CONNECTIONS

KWB Easyfire

EF2

Table of Contents (Index)

Foreword

About this manual

This manual contains all the required information for connection by external specialists. The chapter sequence corresponds to the recommended workflow. For further queries please contact your sales partner or KWB Customer Service.

KWB – Kraft und Wärme aus Biomasse GmbH including its country representatives and authorised competence partners are hereinafter referred to as KWB.

Our objective is to constantly improve our products and manuals – we would appreciate your comments and suggestions.

You can find all contact data on the KWB home page www.kwb.net.

If you find any errors or mistakes, please let us know at: doku@kwb.at

Original manual – Subject to change. No responsibility accepted for errors and omissions!

Explanation of the Formatting

Work steps

We use different symbols for the preconditions, the actual work steps and the result:

↘ Precondition

⇢ Work step

↳ Result

Page texts

The keywords to the left of the text column assist you in immediately detecting the content of the text paragraph.

Cross references

A reference to another section of this document can be recognized with an arrow and the page number in brackets. Example: **About this manual [►6]**

Legal

Intellectual Property

When operating the contractual goods, the installation, operating and other technical regulations and instructions from KWB must be strictly observed and adhered to.

NOTE	**Warranty**
	↘ The manufacturer's KWB warranty specifies proper installation and commissioning of the system as a prerequisite. Defects and damage due to improper installation, commissioning and operation are excluded from the warranty!
	⇢ The manufacturer's instructions must be complied with to ensure proper system function. Knowledge of the manuals is a prerequisite.
	⇢ Use only original parts or parts that have been expressly approved by the manufacturer.
	⇢ If something is not clear, please look it up in this manual or contact the KWB customer service.

Liability / Warranty

Any change and / or modification of the contractual goods or in the operation of the contractual goods not expressly authorised by KWB in writing or their operation in conjunction with other devices or accessories the compatibility of which has not been expressly confirmed by KWB, any inappropriate operation/use (e.g. the use of fuels and/or water not in accordance with standards which do not correspond to VDI 2035 or ÖNORM H 5195-1; inappropriate and / or excessive use) leads to the exclusion of the warranty. Any liability or warranty for compatibility of the contractual goods with other products, systems, plants or parts, as well as the suitability thereof for a specific use shall be excluded unless expressly permitted in writing.

Intended use

KWB boilers heat water for central heating systems. The application, operation, maintenance and repair of KWB systems must, without exception, be performed as described in the instructions.

KWB dust filter separate dust.

Only the fuels specified in the Operating instructions in Section Intended fuels may be used without exception.

Any other use shall be deemed IMPROPER. The responsibility for the resultant damage shall lie with those who operate and use the system!

1 Safety

1.1 Please note

1.1.1 Grading of the safety instructions

In this documentation, warnings with the following hazard levels are used to indicate direct dangers and important safety regulations:

NOTE	**General information** We use this display to indicate and describe **important information**.
⚠ **CAUTION**	**Beginning hazard** We use this display to indicate and describe **beginning hazards**. If these stated hazards are **not observed**, **injuries, property damage and environmental damage** can occur.
⚠ **WARNING**	**Medium hazard** We use this display to indicate and describe hazards. If this warning is **not observed**, **severe or fatal injuries** can occur.
⚠ **DANGER**	**Serious hazard** We use this display to indicate and describe **hazards**. **If this warning is not observed, severe or fatal injuries occur!**

1.1.2 General safety instructions

- **Do not alter the system in any way!**
- Close all provided covers before you place the system into operation!
- Unplug the connector before you perform any service or open the control!
- Always disconnect the power supply to the boiler and conveyor system (main switch) before you enter the fuel storage room.

NOTE	**Proper installation by specialists** ↘ The entire installation, integration and commissioning of the heating system may only be carried out by expert specialists of KWB or their partners. ⇢ All the work must conform to the specifications stated in the KWB manuals and local regulations.

1.1.3 Comply with the safety instructions

NOTE	**Please comply with the safety instructions** Your system has been tested for safety and it satisfies the applicable standards, directives and regulations. Failure to comply with the safety instructions or improper use poses danger of material damage. In addition, failure to comply with the safety instructions or improper use also poses a life-threatening hazard!

1.1.4 Please read and follow the manual

NOTE	**Please read the instructions carefully before installation or commissioning!**
	Compliance with the instructions and proper installation or commissioning is a prerequisite for a warranty provided by KWB.
	⇢ If you are unsure about anything, please refer to the instructions or contact the KWB customer service.
	↳ You will find all instructions for our heating systems in the KWB PartnerNet: http://partnernet.kwb.net/

1.1.5 Qualification of the installation personnel

⚠ CAUTION	**Assembly and installation by unqualified personnel may lead to material damage and injuries!**
	↘ The following applies for assembly and installation:
	⇢ Comply with the directions and notes in the instructions.
	⇢ Have the work on the system only carried out by personnel with appropriate technical skills.

Assembly, installation, commissioning and maintenance must only be carried out by qualified persons:

- Heating engineers / building services engineers
- Electrical installation engineer
- KWB Customer Service

The installation personnel must have read and understood the directions in the documentation.

1.1.6 Protective equipment of the assembly personnel

To the extent necessary or required by regulations, personal protective equipment must be used. Such obligations may also refer to the use of hazardous materials, for example, or the wearing of personal protective equipment.

	During transport, installation and assembly: • Suitable work clothes • Protective gloves • Safety footwear (at least protection class S1P)

1.2 Pictograms used

The following command, prohibition and warning signs are used in the documentation and/or at the boiler.

According to the Machine Directive, signs attached directly at the danger location of the boiler warn of direct dangers or signal safety-relevant behaviours. These stickers must not be removed or covered up.

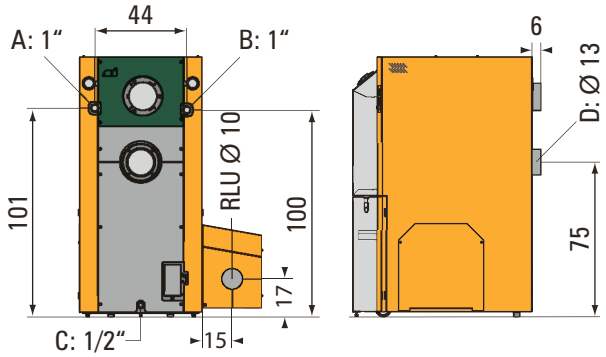
Command sign (safety colour blue)			
	General command signs		Use mask
	Follow instructions		Use welding mask
	Use hearing protection		Before maintenance and repair disconnect from mains
	Use eye protection		Check barrier
	Earth before use		Keep closed
	Disconnect plug from the mains!		Use gas detector
	Use foot protection		Continuous ventilation to the outside is required
	Use hand protection		Ventilation required
	Use protective clothing		Entry only with a second person on the outside! In the event of an accident first call for help!
	Use face guard		Only certified technicians
	Use head protection		Only certified electricians

Prohibition sign (safety colour red)			
	General prohibition signs		No access for persons with pace-makers or implanted defibrillators
	Unauthorized access prohibited		Reaching in prohibited
	Smoking is prohibited		Stepping on the surface is prohibited
	No open flames; Fire, open ignition sources and smoking are prohibited		

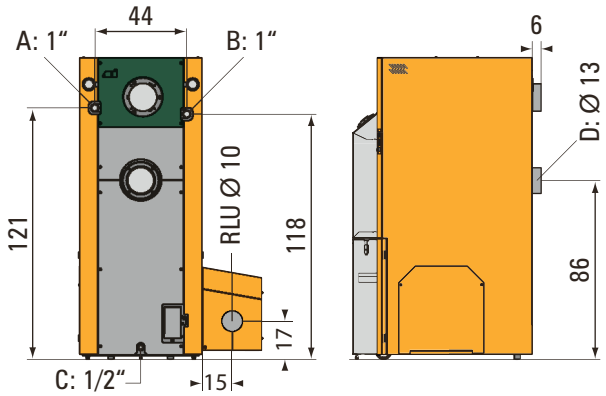
Warning signs (safety colour yellow)			
	General warning sign		Warning of automatic start-up
	Warning of explosive substances		Warning of danger of crushing
	Warning of obstructions on the ground		Warning of flammable substances
	Warning of danger of falling		Warning of sharp object
	Warning of low temperature / frost		Warning of hand injuries
	Warning of danger of slipping		Warning of rollers running in opposite direction
	Warning of electrical voltage		Warning of optical radiation
	Warning of suspended load		Warning of flammable materials
	Warning of hot surface		Warning of suffocation risk

2 Connection dimensions

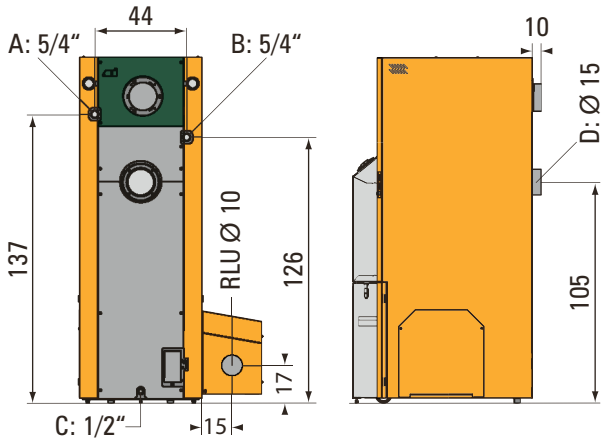
Type EF2 8-12 kW



Type EF2 15-22 kW

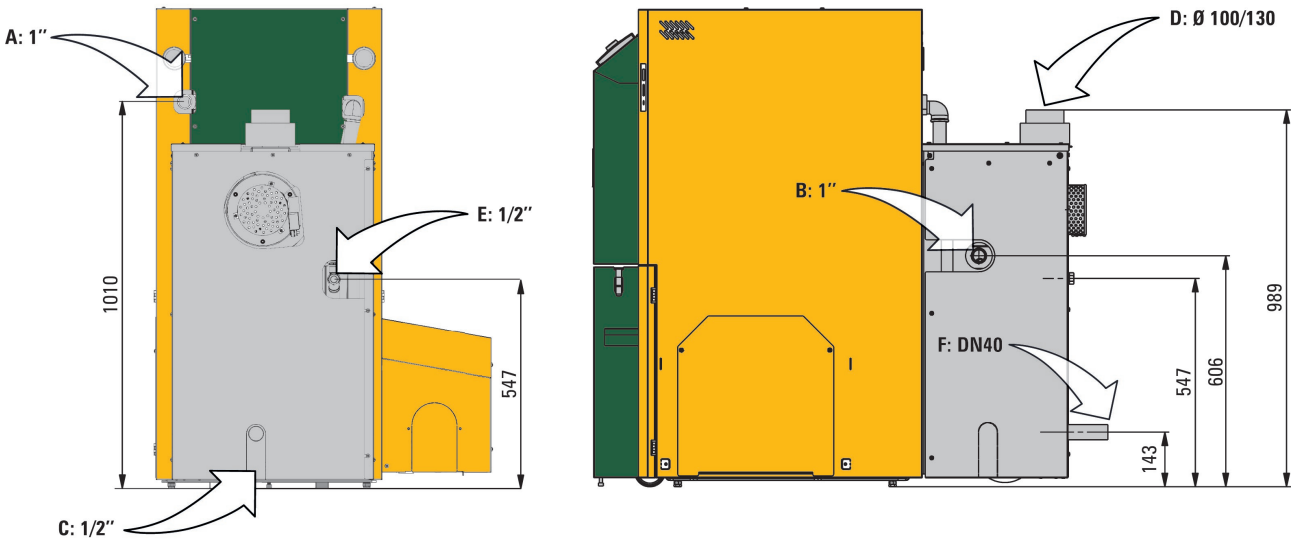


Type EF2 25-38 kW

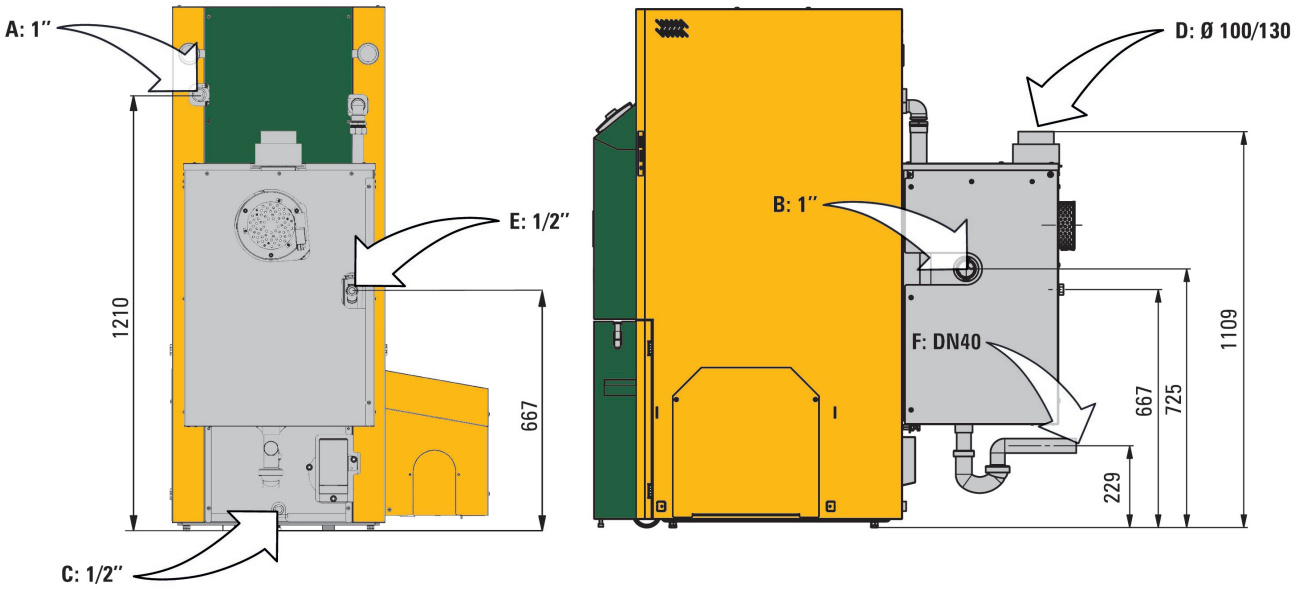


A	Forward flow	C	Boiler filling and emptying
B	Return flow	D	Exhaust pipe
[AAI]	Connection for ambient air-independent operation (outer diameter 10 cm)		

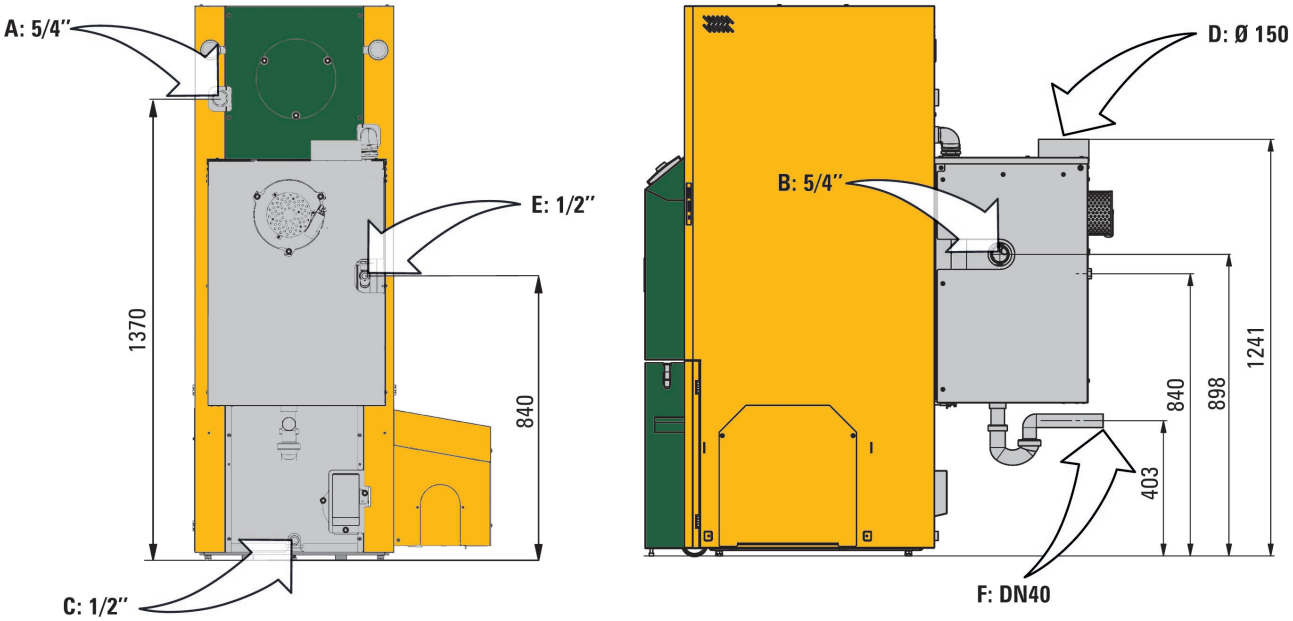
Type EF2 CC4 10-12 kW



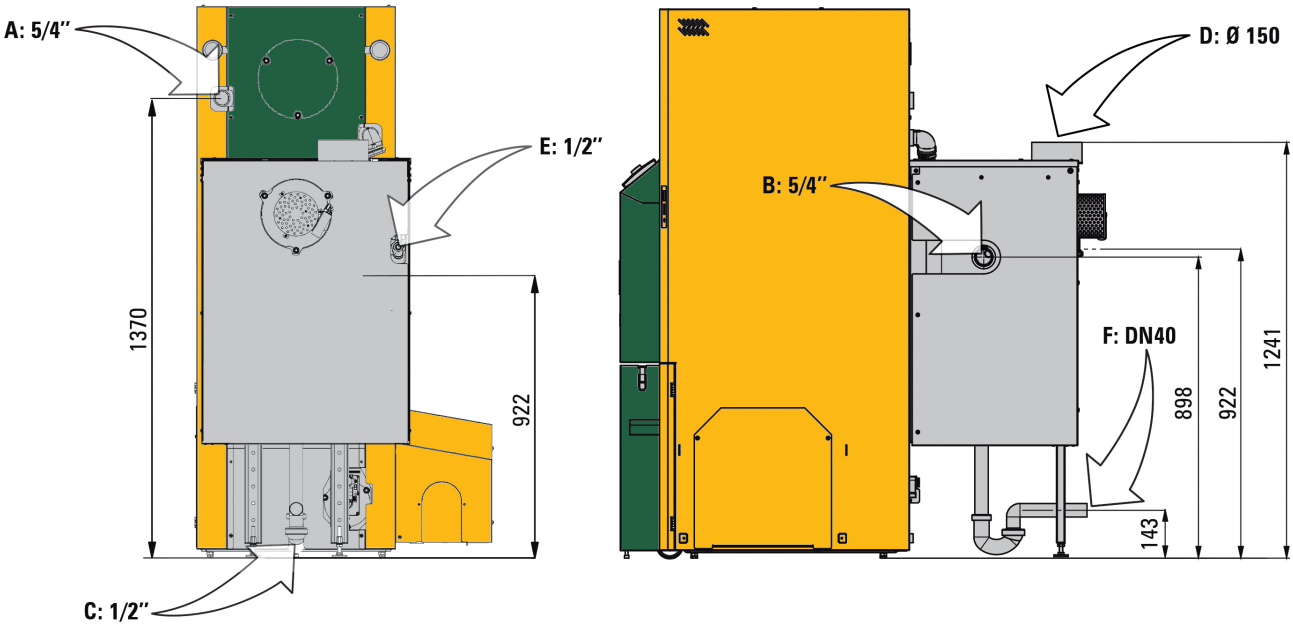
Type EF2 CC4 15-22 kW



Type EF2 CC4 25-35 kW



Type EF2 CC4 40 kW



A	Forward flow	D	Exhaust pipe
B	Return flow	E	Washing facility
C	Boiler filling and emptying	F	Condensate drain

3 Water

Important: The system and the boiler water must meet several requirements that reduce or prevent corrosion in the system for guarantee and warranty claims to remain valid.

Air-tight ⇢ The heating system must be configured as a closed circuit!

Standards ⇢ With respect to the condition of the fill water you must strictly comply with VDI 2035 and ÖNORM H 5195! (Italy: UNI 8065; Switzerland: SWKI BT 102-01)

Corrosion ⇢ Regarding corrosion, it is necessary to keep an eye on the water conductivity in addition to strictly keeping oxygen from entering into the system.

pH value ⇢ A pH-value between 8.2 and 10.0 should be targeted. If the heating water comes into contact with aluminium, a ph-value between 8.0 and 8.5 should be targeted.

Decoupling ⇢ Ensure the oxygen **im**permeability of the parts used for the acoustic transmission decoupler of the water connections!

Limiting thermostat ⇢ Protect plastic lines for underfloor heating or district heating pipes from excessive temperatures. Use a limiting thermostat for the circulation pumps.

Safety group ⇢ Always use a safety group.

Mud strainer ⇢ To prevent deposits caused by limescale and rust mud, we recommend the installation of a mud strainer in the return flow and a microbubble trap in the forward flow.

Buffer storage tank recommendation

KWB recommends load-balancing or buffer storage tanks for efficiency reasons, particularly when integrating solar systems or if very low continuous heating is required in summer.

Buffer storage tank recommendation

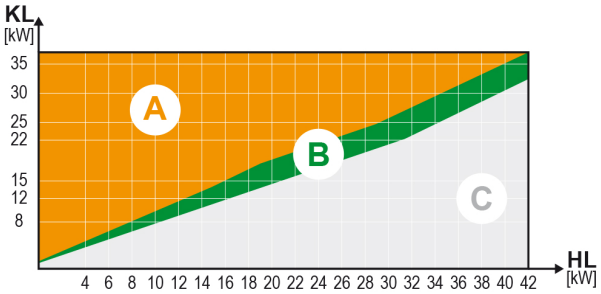
KWB also recommends the installation of an intelligent buffer tank storage when installing a biomass heating system, which can be considered the energy centre of the heating system. As a result, the owner saves on heating costs due to lower fuel consumption, increases the annual efficiency coefficient as well as the profitability of the heating system and ensures perfect system solutions and lower emissions. The reason for this is that the heating system is focused on the coldest time of the year, this type of performance, however, is rarely needed and, especially in transition periods, barely utilised. This leads to frequent burner starts, which has a negative effect on fuel consumption and the entire service life of the heating system. The effect is comparable to the stop-and-go traffic on the road.

A buffer or a load balancing tank is absolutely mandatory in the event of

- oversizing: When the rated boiler performance exceeds the heat requirement of the entire building by 50%, you will need a buffer tank (this is often the case when buildings are subsequently enlarged or in low energy houses). In the event of such dimensioning, a large portion of the operating time the boiler will run under the boiler's smallest modulation degree. When using the buffer storage tank, the boiler can be operated in the preferred load range.
- Very small heating loads in summer / during transition periods, e.g. when only the bathroom is heated in summer/during the transition period, operation of only one or two heating units during transition periods, hot water heating in summer in a heating network without block charge, ...
- If parts of the heat dissipation system are frequently switched off or in the event of a high passive solar contribution
- In case of large demand for hot water, e. g. hotels, showers in sports facilities, large multi-family houses
- In case of demand peaks for hot water in the morning, e.g. in production facilities, schools
- Integration of a solar power heating system or a log wood boiler
- Multi-boiler systems (boiler master-and-slave circuits)

There are two options to prevent safety devices protecting against overheating from tripping when all heat consumers are switched off: either through a phased consumer switch-off or by ensuring sufficient afterrun in the consumer circuits with sufficient load.

The use of a KWB Easyfire type EF2 requires a buffer tank of sufficient size, if the average building heating load is more than 20% less than the rated boiler performance. The average building heating load is calculated based on the standard building heating load minus the maximum load. The following diagram may assist with your planning:



KL	Boiler output	B	No buffer tank required
HL	Heating load of the building	C	Next larger boiler possible
A	Buffer tank required		

A charging pump may possibly be required when using a load-balancing tank or buffer tank.

3.1 Mounting the return flow boost

⚠ WARNING **Unforeseeable consequences caused by improper work on the heating system**

⇢ Work on the heating system (boiler connection, buffer tank, heating circuits …) may only be performed by qualified experts!

Internal return flow boost with the supplied 2-way-valve

The KWB Easyfire type EF2 can be installed with an internal return flow boost: The KWB Comfort control manages the flow rate in the boiler-internal loop and in this way holds the set return flow temperature (the respective sensor is pre-installed).

↘ The scope of delivery (EF2: packaging unit 2) includes a 2-way valve with servomotor.

⇢ The valve must be set to the correct volume flow depending on the boiler output. Adjust the valve by changing the position of the stop at the lower part of the motor:

8-12 kW	Position 6
15-22 kW	Position N
25-40 kW	Remove stop

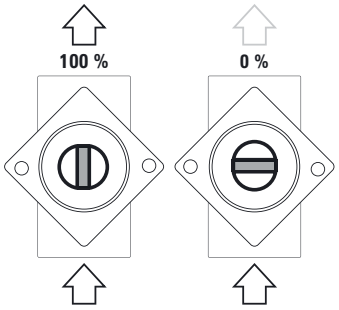
⇢ Install the appropriate adaptor at the return flow connection.

⇢ Install the 2-way valve including the servomotor.

⇢ Equip the heating system with a pressure-tight distributor and a safety group (according to ÖNORM EN 12828 or EN 303).

⇢ Run the cable to the control cabinet and plug in plug S11 at the top right of the control cabinet.

Ball valve



⇢ Bring the ball valve to the position "Open" (100%) and set the servomotor to "Open" before you mount the servomotor and bolt it.

Internal return flow boost with buffer charging pump with [PWM] activation

Note: The supplied 2-way valve cannot be used when using a pump with [PWM] activation.

⇢ Install the buffer charging pump.

⇢ Guide the cabling through (see section **Charging the buffer storage tank directly from the boiler [►37]**).

⇢ Equip the heating system with a pressure-tight distributor and a safety group (according to ÖNORM EN 12828 or EN 303).

External return flow boost

It is possible to utilise an external return flow boost instead of the above-described internal return flow boost.

All boilers

The planning and execution lies within the scope of responsibility of the heating technician; the heating system must in any case be provided with a pressureless distribution system (switch, distributor, load-balancing tank, buffer storage tank …)!

Caution: With this boiler, an external return flow boost with mixing pump must NOT be used!

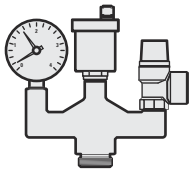
Please also see

Charging the buffer storage tank directly from the boiler (►37)

3.2 Installing filling/emptying connections

Note: The tap for filling & emptying is NOT included in the scope of delivery!

3.3 Installing the safety group (option)



The standard requires installation of a pressure control valve. KWB offers a safety group with automatic bleeder and pressure gauge (manometer).

⇢ Install the KWB safety group at the boiler: The respective connection (diameter 1") is located at the connecting pipe socket at the heat exchanger.

Among other things, the safety group must be installed at the boiler or in direct vicinity to the boiler to make sure it is accessible and that there are NO shut-off devices between the boiler and the safety valve!

3.4 Safety valve

Safety valve

When the boiler pressure reaches 3 bar, the safety valve opens and discharges hot (!) heating system water!

You must comply with EN ISO 4126-1:2013 requirements, diameter according to EN 12828 or national standard.

Among other things, the safety valve must be installed at the boiler or in direct vicinity to the boiler to make sure it is accessible and that there are NO shut-off devices between the boiler and the safety valve!

3.5 Ventilation

⇢ Only use high quality ventilation valves:

- in the boiler forward flow
- at the highest point of the distribution network **and**
- at the head of the buffer tank.

This will reduce the risk of corrosion **and** facilitates the bleeding of the system significantly!

3.6 Condensate discharge when using a condensing boiler system

When using a condensing boiler system, condensate is generated which must be continuously discharged into the waste water system according to local regulations. For this reason, a wastewater connection is necessary to discharge the condensate and flushing water.

The discharge connection for the condensate must have the following features:

- Condensate-proof
- Frost-proof
- Installed to ensure a gravity-powered movement (min. 3%)

If gravity-powered movement is impossible, a suitable wastewater lifting system with a condensate-proof pump must be used.

Note: The condensate connection must not be modified or closed! The condensate discharge outlet must be regularly checked!

3.7 Water connection for the washing unit when using a condensing boiler system

Attention: The maximum pressure in the water line must not exceed 4 bar.

⇢ Connect the washing unit of the condensing boiler system module with the water supply line.

3.8 Dimensioning the buffer-charging pump

Volume flow [m³/h]

Spread over the boiler [K]	Boiler output [kW]									
	8	10	12	15	22	25	30	35	38	40
15	0.46	0.57	0.69	0.86	1.26	1.43	1.72	2.00	2.18	2.29
20	0.34	0.43	0.52	0.64	0.95	1.07	1.29	1.50	1.63	1.72
25	0.27	0.34	0.41	0.52	0.76	0.86	1.03	1.20	1.31	1.37
30	0.23	0.29	0.34	0.43	0.63	0.72	0.86	1.00	1.09	1.15
35	0.20	0.25	0.29	0.37	0.54	0.61	0.74	0.86	0.93	0.98
40	0.17	0.21	0.26	0.32	0.47	0.54	0.64	0.75	0.82	0.86

Please see additional specifications in the **Technical data table** in the attachment to this document.

The specifications apply for average local conditions and must be checked by a qualified heating equipment technician. The pump selection is based on friction values and the delivery height in the planned pipe system.

3.9 Expansion tank dimensions

⚠ CAUTION **No effect if installed incorrectly**

↘ It must be impossible to close off the path between the expansion tank and heat source (boiler …)!

⇢ The expansion tank must be installed in the boiler return flow – BEFORE the first valve!

System volume

Use a membrane type expansion tank for pressure compensation within the heating system pursuant to EN 13831. Calculate the dimensions in accordance with EN 12828 annex D; to give an idea regarding size: usually expansion tanks are used with a gross volume of approx. 10% of system volume.

Water content KWB Easyfire 8–40 kW (litres)

8 kW	10 kW	12 kW	15 kW	22 kW	25 kW	30 kW	35 kW	38 kW	40 kW
40 l			52 l		78 l				

These specifications are to be supplemented by the fill quantities of the heating system lines, radiators etc.!

3.10 Hydraulic diagrams

KWB offers an extensive selection of hydraulics schematics.

Note: This document is available for download in the KWB PartnerNet.

3.11 Fill water

NOTE	**Please comply with: ÖNORM H 5195 + VDI 2035**
	KWB assumes ÖNORM H 5195-1 / -2 for the initial filling and subsequent filling. You must also comply with local requirements (e.g. VDI 2035 - in part, these are stricter)!

The water quality is a significant factor for the smooth operation of the heating system. Deposits caused by limescale and rust mud can block pumps, damage boilers, reduce flow volumes, cause corrosion and lead to poor efficiency.

We assume that the heating system possesses flushing nozzles for forward flow and return flow as well as a standard-compliant heating protection program ("BWT AQA therm" or equivalent).

Purging **NOTE! Purge the system twice before commissioning!**

Ventilation When refilling make-up water you must first bleed the refilling hose before connecting it to prevent air from entering the system.

System book

The system operator is responsible for maintaining a system book (see section **Logs [►21]**), Forms). In this section, the respective steps are to be documented – from the planning to commissioning to maintenance.

3.11.1 Requirements for fill water

Limit values for fill-up or make-up water

	Austria	Germany	Switzerland
Total hardness	≤ 1.0 mmol/l	≤ 2.0 mmol/l	< 0.1 mmol/l
Conductivity	–	< 100 µS/cm	< 100 µS/cm
pH value	6.0 – 8.5	6.5 – 8.5	6.0 – 8.5
Chloride	< 30 mg/l	< 30 mg/l	< 30 mg/l

Additional requirements for Switzerland

The fill-up and make-up water must be demineralised (de-salted):

- As a result, the water will no longer contain any materials that might form deposits in the system.
- This way, the water is no longer electroconductive which prevents corrosion.
- Also, the process removes all neutral salts such as chlorides, sulphates and nitrates which attack corroding materials under certain conditions.

If part of the system water gets lost, e.g. due to repairs, the supplementary water must also be demineralised. It is not sufficient to soften the water. Before filling the systems, it is necessary to carry out a professional cleaning and purging of the heating system.

Check:

- After eight weeks, the ph-value of the water must be between 8.2 and 10.0. If the heating water comes into contact with aluminium, a ph-value between 8.0 and 8.5 should be targeted.
- Annually – the owner must log the readings

Test intervals

Condition	Intervals (ÖNORM)	Intervals (VDI)
Heating system with a water content <5000 l	2 years	1 year
Heating system with a water content ≥5000 l	1 year	
Work on the heating system (loss of water)	Additional test after 4-6 weeks in heating mode	

Tip: The standard provisions permit the use of completely decalcified water – this means you can save a considerable amount of calculation time by always calculating to a value of zero. Due to inaccuracies during the rinsing process, you will never actually reach a value of 0.0, but your calculations will always fall in a safe range!

3.11.1.1 Commissioning the heating system

Based on the requirements of ÖNORM H 5195-1:2010

- ⇢ Rinse the heating system with at least two times the quantity of the system water quantity.
- ⇢ Top up the system water quantity with appropriately prepared water.
- ⇢ Run the heating system for 72 hours at a minimum of 60 °C feed temperature immediately after this filling process.
  This will accelerate the exhaust process and prevent corrosion.
- ⇢ Hand over the "System and Test Log for Heating Water" (Appendix A) and the "Rinsing Log" (Appendix C) to the system operator.
  Include the product and safety data sheet if you added protective substances.
- ⇢ Tell the operator that the heating water should be checked after 4-6 weeks in heating mode!

3.11.2 Fill water with frost protection

⚠ CAUTION **Frost damage due to heating system failure**

In a house with average insulation, the heating water can freeze within 5 days at low temperatures if the control system of an automatic heating system fails.

⇢ Mix antifreeze into the heating system water according to the enclosed instructions or ensure regular checks!

Comply with: ÖNORM H 5195-2

↘ The water–antifreeze mixture has a lower thermal capacity and a higher flow resistance.

⇢ Increase the forward flow temperature by 1–2 °C in order to compensate for these changes. The heating curve can usually be left unchanged.

Tip: Place the heating system into operation at least once a week.

⚠ CAUTION **Risk of rust due to false water preparation**

⇢ If you use antifreeze in the fill water, the fill water must NO longer undergo osmotic treatment (desalting)!

3.11.3 Logs

You can find forms here:

- Maintenance instructions
- ÖNORM H 5195-1:2010 Appendix A and Appendix C
- VDI 2035 Appendix C and VDI 4708 sheet 1

3.11.3.1 Rinsing Log

Operator:		System type:
Location (+building/block):		System name/object:
Date:	Telephone:	Technician:

Date	Junction No.	Room	Cleaning agent	System part	Rinsing start	Rinsing end	× O	Problem	Line designation	✓ O
Product & Safety sheet available: Yes ☐ / No ☐					O = not completed		× = clean		✓ = completed	

3.11.3.2 System and Test Log for Heating Water

Operator:	Location (+building/block):

System type:		Commissioning date:	
Total heat generation capacity:	kW	Water content of the system:	l
Heating capacity of the smallest heat generator:	kW	Specific water content of the system:	l/kW
Water content of the smallest heat generator:	l	Max. operating temperature:	°C
Heating system rinsing pursuant to EN 14336 completed:		Yes ☐ / No ☐	

Material (put check mark)	**Steel**	**Stainless steel**	**Cast iron**	**Aluminium**	**Copper**	**Organic materials**	**Alloys**
Heat generator							
Expansion container							
Armatures							
Pipework							
Heat emission							

Water meter reading at the filling spot BEFORE filling: Z =		m^3
Water meter reading at the filling spot AFTER filling: Z_{new} =		m^3
Volume / Fill quantity: V = Z_{new} - Z	m^3	Date:
Completed emptying:		Date:
Preparation after emptying:		Date:

During first commissioning:

Parameters	**Unit**	**Guidance values (VDI 2035)**	**Analysis values Fill water**	**Analyses values Heating water**	**Measuring processes**
Total hardness	mmol/l (°dH)	See: **Requirements for fill water [►20]**			Analytic ready-to-use test
pH value	—	8.2 to 10.0 [a)]			pH meter
Conductivity	µS/cm	<1500			
Iron	mg/l				Analytic ready-to-use test
Copper	mg/l				Analytic ready-to-use test
Aluminium	mg/l				—
Chloride	mg/l				Analytic ready-to-use test
Ammonium	mg/l				Analytic ready-to-use test

3 Water

Fill water

Parameters	Unit	Guidance values (VDI 2035)	Analysis values Fill water	Analyses values Heating water	Measuring processes
[a] For systems with Al or Al alloys: 8.2 to 8.5 (9.0)					
Comments:					

During maintenance and inspection:

Parameters	Unit	Guidance values (VDI 2035)	Analysis values Fill water	Analyses values Heating water	Measuring processes
Total hardness	mmol/l (°dH)	See: **Requirements for fill water [►20]**			Analytic ready-to-use test
pH value	—	8.2 to 10.0 [a]			pH meter
Conductivity	µS/cm	<1500			
Iron	mg/l				Analytic ready-to-use test
Copper	mg/l				Analytic ready-to-use test
Aluminium	mg/l				—
Chloride	mg/l				Analytic ready-to-use test
Ammonium	mg/l				Analytic ready-to-use test
[a] For systems with Al or Al alloys: 8.2 to 8.5 (9.0)					
Comments:					

Additives: Type:	Manufacturer:	Supplier

Pressure			
* To determine by the planner pursuant to VDI 4708 sheet 1 ($>p_{a,min}$; $<p_{e,max}$).	System pressure	P_{Anl} =	bar
	Maximum final pressure *	$p_{e,max}$ =	bar (Ü)
For a membrane pressure expansion container	Gas pressure *	p_0 =	bar (Ü)
For pump or compressor pressure control	Set pressure system *	p_{set} =	bar (Ü) ±..... bar
Pressure control commissioned pursuant to manufacturer requirements:			Yes ☐ / No ☐

Actions required:	
Product & Safety sheets available:Yes ☐ / No ☐	Next inspection date:

Signature and stamp of the inspecting / commissioning company:

Date of the inspection:

3.12 Solar control

NOTE	**Follow the manufacturer's instructions!**
	⇢ Follow the manufacturer's instructions with respect to the installation and commissioning of the solar system.
	⇢ Follow the manufacturer's hazard and safety instructions.

Flushing and filling of the solar system

For safety reasons, filling must be carried out exclusively during times without sunlight or with covered collectors. Particularly in areas which experience frost, a 42% antifreeze-water mixture must be used. To protect the materials from excessive thermal loads, the filling and commissioning of the system should occur within a short time, but at most after 4 weeks. If this is not possible, the flat seals should be renewed before commissioning to prevent leaks.

Attention: If the antifreeze is not pre-mixed, it must be mixed with water before filling!

You must use the manufacturer-recommended antifreeze!

It is possible that collectors that have once been filled cannot be fully emptied. For this reason, collectors may even for pressure and function tests only be filled with the water/antifreeze mix when there is danger of frost. Alternatively, the pressure test can be performed with compressed air and leak locator spray.

Operating pressure

Observe the manufacturer-recommended maximum operating pressure.

Bleeding

The system must be bled:

- During commissioning (after filling)
- 4 weeks after commissioning
- If required (e.g. during faults)

⚠ WARNING	**Risk of scalding from steam or hot heat transfer fluid!**
	⇢ Only activate the bleed valve if the temperature of the heat transfer fluid < 60 °C. The collectors must not be hot when the system is emptied!
	↳ Cover the collectors and, if possible, empty the system in the morning.

Check the heat transfer fluid

The heat transfer fluid must be checked every 2 years for frost protection and pH value.

- Check the frost protection with the antifreeze tester and replace or refill, if necessary! Setpoint approx. –25 °C to –30 °C depending on the climatic conditions.
- Check the pH-value with an indicator stick (setpoint approx. pH 7.5):
  Replace the heat transfer fluid if the limit ph-value of ≤ pH 7 is undershot.

Collector maintenance

Warranty claims only in connection with the supplier's original antifreeze and properly performed installation, commissioning and maintenance. Installation by a certified technician in strict adherence to the instruction description is required to justify the claim.

Mass flow rate

A specific flow rate of 30 l/m²h must be selected up to a collector field size of approx. 25 m² to ensure good collector performance.

3.12.1 Connections

This chapter illustrates various hydraulic options for implementing a thermal solar system.

The following illustrations are only meant to show principle of the schematics to understand the respective system hydraulics and are not intended to be complete. The control system does not replace any safety equipment. Depending on the use case, additional system and safety components, such as block valves, non-return valves, safety temperature limiters, scalding protection, etc., are required and must be included.

3.12.2 Hydraulic diagrams Solar

The hydraulics diagrams can be selected in `Menu >> Basic settings >> Network settings >> Solar >> SOL 1 Solar >> Schema`.

Four diagrams are available:

Description of the functions of the individual diagrams

Diagram 1 – simple solar circuit

The control system determines the temperature difference between the collector sensor and storage tank sensor. As soon as the difference is greater than or equals the specified value for the switch-on temperature differential, the pump is switched on and the storage tank is charged until the switch off temperature differential or the maximum storage tank temperature has been reached.

Diagram 2 – 2-zone switchover

The control system compares the temperatures of the collector sensor with the temperatures at sensor 2 (S20) and sensor 5 (S5) in the buffer storage tank.

If the measured temperature differences are greater than the specified values for the switch-on temperature differentials, the pump is activated and the respective storage tank section is charged via the valve (or 2nd pump) until the temperature reaches the specified storage tank maximum temperature. The switchover logic is set up so charging the upper storage tank area has priority.

Diagram 3 – 2-storage tank switchover (…with a second pump)

The control system compares the temperatures of the collector sensor and the lower temperatures of the two storage tanks.

If the measured temperature differences are greater than the specified values for the switch-on temperature differentials, the respective pump of the storage tank to be charged is activated and the respective storage tank is charged up to the specified maximum temperature. The switchover logic is set up so that charging storage tank 1 has priority.

Diagram 3 – 2-storage tank switchover (…with a switchover valve)

The control system compares the temperatures of the collector sensor and the lower temperatures of the two storage tanks.

If the measured temperature differences are greater than the specified values for the switch-on temperature differentials, the respective pump is activated and the respective storage tank is charged up to the specified maximum temperature using the valve. The switchover logic is set up so that charging storage tank 1 has priority.

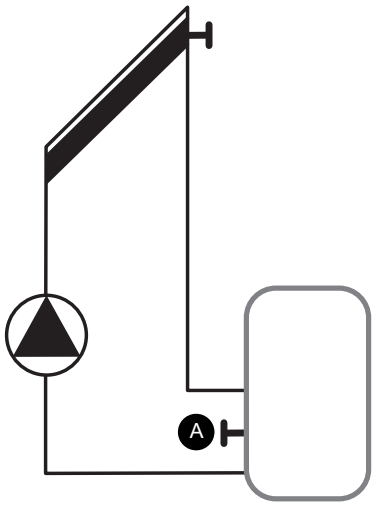
Diagram 4 – External heat exchanger

The control system determines the temperature difference between the collector sensor and storage tank sensor.

The primary pump is switched on as soon as the differential is greater than or equals the set value for the switch-on temperature differential. As soon as the temperature difference between forward flow sensor and storage tank sensor is greater than the specified value for the switch-on temperature differential, the secondary pump is switched on and the storage tank is charged until the switch off temperature differential or the maximum temperature of the storage tank has been reached.

3.12.2.1 Diagram 1

Single solar circuit (with buffer tank or DHWC)



Temperature sensor for	Buffer	Buffer 0	DHWC
[A] plug number	# 334	# 242	# 341

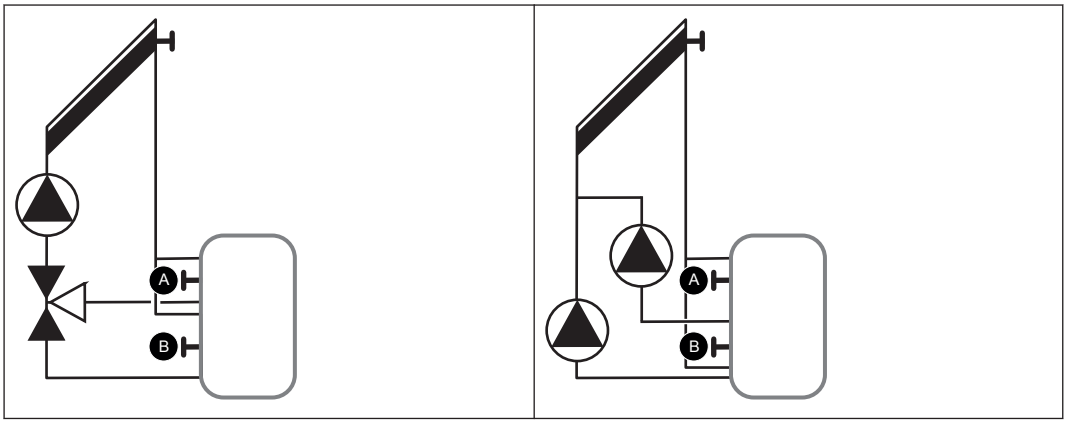
- `Storage tank 1`: Buffer | Buffer 0 | DHWC
  Select a buffer storage tank. A DHWC or buffer storage tank must be activated! If required, activate the buffer type (2.2 or 5.2) at which sensor 4 (S4) is used as switch-off sensor for the boiler. Only in this way it is possible to use the different sensors for the solar charging (S5) and the recharging by the boiler (S4). (Applies to every diagram)
- `Pump 1 PWM signal`: PWM1 | PWM2
- `Heat quantity measurement`: VFS 1-12l/m | VFS 2-40 l/m | Manually
- `Sensor for HQM`: VL sensor | Collector

3.12.2.2 Diagram 2

⇢ **2-zone switchover (buffer storage tank)**

↳ …with a switchover valve

↳ …with a second pump



Temperature sensor for	Buffer	Buffer 0
[A] plug number TOP	# 331	# 239
[B] plug number BOTTOM	# 334	# 242

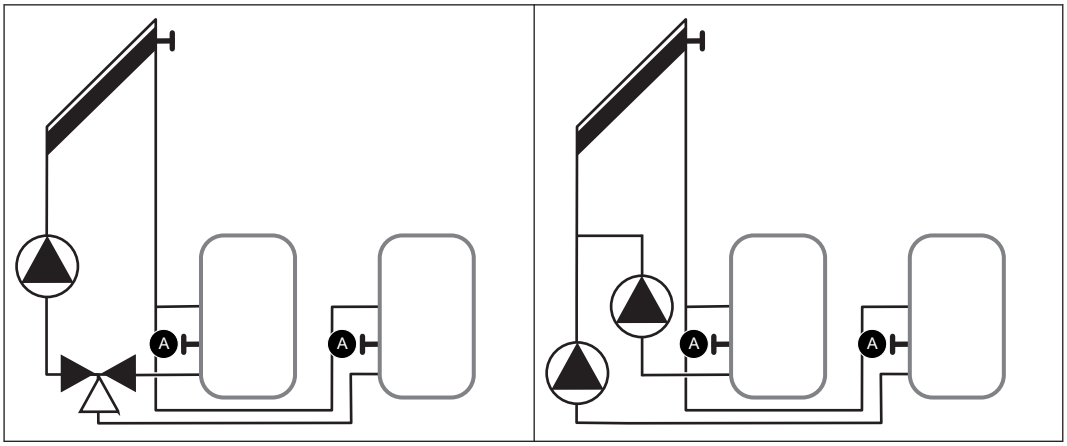
- `Storage tank 1`: Buffer | Buffer 0
  Select a buffer storage tank. A buffer storage tank must be activated! If required, activate the buffer type where sensor 4 (S4) is used as switch-off sensor for the boiler. It is primarily charged to sensor 2 (S2) on top.
- `Switchover`: Pump | Valve
  When switching using a valve, the output can be inverted.
- `Invert valve`: No | Yes
  If the valve is de-energized = storage tank 2, then invert valve by setting "yes".
- `Pump 1 PWM signal`: PWM1 | PWM2
- `Heat quantity measurement`: VFS 1-12l/m | VFS 2-40 l/m | Manually
- `Sensor for HQM`: VL sensor | Collector

3.12.2.3 Diagram 3

⇢ **2-storage tank switchover (buffer tank or DHWC)**

↳ …with a switchover valve

↳ …with a second pump



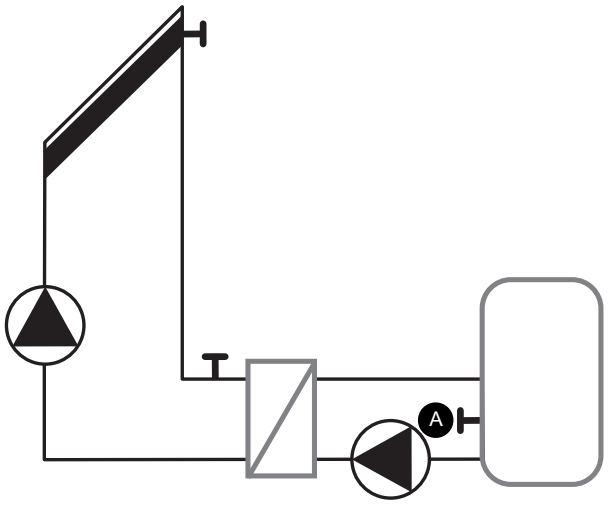
Temperature sensor for	Buffer	Buffer 0	DHWC
[A] plug number	# 334	# 242	# 341

Warning: The selection of storage tank 1 and storage tank 2 depends on the electrical connection of the pumps (valve). A subsequent change of the primary storage tank (storage tank 1) is not available without changing the electrical connection!

- `Storage tank 1`: Buffer | Buffer 0 | DHWC
  Select a storage tank; this storage tank will function as the primary (priority) storage tank.
- `Storage tank 2`: Buffer | Buffer 0 | DHWC
  Select a storage tank; this storage tank will function as the subordinate storage tank.
- `Switchover`: Pump | Valve
  Specifies how the switchover works between two storage tanks.
- `Pump 1 PWM signal`: PWM1 | PWM2
  Specifies the pump type.
- `Pump 2 PWM signal`: PWM1 | PWM2
  Specifies the pump type.
- `Heat quantity measurement`: VFS 1-12l/m | VFS 2-40 l/m | Manually
  Specifies how the heat quantity is measured.
- `Sensor for HQM`: VL sensor | Collector
  Specifies which sensor is to be used for recording the heat quantity measurement (HQM)
- `Flow at 50%`: 0.0lt/min
  Enter flow during manual heat quantity measurement
- `Flow at 100%`: 0.0lt/min
  Enter flow during manual heat quantity measurement

3.12.2.4 Diagram 4

External heat exchanger (buffer tank or DHWC)



Temperature sensor for	Buffer	Buffer 0	DHWC
[A] plug number	# 334	# 242	# 341

- `Storage tank 1`: Buffer | Buffer 0 | DHWC
  Select a buffer storage tank.
- `Pump 1 PWM signal`: PWM1 | PWM2
  Specifies the pump type.
- `Pump 2 PWM signal`: PWM1 | PWM2

Specifies the pump type.

- `Heat quantity measurement`: VFS 1-12l/m | VFS 2-40 l/m | Manually
  Specifies how the heat quantity is measured.
- `Sensor for HQM`: VL sensor | Collector
  Specifies which sensor is to be used for recording the heat quantity measurement (HQM)
- `Flow at 50%`: 0.0lt/min
  Enter flow during manual heat quantity measurement
- `Flow at 100%`: 0.0lt/min
  Enter flow during manual heat quantity measurement

4 Electrical system

⇢ **Tip:** Always ensure the strain on the connection is relieved by always using a cable tie to connect two cables inside a cable housing that enter the cable housing through different openings.

↘ Prevent static charging of the conveyor system!

⇢ Connect the conveyor hose to the conveyor system via the integrated earthing strands.

⇢ Connect the conveyor system with the earthing strand in the motor terminal box.

⇢ Connect the fill nozzle and suction nozzle in the fuel storage room with the equipotential bonding strip.

⚠ WARNING **Life-threatening electrical voltage**

⇢ The electrical installation may only be carried out by qualified specialists who have the required training and expertise!

⇢ If required, shut down the system completely at the main switch.

⇢ Unplug the mains plug before you start working on the system!

↳ Comply with applicable standards and regulations!

⚠ CAUTION **Quality of the electrical installation**

↘ The applicable directives, particularly *EN 60204-1 Electrical equipment of machines – general requirements* must be complied with when performing the installation work.

⇢ In addition, please ensure that there is no possibility of damage to electrical system components due to heat radiation!

NOTE **Possible damage because cabling has been installed too loosely**

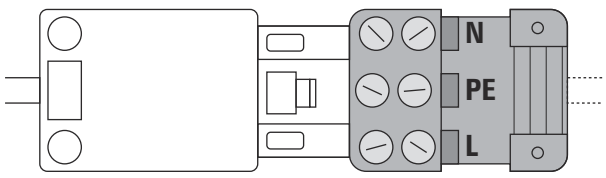
⇢ Secure all cables in the cable duct with cable ties!

↳ You ensure electrotechnical safety with this kind of strain relief.

4.1 Electrical connections - boiler

Establishing the mains connection

The mains connection of the KWB Easyfire is provided via a pre-mounted 3-pin plug-in connector on the rear wall of the boiler.



⇢ Open the prepared (Wieland) connector and connect the power supply according to the labelling (N, PE and L) to the connector!

Open control cabinet

Only certified technicians!

↘ Only licensed electricians/companies are permitted to connect the pumps, motor mixers and other heating system components!

⇢ Please read these instructions carefully before you pull the plug and take off the cover of the control cabinet! Secure the system against an unintentional restart!

- ⇢ Separate the Exclusive control unit from the front casing (start lifting from the lower edge) and remove the bus cable before finally taking off the Exclusive control unit.
- ⇢ Unscrew the screws from the front casing and remove the front casing.
- ⇢ Carefully place the front casing on a stable surface to avoid scratches and other damage!
- ⇢ Unscrew the screws from the cover and remove the cover from the control cabinet.

Internal return flow boost with supplied 2-way valve

Note: The installing company has installed a 2-way valve with servomotor and connected it with plug S11 at the top of the control cabinet (except when using a buffer charging pump with [PWM] activation).

4.1.1 Emergency stop

- ⇢ Install the light switch and the **labelled** emergency stop switch ("Stop Escape" as per TRVB H118) of the heating system at an easily accessible location **outside** of the boiler room next to the boiler room door.

Connector	Pins	Description	Function
129	3	3-pin digital input 230 V_{AC}	Emergency stop ("emergency escape switch")

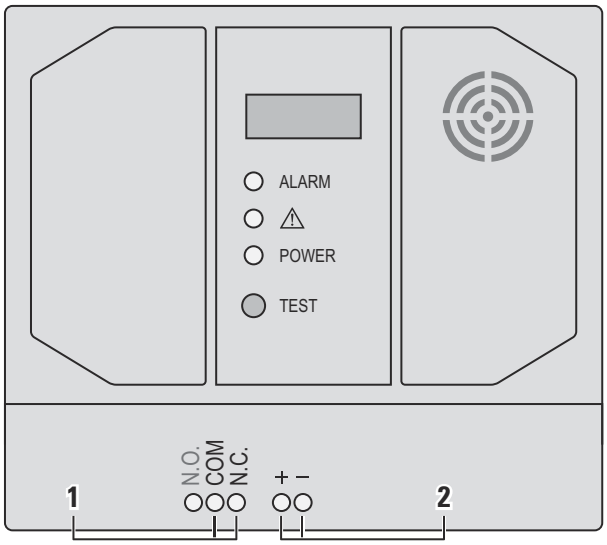
4.1.2 Mounting CO sensor for ambient air-independent operation (option)

The CO sensor used serves to detect carbon monoxide in private rooms.

The goal is to provide visual and acoustic alarms and trigger a control signal that is used to switch off the pellet heating system.

Environmental conditions:

- Interior rooms
- Relative humidity: max. 95%
- Temperature range: -10 to +40°C
- Excessive dust accumulation can clog the sensor



1	Floating relay output for connection to the controller (5 A/230 V_{AC}, 5 A/30 V_{DC})	COM	Contact for relay
2	Output 12 V_{DC}, maximum load 200 mA Unused	N.C.	(Open) contact to COM: normally closed, opens in case of alarm
		N.O.	Unused

↘ A CO sensor must be installed to monitor that the exhaust gas system is leak-tight.

↘ Mounting must be done WITHOUT power supply!

⇢ Mount the CO sensor at one of the following positions:

Installation position of the sensor

To mount the CO sensor **in the boiler room**:

- Device approx. 15 cm below the ceiling and above the height of all windows and doors.
- In case of sloped ceilings: On the higher side of the room
- 1–3 m away from the pellet heating system
- In case of room dividers: On the side of the pellet heating system

Not permitted is placement …

- behind curtains
- in the air stream of ventilators
- near a door, a window, an exhaust hood or other ventilation openings
- next to stoves and burners or over washbasins

Cable connections and commissioning

⇢ Connect the opener contact [N.C.] and [COM] with plug #133 with the included cable (KWB art. no. 13-1010238).

Connector	Pins	Description	Function
133	2	2-pin digital input 24 V_{DC}	**CO sensor** [EF2]

⇢ Now connect the power supply.

- The self-test starts: The green LED flashes for a duration of max. 90 seconds.

- Subsequently, the 3 LEDs flash alternately for about 50 seconds.
  Exception: If the CO concentration is already too high, the CO sensor immediately switches to standby and puts out an alarm!
- After a successful self-test, a brief signal tone sounds and the green LED indicates readiness.

NOTE	**The limits of a CO sensor**
	Under some circumstances, the CO sensor does not offer ANY sufficient protection for people who, due to age, illness or pregnancy, are especially susceptible to carbon monoxide. In case of doubt, contact your physician. Devices for detecting carbon monoxide are NO substitute for proper installation and regular maintenance of fireplaces and the regular cleaning of chimneys! The CO sensor is NOT suited to be a smoke detector or sensor for combustible gases!

Note: The housing of the CO sensor must NOT be painted or varnished!

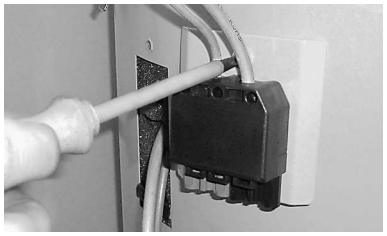
If the sensor triggers an alarm, the alarm must first be rectified in the KWB Comfort controller before the heating system can be put back into operation.

⚠ WARNING	**Failure of the alarm without power supply**
	↘ The CO sensor depends on the power supply from the plug-in power supply unit. ⇢ Inform the operator that the power supply for the CO sensor may absolutely not be interrupted!

4.2 Electrical connections, conveyor system with suction conveyor

4.2.1 Electrical connections at the boiler

Fuse rating: 13 A, type C / 230 V_{AC}

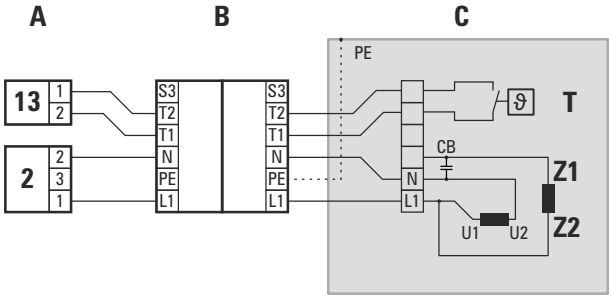


⇢ Check whether the 6-pin [Wieland] female connector has been correctly installed on the back of the suction container.

⇢ Check whether the cable from the suction container is correctly connected with the connector bracket at the burner (plugs #13 and #2).

4.2.2 Conveyor screw / KWB Pellet Stirrer Plus / KWB Pellet Big Bag

Connecting the conveyor system drive and suction container



A	Cable #13 [Klixon fuel extraction] and #2 [fuel extraction]	T	Thermal switch
B	Connector plug to the rear of the suction container	Z1	Auxiliary windings
C	Motor, conveyor system	Z2	

⇢ Swap Z1 and Z2 to change the direction of rotation.

4.2.3 Sampling probes

⚠ WARNING **Life-threatening electrical voltage**

⇢ The electrical installation may only be carried out by qualified specialists who have the required training and expertise!

⇢ If required, shut down the system completely at the main switch.

⇢ Unplug the mains plug before you start working on the system!

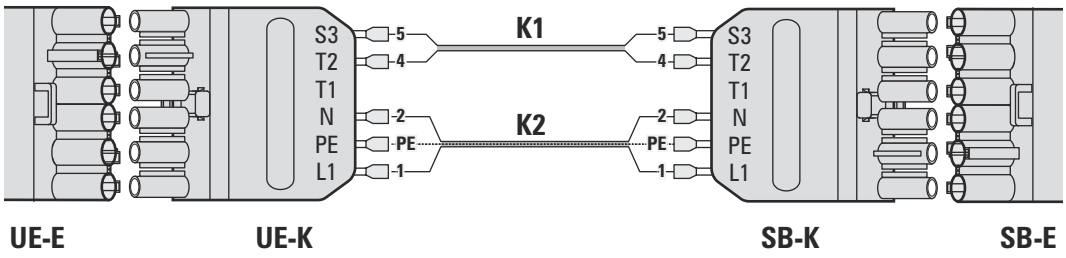
↳ Comply with applicable standards and regulations!

4.2.3.1 Connect the switch unit and suction container

⇢ Connect the two [Wieland] plugs ("UE-K" and "SB-K") with 2 separate cables:

- 2×0.5 mm² control line (24 V_{DC} signal voltage)
- 3×1 mm² power supply (230 V_{AC})

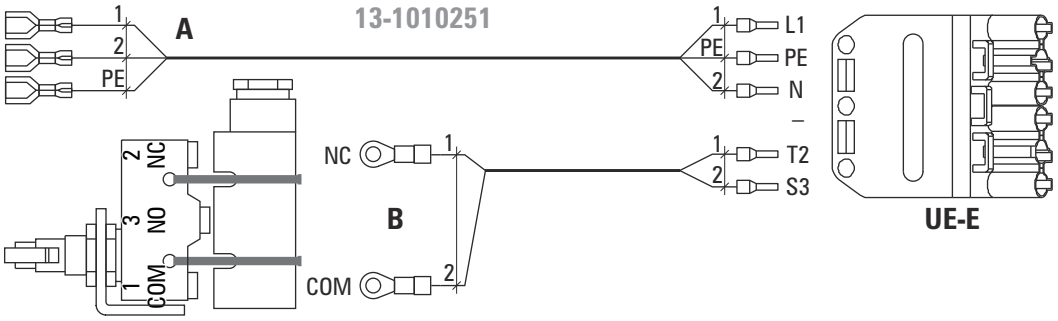
Warning: Adhere to the separation into two cables! Failure to comply may result in a defective board due to the difference in voltages!



UE-E	Female connector on switch unit	SB-E	Female connector on suction container (at the back of the suction container)
UE-K	Plug for the cable between switch unit and suction container	SB-K	Plug for the cable between switch unit and suction container
K1	Control line, e.g.: YSLY-OZ 2×0.5 mm² (S3, T2)	K2	Supply line, e.g., YSLY-JZ 3×1 mm² (N, PE, L1)

4.2.3.2 Internal wiring of the switch unit

Switch unit control



A	Switch unit motor connections
B	Position switch in switch unit
UE-E	Female connector on switch unit

4.2.4 House connection box for pellet suppliers

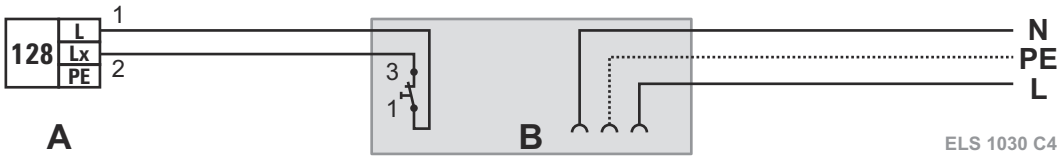
⇢ Install the house connection box (art. no. 13-1000534) near the filling nozzles.

⇢ Connect the switch in the house connection box with input #128 [reserve safety input].
Note: Cables are NOT supplied!

⇢ Connect the power supply with the socket (230 V_{AC}, fuse 16 A).
Use a **separate power supply** – do NOT supply via the boiler!

↳ Safety circuit:
The button in the cabinet shuts down the heating if the house connection cabinet, which is wired according to ELS 1030, is opened. This ensures that the system is shut down during filling!

ELS 1030 C4



A	Plug #128 [reserve safety input]	B	Exterior wall cabinet with heating off-switch and power socket 16 A

4.3 Heating system electrical connections

4.3.1 Buffer storage tank

4.3.1.1 Charging the buffer storage tank directly from the boiler

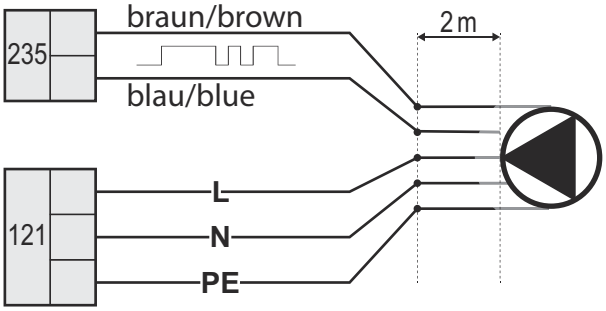
Pump

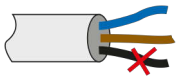
Connection to the Boiler signal module [KSM] and Boiler power module [KPM]:

Connection to the Boiler signal module [KSM]:

We recommend using a pump with [PWM] speed control activation.

⇢ Install the buffer charging pump:



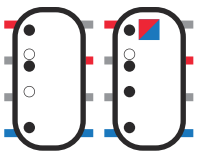


If an iPWM pump is installed, the third wire (black) is not be connected. This signal is not needed.

Plug 235 is not connected when using a pump without [PWM] activation.

Connector	Pins	Description	Function
121	3	3-pole supply 230 V_{AC}, max. 200 W	**Boiler circuit pump or buffer charging pump**
123	3	3-pole supply 230 V_{AC}	**Feeder pump/valve or buffer charging pump 0**
235	2	2-pole connection, actuator	**Boiler circuit pump PWM 10 V_{DC}**

Sensors



The standard configuration requires 3 sensors (WITHOUT domestic hot water preparation) or 4 sensors (WITH domestic hot water preparation) for the buffer tank.

⇢ Use sensors S1–S3–S5 or S1–S3–S4–S5 depending on the buffer tank diagram.

⇢ Route the sensor such that you can subsequently change the sensor positions.
Allow for sufficient reserve cable!

Connection at the Boiler signal module [KSM]:

Note: The operation of a domestic hot water circulation pump is only possible if connecting to aHeat management module [WMM].

Connector	Pins	Description	Function

238	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 1**
239	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 2**
240	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 3**
241	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 4**
242	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 5**

Connection to the Heat management module [WMM]:

Connector	Pins	Description	Function
330	2	2-pole connection sensor PT1000	**Buffer storage tank 1 temperature**
331	2	2-pole connection sensor PT1000	**Buffer storage tank 2 temperature**
332	2	2-pole connection sensor PT1000	**Buffer storage tank 3 temperature**
333	2	2-pin connection sensor PT1000	**Buffer storage tank 4 temperature**
334	2	2-pole connection sensor PT1000	**Buffer storage tank 5 temperature**

4.3.1.2 Charging the buffer storage tank indirectly from the boiler

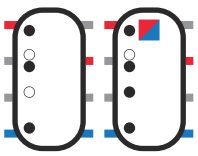
Connection at the Heat management module [WMM]:

Pump

⇢ Install the buffer charging pump:

306	3	3-pole power supply 230 V_{AC}	**Feeder pump/valve or buffer charging pump**

Sensors



The standard configuration requires 3 sensors (WITHOUT domestic hot water preparation) or 4 sensors (WITH domestic hot water preparation) for the buffer tank.

⇢ Use sensors S1–S3–S5 or S1–S3–S4–S5 depending on the buffer tank diagram.

⇢ Route the sensor such that you can subsequently change the sensor positions.
Allow for sufficient reserve cable!

330	2	2-pole connection sensor PT1000	**Buffer storage tank 1 temperature**
331	2	2-pole connection sensor PT1000	**Buffer storage tank 2 temperature**
332	2	2-pole connection sensor PT1000	**Buffer storage tank 3 temperature**
333	2	2-pin connection sensor PT1000	**Buffer storage tank 4 temperature**
334	2	2-pole connection sensor PT1000	**Buffer storage tank 5 temperature**

4.3.2 Heating circuit

Several installation steps are required to activate the heating circuit.

⇢ Install an outside temperature sensor on the building's northern side.

Connector	Pins	Description	Function
327	2	2-pole connection sensor PT1000	**Outside temperature**

⇢ Install a forward flow temperature sensor for each heating circuit at the respective forward flow.

337	2	2-pole connection sensor PT1000	**Forward flow temperature heating circuit 1**
338	2	2-pole connection sensor PT1000	**Forward flow temperature heating circuit 2**

⇢ Install the heating circuit pump including mixer motor:

309	4	4-pole power supply 230 V_{AC}	**Heating circuit 1 mixer**
310	3	3-pole power supply 230 V_{AC}	**Heating circuit 1 pump**
307	4	4-pole power supply 230 V_{AC}	**Heating circuit 2 mixer**
308	3	3-pole power supply 230 V_{AC}	**Heating circuit 2 pump**

Optional

Carry out the following installation steps only if required.

⇢ Install the control units in the living quarters:

362	7	7-pole bus connection	**Control unit 1**
363	7	7-pole bus connection	**Control unit 2** (is delivered bridged)

• Install one release contact or request contact:

322	2	2-pole digital input 24 V_{DC} Is delivered bridged.	**Release heating circuit 1**
323	2	2-pole digital input 24 V_{DC} Is delivered bridged.	**Release heating circuit 2**

4.3.3 Pumps/mixer (WMM)

Pumps

The respective Comfort 4 connections are suitable for energy-saving pumps ("category A").

Connector	Pins	Description	Function
301	3	3-pole supply 230 V_{AC}	**Pump/valve for secondary heating source / For boiler master-and-slave circuit: Fault duration - output**
302	3	3-pole supply 230 V_{AC}	**Solar pump 2** or **switchover valve**
303	3	3-pole supply 230 V_{AC}	**Solar pump**
304	3	3-pole power supply 230 V_{AC}	**Circulation pump**
305	3	3-pole supply 230 V_{AC}	**DHW pump / For boiler master-and-slave circuit: Fault interval - output**

306	3	3-pole power supply 230 V_{AC}	**Feeder pump/valve or buffer charging pump**
310	3	3-pole power supply 230 V_{AC}	**Heating circuit 1 pump**
308	3	3-pole power supply 230 V_{AC}	**Heating circuit 2 pump**

Mixer

309	4	4-pole power supply 230 V_{AC}	**Heating circuit 1 mixer**
307	4	4-pole power supply 230 V_{AC}	**Heating circuit 2 mixer**

4.3.4 Fault contact + multi-function outputs

Four (4) multi-function outputs (floating switch contacts) are available for the following functions.

Multi-function outputs 1, 2 and 4: (#125, #127 and #126)

The following options are also possible as alternatives!
NO contact (in de-energized state as well as "main switch: Off", contact open) configurable for:

- `Fault`
  To display faults (can be configured as "NC" or "NO" contact)
- `Request conveyor system`
  As request contact for switching an external conveyor system
- `Automatic boiler`
  As request contact for switching and/or requesting an automatic boiler.
- `Burner operating display`
  Output closed if the boiler is in operation
- `Boiler master-and-slave circuit`
  To request a second boiler (e.g. to cover peak loads)
- `TMFS optical alarm`
  To connect an optical warning device if the sensor at the conveyor channel triggers an alarm
- `TMFS acoustic alarm`
  To connect an acoustic warning device if the sensor at the conveyor channel triggers an alarm
- `Smoke extractor`
  As request contact to switch an external smoke extractor or an air inlet flap
- `Boiler pump`
  For the potential-free switching of boiler pumps with release contacts

Connector	Pins	Description	Function
125	2	2-pole floating contact, max. 10 A	**Multi-function output 1**
126	2	2-pole floating contact, max. 10 A	**Multi-function output 4**
127	2	2-pole floating contact, max. 10 A	**Multi-function output 2**

Multi-function output 3 (#124):

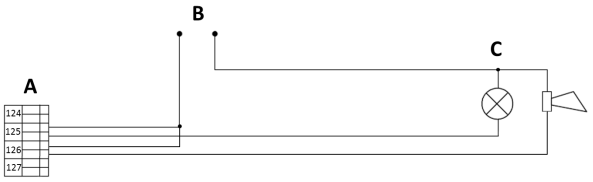
The following options are also possible as alternatives!
NC contact (in de-energized state as well as "main switch: Off", contact closed) configurable for:

- `Fault`
  To display faults (can be configured as "NC" or "NO" contact)
- `Automatic boiler`
  As request contact for switching and/or requesting an automatic boiler
- `Boiler master-and-slave circuit`
  To request a second boiler (e.g. to cover maximum loads)
- `TMFS optical alarm`
  To connect an optical warning device if the sensor at the conveyor channel triggers an alarm
- `TMFS acoustic alarm`
  To connect an acoustic warning device if the sensor at the conveyor channel triggers an alarm
- `Fault shutdown`
  To indicate faults that trigger a boiler shutdown

Connector	Pins	Description	Function
124	2	2-pole floating contact, max. 10 A	**Multi-function output 3**

Wiring example when using the "TMFS acoustic/optical alarm":

- Multi-function output #125 configured for "TMFS alarm optical“
- Multi-function output #126 configured for "TMFS alarm acoustic“



A	#124-127: floating contacts, max. 10 A
B	External power supply
C	Optical signal (lamp) and acoustic signal (horn)

4.3.5 External

NOTE! 24 VDC power supply to connect floating contacts!

3 external inputs are available:

External 1:

This is where you connect external safety devices (low water pressure switch ...).

If this input is not used, it must be bridged.

Connector	Pins	Description	Function
230	2	2-pole digital input 24 V_{DC}	**Combustion release** ("External 1") (Is delivered bridged.)

External 2 (multi-function input):

- Heating to setpoint 2:
  To request the boiler with the second boiler setpoint temperature or as a request contact for external third-party control systems (request duration should be at least 30 minutes).
- Holiday remote control:
  If the contact is closed, all consumers are "on holiday."

231	2	2-pole digital input 24 V_{DC}	**Multi-function input** ("External 2"), e.g. Heating to setpoint temperature 2

External 3:

Serves as release contact by the smoke extractor or exhaust gas shutter (factory setting: bridged).

232	2	2-pole digital input 24 V_{DC}	**Released by the smoke extractor** (delivered bridged)

4.3.6 External temperature/output specification

Two analogue inputs are available, optionally 0-20 mA | 4-20 mA or 0-10 V for the external output **or** temperature specification.

Specification via 0-20 | 4-20 mA signal

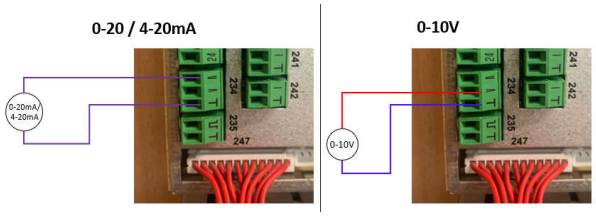
0-20 mA: < 1 mA request `Off` | > 2 mA request `On`

4-20 mA: < 2 mA request `Off` | ≥ 4 mA request `On`

Specification per 0-10 V signal

< 0.5 V request `Off` | > 1.5 V request `On`

234	3	3-pole connection sensor 4—20 mA | 0—20 mA | 0—10 V	**External SETPOINT boiler temperature or external burner output**



4.3.7 DHWC

Several installation steps are required to activate the DHWC.

⇢ Install a temperature sensor at the storage tank:

Connector	Pins	Description	Function
328	2	2-pole connection sensor PT1000	**Temperature DHWC 1 / Only with boiler master-and-slave circuit: Temperature forward flow network**

⇢ Install a DHW pump:

305	3	3-pole supply 230 V_{AC}	**DHW pump / For boiler master-and-slave circuit: Fault interval - output**

4.3.8 Circulation

⇢ Install a circulation pump – If required, a push-button can send the external start signal to the pump:

Connector	Pins	Description	Function
304	3	3-pole power supply 230 V_{AC}	**Circulation pump**

Option

⇢ If required, install a return flow temperature sensor on the metal of the circulation return flow:

329	2	2-pole connection sensor PT1000	**Circulation temperature**
320	2	2-pole digital input 24 V_{DC}	**Circulation, push button**

4.3.9 Secondary heating source

Several installation steps are required to activate an additional heating source.

⇢ Install the pump or the valve for the secondary heating source:

Connector	Pins	Description	Function
301	3	3-pole supply 230 V_{AC}	**Pump/valve for secondary heating source / For boiler master-and-slave circuit: Fault duration - output**

⇢ Install a request contact if the secondary heating source is an automatic boiler:

311	2	2-pole floating contact, max. 10 A	**Secondary heating source request / For boiler master-and-slave circuit: Peak-load boiler request**

Option

Optionally, you can also clip the exhaust gas thermostat to plug #230 ("Extern 1") if the secondary heating source is a manually filled boiler:

230	2	2-pole digital input 24 V_{DC}	**Combustion release** ("External 1") (Is delivered bridged.)

⇢ Install a temperature sensor for the secondary heating source:

342	2	2-pole connection sensor PT1000	**Secondary heating source temperature**

If a manually filled secondary heating source charges the buffer tank, you must always use sensor S5 for the differential charge.

4.3.10 Solar

4.3.10.1 Connection to the heat management module [WMM]

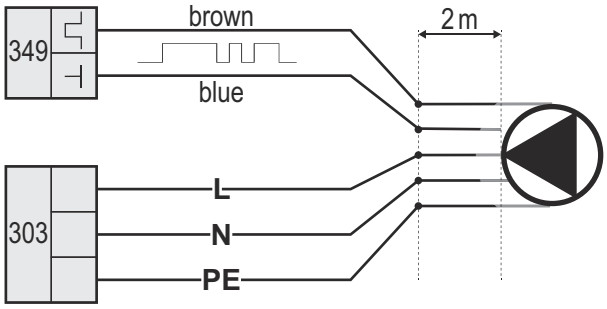
Attention: Solar control is only possible in the version Heat management module [WMM] with 2 heating circuits and the universal Heat management module! The storage tanks must be connected to the same Heat management module as the solar system (exception: buffer 0).

⇢ Install a temperature sensor at the collector.

↳ The temperature sensor must be installed in the sensor sleeve closest to the collector field forward flow. To ensure optimum contact, the gap between sensor sleeve and sensor element must be filled with a suitable heat-conducting paste. When installing the sensor, only materials that can withstand the respective temperatures (up to 250 °C) must be used (sensor with silicone cable, contact paste, cable, sealing materials, insulation).

Connector	Pins	Description	Function
339	2	2-pin connection sensor PT1000	**Temperature, collector**

⇢ Install the collector pump.



↳ If using a pump without [PWM] activation, the 349 plug is not connected.

↳ **Attention:** If using a pump with [i-PWM] activation, the black wire is NOT used and must be insulated.

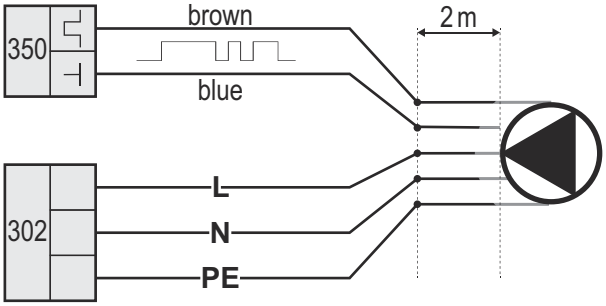
Connector	Pins	Description	Function
303	3	3-pole supply 230 V_{AC}	**Solar pump**
349	2	2-pole connection actuator	**Solar PWM signal pump 1**

Optional

⇢ If required (depending the used solar schematic diagram): Install collector pump 2.
Note: If required, the output can be inverted!

↳ If using a pump without [PWM] activation, the 350 plug is not connected.

↳ **Attention:** If using a pump with [i-PWM] activation, the black wire is NOT used and must be insulated.



Connector	Pins	Description	Function
302	3	3-pole supply 230 V_{AC}	**Solar pump 2** or **switchover valve**
350	2	2-pole connection actuator	**Solar PWM signal pump 2**

Optional

⇢ If required (depending the used solar schematic diagram): Install the switchover valve (instead of collector pump 2).

Connector	Pins	Description	Function
302	3	3-pole supply 230 V_{AC}	**Solar pump 2** or **switchover valve**

Optional

⇢ If required (depending the used solar schematic diagram): Install the solar temperature sensor in the lower area of the DHWC (at the level of the solar register).

↳ Route the sensor such that you can subsequently change the sensor positions.

↳ **Note:** Allow for sufficient reserve cable!

Connector	Pins	Description	Function
341	2	2-pole connection sensor PT1000	**Temperature DHWC 2 / Only with boiler master-and-slave circuit: Temperature return flow network**

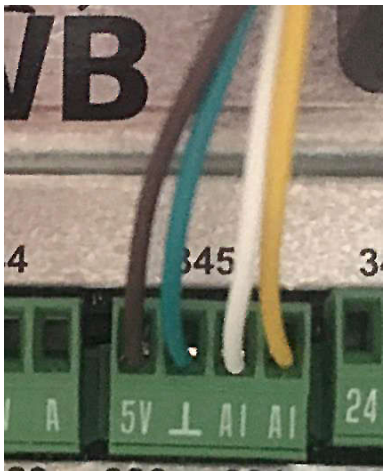
Optional

⇢ If required: Install the Vortex flow sensor in the return flow to count the heat quantity. (Diagram 4 – heat exchanger – in the primary circuit)

↳ **Attention:** The maximum cable length between flow sensor and Heat management module [WMM] is 3 m!

↳ **Note:** To avoid damage to the flow sensor due to the high flow rate and air pockets (air bubbles) when flushing the solar system, the Vortex flow sensor should be installed using a bypass line.

↳ Remove the existing plug at the cable and connect the 4 wires as follows at plug 345 at the WMM Heat management module [WMM]:



Description of individual wires		
5V	brown	supply voltage
⊥	Green	Ground
AI	White	Flow signal
AI	Yellow	Temperature signal

Connector	Pins	Description	Function
345	4	4-pole connection	**Solar flow & temperature sensor (vortex) for heat quantity measurement**

Optional

⇢ If required: Install the forward flow temperature sensor of the heat quantity meter (close to the inlet to the storage tank to be charged).

↳ **Note:** Plug 340 can be used either for the forward flow temperature sensor of the external heat exchanger and/or for the forward flow temperature sensor of the heat quantity meter.

Connector	Pins	Description	Function
340	2	2-pole connection sensor PT1000	**Temperature forward flow solar**

Optional

⇢ If required, (depending to the used solar schematics diagram) install the forward flow temperature sensor of the external heat exchanger close to the inlet to the heat exchanger. (primary)

↳ **Note:** Plug 340 can be used either for the forward flow temperature sensor of the external heat exchanger and/or for the forward flow temperature sensor of the heat quantity meter.

Connector	Pins	Description	Function
340	2	2-pole connection sensor PT1000	**Temperature forward flow solar**

4.4 KWB Comfort 4 electrical connections

Modular

The KWB Comfort 4 control platform is a modularly designed bus system that is used to operate and regulate the KWB biomass heating systems.

The central element is the bus that connects almost all components with each other: The entire communication is processed via this bus, from the exchange of measuring data to the implementation of user entries.

4.4.1 Equipotential bonding

⚠ CAUTION **Differences in voltage can damage the electronics and endanger your safety**

↘ The equipotential bonding is important in order to prevent voltage differences between parts of the system.

⇢ Connect the system as prescribed by regulations to the equipotential bonding strip via the connected pipe system.

4.4.2 Cabling

A network connects the components of the KWB Comfort 4 control system.

Boiler bus

The boiler bus connects ...

- Boiler power module
- Boiler signal module

House bus

The house bus connects ...

- Heat management module (Option)

Control unit bus

The control unit bus connects the WMM with max. 2 control units:

- Basic control unit
- Exclusive control unit

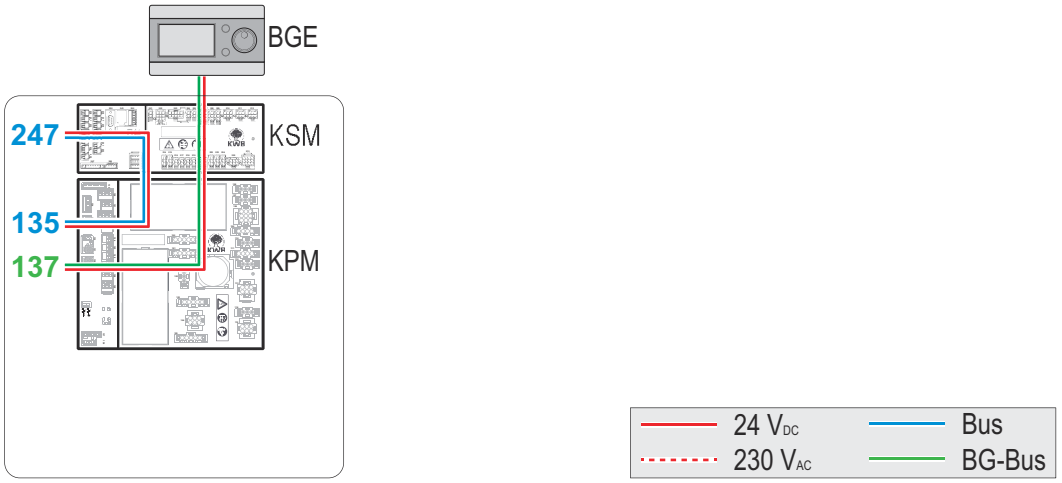
Exception: The control unit at the boiler is connected to the Boiler power module.

4.4.2.1 Network examples

WMM	Heat management module	KSM	Boiler signal module
KPM	Boiler power module	BGB	Basic control unit
BGE	Exclusive control unit	BGBS	Mounting base for Basic control unit
BGES	Mounting base for Exclusive control unit	Bus	Boiler bus and/or house bus
BG bus	Control unit bus		

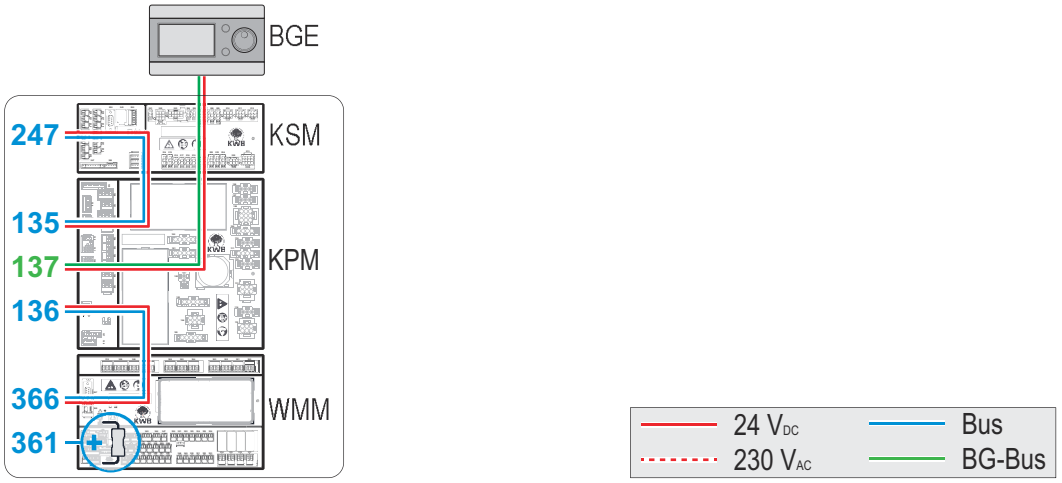
Note: The first operating device (Basic control unit or Exclusive control unit) must always be connected at input 362. The second operating device (is any) at input 363 (see **Control unit cabling [►55]**).

Simplest network – WITHOUT heat management module

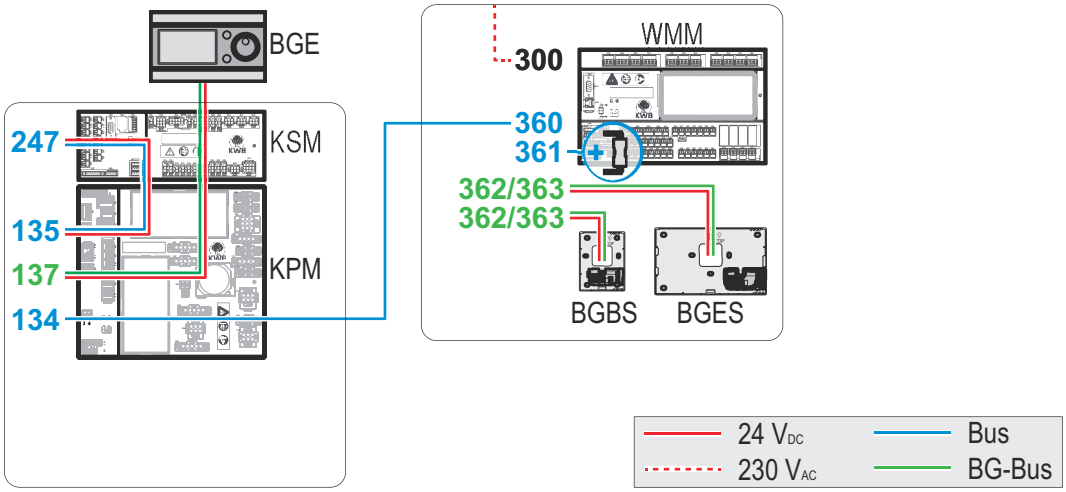


Network with 1x heat management module

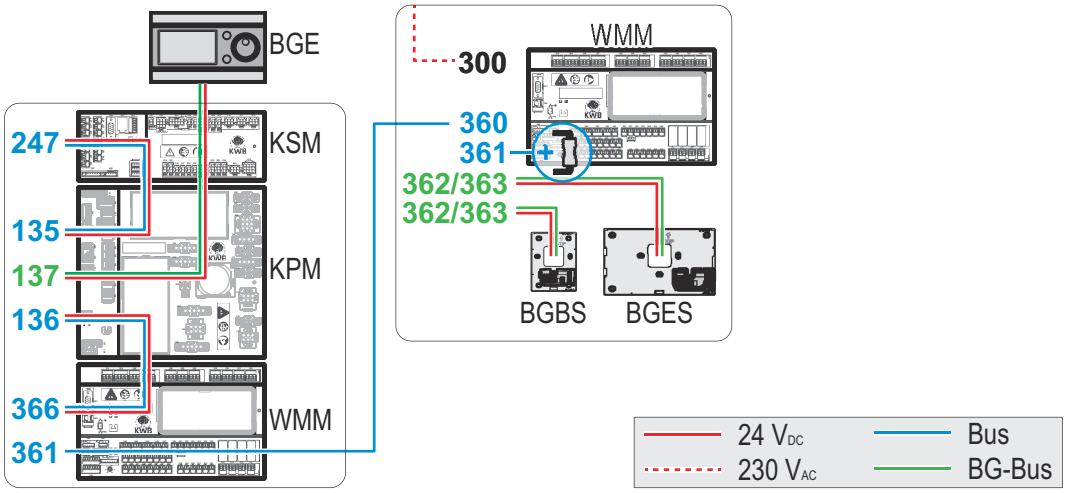
WMM in the boiler



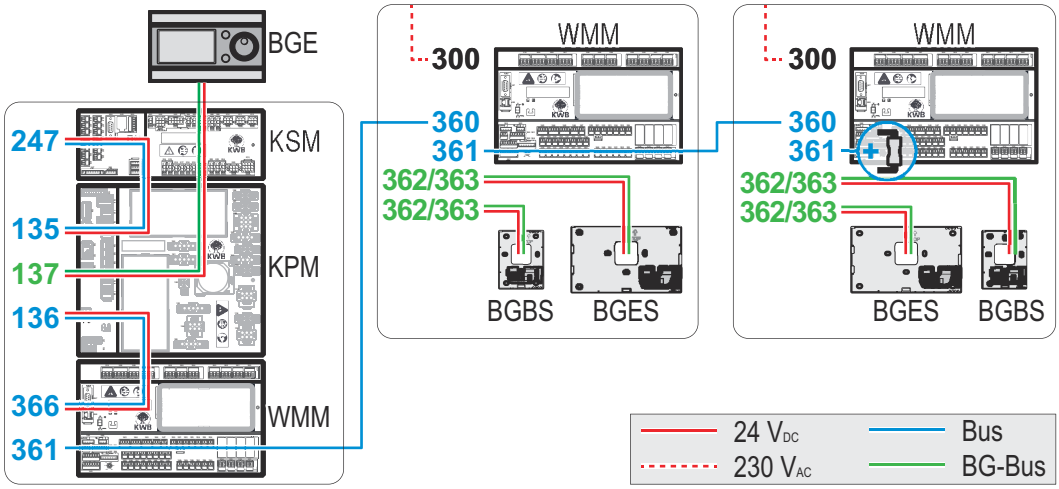
WMM external



Network with 2x heat management modules



Network with 3x heat management modules



Please also see

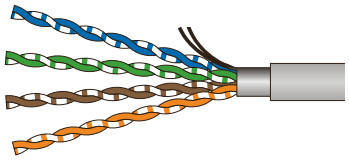
Control unit cabling (▶55)

4.4.2.2 Cable assignment

NOTE	**The following must be observed with regard to the bus wiring!**
	⇢ A Cat.5 cable can be used for the bus cabling if the total bus cabling length is less than 100 m.
	⇢ If the total length of the bus cabling amounts to more than 100 m, a CAN bus cable must be used. For bus lengths of **more than 100 m**, we recommend using a CAN bus cable of the type "UNITRONIC BUS DN THIN FD P pair number & AWG size: 1x2xAWG24 + 1x2xAWG22" (Art.No.: 2170345).

Cat.5 cable

⇢ Use a Cat.5 cable (twisted & screened/shielded) for the bus cabling.



blue	[CAN Ground]
Blue-white	Return flow *(only for unfavourable cabling)*
Green	Data transfer
Green-white	
brown	24 V_{DC} and GND **for control unit**
Brown-white	
black	Cable screening/shielding
Orange	Return flow *(only for unfavourable cabling)*
Orange-white	

Maximum length

With proper cabling using a Cat5 cable, the house bus will function up to a length of 100 meters.

- In this case, you will also have to count in the **return wires** used!
- The cable lengths to the **control units are NOT** included in the calculation!

CAN bus cable

⇢ Using of a CAN bus cable for the bus cabling.

	Colour	Description		Connection on
1	Blue (CAN high)	Data pair – data transmission		Green
2	White (CAN low)			Green-white
3	Silver	Cable screening/shielding		black
4	Red (not used)	Power pair – 24 V_{DC} and GND **for control unit**		-
5	Black (CAN ground)			blue

Maximum length

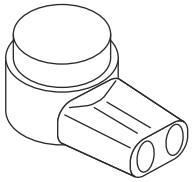
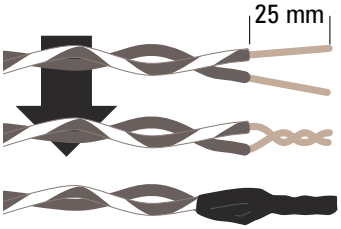
With proper cabling using a CAN bus cable, the house bus will function up to a length of 900 meters.

- In this case, you will also have to count in the **return wires** used!
- The cable lengths to the **control units are NOT** included in the calculation!

4.4.2.3 Connecting the cable

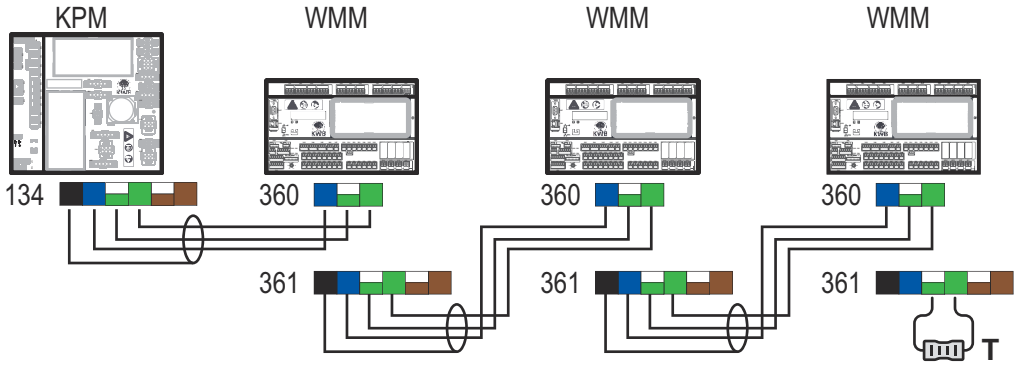
↘ Ensure optimally established contacts at the cable ends: Badly established contacts may result in unforeseen problems!

⇢ Use individual wire connectors or twist the Litz wires individually with one another.

CORRECT: Individual wire connectors	CORRECT: Twist litz wires	INCORRECT: 230 V connection techniques
		Note that all connection techniques intended for 230 V are NOT allowed. (terminal strips, push terminals, etc.)
(e.g. 3M Scotchlok) Insert Litz wires, crimp - done!	Strip litz wires 25 mm, twist, and insulate with shrink hose	

⇢ **Tip:** Always ensure that the connection has strain relief.

4.4.2.4 House bus cabling

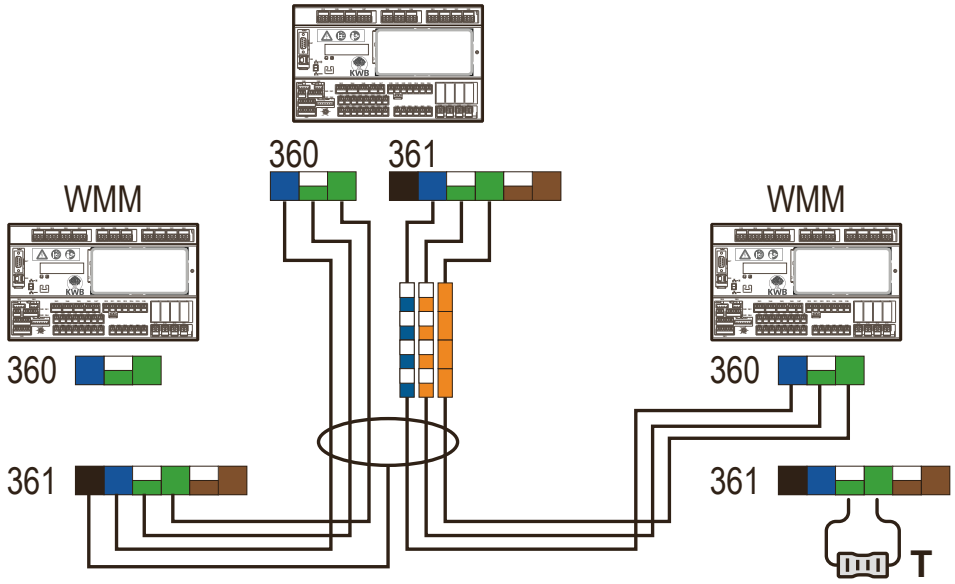


KPM	Boiler power module	T	Terminating resistor
WMM	Heat management module		

Unfavourable cabling

In case of unfavourable cabling, the three unused litz wires of the Cat.5 cable (blue-white, orange-white and orange) can be used as return wires:

Note: This is not possible when using a CAN bus cable!



Bus cabling with return wire (Cat.5 cable – up to a max. of 100 m)

4.4.2.5 Cabling lightning protection module (optional)

Surge voltage protection – lightning protection module (optional)

⇢ The optionally lightning protection module for the bus system is to be connected respectively (Art. No.: 13-2000454 – Instructions for the Lightning Protection Module).

4.4.2.6 Terminating resistor

To ensure that the data bus signals are not reflected at the end of the cabling (and thus disturb the detection of the next signals!), you must check the terminating resistor at the end of the house bus cabling ("terminate")!

↘ The terminating resistor is available on all Heat management module [WMM].

⇢ Remove all terminating resistors between the last Heat management module [WMM] and the Boiler power module [KPM].

⇢ Leave the terminating resistor only at the last Heat management module [WMM].
The terminating resistor connects the contacts green and green-white.

Warning: Do not install a terminating resistor with the control units!

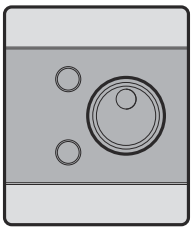
4.4.3 Control units

KWB Comfort 4 offers several options to control your heating system:

- The Basic control unit is a cost-effective, easy to use control frequent performed actions.
- The Exclusive control unit provides extensive control over the heating system.

With a maximum of 14 heating management modules and 2 control units per heating management module, the maximum number is 28 control units per bus. In addition, there are the directly connected BGEs in the Exclusive heat management modules.

4.4.3.1 Basic control unit [BGB]



You can change the settings for a heating circuit via the buttons and the dial.

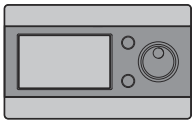
- Size: 103×122 mm
- For installation on the wall, the Basic control unit [BGB] is inserted in the supplied unit base [BGBS]. The room temperature sensor is integrated in the base.
- The LEDs light up green or red.
- The setpoint room temperature can be corrected by ±5°C via the dial.
- Two buttons permit switching between programs and enable theactivation of the DHW quick charge (heating DHW 1x).
- Every Basic control unit [BGB] comes with two designer covers in white and black; these can be installed without tools to replace the silver standard designer cover.

Bus The module is connected to the WMM via the control unit bus.

Voltage The power supply comes from the Heat management module via the Cat.5 cable (up to max. 100 m total length).

- One Basic control unit [BGB] is possible per heating circuit.

4.4.3.2 Exclusive control unit [BGE]



You can change the settings for boilers, heating circuits, buffer storage tanks and DHWC via the buttons and the dial or the 4.3" touch screen ("touch screen") ...

- Size: 200×122 mm
- A Exclusive control unit [BGE] must be available at the boiler or at the Heat management module Exclusive [WMM].
- To mount the Exclusive control unit [BGE] on a wall, it is inserted into a separately supplied control unit base [BGES]. The room temperature sensor is integrated in the base.
- The number of Exclusive control unit [BGE]s in the network is limited to 30.
- Every Exclusive control unit [BGE] has an SD card slot for software updates at the lower edge.
- Every external Exclusive control unit [BGE] comes with two designer covers in white and black; these can be installed without tools to replace the silver standard designer cover.

Bus The module is connected to the WMM via the control unit bus.

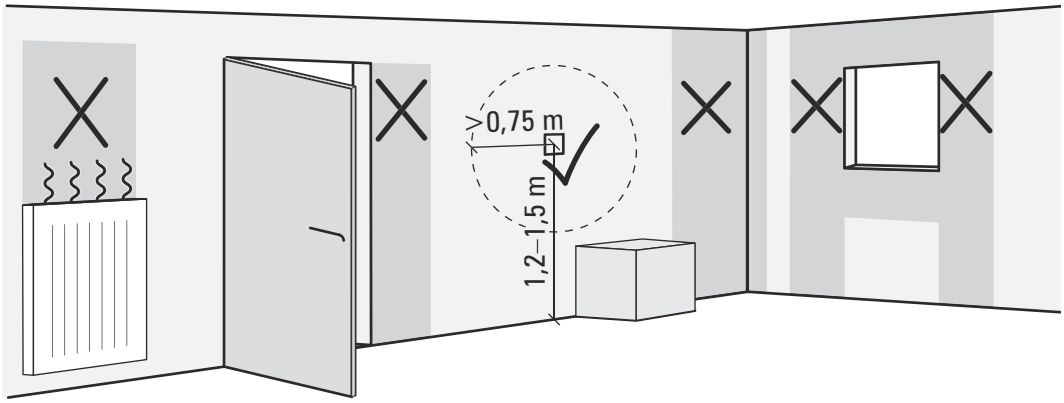
Voltage The power supply comes from the Heat management module via the Cat.5 cable (up to max. 100 m total length).

In the room The majority of the parameters are accessible, even if the Exclusive control unit [BGE] is used externally (e.g. in the living room) – Only the actuators cannot be controlled manually!

4.4.3.3 Correct positioning

The correct positioning of the control units is important if the temperature probes integrated in the control units are used for heating regulation.

If you use control units without temperature measuring, you can position the control units at any desired place in the living quarters.



Using control units with room temperature measuring

- ⇢ Use the coolest room that you spend time in during the day.
- ⇢ Install the control units at a height of 120–150 cm.
- ⇢ Make sure to leave a distance of 100 cm between the control units and doors and windows.
- ⇢ Avoid heating sources (heating units, chimneys, heating pipes in the wall, but also electronic devices such as TVs!) and direct sunlight (keep the position of the sun in winter in mind!).
- ⇢ Avoid positioning the unit in room corners, niches or shelves: There is not enough air circulation available!
- ⇢ Avoid uninsulated outer walls.
- ⇢ The control units must not be covered (e.g. by curtains).

Warning: No other sensor must be active in this room that might be able to influence the control: If the radiators contain thermostatic valves, they should always be fully open!

Optimum position

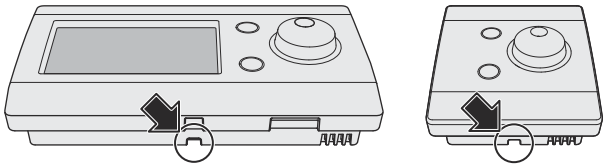
- ⇢ Install the control units at a free and unobstructed internal wall with 75 cm free space on each side to ensure that the integrated room temperature sensor is able to function properly!

On the wall

The unit base for the control unit must always mounted **on** the wall: An installation under the plaster would obstruct the function of the temperature sensor!

4.4.3.4 Open the control unit

Control units are clamped onto the mounting base without screws.

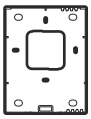
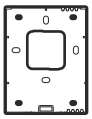
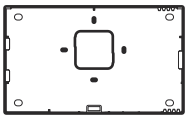
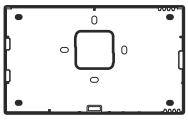


- ⇢ Use a pen to push into the recess on the lower side of the control unit to release the lock as illustrated in the picture.
- ⇢ **NOTE! Please note when using the control unit that a short cable links the control unit to the mounting base!**

4.4.3.5 Mount and connect

Base

- ⇢ Secure the mounting base with the 4 supplied screws.

On a socket installed under the plaster	With wall anchors
	
	
⇢ Secure the mounting base exactly aligned with the socket under the plaster.	⇢ Insert the wall anchors at the desired position of the control unit. ⇢ Screw the mounting base to the wall anchors.

Cable

⇢ Pull the Cat.5 cable (up to a max. length of 100 m) from the rear through the large opening in the mounting base.

⇢ Ensure that you have enough reserve cable before you fasten the Cat.5 cable with a cable binder at the mounting base.

⇢ Always seal the cable duct against draughts!
Only then you can be sure that the measured temperature will be accurate!

Control unit

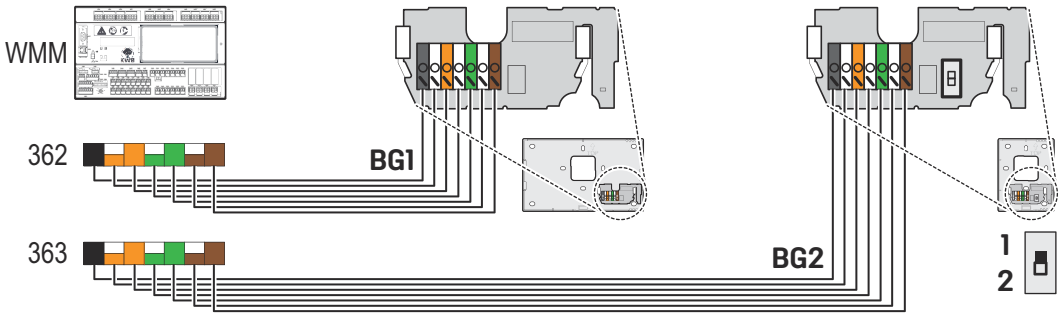
⇢ Connect the control unit with the mounting base.

⇢ Place the control unit – true to side – inclined from below at the two upper corners of the mounting base. Then, push the control unit's lower edge onto the mounting base: The control unit will make an audible noise when it snaps into place!

⇢ The control unit packaging contains the upper and lower lids in 2 additional covers. Insert the lids in the desired colours.

⇢ Only for Basic control unit:
In the control unit packaging you will find a removable card containing an explanation of symbols in several languages. Remove your desired language and place the strip in the lower lid.

4.4.3.6 Control unit cabling



WMM	Heat management module		
BG1	1. Control unit, e.g one Exclusive control unit	BG2	2. Control unit, e.g one Basic control unit

Terminating resistor

When cabling the control units, NO termination is required!

⇢ Use plug 362 for the first control unit that you connect to the Heat management module [WMM]!

⇢ If you use plug 363 for an additional control unit, you will first have to remove the existing bridges!

Only for Basic control unit [BGB]:

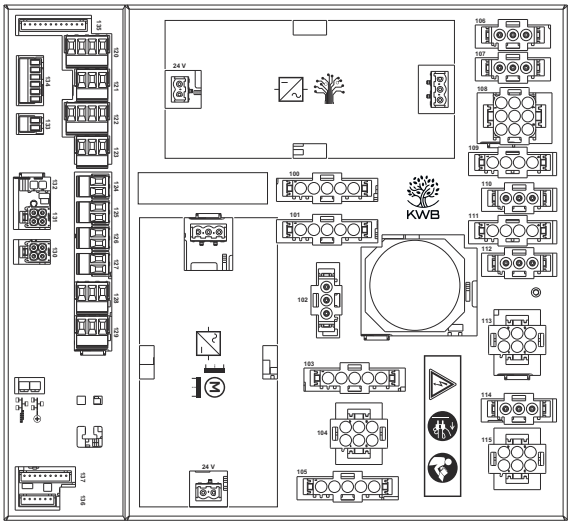
1
2

↘ The base for the Basic control unit [BGBS] contains a DIP switch which specifies the address for the Basic control unit [BGB].

⇢ When you connect two BGBs with a Heat management module [WMM], you must specify a unique address for every BGB (control unit Basic).

4.4.4 Boiler power module [KPM]

The boiler-dependent Boiler power module contains all required power connections for motors and actuators that use mains voltage (230/400 V_{AC}) as well as the safety switches.

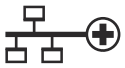
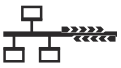


The illustration shows a fully equipped circuit board. Individual connections might be missing depending on the usage. As a replacement part, the circuit board always comes fully equipped and the software detects the specific use and releases the required parts/interfaces.

Bus The module is connected to other bus devices via the control unit bus.

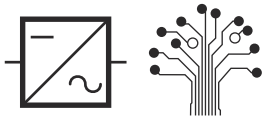
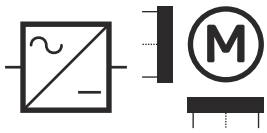
LED displays

The circuit board contains 2 LEDs that show the house bus status.

LED behaviour		
Flashing red	Adjusting the data rate	–
Flashes red 1x	CAN error	–
Red light (not flashing)	No bus, bus reset	CAN error
Flashing green	Waiting for the BGE connection	**OK** (CAN activity)
Green light	**OK**	No activity

Power supply units

The Boiler power module contains slots for two pluggable power supply units.

1. Power supply unit	2. Power supply unit
	
Always required.	Only required for the power supply of the KWB Multifire and KWB Pelletfire Plus multi-phase motors.

For an output voltage of 24 V_{DC}, the input voltage must be between 161 V_{AC} and 264 V_{AC} and the frequency between 45—63 Hz.

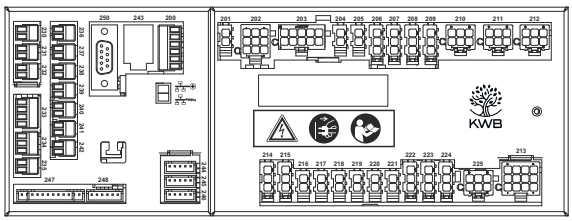
4.4.4.1 Plug at the KPM

Connector	Pins	Description	Function
100	5	3-pole power supply 230 V_{AC}	Boiler power supply (L1 to L3 bridged)
101	5	5-pin power supply 230 V_{AC}	Outgoing power supply for supplementary circuit board
102	3	3-pole power supply 230 V_{AC}	Suction turbine
104	6	6-pole power supply 230 V_{AC}	Conveyor motor/drum motor (1-2-3) and main drive (4-5-6)
108	9	9-pin supply 230 V_{AC}	Mixer or valve for return flow boost (1-2-4-7)
109	4	4-pin supply 230 V_{AC}	As #122, but plug
110	3	3-pin supply 230 V_{AC}	Revolving grate (motor)
111	2	2-pin digital input 230 V_{DC}	Safety temperature limiter (STL)
112	3	3-pin supply 230 V_{AC}	Ignition
113	6	6-pole supply 230 V_{AC}	Heat exchanger cleaning (1-2-3) and induced draught (4-5-6)
115	6	6-pole power supply 230 V_{AC}	Fan, combustion air (1-2-3)
120	4	4-pole power supply 230 V_{AC}	**Mixer for return flow boost**
121	3	3-pole supply 230 V_{AC}, max. 200 W	**Boiler circuit pump or buffer charging pump**
122	4	4-pin supply 230 V_{AC}	Washing unit (only for EF2 CC4)
123	3	3-pole supply 230 V_{AC}	**Feeder pump/valve or buffer charging pump 0**
124	2	2-pole floating contact, max. 10 A	**Multi-function output 3**
125	2	2-pole floating contact, max. 10 A	**Multi-function output 1**

126	2	2-pole floating contact, max. 10 A	**Multi-function output 4**
127	2	2-pole floating contact, max. 10 A	**Multi-function output 2**
128	3	3-pole digital input 230 V_{DC} Is delivered bridged.	**Reserve safety input, e.g. for the low water pressure switch**
129	3	3-pin digital input 230 V_{AC}	Emergency stop ("emergency escape switch")
130	4	4-pin digital input 24 V_{DC}	Ash container switch removed (1-3)
131	4	4-pin digital input 24 V_{DC}	Sensor for overfill protection cover at the conveyor channel (must remain bridged in Easyfire, Combifire and Classicfire!)
132	2	2-pin digital input 24 V_{DC}	Temperature monitor fuel storage (TMFS) (must either remain bridged or must be used!)
133	2	2-pin digital input 24 V_{DC}	**CO sensor** [EF2]
134	6	6-pole bus clamp	House bus [OUT]
135	12	12-pole bus flat connector	Boiler bus [OUT]
136	6	6-pole bus flat connector	Outgoing bus connection for supplementary circuit board
137	9	Bus flat connector (3 + 4 = unused. 9 = screen/shield.)	House bus [IN] + 24 V_{DC} control unit and boiler bus [IN] + 24 V_{DC} control unit Only to be used for the boiler control unit!

4.4.5 Boiler signal module [KSM]

The boiler-dependent Boiler signal module [KSM] contains the connections for all sensors (boiler, outside temperature, buffer storage tank, external) and offers a serial interface.



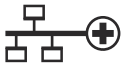
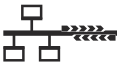
The illustration shows a fully equipped circuit board. Individual connections might be missing depending on the usage. As a replacement part, the circuit board always comes fully equipped and the software detects the specific use and releases the required parts/interfaces.

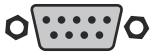
Voltage The module receives its voltage (24 V_{DC}) from the Boiler power module [KPM].

Bus The module is connected to the Boiler power module [KPM] via the boiler bus.

LED displays

The circuit board contains 2 LEDs that show the house bus status.

LED behaviour		
Flashing red	Adjusting the data rate	–
Flashes red 1x	CAN error	–
Red light (not flashing)	No bus, bus reset	CAN error
Flashing green	Waiting for the BGE connection	**OK** (CAN activity)
Green light	**OK**	No activity



Serial interface

The serial interface (RS232) is the basis for future expansions and various connections (e.g. GSM module). NO power supply has been integrated for connected components!

RJ12 socket

The 6-pole RJ12 sockets integrates an GSM module and supplies it with power.

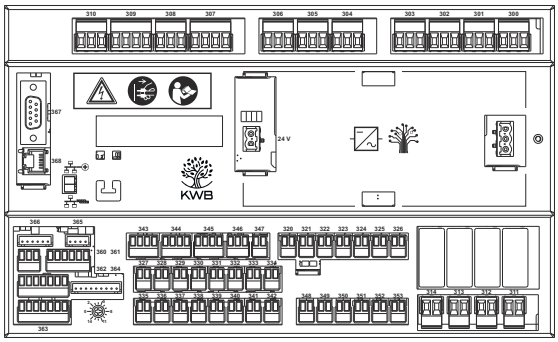
4.4.5.1 Plug at the KSM

Connector	**Pins**	**Description**	**Function**
200	6	6-pole connection sensor	Lambda probe
202	9	9-pole connection sensor	Fill level 1 (2-5-8)
203	10	10-pin connection sensor	Temperature protection switch, conveyor system (pin 2, 7) or drum position (pin 2, 7)
204	2	2-pole connection, push button	Measuring mode switch
209	3	3-pole connection sensor	Main drive, speed
210	6	6-pole connection sensor	Combustion air, speed (1-2-3)
211	6	6-pin connection sensor	Induced draught, fan speed (4-5-6)
215	3	3-pole connection sensor	Negative pressure sensor 0—5 V_{DC}
217	2	2-pole connection sensor PT1000	Return flow temperature
218	2	2-pole connection sensor PT1000	Boiler forward flow temperature
220	2	2-pole connection sensor type K	Flame temperature
230	2	2-pole digital input 24 V_{DC}	**Combustion release** ("External 1") (Is delivered bridged.)
232	2	2-pole digital input 24 V_{DC}	**Released by the smoke extractor** (delivered bridged)
234	3	3-pole connection sensor 4—20 mA | 0—20 mA | 0—10 V	**External SETPOINT boiler temperature or external burner output**
235	2	2-pole connection, actuator	**Boiler circuit pump PWM 10 V** $_{DC}$

237	2	2-pole connection sensor PT1000	**Outside temperature**
238	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 1**
239	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 2**
240	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 3**
241	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 4**
242	2	2-pole connection sensor PT1000	**Buffer storage tank temperature 5**
243	6	RJ12 plug	Power supply 24 V_{DC} for GSM module
247	12	12-pole bus flat connector	Boiler bus [IN] from KPM (#135)
248	6	6-pole bus flat connector	Boiler bus [OUT]
250	9	D-SUB 9M plug	RS232 interface, e.g. for GSM module

4.4.6 Heat management module [WMM]

Comprises all heat management connections.



The illustration shows a fully equipped circuit board. Individual connections might be missing depending on the usage. As a replacement part, the circuit board always comes fully equipped and the software detects the specific use and releases the required parts/interfaces.

Voltage

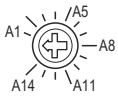
Board in the control box	**Board in the multi-function enclosure**
24 V_{DC} power supply by the Boiler power module:	Voltage supply 230 V_{AC} In this case, a power supply is required at the Heat management module

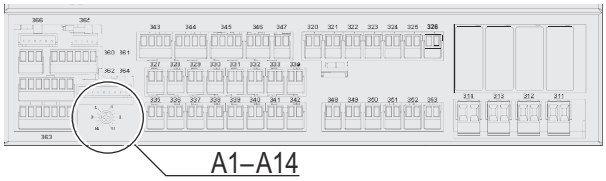
Bus

The module is connected to other bus devices via the control unit bus.

Board in the control box	**Board in the multi-function enclosure**
Bus connection through ribbon cable	Bus connection with Cat.5 cable (up to max. 100 m total length) or CAN bus cable (up to max. 900 m total length)

Node number





⇢ Use a unique node number for every module: Use a small screw driver to set the selector switch to a free node number.

- The number range for the Heat management module is A1 to A14.
- Maximally 14 heat management modules [WMM] maybe addressed per bus.

Versions

- Version with 1 heating circuit
  Enables control of 1 heating circuit with mixer control and pump activation, 1 buffer storage tank incl. activation of 1 buffer charging pump or activation of 1 supply pump (network pump), 1 DHWC, 1 circulation pump.
- Version with 2 heating circuits
  As described above, but for 2 heating circuits and the option to activate a second boiler and a solar system.

Scope of delivery

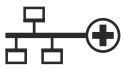
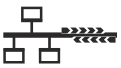
- 1 sensor for forward flow temperature
- 1 sensor for DHWC temperature
- 1 sensor for temperature in the circulation line
- 3 sensors for temperature in the buffer storage tank (4th and 5th sensor optionally possible)

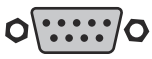
The version with 2 heating circuits also contains ...

- 1 sensor for forward flow temperature
- 1 sensor for temperature in the second boiler

LED displays

The circuit board contains 2 LEDs that show the house bus status.

LED behaviour		
Flashing red	Adjusting the data rate	–
Flashes red 1x	CAN error	–
Red light (not flashing)	No bus, bus reset	CAN error
Flashing green	Waiting for the BGE connection	**OK** (CAN activity)
Green light	**OK**	No activity



Serial interface

The serial interface (RS232) is the basis for future expansions and various connections (e.g. GSM module). NO power supply has been integrated for connected components!

RJ12 socket

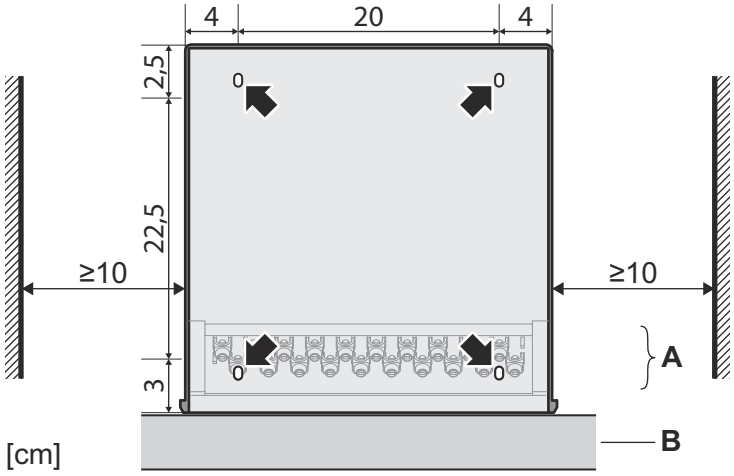
The 6-pole RJ12 sockets integrates an GSM module and supplies it with power.

4.4.6.1 Wall installation

Positioning the multi-function enclosure

Position the multi-function enclosure at a location where the connected sensors and actuators (pumps, mixers ...) will also be close by, e.g. at the heat distributor station of the respective building.

Mounting on the wall



A	Cable clamps	B	Cable duct (max. 40 mm deep)

↘ Leave a clearance of approximately 10 cm on both sides so that you can later loosen the side fastening of the cover with an appropriately short tool.

↘ Ideally, you should run the cables in the cable duct (e.g. 60x40 mm). Up to a depth of 40 mm, the cable duct can be installed directly at the multi-function enclosure without obstructing its operation.

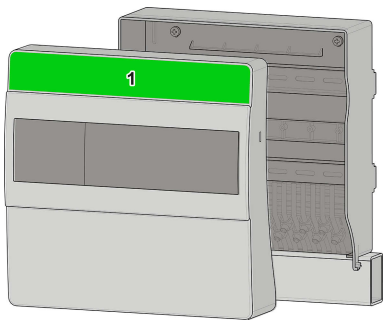
↘ The lower cup has 4 slotted holes.

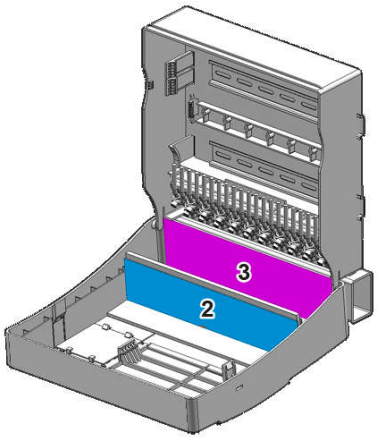
⇢ Open the enclosure and remove the cover.

⇢ Position the lower tray at the intended wall position and mark the hole positions (see arrows in the illustration) with a pencil on the wall.

⇢ Fasten the lower tray in the desired position with the 4 included screws.

⇢ Attach three labels (stickers) to the Heat management module [WMM] as follows:





1	Cover, outer side – front top	Sticker with symbols
2	Cover, inside – in the middle	Sticker "Outputs 230 V_{AC} ≤ 200 W"
3	Cover inside – bottom	Sticker "Inputs PT1000 temperature sensors"

Note: Replace the cover of the Heat management module only during installation & commissioning (see section).

4.4.6.2 Connecting dimensions

Max. permitted values: Total loads for all connections

Switching voltage	≤440 V_{AC} or 125 V_{DC}
Switching current	≤10 A
Switching power	≤2500 VA
Pumps	≤200 W (Category A)

4.4.6.3 Pulling in the cable

The multi-function enclosure offers 20 cable feedthroughs at its underside.

- ⇢ Thread the cables into the enclosure from below and fasten each cable at one cable clamp (1), respectively.
- ⇢ Ensure short cable paths, so select the cable feedthrough closest to the connector.
- ⇢ Keep the terminal compartment clear and avoid crossing wires and cables.
- ⇢ Always route signal and power supply cables separately!
- ⇢ Use the power cable in accordance with DIN VDE 0281-5 or local regulations.
- ⇢ Check the polarity of the connections.

Sensors

- ⇢ When connecting the sensors, there is no specified polarity; you only need to observe the correct connection in pairs.

Strain relief

- ⇢ To relieve the strain use a cable clamp for every cable.

4.4.6.4 Plug at the WMM

Connector	Pins	Description	Function

300	3	3-pole supply 230 V_{AC} (fuse rating 13A type B)	**supply voltage**
301	3	3-pole supply 230 V_{AC}	**Pump/valve for secondary heating source / For boiler master-and-slave circuit: Fault duration - output**
302	3	3-pole supply 230 V_{AC}	**Solar pump 2** or **switchover valve**
303	3	3-pole supply 230 V_{AC}	**Solar pump**
304	3	3-pole power supply 230 V_{AC}	**Circulation pump**
305	3	3-pole supply 230 V_{AC}	**DHW pump / For boiler master-and-slave circuit: Fault interval - output**
306	3	3-pole power supply 230 V_{AC}	**Feeder pump/valve or buffer charging pump**
307	4	4-pole power supply 230 V_{AC}	**Heating circuit 2 mixer**
308	3	3-pole power supply 230 V_{AC}	**Heating circuit 2 pump**
309	4	4-pole power supply 230 V_{AC}	**Heating circuit 1 mixer**
310	3	3-pole power supply 230 V_{AC}	**Heating circuit 1 pump**
311	2	2-pole floating contact, max. 10 A	**Secondary heating source request / For boiler master-and-slave circuit: Peak-load boiler request**
312	2	2-pole floating contact, max. 10 A	**Only for boiler master-and-slave circuit: Request boiler 1**
313	2	2-pole floating contact, max. 10 A	**Only for boiler master-and-slave circuit: Request boiler 2**
314	2	2-pin floating contact, max. 10 A	**Only for WMM autonomous: Fault duration**
320	2	2-pole digital input 24 V_{DC}	**Circulation, push button**
321	2	2-pole digital input 24 V_{DC}	**Only for boiler master-and-slave circuit: Fault boiler 1**
322	2	2-pole digital input 24 V_{DC} Is delivered bridged.	**Release heating circuit 1**
323	2	2-pole digital input 24 V_{DC} Is delivered bridged.	**Release heating circuit 2**
324	2	2-pole digital input 24 V_{DC}	**Only for boiler master-and-slave circuit: Fault boiler 2**
327	2	2-pole connection sensor PT1000	**Outside temperature**

328	2	2-pole connection sensor PT1000	**Temperature DHWC 1 / Only with boiler master-and-slave circuit: Temperature forward flow network**
329	2	2-pole connection sensor PT1000	**Circulation temperature**
330	2	2-pole connection sensor PT1000	**Buffer storage tank 1 temperature**
331	2	2-pole connection sensor PT1000	**Buffer storage tank 2 temperature**
332	2	2-pole connection sensor PT1000	**Buffer storage tank 3 temperature**
333	2	2-pin connection sensor PT1000	**Buffer storage tank 4 temperature**
334	2	2-pole connection sensor PT1000	**Buffer storage tank 5 temperature**
335	2	2-pole connection sensor PT1000	**Room temperature heating circuit 1 analog**
336	2	2-pole connection sensor PT1000	**Room temperature heating circuit 2 analog**
337	2	2-pole connection sensor PT1000	**Forward flow temperature heating circuit 1**
338	2	2-pole connection sensor PT1000	**Forward flow temperature heating circuit 2**
339	2	2-pin connection sensor PT1000	**Temperature, collector**
340	2	2-pole connection sensor PT1000	**Temperature forward flow solar**
341	2	2-pole connection sensor PT1000	**Temperature DHWC 2 / Only with boiler master-and-slave circuit: Temperature return flow network**
342	2	2-pole connection sensor PT1000	**Secondary heating source temperature**
345	4	4-pole connection	**Solar flow & temperature sensor (vortex) for heat quantity measurement**
349	2	2-pole connection actuator	**Solar PWM signal pump 1**
350	2	2-pole connection actuator	**Solar PWM signal pump 2**
360	3	3-pole bus connection	**House bus [IN] (remains open if installed in the boiler)**
361	6	6-pole bus connection	**House bus [OUT]** Delivered terminated (120 Ω). Must be removed in case of bus extensions!
362	7	7-pole bus connection	**Control unit 1**
363	7	7-pole bus connection	**Control unit 2** (is delivered bridged)
364	9	9-pole flat connector	**Control unit 3** – Only for the control unit directly in the multi-function enclosure!

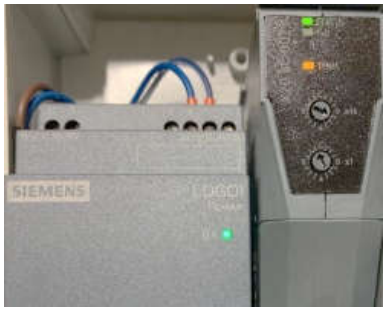
365	4	4-pole flat connector	**Connection to the LED row**
366	6	6-pole flat connector	**Input bus connection from the** Boiler power module **(#136)**
367	9	D-SUB 9M plug	**RS232 interface, e.g. for GSM module**
368	6	RJ12 plug	**Power supply 24 V_{DC} for GSM module**

4.4.6.5 Heat quantity meter KWB C4 M-bus module

With the M-bus interface, heat quantity meters can be read into the KWB Comfort 4 control via a KWB C4 M-bus module. The following types of heat quantity meters have been tested and approved by KWB:

- AMess model S3
- Kamstrup model 403W702AB
- Sharky models 774 & 775
- Siemens
  - WS.5..
  - WS.6..
  - UH50..
  - UH30..
  - WS.8..
- Danfoss SonoSafe 10

Cabling



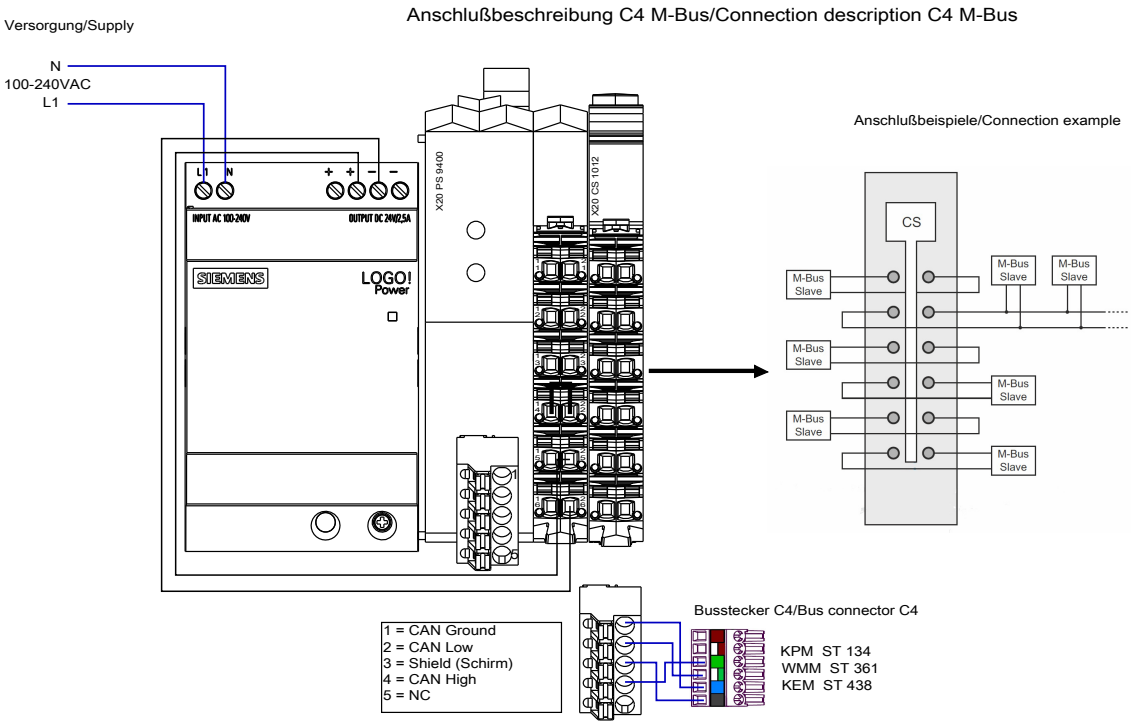
The KWB Comfort 4 M-bus module (art. no.: 13-2000549) can be installed at any location. It requires the following connections:

- Mains supply (230 V AC | 6A)
- Bus cabling to the Comfort 4 network (Cat 5e, as of 100 m CAN bus cable)

Please also see sections Cable assignment and Terminating resistor.

M-bus cabling

- Cable type: J-Y(ST)Y (LG indoor cable)
- Maximum cable length: 850 m
- Laying method: linear



Please also see

- Cable assignment (▶49)
- Terminating resistor (▶52)

4.4.7 Final steps

- ⇢ Leave the construction site in a clean condition.
- ⇢ Close the control box at the boiler.
- ⇢ Install the front casing and connect the Exclusive control unit [BGE].
- ⇢ Install the Exclusive control unit [BGE] on the front casing: First, hook the control unit in at the upper edges and then push the lower edge down.
- ⇢ Ensure strain relief for the cable to the Exclusive control unit [BGE].
- ⇢ Use the two screws to fasten the front casing to the boiler housing.

5 Chimney

5.1 Chimney requirements

Moisture-resistant according to DIN 18160

Due to the high boiler efficiency, the chimney design should be resistant to moisture. According to DIN 18160, these are chimney designs which prevent moisture penetration or damage to the brickwork, even though the temperature level in the exhaust path remains permanently below the exhaust gas dewpoint! Exceptions are only possible if the exhaust gas temperature is increased due to interventions in the device. However, boiler efficiency will be reduced by such a measure.

Chimney diameter

The approximate values for the chimney diameter are specified in the technical data table. They are valid for the applicable system size, given average constructional conditions. This means: Effective chimney height 8–10 m, 1.5 m exhaust pipe length, maximum 2 segment bends at 90° each, 1 contraction, 1 T-connection at 90°.

The cross-section diagrams provided by the chimney manufacturer can serve as a quick reference aid, if the site conditions are not less favourable than the conditions specified in the cross-section diagrams. If conditions differ or are less favourable, it is necessary to carry out a chimney calculation according to EN 13384-1. The boiler parameters required for the calculation are specified in the technical data table.

KWB provides an electronic data entry sheet for this purpose. Upon request, KWB will provide the chimney calculation based on the information provided on the form. This is a chargeable service.

The local expert for these issues is your responsible chimney sweep. It is advisable to involve the chimney sweep during the planning phase as he is the one who will have to issue the acceptance certificate for the exhaust gas system.

NOTE	**Approval required!**
	The chimney must be approved by the chimney sweep!

5.2 Connecting the exhaust pipe

The KWB system is equipped with an induced draught fan as standard equipment.

Chimney connection

The diameter of the chimney connection should be 20 mm larger than the exhaust gas pipe diameter at the boiler. This way, it is possible to integrate an acoustic transmission decoupler between the exhaust gas pipe and the chimney.

The exhaust gas pipe connection between boiler and chimney should be identical to the connection on the boiler.

⇢ Install a **damper** and a **blowback flap** at the exhaust pipe or the chimney side wall (**except** when using an ambient air-independent operation or condensing boiler system with a KWB Easyfire!).

↳ We recommend installing the damper in the chimney under the exhaust pipe junction as constant negative pressure is ensured at this location.

⇢ Position both safety elements such that there is no chance of a risk to persons!

Exhaust pipe requirements:

- Pipe length as short as possible
- With a slight upward slope to the chimney connection (≥3°, ideally 30-45°, max. 45°)
- Sealed and thermally insulated
- Equipped with easily accessible openings for cleaning

5.3 Chimney system when using a condensing boiler system

When using a condensing boiler system, the chimney must meet the following requirements:

- Moisture-resistant
- Suitable for solid fuels
- T-400 soot fire-resistant
- Condensate-tight (use of seals or conical plugged-in, metal-seated sealing systems).
- Certificate (CE or UA label)
- Suitable condensate drain available
- In addition, KWB recommends using a pipe bend instead of a T-piece at the junction into the chimney during a chimney retrofitting (insertion of a stainless steel chimney, placement outside). The objective is to drain the condensate via the connecting line as the chimney condensate openings tend to be too small.

NOTE	**You should always comply with the regionally applicable regulations**
	We recommend consulting with the responsible chimney sweep early, such as during the planning phase.

⚠ **WARNING**	**Risk of suffocation due to leaks in the connecting line**
	After an incident (soot fire), it is strictly necessary to replace the seals in the connecting line and the chimney!

5.4 Connecting line when using a condensing boiler system

When using a condensing boiler system, the connecting line must meet the following requirements:

- Moisture-insensitive / condensate-tight
- Made of stainless steel
- Min. 20 Pascal overpressure-tight
- Certificate (CE or UA label)
- Cleaning opening, exhaust gas measuring opening

The connecting piece should be installed via the shortest path possible on an incline to the chimney. Horizontal lines should be strictly avoided!

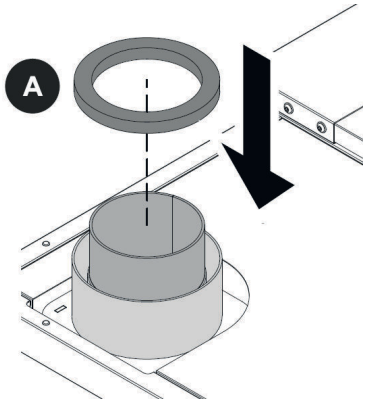
A possible backflow of the condensate into the condensing boiler heat exchanger is no problem as the condensate is drained via the siphon. A condensate trap is therefore not required.

All connections (including the boiler and chimney connections) must therefore be tightly sealed to prevent condensate from escaping!

Installing a silicone sealing in a connection line with a diameter of 100 mm (only possible in the EF2 CC4 10-22 kW):

⇢ Slide the silicone sealing (A) onto the exhaust gas pipe and push it down until it is flush with the end of the outer pipe.

Note: The silicone sealing must NOT be installed in a connection line with a diameter of 130 mm.



5.5 Mounting connections for balanced flue operation

This section is only relevant if the KWB Easyfire is operated with a balanced flue

DANGER

Fatal injuries due to improper work

Due to ventilation systems, it is possible that negative pressure can be created in the room. There is a risk that some of the gases from the heating system are "sucked" into the room.

In case of improper installation and operation, carbon monoxide (CO) can escape and carbon monoxide poisoning can result!

DANGER

Danger of suffocation with leaky mounting

↘ For ambient air-independent operation, it is important that each individual component and connection of the KWB Easyfire, exhaust gas system, combustion air supply and connector lines is tight!

⇢ Make sure that all connections are mounted so they are pressure-tight!

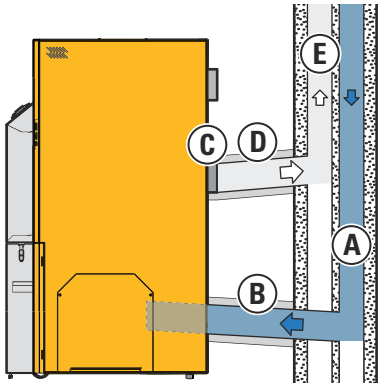
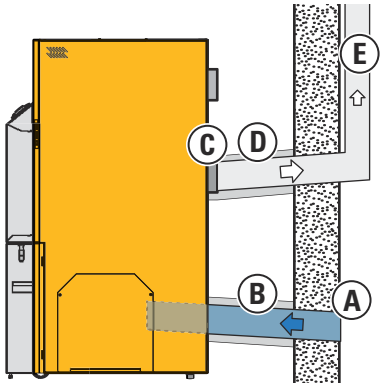
⇢ Make sure that all components are approved for use with ambient air-independent solid fuel fireplaces and follow the manufacturer's installation instructions!

⇢ If additional components or additional connections are installed that are not checked **jointly** with the KWB Easyfire Type EF2, then a leak test must always be conducted on site.
Send the test results report (found in the "Instructions for commissioning RLU“) to the operator!

⇢ Follow DIN 18897-1 and all local regulations.

5.5.1 Designation of the components

Designation of the components

Type FC43x according to DIN 18897-1	Type FC53x according to DIN 18897-1
	
Fireplace with combustion air blower for connection to an air-flue gas system.	Fireplace with combustion air blower for connection to a chimney.
The combustion air line from the air shaft and the connector to the chimney are a component of the fireplace.	The combustion air line from outdoors and the connector to the chimney are a component of the fireplace.

A	Combustion air supply	B	Combustion air line
C	Connection of connection line	D	Flue gas connection line
E	Flue gas pipe		

5.5.2 Overview

Before the commissioning of balanced-flue fireplaces, it must be clarified with the responsible chimney sweep whether the overall system (joint operation of fireplaces, flue gas system and room air-technical system) satisfies the safety-technical and functional requirements.

↘ The air-pipe union was already mounted on the blower (on the burner).

⇢ There are two possibilities for the **Mounting of the connection of the connection line [►71]** (): System Raab EW Alkon (with pipe unions from KWB) or Schiedel Prima Plus system (with connector pieces from Schiedel).

⇢ Mount the flue gas connection line

⇢ Mount the connector piece to the flue gas system.

⇢ Mount the aluminium flex-pipe as combustion air line to the air-flue gas system or outdoors (**Mounting the combustion air line [►72]**). Here the pipe must be laid in one piece!

⇢ Mount the **CO sensor [►32]** supplied near the boiler and connect it to the safety loop.

5.5.3 Mounting the connection to the connection line

There are two possibilities for connecting the connection line ():

Schiedel system

If you are using the "Schiedel Prima Plus" system:

⇢ Order the connector piece from Schiedel:
"Schiedel PPL boiler connection solid fuel" with 130 mm or 150 mm diameter.

⇢ Place the Schiedel boiler connection piece on the pre-mounted exhaust pipe connection.

⇢ As sealing material, use Schiedel ICS seal ring Viton Ø 130/150 mm and Schiedel KRS seal kit ES to 300 °C.

Raab system

If you are using the "Raab EW Alkon" system:

⇢ Order – depending on the diameter – the appropriate exhaust pipe connector from KWB:

- Art. no. 24-2000428 Exhaust gas pipe connector Ø 130 mm pressure-tight
- Art. no. 24-2000429 Exhaust gas pipe connector Ø 150 mm pressure-tight

⇢ Remove the pre-mounted exhaust pipe connection and install the connection for the connection line ("exhaust gas pipe connector" from Raab) with the appropriate diameter.

5.5.4 Mounting the flue gas connection line

⇢ Mount the flue gas connection line: Use the specified sealing materials.

The connection line must be pressure-tight since due to the room air-technical system in the installation room, a lower pressure can prevail than inside the heating system.

Requirements for the flue gas connection line:

- Maximum length: 2 m
- Maximum 2 90° bends
- Heat insulated with at least 30 mm
- CE certificate according to DIN EN 1856-2

KWB has had two systems inspected with the KWB Easyfire Type EF2:

- Schiedel Prima Plus system (certificate number 0036 CPD 9195 017/2006)
- Raab EW Alkon system (certificate number 0432 BPR 219914).

Draft limiter, explosion door

- For balanced flue operation, there can be no draft limiter and explosion door if there is a room air-technical system in the air connection of the pellet heating system – **WARNING! there is a danger that poisonous gas may escape!**

5.5.5 Mounting the flue gas system connection

⇢ Mount the connector piece to the flue gas system according to the instructions from the manufacturer of the flue gas system so that it is pressure-tight.

⇢ Check the connector piece at the connections and along the welded seam to ensure it is air-tight.

5.5.6 Mounting the combustion air line

⇢ Use an alu flex pipe in order to supply combustion air to the fan of the KWB Easyfire:

- Interior diameter of Ø 100 mm
- Leakage rate <0.1 m³/h, at least 2 layer, permissible over and underpressure ≥ 2500 Pa, temperature-resistant up to 200 °C, non-combustible (Class A1 according to EN-13501-1)
- Maximum length of the combustion air line: 15 m
  length reduction per 90° bend: 1 m
  length reduction per 45° bend: 0.5 m

⇢ Secure the flexible alu flex pipe with hose clamps and seal the transitions and connection points with alu adhesive tape.

⇢ Check the alu flex pipes for impermissible deformations.

⇢ Secure the alu flex pipes against mechanical damage.

⇢ Prevent the formation of condensation (no water may penetrate the pellet heating system!) by...

...heat insulating the combustion air line with at least 30 mm (in Germany, heat insulation must comply with EnEV!).

...laying the combustion air line so that there is a slight rise towards the heating system.

⇢ If you lay the combustion air line through other rooms, then you must cover the line in I90 according to EN 13501!

WARNING! When connecting the combustion air line to an air-flue gas system, also heed the manufacturer's technical documents!

The feed for the combustion air may NOT be limited or cut off!

NOTE	**Corrosion due to halogen compounds**
	↘ Halogen compounds in the combustion air are highly corrosive. Halogen compounds are found in spray cans, thinners, degreasers, cleaning and washing agents, and in solvents.
	⇢ Plan the combustion air supply so as to ensure that there is no intake of exhaust air from washing machines, dryers, electroplating and metalworking companies, dry cleaners, petrol stations or paintshops, for example.

Requirements of combustion air line to the outdoors

- Suitable wind protection
- Grille with a mesh width > 1 cm at the entry cross-section of the combustion air line to protect against small animals and other forms of contamination
- The construction guideline for fire protection requirements of ventilation systems applies. Ventilation lines and their cladding and insulation must be made of non-flammable materials (EI90).
- If you lay the combustion air line through other rooms, then you must cover the line in I90 according to ÖNORM EN 13501!

5.5.7 Requirements for the flue gas system

- The flue gas system must be pressure-tight and insensitive to humidity.
- The flue gas system must (like all other components of the flue gas system) be approved by construction guidelines for the connection of balanced flue solid fuel fireplaces.
- An individual chimney must be present for each fireplace.
- A chimney calculation incl. combustion air supply must be made by appropriately-qualified professionals.

Prevent the following severe errors:

- For an air-flue gas system, there may be no short-circuit between the flue gases and the supply air at the chimney entry and along the chimney. Use suitable shaft heads (DIN V 18160-1)!
- Air-flue gas systems with annular gap and non-insulated flue gas pipe cool the flue gas off too much and are therefore unsuitable!

6 Appendix

Please also see

- Technical data table EF2 (►75)
- Technical data table EF2 CC4 (►77)
- Declaration of Conformity (►79)

EF2 S / EF2 GS / EF2 V 18.01.2021	Unit	8	12	15	22	25	30	35	38
Rated power	kW	8,0	12,0	15,0	22,0	25,0	30,0	34,9	38
Partial load	kW	2,4	3,5	4,4	6,4	7,3	8,7	10,1	11,4
Boiler efficiency at rated power	%	92,4	94,0	94,3	95,0	95,2	95,4	95,7	95,3
Boiler efficiency at partial load	%	91,4	89,4	90,0	91,5	92,4	93,8	95,3	94,9
Fuel thermal output at rated load	kW	8,7	12,8	15,9	23,2	26,3	31,4	36,5	39,9
Fuel thermal output at partial load	kW	2,6	3,9	4,9	7,0	7,9	9,2	10,6	12,0
Boiler class according to EN 303-5:2012	–	5	5	5	5	5	5	5	5
EU Energy Label		A+	A+	A+	A+	A+	A+	A+	A+
Water side									
Water content	l	40	40	52	52	78	78	78	78
Water connection, forward/return flow (internal thread)	inch	1	1	1	1	5/4	5/4	5/4	5/4
	mm	25,4	25,4	25,4	25,4	31,8	31,8	31,8	31,8
	DN	25	25	25	25	32	32	32	32
Water connection for filling and/or emptying	inch	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
(internal thread)	mm	12,7	12,7	12,7	12,7	12,7	12,7	12,7	12,7
Thermal safety valve: no	–	×	×	×	×	×	×	×	×
Water-side resistance at 10 K	mbar	5,7	12	34	55,9	39,1	52,1	66,2	66,2
	Pa	570	1200	3400	5590	3910	5210	6620	6620
Water-side resistance at 20 K	mbar	1,7	3,5	9,5	15,4	10,8	14,1	18,1	18,1
	Pa	170	350	945	1540	1080	1410	1810	1810
Boiler-entry temperature (for installation of the KWB-supplied two-way valve with servomotor)	°C	10–70	10–70	10–70	10–70	10–70	10–70	10–70	10–70
Boiler-entry temperature (for installation of an external return-flow boost device)	°C	40–70	40–70	40–70	40–70	40–70	40–70	40–70	40–70
Working temperature/operating temperature	°C	80	80	80	80	80	80	80	80
Maximum permitted temperature	°C	110	110	110	110	110	110	110	110
Maximum operating pressure	bar	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
Volume flow at spread 10 K	m^3/h	0,69	1,03	1,29	1,89	2,15	2,58	3,01	3,01
Volume flow at spread 15 K	m^3/h	0,46	0,69	0,86	1,26	1,43	1,72	2,00	2,00
Volume flow at spread 20 K	m^3/h	0,34	0,52	0,64	0,95	1,07	1,29	1,50	1,50
Minimum usable buffer tank volume	l	500	500	500	800	800	800	1.000	1.000
Exhaust-gas side (for chimney calculation)									
Combustion chamber temperature	°C	900–1100	900–1100	900–1100	900–1100	900–1100	900–1100	900–1100	900–1100
Combustion chamber pressure	mbar	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20
Required draft at rated power/partial load	mbar	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
		0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
Suction available	–	✓	✓	✓	✓	✓	✓	✓	✓
Exhaust-gas temperature at rated power	°C	120	120	120	120	120	120	120	120
Exhaust-gas temp. Partial load	°C	90	90	90	90	90	90	90	90
Exhaust-gas mass flow at rated power	kg/s	0,006	0,009	0,011	0,016	0,018	0,022	0,026	0,028
Exhaust-gas mass flow at partial load	kg/s	0,002	0,003	0,004	0,005	0,006	0,007	0,008	0,008
Exhaust-gas volume at rated power	Nm^3/h	16,5	24,9	31,1	45,2	51,3	61,4	71,2	77,3
Exhaust-gas volume at partial load	Nm^3/h	5,3	7,9	9,8	14,1	15,9	18,7	21,5	23,3
Exhaust-gas connection height boiler side	mm	750	750	860	860	1050	1050	1050	1050
Exhaust-gas pipe diameter	mm	130	130	130	130	150	150	150	150
Incline of the smoke-pipe	°	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3
Chimney diameter (approx. values)	mm	140	140	140	140	160	160	160	160
Chimney design: Moisture-resistant	–	✓	✓	✓	✓	✓	✓	✓	✓
Fuel: Pellets of pure wood in accordance with ISO 17225-2									
Calorific value	MJ/kg	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5
Density	kg/m^3	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600
Water content	% by weight	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Ash content	% by weight	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7
Length	mm	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40
Diameter	mm	6±1	6±1	6±1	6±1	6±1	6±1	6±1	6±1
Dust proportion before loading	% by weight	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
Raw material: Pure wood, bark proportion <15 %	–	–	–	–	–	–	–	–	–
Ash									
Ash container volume	l	28	28	28	28	28	28	28	28
Ash container filled	kg	27	27	27	27	27	27	27	27
Ash removal system	–	✓	✓	✓	✓	✓	✓	✓	✓
Electrical system									
Connection	–	230V, 1~	230V, 1~	230V, 1~	230V, 1~	230V, 1~	230V, 1~	230V, 1~	230V, 1~
		50Hz, C13 A	50Hz, C13 A	50Hz, C13 A	50Hz, C13 A	50Hz, C13 A	50Hz, C13 A	50Hz, C13 A	50Hz, C13 A
Connected power EF2 V	W	559	559	559	559	577	577	577	577
Connected power EF2 S	W	609	609	609	609	627	627	627	627
Connected power EF2 GS	W	2189	2189	2189	2189	2207	2207	2207	2207
Connected power EF2 GS with sample probes	W	2444	2444	2444	2444	2462	2462	2462	2462
Storage container									
Contents storage container for type EF2 V	l	107	107	107	107	107	107	107	107
Contents storage container for type EF2 S + 300	l	300	300	300	300	300	300	300	300
Suction conveyor type EF2 GS									
Max. suction length	m	25	25	25	25	25	25	25	25
Max. suction head	m	5	5	5	5	5	5	5	5
Contents storage container for type EF2 GS	l	42	42	67	67	90	90	90	90

EF2 S / EF2 GS / EF2 V 18.01.2021	Unit	8	12	15	22	25	30	35	38
Weights									
Boiler weight EF2 V	kg	341	341	370	370	416	416	416	416
Boiler weight EF2 S	kg	326	326	352	352	394	394	394	394
Boiler weight EF2 GS	kg	349	349	378	378	424	424	424	424
Emissions according to test report									
Test report no.	–	BLT-014/12	BLT-019/10	***	BLT-020/10	***	***	BLT-021/10	***
O_2 content rated power	Vol.-%	7,7	9,2	8,6	7,3	7,0	6,6	6,1	6,0
O_2 content partial load	Vol.-%	12,4	9,7	9,9	10,3	10,4	10,7	10,9	10,5
CO_2 content rated power	Vol.-%	11,2	11,4	11,9	13,2	13,4	13,9	14,4	14,3
CO_2 content partial load	Vol.-%	8,8	10,9	10,7	10,3	10,2	9,9	9,7	10,0
Noise emissions									
Normal operating noise at rated power	dB(A)	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
Reference 10 % O_2 dry (EN 303-5)									
CO at rated power	mg/Nm³	30,0	33,0	27,6	15,0	13,8	11,9	10,0	11,0
CO at partial load	mg/Nm³	102,0	20,0	21,5	25,0	25,7	26,8	28,0	22,0
NOx at rated power	mg/Nm³	124,0	135,0	137,7	144,0	147,5	153,2	159,0	170,0
NOx at partial load	mg/Nm³	95,0	131,0	131,0	131,0	133,3	137,2	141,0	149,0
OGC at rated power	mg/Nm³	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2
OGC at partial load	mg/Nm³	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2
Dust at rated power	mg/Nm³	19,0	21,0	16,8	7,0	8,4	10,7	13,0	15,0
Dust at partial load	mg/Nm³	13,0	9,0	11,7	18,0	15,9	12,5	9,0	10,0
Reference 11 % O_2 dry									
CO at rated power	mg/Nm³	27,3	30,0	25,1	13,6	12,6	10,8	9,1	10,0
CO at partial load	mg/Nm³	92,7	18,2	19,5	22,7	23,4	24,4	25,5	20,0
NOx at rated power	mg/Nm³	112,7	122,7	125,2	130,9	134,1	139,3	144,5	154,5
NOx at partial load	mg/Nm³	86,4	119,1	119,1	119,1	121,2	124,7	128,2	135,5
OGC at rated power	mg/Nm³	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2
OGC at partial load	mg/Nm³	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2
Dust at rated power	mg/Nm³	17,3	19,1	15,3	6,4	7,6	9,7	11,8	13,6
Dust at partial load	mg/Nm³	11,8	8,2	10,6	16,4	14,5	11,3	8,2	9,1
Reference 13 % O_2 dry (FJ-BLT)									
CO at rated power	mg/Nm³	22,0	24,0	20,1	11,0	10,1	8,5	7,0	8,0
CO at partial load	mg/Nm³	74,0	15,0	15,9	18,0	18,5	19,2	20,0	16,0
NOx at rated power	mg/Nm³	90,0	98,0	100,1	105,0	107,3	111,2	115,0	124,0
NOx at partial load	mg/Nm³	69,0	96,0	95,7	95,0	96,8	99,9	103,0	108,0
OGC at rated power	mg/Nm³	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2
OGC at partial load	mg/Nm³	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dust at rated power	mg/Nm³	14,0	15,0	12,0	5,0	6,2	8,1	10,0	11,0
Dust at partial load	mg/Nm³	10,0	7,0	8,8	13,0	11,4	8,7	6,0	7,0
In accordance with § 15a-BVG Austria									
CO at rated power	mg/MJ	14,0	15,0	12,6	7,0	6,3	5,2	4,0	5,0
CO at partial load	mg/MJ	48,0	9,0	9,9	12,0	12,2	12,6	13,0	11,0
NOx at rated power	mg/MJ	58,0	63,0	64,2	67,0	68,4	70,7	73,0	84,0
NOx at partial load	mg/MJ	44,0	61,0	61,0	61,0	61,9	63,5	65,0	74,0
OGC at rated power	mg/MJ	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
OGC at partial load	mg/MJ	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dust at rated power	mg/MJ	9,0	10,0	7,9	3,0	3,7	4,8	6,0	8,0
Dust at partial load	mg/MJ	6,0	4,0	5,2	8,0	7,1	5,5	4,0	5,0

*** ... Drawing inspection, values for intermediate sizes interpolated

FJ-BLT ... Franciso Josephinum Wieselburg – Biomass Logistic Technology

mg/Nm³ ... Milligram per standard cubic meter (1 Nm³ under 1.013 hectopascal at 0 °C)

EF2 S / EF2 GS / EF2 V 18.01.2021	Unit	CC4 10	CC4 12	CC4 15	CC4 22	CC4 25	CC4 30	CC4 35	CC4 40
Rated power	kW	10,0	12,0	15,0	22,0	25,0	30,0	34,9	40
Partial load	kW	3,0	3,6	4,5	6,6	7,5	9,0	10,5	12,0
Boiler efficiency at rated power (based on the net calorific value)	%	101,6	101,8	102,1	102,8	102,7	102,6	102,5	103,1
Boiler efficiency at partial load (based on the net calorific value)	%	96,9	97,2	97,6	98,6	99,2	100,1	101,0	101,7
Boiler efficiency at rated power (based on the gross calorific value)	%	93,4	93,6	93,9	94,7	94,7	94,6	94,6	95,0
Boiler efficiency at partial load (based on the gross calorific value)	%	89,0	89,3	89,8	90,8	91,4	92,3	93,2	93,7
Fuel thermal output at rated load (based on the net calorific value)	kW	9,8	11,8	14,7	21,4	24,3	29,2	34,0	38,8
Fuel thermal output at partial load (based on the net calorific value)	kW	3,1	3,7	4,6	6,7	7,6	9,0	10,4	11,8
Boiler class according to EN 303-5:2012	–	5	5	5	5	5	5	5	5
EU Energy Label	–	A+	A+	A++	A++	A++	A++	A++	A++
Water side									
Water content	l	40	40	52	52	78	78	78	78
Water connection, forward/return flow (internal thread)	inch	1 / 6/4	1 / 6/4	1 / 6/4	1 / 6/4	5/4 / 6/4	5/4 / 6/4	5/4 / 6/4	5/4 / 6/4
	mm	25,4 / 38,1	25,4 / 38,1	25,4 / 38,1	25,4 / 38,1	31,8 / 38,1	31,8 / 38,1	31,8 / 38,1	31,8 / 38,1
	DN	25 / 40	25 / 40	25 / 40	25 / 40	32 / 40	32 / 40	32 / 40	32 / 40
Water connection for filling and/or emptying (internal thread)	inch	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
	mm	12,7	12,7	12,7	12,7	12,7	12,7	12,7	12,7
Thermal safety valve: no	–	×	×	×	×	×	×	×	×
Water-side resistance at 10 K	mbar Pa	17,3	30,5	50,3	96,4	95,9	95,2	94,4	124,7
Water-side resistance at 20 K	mbar Pa	4,89	7,7	12,0	21,9	22,6	23,8	24,95	32,4
Boiler-entry temperature (for installation of the KWB-supplied two-way valve with servomotor)	°C	10–70	10–70	10–70	10–70	10–70	10–70	10–70	10–70
Boiler-entry temperature (for installation of an external return-flow boost device)	°C	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70
Working temperature/operating temperature	°C	80	80	80	80	80	80	80	80
Maximum permitted temperature	°C	110	110	110	110	110	110	110	110
Maximum operating pressure	bar	3	3	3	3	3	3	3	3
Volume flow at spread 10 K	m^3/h	0,86	1,03	1,29	1,89	2,15	2,58	3,01	3,44
Volume flow at spread 15 K	m^3/h	0,57	0,69	0,86	1,26	1,43	1,72	2,00	2,30
Volume flow at spread 20 K	m^3/h	0,43	0,52	0,64	0,95	1,07	1,29	1,50	1,72
Minimum usable buffer tank volume	l	500	500	500	800	800	800	1.000	1.000
Exhaust-gas side (for chimney calculation)									
Combustion chamber temperature	°C	900–1100	900–1100	900–1100	900–1100	900–1100	900–1100	900–1100	900–1100
Combustion chamber pressure	mbar	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20
Required draft at rated power/partial load	mbar	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
		0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Suction available	–	✓	✓	✓	✓	✓	✓	✓	✓
Exhaust-gas temperature at rated power	°C	40–70	40–70	40–70	40–70	40–70	40–70	40–70	40–70
Exhaust-gas temp. Partial load	°C	40–70	40–70	40–70	40–70	40–70	40–70	40–70	40–70
Exhaust-gas mass flow at rated power	kg/s	0,007	0,009	0,011	0,016	0,018	0,022	0,026	0,031
Exhaust-gas mass flow at partial load	kg/s	0,002	0,003	0,004	0,005	0,006	0,007	0,008	0,009
Exhaust-gas volume at rated power	Nm^3/h	20,8	24,9	31,1	45,2	51,3	61,4	71,2	83
Exhaust-gas volume at partial load	Nm^3/h	6,6	7,9	9,8	14,1	15,9	18,7	21,5	26,2
Exhaust-gas connection height boiler side	mm	990	990	1110	1110	1241	1241	1241	1241
Exhaust-gas pipe diameter	mm	100/130	100/130	100/130	100/130	150	150	150	150
Chimney diameter (approx. values)	mm	140	140	140	140	160	160	160	160
Chimney design: Moisture-resistant	–	✓	✓	✓	✓	✓	✓	✓	✓
Fuel: Pellets of pure wood in accordance with ISO 17225-2									
Calorific value	MJ/kg	16,5	16,5	16,5	16,5	16,5	16,5	16,5	16,5
Density	kg/m^3	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600
Water content	% by weight	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Ash content	% by weight	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7	≤ 0,7
Length	mm	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40	3,15–40
Diameter	mm	6±1	6±1	6±1	6±1	6±1	6±1	6±1	6±1
Dust proportion before loading	% by weight	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
Raw material: Pure wood, bark proportion <15 %	–	–	–	–	–	–	–	–	–
Ash									
Ash container volume	l	28	28	28	28	28	28	28	28
Ash container filled	kg	27	27	27	27	27	27	27	27
Ash removal system	–	✓	✓	✓	✓	✓	✓	✓	✓
Electrical system									
Connection	–	230V, 1~ 50Hz, C13 A	230V, 1~ 50Hz, C13 A	230V, 1~ 50Hz, C13 A	230V, 1~ 50Hz, C13 A	230V, 1~ 50Hz, C13 A	230V, 1~ 50Hz, C13 A	230V, 1~ 50Hz, C13 A	230V, 1~ 50Hz, C13 A
Connected power EF2 V	W	559	559	559	559	577	577	577	577
Connected power EF2 S	W	609	609	609	609	627	627	627	627
Connected power EF2 GS	W	2.189	2.189	2.189	2.189	2.207	2.207	2.207	2.207
Connected power EF2 GS with sample probes	W	2.444	2.444	2.444	2.444	2.462	2.462	2.462	2.462
Storage container									
Contents storage container for type EF2 V	l	107	107	107	107	107	107	107	107
Contents storage container for type EF2 S + 300	l	300	300	300	300	300	300	300	300
Suction conveyor type EF2 GS									
Max. suction length	m	25	25	25	25	25	25	25	25
Max. suction head	m	5	5	5	5	5	5	5	5
Contents storage container for type EF2 GS	l	42	42	67	67	90	90	90	90

EF2 S / EF2 GS / EF2 V 18.01.2021	Unit	CC4 10	CC4 12	CC4 15	CC4 22	CC4 25	CC4 30	CC4 35	CC4 40
Weights									
Boiler weight EF2 V	kg	341	341	370	370	416	416	416	416
Boiler weight EF2 S	kg	326	326	352	352	394	394	394	394
Boiler weight EF2 GS	kg	349	349	378	378	424	424	424	424
Emissions according to test report		TÜV Austria	TÜV Austria	TÜV Austria	TÜV Austria	TÜV Austria	TÜV Austria	TÜV Austria	TÜV Austria
Test report no.	–	17-IN-AT-UW WE-EX-284/2	18-U-032/SD	18-U-033/SD	17-IN-AT-UW WE-EX-284/3	18-U-034/SD	18-U-035/SD	17-IN-AT-UW WE-EX-284/4	18-U-036/SD
O_2 content rated power	Vol.-%	8,2	8,0	7,6	6,8	6,9	7,0	7,1	6,9
O_2 content partial load	Vol.-%	8,8	8,8	8,9	9,0	9,0	9,1	9,1	10,2
CO_2 content rated power	Vol.-%	12,0	12,2	12,5	13,1	13,1	13,2	13,3	13,4
CO_2 content partial load	Vol.-%	11,3	11,3	11,2	11,1	11,1	11,2	11,3	10,1
Noise emissions									
Normal operating noise at rated power	dB(A)	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
Reference 10 % O_2 dry (EN 303-5)									
CO at rated power	mg/Nm³	35	35	35	35	29	20	11	11
CO at partial load	mg/Nm³	29	32	36	45	52	64	75	55
NOx at rated power	mg/Nm³	164	164	164	163	166	171	176	179
NOx at partial load	mg/Nm³	144	143	141	136	139	143	147	155
OGC at rated power	mg/Nm³	2,6	< 3	< 2	< 2	< 2	< 2	< 2	< 2
OGC at partial load	mg/Nm³	< 2	< 2	< 2	< 3	< 3	< 3	< 3	< 3
Dust at rated power	mg/Nm³	19	19	18	17	16	15	13	17
Dust at partial load	mg/Nm³	8	9	11	14	16	18	21	17
Reference 11 % O_2 dry									
CO at rated power	mg/Nm³	32	32	32	32	27	18	10	9
CO at partial load	mg/Nm³	27	29	33	41	47	58	68	50
NOx at rated power	mg/Nm³	149	149	149	149	152	156	160	162
NOx at partial load	mg/Nm³	131	130	128	123	126	130	134	141
OGC at rated power	mg/Nm³	2,3	< 2	< 2	< 2	< 2	< 2	< 2	< 2
OGC at partial load	mg/Nm³	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 3
Dust at rated power	mg/Nm³	18	18	17	16	15	14	12	16
Dust at partial load	mg/Nm³	7	8	10	13	14	17	19	15
Reference 13 % O_2 dry (TÜV-AUSTRIA)									
CO at rated power	mg/Nm³	25	25	25	26	22	15	8	8
CO at partial load	mg/Nm³	21	23	26	33	38	47	55	40
NOx at rated power	mg/Nm³	120	120	120	119	121	125	128	130
NOx at partial load	mg/Nm³	105	104	103	99	101	104	107	113
OGC at rated power	mg/Nm³	1,9	< 2	< 2	< 2	< 2	< 2	< 2	<2
OGC at partial load	mg/Nm³	< 2	< 2	< 2	< 2	< 2	< 2	< 2	<3
Dust at rated power	mg/Nm³	14	14	14	13	12	11	10	12
Dust at partial load	mg/Nm³	6	7	8	10	11	13	15	12
In accordance with § 15a-BVG Austria									
CO at rated power	mg/MJ	17	17	17	18	15	10	5	5
CO at partial load	mg/MJ	14	15	17	22	25	31	37	27
NOx at rated power	mg/MJ	81	81	81	81	82	85	87	88
NOx at partial load	mg/MJ	71	70	69	67	68	71	73	77
OGC at rated power	mg/MJ	1,3	< 1	< 1	< 1	< 1	< 1	< 1	<1
OGC at partial load	mg/MJ	< 1	< 1	< 1	< 2	< 2	< 2	< 2	< 2
Dust at rated power	mg/MJ	10	10	9	8	8	7	6	8
Dust at partial load	mg/MJ	4	5	5	7	8	9	10	8
EF2 with condenser module									
Length, boiler and condenser module	mm	1.295	1.295	1.346	1.346	1.395	1.395	1.395	1.448
Length, condenser module	mm	431	431	484	484	530	530	530	585
Width, boiler and condenser module	mm	874	874	874	874	874	874	874	874
Width, condenser module	mm	532	532	532	532	532	532	532	623
Distance, condensate discharge to boiler side	mm	260	260	275	275	280	280	280	295
Connection height, return flow	mm	606	606	725	725	899	899	899	899
Connection height, condensate discharge	mm	150 - 160	150 - 160	150 - 240	150 - 240	150 - 410	150 - 410	150 - 410	150 - 310
Connection height, washing unit	mm	547,0	547,0	667,0	667,0	840,0	840,0	840,0	922,0
Condensate/nominal load hour	l	0,8 - 1	0,9 - 1,3	1 - 1,5	1,9 - 2,3	2 - 2,5	2,2 - 2,6	2,3 - 2,7	2,5 - 3
Connection, washing unit	inch	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	3/4"	1/2"
Connection, condensate discharge	DN	40mm	40mm	40mm	40mm	40mm	40mm	40mm	40mm
Weight, condenser module	kg	49	49	59	59	59	59	59	84

mg/Nm³ ... Milligram per standard cubic meter (1 Nm³ under 1.013 hectopascal at 0 °C)

*** ... Drawing inspection, values for intermediate sizes interpolated

KWB – Kraft und Wärme aus Biomasse GmbH
Industriestraße 235
A-8321 St. Margarethen an der Raab (Austria)

Declaration of Conformity

As specified by the EC Machinery Directive 2006/42/EC, Annex II 1 A

We hereby declare that the specified system in the series version complies with all applicable provisions of the Machine Directive.

Boilers of the model range
KWB Easyfire 8–40 kW, comprising the models
EF2 S/GS/V 8 / 12 / 15 / 22 / 25 / 30 / 33 / 35 / 38
EF2 CC4 S/GS/V 10 / 12 / 15 / 22 / 25 / 30 / 35 / 40

in combination with conveyor systems
Pellet Stirrer Plus with elbow screw or suction conveyor, KWB Pellet Big Bag with elbow screw or suction conveyor, conveyor screw with elbow screw or suction conveyor, KWB Pellet Box with suction conveyor, sampling probes with suction conveyor, buried tank with suction conveyor

Furthermore, the system conforms to the following directives/applicable regulations:
EMC Directive 2014/30/EU; Directive 2014/35/EU; RoHS Directive 2011/65/EU

Applied European harmonised standards:
EN 303-5:2012, EN 60335-1:2014-04, EN 60335-2-102:2006, ÖNORM EN ISO 12100:2013-10-15
EF2 CC4 S/GS/V: ÖNORM M 7551:2012

KWB – Kraft und Wärme aus Biomasse GmbH	St. Margarethen an der Raab 19. 06. 2018	
Authorised representative for the compilation of the technical documents	Place, Date	Helmut Matschnig, Managing Director

Keyword index

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Original manual | 2021-02 | Index 2 | EN