



CONNECTIONS



KWB Multifire

Type MF2 D/ZI

Contents

Foreword.....	6
About this manual.....	6
Explanation of the formatting.....	6
Legal.....	6
1 Safety.....	8
1.1 Please note.....	8
1.1.1 Gradation of the hazard statements.....	8
1.1.2 General safety instructions.....	8
1.1.3 Comply with the safety instructions.....	9
1.1.4 Please read and follow the manual.....	9
1.1.5 Qualification of the installation personnel.....	9
1.1.6 Protective equipment of the assembly personnel.....	9
1.2 Pictograms used.....	10
1.2.1 Additional icons/pictograms.....	12
2 Connections.....	13
3 Water.....	15
3.1 Mounting the return flow boost.....	16
3.2 Installing the thermal safety valve.....	16
3.3 Installing filling/emptying connections.....	17
3.4 Installing the safety group (option).....	17
3.5 Safety valve.....	18
3.6 Ventilation.....	18
3.7 Return flow boost dimensions.....	18
3.8 Dimensioning the buffer-charging pump.....	18
3.9 Expansion tank dimensions.....	19
3.10 Hydraulic diagrams.....	19
3.11 Fill water.....	19
3.11.1 Requirements for fill water.....	20
3.11.1.1 Commissioning the heating system.....	21
3.11.2 Fill water with frost protection.....	21
3.11.3 Logs.....	21
3.11.3.1 Rinsing Log.....	22
3.11.3.2 System and Test Log for Heating Water.....	23
3.12 Solar control.....	25
3.12.1 Connections.....	26
3.12.2 Hydraulic diagrams Solar.....	26
3.12.2.1 Diagram 1.....	27
3.12.2.2 Diagram 2.....	27
3.12.2.3 Diagram 3.....	28
3.12.2.4 Diagram 4.....	29
4 Electrical system.....	31
4.1 Electrical connections - boiler.....	31
4.1.1 Emergency stop.....	32
4.2 Electrical connections, conveyor system with suction conveyor.....	33

4.2.1	Electrical connections at the boiler.....	33
4.2.2	House connection box for pellet suppliers.....	33
4.3	Heating system electrical connections.....	33
4.3.1	Buffer storage tank.....	33
4.3.1.1	Charging the buffer storage tank directly from the boiler.....	33
4.3.1.2	Charging the buffer storage tank indirectly from the boiler.....	34
4.3.2	Heating circuit.....	35
4.3.3	Pumps/mixer (WMM).....	36
4.3.4	Fault contact + multi-function outputs.....	36
4.3.5	External.....	38
4.3.6	External temperature/output specification.....	38
4.3.7	DHWC.....	39
4.3.8	Circulation.....	39
4.3.9	Secondary heating source.....	39
4.3.10	Solar.....	40
4.3.10.1	Connection to the heat management module [WMM].....	40
4.4	KWB Comfort 4 electrical connections.....	42
4.4.1	Equipotential bonding.....	43
4.4.2	Cabling.....	43
4.4.2.1	Network examples.....	43
4.4.2.2	Cable assignment.....	45
4.4.2.3	Connecting the cable.....	46
4.4.2.4	House bus cabling.....	47
4.4.2.5	Cabling lightning protection module (optional).....	48
4.4.2.6	Terminating resistor.....	48
4.4.3	Control units.....	48
4.4.3.1	Basic control unit [BGB].....	48
4.4.3.2	Exclusive control unit [BGE].....	49
4.4.3.3	Correct positioning.....	49
4.4.3.4	Open the control unit.....	50
4.4.3.5	Mount and connect.....	50
4.4.3.6	Control unit cabling.....	51
4.4.4	Boiler power module [KPM].....	51
4.4.4.1	Plug at the KPM.....	52
4.4.5	Boiler signal module [KSM].....	54
4.4.5.1	Plug at the KSM.....	54
4.4.6	Heat management module [WMM].....	56
4.4.6.1	Wall installation.....	57
4.4.6.2	Connecting dimensions.....	59
4.4.6.3	Pulling in the cable.....	59
4.4.6.4	Plug at the WMM.....	59
4.4.6.5	Heat quantity meter KWB C4 M-bus module.....	62
4.4.7	Conveyor system module [FSM].....	63
4.4.7.1	Wall installation.....	64
4.4.7.2	Connecting dimensions.....	65
4.4.7.3	Pulling in the cable.....	65
4.4.7.4	Connecting motors.....	66
4.4.7.5	Plug at the FSM.....	67
4.4.7.6	Connection variants at the conveyor system module.....	68
5	Chimney.....	73
5.1	Chimney requirements.....	73
5.2	Connecting the exhaust pipe.....	73

5.3	Multiple-use chimney.....	75
6	Dismantling and disposal.....	76
6.1	Dismantling.....	76
6.2	Disposal.....	76
7	Appendix.....	78
7.1	Technical data table KWB Multifire - log wood.....	79
7.2	Technical data table KWB Multifire - pellets.....	80
7.3	TDT-MF2-D-ZI_mit_Pellets_EN.....	81
7.4	Declaration of Conformity.....	83
	Keyword index.....	84

Foreword

About this manual

This manual contains all the required information for connection by external certified technicians. 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 therefore appreciate your feedback.

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: <ul style="list-style-type: none">↪ Precondition⇒ Work step⇨ Result
Page texts	The keywords to the left of the text column assist you in immediately recognising what the content of the text section is.
Cross references	A reference to another section of this document recognizable by the arrow and the page number in brackets. Example: About this manual [► 6]

Legal

Intellectual Property

© 2021 KWB – Kraft und Wärme aus Biomasse GmbH

All catalogues, brochures, illustrations, drawings, manuals and control and regulation programs etc. are protected under intellectual property law and will always remain the intellectual property of KWB. Any use, reproduction, distribution, publication, processing and/or other transfer to third parties requires KWB's prior written consent.

When operating the contractual goods, the installation, operating and other technical instructions and information from KWB must be strictly observed and complied with.

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.
- ➔ Only original parts or parts that have been expressly approved by the manufacturer must be used.
- ➔ 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 Gradation of the hazard statements

In this documentation, we will use warnings with the following hazard levels to indicate direct dangers and important safety regulations:

NOTE



General information

We use this representation to indicate and describe **important information**.

CAUTION



Incipient hazard

We use this symbol to indicate and describe **incipient hazards**. If the stated risks are **ignored, injuries, property damage and environmental damage** may result.

WARNING



Medium hazard

We use this representation to indicate and describe hazards. If this warning is **ignored, serious or fatal injuries** may result.

DANGER



Serious hazard

We use this representation to indicate and describe **serious hazards**. **If this warning is ignored, serious or fatal injuries result!**

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.
- Notify KWB customer service if the emergency fire extinguisher has been activated!

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.
- ⇒ Only then are you eligible for any warranty claims.

1.1.3 Comply with the safety instructions

NOTE



Comply with the safety instructions

Your system has been tested for safety and satisfies the applicable standards, guidelines and regulations.

Failure to comply with the safety instructions or improper use poses the risk of material damage. In addition, you risk your health or your life!

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 sign		Use mask
	Follow the instructions		Use a welding mask
	Use hearing protection		Disconnect from mains before maintenance and repair
	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 is required
	Use protective clothing		Entry only with a second person 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		

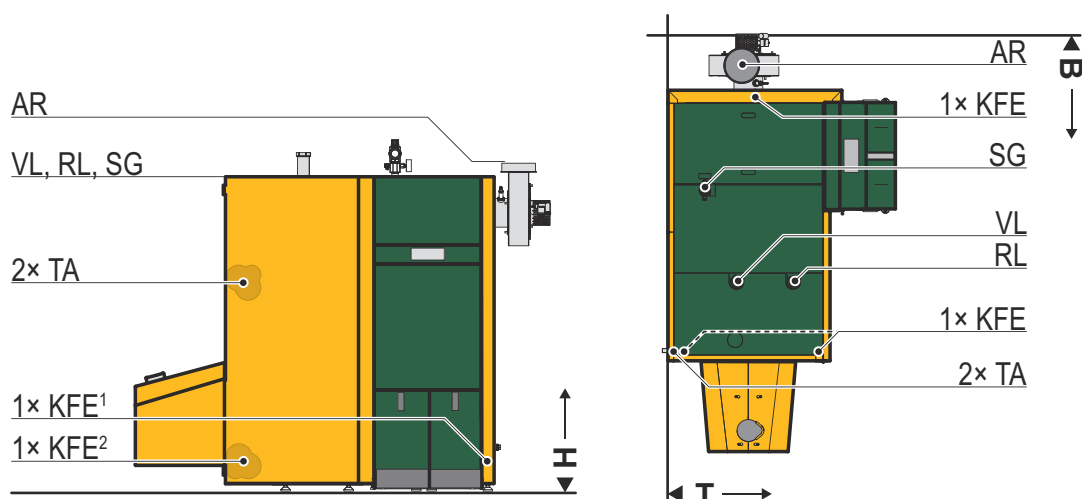
Warning signs (safety colour yellow)

	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

1.2.1 Additional icons/pictograms

General symbol legend			
	Scope of delivery		Heat-resistant aluminium adhesive tape
	Fuel supply from the left		High-temperature silicone
	Fuel supply from the right		Small leaks permissible
	Adhesive tape		Wrench opening
	Loosen screw or nut		Tighten screw or nut
	Torx screw(s)		Bend tab 15° to the outside

2 Connections



KWB Multifire KWB Pelletfire Plus		20-50 kW 45-65 kW	60-80 kW 70-95 kW	100-120 kW 100-135 kW
Legend	Connection			
AR	Exhaust gas pipe	Ø 15 cm H: 166 cm W: 72 cm D: 37 cm	Ø 18/20 cm H: 185 cm W: 85 cm D: 39 cm	Ø 20 cm H: 175 cm W: 85 cm D: 39 cm
VL	Forward flow	Ø 32 G 5/4", flat seal with union nut H: 157 cm W: 44 cm D: 32 cm	Ø 50 G 2", flat seal with union nut H: 180 cm W: 44 cm D: 36 cm	Ø 50 G 2", flat seal with union nut H: 180 cm W: 44 cm D: 36 cm
RL	Return flow	Ø 32 G 5/4", flat seal with union nut H: 157 cm W: 44 cm D: 56 cm	Ø 50 G 2", flat seal with union nut H: 180 cm W: 44 cm D: 65 cm	Ø 50 G 2", flat seal with union nut H: 180 cm W: 44 cm D: 65 cm
SG	Safety group	Ø R 1" H: 157 cm W: 72 cm D: 17 cm	Ø R 1" H: 171 cm W: 93 cm D: 19 cm	Ø R 1" H: 171 cm W: 93 cm D: 19 cm
TA	Thermal safety valve – inflow	Ø R ½" H: 107 cm W: 29 cm D: 42 cm	Ø R ½" H: 127 cm W: 31 cm D: 47 cm	Ø R ½" H: 127 cm W: 31 cm D: 47 cm
TA	Thermal safety valve – outflow	Ø R ½" H: 107 cm W: 29 cm D: 32 cm	Ø R ½" H: 127 cm W: 31 cm D: 37 cm	Ø R ½" H: 127 cm W: 31 cm D: 37 cm
KFE¹	Boiler filling and emptying	Ø Rp ¾" H: 23 cm W: 23 cm D: 37 cm	Ø Rp ¾" H: 23 cm W: 28 cm D: 42 cm	Ø Rp ¾" H: 23 cm W: 28 cm D: 42 cm

KWB Multifire KWB Pelletfire Plus		20-50 kW 45-65 kW	60-80 kW 70-95 kW	100-120 kW 100-135 kW
Legend	Connection			
KFE ²	Boiler filling and emptying	Ø Rp ¾" H: 22 cm W: 117 cm D: 66 cm	Ø Rp ¾" H: 22 cm W: 137 cm D: 77 cm	Ø Rp ¾" H: 22 cm W: 150 cm D: 77 cm
Legend: "Rp" ... cylindrical inside thread with metallic seal pursuant to EN 10226 "R" ... tapered or conical outer thread with metallic seal pursuant to EN 10226 "G" ... cylindrical thread pursuant to ISO 228-1				

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 impermeability 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.

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!

Pre-assembled return flow boost

- ⇒ The KWB Multifire type MF2 and the KWB Pelletfire Plus type MF2 can be installed with a pre-assembled return flow boost: The KWB Comfort control regulates the flow volume in the loop and thus maintains the pre-set return flow temperature.
- ⇒ Connect the forward flow (red ball valve) and return flow (blue ball valve) at the boiler with the piping in the room.

	Multifire Pelletfire Plus	20-50 kW 45-65 kW	60–80 kW 75–95 kW	90-120 kW 99-135 kW
Pre-installed return flow boost		5/4"	6/4"	2"
Without return flow boost		5/4"	2"	2"

External return flow boost

It is possible to utilise an external return flow boost instead of the above-described pre-assembled 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!

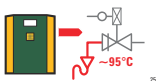
3.2 Installing the thermal safety valve

CAUTION

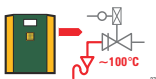


Risk of overheating - possible risks for people and system!

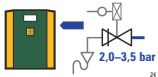
- ⇒ You must comply with all specifications!



The thermal discharge safety valve triggers at a boiler temperature of 95 °C!

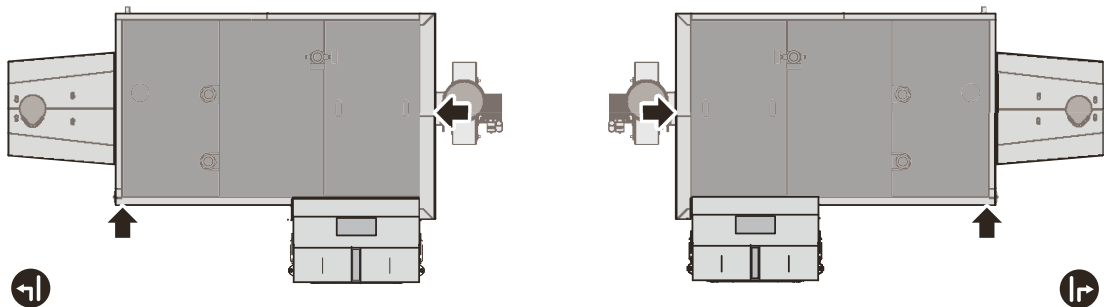


The thermal discharge safety valve triggers at a boiler temperature of 100 °C!



- ➔ The cold water must have a pressure of 2-3.5 bar!
- ➔ The piping system must be temperature-resistant!
Install a 90° bend and route the drain to the back.
- ➔ The discharge into the channel must be safe: Hot steam may cause injuries and damage!
- ➔ Install the piping such that it can be disassembled to ensure that subsequent maintenance and repair work is possible!
- ➔ When installing the outlet ensure a >1% slope!
- ➔ To prevent legionella growth, the thermal valve should be placed at least 100 mm above the drain.

3.3 Installing filling/emptying connections



- ➔ The KWB Multifire has 2 connections ($\frac{3}{4}$ "") for the filling or emptying of the heat exchanger and the combustion chamber.

Note: Depending on installation model (left **l** or right **r**), these will be in different positions.

- ➔ The system is delivered with all 2 connections sealed with plugs.

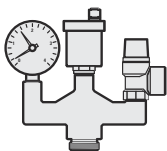
- ➔ **Note:** Ensure that the extension of the KFE tap is installed.

- ➔ Install 1 tap at the heat exchanger – otherwise you will not be able to empty the heat exchanger!

- ➔ Install 1 tap at the combustion chamber – otherwise you will not be able to empty the combustion chamber!

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

3.4 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.

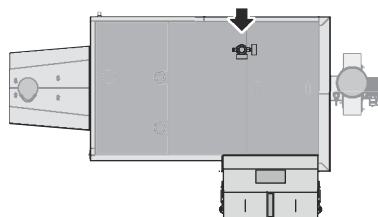


Fig. 1: Safety group position

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!

3.5 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!

3.6 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!

3.7 Return flow boost dimensions

MF2 D/ZI MF2 S/GS	20–30 kW 45 kW	40–50 kW 55–65 kW	60–80 kW 75–95 kW	100-120 kW 100-135 kW
Pipe DN	28	28	35	42
Screw connection	G 5/4"	G 5/4"	G 6/4"	G 2"
Kvs mixer	8	12	15	32
Pump	Wilco Yonos Para 25/7.5		Wilco Stratos 30/1-8	Wilco Stratos 30/1-12
Construction length	180 mm		180 mm	

3.8 Dimensioning the buffer-charging pump

Spread via the boiler [K]	Boiler output [kW]											
	20	30	40	45	50	60	65	69.5	80	100	108	120
10	1.72	2.58	3.44	3.86	4.30	5.16	5.58	5.97	6.87	8.59	9.28	10.30
15	1.15	1.72	2.29	2.58	2.86	3.44	3.72	3.98	4.58	5.73	6.19	6.87
20	0.86	1.29	1.72	1.93	2.15	2.58	2.79	2.98	3.44	4.30	4.64	5.16

Table 1: Volume flow [m³/h]

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.

20 – 30 kW	40 – 50 kW	60 – 80 kW	100 – 120 kW
155 l	135 l	165 l	195 l

Table 2: Water volume KWB Multifire 20-120 kW (litre)

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	$\leq 1.0 \text{ mmol/l}$	$\leq 2.0 \text{ mmol/l}$	$< 0.1 \text{ mmol/l}$
Conductivity	–	$< 100 \mu\text{S/cm}$	$< 100 \mu\text{S/cm}$
pH value	6.0 – 8.5	6.5 – 8.5	6.0 – 8.5
Chloride	$< 30 \text{ mg/l}$	$< 30 \text{ mg/l}$	$< 30 \text{ mg/l}$

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

Limit values The following limit values for fill water are intended to ensure the long-term reliable operation of hot water heating systems: The fill water should be low-salt and alkaline and not exceed a specific hardness.

Total heat generation capacity	mmol/l		°dH	
	ÖNORM ¹	VDI ²	ÖNORM ¹	VDI ²
Specific water content of the system $< 20 \text{ l/kW}$				
$\leq 50 \text{ kW}$	≤ 3	≤ 3	≤ 16.8	≤ 16.8
$> 50 \text{ to } \leq 200 \text{ kW}$	≤ 2	≤ 2	≤ 11.2	≤ 11.2
$> 200 \text{ to } \leq 600 \text{ kW}$	≤ 1	≤ 1.5	≤ 5.6	≤ 8.4
Specific water content of the system $\geq 20 \text{ l/kW}$, but $< 50 \text{ l/kW}$				
$\leq 50 \text{ kW}$	≤ 2	≤ 2	≤ 11.2	≤ 11.2
Specific water content of the system $\geq 50 \text{ l/kW}$				
$\leq 50 \text{ kW}$	≤ 1	≤ 0.02	≤ 5.6	< 0.11

Table 3: Highest permitted total hardness of the fill water for heating systems with a heat generation system with large water content (WBS $> 0.3 \text{ l/kW}$)

mmol/l ... SI unit sum alkaline earth | °dH ... German degrees of hardness

¹ acc. to ÖNORM H 5195-1:2010

² acc. to VDI 2035

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

3.11.3.2 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 <input type="checkbox"/> / No <input type="checkbox"/>	

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
^{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 <input type="checkbox"/> / No <input type="checkbox"/>

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 \leq 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.

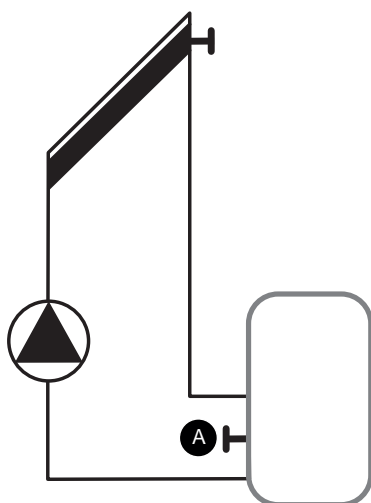
Diagram 4 – External heat exchanger

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)



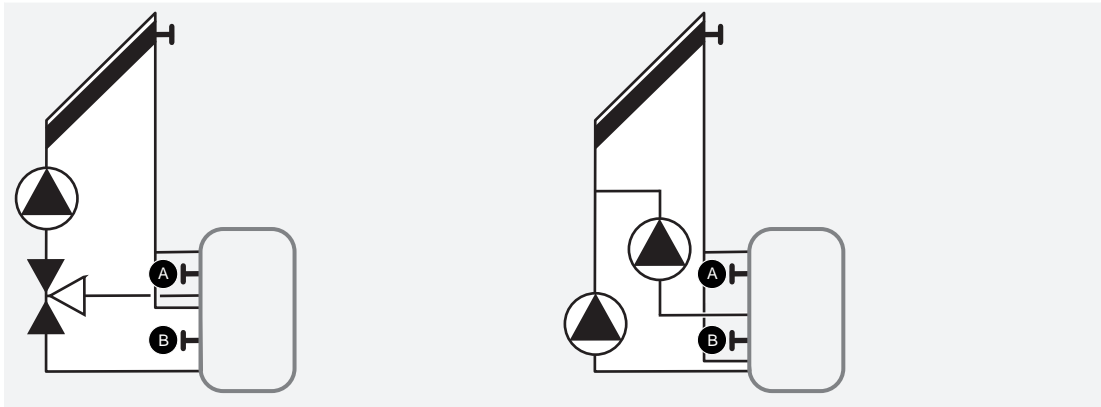
Temperature sensor for	Buffer	Buffer 0	DHWC
[A] plug number	# 334	# 242	# 341

- 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

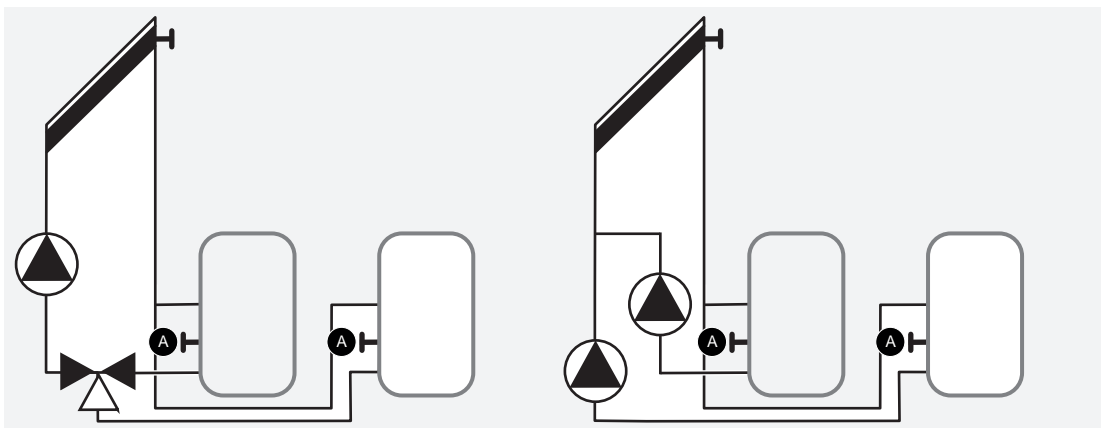
- Storage tank 1: Buffer | Buffer 0
Select a buffer storage tank. A buffer storage tank must be activated! If required, activate the buffer type where sensor 4 (S4) is used as switch-off sensor for the boiler. It is primarily charged to sensor 2 (S2) on top.
- Switchover: Pump | Valve
When switching 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



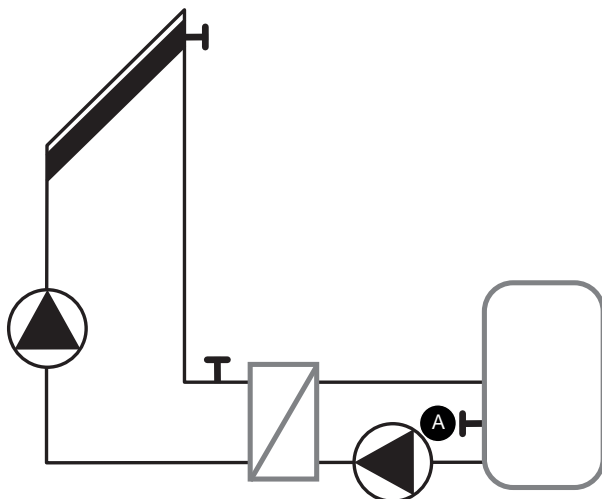
Temperature sensor for	Buffer	Buffer 0	DHWC
[A] plug number	# 334	# 242	# 341

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

⚠ 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!

The entire system-internal wiring is done in the factory or by the installation personnel. After installation, the mains connection and the external cabling of all system parts (e.g. heating circuit pumps, mixing valves, sensors, remote communication devices, remote switches, analogue remote control units, ...), and, if there is a network, the bus cabling of the heating circuit modules and the digital remote control units must be carried out by a qualified electrical installation company.

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.

⚠ 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!

4.1 Electrical connections - boiler

Establishing the mains connection

The mains connection of the KWB Multifire is established via the supplied 5-pin connector.

⚠ WARNING



Required electrical connections

Please strictly observe the required connections shown below!

Mains connection:

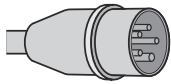
**Three-phase connection 400 VAC
line protection switch 13 A, Type "B"**

Required connections to
be provided by the cus-
tomer:

**5-pole (L1/L2/L3/N/PE) with fault current protection switch and
lightning arrester at the building distribution board**

**Emergency stop switch ("stop escape" according to TRVB H118),
must be mounted outside of the boiler room**

Version 400 V

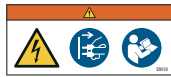


If the conveyor system is powered by a three-phase motor, a 400 V_{AC} power supply must always be available. The mains connection is established via the supplied 5-pin connector. The KWB conveyor systems [M] and [L] require a 400 V_{AC} power supply.

- ⇒ Open the provided CEE connector and connect the power supply according to the coding of N, PE and L1/L2/L3 to the connector!

Opening the control cabinet

Only certified technicians!



- ➔ The connection of pumps, motor mixers and other heating system components may only be performed by companies licensed to install electrical equipment!
- ⇒ Read the instruction manual completely before you unplug the connector and remove the control box casing. Secure the system against being switched on again!
- ⇒ Remove the Exclusive control unit from the front cover (first unhook from lower edge) and then release the bus cable before you finally remove the Exclusive control unit.
- ⇒ Unscrew the two front casing screws and remove this casing part.
- ⇒ Place the front casing on a stable surface to avoid scratches and other damage!
- ⇒ Unscrew the two casing screws and remove the control cabinet casing.

Pre-assembled return flow boost

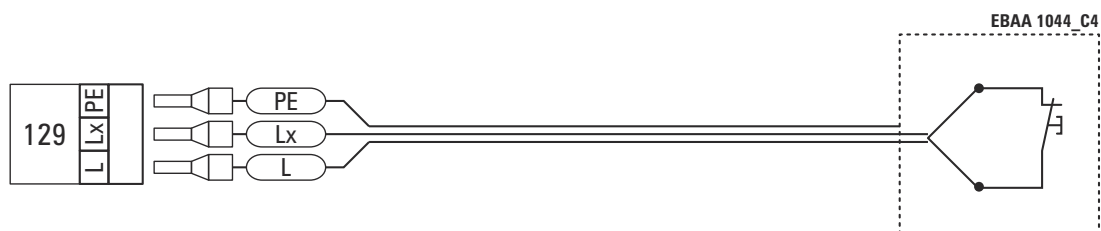
The installation company installed and pre-wired a 3-way valve with servomotor and the pump.

Wiring to the fire shutter motor (only for type MF2 ZI)

- ➔ In the KWB Multifire type MF2 ZI, the fire shutter (in place of the cellular wheel sluice) is already installed.
- ⇒ When installing the wiring, please comply with the rule that the bending radius must be 5 × greater than the cable diameter!

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.



Connec- tor	Pins	Description	Function
129	3	3-pin digital input 230 V _{AC}	Emergency stop ("emergency escape switch")

4.2 Electrical connections, conveyor system with suction conveyor

4.2.1 Electrical connections at the boiler



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

4.2.2 House connection box for pellet suppliers

Note: If you operate KWB Multifire type MF2 ZI with pellets, KWB offers a specially adjusted house connection box with automatic safety shutdown (Art. No. 13-2000427).

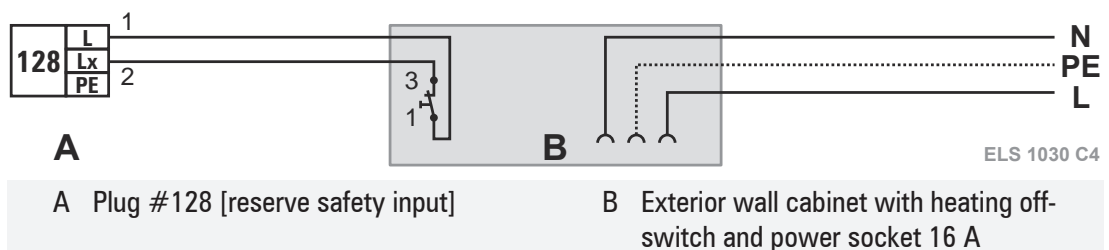
- ⇒ Install the house connection box (art. no. 13-1000534) near the filling nozzles.
 ⇒ Connect the switch in the house connection box with input #128 [reserve safety input].
 Note: Cables are NOT supplied!

- ⇒ 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



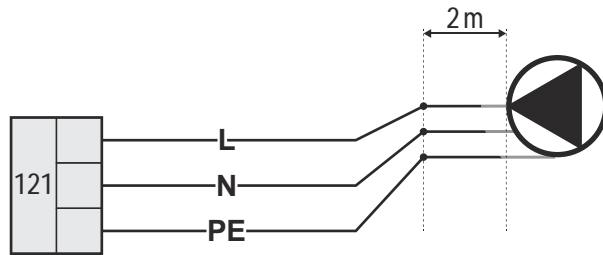
4.3 Heating system electrical connections

4.3.1 Buffer storage tank

4.3.1.1 Charging the buffer storage tank directly from the boiler

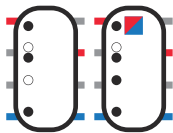
Pump

- ⇒ Install the buffer charging pump:



Connec- tor	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

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].

Connec- tor	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]:

Connec- tor	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

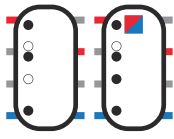
Connection at the Heat management module [WMM]:

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.

Conne- tor	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").

Conne- tor	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 or the float switch at the emergency fire extinguishing device system triggers an alarm

- TMFS acoustic alarm
To connect an acoustic warning device if the sensor at the conveyor channel or the float switch at the emergency fire extinguishing device system 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

Connec- tor	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!

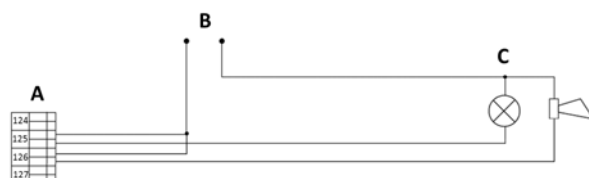
NC contact (in de-energized state as well as "main switch: Off", contact closed) configurable for:

- 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 or the float switch at the emergency fire extinguishing device system triggers an alarm
- TMFS acoustic alarm
To connect an acoustic warning device if the sensor at the conveyor channel or the float switch at the emergency fire extinguishing device system triggers an alarm
- Fault shutdown
To indicate faults that trigger a boiler shutdown

Connec- tor	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.

Connec- tor	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

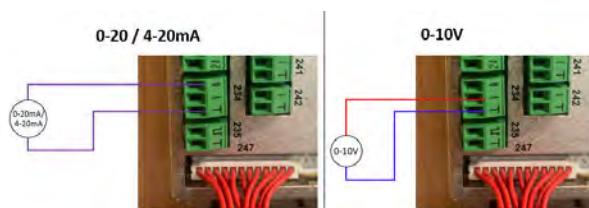
0-20 mA: < 1 mA request Off | > 2 mA request On

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:

Conne- tor	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:

Conne- tor	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:

Conne- tor	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]

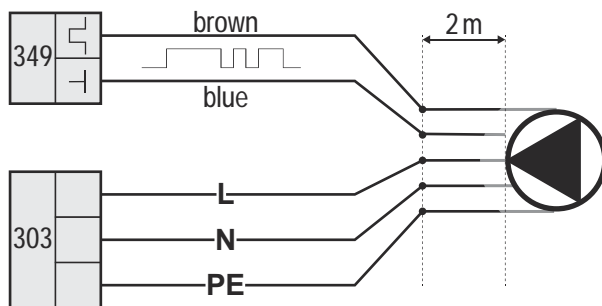
Attention: Solar control is only possible in the version Heat management module [WMM] with 2 heating circuits and the universal Heat management module! The storage tanks must be connected to the same Heat management module as the solar system (exception: buffer 0).

⇒ 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).

Connec- tor	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.

Connec- tor	Pins	Description	Function
303	3	3-pole supply 230 V _{AC}	Solar pump
349	2	2-pole connection actuator	Solar PWM signal pump 1

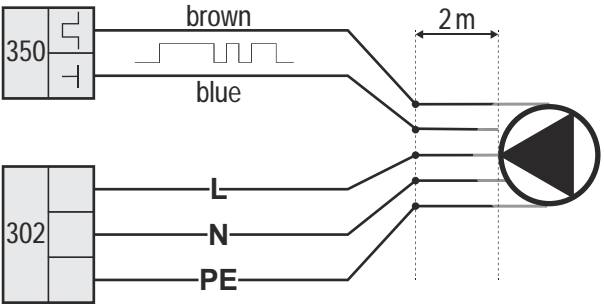
Optional

⇒ 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.



Conne- tor	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

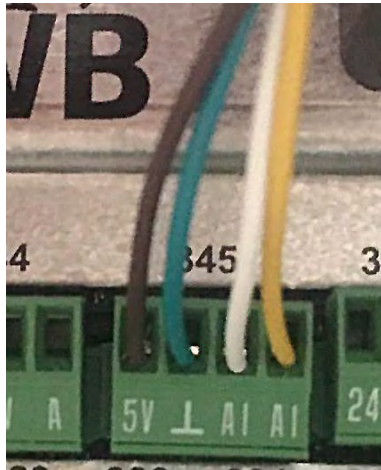
Optional ⇒ If required (depending the used solar schematic diagram): Install the switchover valve (instead of collector pump 2).

Conne- tor	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!

Conne- tor	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	

Connec- tor	Pins	Description	Function
345	4	4-pole connection	Solar flow & temperature sensor (vor- tex) 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.

Connec- tor	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.

Connec- tor	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)
- Boiler expansion module
- Conveyor system module

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

- Basic control unit
- Exclusive control unit

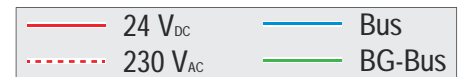
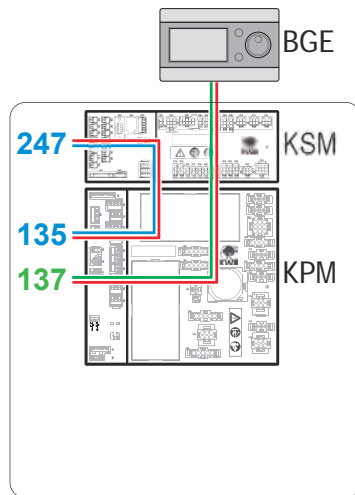
Exception: The control unit at the boiler is connected to the Boiler power module.

4.4.2.1 Network examples

WM M	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		

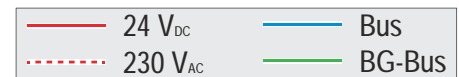
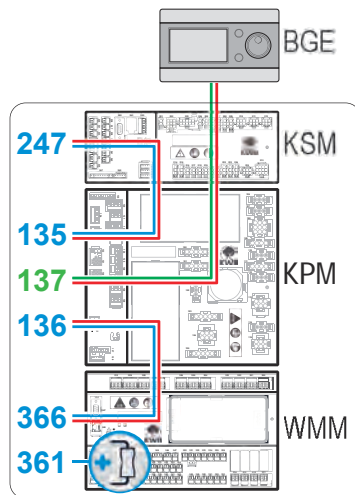
Note: The first operating device (Basic control unit or Exclusive control unit) must always be connected at input 362. The second operating device (is any) at input 363 (see Control unit cabling ► 51]).

Simplest network – WITHOUT heat management module

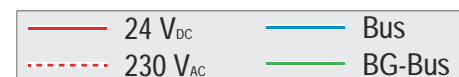
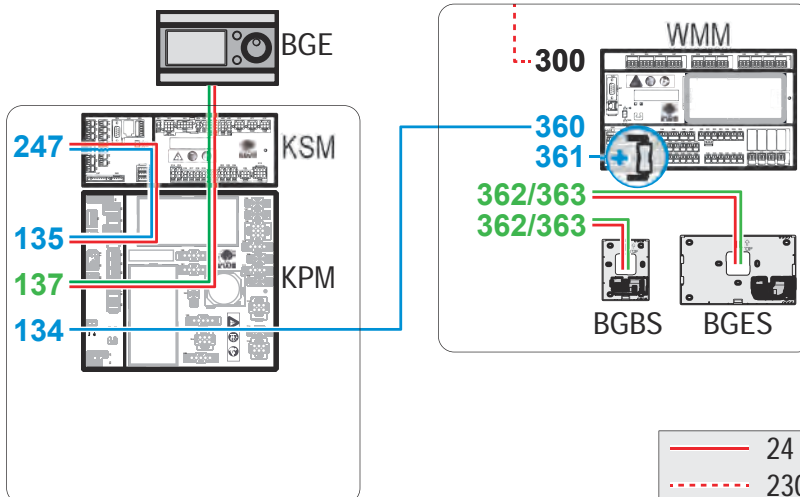


Network with 1x heat management module

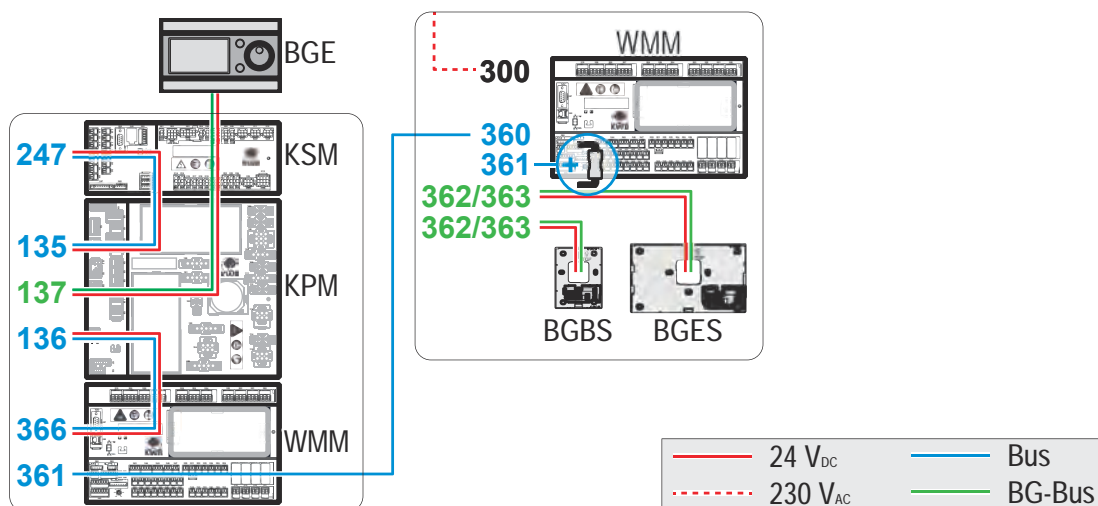
WMM in the boiler



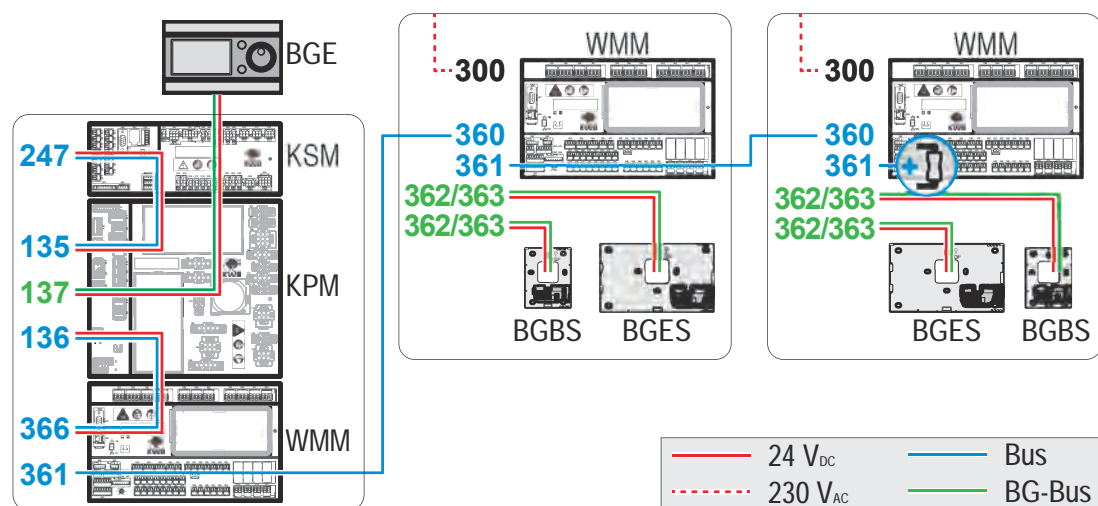
WMM external



Network with 2x heat management modules



Network with 3x heat management modules



Please also see

Control unit cabling [► 51]

4.4.2.2 Cable assignment

NOTE

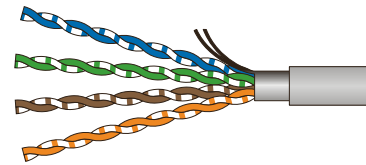
The following must be observed with regard to the bus wiring!



- ➔ 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 (<i>only for unfavourable cabling</i>)
Green	Data transfer
Green-white	
brown	24 V _{DC} and GND for control unit
Brown-white	
black	Cable screening/shielding
Orange	Return flow (<i>only for unfavourable cabling</i>)
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

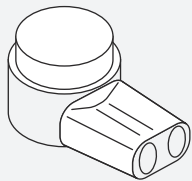
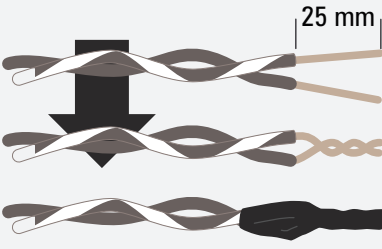
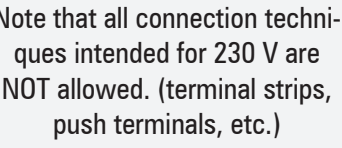
Maximum
length

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!

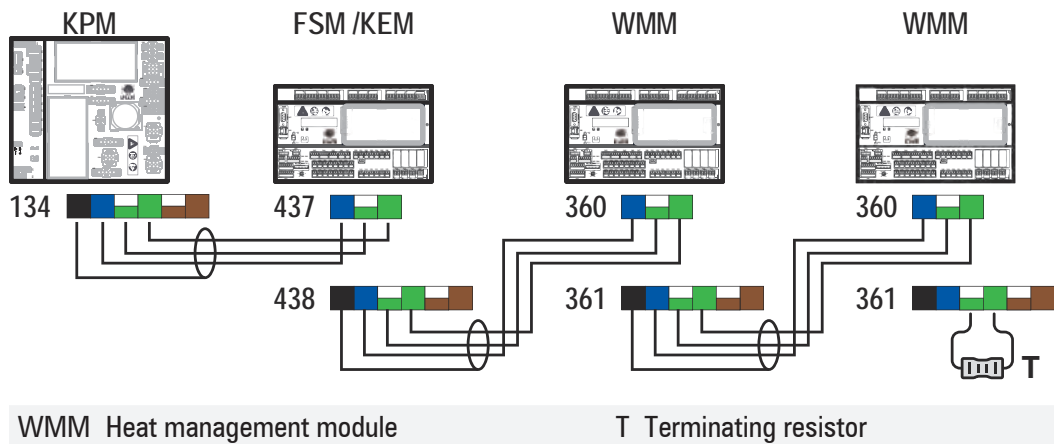
4.4.2.3 Connecting the cable

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

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

4.4.2.4 House bus cabling



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!

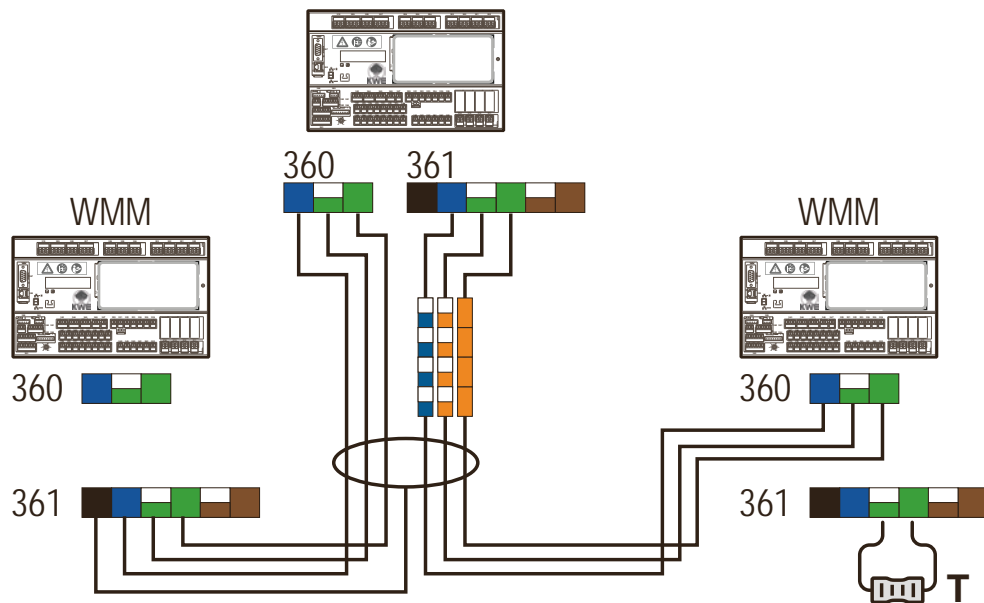


Fig. 2: Bus cabling with return wire (Cat.5 cable – up to a max. of 100 m)

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 modules [WMM], Conveyor system modules [FSM] and Boiler expansion modules [KEM].
 - ⇒ Remove all terminating resistors between the last Heat management module [WMM] and the Boiler power module [KPM].
 - ⇒ Leave the terminating resistor installed only at the last Heat management module [WMM] at the house bus.
- The terminating resistor connects the contacts green and green-white.

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

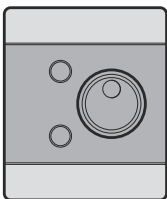
4.4.3 Control units

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 $\pm 5^{\circ}\text{C}$ via the dial.
- Two buttons permit switching between programs and enable the activation 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

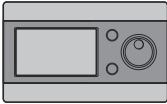
The module is connected to the WMM via the control unit bus.

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.

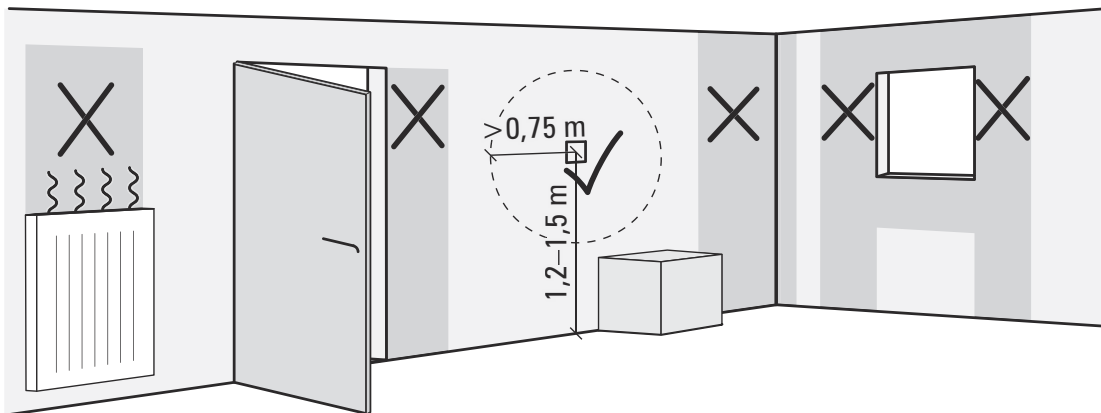
Voltage The power supply comes from the Heat management module via the Cat.5 cable (up to max. 100 m total length).

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

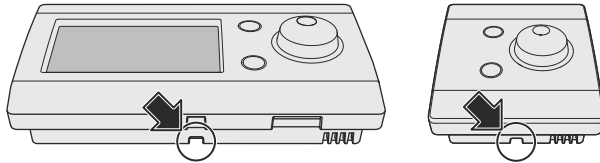
- ⇒ Use the coolest room that you spend time in during the day.
- ⇒ Install the control units at a height of 120–150 cm.
- ⇒ Make sure to leave a distance of 100 cm between the control units and doors and windows.
- ⇒ Avoid heating sources (heating units, chimneys, heating pipes in the wall, but also 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 be 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.

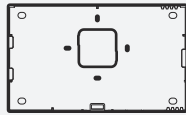
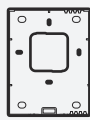


- ⇒ Use a pen to push into the recess on the lower side of the control unit to release the lock as illustrated in the picture.
- ⇒ NOTE! Please note when using the control unit that a short cable links the control unit to the mounting base!

4.4.3.5 Mount and connect

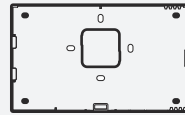
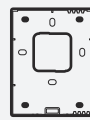
- Base ⇒ Secure the mounting base with the 4 supplied screws.

On a socket installed under the plaster



- ⇒ Secure the mounting base exactly aligned with the socket under the plaster.

With wall anchors

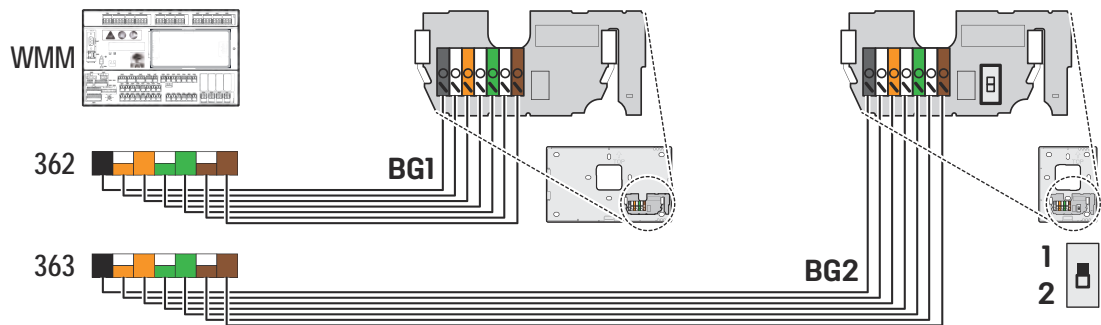


- ⇒ Insert the wall anchors at the desired position of the control unit.
- ⇒ Screw the mounting base to the wall anchors.

- 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!

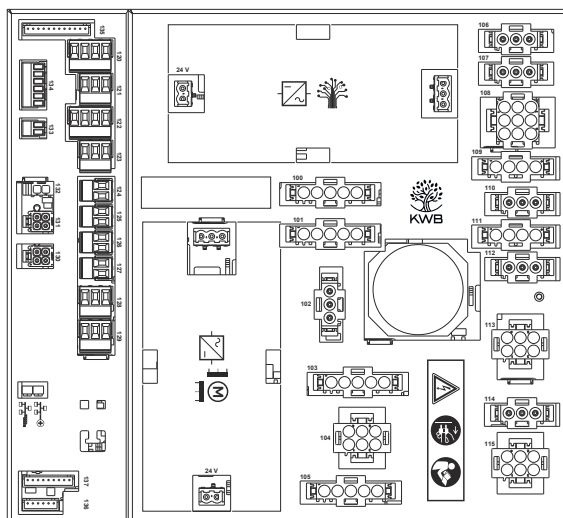
Only for Basic control unit [BGB]:



- ↪ 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.

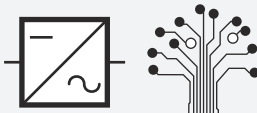

LED displays

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 400 V, the input voltage must be between 173 V_{AC} and 476 V_{AC} and the frequency between 45–63 Hz.

Maximum rated current: L1 = 16 A, L2 = 16 A, L3 = 16 A

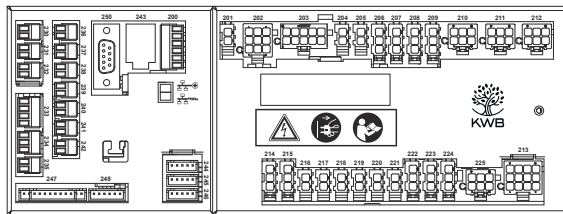
4.4.4.1 Plug at the KPM

Connec- tor	Pins	Description	Function
100	5	5-pole supply 230/400 V _{AC}	Power supply, boiler
101	5	5-pin power supply 230 V _{AC}	Outgoing power supply for supplementary circuit board
103	5	5-pole supply 230/400 V _{AC}	Main drive
105	5	5-pole supply 230/400 V _{AC}	Conveyor motor
107	3	2-pole (L+N) supply 230 V _{AC}	Ignition rod, Heating [CF2] and Ignition [MF2]
108	9	9-pole supply 230 V _{AC}	Mixer or valve for return flow boost (1-2-4-7) and boiler circuit pump (3-6-9) for the pre-assembled return flow boost [MF2]
109	4	4-pin power supply 230 V _{AC}	Recirc. or bypass shutter (pin 1-3-4) (optional)
110	3	3-pin power supply 230 V _{AC}	Reserve or cleaning motor KWB dust filter
111	2	2-pin digital input 230 V _{AC}	Safety temperature limiter (STL) or additional supply tapping KWB dust filter

112	3	3-pin power supply 230 V _{AC}	Fire shutter
113	6	6-pole supply 230 V _{AC}	Heat exchanger cleaning (1-2-3) and induced draught (4-5-6)
114	3	3-pole power supply 230 V _{AC}	Recirculation fan
115	6	6-pole supply 230 V _{AC}	Primary air fan (1-2-3) and secondary air fan (4-5-6) [MF2]
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-pole supply 230 V _{AC}	As #109, but clamp
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 overflow 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}	Reserve safety input [MF2, CF2, CF1], limit switch ash tray dust filter
134	6	6-pole bus clamp	House bus [OUT]
135	12	12-pin bus flat connector	Boiler bus [OUT] + 24 V _{DC} multi-phase motor
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].

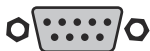
Bus

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

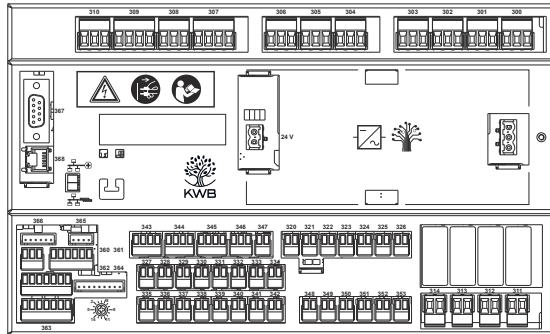
Connec- tor	Pins	Description	Function
200	6	6-pole connection sensor	Lambda probe
202	9	9-pin connection sensor	Position feedback bypass (if no exhaust gas recirculation)
203	10	10-pin connection sensor/actuator	Main drive temperature protection switch (pin 1, 6) and conveyor system temperature protection switch (pin 2, 7) and fire shutter OPEN (pin 3, 8) and fire shutter CLOSED (pin 4, 9) and drum position (pin 2, 7) and cleaning position KWB dust filter (pin 5, 10)

204	2	2-pole connection, push button	Measuring mode switch
205	2	2-pole connection sensor	Door contact [CF2] or float switch [MF2]
206	3	3-pin connection sensor	Recirculation or bypass shutter open (pin 1, 2) (optional)
207	3	3-pole connection sensor	Ash container, fill level 90%
208	3	3-pole connection sensor	Inductive sensor upward transfer unit flap
210	6	6-pole connection sensor	Primary air, speed (1-2-3) and secondary air, speed (4-5-6)
211	6	6-pin connection sensor	Recirculation fan speed (1-2-3); induced draught speed (4-5-6)
214	3	3-pole connection	Fill level hopper
215	3	3-pole connection sensor	Negative pressure sensor 0–5 V _{DC}
216	2	2-pole connection sensor PT1000	Ash temperature
217	2	2-pole connection sensor PT1000	Return flow temperature
218	2	2-pole connection sensor PT1000	Boiler forward flow temperature
219	2	2-pole connection sensor PT1000	Stoker temperature
220	2	2-pole connection sensor type K	Flame temperature
221	2	2-pole connection sensor type K	Burnout 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
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
244	5	5-pin flat connector	Multi-phase motor, crawler burner
245	5	5-pole flat connector	Multi-phase motor, grate ash conveyor
246	5	5-pole flat connector	Multi-phase motor, fly ash conveyor
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]

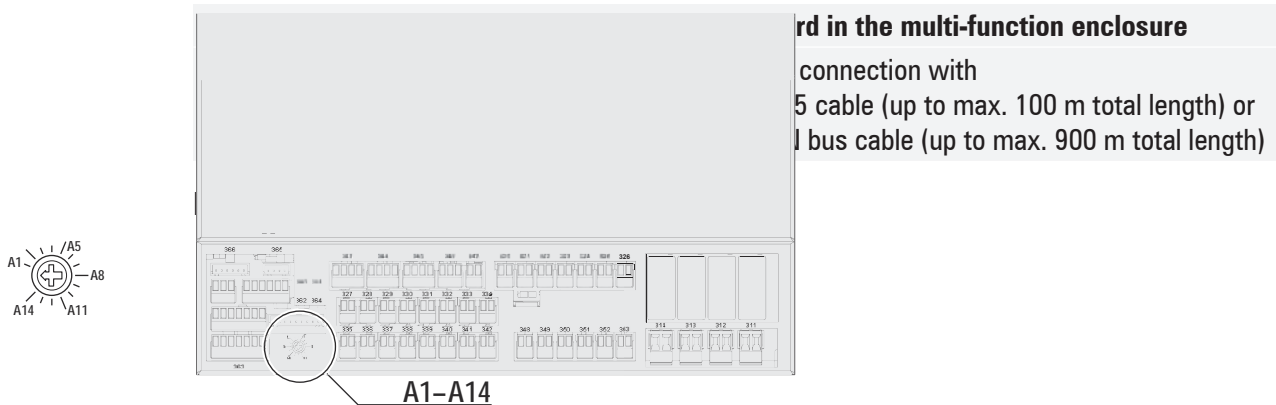
Comprises all heat management connections.



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.
-----	------------------------------------------------------------------------



- ⇒ 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.

Scope of delivery



- 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.
- 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)

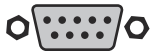
The version with 2 heating circuits also contains ...

- 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

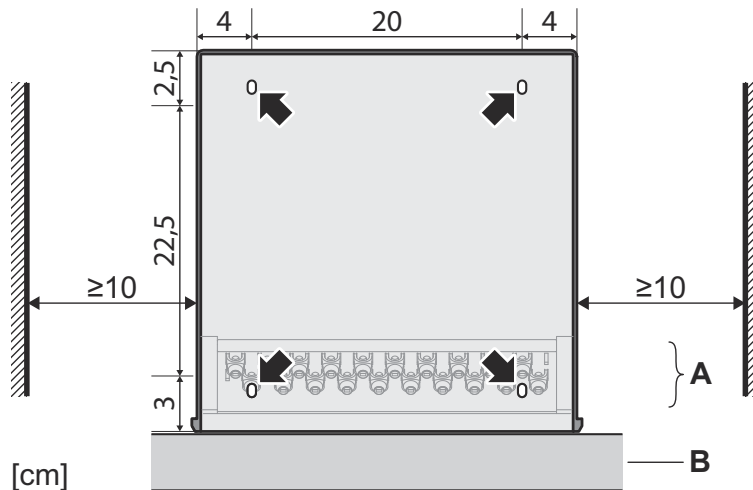
The 6-pole RJ12 sockets integrates an GSM module and supplies it with power.

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.

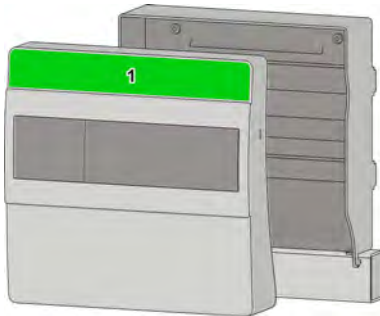
Mounting on the wall

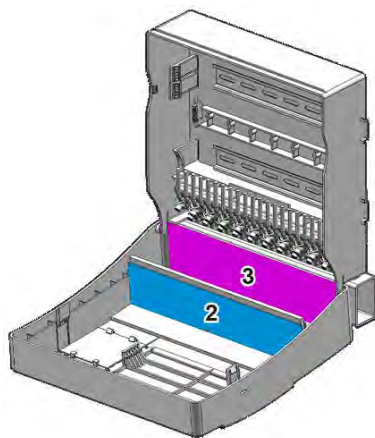


A Cable clamps

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

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

Table 4: Max. permitted values: Total loads for all connections

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

Conne- tor	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

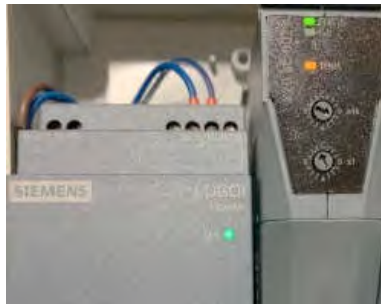
331	2	2-pole connection sensor PT1000	Buffer storage tank 2 temperature
332	2	2-pole connection sensor PT1000	Buffer storage tank 3 temperature
333	2	2-pin connection sensor PT1000	Buffer storage tank 4 temperature
334	2	2-pole connection sensor PT1000	Buffer storage tank 5 temperature
335	2	2-pole connection 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

The M-bus interface permits reading heat quantity meters via a C4 M-bus module into the KWB Comfort 4 control. 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 anywhere you prefer. It requires the following connections:

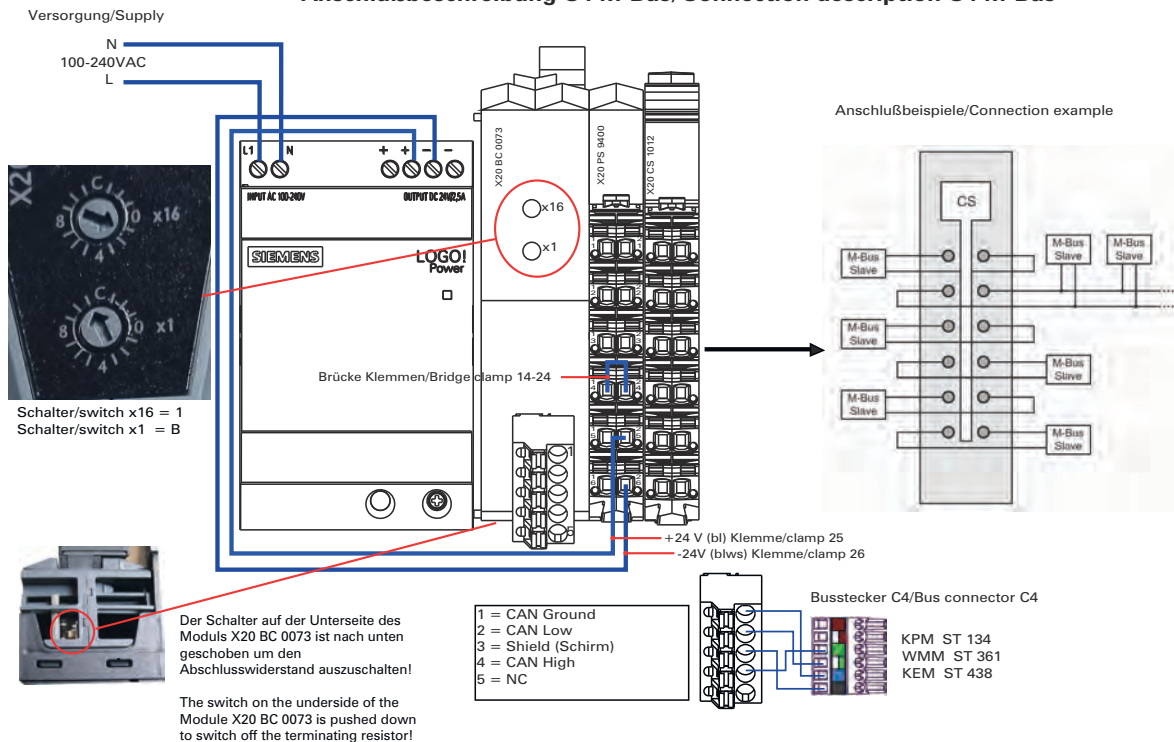
- Mains connection (230 V AC | 6A)
- Bus cabling to the Comfort 4 network (Cat 5e, as of 100 m CAN bus cable)

For this, see also sections Cable assignment and Terminating resistor.

M-bus cabling

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

Anschlußbeschreibung C4 M-Bus/Connection description C4 M-Bus



Please also see

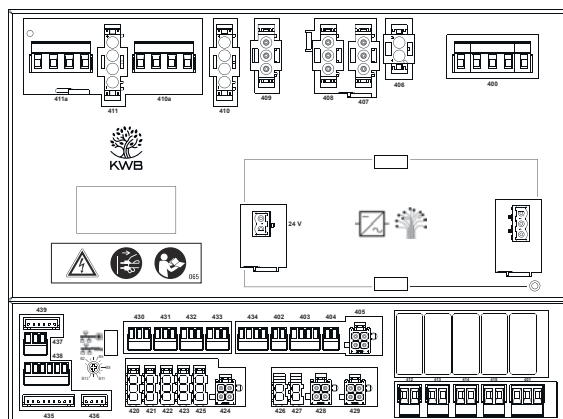
- Cable assignment [► 45]
- Terminating resistor [► 48]

4.4.7 Conveyor system module [FSM]

The Conveyor system module contains all required power connections and safety devices for one to two additional conveyor system drives which function with mains voltage (230/400 V_{AC}).

Note! Drives such as the joint stirrer which must also be requested by a 2nd boiler, must be connected as Motor 2.

Drives which are, e.g., additionally released via a light barrier, and the drive for the ascending screw must be connected as Motor 1.



The illustration shows a partially equipped circuit board [FSM]. When the board is being replaced, it is always fully equipped and is called Boiler expansion module.

Voltage

Board in the control box - boiler

Power supply 24 V_{DC} and 400 V_{DC} is carried out via the Boiler power module

Board in the multi-function enclosure

Power supply 400 V_{AC} (3L/N/PE)
CEE electrical outlet 5-pole (3L/N/PE) needs to be provided by the customer

In this case, a power supply unit is required at the Conveyor system module.

Either a Heat management module or a Conveyor system module can be installed in the control box.

Bus

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

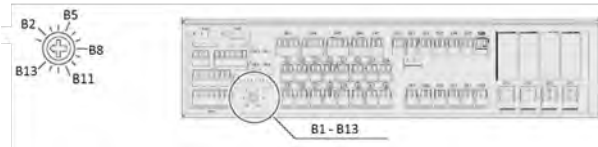
Board in the control box - boiler

Bus connection through ribbon cable

Board in the multi-function enclosure

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

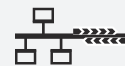


⇒ Use a unique node number for every module: Use the small screw driver to set the selector switch to a free node number.

- The number range for the Conveyor system module is B1 to B13.
- A max. of 10 Conveyor system modules or Boiler expansion modules can be addressed per 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

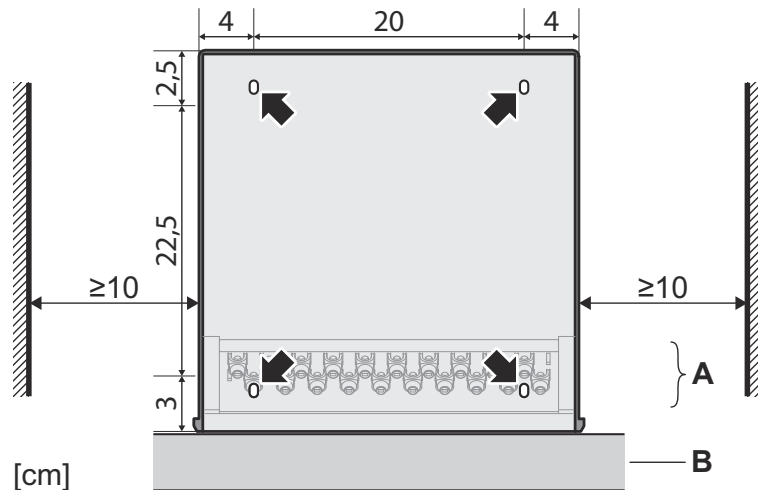
OK

No activity

4.4.7.1 Wall installation**Positioning the multi-function enclosure**

Place the multi-function housing at a spot next to the associated additional conveyor system drives.

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. 60×40 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.
- ⇒ Remove the module from the housing. To achieve this, push the lateral retaining lugs outward so that you can swivel the module out and remove it.
- ⇒ 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 with the 4 supplied screws to the desired position and put the module back into the housing.
- ⇒ Replace the cover.

4.4.7.2 Connecting dimensions

Switching voltage	$\leq 440 V_{AC}$ or $125 V_{DC}$
Switching current	$\leq 10 A$
Switching power	$\leq 2500 VA$
Drives	$\leq 1500 W$

Table 5: Max. permitted values: Total loads for all connections

4.4.7.3 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 runs. Always choose the next free cable feedthrough that is closest to the plug.
- ⇒ 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.

Strain relief

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

Required connections to be provided by the customer: supply with CEE electrical outlet 5-pole (3L/N/PE)

Power supply

The electrical connection must be executed via a 5-pole CEE plug-in connector to be able to disconnect from the power supply. The connection cable must be a wet-duty room line (or equivalent) with a cross-section of at least 1.5 mm².

Make sure during the connection process that the protective conductor, neutral conductor and phase sequence agree with the markings on the terminals.

4.4.7.4 Connecting motors

KWB 400V drives are equipped with an AMP plug via the pre-installed 4-pole extension cable. To connect them to the Conveyor system module, it is necessary to remove the 4-pole **plug connector on one side**, insulate 3-4 cm and crimp on the conductor sleeves. Extend the cables if necessary.



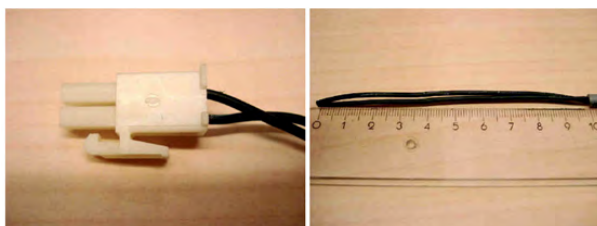
Connection cable 400V motor

Wire markings - cable	FSM - plug #410 / #411
1	U1
2	V1
3	W1
Yellow-green	PE

Inputs

The inputs are used differently, depending on the variant, see Connection variants at the conveyor system module [► 68].

The temperature protection switch (Klixon) of the motors and the overfill protection switch are equipped with a pre-installed extension cable with an AMP socket plug. The AMP socket plug must be removed for the connection with the Conveyor system module. Approximately 10 cm of the cable must be insulated and then the conductor sleeves need to be crimped onto the cable. Extend the cables if necessary. The connection is installed at plugs #431/432 with **24V** and **I**.



439	6	6-pole bus connection	Input voltage supply 24 V from the boiler-power module (#136)
-----	---	-----------------------	---------------------------------------------------------------

* Only if the module is installed in the boiler

4.4.7.5 Plug at the FSM

Connec- tor	Pins	Description	Function
400	5	5-pole supply 400 V _{AC}	Power supply 400 V _{AC}
401	3	3-pole digital input 230 V _{DC} (is delivered bridged)	Emergency stop (emergency escape switch)
402	2	2-pole digital input 24 V _{DC} (is delivered bridged)	Temperature monitor fuel storage (TMFS)
403	4	4-pole digital input 24 V _{DC}	Sensor for overfill protection cover at the conveyor channel
404	2	2-pole digital input 24 V _{DC} (is delivered bridged)	External, safety circuit 24 V _{DC}
405	4	4-pole digital input 24 V _{DC} (is delivered bridged)	Limit switch ash container (safety circuit 24 V _{AC})
410	4	4-pole supply 400 V _{AC}	Conveyor motor 1 Corresponds to 410a, but is a plug
410a	4	4-pole supply 400 V _{AC}	Conveyor motor 1 Corresponds to 410, but is a clamp
411	4	4-pole supply 400 V _{AC}	Conveyor motor 2 Corresponds to 411a, but is a plug
411a	4	4-pole supply 400 V _{AC}	Conveyor motor 2 Corresponds to 411, but is a clamp
<i>Plugs 417–419 do not exist.</i>			
430	3	3-pole digital input 24 V _{DC} (is delivered bridged)	Release contact conveyor system Motor 1 (e.g. when using a light barrier)
431	3	3-pole digital input 24 V _{DC}	Temperature protection switch conveyor system Motor 1
432	3	3-pole digital input 24 V _{DC}	Temperature protection switch conveyor system Motor 2
433	3	3-pole digital input 24 V _{DC}	External requirement conveyor system Motor 2 (e.g. for a joint stirrer)
434	4	4-pole connection	Reserve
435	9	9-pole flat connector	Control unit – Only for the control unit directly in the multi-function enclosure!
436	4	4-pole flat connector	Connection to the LED row
437	3	3-pole bus connection	House bus [IN] Input bus connection

438	6	6-pole bus connection	House bus [OUT] Delivered terminated (120 Ω). Must be removed in case of bus extensions!
439	6	6-pole bus connection	Input bus connection 24 V of the boiler-power module (#136)

4.4.7.6 Connection variants at the conveyor system module

Ascending screw with downward transfer

In a conveyor system with downward transfer and an ascending screw, the ascending screw motor must be connected to the boiler together with the sensor system. The more distant motor that drives the stirrer must be connected to the Conveyor system module.

Connec- tor	Pins	Description	Function
400	5	5-pole supply 400 V _{AC}	Power supply 400 V _{AC}
<i>Installed in the wall-mounted housing: supply with CEE electrical outlet 5-pole (3L/N/PE) 13A</i>			
401	3	3-pole digital input 230 V _{DC} (is delivered bridged)	Emergency stop (emergency escape switch)
<i>Use a 2-pole emergency stop switch to be able to switch off the boiler and the Conveyor system module with one switch</i>			
402	2	2-pole digital input 24 V _{DC} (is delivered bridged)	Temperature monitor fuel storage (TMFS)
<i>If the switch for the temperature monitoring of the fuel storage (TMFS) is connected to the boiler, then this connection remains bridged.</i>			
403	4	4-pole digital input 24 V _{DC}	Sensor for overfill protection cover at the conveyor channel
410	4	4-pole supply 400 V _{AC}	Conveyor motor 1 Corresponds to 410a, but is a plug
410a	4	4-pole supply 400 V _{AC}	Conveyor motor 1 Corresponds to 410, but is a clamp
430	3	3-pole digital input 24 V _{DC} (is delivered bridged)	Release contact conveyor system Motor 1 (e.g. when using a light barrier)
431	3	3-pole digital input 24 V _{DC}	Temperature protection switch conveyor system Motor 1
437	3	3-pole bus connection	House bus [IN] Input bus connection
438	6	6-pole bus connection	House bus [OUT] Delivered terminated (120 Ω). Must be removed in case of bus extensions!
439	6	6-pole bus connection	Input bus connection 24 V of the boiler-power module (#136)

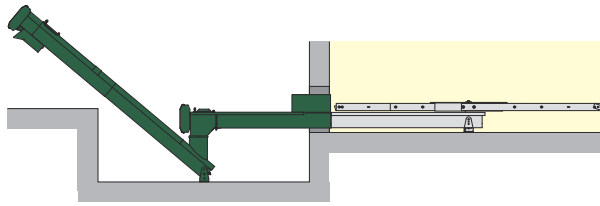


Fig. 3: Example: Ascending screw with downward transfer

Dual boiler system – activation of the joint stirrer

In case of a dual boiler system with joint stirrer, the drive for the joint stirrer must be connected to the Conveyor system module. In this case the activation (request) of the joint stirrer takes place via request contact from the 2nd boiler.

Conne- tor	Pins	Description	Function
---------------	------	-------------	----------

400	5	5-pole supply 400 V _{AC}	Power supply 400 V _{AC}
-----	---	-----------------------------------	----------------------------------

Installed in the wall-mounted housing: supply with CEE electrical outlet 5-pole (3L/N/PE) 13A

401	3	3-pole digital input 230 V _{DC} (is delivered bridged)	Emergency stop (emergency escape switch)
-----	---	--------------------------------------------------------------------	------------------------------------------

Use a 3-pole emergency stop switch to be able to switch off both boilers and the Conveyor system module with one switch.

402	2	2-pole digital input 24 V _{DC} (is delivered bridged)	Temperature monitor fuel storage (TMFS)
-----	---	-------------------------------------------------------------------	-----------------------------------------

If the switch for the temperature monitoring of the fuel storage (TMFS) is connected to the boiler, then this connection remains bridged.

411	4	4-pole supply 400 V _{AC}	Conveyor motor 2 Corresponds to 411a, but is a plug
-----	---	-----------------------------------	-----------------------------------------------------

411a	4	4-pole supply 400 V _{AC}	Conveyor motor 2 Corresponds to 411, but is a clamp
------	---	-----------------------------------	-----------------------------------------------------

432	3	3-pole digital input 24 V _{DC}	Temperature protection switch conveyor system Motor 2
-----	---	-----------------------------------------	-------------------------------------------------------

433	3	3-pole digital input 24 V _{DC}	External requirement conveyor system Motor 2 (e.g. for a joint stirrer)
-----	---	-----------------------------------------	----------------------------------------------------------------------------

Request comes from the 2nd boiler via the floating switch contact:

- KWB Comfort 3: #7.3 output or in case of a MF2 – "Relay LB" (11-14)
- KWB Comfort 4 : #125-127 multi-function output 1, 2, 4 (one of the contacts)

437	3	3-pole bus connection	House bus [IN] Input bus connection
-----	---	-----------------------	----------------------------------------

438	6	6-pole bus connection	House bus [OUT] Delivered terminated (120 Ω). Must be removed in case of bus extensions!
-----	---	-----------------------	------------------------------------------------------------------------------------------------

439	6	6-pole bus connection	Input bus connection 24 V of the boiler-power module (#136)
-----	---	-----------------------	-------------------------------------------------------------

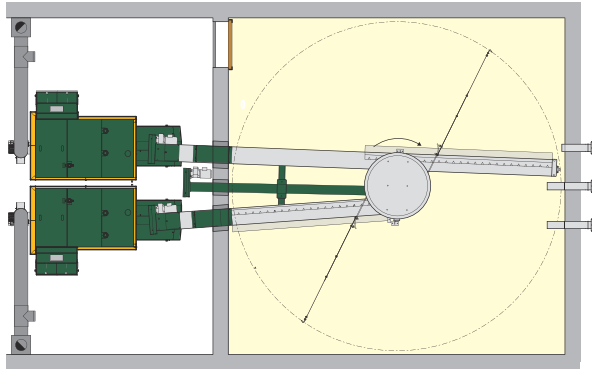


Fig. 4: Example: Dual boiler system – activation of the joint stirrer

Ascending screw – external ash bin

If an external ascending screw (ash bin) was installed, then the ascending screw drive must be connected to the Conveyor system module as Motor 1.

Connec- tor	Pins	Description	Function
400	5	5-pole supply 400 V _{AC}	Power supply 400 V _{AC}
<i>Installed in the wall-mounted housing: Supply with CEE electrical outlet 5-pin (3L/N/PE) 13A</i>			
401	3	3-pole digital input 230 V _{DC} (is delivered bridged)	Emergency stop (emergency escape switch)
<i>Use a 2-pin emergency stop switch to be able to switch off the boiler and the Conveyor system module with one switch</i>			
410	4	4-pole supply 400 V _{AC}	Conveyor motor 1 Corresponds to 410a, but is a plug
410a	4	4-pole supply 400 V _{AC}	Conveyor motor 1 Corresponds to 410, but is a clamp
431	3	3-pole digital input 24 V _{DC}	Temperature protection switch conveyor system Motor 1
437	3	3-pole bus connection	House bus [IN] Input bus connection
438	6	6-pole bus connection	House bus [OUT] Delivered terminated (120 Ω). Must be removed in case of bus extensions!
439	6	6-pole bus connection	Input bus connection 24 V of the boiler-power module (#136)

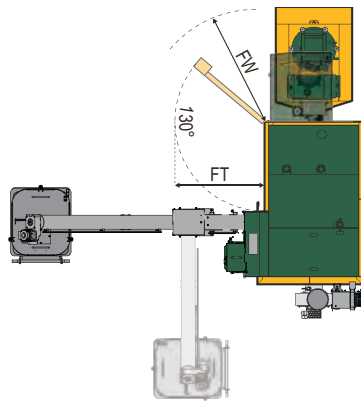


Fig. 5: Example: Ascending screw – external ash bin

Dual boiler system – Activation of the joint stirrer + respectively with ascending screw

In case of a dual boiler system with a joint stirrer drive, with one ascending screw per boiler, one Conveyor system module each is required. The drive for the joint stirrer and the motor for the ascending screw can be connected to one Conveyor system module. In this case the activation (request) of the joint stirrer takes place via request contact from the 2nd boiler.

Conne- tor	Pins	Description	Function
400	5	5-pole supply 400 V _{AC}	Power supply 400 V _{AC}

Installed in the wall-mounted housing: supply with CEE electrical outlet 5-pole (3L/N/PE) 13A

401	3	3-pole digital input 230 V _{DC} (is delivered bridged)	Emergency stop (emergency escape switch)
-----	---	--------------------------------------------------------------------	------------------------------------------

Use a 3-pole emergency stop switch to be able to switch off both boilers and the Conveyor system module with one switch.

402	2	2-pole digital input 24 V _{DC} (is delivered bridged)	Temperature monitor fuel storage (TMFS)
-----	---	-------------------------------------------------------------------	-----------------------------------------

If the switch for the temperature monitoring of the fuel storage (TMFS) is connected to the boiler, then this connection remains bridged.

410	4	4-pole supply 400 V _{AC}	Conveyor motor 1	Corresponds to 410a, but is a plug
410a	4	4-pole supply 400 V _{AC}	Conveyor motor 1	Corresponds to 410, but is a clamp
411	4	4-pole supply 400 V _{AC}	Conveyor motor 2	Corresponds to 411a, but is a plug
411a	4	4-pole supply 400 V _{AC}	Conveyor motor 2	Corresponds to 411, but is a clamp
431	3	3-pole digital input 24 V _{DC}	Temperature protection switch conveyor system Motor 1	
432	3	3-pole digital input 24 V _{DC}	Temperature protection switch conveyor system Motor 2	

433	3	3-pole digital input 24 V _{DC}	External requirement conveyor system Motor 2 (e.g. for a joint stirrer)
-----	---	-----------------------------------------	-------------------------------------------------------------------------------

Request comes from the 2nd boiler via the floating switch contact:

- KWB Comfort 3: #7.3 output or in case of a MF2 – "Relay LB" (11-14)
- KWB Comfort 4 : #125-127 multi-function output 1, 2, 4 (one of the contacts)

437	3	3-pole bus connection	House bus [IN] Input bus connection
438	6	6-pole bus connection	House bus [OUT] Delivered terminated (120 Ω). Must be removed in case of bus extensions!
439	6	6-pole bus connection	Input bus connection 24 V of the boiler-power module (#136)

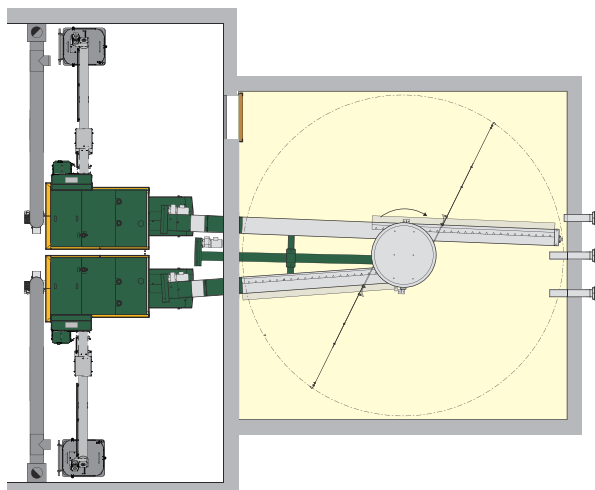


Fig. 6: Example: Dual boiler system – Activation of the joint stirrer + respectively with ascending screw

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	<p>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°.</p> <p>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.</p> <p>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.</p> <p>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.</p>

NOTE



Approval required!

The chimney must be approved by the chimney sweep!

5.2 Connecting the exhaust pipe

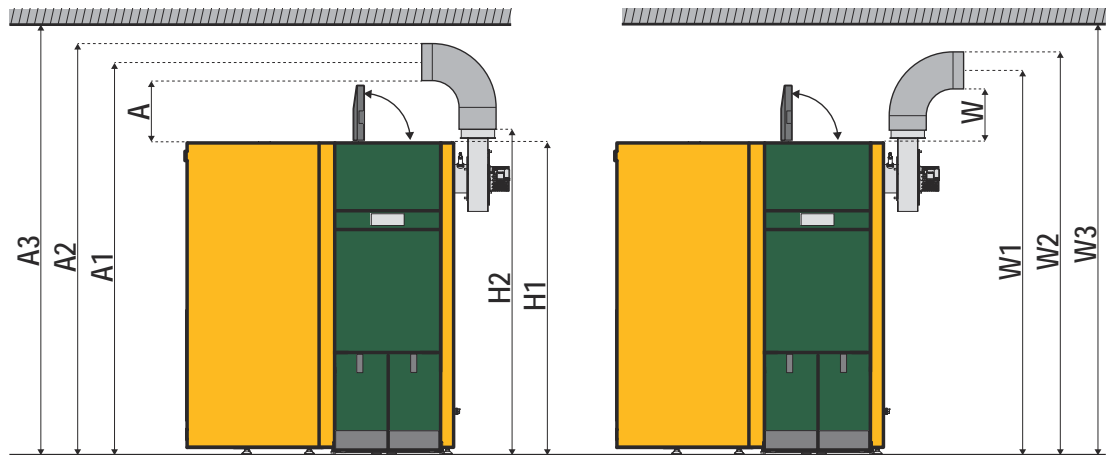
The KWB system comes standard with an induced draught fan.

NOTE



Keep the maintenance area free!

- ➔ If the exhaust pipe is installed above the heat exchanger, it is essential that you adhere to the specified clearance!
- ➔ Otherwise it will not be possible to open the heat exchanger maintenance cover during servicing.



KWB Multifire KWB Pelletfire Plus	20-50 kW 45-65 kW	60-80 kW 70-95 kW	100-120 kW 100-135 kW
Pipe diameter	15 cm	18/20 cm	20 cm
H1: Boiler height	159 cm	167 cm	167 cm
H2: Exhaust pipe, connection height	166 cm	185 cm	175 cm
A: Height above boiler	25 cm	36 cm	25 cm
A1: Exhaust pipe, medium height	184 cm	203 cm	192 cm
A2: Exhaust pipe, upper edge	191 cm	212 cm	202 cm
A3: Min. room height	200 cm	220 cm	210 cm
W: Clearing above heat exchanger	30 cm	30 cm	38 cm
W1: Exhaust pipe, medium height	196 cm	206 cm	215 cm
W2: Exhaust pipe, upper edge	204 cm	215 cm	225 cm
W3: Min. room height	210 cm	220 cm	230 cm

The models 60-80 or 70-95 kW contain an exhaust pipe with a diameter of 20 cm onto which a pipe reduction of 18 cm can be installed.

If required, first install a bend with a diameter of 20 cm and then the 18 cm pipe reduction.

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 at the boiler.

- ⇒ Install a **draught limiter** and an **explosion damper** at the exhaust pipe or the chimney side wall.
 - ⇒ We recommend installing a draught limiter in the chimney under the exhaust pipe inlet as constant negative pressure is ensured at this spot.
- ⇒ Position both safety elements so 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 ($\geq 3^\circ$, ideal: $30-45^\circ$, max. 45°)
- Sealed and thermally insulated
- Equipped with easily accessible openings for cleaning

5.3 Multiple-use chimney

NOTE



Preconditions for a multiple use:

- ➔ The boilers are placed in the same room (heating room)
- ➔ A positive calculation and a respective dimensioning of the chimney for the simultaneous operation of the systems according to EN 13384-2
- ➔ The chimney use by several systems must comply with country-specific rules and regulations.

6 Dismantling and disposal

6.1 Dismantling

- ➔ Dismantle the boiler in reverse order of the assembly sequence. Consult KWB Customer Service for advice! Comply with local regulations!
- ➔ Shut down the heating system and disconnect the boiler from the mains after the system has cooled down.
- ➔ Empty the boiler.

WARNING

Fatal crushing (pulled muscles) caused by heavy components! Inappropriate lifting/transporting can lead to fatal injury and serious damage to the equipment.



- ➔ **Only trained staff** may lift/transport heavy components!
- ➔ **Keep the component weight in mind – handle accordingly:**
 - ➔ Verify transport securing devices BEFORE lifting / transporting!
 - ➔ Keep the centre of gravity in mind - always secure components to prevent slipping and tilting!
 - ➔ Select stable bases, suitable tools and assistance from staff!
 - ➔ Lift with your back straight, NOT too heavy.
 - ➔ Use your personal protection equipment[PSA].
 - ➔ In difficult areas ensure that people and system are safe!

- ➔ Remove and empty the ash container.
- ➔ Disconnect the boiler from the hydraulic system and the chimney connection.
- ➔ Dismantle the casing cover parts and the cabling.
- ➔ Disconnect the heat exchanger from the combustion chamber.
- ➔ Disconnect the stoker from the combustion chamber and the conveyor system.
- ➔ Remove the cellular sluice wheel.
- ➔ Remove the crawler burner from the combustion chamber.

6.2 Disposal

- ➔ Comply with local waste disposal regulations! Ensure environmentally sound disposal pursuant to AWG (Austria) or country-specific provisions.
- ➔ Recyclable materials can be taken separately and in clean condition to the specified recycling points.

In principle, you can dispose of the heating system as residual or bulky waste – but we recommend separating its components for recycling purposes (in a recycling centre) in order to handle resources in a more sustainable manner.

Plastic materials

The control unit housings, cable bushings and seals are made of plastic or rubber.

Construction waste

This includes the insulation (mineral wool) and the refractory bricks from the combustion chamber.

Metal

Our main material is metal which can be recycled efficiently: Substructure, burner, heat exchanger, cables ...

Circuit boards

- ⇒ Dispose of these responsibly!
Comply with all local waste disposal regulations!

CAUTION

Hazardous waste – dispose of properly!

The metals on and in the circuit boards do NOT belong in the household waste.



- ↪ All circuit boards used by KWB comply with the "Directive 2002/95/EC for the restriction of certain hazardous substances in electrical and electronics equipment".
- ⇒ Take the circuit boards to a proper disposal facility – this helps protect the environment!
- ⇒ Dispose of the circuit boards at collection points for electronic waste only.

Battery

CAUTION

Environmental contamination by batteries



- ↪ There is a lithium battery inside the boiler control unit.
- ⇒ Dispose of the battery separately. When doing so, you must comply with all local regulations!

The following characters below the garbage bin symbol stand for:





- Pb: Battery contains lead
- Cd: Battery contains cadmium
- Hg: Battery contains mercury

Old batteries may not be disposed of in the household waste: EU Directive 2006/66/EC obligates consumers to dispose of batteries/rechargeable batteries at a collection point (more information can be found at <http://www.epbaeurope.net/>). Returning batteries to communal collection points is free of charge for private households.

Alternatively, you can send used batteries from the KWB control unit back to us. When sending batteries/rechargeable batteries, you must meet a few special conditions: Please inquire ahead of time (hazardous materials) and be sure to provide sufficient postage.

7 Appendix

Please also see

-  Technical data table KWB Multifire - log wood [► 79]
-  Technical data table KWB Multifire - pellets [► 80]
-  TDT-MF2-D-ZI_mit_Pellets_EN [► 81]
-  Declaration of Conformity [► 83]

Unit	20	30 ¹	30 ²	40	45 ¹	50 ¹	60 ¹	65 ¹	70 ¹	80	100 ²	108 ¹	120	
Rated power	kW	20	30	32,5	40	45	49,5	60	65	69,5	80	99/100/101	108	120
Partial load	kW	6,0	9,0	9,8	12,0	13,5	14,9	18,0	19,5	20,9	24,0	30,0	32,4	36,0
Boiler efficiency at rated power (values with dust filter)	%	94,8 (94,8)	95,1 (95,1)	95,2 (95,2)	94,0 (95,4)	94,0 (95,3)	93,9 (95,3)	93,8 (95,2)	93,8 (95,1)	93,7 (95,0)	93,6 (94,9)	93,8 (95,3)	93,9 (95,5)	94,0 (95,7)
Boiler efficiency at partial load (values with dust filter)	%	92,4 (92,4)	93,0 (93,0)	93,1 (93,1)	92,7 (93,5)	92,6 (93,6)	92,6 (93,7)	92,4 (93,9)	92,3 (94,0)	92,3 (94,1)	92,1 (94,3)	93,3 (95,0)	93,7 (95,2)	94,4 (95,6)
Fuel thermal output at rated power (values with dust filter)	kW	21,1 (21,1)	31,5 (31,5)	34,1 (34,1)	42,6 (41,9)	47,9 (47,2)	52,7 (51,9)	64,0 (63,0)	69,3 (68,3)	74,2 (73,2)	85,5 (84,3)	106,6 (104,9)	115 (113,1)	127,7 (125,4)
Fuel thermal output at partial load (values with dust filter)	kW	6,5 (6,5)	9,7 (9,7)	10,5 (10,5)	12,9 (12,8)	14,6 (14,4)	16,0 (15,8)	19,5 (19,2)	21,1 (20,7)	22,6 (22,2)	26,1 (25,5)	32,2 (31,6)	34,6 (34,0)	38,1 (37,7)
Boiler class according to EN 303-5:2012	–	5	5	5	5	5	5	5	5	5	5	5	5	5
EU Energy label	–	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
Water side														
Water content	l	155	155	155	135	135	135	165	165	165	165	195	195	195
Water connection, forward/return flow (internal thread) without return-flow boost device	Inch mm DN	5/4	5/4	5/4	5/4	5/4	5/4	2	2	2	2	2	2	2
Water connection, forward/return flow (internal thread) with return-flow boost device	Inch mm DN	5/4	5/4	5/4	5/4	5/4	5/4	6/4	6/4	6/4	6/4	2	2	2
Water connection for filling and/or emptying (internal thread)	inch mm	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Water connection for thermal safety valve (external thread)	Inch mm	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Thermal safety valve: pressure	bar	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4
Thermal safety valve: required cold water temperature	°C	20	20	20	20	20	20	20	20	20	20	20	20	20
Water-side resistance at 10 K	mbar Pa	37,0	37,0	85,4	153,8	200,2	242,1	56,1	67,2	77,2	100,6	158,0	172,8	228,7
Water-side resistance at 20 K	mbar Pa	8,5	8,5	20,2	37,0	47,2	58,7	13,5	16,3	18,7	24,5	38,7	42,3	56,1
Boiler-entry temperature	°C	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70
Working temperature/operating temperature	°C	90	90	90	90	90	90	90	90	90	90	90	90	90
Working temperature/operating temperature (optional)	°C	95	95	95	95	95	95	95	95	95	95	95	95	95
Maximum permitted temperature	°C	110	110	110	110	110	110	110	110	110	110	110	110	110
Max. operating pressure	bar	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
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	900–1100	900–1100	900–1100	900–1100	900–1100
Combustion chamber pressure	mbar Pa	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5	-0,5...-5
Required draft at rated power	mbar Pa	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Required draft at partial load	mbar Pa	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
Suction required: yes	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Exhaust-gas temperature at rated power	°C	140	140	140	140	140	140	140	140	140	140	140	140	140
Exhaust-gas temp. Partial load	°C	100	100	100	100	100	100	100	100	100	100	100	100	100
Exhaust-gas mass flow at rated power	kg/s	0,014	0,014	0,021	0,029	0,032	0,036	0,043	0,046	0,050	0,057	0,071	0,082	0,086
Exhaust-gas mass flow at partial load	kg/s	0,005	0,005	0,006	0,010	0,009	0,010	0,012	0,013	0,014	0,016	0,020	0,023	0,024
Exhaust-gas mass flow at rated power	kg/h	51,3	51,3	77,0	102,6	115,5	128,3	154,0	166,8	178,3	205,3	256,6	295,1	307,9
Exhaust-gas mass flow at partial load	kg/h	18,5	18,5	27,8	37,0	41,7	46,3	55,5	60,2	64,3	74,1	92,6	106,5	111,1
Exhaust-gas volume at rated power	Nm³/h	40,1	40,1	60,1	80,2	90,2	100,2	120,2	130,3	139,3	160,3	200,4	230,5	240,5
Exhaust-gas volume at partial load	Nm³/h	14,5	14,5	21,7	28,9	32,5	36,1	43,4	47,0	50,2	57,8	72,3	83,1	86,7
Incline of the exhaust-gas pipe	°	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3
Connection height exhaust-gas pipe	mm	>1395	>1395	>1395	>1395	>1395	>1395	>1445	>1445	>1445	>1445	>1445	>1445	>1445
Exhaust-gas pipe diameter	mm	150	150	150	150	150	150	180	180	180	180	200	200	200
Chimney diameter (approx. values)	mm	180	180	180	180	180	180	200	200	200	200	220	220	220
Chimney design: Moisture-resistant	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fuel: Wood chips, ISO 17225-4														
Maximum water content	–	M40	M40	M40	M40	M40	M40	M40	M40	M40	M40	M40	M40	M40
Maximum fuel size	–	P16S	P16S	P16S	P16S	P16S	P16S	P16S	P16S	P16S	P16S	P16S	P16S	P16S
Ash														
Ash container volume	l	32	32	32	32	32	32	32	32	32	32	32	32	32
Ash container filled	kg	36	36	36	36	36	36	36	36	36	36	36	36	36
Ash removal system	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Convenient ash container (optional)	l	240	240	240	240	240	240	240	240	240	240	240	240	240
Electrical system														
Connection: CEE 5-pole 400 V _{AC}	–	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
		13 A	13 A	13 A	13 A	13 A	13 A	13 A	13 A	13 A	13 A	13 A	13 A	13 A
Connected power MF2 D: P16S/P31S	W	1769	1769	1769	1769	1769	1769	1827	1827	1827	1827	1827	1827	1827
		-	-	-	-	-	-	2207	2207	2207	2207	2207	2207	2207
Connected power MF2 ZI	W	1655	1655	1655	1655	1655	1655	1713	1713	1713	1713	1713	1713	1713
Connected load dust filter	W	115	115	115	115	115	115	115	115	115	115	115	115	115
Weights														
Heat exchanger module, assembled	kg	300	300	300	340	340	340	360	360	360	360	450	450	450
Burning chamber module, assembled	kg	265	265	265	265	265	265	320	320	320	320	320	320	320
Boiler weight MF2 D (P16S/P31S)	kg	920	920	920	980	980	980	1100	1100	1100	1100	1200	1200	1200
		-	-	-	-	-	-	1129	1129	1129	1129	1229	1229	1229
Boiler weight MF2 ZI	kg	890	890	890	930	930	930	1070	1070	1070	1070	1170	1170	1170
Weight dust filter (stand-alone)	kg	138 (152)	138 (152)	138 (152)	138 (152)	138 (152)	138 (152)	168 (203)	168 (203)	168 (203)	168 (203)	191 (203)	191 (203)	191 (203)
Emissions according to test report														
Test report no.	–	O-B-00592-21							18-IN-AT-UW-00-EX-255					
Test report no.		O-B-00593-21												
Noise emissions (EN 15036-1) ¹⁾														
Normal operating noise at rated power	dB(A)	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
Ref. 10 % O ₂ dry (EN303-5)														
CO at rated power (values with dust filter)	mg/Nm³	4 (4)	3 (3)	3 (3)	<4 (2)	5 (2)	6 (2)	9 (2)	10 (2)	11(2)	14 (2)	15 (3)	15 (3)	16 (3)
CO at partial load (values with dust filter)	mg/Nm³	86 (86)	59 (59)	52 (52)	15 (31)	17 (35)	19 (38)	23 (46)	24 (50)	26 (53)	30 (61)	47 (36)	53 (26)	63 (11)
NO _x at rated power (values with dust filter)	mg/Nm³	87 (87)	83 (83)	82 (82)	93 (79)	93 (80)	93 (81)	92 (83)	92 (84)	92 (85)	91 (87)	93 (84)	93 (82)	94 (80)
NO _x at partial load (values with dust filter)	mg/Nm³	66 (66)	71 (71)	72 (72)	61 (76)	64 (74)	67 (73)	73 (69)	75 (67)	78 (66)	84 (62)	81 (62)	79 (62)	77 (62)
OGC at rated power (values with dust filter)	mg/Nm³	1 (1)	1 (1)	1 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)
OGC at partial load (values with dust filter)	mg/Nm³	2 (2)	2 (2)	1 (1)	<4 (1)	<4 (1)	<4 (1)	<4 (2)	<4 (2)	<4 (2)	<3 (2)	<3 (2)	<3 (1)	<3 (1)
Dust at nominal load (values with dust filter)	mg/Nm³	5,4 (2,2)	5,4 (1,5)	5,3 (1,3)	14 (0,7)	14 (0,7)	14 (0,7)	14 (0,6)	14 (0,6)	14 (0,6)	14 (0,5)	14 (0,7)	14 (0,7)	14 (0,8)
Dust at partial load (values with dust filter)	mg/Nm³	17,8 (1,5)	12,7 (1,3)	11,4 (1,2)	10 (1,0)	11 (1,0)	11 (1,0)	12 (1,0)	13 (1,0)	13 (1,0)	14 (1,0)	10 (1,1)	8 (1,1)	5 (1,1)
Ref. 13 % O ₂ dry														
CO at rated power (values with dust filter)	mg/Nm³	3 (3)	2 (2)	2 (2)	<3 (1)	4 (1)	5 (1)	7 (1)	8 (1)	8 (1)	10 (1)	11 (2)	11 (2)	12 (2)
CO at partial load (values with dust filter)	mg/Nm³	63 (63)	43 (43)	37 (37)	11 (22)	12 (25)	14 (27)	16 (33)	18 (36)	19 (38)	22 (44)	34 (26)	39 (19)	46 (8)
NO _x at rated power (values with dust filter)	mg/Nm³	63 (63)	60 (60)	59 (59)	68 (57)	68 (58)	67 (58)	67 (60)	67 (61)	67 (61)	66 (63)	67 (61)	68 (60)	68 (58)
NO _x at partial load (values with dust filter)	mg/Nm³	48 (48)	52 (52)	52 (52)	44 (55)	47 (54)	48 (53)	53 (50)	55 (49)	57 (48)	61 (45)	59 (45)	58 (45)	56 (45)
OGC at rated power (values with dust filter)	mg/Nm³	<1 (<1)	1 (1)	1 (1)	<2 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<2 (<1)	<3 (<1)	<3 (<1)	<2 (<1)
OGC at partial load (values with dust filter)	mg/Nm³	<1 (<1)	1 (1)	1 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (1)	<3 (<1)
Dust at nominal load (values with dust filter)	mg/Nm³	3,9 (1,6)	3,9 (1,1)	3,9 (0,9)	10 (0,5)	10 (0,5)	10 (0,5)	10 (0,5)	10 (0,4)	10 (0,4)	10 (0,4)	10 (0,5)	10 (0,5)	10 (0,6)
Dust at partial load (values with dust filter)	mg/Nm³	12,9 (1,1)	9,2 (0,9)	8,2 (0,9)	8 (0,7)	8 (0,7)	8 (0,7)	9 (0,7)	9 (0,7)	9 (0,7)	10 (0,7)	7 (0,8)	5 (0,8)	3 (0,8)
In accordance with § 15a-BVG Austria														
CO at rated power	mg/MJ	2 (2)	2 (2)	1 (1)	<3 (1)	4 (1)	4 (1)	5 (1)	6 (1)	6 (

MF2 R D/ZI MF2 ER D/ZI 03.05.2021	Unit	40	45 ¹	50 ¹	60 ¹	65 ¹	70 ¹	80	100 ²	108 ¹	120 ¹
Rated power	kW	40	45	49,5	60	65	69,5	80	99/100/101	108	120
Partial load	kW	12,0	13,5	14,9	18,0	19,5	20,9	24,0	30,0	32,4	36,0
Boiler efficiency at rated power (pellets)	%	96,5	96,4	96,3	96,1	96,1	96,0	95,8	95,8	95,7	95,7
Boiler efficiency at partial load (pellets)	%	94,8	94,9	94,9	95,1	95,2	95,2	95,4	95,7	95,8	96,0
Fuel thermal output at rated power (pellets)	kW	41,5	46,7	51,4	62,4	67,6	72,4	83,5	104,4	112,9	125,4
Fuel thermal output at partial load (pellets)	kW	12,7	14,2	15,6	18,9	20,5	21,9	25,2	31,3	33,8	37,5
Boiler class according to EN 303-5:2012	–	5	5	5	5	5	5	5	5	5	5
EU Energy label	–	A+	A+	A+	A+	A+	A+	A+	A+	A+	A+
Water side											
Water content	l	135	135	135	165	165	165	165	195	195	195
Water connection, forward/return flow (internal thread) without return-flow boost device	Inch mm DN	5/4	5/4	5/4	2	2	2	2	2	2	2
Water connection, forward/return flow (internal thread) with return-flow boost device	Inch mm DN	5/4	5/4	5/4	6/4	6/4	6/4	6/4	2	2	2
Water connection for filling and/or emptying (internal thread)	inch mm	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Water connection for thermal safety valve (external thread)	Inch mm	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Thermal safety valve: pressure	bar	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4	2–4
Thermal safety valve: required cold water temperature	°C	20	20	20	20	20	20	20	20	20	20
Water-side resistance at 10 K	mbar Pa	153,8	200,2	242,8	56,1	67,2	77,2	100,6	158,0	172,8	228,4
Water-side resistance at 20 K	mbar Pa	37,0	48,4	58,7	13,5	16,3	18,7	24,5	38,7	42,3	56,1
Boiler-entry temperature	°C	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70	55–70
Working temperature/operating temperature	°C	90	90	90	90	90	90	90	90	90	90
Working temperature/operating temperature (optional)	°C	95	95	95	95	95	95	95	95	95	95
Maximum permitted temperature	°C	110	110	110	110	110	110	110	110	110	110
Max. operating pressure	bar	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
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	900–1100	900–1100
Combustion chamber pressure	mbar Pa	–0,5...–5	–0,5...–5	–0,5...–5	–0,5...–5	–0,5...–5	–0,5...–5	–0,5...–5	–0,5...–5	–0,5...–5	–0,5...–5
Required draft at rated power	mbar Pa	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Required draft at partial load	mbar Pa	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
Suction required: yes	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Exhaust-gas temperature at rated power	°C	140	140	140	140	140	140	140	140	140	140
Exhaust-gas temp. Partial load	°C	100	100	100	100	100	100	100	100	100	100
Exhaust-gas mass flow at rated power	kg/s	0,029	0,032	0,036	0,043	0,046	0,050	0,057	0,071	0,082	0,086
Exhaust-gas mass flow at partial load	kg/s	0,010	0,009	0,010	0,012	0,013	0,014	0,016	0,020	0,023	0,024
Exhaust-gas mass flow at rated power	kg/h	102,6	115,5	128,3	154,0	166,8	178,3	205,3	256,6	295,1	307,9
Exhaust-gas mass flow at partial load	kg/h	37,0	41,7	46,3	55,5	60,2	64,3	74,1	92,6	106,5	111,1
Exhaust-gas volume at rated power	Nm³/h	80,2	90,2	100,2	120,2	130,3	139,3	160,3	200,4	230,5	240,5
Exhaust-gas volume at partial load	Nm³/h	28,9	32,5	36,1	43,4	47,0	50,2	57,8	72,3	83,1	86,7
Incline of the exhaust-gas pipe	°	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3	≥ 3
Connection height exhaust-gas pipe	mm	>1395	>1395	>1395	>1445	>1445	>1445	>1445	>1445	>1445	>1445
Exhaust-gas pipe diameter	mm	150	150	150	180	180	180	180	200	200	200
Chimney diameter (approx. values)	mm	180	180	180	200	200	200	200	220	220	220
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	16,5	16,5
Density	kg/m³	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600	≥ 600
Water content	% by weight	≤ 10	≤ 10	≤ 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	≤ 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	3,15–40	3,15–40
Diameter	mm	6±1	6±1	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	≤ 1	≤ 1
Raw material: pure wood, bark content <15 %	–	–	–	–	–	–	–	–	–	–	–
Ash											
Ash container volume	l	32	32	32	32	32	32	32	32	32	32
Ash container filled	kg	36	36	36	36	36	36	36	36	36	36
Ash removal system	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Electrical system											
Connection: CEE 5-pole 400 V _{AC}	–	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
Connected power MF2 D: P16S	W	1769	1769	1769	1827	1827	1827	1827	1827	1827	1827
Connected power MF2 ZI	W	1655	1655	1655	1713	1713	1713	1713	1713	1713	1713
Connected load dust filter	W	115	115	115	115	115	115	115	115	115	115
Weights											
Heat exchanger module, assembled	kg	340	340	340	360	360	360	360	450	450	450
Burning chamber module, assembled	kg	265	265	265	320	320	320	320	320	320	320
Boiler weight MF2 D (P16B/P45A)	kg	980	980	980	1100	1100	1100	1100	1200	1200	1200
Boiler weight MF2 ZI	kg	930	930	930	1070	1070	1070	1070	1170	1170	1170
Weight dust filter (stand-alone)	kg	138 (152)	138 (152)	138 (152)	168 (203)	168 (203)	168 (203)	168 (203)	191 (203)	191 (203)	191 (203)
Emissions according to test report (values with dust filter)											
Test report no.	–	O-B-00503-21 O-B-00501-21									
Noise emissions (EN 15036-1) ³											
Normal operating noise at rated power	dB(A)	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
Ref. 10 % O ₂ dry (EN303-5)											
CO at rated power	mg/Nm³	1	1	1	1	1	1	1	2	2	2
CO at partial load	mg/Nm³	63	63	63	62	62	62	61	41	39	25
NO _x at rated power	mg/Nm³	110	109	109	108	107	106	105	106	106	106
NO _x at partial load	mg/Nm³	99	98	97	95	94	93	91	93	94	95
OGC at rated power	mg/Nm³	1	1	1	1	1	1	1	1	1	1
OGC at partial load	mg/Nm³	1	1	1	2	2	2	3	2	2	2
Dust at nominal load (values with dust filter)	mg/Nm³	2,8 (0,9)	2,8 (0,9)	2,8 (0,9)	2,7 (0,8)	2,7 (0,8)	2,7 (0,8)	2,6 (0,7)	2,7 (0,6)	2,7 (0,6)	2,8 (0,6)
Dust at partial load (values with dust filter)	mg/Nm³	2,4 (0,6)	2,3 (0,6)	2,3 (0,6)	2,2 (0,6)	2,1 (0,6)	2,0 (0,6)	1,9 (0,6)	1,9 (0,6)	1,9 (0,6)	1,8 (0,6)
Ref. 13 % O ₂ dry											
CO at rated power	mg/Nm³	1	1	1	1	1	<1	<1	1	1	1
CO at partial load	mg/Nm³	46	46	46	45	45	45	44	29	23	14
NO _x at rated power	mg/Nm³	80	80	79	78	78	77	76	77	77	77
NO _x at partial load	mg/Nm³	72	71	71	69	68	68	66	68	69	70
OGC at rated power	mg/Nm³	2	2	2	2	2	2	2	2	1	1
OGC at partial load	mg/Nm³	<1	<1	<1	1	1	1	1	<1	<1	<1
Dust at nominal load (values with dust filter)	mg/Nm³	2,0 (0,6)	2,0 (0,6)	2,0 (0,6)	2,0 (0,6)	1,9 (0,5)	1,9 (0,5)	1,9 (0,5)	2,0 (0,5)	2,0 (0,4)	2,0 (0,4)
Dust at partial load (values with dust filter)	mg/Nm³	1,7 (0,5)	1,7 (0,5)	1,6 (0,5)	1,6 (0,5)	1,5 (0,4)	1,5 (0,4)	1,4 (0,4)	1,4 (0,4)	1,3 (0,5)	1,3 (0,5)
In accordance with § 15a-BVG Austria											
CO at rated power	mg/MJ	<1	<1	<1	<1	<1	<1	<1	1	2	2
CO at partial load	mg/MJ	32	32	32	32	31	31	31	20	16	10
NO _x at rated power	mg/MJ	55	55	55	54	54	54	53	53	54	54
NO _x at partial load	mg/MJ	50	50	49	48	48	47	46	47	48	48
OGC at rated power	mg/MJ	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
OGC at partial load	mg/MJ	1	1	1	2	2	2	2	2	1	1
Dust at nominal load (values with dust filter)	mg/Nm³	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)
Dust at partial load (values with dust filter)	mg/Nm³	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)	1 (<1)

¹⁾ Drawing inspection

²⁾ Typification variants

³⁾ Normal operating noise at rated power: Leq(A) at 1 m distance (ISO 11202:2010)
mg/Nm³ ... milligram per standard cubic meter (Nm³ - standard cubic meter under 1013 hectopascal at 0 °C)

[illegible]

MF2 D / MF2 ZI 18.01.2021	Unit	20	30 ¹	30 ²	40	45 ¹	50 ¹	60 ¹	65 ¹	70 ¹	80	100 ²	108 ¹	120
Weights														
Water jacket	kg	300	300	300	340	340	340	360	360	360	360	450	450	450
Boiler body	kg	265	265	265	265	265	265	320	320	320	320	320	320	320
Boiler weight MF2 D (P16B/P45A)	kg	920	920	920	980	980	980	1100	1100	1100	1100	1200	1200	1200
	-	-	-	-	-	-	-	1129	1129	1129	1129	1229	1229	1229
Boiler weight MF2 ZI	kg	890	890	890	930	930	930	1070	1070	1070	1070	1170	1170	1170
Emissions according to test report														
Test report no.	-	13-UW/Wels-EX-344/1-4												
Noise emissions (EN 15036-1)														
Normal operating noise at rated power	dB(A)	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70	< 70
Ref. 10 % O ₂ dry (EN303-5)														
CO at rated power	mg/Nm ³	13	9	7	4	6	8	12	14	16	20	14	12	< 4
CO at partial load	mg/Nm ³	65	50	46	34	32	30	25	22	20	15	24	28	40
NO _x at rated power	mg/Nm ³	120	124	124	127	125	122	117	115	112	107	117	121	134
NO _x at partial load	mg/Nm ³	117	107	105	97	97	98	98	98	99	99	100	101	102
OGC at rated power	mg/Nm ³	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
OGC at partial load	mg/Nm ³	5	4	4	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Dust at rated power	mg/Nm ³	14	17	17	19	19	19	18	18	18	17	17	18	18
Dust at partial load	mg/Nm ³	10	12	13	14	14	14	13	12	12	11	12	13	14
Ref. 11 % O ₂ dry														
CO at rated power	mg/Nm ³	12	8	6	3	5	7	11	13	15	19	13	11	< 4
CO at partial load	mg/Nm ³	59	45	42	31	29	27	23	20	18	14	22	25	36
NO _x at rated power	mg/Nm ³	109	113	113	115	114	111	106	105	102	97	106	110	121
NO _x at partial load	mg/Nm ³	106	97	95	88	88	89	89	89	90	90	91	92	93
OGC at rated power	mg/Nm ³	< 3	< 3	< 3	< 2	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
OGC at partial load	mg/Nm ³	5	4	4	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Dust at rated power	mg/Nm ³	12	15	15	17	17	17	16	16	16	15	15	16	16
Dust at partial load	mg/Nm ³	9	11	12	12	13	13	12	11	11	10	11	12	12
Ref. 13 % O ₂ dry														
CO at rated power	mg/Nm ³	10	7	5	3	4	6	9	10	12	15	10	9	< 3
CO at partial load	mg/Nm ³	48	36	33	27	23	22	18	16	15	12	17	20	29
NO _x at rated power	mg/Nm ³	87	90	90	92	91	89	85	84	81	78	85	88	97
NO _x at partial load	mg/Nm ³	85	78	76	70	71	71	71	71	72	72	73	73	74
OGC at rated power	mg/Nm ³	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
OGC at partial load	mg/Nm ³	4	3	3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Dust at rated power	mg/Nm ³	10	12	12	14	14	14	13	13	13	12	12	13	13
Dust at partial load	mg/Nm ³	7	9	9	10	10	10	9	9	9	8	9	9	10
In accordance with § 15a-BVG Austria														
CO at rated power	mg/MJ	7	5	4	2	3	4	6	7	8	10	6	4	< 2
CO at partial load	mg/MJ	32	25	23	18	17	16	13	12	11	8	14	16	20
NO _x at rated power	mg/MJ	59	66	67	72	70	67	63	60	58	53	60	62	66
NO _x at partial load	mg/MJ	58	53	52	48	48	48	49	49	49	49	50	50	50
OGC at rated power	mg/MJ	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 1
OGC at partial load	mg/MJ	3	< 3	< 3	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Dust at rated power	mg/MJ	7	8	8	9	9	9	9	8	8	8	9	9	9
Dust at partial load	mg/MJ	5	6	6	7	7	7	6	6	6	5	6	6	7

1 ... Drawing inspection

2 ... Typification variants

mg/Nm³ ... milligram per standard cubic meter (Nm³ - standard cubic meter under 1013 hectopascal at 0 °C)

EU-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 Multifire 20–120 kW, comprising the models
MF2 D/ZI 20 / 30 / 40 / 45 / 50 / 60 / 65 / 70 / 80 / 100 / 108 / 120

in combination with conveyor systems

Stirrer M, conveyor channel with conveyor screw M,
drive unit, ascending channel with conveyor screw M, downpipe

Furthermore, the system conforms to the following directives/applicable regulations:

EMC Directive 2014/30/EU; Directive 2014/35/EU, RoHS Directive 2011/65/EU; Ecodesign Directive 2009/125/EG, EnEV 2021 Switzerland

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

KWB – Kraft und Wärme aus
Biomasse GmbH

St. Margarethen an der Raab
06.07.2021



Authorised representative for
the compilation of the technical
documents

Place,
Date

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Keyword index

Symbols

°dH 20

A

Additives 24
alkaline 20
ÖNORM H 5195-1:2010 21
Automatic boiler 36, 39
Avoid corrosion 21

B

Boiler master-and-slave circuit 36
Boiler water 15
Bus 42

C

CEE plug 8
Chimney calculation 73
Chimney connection 74
Chimney sweep 73
Circulation 39
Cleaning opening 75
Conductivity 23
Control system 16
Corrosion 15, 19

D

Decoupling
Acoustic 15
Designer covers 49
DHW 39
Differential charge 40
DIN 18160 73
Draught limiter 74

E

Emergency escape switch 67, 68, 69, 70, 71
Emergency stop switch 31, 67, 68, 69, 70, 71
Emptying 17
Exhaust gas shutter 38
Expansion container 23
Explosion damper 74
External 1 38
External 2 38
External 3 38
Extinguisher 8

F

Fault 37

Fill water 20
Fill water (decalcified) 21
Fill water limit values 20
Filling 17, 21
Fire extinguisher 8
Flow volume 16
Forms 21

G

German degrees of hardness 20
GSM module 54, 57
Guidance values 23

H

Heat generation 23
Heat quantity meter 62
Heating to setpoint 38
Holiday remote control 38
House bus 46

I

Induced draught fan 73
Insufficient water 38

L

low-salt 20

M

Maximum length 46
Membrane pressure expansion container 24
Mixing pump 16
mmol/l 20
modular 42
Multifunction input 38

N

Commissioning 21

O

ÖNORM 21

P

Purging 19

R

Release contact 38
Request contact 36, 39
Return flow boost 16

Rinsing Log	21
Rust mud	19

S

Safety devices	38
Secondary heating source	40
Setpoint 2	38
Smoke extractor	38
Strain relief	59, 66
sum alkaline earth	20
Sunlight	49
System and Test Log for Heating Water	21
System book	19
System pressure	24
System volume	19

T

terminate	48
Terminating resistor	48
Thermostatic valves	49
TMFS	53
TMFS - Temperature monitor fuel storage	67, 68, 69, 71
Touch screen	49

U

Intervals	21
Unfavourable cabling	47
Wiring	47

V

VDI 2035 Appendix C	21
VDI 4708	24

W

Water meter reading	23
Water quality	19

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