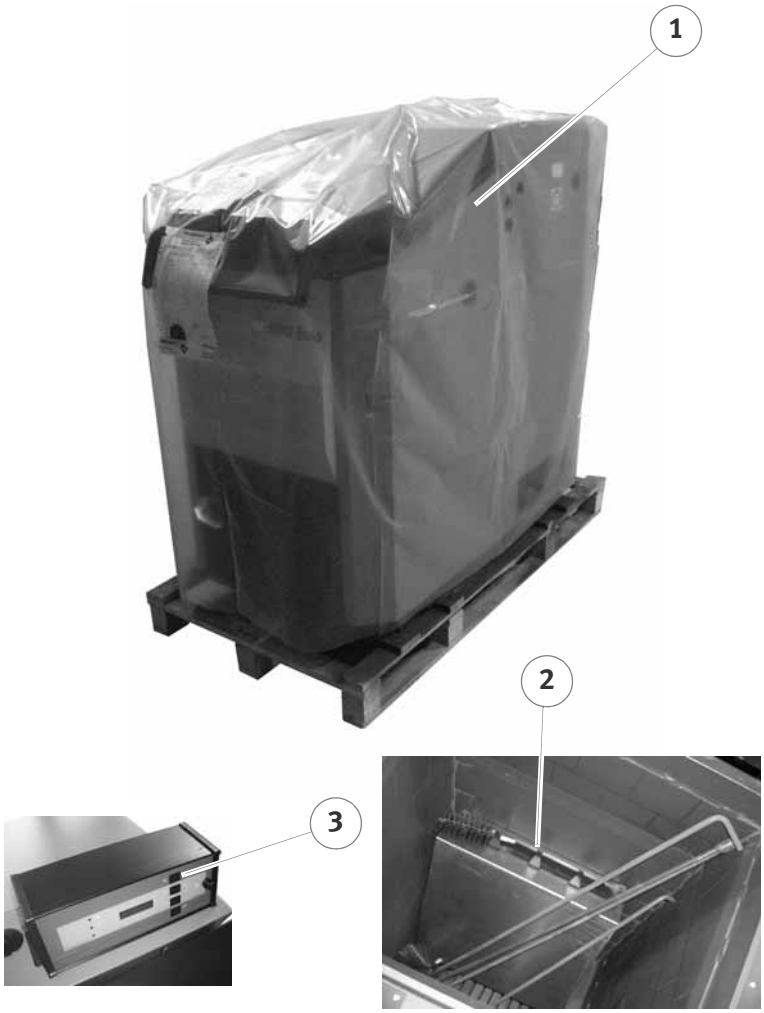


Figure 4/1 - Scope of delivery for HDG Euro V3.0 with HDG Lambda Control 1

1 HDG Euro V3.0 with HDG Lambda Control 1, boiler cladding (preassembled)

2 Included cleaning tools can be found in the fuelling chamber

3 HDG Lambda Control 1 boiler controller

4.3 Installing the HDG Euro V3.0 with HDG Lambda Control 1

Installing the boiler

Transporting with a crane

Caution!

Danger from suspended loads.

The boiler weighs over 979 kg. If the boiler is dropped during transport, people can be seriously injured and the boiler can be damaged.

Make sure that you use appropriate lifting gear when installing the boiler.

Figure 4/2 - Transporting with a crane

1. Remove the packaging from the boiler.
2. Attach suitable lifting equipment to the eyebolt (1).

✓ The boiler can now be moved with a crane.

Setting up the HDG Euro V3.0 with HDG Lambda Control 1

Caution!

Hand injuries

Working in areas marked with this symbol can lead to hand injuries.

1. Loosen the M8 hexagon head nuts (2), with which the boiler is fixed to the pallet with a SW 13 spanner.

Figure 4/3 - Transporting with a pallet truck

2. Lift up the boiler (1).
3. Remove the pallet (3).
4. Place metal sheeting in the appropriate locations underneath the base profile to compensate for uneven flooring and thus ensure the boiler is horizontal.

✓ The boiler is now in place in the boiler room.

Mounting the HDG Lambda Control 1

Make sure that the boiler is accessible and minimum distances to other objects are observed.

1. Remove the upper cladding (1) from the boiler by lifting it straight up.

Figure 4/4 - Mounting the HDG Lambda Control 1

2. Unscrew the sheet metal screws with a Phillips-head screwdriver and remove the cover plate from the board (1).

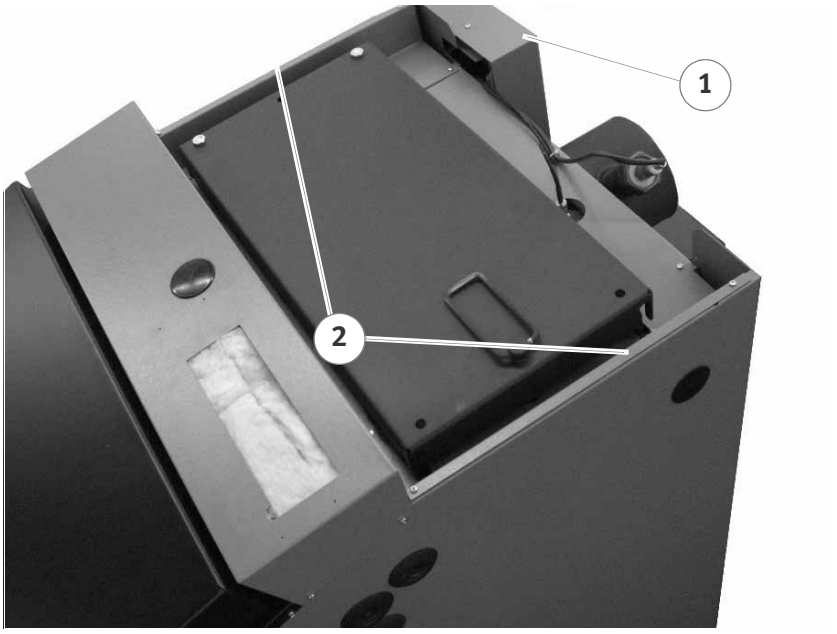


Figure 4/5 - Mounting the HDG Lambda Control 1

3. Unscrew the sheet metal screws with a screwdriver and take off the cover plate (2) upwards from the cladding.

4. Unscrew the screws of the control panel (1) and take it off upwards.
5. Remove the cap (2).

Figure 4/6 - Mounting the HDG Lambda Control 1

6. Take the cable tree (4) for the HDG Lambda Control 1 from the accessories package.

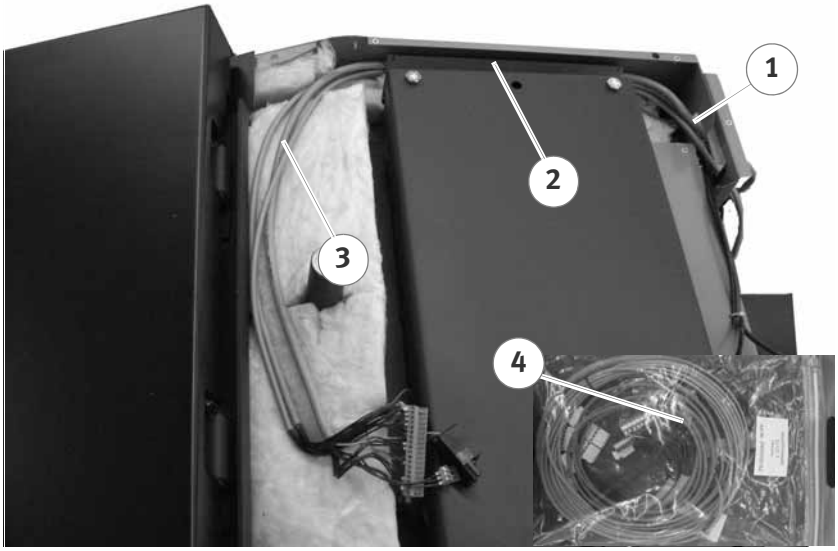


Figure 4/7 - Mounting the HDG Lambda Control 1

7. Lay the cable tree (3) as shown in Figure 4/7 - Mounting the HDG Lambda Control 1, in the cable channel (2) and the cable inlet (1).

Please note the markings on the cable tree as to which side belongs to the controller and which to the terminal board.

8. Mount the control panel (1) and pull the cable tree into the opening (2).

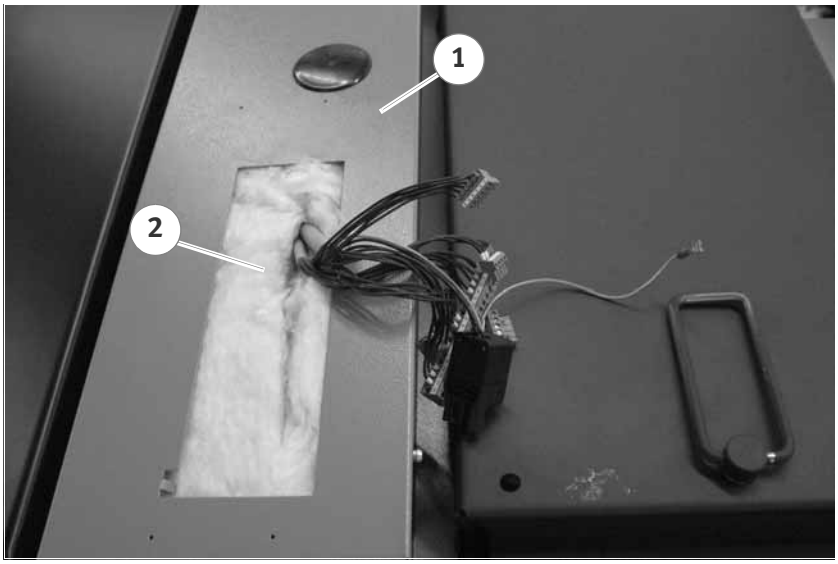


Figure 4/8 - Mounting the HDG Lambda Control 1

9. Place the HDG Lambda Control 1 (1) on the top cleaning lid.

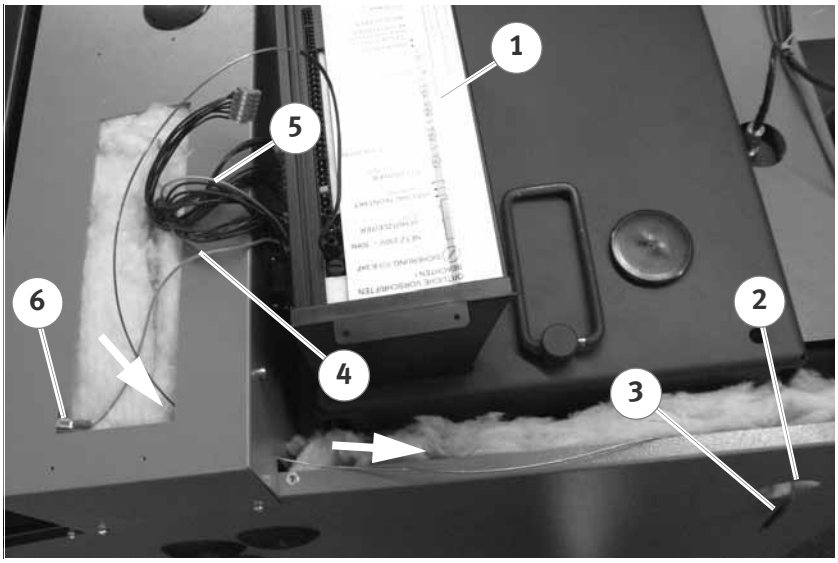


Figure 4/9 - Mounting the HDG Lambda Control 1

10. Plug the earth cable (4) in the intended socket (6).
11. Connect the HDG Lambda Control 1 (1) with the cable tree (5).
12. Plug the sensor of the safety temperature limiter (STB) (3), as indicated by the arrows, through the opening of the control panel and guide the tube to the multiple immersion sleeve (2).

Make sure you do not kink the tube.

13. Remove the cable securing device (2) and guide the sensor of the STB into the immersion sleeve (1).

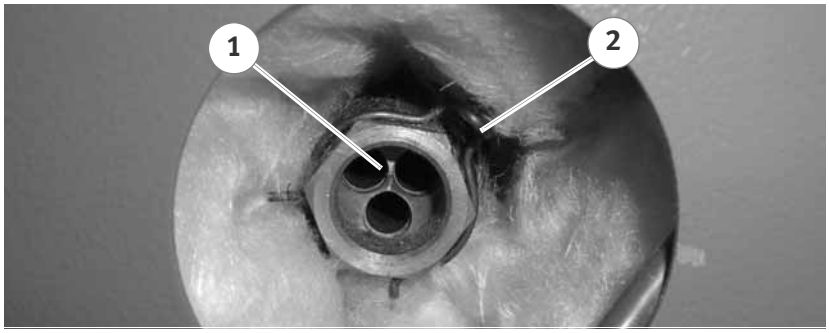


Figure 4/10 - Mounting the HDG Lambda Control 1

14. Lay the cable as shown in Figure 4/11 - Mounting the HDG Lambda Control 1, and connect the plug of the cable tree to the board.

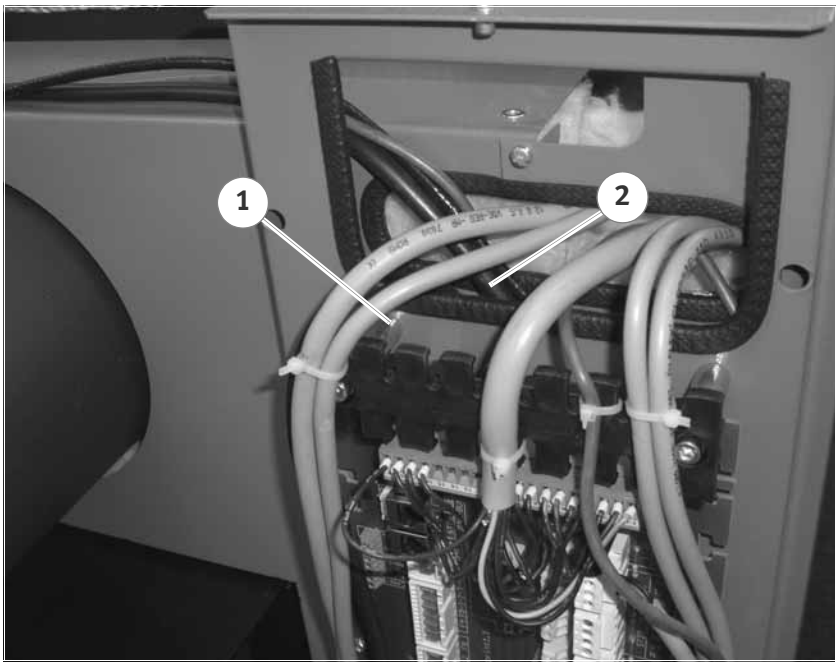


Figure 4/11 - Mounting the HDG Lambda Control 1

✎ See chapter “5 Appendix”, section “5.1 Circuit diagram on the plug board of the HDG Euro V3.0 with HDG Lambda Control 1” and section “5.2 Electrical connection HDG Lambda Control 1”.

15. Lay the cable of the boiler temperature sensor (3) as shown in Figure 4/12 - Mounting the HDG Lambda Control 1.

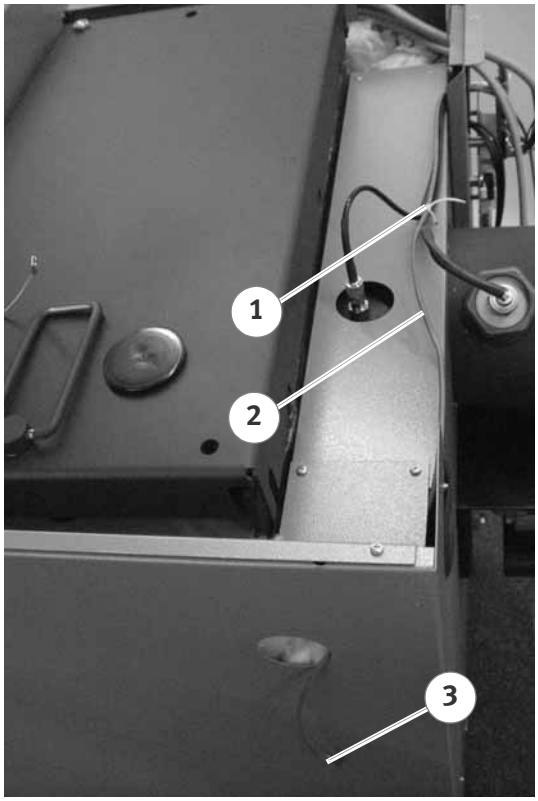


Figure 4/12 - Mounting the HDG Lambda Control 1

Caution!

Danger of fire

Do not lay the cable on hot surfaces.

16. Fix the cable (2) in position (1) with a suitable cable binder.

17. Guide the sensor into the multiple immersion sleeve (1) and attach the cable securing device (2) again.

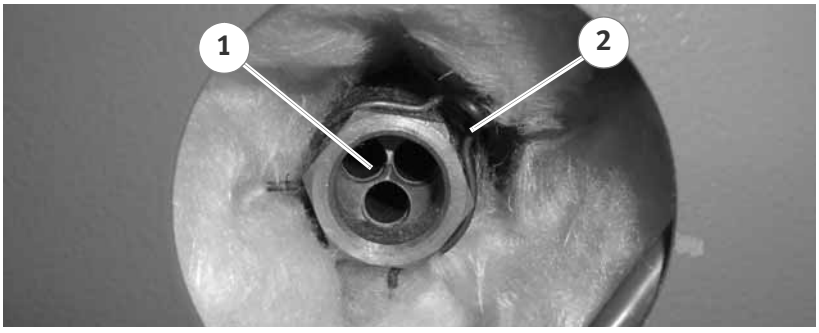


Figure 4/13 - Mounting the HDG Lambda Control 1

18. Attach the HDG Lambda Control 1 (1) with the supplied screws (3) to the control panel.

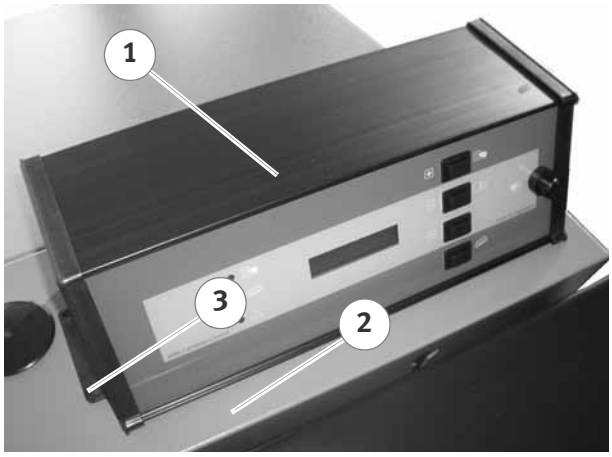


Figure 4/14 - Mounting the HDG Lambda Control 1

19. Attach all caps, cladding parts and covers again.

✓ The HDG Lambda Control 1 is now installed.

✓ The HDG Euro V3.0 with HDG Lambda Control 1 log wood boiler has been put in place.

Removing the transport safety device

1. Remove the upper cladding (1) from the shaped studs (3) by lifting it upwards.
2. Open the upper cleaning door (2).

Caution!

Hand injuries

Open the cleaning doors (2) to their stop limits to ensure it is held securely.

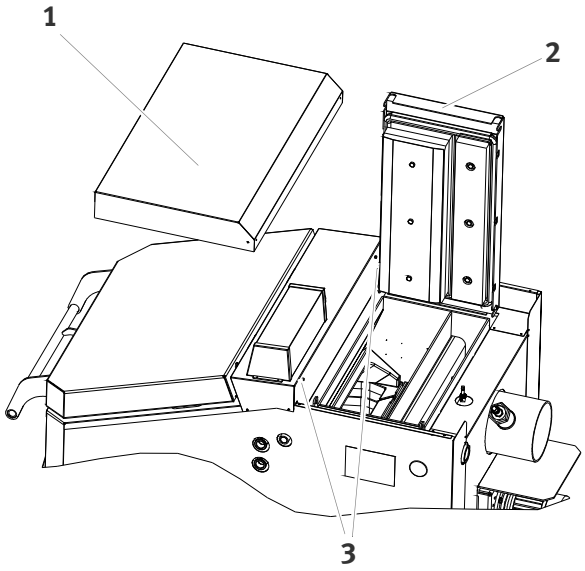


Figure 4/15 - Opening the cleaning doors

The inner transport safety device **must** be removed from the combustion chamber before commissioning. The outer transport safety device (3) may be left in the boiler.

✎ See “Figure 4/16 - Transport safety device”.

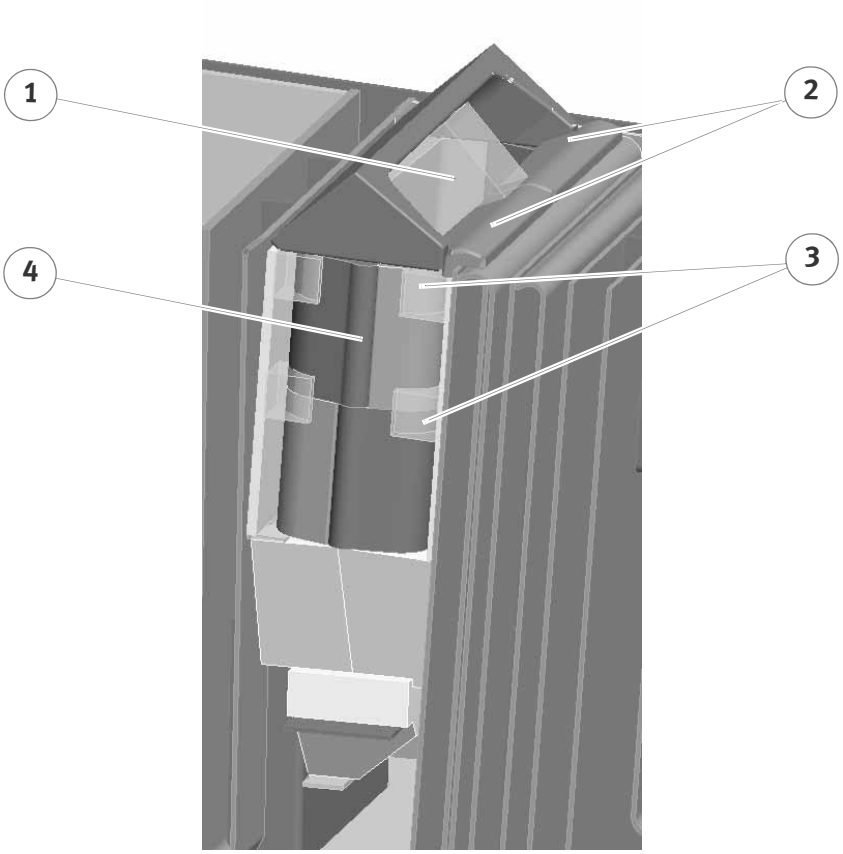


Figure 4/16 - Transport safety device

1 Inner transport safety device
2 Cap stone A and B
3 Outer transport safety device
4 Jointed combustion chamber

5. Hold the cap stones A and B (2) firmly.
6. Pull the transport safety device (1) out of the combustion chamber (4).
7. Close the boiler in the reverse sequence.

✓ The transport safety device has been removed.

The internal transport safety device (1) can be disposed of in the residual waste bin.

4.4 Connecting the chimney

1. The connection from the boiler to the chimney must conform to the current building regulations. All joints must be sealed to prevent air leakage into the flue system.
2. We recommend all installations include a draught stabilizer.
3. The chimney connection design must allow access to the boiler fan for servicing and its removal.
4. The connecting flue between the boiler and the flue should have a cleaning access door to allow cleaning and removable debris from the flue spigot.

✓ The boiler has been connected to the chimney.

4.5 Electrical system

All electrical connections must conform to the IEE wiring regulations.

✎ The technical details are described in section “3.3 Technical data” in chapter “3 Planning the HDG Euro”.

✎ The circuit diagram is in the chapter “5 Appendix”.

4.6 Water

The heating system must be filled with water which conforms to the UK guidelines “Avoiding damage in hot water heating systems”.

Before putting the system into operation, the pressure of the membrane expansion container must be adjusted for the conditions in the heating system and in the building.

Water installations must conform to current water regulations.

After putting the system into operation, heat up the system to the maximum boiler temperature and bleed air from the system again to make sure that there are no air pockets.

4.7 Connecting the thermal safety device

In accordance with BS EN 12828, heating systems must be equipped with safety devices to prevent the maximum operating temperature from being exceeded. The safety heat exchanger serves to protect the boiler against overheating and may **not** be used for other purposes (i.e. utilised as a normal heat exchanger). If the heat intake capacity is suddenly lost (e.g. the circulation pump for raising return temperature fails), heat production cannot be stopped as quickly as with an oil or gas boiler, so the resulting excess energy is dissipated

through the safety heat exchanger (as an alternative to fast regulation), which serves as a form of emergency cooling, when triggered by the thermal safety device (TAS for short).

However, the safety heat exchanger and thermal safety device can only serve their purpose if the following requirements have been met:

- Flow pressure of at least **two** bar must be available at the cold water inlet of the safety heat exchanger.

Mains-dependent, stand-alone supply systems are not a viable alternative.

- Water must be able to flow freely through the system.
- The conveying pressure of the chimney at the flue support on the boiler may not significantly exceed the prescribed value.

The TAS is to be inspected annually by a qualified technician to verify that it is functional.

The thermal safety device is to be installed according to guidelines from HDG Bavaria.

Caution!

In order to prevent leaks, avoid turning the connections of the safety heat exchanger in an anticlockwise direction when installing the thermal safety device.

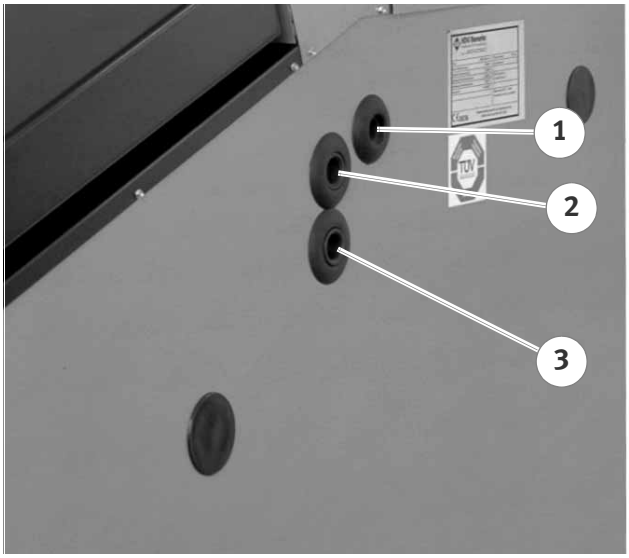


Figure 4/17 - Installing the thermal safety device

1 Connection bushing for the immersion sleeve of the TAS, DN 15 internal thread
2 Safety heat exchanger cold water inlet DN 20 internal thread
3 Safety heat exchanger cold water outlet DN 20 internal thread
4 Thermal safety device (TAS)

5 Runoff connection to drainage system

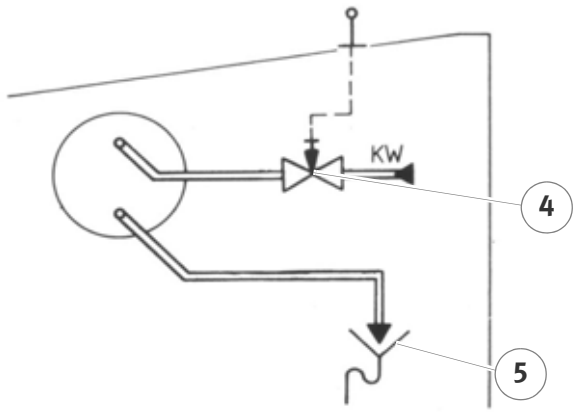


Figure 4/18 - Installing the thermal safety device

4.8 Starting the system

The heating system will initially be commissioned by specialists from HDG Bavaria or from an authorised HDG partner.

The commissioning includes an introduction to the operation and maintenance of the heating system as well as the taking of measurements on the system in terms of exhaust emissions values and firing performance.

Danger!

Material damage and injury due to incorrect commissioning.

Commissioning the system requires comprehensive specialist knowledge. If this commissioning is done by an untrained person, the heating system can be damaged.

Only allow authorised specialists to perform the commissioning.

✎ The initial commissioning is described in the operating instructions in chapter 7 “ Commissioning the heating system”.

5 Appendix

5.1 Circuit diagram on the plug board of the HDG Euro V3.0 with HDG Lambda Control 1

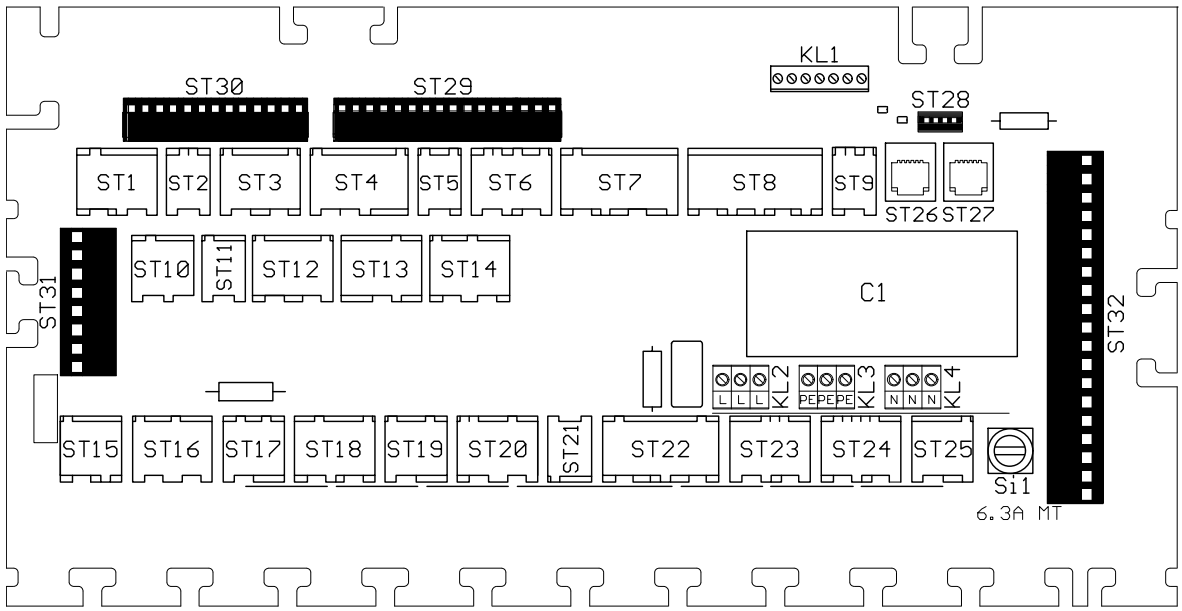


Figure 5/1 - Circuit diagram of the plug board

Plug	Description
ST3	Boiler temperature sensor
ST8	Buffer or return flow sensor (SF)
ST 15	Charging pump, (primary pump)
ST 16	Flue fan
ST22	Refill signal, break contact, selection output 3 (WA 3)
ST23	Buffer charging valve Y2, selection output 4 (WA 4)
ST 24	Return valve Y1, selection output 5 (WA 5)
ST 25	Mains power supply 230 V~

Table 5/1 - Circuit diagram

Main switch

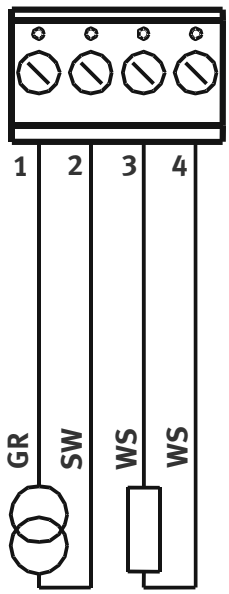
There is no device or main switch on the boiler or the HDG Lambda Control 1 controller. The customer can have a switch installed, or switch off the circuit breaker in the mains distribution box of the building when it is necessary to de-energise the system.

✎ Also see section 4.2 “Switching on the heating system” in chapter 4 “Using the heating system”.

5.2 Electrical connection HDG Lambda Control 1

Terminal diagram

ST1: O2 sensor LSM 11



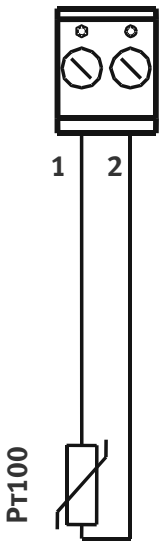
- KL1: minus signal (grey)
- KL2: plus signal (black)
- KL3: heating 12 V ~ (white)
- Kl4: heating 12 V ~ (white)

No polarity for sensor heating.

- Tighten the sensor securely.
- Do not extend the connection cable.
- There may be no electrical connection between the sensor housing and the boiler, or the boiler cladding.
- Make sure the doors and lid seal properly.
- Before commissioning the system, conduct the “O2 sensor test” (component test).

Figure 5/2 - O2 sensor terminal diagram

ST2: Flue gas sensor AGF Pt100



- KL1: flue gas sensor AGF Pt 100
- KL2: flue gas sensor AGF Pt 100

T=0 ˚C R=100 Ohm

T=20 ˚C R=107.8 Ohm

T=100 ˚C R=138.5 Ohm

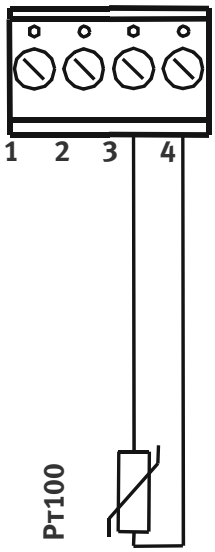
T=200 ˚C R=175.8 Ohm

No polarity.

- Use a bayonet holder to fasten the flue gas sensor inside the flue.
- Do not extend the cable for the flue gas sensor.

Figure 5/3 - Terminal diagram for flue gas sensor

ST3: Boiler sensor KF Pt 100



- KL1: unused
- KL2: unused
- KL3: boiler sensor Pt 100
- KL4: boiler sensor Pt 100

T=0 °C R=100 Ohm

T=20 °C R=107.8 Ohm

T=80 °C R=130.9 Ohm

No polarity.

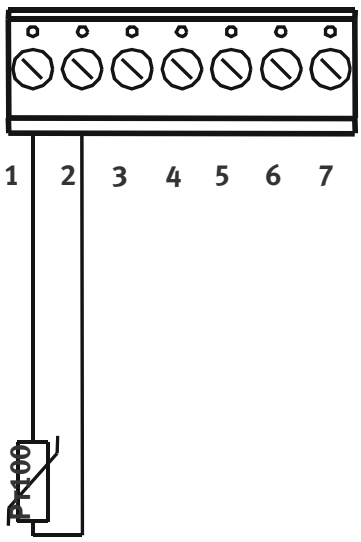
– Using the coupling spring and heat-conducting gel, slide the boiler and STB sensors into the boiler immersion bushing and secure them against unintentional removal with the holding clamp.

– Do not crimp the tube for the STB.

– Do not extend the connection cable from the boiler sensor.

Figure 5/4 - Terminal diagram for boiler sensor

ST8: Buffer or return flow sensor



- KL1 and KL2: buffer or return flow sensor F4 Pt 100
- KL3 to KL7: unused

T=0 °C R=100 Ohm

T=20 °C R=107.8 Ohm

T=80 °C R=130.9 Ohm

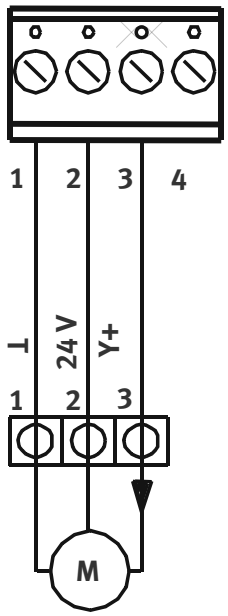
No polarity.

– Using the coupling spring and heat-conducting gel, slide the buffer sensor into the immersion bushing and secure it against unintentional removal with the holding clamp.

– For system 5: return flow sensor instead of buffer sensor.

Figure 5/5 - Terminal diagram for buffer or return flow sensor

ST12: V1 servo drive



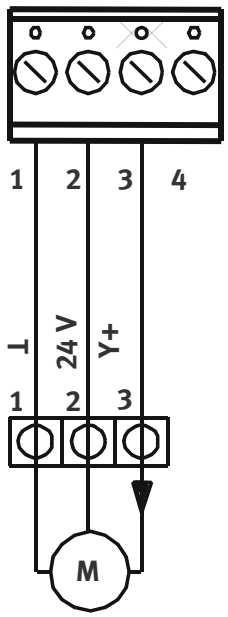
- KL1: supply
- KL2: 24V~ supply
- KL3: input signal Y+ (2-10V)
- KL4: unused

Make sure connections are made properly.

– Use flexible, silicon sheathed wires with conductor cross section of 0.75 mm².

Figure 5/6 - Terminal diagram for V1 servo drive

ST13: V2 servo drive



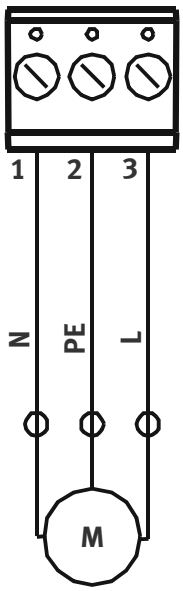
- KL1: supply
- KL2: 24V~ supply
- KL3: input signal Y+ (2-10V)
- KL4: unused

Make sure connections are made properly.

– Use flexible, silicon sheathed wires with conductor cross section of 0.75 mm².

Figure 5/7 - Terminal diagram for V2 servo drive

ST15: Charging pump (primary pump)



- KL1: N charging pump
- KL2: PE charging pump
- KL3: L charging pump

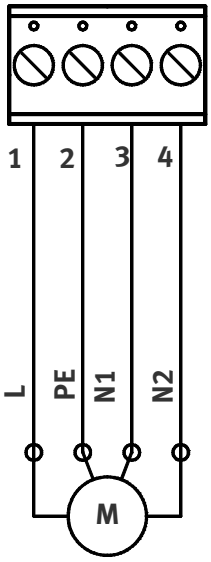
Make sure connections are made properly.

– Use flexible wire with a conductor cross section of 0.75 mm².

PE = ⏚

Figure 5/8 - Charging pump terminal diagram (primary pump)

ST16: Suction draught ventilator



- KL1: L suction draught ventilator
- KL2: PE suction draught ventilator
- KL3: N1 suction draught ventilator (low rotational frequency)
- KL4: N2 suction draught ventilator (high rotational frequency)

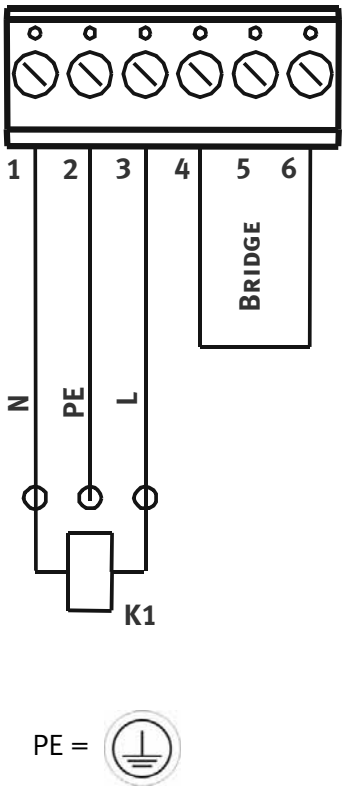
Make sure connections are made properly.

– Use flexible, silicon sheathed wires with conductor cross section of 0.75 mm².

PE = ⏚

Figure 5/9 - Terminal diagram for suction draught ventilator

ST22: BREAK CONTACT, SELECTION OUTPUT 3 (WA3)



- KL1: N auxiliary contactor
- KL2: PE auxiliary contactor (if needed)
- KL3: L auxiliary contactor
- KL4: WK-LC1
- KL5: unused
- KL6: L-Si (fused with Si 1 - 6.3A
- - 6.3A)

Make sure connections are made properly.

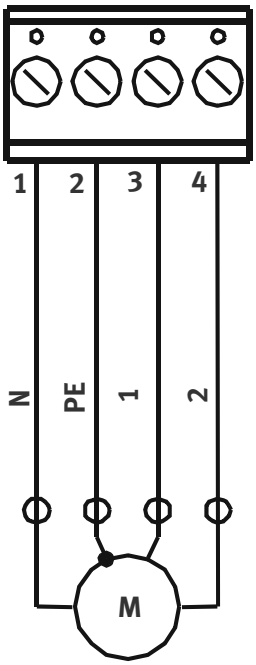
– Use flexible wire with a conductor cross section of 0.75 mm².

– Safety temperature limiter (STB) and boiler thermostat must be installed in the oil/gas boiler.

– K1 ... contactor

Figure 5/10 - Break contact terminal diagram

ST23: BUFFER CHARGING VALVE Y2 (WA4)



- KL1: N buffer charging valve
- KL2: PE buffer charging valve
- KL3: Y1 buffer charging valve
- KL4: Y2 buffer charging valve
- 1 ... entire buffer switched on
- 2 ... top section of buffer switched on

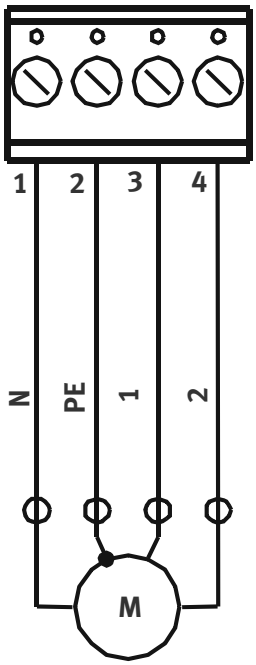
Make sure connections are made properly.

– Use flexible wire with a conductor cross section of 0.75 mm².

PE =

Figure 5/11 - Terminal diagram for buffer charging valve

ST24: Return valve Y1 (WA5)



- KL1: N return valve
- KL2: PE return valve
- KL3: Y1 return valve
- KL4: Y2 return valve
- 1 ... heat extraction ON
- 2 ... heat extraction OFF

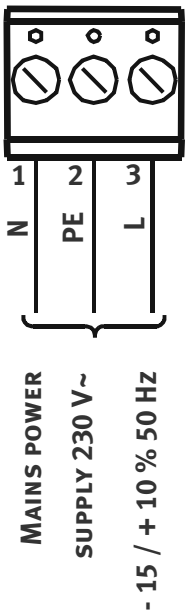
Make sure connections are made properly.

– Use flexible wire with a conductor cross section of 0.75 mm².

PE = ⏚

Figure 5/12 - Return valve terminal diagram

ST25: Mains power supply 230 V~



- KL1: N mains power supply
- KL2: PE mains power supply
- KL3: L mains power supply
- Max. current-carrying capacity of the
- Plug: I_{max}=10 A

Make sure connections are made properly.

– Mains power supply fuse/ breaker 10 A max.

– Use flexible wire with a conductor cross section of 1.5 mm².

PE = ⏚

Figure 5/13 - Terminal diagram for mains power supply

5.3 HDG Öku 3.1 circuit diagram for controlling an oil or gas boiler

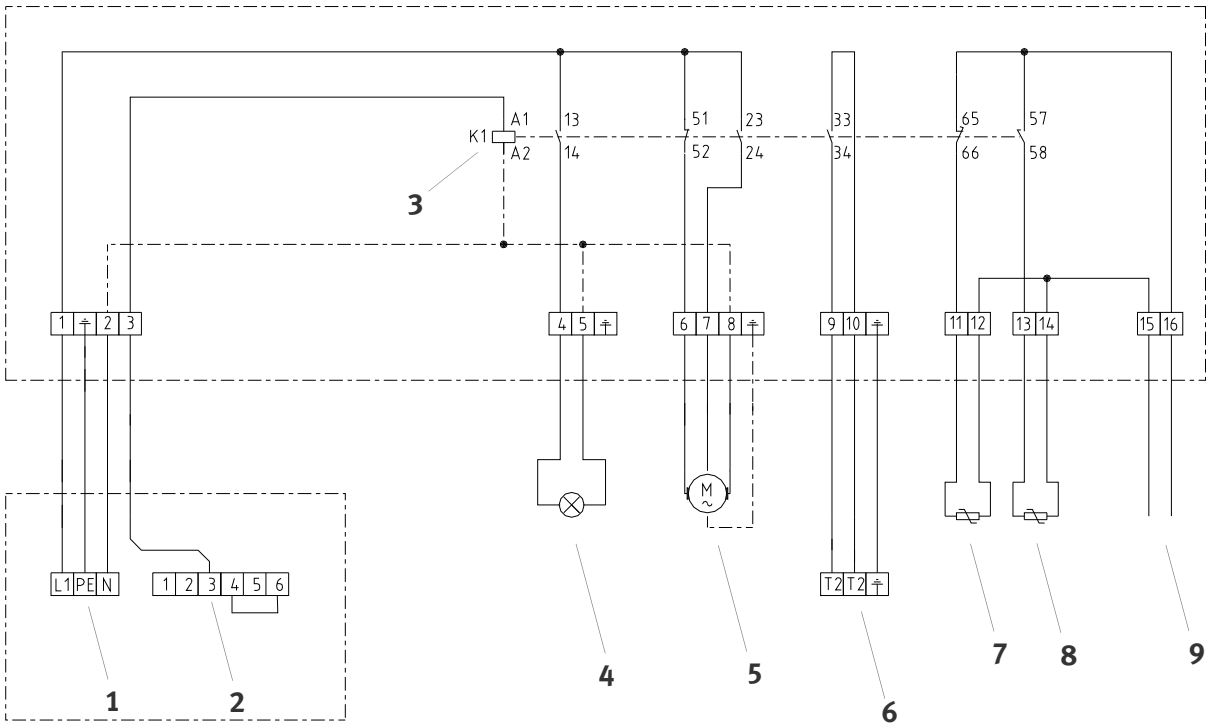


Figure 5/14 - HDG Öku 3.1 circuit diagram for controlling an oil or gas boiler

1 Plug 25

2 Plug 22

3 Contactor, type: DIL ER-31 11D DIL E

4 Refill signal, (e.g. for customer installed lamp)

5 Mixer Y3

6 Phase T2 of the oil/gas boiler

7 Boiler temperature sensor 2 in the accumulator; additional sensor suitable for heating circuit and hot water control HDG A3D, HDG E6 (HDG order no.: 1550001619) or customer's existing heating circuit control for oil/gas boiler

8 Boiler temperature sensor 1 in the customer's existing oil/gas boiler suitable for heating circuit and hot water control HDG A3D, HDG E6 or customer's existing heating circuit control for oil/gas boiler

9 Sensor cable to heating circuit controller of the oil/gas boiler (provided by the customer) if no HDG Bavaria controller with integrated HDG Öku 3.1 is in use.

NOTES

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