

froling

Installation instructions

Pellet boiler PT4e 100-180 (ESP)



Translation of original German version of installation instructions for technicians.

Read and follow all instructions and safety instructions.
All errors and omissions excepted.

CE

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1 General

Thank you for choosing a quality product from Froling. The product features a state-of-the-art design and conforms to all currently applicable standards and testing guidelines.

Please read and observe the documentation provided and always keep it close to the system for reference. Observing the requirements and safety information in the documentation makes a significant contribution to safe, appropriate, environmentally friendly and economical operation of the system.

The constant further development of our products means that there may be minor differences from the pictures and content. If you discover any errors, please let us know: doku@froeling.com.

Subject to technical change.

Issuing a delivery certificate

The EC Declaration of Conformity is only valid in conjunction with a delivery certificate, which has been filled in correctly and signed as part of the commissioning process. The original document remains at the installation site. Commissioning installers or heating engineers are requested to return a copy of the delivery certificate together with the guarantee card to Froling. On commissioning by FROLING Customer Service the validity of the delivery certificate will be noted on the customer service record.

1.1 About this manual

These installation instructions contain information for the following boiler sizes of PT4e / PT4e ESP:

100, 110, 120, 140, 150, 160, 170, 180;

2 Safety

2.1 Hazard levels of warnings

This documentation uses warnings with the following hazard levels to indicate direct hazards and important safety instructions:

DANGER

The dangerous situation is imminent and if measures are not observed it will lead to serious injury or death. You must follow the instructions!

WARNING

The dangerous situation may occur and if measures are not observed it will lead to serious injury or death. Work with extreme care.

CAUTION

The dangerous situation may occur and if measures are not observed it will lead to minor injuries.

NOTICE

The dangerous situation may occur and if measures are not observed it will lead to damage to property or pollution.

2.2 Qualification of assembly staff

CAUTION



Assembly and installation by unqualified persons:

Risk of personal injury and damage to property

During assembly and installation:

- Observe the instructions and information in the manuals
- Only allow appropriately qualified personnel to work on the system

Assembly, installation, initial startup and servicing must always be carried out by qualified personnel:

- Heating technician / building technician
- Electrical installation technician
- Froling customer services

The assembly staff must have read and understood the instructions in the documentation.

2.3 Personal protective equipment for assembly staff

You must ensure that staff have the protective equipment specified by accident prevention regulations!



- During transport, erection and installation:
 - wear suitable work wear
 - wear protective gloves
 - wear safety shoes (min. protection class S1P)

3 Design Information

3.1 Overview of standards

Perform installation and commissioning of the system in accordance with the local fire and building regulations. Unless contrary to other national regulations, the latest versions of the following standards and guidelines apply:

3.1.1 General standards for heating systems

EN 303-5	Boilers for solid fuels, manually and automatically fed combustion systems, nominal heat output up to 500 kW
EN 12828	Heating systems in buildings - design of water-based heating systems
EN 13384-1	Chimneys - Thermal and fluid dynamic calculation methods Part 1: Chimneys serving one appliance
ÖNORM H 5151	Planning of central hot water heating systems with or without hot water preparation
ÖNORM M 7510-1	Guidelines for checking central heating systems Part 1: General requirements and one-off inspections
ÖNORM M 7510-4	Guidelines for checking central heating systems Part 4: Simple check for heating plants for solid fuels

3.1.2 Standards for structural and safety devices

ÖNORM H 5170	Heating installation - Requirements for construction and safety engineering, as well as fire prevention and environmental protection
ÖNORM M 7137	Compressed untreated wood – Requirements for storing pellets at the end customer's site
TRVB H 118	Technical directives for fire protection/prevention (Austria)

3.1.3 Standards for heating water

ÖNORM H 5195-1	Prevention of damage by corrosion and scale formation in closed warm water heating systems at operating temperatures up to 100°C (Austria).
VDI 2035	Prevention of damage hot water heating systems (Germany)
SWKI BT 102-01	Water quality for heating, steam, cooling and air conditioning systems (Switzerland)
UNI 8065	Technical standard regulating hot water preparation. DM 26.06.2015 (Ministerial Decree specifying the minimum requirements) Follow the instructions of this standard and any related updates. (Italy)

3.1.4 Regulations and standards for permitted fuels

1. BImSchV	First Order of the German Federal Government for the implementation of the Federal Law on Emission Protection (Ordinance on Small and Medium Combustion Plants) in the version published on 26 January 2010, BGBl. JG 2010 Part I No. 4.
EN ISO 17225-2	Solid bio-fuel - Fuel specifications and classes Part 2: Wood pellets for use in industrial and domestic systems

3.2 Installation and approval

The boiler should be operated in a closed heating system. The following standards govern the installation:

Note on standards

EN 12828 - Heating Systems in Buildings

IMPORTANT: Every heating system must be officially approved.

The appropriate supervisory authority (inspection agency) must always be informed when installing or modifying a heating system, and authorisation must be obtained from the building authorities:

Austria: report to the construction authorities of the community or magistrate

Germany: report new installations to an approved chimney sweep / the building authorities.

3.3 Installation site

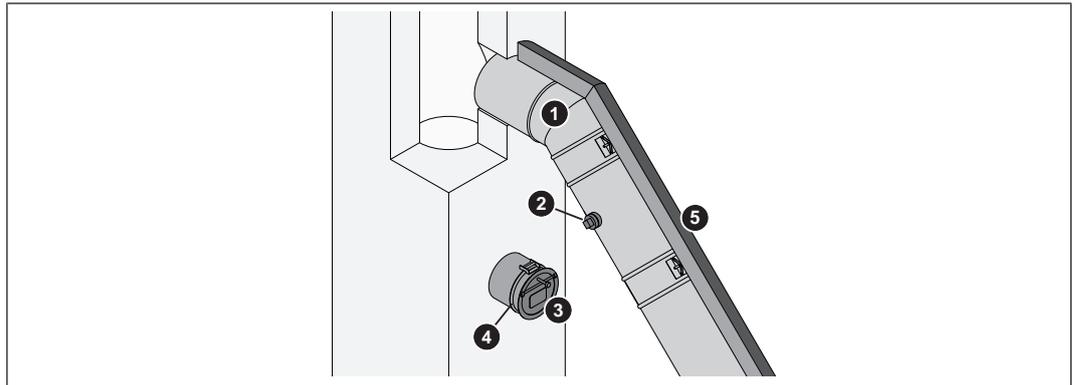
Requirements for the load bearing substrate:

- Flat, clean and dry
- Non-combustible and with sufficient load-bearing capacity

Conditions at the installation site:

- Frost-free
- Sufficiently well lit
- Free of explosive atmospheres such as flammable substances, hydrogen halides, cleaning agents and consumables
- Installation at altitude higher than 2000 metres above sea level only after consultation with the manufacturer
- The system must be protected against gnawing and nesting by animals (such as rodents)
- No flammable materials in proximity to the system

3.4 Chimney connection/chimney system



1	Connection line to the chimney
2	Measuring port
3	Draught limiter
4	Explosion flap (for automatic boilers)
5	Thermal insulation

NOTICE! The chimney must be authorised by a smoke trap sweeper or chimney sweep.

The entire flue gas system (chimney and connection) must be laid out as per ÖNORM / DIN EN 13384-1 or ÖNORM M 7515 / DIN 4705-1.

The flue gas temperatures (for clean systems) and additional flue gas values can be found in the table in the technical data.

Local regulations and other statutory regulations are also applicable.

EN 303-5 specifies that the entire flue gas system must be designed to prevent, wherever possible, damage caused by seepage, insufficient feed pressure and condensation. Please note within the permissible operating range of the boiler flue gas temperatures lower than 160K above room temperature may occur.

3.4.1 Connection line to the chimney

Requirements for the connection line:

- this should be as short as possible and follow an upward incline to the chimney (30 - 45° recommended)
- thermally insulated

MFeuV ¹⁾ (Germany)	EN 15287-1 and EN 15287-2
<p>1. Observe the fire regulations of the respective federal state 2. Component made of flammable material 3. Nonflammable insulating material 4. Radiation shield with rear ventilation</p>	

Minimum distance from flammable substances as per MFeuV¹⁾ (Germany):

- 400 mm excluding thermal insulation
- 100 mm if at least 20 mm thermal insulation is installed

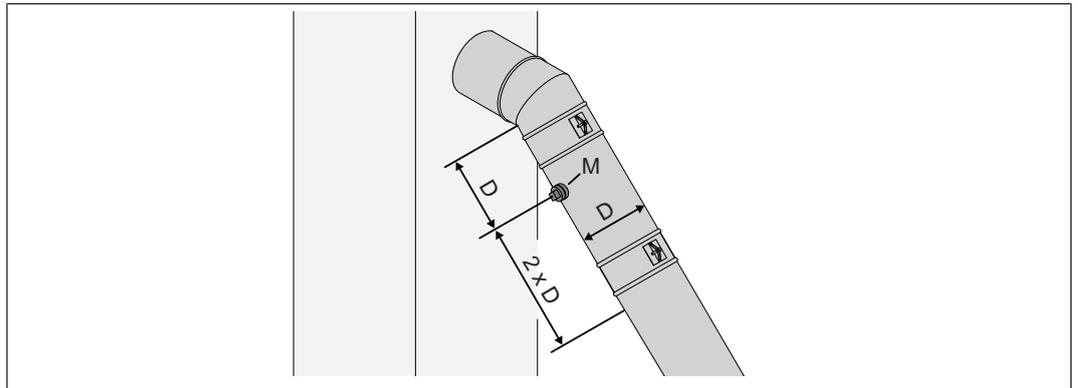
Minimum distance from flammable materials as per EN 15287-1 and EN 15287-2:

- 3 x nominal diameter of connection line, but at least 375 mm (NM)
- 1.5 x nominal diameter of connection line for radiation shield with rear ventilation, but at least 200 mm (NM)

NOTICE! The minimum distances must be observed in accordance with the standards and guidelines applicable in the region

3.4.2 Measuring port

For emissions measurement on the system, a suitable measuring port must be installed in the connection line between the boiler and chimney system.



Upstream of the measuring port (M) there should be a straight run-in section with a length about twice the diameter (D) of the connection line. Downstream of the measuring port (M) there should be a straight run-out section with a length about the diameter (D) of the connection line. The measuring port must remain closed whenever the system is in operation.

The diameter of the measuring probe used by Froling customer service is 14 mm. To avoid measuring errors due to the ingress of false air, the diameter of the measuring port must not exceed 21 mm.

3.4.3 Draught limiter

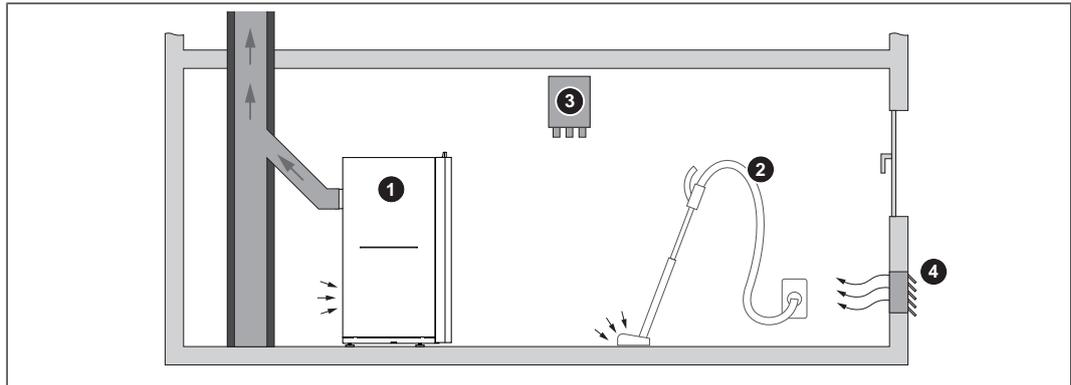
We generally recommend the installation of a draught limiter. A draught limiter must be installed if the maximum permissible feed pressure as given in the boiler data for planning the flue gas system is exceeded.

NOTICE! Install the draught limiter directly under the mouth of the flue line, as the pressure is constantly low at this point.

3.4.4 Explosion flap

TRVB H 118 (only Austria) stipulates that an explosion flap must be installed in the connection line to the chimney, directly next to the boiler. It should be situated in such a way that it poses no risk to persons!

3.5 Combustion air



1	Boiler in room air-dependent operation
2	Air extraction system (such as centralised dust extraction system, room ventilation)
3	Under-pressure monitoring system
4	Combustion air supply from outside

3.5.1 Combustion air supply at the installation room

The system is operated in open flue mode, i.e. the combustion air required to operate the boiler is drawn from the installation room.

Requirements:

- Opening to the atmosphere
 - Weather conditions must not affect the air flow in any way (e.g. snow and foliage)
 - Cross-section area free of obstructions such as cover gratings and slats
- Air supply lines
 - For air supply lines longer than 2 metres and where mechanical means are used to feed combustion air, the flow rate must be calculated (maximum flow rate = 1 m/s)

Note on standards

ÖNORM H 5170 - Construction and fire protection requirements
TRVB H118 - Technical directives on fire protection/prevention

3.5.2 Simultaneous operation with other air-drawing systems

Where the boiler is operated in room air-dependent mode with simultaneous operation of other air-drawing systems (such as room ventilation), safety devices are necessary:

- Air pressure monitor
- Flue gas thermostat
- Window-tilting drive system, window-tilting switch

NOTICE! Clarify the safety devices with appropriate flue sweep / chimney sweep

Recommendation for room ventilation:

Use “intrinsically-safe” room ventilation systems with F classification

As a basic rule:

- Room under-pressure max. 8 Pa
- Air-drawing systems must not exceed the room under-pressure value
 - If the room under-pressure value is exceeded, safety equipment (under-pressure monitoring system) is necessary

In Germany, the following additional requirement must be observed:

A gauge that monitors the negative pressure gauge (e.g. air pressure sensor P4) and is approved by the DIBt (German Technical Authority in the Construction Sector) must be used. This monitor tracks the maximum negative pressure of 4 Pa at the installation site.

In addition, at least one of the following three requirements must be met:

(Source: Section 4 MFeuV 2007 / 2010)

- Dimension the cross-section of the combustion air opening so that when the boiler is in operation the maximum under-pressure is not exceeded (simultaneous operation)
- Use safety equipment that prevents simultaneous operation (alternate operation)
- Monitor the flue gas outlet using safety devices (such as a flue gas thermostat)

Simultaneous operation

An approved safety system (such as an air pressure monitor) ensures that during simultaneous operation of the boiler and the air-drawing appliance the pressure conditions are maintained. In the event of a fault, the safety system will switch off one of the air-drawing systems.

Alternating operation

An approved safety system (such as a flue gas thermostat) ensures (e.g. by switching off the power supply) that the boiler cannot be operated simultaneously with the air-drawing appliance.

3.6 Domestic hot water

Unless contrary to other national regulations, the latest versions of the following standards and guidelines apply:

Austria:	ÖNORM H 5195	Switzerland:	SWKI BT 102-01
Germany:	VDI 2035	Italy:	UNI 8065

Observe the standards and also follow the recommendations below:

- Aim for a pH value of between 8.2 and 10.0. If the central heating water comes into contact with aluminium, the pH value must be between 8.2 and 9.0
- Use prepared water which complies with the standards cited above for filling and make-up water
- Avoid leaks and use a closed heating system to maintain water quality during operation
- When filling with make-up water, always bleed the filling hose before connecting, in order to prevent air from entering the system
- The heating water must be clear and free from substances that lead to sediments.
- With regard to corrosion protection, the use of fully demineralised filling and make-up water with an electrical conductivity of up to 100 µS/cm is recommended in accordance with EN 14868

Advantages of low-salt or fully demineralised water:

- Complies with the applicable standards
- Less of a drop in output due to reduced limescale build-up
- Less corrosion due to fewer aggressive substances
- Long-term cost savings thanks to improved energy efficiency

Filling and make-up water as well as heating water in accordance with VDI 2035:

Total heat output in kW	Total earth alkalis in mol/m ³ (total hardness in °dH)		
	Specific system volume in l/kW heat output ¹⁾		
	≤ 20	20 to ≤40	> 40
≤ 50 specific water content heat generator ≥ 0.3 l/kW ²⁾	none	≤ 3.0 (16.8)	< 0.05 (0.3)
≤ 50 specific water content heat generator < 0.3 l/kW ²⁾ (e.g. circulation water heater) and systems with electric heating elements	≤ 3.0 (16.8)	≤ 1.5 (8.4)	
> 50 to ≤ 200	≤ 2.0 (11.2)	≤ 1.0 (5.6)	
> 200 to ≤ 600	≤ 1.5 (8.4)	< 0.05 (0.3)	
> 600	< 0.05 (0.3)		

1. For calculating the specific system volume, the smallest individual heating capacity is to be used for systems with several heat generators.
2. In systems with several heat generators with different specific water contents, the smallest specific water content is decisive in each case.

Additional requirements for Switzerland

The filling and make-up water must be demineralised (fully purified)

- The water must not contain any ingredients that could settle and accumulate in the system
- This makes the water non-electroconductive, which prevents corrosion
- It also removes all the neutral salts such as chloride, sulphate and nitrate which can weaken corrosive materials in certain conditions

If some of the system water is lost, e.g. during repairs, the make-up water must also be demineralised. It is not enough to soften the water. The heating system must be professionally cleaned and rinsed before filling the units.

Inspection:

- After eight weeks, the pH value of the water must be between 8.2 and 10.0. If the central heating water comes into contact with aluminium, the pH value must be between 8.0 and 8.5
- Yearly. Values must be recorded by the owner

3.7 Pressure maintenance systems

Pressure maintenance systems in hot-water heating systems keep the required pressure within predefined limits and balance out volume variations caused by changes in the hot-water temperature. Two main systems are used:

Compressor-controlled pressure maintenance

In compressor-controlled pressure maintenance units, a variable air cushion in the expansion tank is responsible for volume compensation and pressure maintenance. If the pressure is too low, the compressor pumps air into the tank. If the pressure is too high, air is released by means of a solenoid valve. The systems are built solely with closed-diaphragm expansion tanks to prevent the damaging introduction of oxygen into the heating water.

Pump-controlled pressure maintenance

A pump-controlled pressure maintenance unit essentially consists of a pressure-maintenance pump, relief valve and an unpressurised receiving tank. The valve releases hot water into the receiving tank if the pressure is too high. If the pressure drops below a preset value, the pump draws water from the receiving tank and feeds it back into the heating system. Pump-controlled pressure maintenance systems with **open expansion tanks** (e.g. without a diaphragm) introduce ambient oxygen via the surface of the water, exposing the connected system components to the risk of corrosion. These systems offer no oxygen removal for the purposes of corrosion control as required by VDI 2035 and **in the interests of corrosion protection should not be used.**

3.8 Storage tank

NOTICE

In principle it is not necessary to use a storage tank for the system to run smoothly. However we recommend that you use the system with a storage tank, as this ensures a continuous supply of fuel in the ideal output range of the boiler.

For the correct dimensions of the storage tank and the line insulation (in accordance with ÖNORM M 7510 or guideline UZ37) please consult your installer or Fröling.

Additional requirements for Switzerland in accordance with LRV Appendix 3, section 523

Automatic boilers for wood pellets with a rated thermal output of more than 70 kW must be equipped with a heat accumulator of a volume of at least 25 litres per kW rated thermal output. These dimensioning specifications apply up to 500 kW nominal heat output.

3.9 Return temperature control

If the hot water return is below the minimum return temperature, some of the hot water outfeed will be mixed in. This is done by the return temperature control, which is integrated in the hydraulics on the side panel of the boiler.

3.10 Boiler ventilation



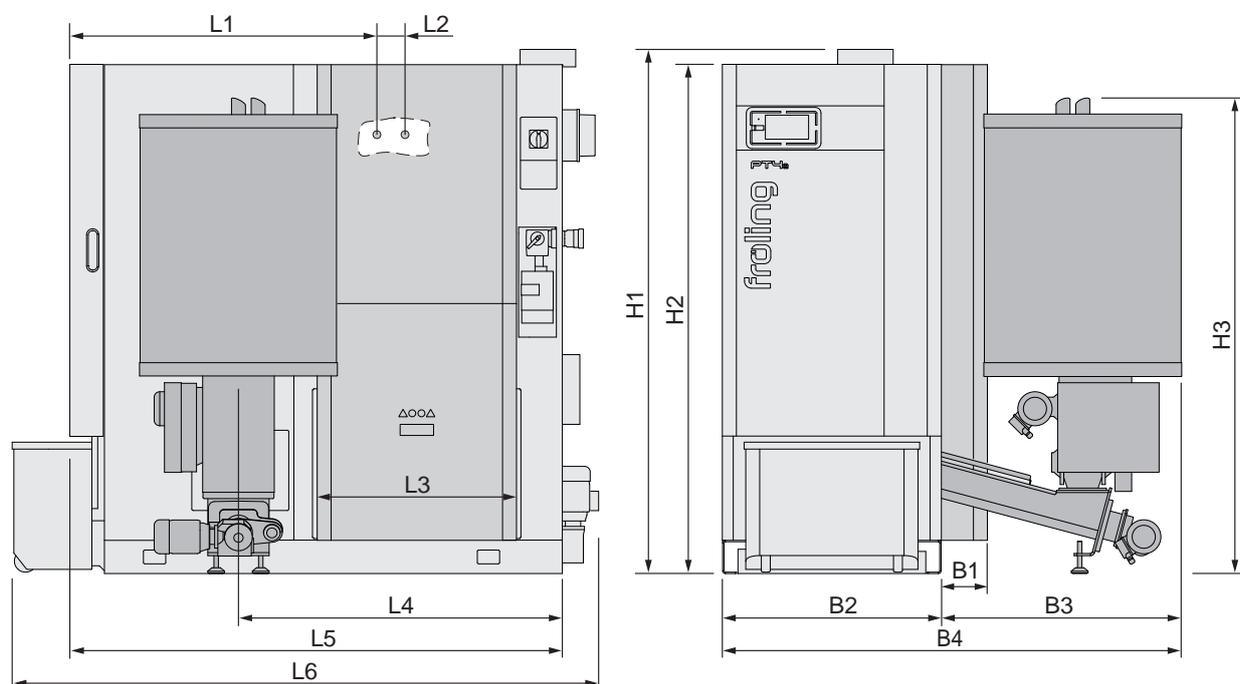
- Fit the automatic ventilating valve at the highest point on the boiler or at the ventilation connection (if present).
 - ↳ This ensures that air in the boiler is constantly expelled, thus preventing malfunctions caused by air in the boiler
- Check that the boiler ventilation is working properly
 - ↳ After installation and periodically according to manufacturer's instructions

Tip: Fit a vertical pipe as a calming section in front of the automatic ventilating valve in such a way that the ventilating valve is positioned above the water level in the boiler

Recommendation: Fit a microbubble separator in the pipes to the boiler
 ↳ Follow the manufacturer's instructions!

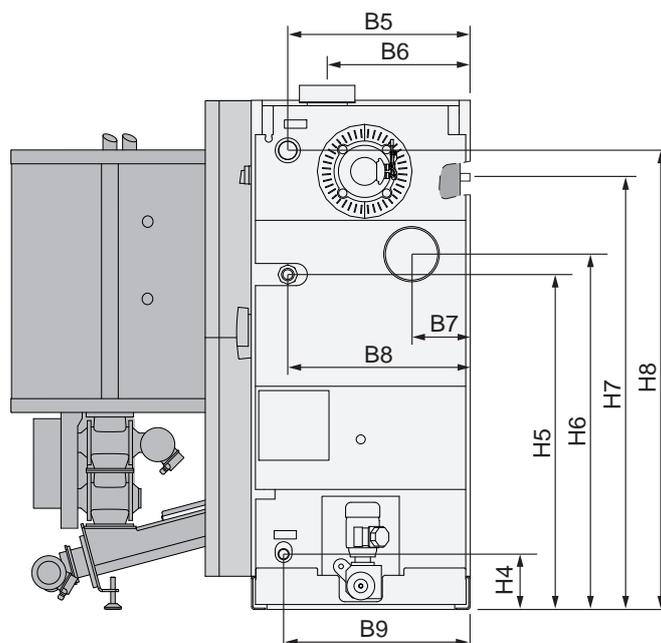
4 Technology

4.1 Dimensions of the PT4e 100-180 / PT4e 100-180 ESP (Electrostatic Particle Separator)



Dimension	Description		100-120	130-180
L1	Distance between connection to safety heat exchanger ¹⁾ and front of the boiler	mm	-	850
L2	Distance between safety heat exchanger connections ¹⁾		-	65
L3	Length of particle separator (optional)		550	715
L4	Distance between stoker and back of the boiler		890	1165
L5	Length of boiler		1420	1770
L6	Total length		1790	2110
B1	Width of particle separator (optional)		165	165
B2	Width, boiler		790	790
B3	Width of stoker unit		860	860
B4	Total width, including stoker unit		1650	1650
H1	Total height incl. flue gas nozzle		1790	1895
H2	Height, boiler		1740	1840
H3	Height of hose line connection		1720	1720

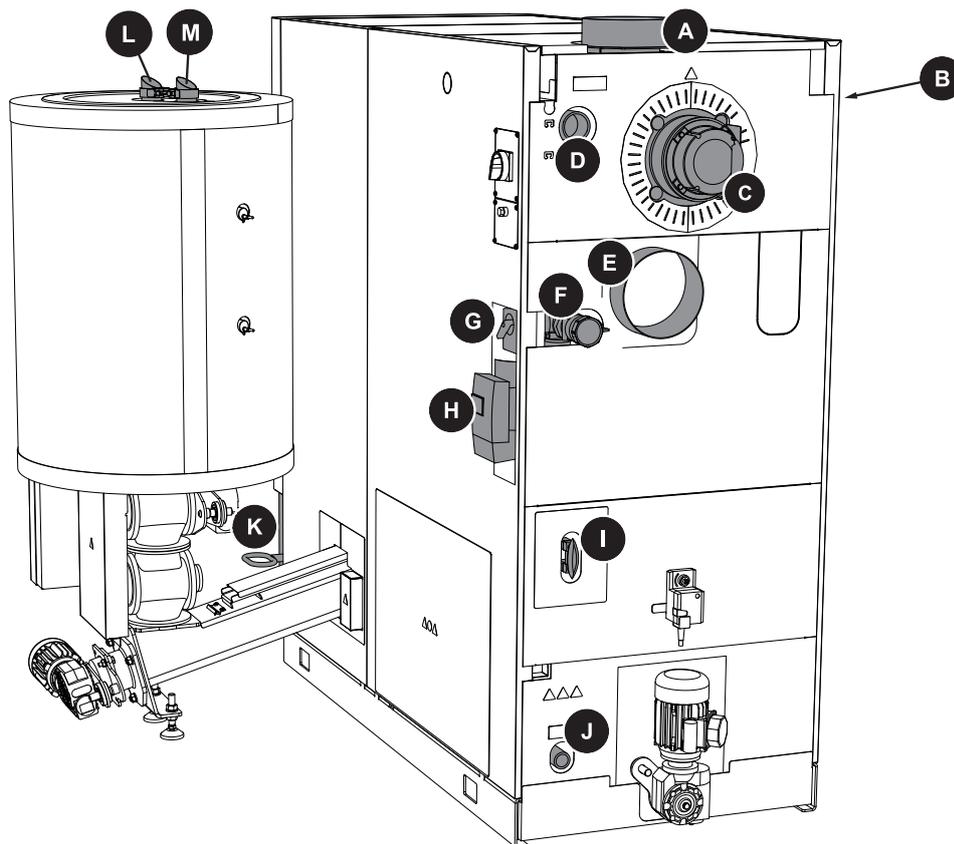
1. Safety heat exchanger connection on left-hand side of boiler



Dimension	Description		100-120	130-180
B5	Distance between flow connection and side of boiler	mm	670	655
B6	Distance between flue gas pipe connection and side of boiler		505	515
B7	Distance from rear flue gas pipe connection ¹⁾ to side of boiler		200	470
B8	Distance between return connection and side of boiler		660	655
B9	Distance between drainage connection and side of boiler		675	665
H4	Height, drainage connection		200	200
H5	Height, return connection		1135	1210
H6	Height of rear flue gas pipe connection ¹⁾		1210	1290
H7	Height, safety heat exchanger connection		-	1620
H8	Height, flow connection	1545	1660	

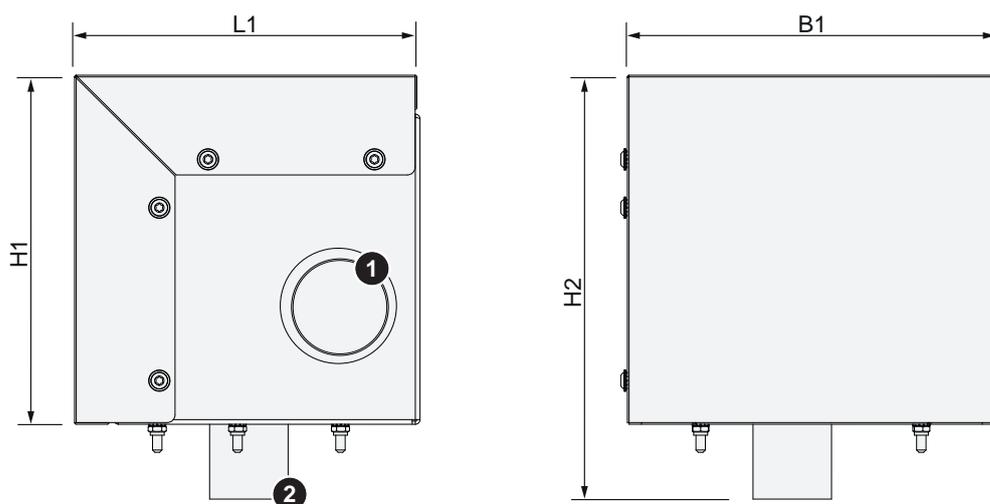
1. optional

4.2 Components and connections



Item	Description	100-120	140-180
A	Flue gas pipe connection	179 mm	199 mm
W	Safety heat exchanger	-	1/2"
C	Induced draught fan	-	
D	Boiler flow	2"	
E	Rear flue gas pipe connection (optional)	179 mm	199 mm
F	Boiler return	2"	
G	Mixing valve for the return temperature control	-	
H	Pump for the return temperature control	WILO Stratos Para 30/1-8	WILO Stratos Para 30/1-12
I	Line regulating valve	-	
J	Drainage	1"	
K	Ash container	55 Litres	75 Litres
L	Suction hose connection (PELLETS sticker)	50 mm	
M	Return-air line connection	50 mm	

4.3 External suction module



Dimension	Description	Unit	Size 1	Size 2
L1	Length of suction module	mm	220	265
B1	Width of suction module		235	290
H1	Height of suction module		225	235
H2	Total height incl. hose connection		275	285
1	Return-air line connection (line to suction point)	mm	50	
2	Return-air line connection (line to boiler)		50	

4.4 Technical data

4.4.1 PT4e 100 - 120

Description		PT4e 100 - 120		
		100	110	120
Nominal heat output	kW	100	110	120
Output range		30-100	33-110	36-120
Electrical connection		400V / 50Hz / fused C16A		
Power consumption (NL/PL)	W	129 / 48	128 / 49	127 / 49
Weight of boiler (including stoker, without water)	kg	1308		
Boiler capacity (water)	l	228		
Capacity of cyclone container		205 ¹⁾		
Available feed height of the pump ²⁾ (at $\Delta T = 20K$)	mbar	525	460	417
Max. permitted operating temperature	°C	90		
Permitted operating pressure	bar	4		
Boiler class as per EN 303-5: 2012		5		
Airborne sound level	dB(A)	<70		
Permitted fuel as per EN ISO 17225 ³⁾		Part 2: Wood pellets class A1 / D06		
Test book number		PB 207	PB 208	PB 144
1. equivalent to approx. 110 kg of pellets with a bulk density of 650 kg/m ³ 2. Pump output less water resistance in the boiler 3. Detailed information on the fuel can be found in the operating instructions in the section entitled "Permitted fuels"				

Regulation (EU) 2015/1187

Heating space annual rate of use η_s	%	≥ 78
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Additional data for regulation (EU) 2015/1189

Description		PT4e 100 - 120		
		100	110	120
Heating up mode		automatic		
Condensing boiler		No		
Solid fuel boiler for combined heat and power		No		
Combined heating system		No		
Storage tank volume		↻ "Storage tank" [▶ 16]		
Characteristics when operated exclusively with the preferred fuel				
Useful heat delivered at rated heat output (P_n)	kW	98.4	109.9	121.3
Useful heat delivered at 30% of rated heat output (P_p)		23.6	27.2	30.8
Fuel efficiency at rated heat output (η_n)	%	87.7	87.6	87.6
Fuel efficiency at 30% of rated heat output (η_p)		87.9	87.8	87.6
Auxiliary current consumption at rated heat output ($e_{I_{max}}$)	kW	0.129	0.128	0.127
Auxiliary current consumption at 30% of rated heat output (η_p)		0.048	0.049	0.049

Description		PT4e 100 - 120		
		100	110	120
Auxiliary current consumption in standby mode (P_{SB})		0.015	0.014	0.014

Regulation (EU) 2015/1189 – emissions in [mg/m ³] ¹⁾	
Annual space heating emissions of dust (PM)	≤ 30
Annual space heating emissions of gaseous organic compounds (GOC)	≤ 20
Annual space heating emissions of carbon monoxide (CO)	≤ 380
Annual space heating emissions of nitrogen oxides (NO _x)	≤ 200

1. The emissions of dust, gaseous organic compounds, carbon monoxide and nitrogen oxides are stated in a standardised form based on dry flue gas with a oxygen content of 10 % and under standard conditions at 0°C and 1013 millibar

4.4.2 PT4e 100 - 120 ESP

Description		PT4e 100 - 120 ESP		
		100	110	120
Nominal heat output	kW	99.8	110	120
Output range		29.9-99.8	33-110	36-120
Electrical connection		400V / 50Hz / fused C16A		
Power consumption (NL/PL)	W	201 / 48	203 / 49	204 / 49
Weight of boiler (including stoker, without water)	kg	1308		
Boiler capacity (water)	l	228		
Capacity of cyclone container		205 ¹⁾		
Available feed height of the pump ²⁾ (at $\Delta T = 20K$)	mbar	525	460	417
Max. permitted operating temperature	°C	90		
Permitted operating pressure	bar	4		
Boiler class as per EN 303-5: 2012		5		
Airborne sound level	dB(A)	<70		
Permitted fuel as per EN ISO 17225 ³⁾		Part 2: Wood pellets class A1 / D06		
Test book number		PB 209	PB 210	PB 170

1. equivalent to approx. 110 kg of pellets with a bulk density of 650 kg/m³
2. Pump output less water resistance in the boiler
3. Detailed information on the fuel can be found in the operating instructions in the section entitled "Permitted fuels"

Regulation (EU) 2015/1187		
Heating space annual rate of use η_s	%	≥ 78

Additional data for regulation (EU) 2015/1189

Description		PT4e 100 - 120 ESP		
		100	110	120
Heating up mode		automatic		
Condensing boiler		No		

Description	PT4e 100 - 120 ESP			
	100	110	120	
Solid fuel boiler for combined heat and power	No			
Combined heating system	No			
Storage tank volume	↻ "Storage tank" ▶ 16]			
Characteristics when operated exclusively with the preferred fuel				
Useful heat delivered at rated heat output (P_n)	kW	97.3	109.3	121.3
Useful heat delivered at 30% of rated heat output (P_p)		23.6	27.7	30.8
Fuel efficiency at rated heat output (η_n)	%	86.6	86.6	86.7
Fuel efficiency at 30% of rated heat output (η_p)		87.9	87.7	87.6
Auxiliary current consumption at rated heat output ($e_{l_{max}}$)	kW	0.201	0.203	0.204
Auxiliary current consumption at 30% of rated heat output (η_p)		0.048	0.049	0.049
Auxiliary current consumption in standby mode (P_{SB})		0.015	0.016	0.017

Regulation (EU) 2015/1189 – emissions in [mg/m ³] ¹⁾	
Annual space heating emissions of dust (PM)	≤ 30
Annual space heating emissions of gaseous organic compounds (GOC)	≤ 20
Annual space heating emissions of carbon monoxide (CO)	≤ 380
Annual space heating emissions of nitrogen oxides (NO _x)	≤ 200

1. The emissions of dust, gaseous organic compounds, carbon monoxide and nitrogen oxides are stated in a standardised form based on dry flue gas with a oxygen content of 10 % and under standard conditions at 0°C and 1013 millibar

4.4.3 PT4e 140 - 150

Description		PT4e 140 - 150	
		140	150
Rated heat output	kW	140	150
Output range		42-140	45-150
Electrical connection		400V / 50Hz / fused C16A	
Power consumption (NL/PL)	W	125 / 51	124 / 52
Weight of boiler (including stoker, without water)	kg	1641	
Boiler capacity (water)	l	320	
Capacity of cyclone container		205 ¹⁾	
Available feed height of the pump ²⁾ (at $\Delta T = 20K$)	mbar	860	790
Max. permitted operating temperature	°C	90	
Permitted operating pressure	bar	4	
Boiler class as per EN 303-5: 2012		5	
Airborne sound level	dB(A)	<70	
Permitted fuel as per EN ISO 17225 ³⁾		Part 2: Wood pellets class A1 / D06	
Test book number		PB 165	PB 166

1. equivalent to approx. 110 kg of pellets with a bulk weight of 650 kg/m³
2. Pump output less water resistance in the boiler
3. Detailed information on the fuel can be found in the operating instructions in the section entitled "Permitted fuels"

Regulation (EU) 2015/1187

Heating space annual rate of use η_s	%	≥ 78
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Additional data for regulation (EU) 2015/1189

Description		PT4e 140 - 150	
		140	150
Heating up mode		automatic	
Condensing boiler		No	
Solid fuel boiler for combined heat and power		No	
Combined heating system		No	
Storage tank volume		↻ "Storage tank" [▶ 16]	
Characteristics when operated exclusively with the preferred fuel			
Useful heat delivered at rated heat output (P_n)	kW	144.2	155.6
Useful heat delivered at 30% of rated heat output (P_p)		37.9	41.4
Fuel efficiency at rated heat output (η_n)	%	87.4	87.4
Fuel efficiency at 30% of rated heat output (η_p)		87.3	87.1
Auxiliary current consumption at rated heat output ($e_{l_{max}}$)	kW	0.125	0.124
Auxiliary current consumption at 30% of rated heat output (η_p)		0.051	0.052
Auxiliary current consumption in standby mode (P_{SB})		0.014	0.014

Regulation (EU) 2015/1189 – emissions in [mg/m ³] ¹⁾	
Annual space heating emissions of dust (PM)	≤ 30
Annual space heating emissions of gaseous organic compounds (GOC)	≤ 20
Annual space heating emissions of carbon monoxide (CO)	≤ 380
Annual space heating emissions of nitrogen oxides (NO _x)	≤ 200

1. The emissions of dust, gaseous organic compounds, carbon monoxide and nitrogen oxides are stated in a standardised form based on dry flue gas with a oxygen content of 10 % and under standard conditions at 0°C and 1013 millibar

4.4.4 PT4e 140 - 150 ESP

Description		PT4e 140 - 150 ESP	
		140	150
Rated heat output	kW	140	150
Output range		42-140	45-150
Electrical connection		400V / 50Hz / fused C16A	
Power consumption (NL/PL)	W	208 / 51	210 / 52
Weight of boiler (including stoker, without water)	kg	1641	
Boiler capacity (water)	l	320	
Capacity of cyclone container		205 ¹⁾	
Available feed height of the pump ²⁾ (at ΔT = 20K)	mbar	860	790
Max. permitted operating temperature	°C	90	
Permitted operating pressure	bar	4	
Boiler class as per EN 303-5: 2012		5	
Airborne sound level	dB(A)	<70	
Permitted fuel as per EN ISO 17225 ³⁾		Part 2: Wood pellets class A1 / D06	
Test book number		PB 171	PB 172

1. equivalent to approx. 110 kg of pellets with a bulk weight of 650 kg/m³
2. Pump output less water resistance in the boiler
3. Detailed information on the fuel can be found in the operating instructions in the section entitled "Permitted fuels"

Regulation (EU) 2015/1187		
Heating space annual rate of use η _s	%	≥ 78

Additional data for regulation (EU) 2015/1189

Description		PT4e 140 - 150 ESP	
		140	150
Heating up mode		automatic	
Condensing boiler		No	
Solid fuel boiler for combined heat and power		No	
Combined heating system		No	
Storage tank volume		↻ "Storage tank" ▶ 16]	
Characteristics when operated exclusively with the preferred fuel			
Useful heat delivered at rated heat output (P _n)	kW	142.6	153.8

Description		PT4e 140 - 150 ESP	
		140	150
Useful heat delivered at 30% of rated heat output (P_p)		37.9	41.5
Fuel efficiency at rated heat output (η_n)	%	86.8	86.8
Fuel efficiency at 30% of rated heat output (η_p)		87.1	87.0
Auxiliary current consumption at rated heat output ($e_{l_{max}}$)	kW	0.208	0.210
Auxiliary current consumption at 30% of rated heat output (η_p)		0.051	0.052
Auxiliary current consumption in standby mode (P_{SB})		0.020	0.022

Regulation (EU) 2015/1189 – emissions in [mg/m^3] ¹⁾	
Annual space heating emissions of dust (PM)	≤ 30
Annual space heating emissions of gaseous organic compounds (GOC)	≤ 20
Annual space heating emissions of carbon monoxide (CO)	≤ 380
Annual space heating emissions of nitrogen oxides (NO_x)	≤ 200

1. The emissions of dust, gaseous organic compounds, carbon monoxide and nitrogen oxides are stated in a standardised form based on dry flue gas with a oxygen content of 10 % and under standard conditions at 0°C and 1013 millibar

4.4.5 PT4e 160 - 180

Description		PT4e 160 - 180		
		160	170	180
Nominal output	kW	160	170	180
Output range		48-160	51-170	54-180
Electrical connection		400V / 50Hz / fused C16A		
Power consumption (NL/PL)	W	124 / 52	123 / 53	122 / 54
Weight of boiler (including stoker, without water)	kg	1641		
Boiler capacity (water)	l	320		
Capacity of cyclone container		205 ¹⁾		
Available feed height of the pump ²⁾ (at $\Delta T = 20K$)	mbar	740	620	530
Max. permitted operating temperature	°C	90		
Permitted operating pressure	bar	4		
Boiler class as per EN 303-5: 2012		5		
Airborne sound level	dB(A)	<70		
Permitted fuel as per EN ISO 17225 ³⁾		Part 2: Wood pellets class A1 / D06		
Test book number		PB 167	PB 168	PB 169
1. equivalent to approx. 110 kg of pellets with a bulk weight of 650 kg/m ³ 2. Pump output less water resistance in the boiler 3. Detailed information on the fuel can be found in the operating instructions in the section entitled "Permitted fuels"				

Regulation (EU) 2015/1187

Heating space annual rate of use η_s	%	≥ 78
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Additional data for regulation (EU) 2015/1189

Description		PT4e 160 - 180		
		160	170	180
Heating up mode		automatic		
Condensing boiler		No		
Solid fuel boiler for combined heat and power		No		
Combined heating system		No		
Storage tank volume		↻ "Storage tank" [▶ 16]		
Characteristics when operated exclusively with the preferred fuel				
Useful heat delivered at rated heat output (P_n)	kW	167.1	178.6	190.0
Useful heat delivered at 30% of rated heat output (P_p)		45.0	48.6	52.1
Fuel efficiency at rated heat output (η_n)	%	87.3	87.2	87.2
Fuel efficiency at 30% of rated heat output (η_p)		87.0	86.8	86.7
Auxiliary current consumption at rated heat output ($e_{l_{max}}$)	kW	0.124	0.123	0.122
Auxiliary current consumption at 30% of rated heat output (η_p)		0.052	0.053	0.054
Auxiliary current consumption in standby mode (P_{sb})		0.014	0.013	0.013

Regulation (EU) 2015/1189 – emissions in [mg/m ³] ¹⁾	
Annual space heating emissions of dust (PM)	≤ 30
Annual space heating emissions of gaseous organic compounds (GOC)	≤ 20
Annual space heating emissions of carbon monoxide (CO)	≤ 380
Annual space heating emissions of nitrogen oxides (NO _x)	≤ 200

1. The emissions of dust, gaseous organic compounds, carbon monoxide and nitrogen oxides are stated in a standardised form based on dry flue gas with a oxygen content of 10 % and under standard conditions at 0°C and 1013 millibar

4.4.6 PT4e 160 - 180 ESP

Description		PT4e 160 - 180 ESP		
		160	170	180
Nominal output	kW	160	170	180
Output range		48-160	51-170	54-180
Electrical connection		400V / 50Hz / fused C16A		
Power consumption (NL/PL)	W	211 / 52	213 / 53	215 / 54
Weight of boiler (including stoker, without water)	kg	1641		
Boiler capacity (water)	l	320		
Capacity of cyclone container		205 ¹⁾		
Available feed height of the pump ²⁾ (at ΔT = 20K)	mbar	740	620	530
Max. permitted operating temperature	°C	90		
Permitted operating pressure	bar	4		
Boiler class as per EN 303-5: 2012		5		
Airborne sound level	dB(A)	<70		
Permitted fuel as per EN ISO 17225 ³⁾		Part 2: Wood pellets class A1 / D06		
Test book number		PB 173	PB 174	PB 175

1. equivalent to approx. 110 kg of pellets with a bulk weight of 650 kg/m³
2. Pump output less water resistance in the boiler
3. Detailed information on the fuel can be found in the operating instructions in the section entitled "Permitted fuels"

Regulation (EU) 2015/1187		
Heating space annual rate of use η _s	%	≥ 78

Additional data for regulation (EU) 2015/1189

Description		PT4e 160 - 180 ESP		
		160	170	180
Heating up mode		automatic		
Condensing boiler		No		
Solid fuel boiler for combined heat and power		No		
Combined heating system		No		
Storage tank volume		↪ "Storage tank" [▶ 16]		
Characteristics when operated exclusively with the preferred fuel				
Useful heat delivered at rated heat output (P _n)	kW	165.1	176.3	187.6

Description		PT4e 160 - 180 ESP		
		160	170	180
Useful heat delivered at 30% of rated heat output (P_p)		45.0	48.6	52.1
Fuel efficiency at rated heat output (η_n)	%	86.8	86.9	86.9
Fuel efficiency at 30% of rated heat output (η_p)		87.0	86.8	86.7
Auxiliary current consumption at rated heat output ($e_{l,max}$)	kW	0.211	0.213	0.215
Auxiliary current consumption at 30% of rated heat output (η_p)		0.052	0.053	0.054
Auxiliary current consumption in standby mode (P_{SB})		0.023	0.025	0.026

Regulation (EU) 2015/1189 – emissions in [mg/m ³] ¹⁾	
Annual space heating emissions of dust (PM)	≤ 30
Annual space heating emissions of gaseous organic compounds (GOC)	≤ 20
Annual space heating emissions of carbon monoxide (CO)	≤ 380
Annual space heating emissions of nitrogen oxides (NO _x)	≤ 200

1. The emissions of dust, gaseous organic compounds, carbon monoxide and nitrogen oxides are stated in a standardised form based on dry flue gas with a oxygen content of 10 % and under standard conditions at 0°C and 1013 millibar

4.4.7 Boiler data for planning the flue gas system

Description		PT4e / PT4e ESP		
		100	110	120
Flue gas temperature at nominal load	°C	135	140	145
Flue gas temperature at partial load		85	85	85
CO ₂ - volume concentration at nominal load / partial load	%	12,8 / 11,8	13.3 / 12.3	13.8 / 12.8
O ₂ -Volume concentration at nominal load/partial load		7.5 / 8.5	7.0 / 8.0	6.5 / 7.5
Flue gas mass flow at nominal load	kg/h	206	219	232
	kg/s	0.057	0.061	0.064
Flue gas mass flow at partial load	kg/h	65	68	72
	kg/s	0.018	0.019	0.020
Required feed pressure at nominal load	Pa	5		
	mbar	0.05		
Required feed pressure at partial load	Pa	2		
	mbar	0.02		
Maximum permissible feed pressure	Pa	30		
	mbar	0.3		
Flue pipe diameter	mm	179		

Description		PT4e / PT4e ESP	
		140	150
Flue gas temperature at nominal load	°C	125	130
Flue gas temperature at partial load		80	80
CO ₂ - volume concentration at nominal load / partial load	%	12.3 / 11.3	12.8 / 11.8
O ₂ -Volume concentration at nominal load/partial load	%	8.0 / 9.0	7.5 / 8.5
Flue gas mass flow at nominal load	kg/h	298	308
	kg/s	0.083	0.086
Flue gas mass flow at partial load	kg/h	94	97
	kg/s	0.026	0.027
Required feed pressure at nominal load	Pa	5	
	mbar	0.05	
Required feed pressure at partial load	Pa	2	
	mbar	0.02	
Maximum permissible feed pressure	Pa	30	
	mbar	0.3	
Flue pipe diameter	mm	199	

Description		PT4e / PT4e ESP		
		160	170	180
Flue gas temperature at nominal load	°C	135	140	145
Flue gas temperature at partial load		85	85	85
CO ₂ - volume concentration at nominal load / partial load	%	12.8 / 11.8	13.3 / 12.3	13.3 / 12.3
O ₂ Volume concentration at nominal load/partial load		7.5 / 8.5	7.0 / 8.0	7.0 / 8.0

Description		PT4e / PT4e ESP		
		160	170	180
Flue gas mass flow at nominal load	kg/h	330	339	360
	kg/s	0.092	0.094	0.100
Flue gas mass flow at partial load	kg/h	104	106	112
	kg/s	0.029	0.029	0.031
Required feed pressure at nominal load	Pa	5		
	mbar	0.05		
Required feed pressure at partial load	Pa	2		
	mbar	0.02		
Maximum permissible feed pressure	Pa	30		
	mbar	0.3		
Flue pipe diameter	mm	199		

4.4.8 Data for planning a backup power supply

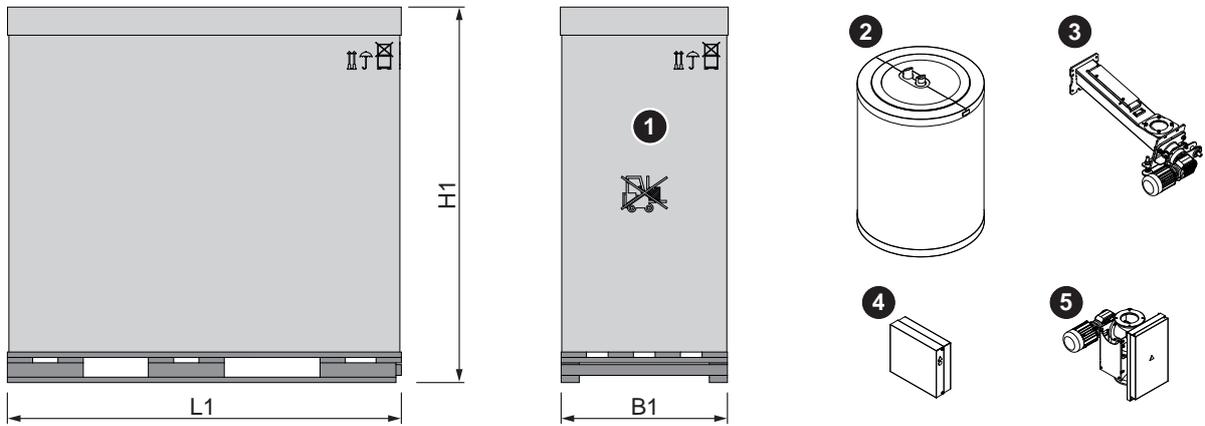
The system can be operated with an emergency generator. The following information must be observed during planning.

Description		Value
Continuous output (three phase)	VA	6375
Nominal voltage	VAC	400 ± 6%
Frequency	Hz	50 ± 2%

5 Transport and storage

5.1 Delivery configuration

The boiler and associated components are delivered on a pallet.



Item	Description	Unit	PT4e / PT4e ESP	
			100-120	140-180
L1	Length	mm	1870	2180
B1	Width		920	920
H1	Height		1995	2095
Weight of the components:				
1	Boiler	kg	1060	1390
2	Cyclone container		35	35
3	Stoker unit		45	45
4	Distributor box		10	10
5	Rotary valve unit		50	50

5.2 Temporary storage

If the system is to be assembled at a later stage:

- Store components at a protected location, which is dry and free from dust
 - ↳ Damp conditions and frost can damage components, particularly electric ones!

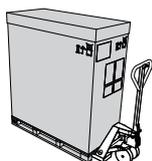
5.3 Positioning

NOTICE



Damage to components if handled incorrectly

- Follow the transport instructions on the packaging
- Transport components with care to avoid damage
- Protect the packaging against damp conditions
- Pay attention to the pallet's centre of gravity when lifting

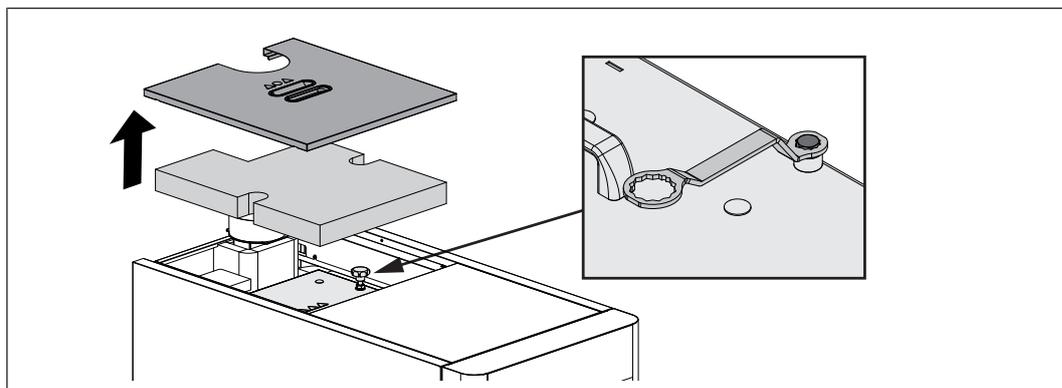


- Position a fork-lift or similar lifting device at the pallet and bring in the components

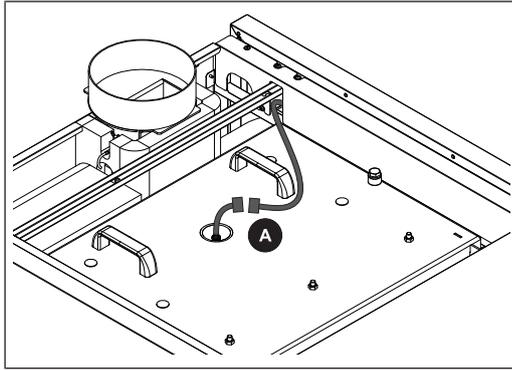
If the boiler cannot be brought in on the pallet:

- Remove the cardboard and take the boiler off the pallet
 - ➔ "Remove boiler from pallet" [▶ 34]

Positioning using a crane:

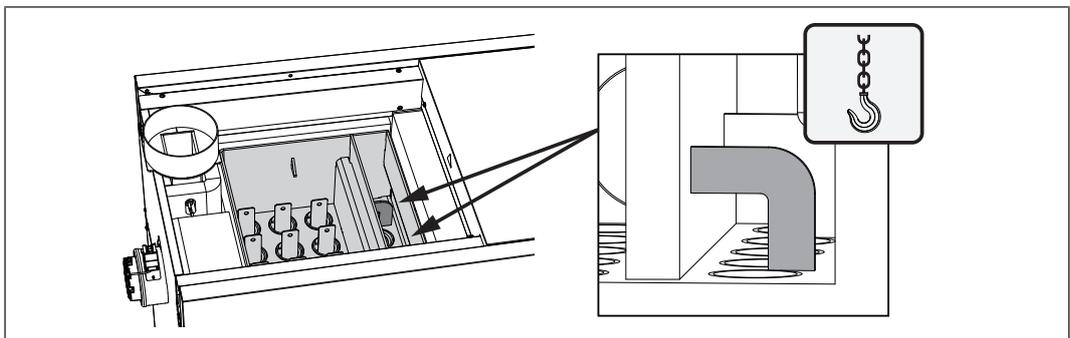


- Remove the cover and thermal insulation
 - ↪ PT4e 100-120: one cover
 - ↪ PT4e 140-180: two covers
- Undo the screw connection and open the heat exchanger cover
 - ↪ Use the spanner provided



Also for PT4e 100-120:

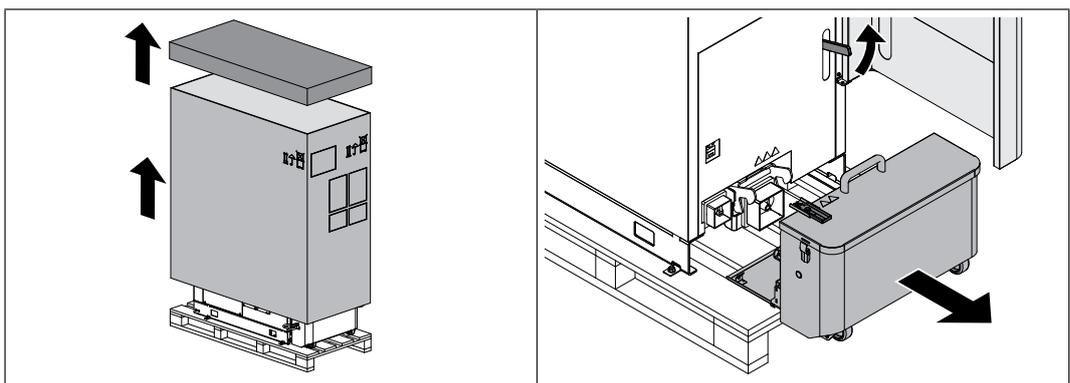
- Disconnect the plug connection (A) from the Lambda probe cable
- Protect the cable from damage



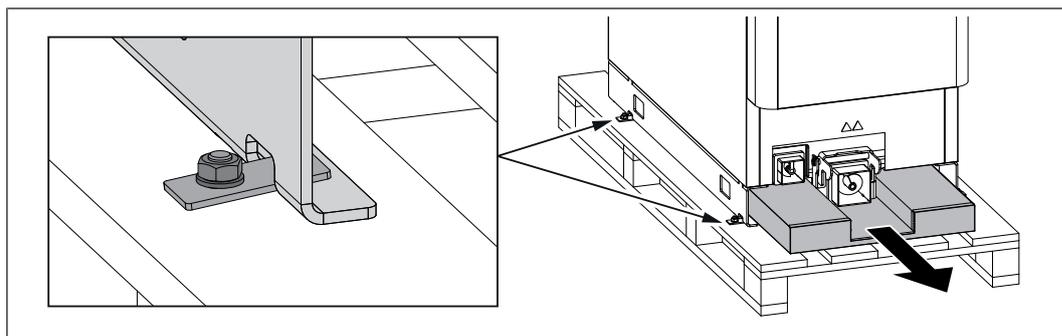
- Hang the crane hook on the crane eye bolts in the flue gas collection chamber and bring in the boiler

5.4 Positioning at the installation site

5.4.1 Remove boiler from pallet



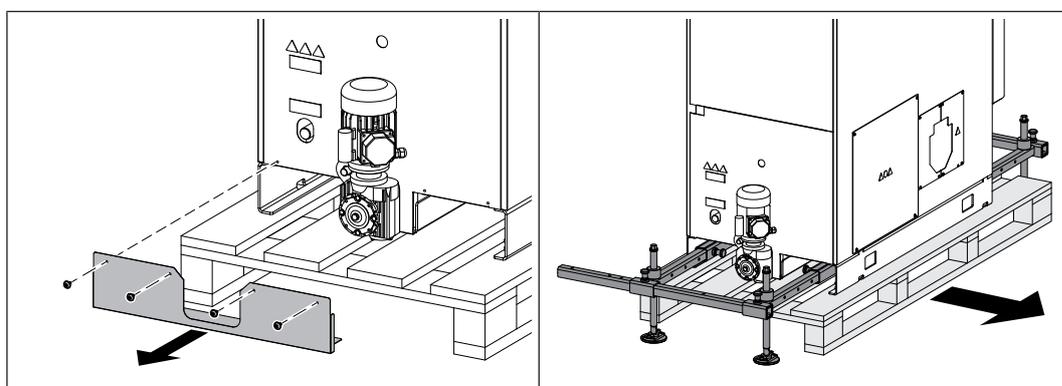
- Cut through the strapping and lift off the cardboard
- Open the insulated door and pull the key plate from the safety limit switch
- Use the locking lever to unlock the ash container and pull off the ash container from the boiler



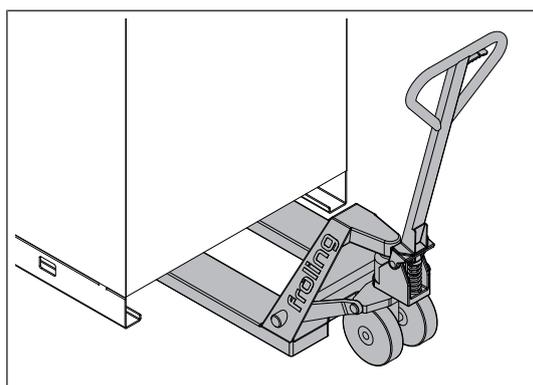
- Remove securing devices used during transportation on the left and right side of the boiler
- Pull out floor insulation
- Lift boiler from pallet



When using the Fröling boiler lifting system KHV 1400:



- Remove the lower cover plate on the boiler's back panel
- Use the boiler lifting system to raise the boiler and pull out the pallet
 - ↪ See operating instructions for the boiler lifting system

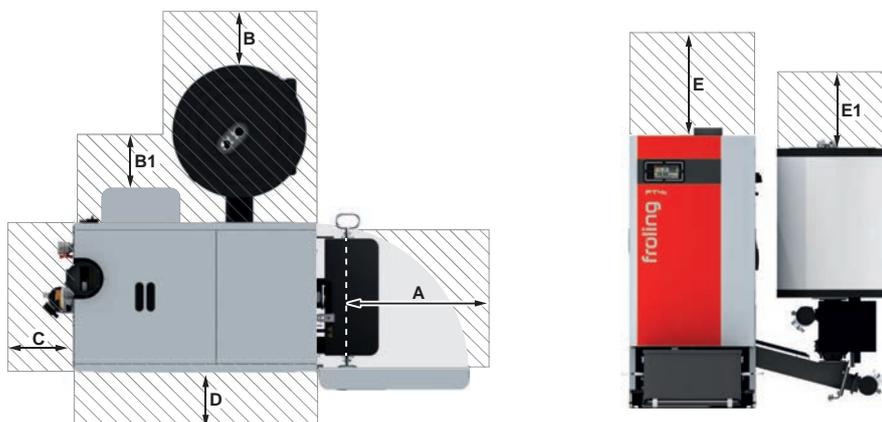


- Position a fork-lift or similar lifting device with a suitable load-bearing capacity at the base frame
- Lift it and transport it to the intended position
 - ↪ Observe the operating and maintenance areas of the equipment in the process!

NOTICE! The insertion dimensions match the dimensions of the boiler, see chapter "Dimensions".

5.4.2 Operating and maintenance areas of the equipment

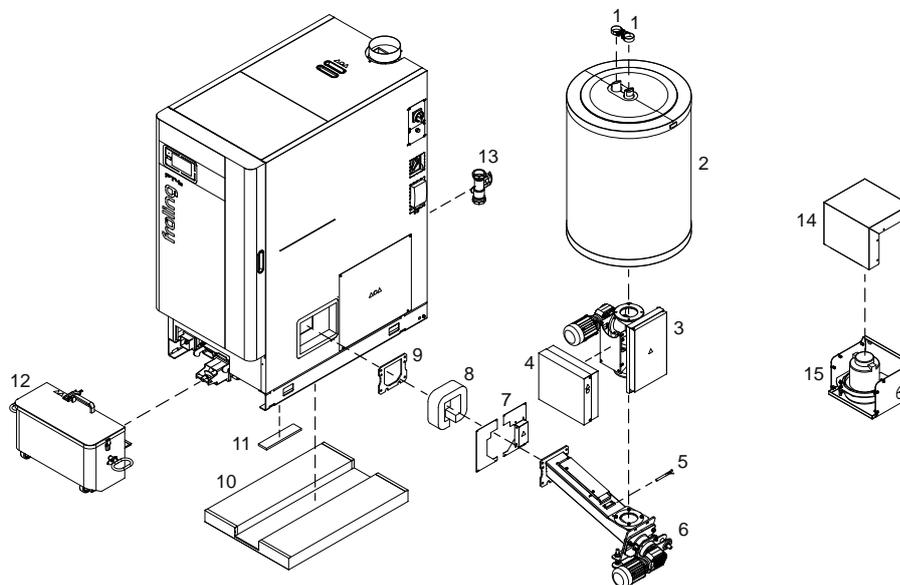
- The system should generally be set up so that it is accessible from all sides to allow quick and easy maintenance!
- Regional regulations regarding necessary maintenance areas for inspecting the chimney should be observed in addition to the specified distances!
- Observe the applicable standards and regulations when setting up the system!
- Comply with additional standards for noise protection!
(ÖNORM H 5190 - Noise protection measures)



A	800 mm
B	300 mm
B1	300 mm
C	500 mm
D	300 mm
E	500 mm ¹⁾
E1	300 mm
1. Maintenance area to expand the WOS springs upwards	

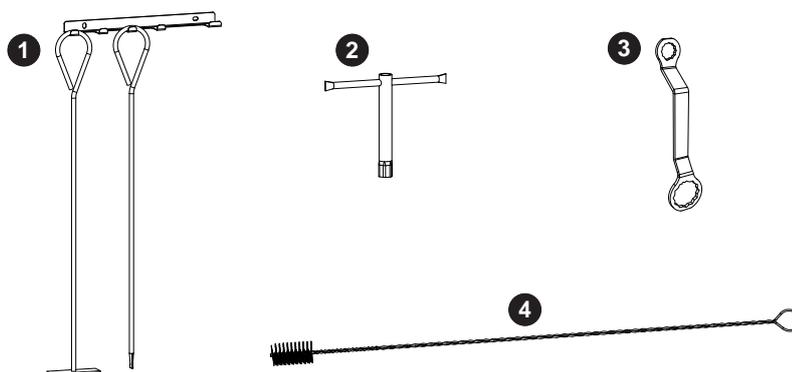
6 Assembly

6.1 Assembly overview



1	Hose clip	9	Stoker unit seal
2	Cyclone container	10	Floor insulation
3	Rotary valve unit	11	Sylomer documentation (4 documents)
4	Distributor box	12	Ash container
5	temperature sensor	13	Line regulating valve (optional)
6	Stoker unit	14	Suction module cover hood
7	Stoker unit cover plates	15	Suction module
8	Stoker duct thermal insulation		

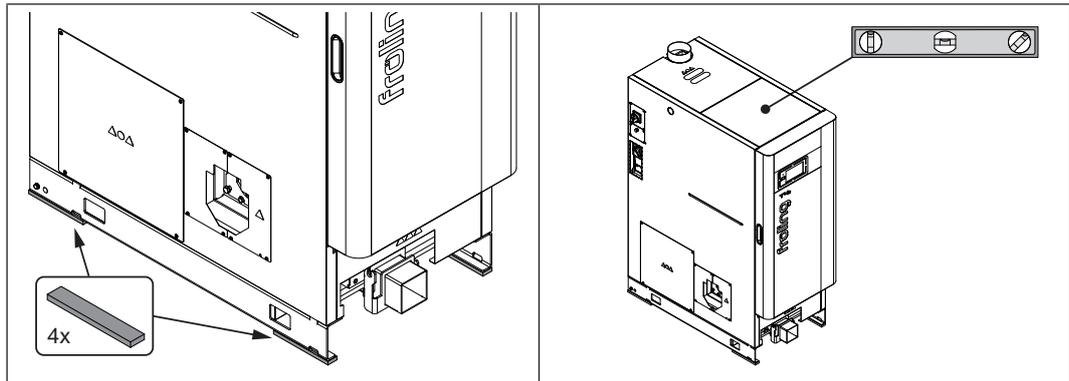
6.2 Accessories supplied



1	Furnace tool with bracket	3	Key for door mountings and WOS cover
2	Socket wrench AF 13	4	Cleaning brush 24 x 50 x 1200

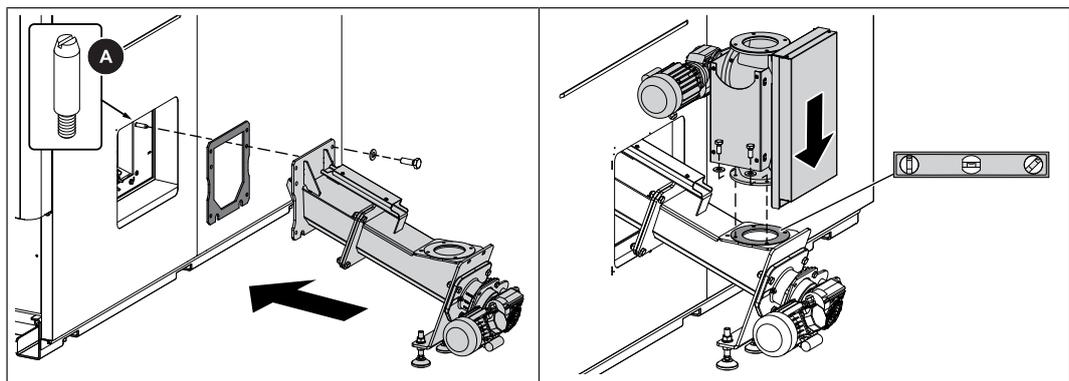
6.3 Installing the boiler

6.3.1 Levelling the boiler

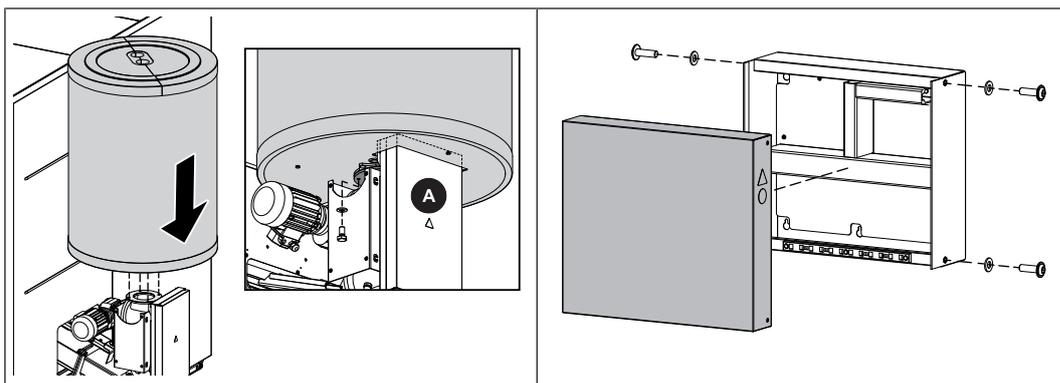


- Lift the boiler using an appropriate lifting device
- Position a Sylomer pad under the boiler base
 - ↳ Sylomer pads prevent the transmission of noise to the ground
- Carefully release the lifting device and check that the boiler is level
- If necessary, level the boiler using load-bearing pads

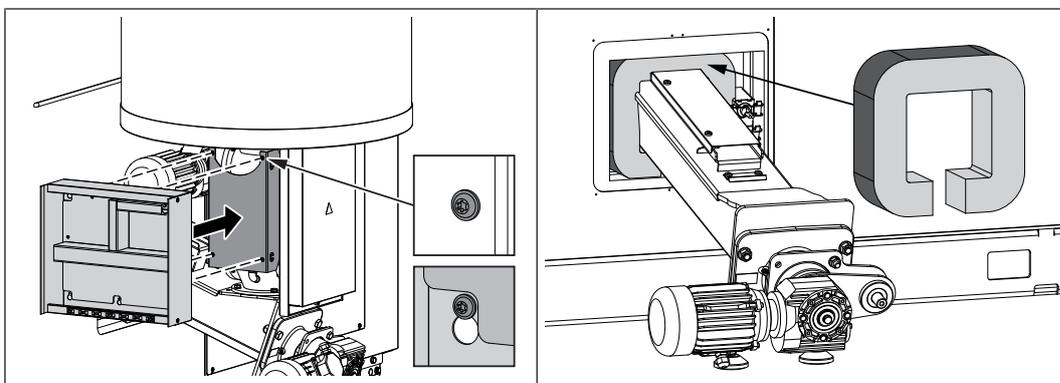
6.3.2 Installing the pellet suction system



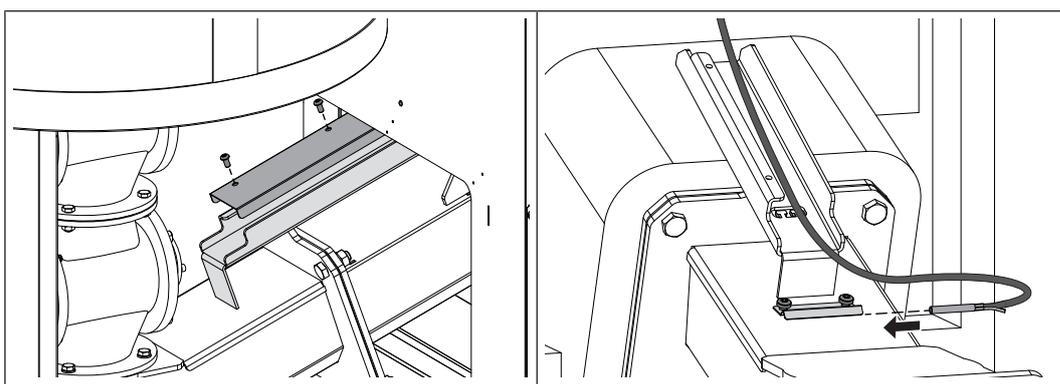
- Remove the stoker cover plates on the right-hand side of the boiler
 - ↳ Stoker cover plates are no longer required
- Position the seal on the connection flange
- Thread the stoker unit onto both lock bolts (A) on the connecting flange and fix in place
 - 4 hexagonal screws M10 x 30
- Use the adjustable feet and align the flange of the stoker unit horizontally.
- Mount the rotary valve unit on the stoker unit as illustrated
 - 4 hexagonal screws M8 x 20



- ❑ Secure the cyclone container to the rotary valve unit
 - 4 hexagonal screws M8 x 16
 - ↪ Note the cut-out for the drive ratio (A) of the rotary valves!
- ❑ Remove the cover from the distributor box
 - 4 lens-head screw M6 x 20 incl. contact washer

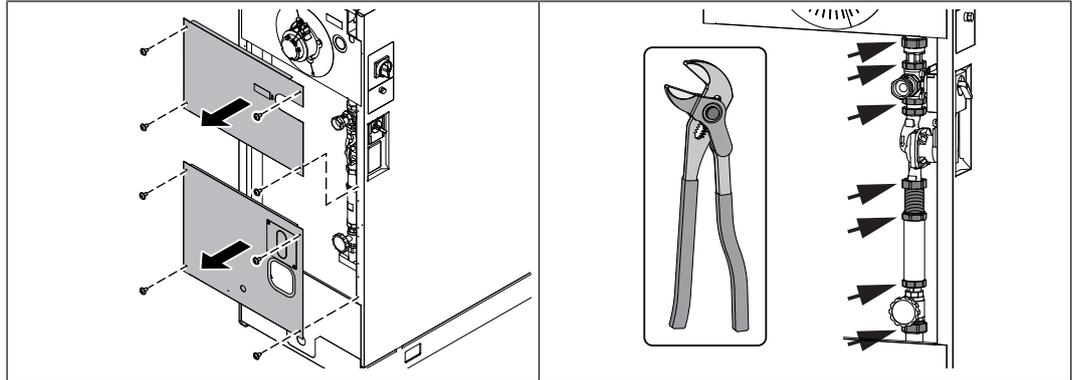


- ❑ Loosen the four screws on the distributor box's bracket.
- ❑ Hang the distributor box on the screw heads and tighten the screws
- ❑ Wrap thermal insulation around stoker duct as shown



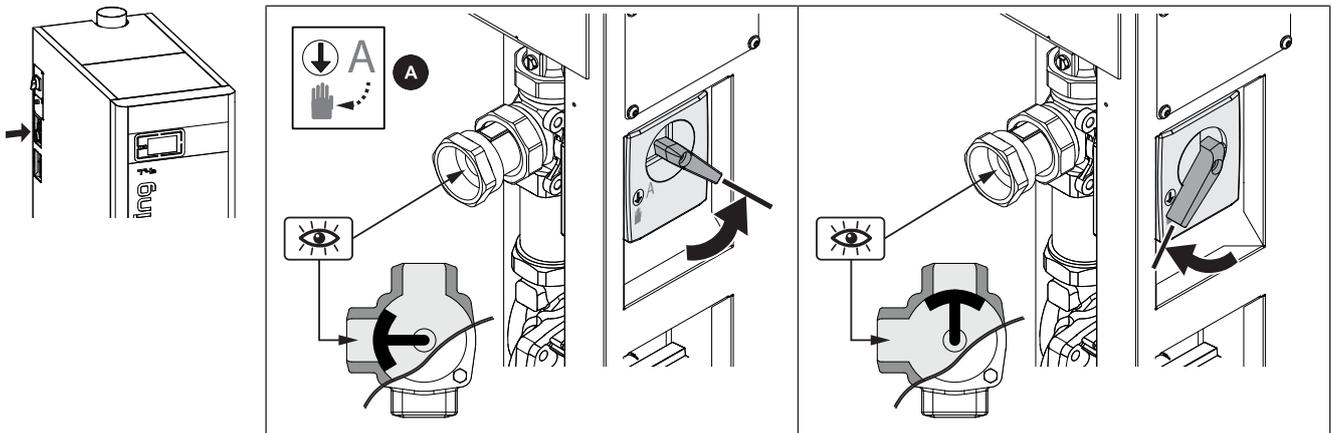
- ❑ Remove the cover on the cable duct
- ❑ Loosen the screws of the clamping plate on the stoker duct
- ❑ Push temperature sensor under clamping plate and fix with screws

6.3.3 Control the return temperature control



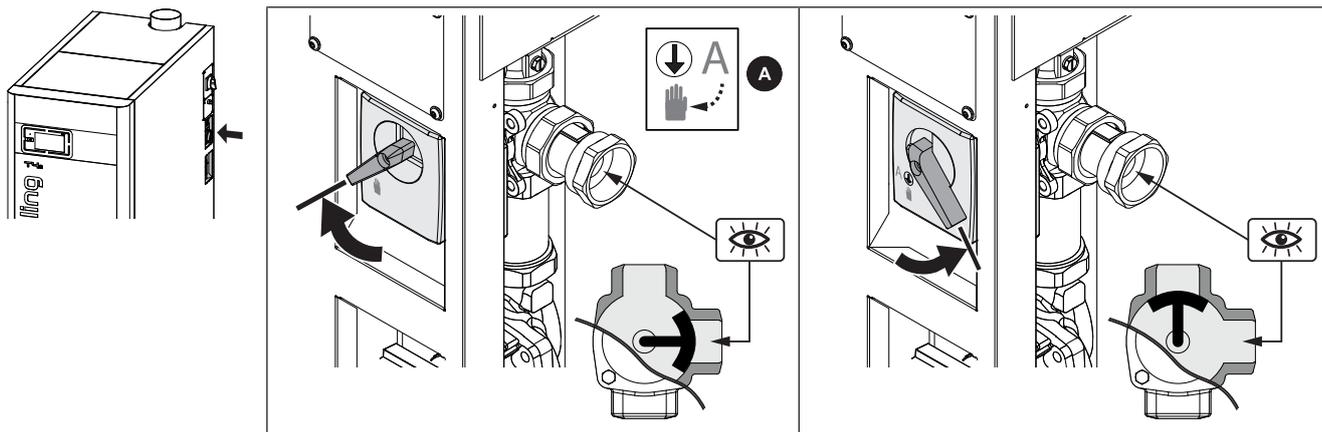
- ❑ Remove both back panels
- ❑ Tighten all of the connections on the return temperature control using a pipe wrench
 - ↳ Connections may have loosened during transport.
 - ↳ **IMPORTANT:** Before and after filling the system with heated water, check the seal of the screw connections on the return temperature control

Return temperature control left



- ❑ Set the knob on the housing of the mixing drive to manual mode (A)
- ❑ Turn the mixing drive counter clockwise until it stops
 - ↳ The mixer valve completely closes off the system return
- ❑ Turn the mixing drive clockwise until it stops
 - ↳ The system return is completely open and the bypass line coming from above is completely closed

Return temperature control right



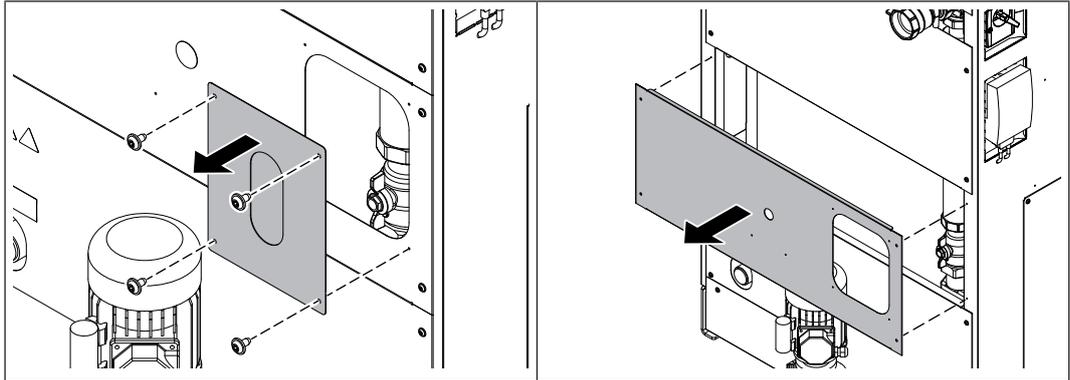
- Set the knob on the housing of the mixing drive to manual mode (A)
- Turn the mixing drive clockwise until it stops
 - ↪ The mixer valve completely closes off the system return
- Turn the mixing drive counter clockwise until it stops
 - ↪ The system return is completely open and the bypass line coming from above is completely closed

After checking that the return temperature control is functioning properly:

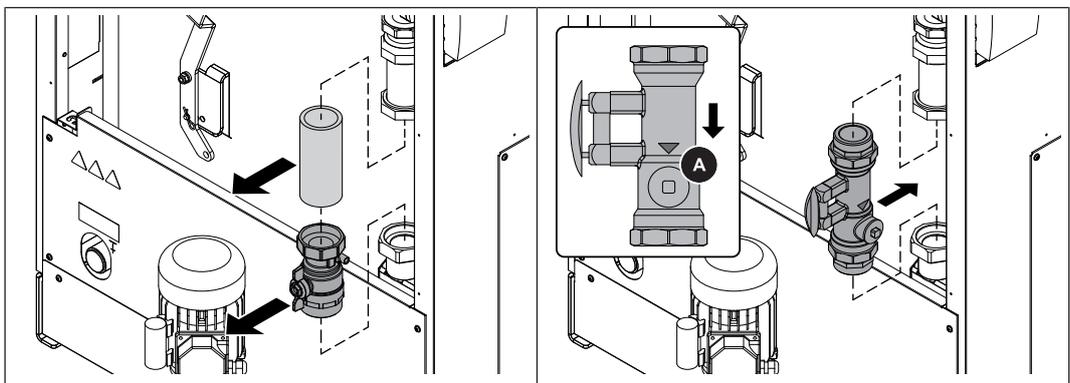
- Turn the knob on the housing of the mixing drive back to automatic mode
- Install the back panels

NOTICE! After filling the boiler with domestic hot water, check the return temperature control for leaks!

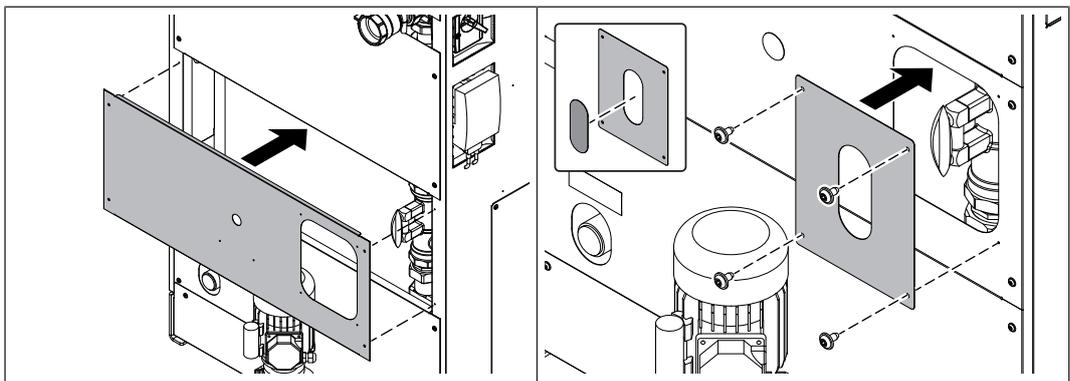
6.3.4 Install the line regulating valve



- ❑ Remove cover plate from back panel and centre back panel

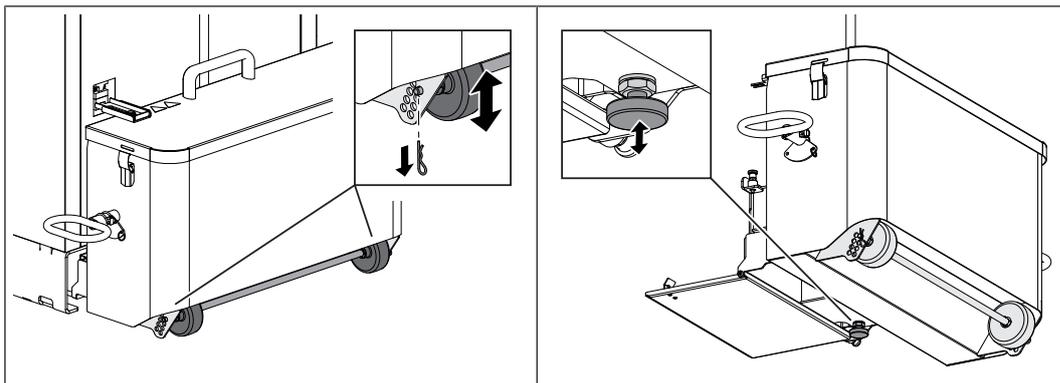


- ❑ Remove pipe section
- ❑ Seal line regulating valve instead
 - ↳ IMPORTANT: Pay attention to direction of flow. Arrow (A) must point downward!



- ❑ Install centre back panel
- ❑ Remove the perforation on the cover plate
 - ↳ Remove the burrs with a half-round file
- ❑ Install cover plate on the balancing valve

6.3.5 Adjusting the height of the ash container



- Pull out the spring cotter on the transport wheels and adjust the height
 - ↳ If the ash container is mounted, the wheels rest on the ground
- Remove the ash container from the boiler and level it using the adjustable foot

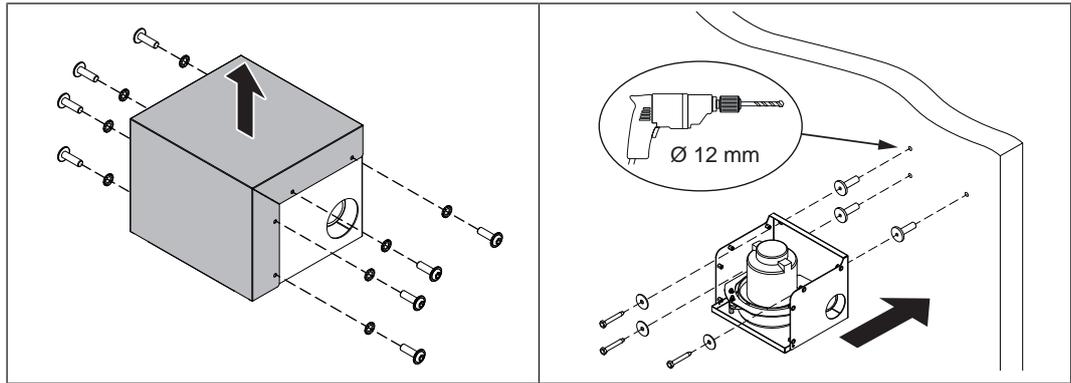
6.3.6 Installing the external suction module

The pellets are loaded using an external suction module. The suction module is installed in the return-air line between the boiler and the suction point.

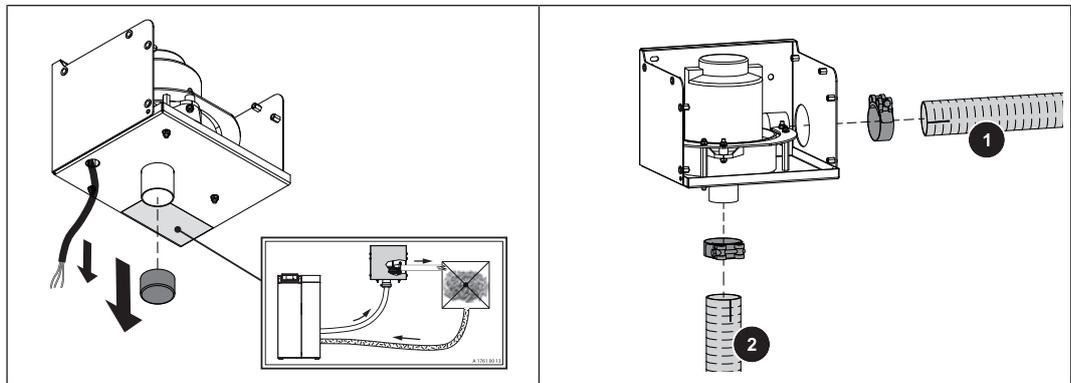
The following points should be noted for assembly:

- The position in the return air line can be chosen freely.
When using an optional PST pellet dust extractor, it is recommended that the suction module be installed in the return air line between the pellet dust extractor and the store to protect the turbine from pellet dust
- Before assembly, check whether the supplied assembly material is suitable and, if required, needs to be replaced by suitable material for the base.
- No specific installation position is required for the suction turbine to operate smoothly. Preferably, the suction module should be mounted so that existing openings in the housing are not on the upper side and the suction turbine is protected against external influences.
- To prevent interference with moving parts, the electrical connection and the setup of the external suction module should be carried out only after connecting the hose lines.

Depending on the boiler type, two different sized suction modules are used. The installation itself is the same for both sizes.

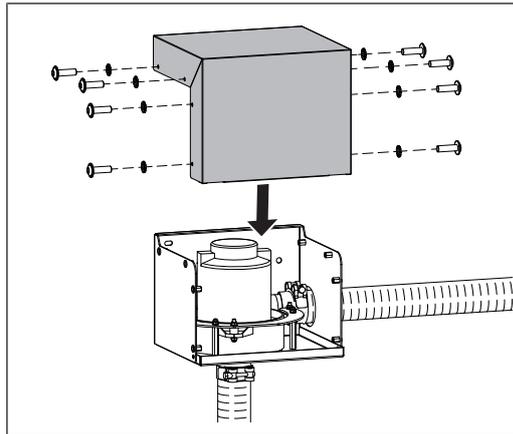


- Unscrew the screws on the side of the suction module and remove the cover hood
- Install the bottom panel including the supplied dowels and screws at any desired position in the return air line
 - ↳ If the suction module is positioned at a maximum distance of 2 m to the boiler, the power supply line can be plugged in as is. When distances are greater the power supply line must be lengthened accordingly on-site



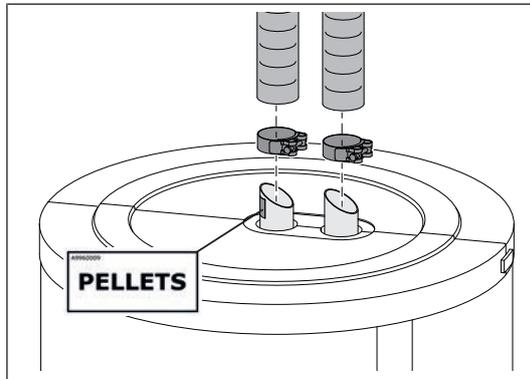
- Unwind the cable of the suction turbine and feed it through the opening of the housing underside
- Remove the protective cap on the underside of the suction module
- Lay the return air line from the suction point to the suction module and fix it to the pressure side (position 1) with a hose clamp
- Fix the second part of the return-air line to the under-pressure side (position 2) with a hose clamp and lay the line to the boiler

NOTICE! When connecting the lines, pay attention to equipotential bonding, ↻
["Assembly information for hose lines" ▶ 46\]](#)



☐ Secure the cover hood with the previously removed screws

6.3.7 Fit the suction hoses to the boiler

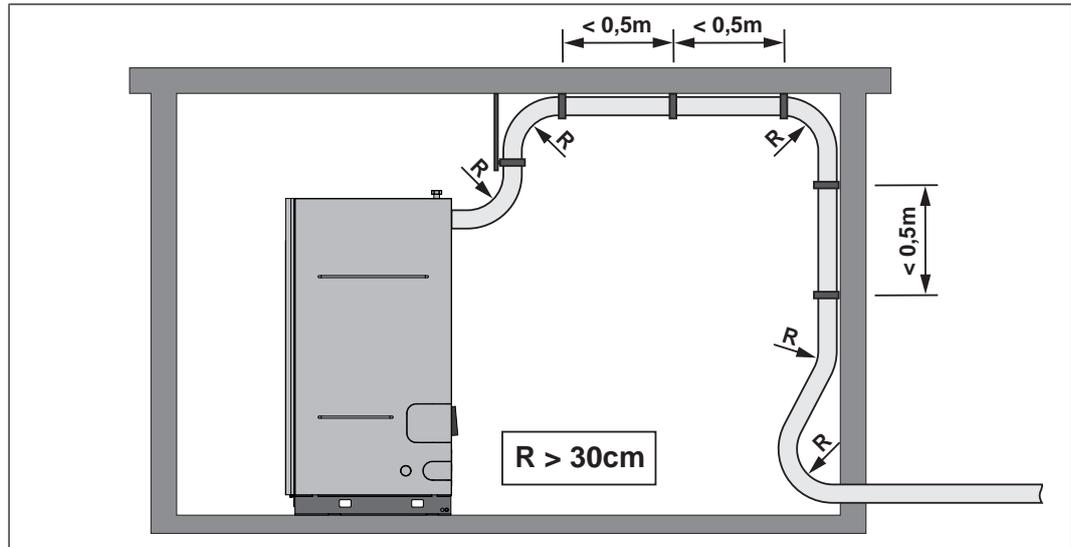


☐ Fix the suction hoses to the connections using hose clamps

↳ When doing so, attach the "PELLETS" sticker at the connection point of the pellet suction hose

NOTICE! When connecting the suction hoses, pay attention to the equipotential bonding.

6.3.8 Assembly information for hose lines

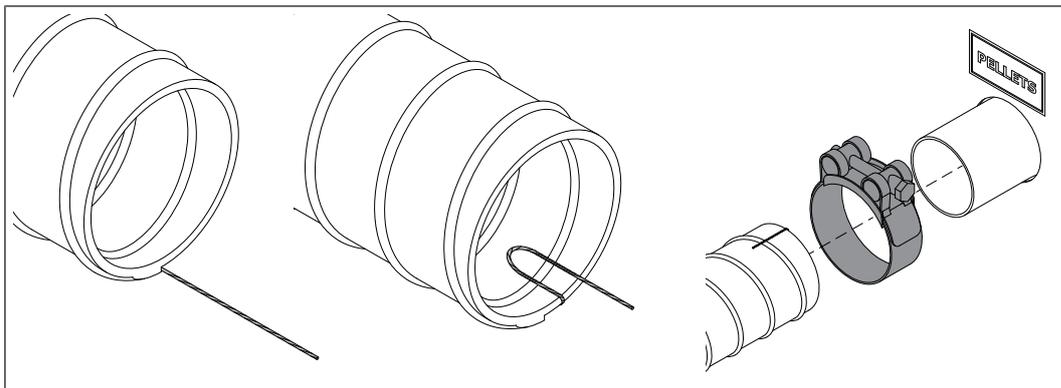


Please note the following:

- Do not kink the hose lines! Minimum bending radius = 30cm
- Lay the hose lines as straight as possible! Sagging lines can lead to so-called “pockets”, which may cause problems with the pellet feed.
- Lay the hose lines in short sections away from walking areas.
- Hose lines are not UV-proof. Therefore: Do not install the hose lines outdoors.
- Hose lines are suitable for temperatures up to 60°C. Therefore: Hose lines must not come into contact with flue gas pipes or uninsulated heating pipes.
- Hose lines must be earthed on both sides to ensure that no static charge builds up as a result of transporting the pellets.
- The suction hose to the boiler must be in a single section.
- The return-air line can be made up of several sections, but consistent potential equalisation must be established throughout the line.
- For systems over 35 kW, only hose lines with PU inlet are recommended due to the increased load

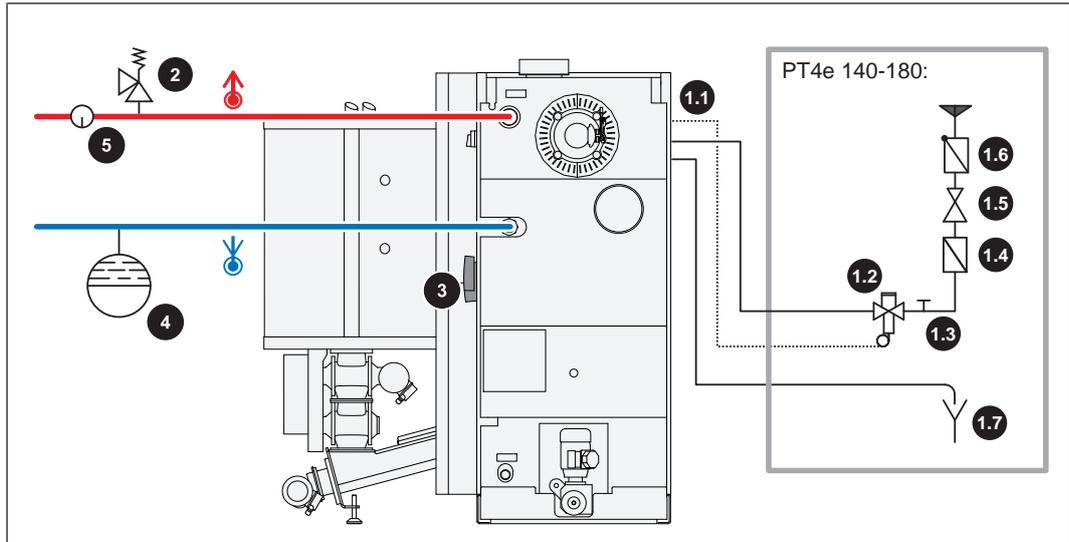
Potential equalisation

NOTICE! Ensure consistent potential equalisation when connecting the hose lines!



- Expose the earth wire of the hose line to approx. 8 cm
 - ↪ **TIP:** Slit the insulation open along the wire with a knife
- Bend the earth wire inwards in a loop
 - ↪ This prevents the earth wire from being damaged by the pellet movement
- Slide the hose clamp onto the hose line and secure to connector
 - ↪ Ensure that contact is established between the earth wire and the connector. Remove paint from the affected area if necessary
 - ↪ **TIP:** If stiffness occurs when trying to attach the hoses to the connectors, pour a few drops of water onto the pipe (do not use lubrication grease!)

6.4 Hydraulic connection



1 Thermal discharge valve

- The thermal discharge safety device must be connected in accordance with ÖNORM/ DIN EN 303-5 and as shown in the diagram above
- The discharge safety sensor must be connected to a pressurised cold water mains supply (temperature $\leq 15^{\circ}\text{C}$) in such a way that it cannot be shut off
- A pressure reducing valve (1.5) is required for a cold water pressure of ≥ 6 bar
Minimum cold water pressure = 2 bar

- 1.1 Sensor of thermal discharge safety device
 1.2 Thermal discharge valve (opens at approx. 95°C)
 1.3 Cleaning valve (T-piece)
 1.4 Dirt trap
 1.5 Pressure reducing valve
 1.6 Backflow preventer to prevent stagnation water from entering the drinking water network
 1.7 Free outlet without counter pressure with observable flow path (e.g. discharge funnel)

2 Safety valve

- Requirements for safety valves as specified by DIN EN ISO 4126-1
- Minimum diameter for the inlet to the safety valve as specified by EN 12828: DN15 (≤ 50 kW), DN20 (> 50 to ≤ 100 kW), DN25 (> 100 to ≤ 200 kW), DN32 (> 200 to ≤ 300 kW), DN40 (> 300 to ≤ 600 kW), DN50 (> 600 to ≤ 900 kW)
- Maximum pressure setting in terms of the permissible operating pressure of the boiler, see the section "Technical Data"
- The safety valve must be installed in an accessible place on the boiler or in direct proximity in the flow pipe in such a way that it cannot be shut off
- Unhindered and safe escape of the steam or water that is released must be ensured

3 Return temperature control

4 Diaphragm expansion tank

- The diaphragm pressurised expansion tank must conform to EN 13831 and hold at least the maximum expansion volume of the heated water in the system, including a water seal
- Its size must comply with the design information in EN 12828 - Appendix D
- Ideally it should be installed in the return line. Follow the manufacturer's installation instructions

5 We recommend installing some sort of monitoring device (such as a thermometer)

6.5 Electrical connection

DANGER

When working on electrical components:



Risk of electrocution!

When work is carried out on electrical components:

- Always have work carried out by a qualified electrician
- Observe the applicable standards and regulations
 - ↪ Work must not be carried out on electrical components by unauthorised persons

CAUTION

If cables come into contact with hot surfaces:



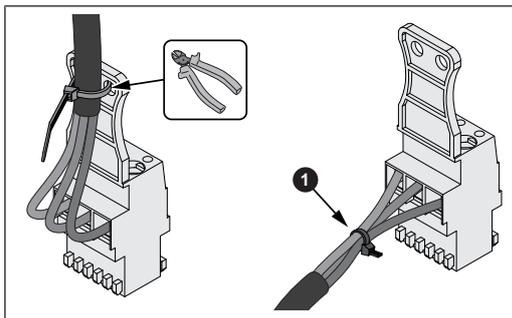
Possible fire hazard of the system and electric shock!

The following applies to assembly work:

- Keep cables away from boiler components that become hot during operation (e.g. stoker duct, inspection cover, flue gas pipe, ash removal, etc.)
- Lay cables in the cable ducts provided and use cable ties to secure against slipping

Prepare the plug

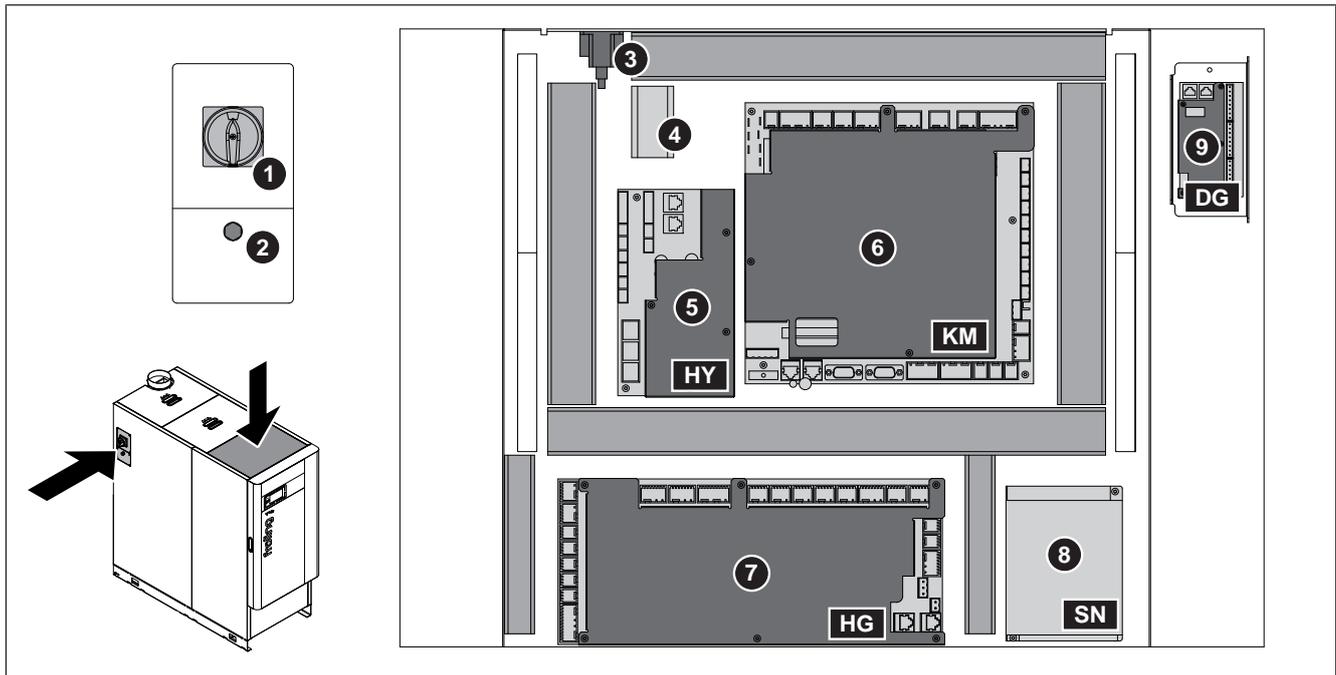
some components come ready to connect with the cable fixed to the tag connector with cable tie.



- Remove the cable ties from the tag connector
- Bind the individual cores together with cable ties (A)

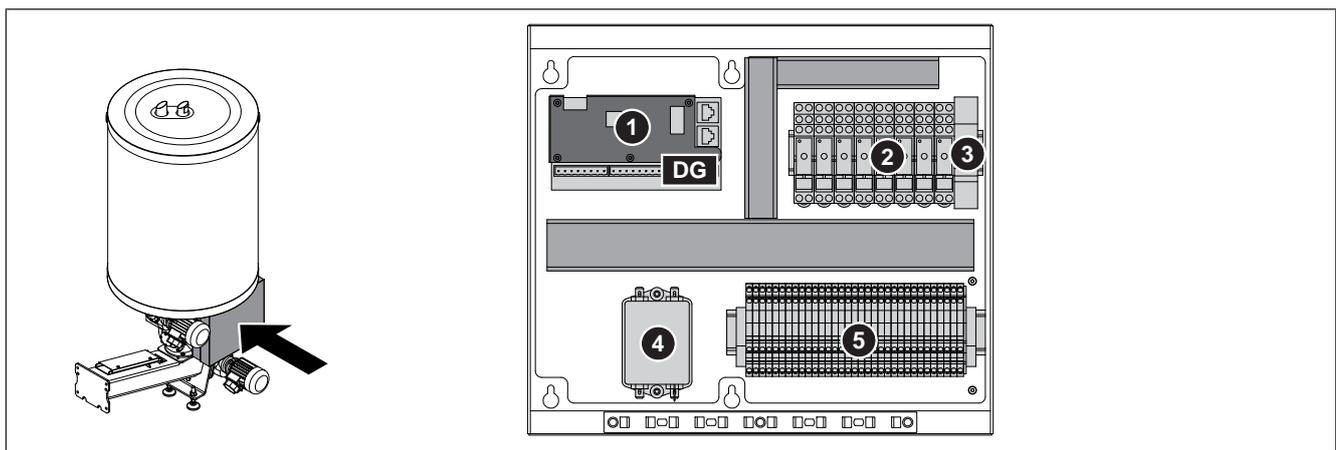
6.5.1 Board overview

PT4e 100-180



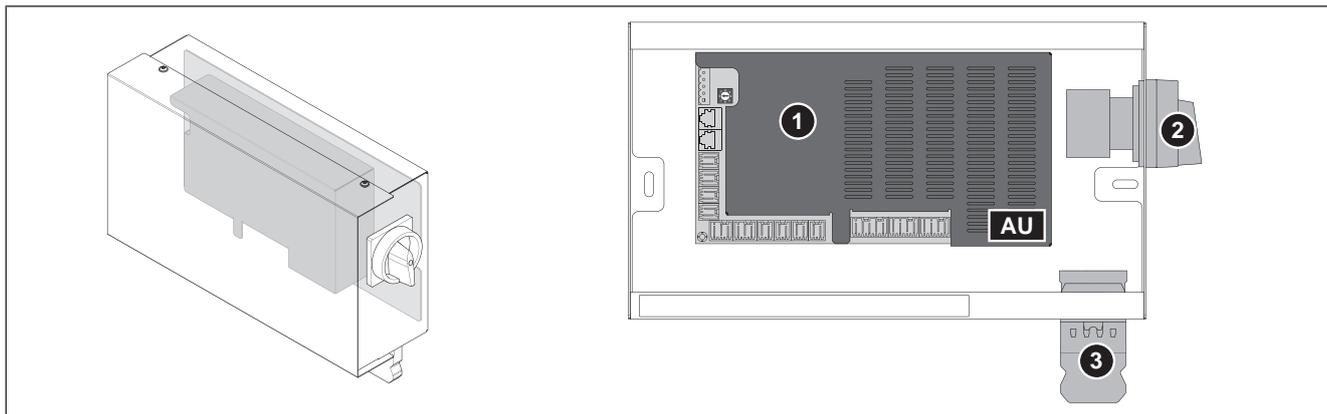
Item	Description	Item	Description
1	Main switch	6	Core module
2	High-limit thermostat (STL)	7	Wood chip module
3	Service interface	8	Plug power pack
4	Device connection terminal	9	Digital module
5	Hydraulic module		

Distributor box PT4e 100-180



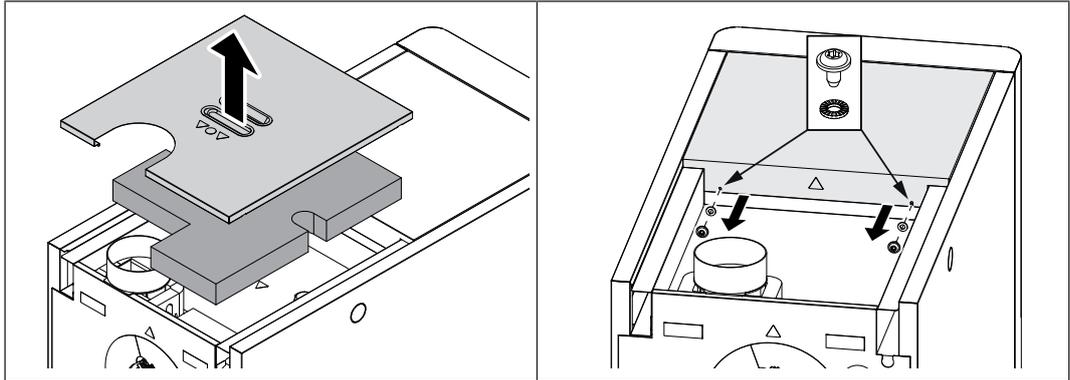
Item	Description	Item	Description
1	Digital module	4	Mains filter
2	Relay	5	Terminal blocks
3	Line protective circuit breaker		

Feed system module (for pellet suction screw)

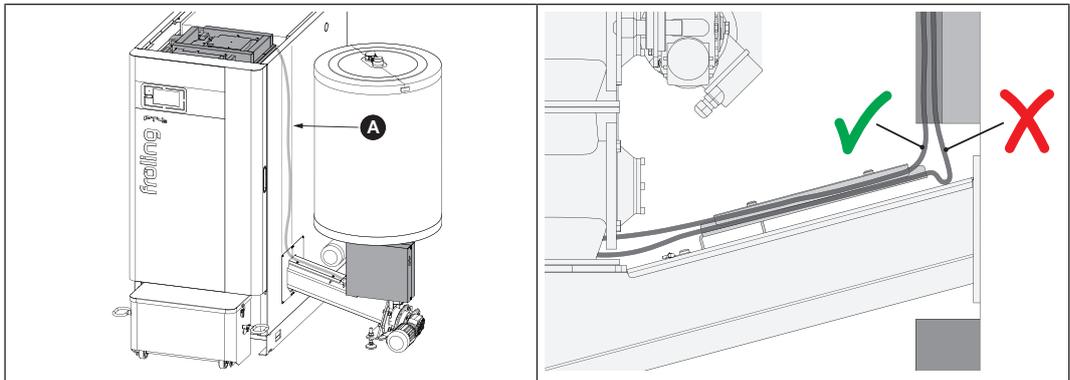


Item	Description	Item	Description
1	Feed system module	3	Power supply plug
2	Main switch		

6.5.2 Lay the cable to the boiler controller

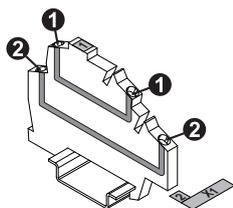


- ❑ Remove the cover and thermal insulation
 - ↳ PT4e 100-120: one cover
 - ↳ PT4e 140-180: two covers
- ❑ Undo the retaining screw and contact washer on the back of the controller cover
- ❑ Slide the controller cover back and lift off



- ❑ Install the cables of all components to the boiler control unit using a cable duct (A)
 - 230 V power supply
 - BUS connection
 - Supply with 24V DC
 - Temperature sensor for the stoke monitoring system
 - Filling level sensors
- ❑ Ensure that the cables do not touch the hot boiler components
 - ↳ Compliance with the warning signs is mandatory, ➔ ["Electrical connection" \[▶ 49\]](#)
 - ↳ Do not install cable across sharp edges

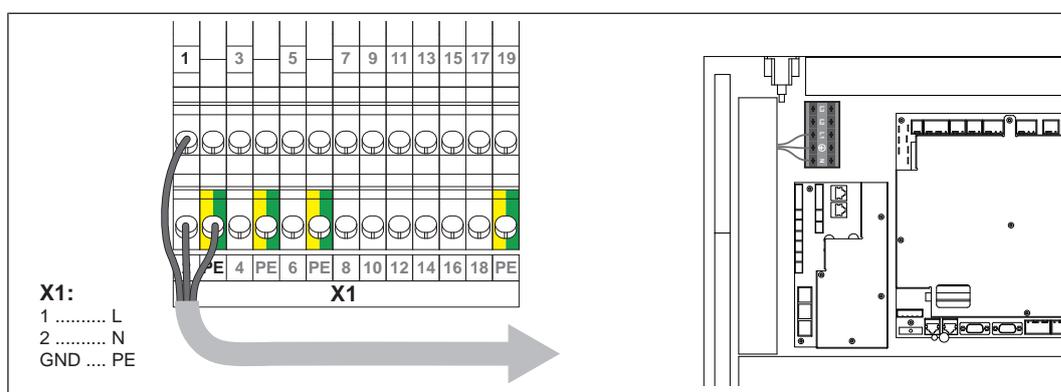
6.5.3 Connect the suction unit components



Some components are connected using double deck terminal blocks located inside the suction unit's distributor box. These double deck terminal blocks consist of two separate decks in which the centre connections (1) and the outer connections (2) are connected to each other. The numbered identifications of the centre connections (1) are located centrally to the terminal; the numbered identifications of the outer connections (2) are adhesively mounted in front of the terminal.

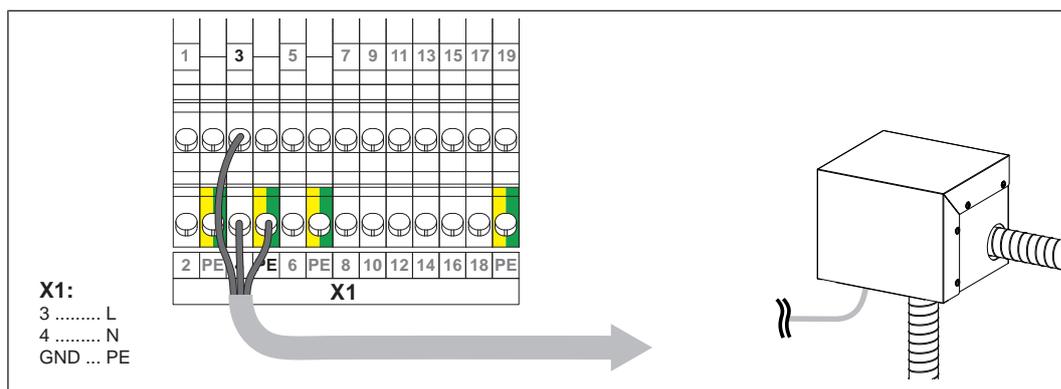
- All connections shall be carried out according to the attached circuit diagram
- Flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations

Connect the 230 V power supply line



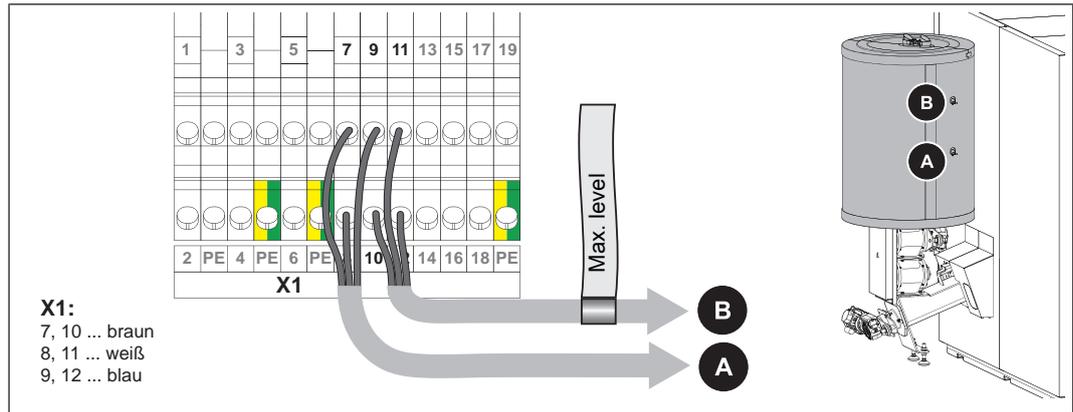
- Connect the 230 V power supply line from the distributor box to the device's connection terminal inside the boiler controller

Connect the suction turbine



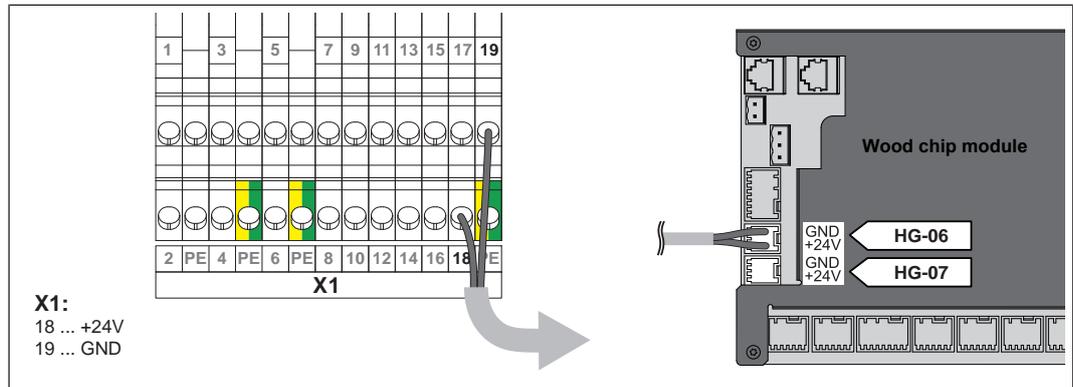
- Connect the suction turbine's power supply line inside the distributor box

Connect the fill level sensors



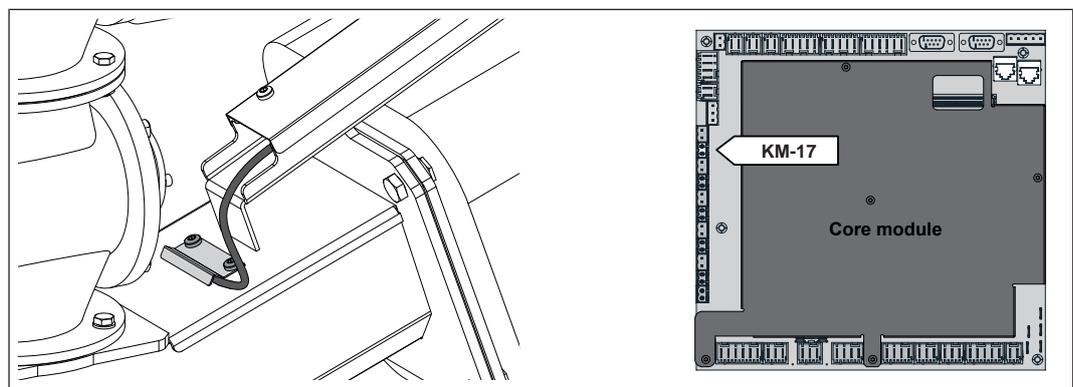
- Connect both fill level sensors of the cyclone container inside the distributor box
- ↳ Upper fill level sensor (B) with "Max. level" marking

Connect the power supply line 24V DC



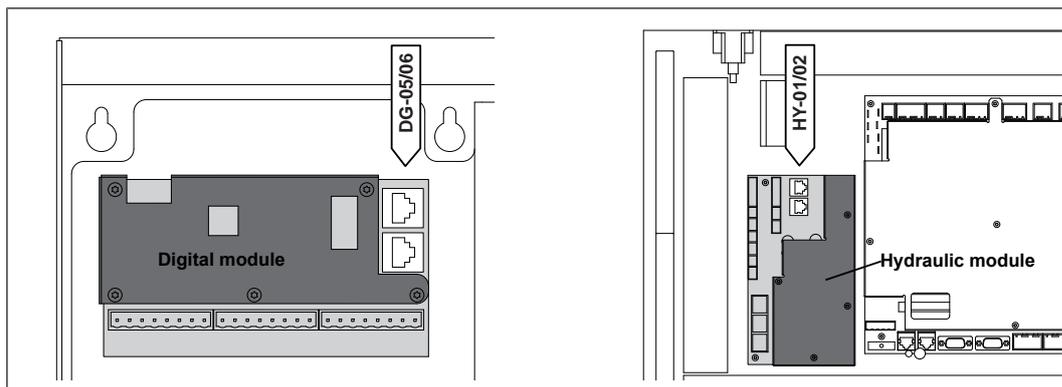
- Connect the 24 V power supply line from the distributor box to the wood chip module inside the boiler controller

Connect the temperature sensor of the stoker monitoring unit



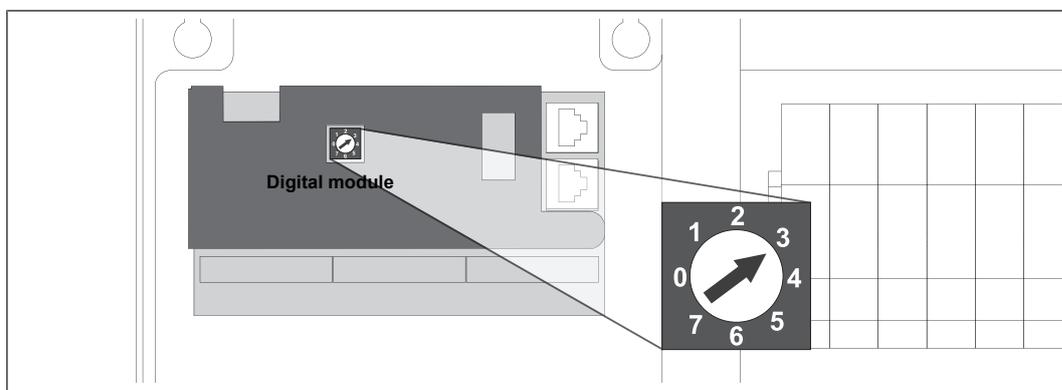
- Connect the temperature sensor of the stoker monitoring unit at the core module in the boiler controller

Establish bus connection



- ❑ Use a vacant port to establish a bus connection from the digital module inside the distributor box to the hydraulic module inside the boiler control

Check the digital module



- ❑ Set the module address of the digital module inside the distributor box to “3”

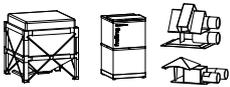
6.5.4 Connect an individual discharge systems

Depending on the conditions of the fuel store, the following pellet discharge systems can be connected:

- Bag silo, Cube RS 4 manual or individual probe
- Pellet mole
- Pellet suction screw
- RS 4 / RS 8 pellet suction system

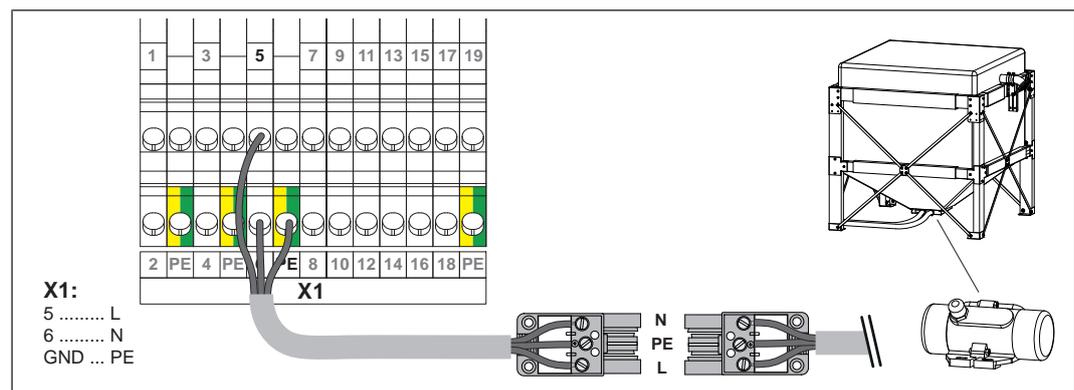
NOTICE! Observe the enclosed installation and operating instructions of the discharge system used. Observe the installation instructions for hose lines, ➔ "Assembly information for hose lines" [▶ 46]

Bag silo / Cube / RS 4 manual / individual probe



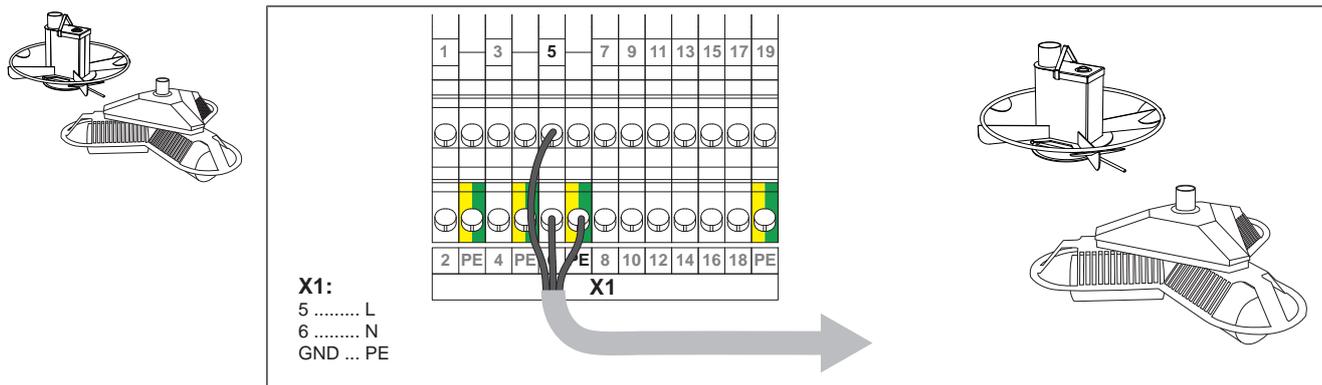
When using a bag silo, cube, RS 4 manual or individual probe, additional electrical wiring is not required.

In addition for bag silo with shaker:



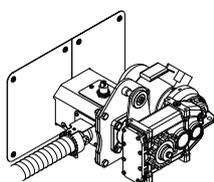
- Connect the power supply line from the distributor box to the socket of the extension cable and onto the shaker

Pellet mole



- ❑ Establish the power supply line from the distributor box to the plug connection or the mole junction box

Pellet suction screw



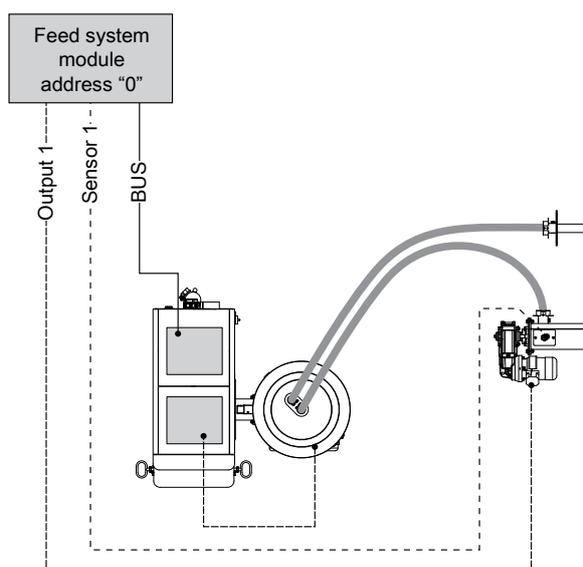
NOTICE! For the electrical wiring of the components an additional discharge module is required.

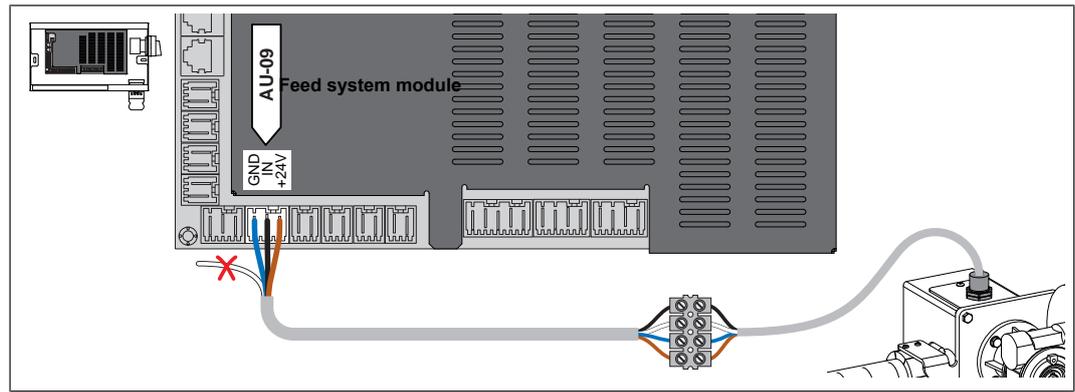
Perform the following steps on the feed system module:

- Establish BUS connection to boiler
- Establish 24V connection to boiler
- Power supply 400 V must be provided by the customer
- Connecting the lock
- Inputs not used for gravity shaft covers must be closed using a wire jumper
- Check end jumper
- Check module address

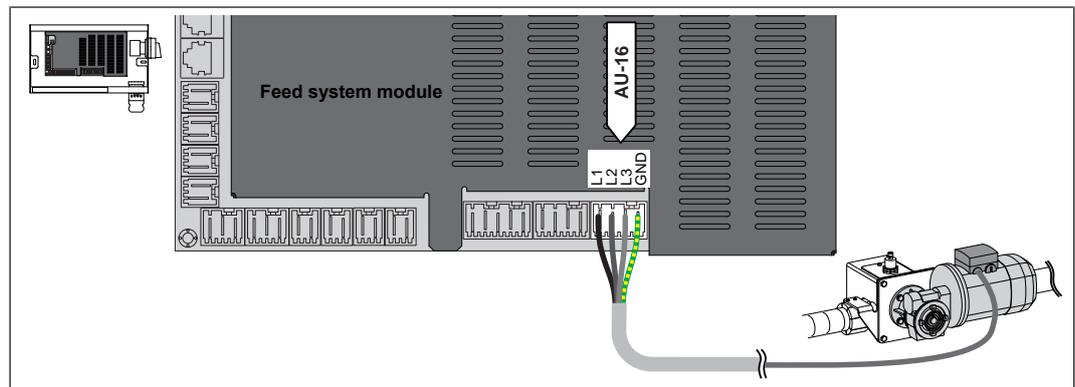
NOTICE! See feed system module installation instructions for more details

Schematic diagram of the electrical connection of the discharge systems:



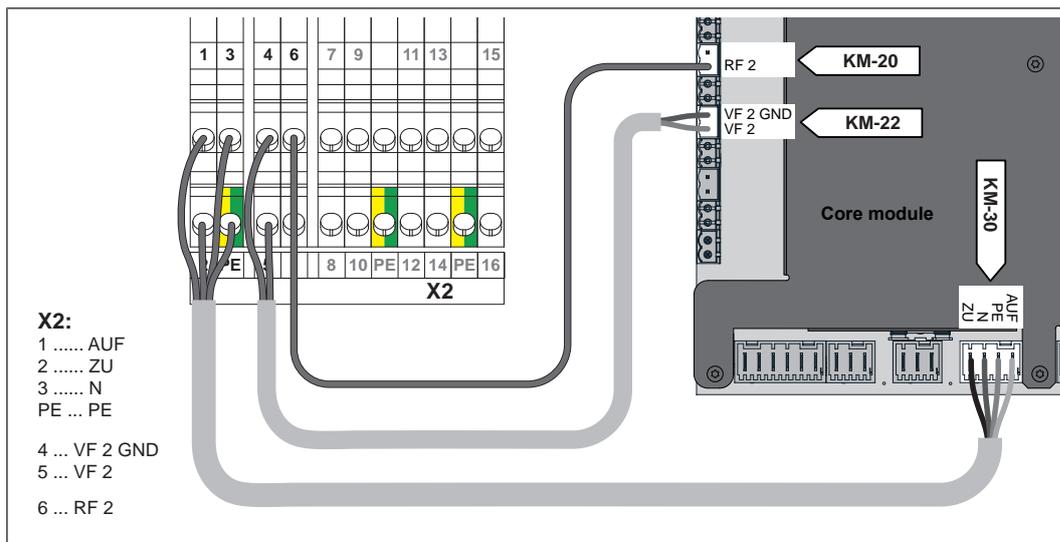
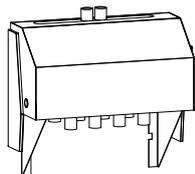


- Connect the sensor of the pellet suction screw inside the wall-mounted cabinet. The connection can be found on the feed system module

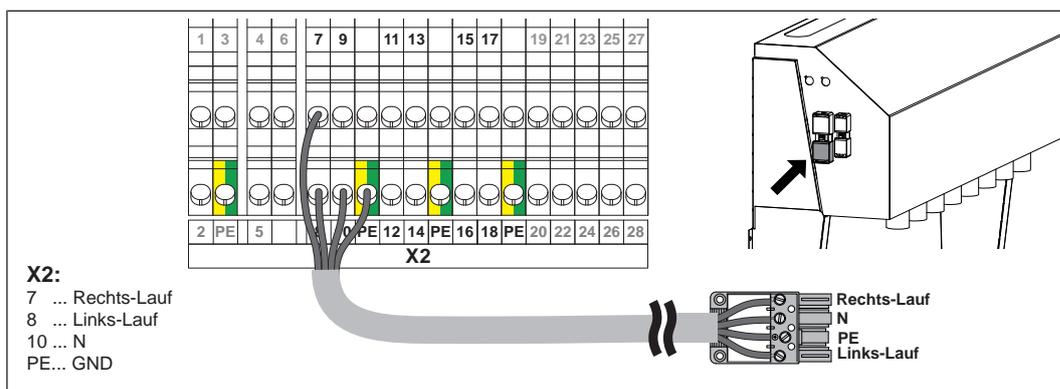


- Connect the geared motor of the pellet suction screw inside the wall-mounted cabinet. The connection can be found on the feed system module

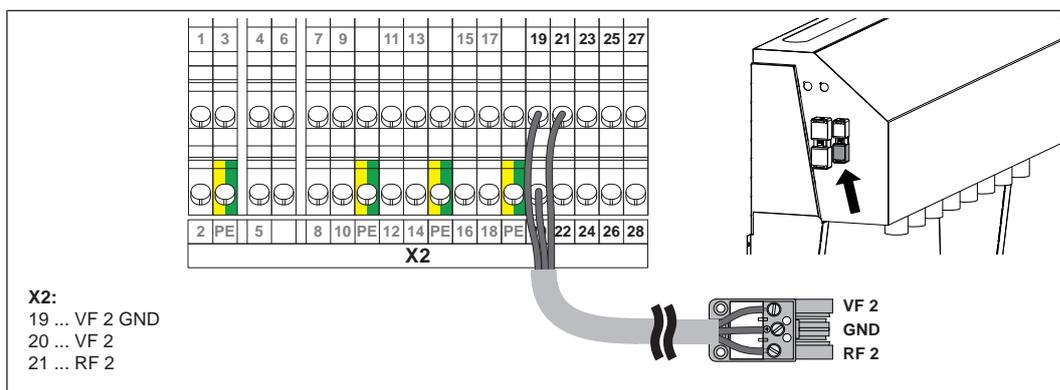
RS 4 / RS 8 pellet suction system



- Install the connection line for the motor control and position control from the distributor box to the core module inside the boiler controller

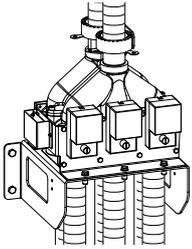


- Attach the connection line for the motor control from the distributor box to the 4-pin plug of the change-over unit



- Establish a connection line for the position control from the distributor box to the 3-pin plug of the change-over unit

6.5.5 Connect multiple discharge systems with change-over units

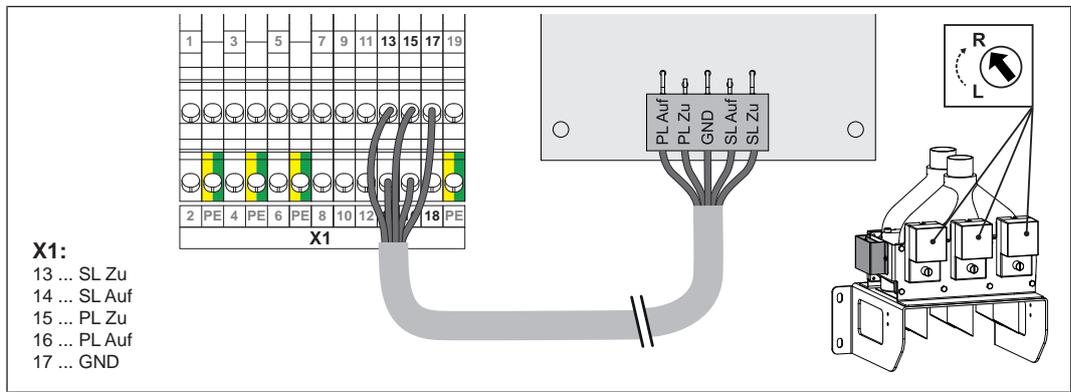


When using the 1-2-3 suction module, up to three discharge systems of the same boiler can be used:

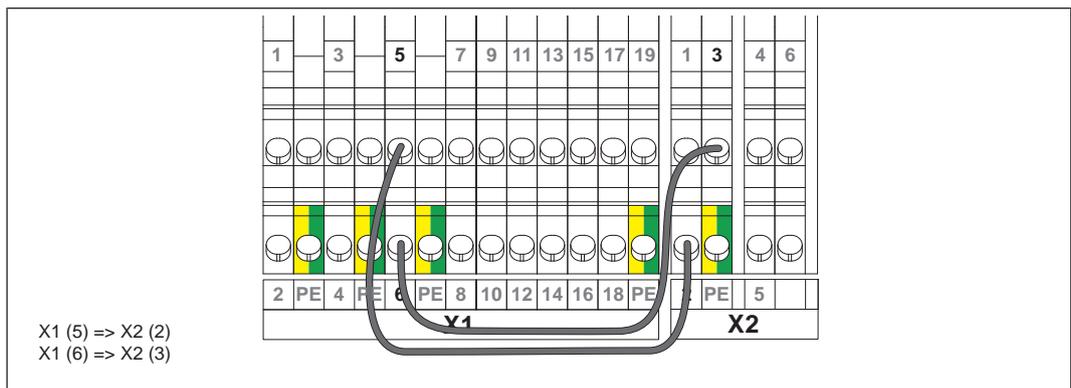
- Bag silo, Cube, RS 4 manual or individual probe
- Pellet mole
- Pellet suction screw
- RS 4 / RS 8 pellet suction system

NOTICE! Observe the enclosed installation and operating instructions of the discharge system used. Compliance with the hose line's installation instructions is mandatory, ➔ "Assembly information for hose lines" [▶ 46]

Connecting the 1-2-3 Suction module

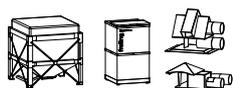


- Establish a connection line from the distributor box to the circuit board on the suction module
- Set the direction of rotation of the servo-motor to right (R)



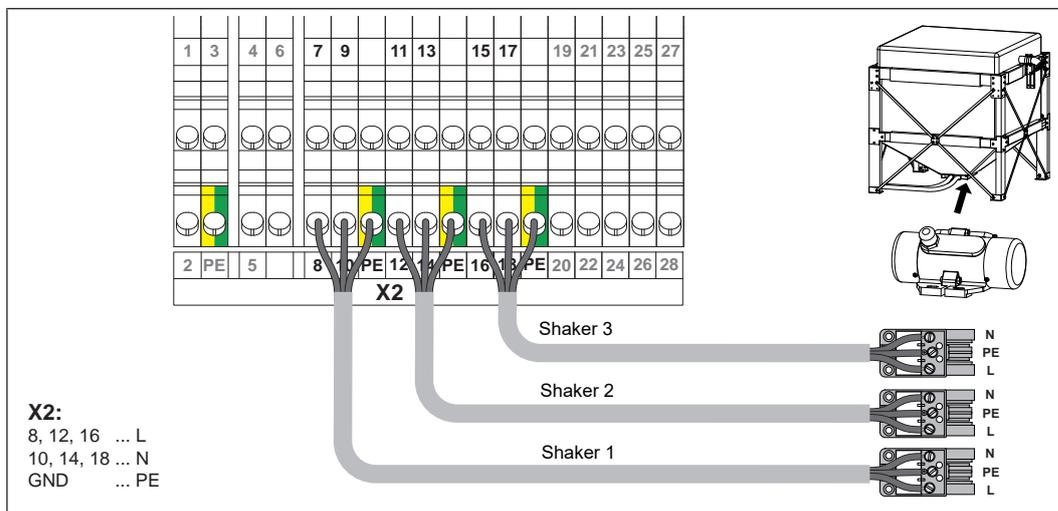
- Create a connection line for the enabling signal from terminal block X1 to X2.

Bag silo / Cube / RS 4 manual / individual probe with change-over



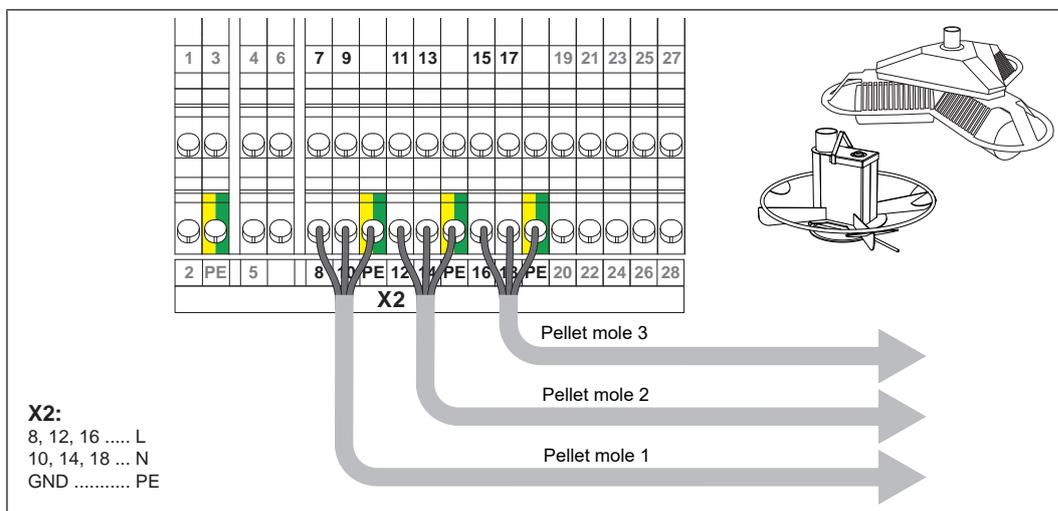
When using a bag silo, cube, RS 4 manual or individual probe, additional electrical wiring is not required. All types of these systems can be combined (e.g. 2 bag silos and 1 cube).

Additional information for bag silos with shakers



- ❑ Prepare power supply lines from the distributor box to the sockets of the extension cables on the shakers.

Pellet mole with change-over



- ❑ Establish power supply lines from the distributor box to the plug-in connections (Pellets Mole Classic) or connection boxes (Pellets Mole E3)

Pellet suction screw with change-over feature



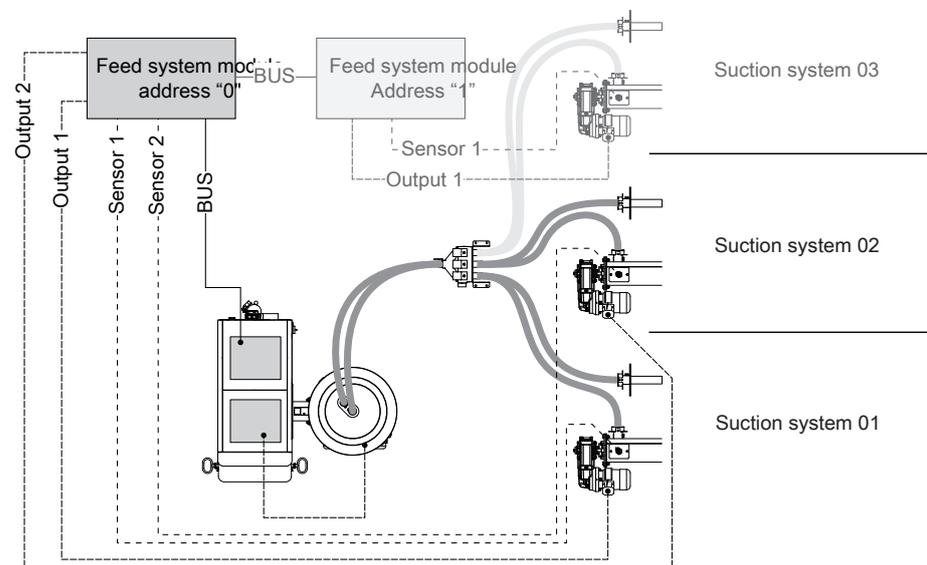
NOTICE! A feed system module is also required for the electrical wiring of the components. If three pellet suction screws are used, an additional feed system module is required.

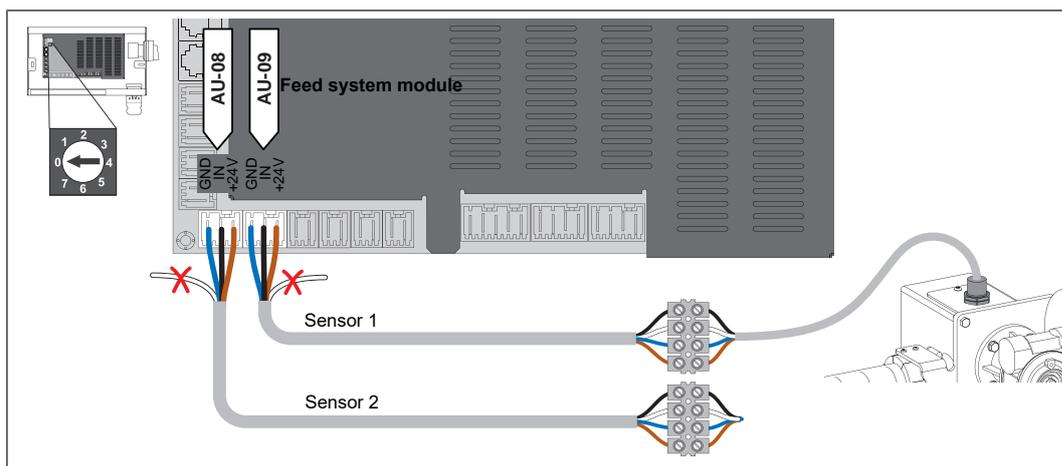
Perform the following steps on the feed system module:

- Establish BUS connection to boiler
- Establish 24V connection to boiler
- Power supply 400 V must be provided by the customer
- Connecting the lock
- Inputs not used for gravity shaft covers must be closed using a wire jumper
- Check end jumper
- Check module address

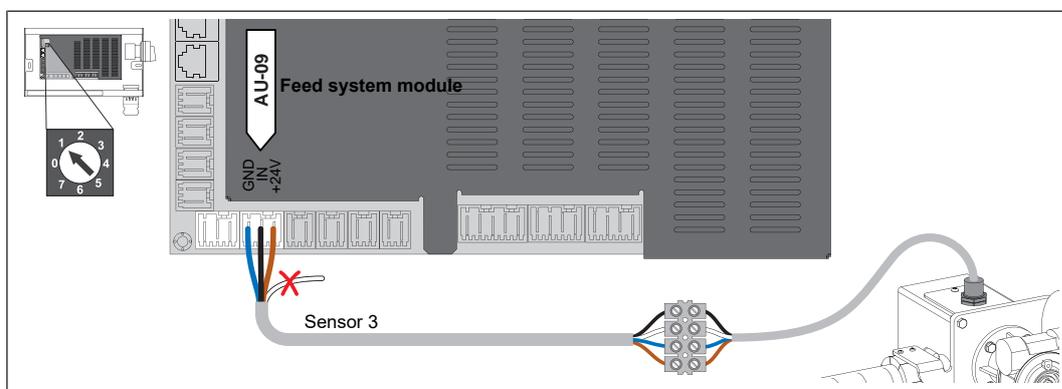
NOTICE! See feed system module installation instructions for more details

Diagram of electrical connection of feed systems:

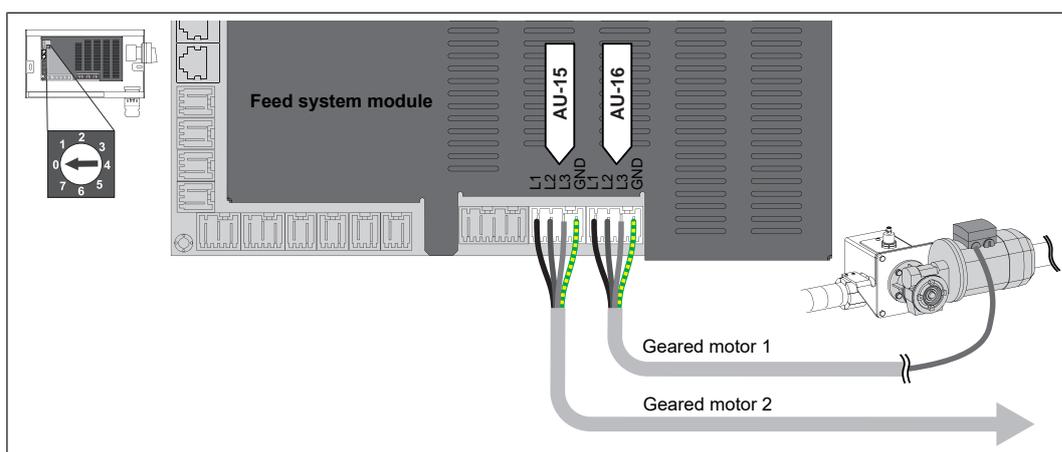




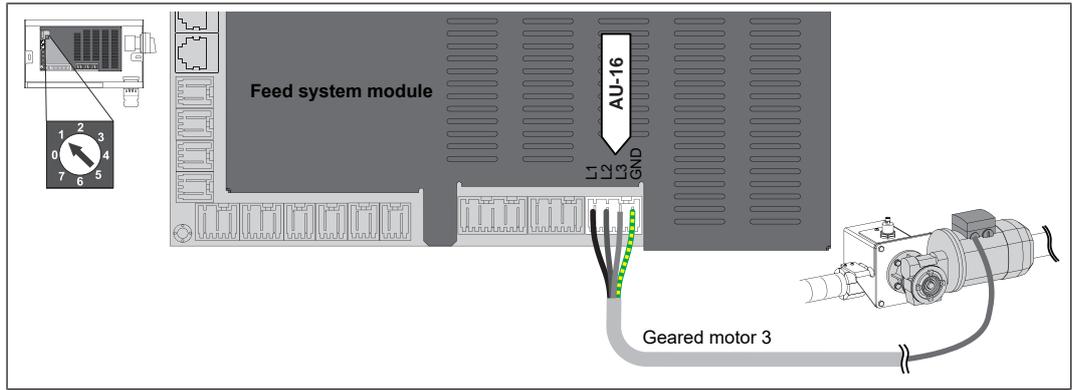
- Connect the sensors of the pellet suction screws 1 and 2, which are located on the feed system module (address 0), inside the wall-mounted cabinet



- Connect the sensors of the pellet suction screws 3, which is located on the feed system module (address 1), inside the wall-mounted cabinet

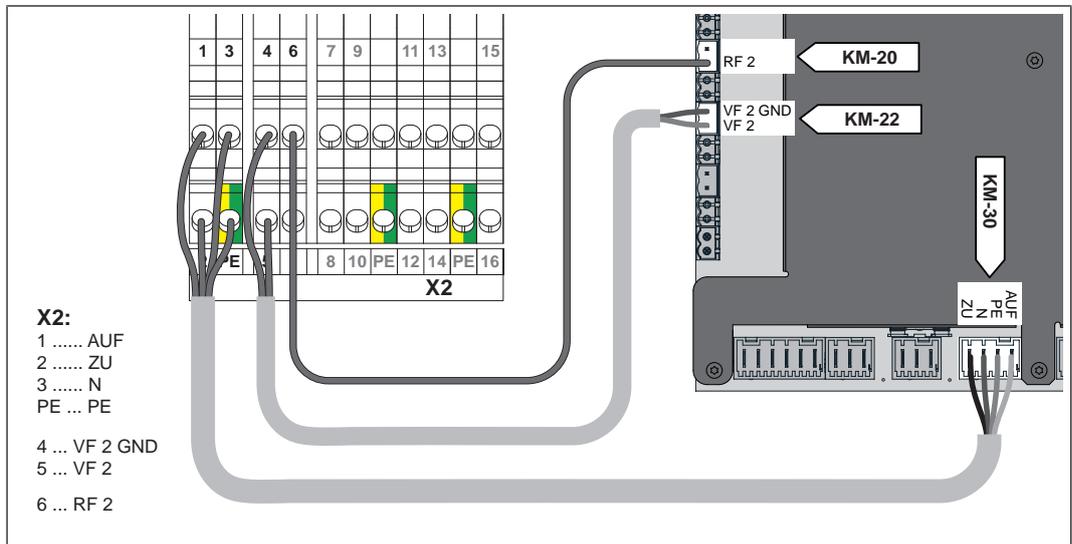


- Connect the geared motor for the pellet suction screws 1 and 2, which are located on the feed system module (address 0), inside the wall-mounted cabinet

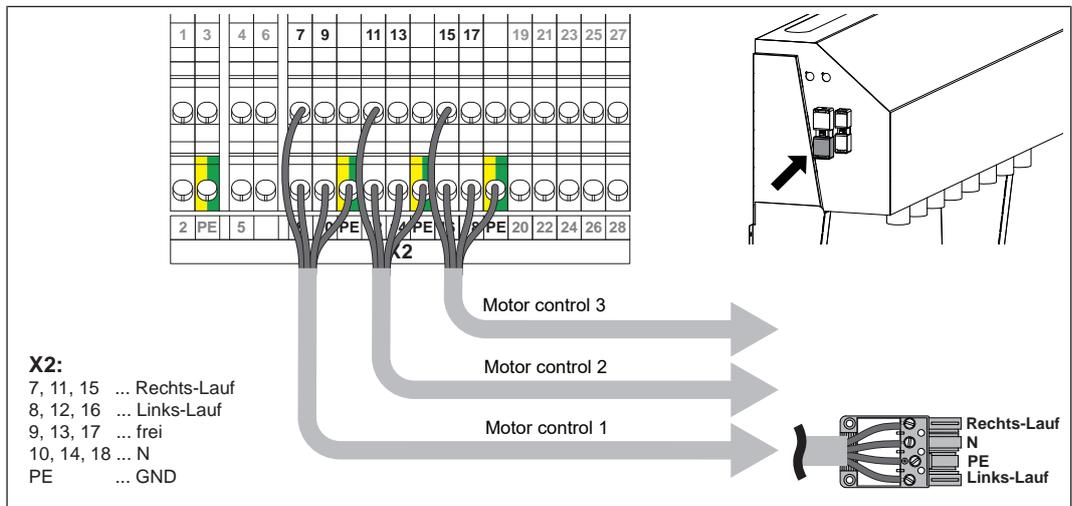


- ❑ Connect the geared motor for the pellet suction screws 3, which are located on the feed system module (address 1), inside the wall-mounted cabinet

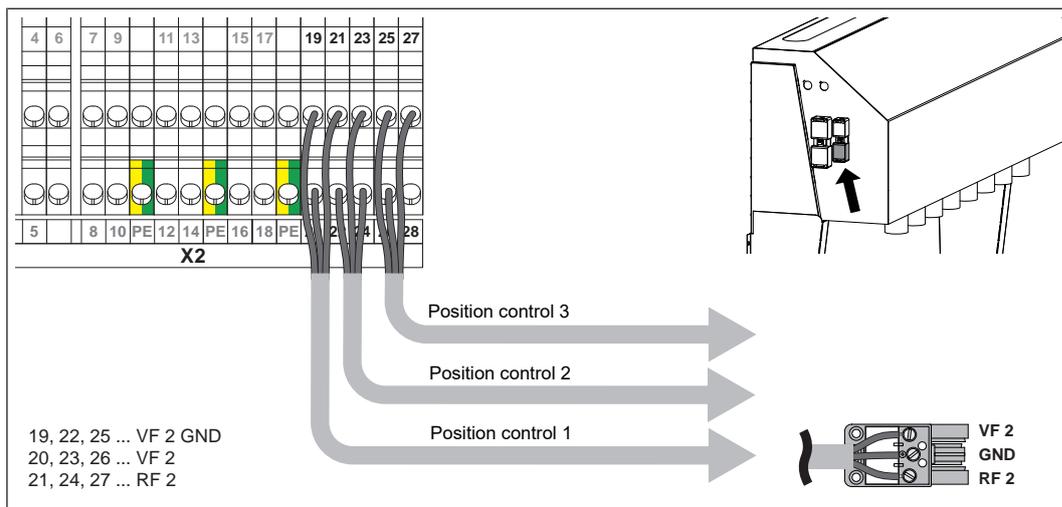
RS 4 / RS 8 pellet suction system with change-over



- ❑ Install the connection line for the motor control and position control from the distributor box to the core module inside the boiler controller

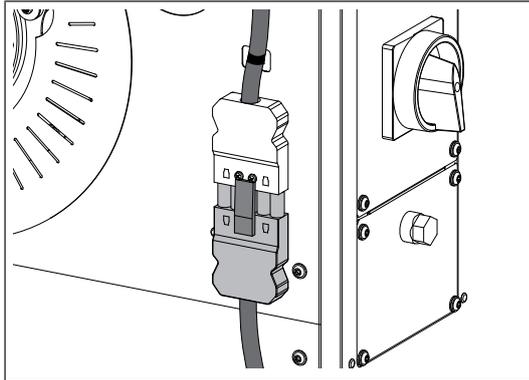


- ❑ Attach the connection line for the motor control from the distributor box to the 4-pin plug of the change-over unit



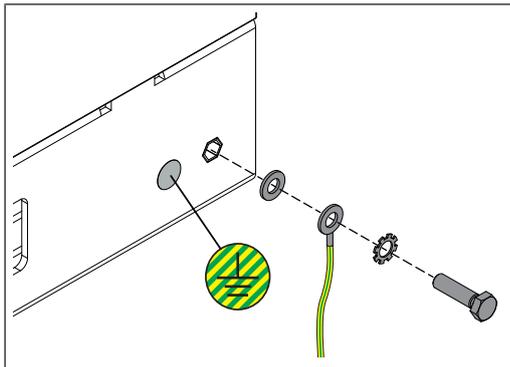
- Attach the connection line for the position control from the distributor box to the 3-pin plug of the change-over unit

6.5.6 Attach the mains connection to the boiler



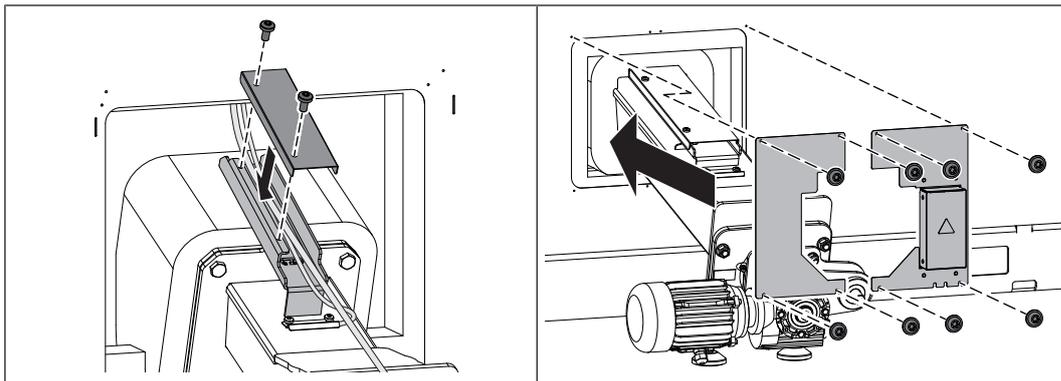
- Press the mains plug on the back of the boiler to release and remove it
- Open the plug and connect the mains connection cable
 - ↳ Flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations.
 - ↳ The power supply line (mains connection) must be fitted with a C16 A fuse by the customer.

6.5.7 Potential equalisation

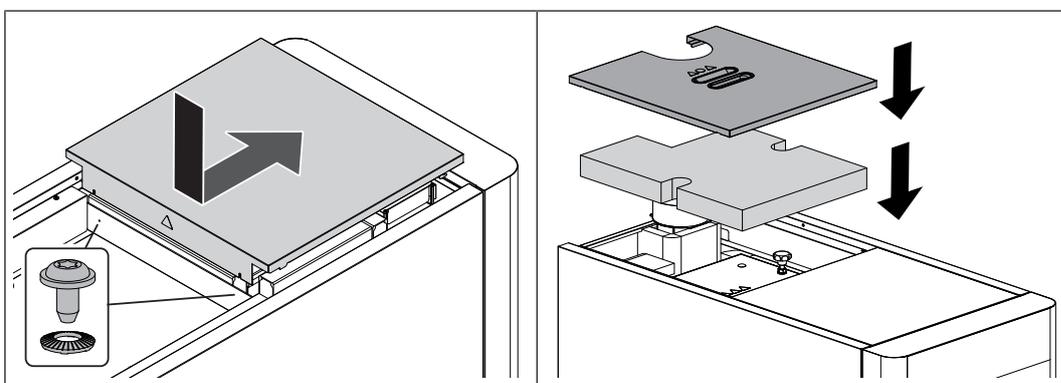


- The potential equalisation on the boiler base must comply with current directives, regulations and standards.

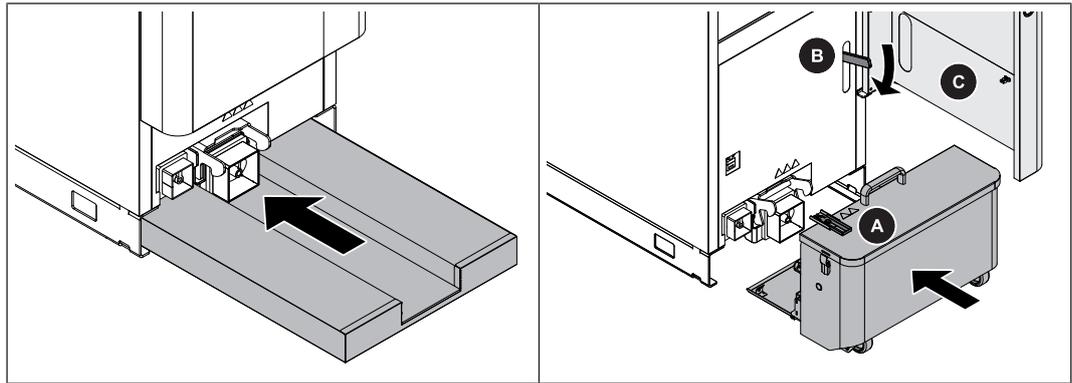
6.6 Final installation steps



- Install the cover of the cable duct
 - 2 lens-head screws M6 x 12
- Install the cover plates to the side panel of the boiler
 - 8 lens-head screw M4 x 8



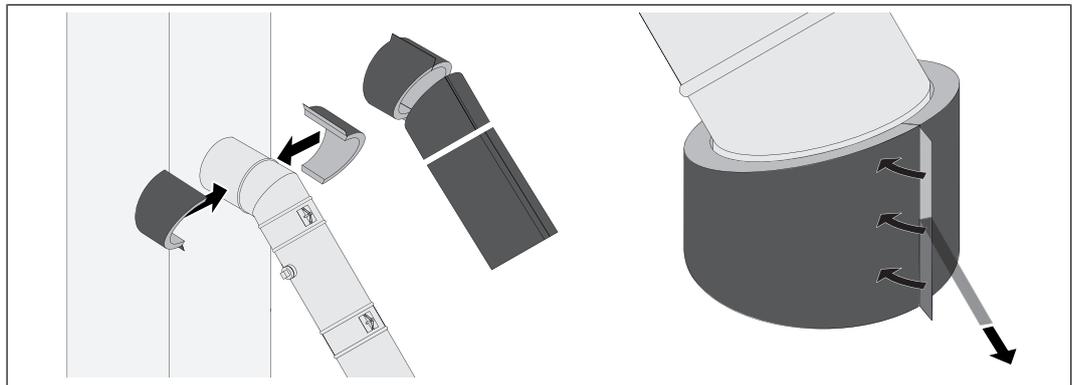
- Place the controller cover on the controller box and fix it
 - 2 lense-head screws M4 x 8 with contact washer
- Put on the heat exchanger cover and attach using star-shaped screws
- Put down the cover and thermal insulation
 - ↪ PT4e 100-120: one cover
 - ↪ PT4e 140-180: two covers



- Slide the floor insulation under the boiler until it stops
- Slide the ash container on to the ash duct of the boiler
- Push the key plate (A) into the safety limit switch
- Push the locking lever (B) down and close the insulated door (C)

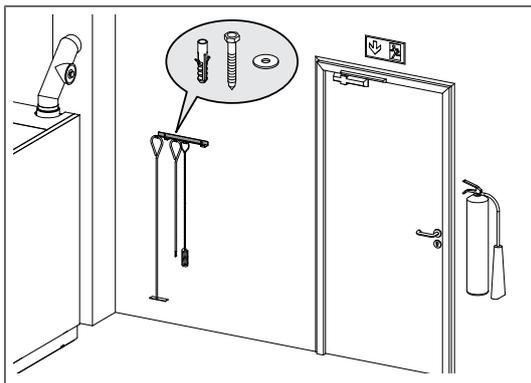
6.6.1 Insulate the connection line

When using the optionally available thermal insulation supplied by Fröling GesmbH, perform the following steps:



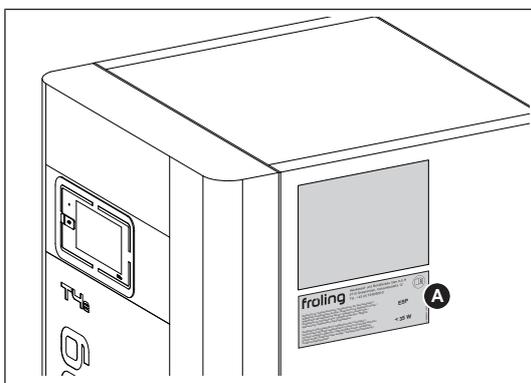
- Cut the half shells of thermal insulation to length and lay them on the connection line
- Create an opening for access to the measuring port
- Apply protective foil at the projecting lugs
- Glue the half shells to each other

6.6.2 Install the brackets for accessories



- Using appropriate fasteners, attach the brackets to the wall on the boiler
- Attach the accessories to the brackets

6.6.3 Stick on an additional identification plate (applicable to T4e ESP)



- Stick the additional identification plate (A) visibly on the side panel of the boiler

7 Start-up

7.1 Before commissioning / configuring the boiler

The boiler must be configured to the heating system during initial start-up!

NOTICE

Optimum efficiency and efficient, low-emission operation can only be guaranteed if the system is set up by trained professionals and the standard factory settings are observed.

Take the following precautions:

- Initial startup should be carried out with an authorised installer or with Froling customer services

NOTICE

Foreign bodies in the heating system impair its operational safety and can result in damage to property.

As a result:

- The whole system should be rinsed out before initial start-up in accordance with EN 14336.
- Recommendation: Make sure the hose diameter of the flush nozzles in the flow and return complies with ÖNORM H 5195 and is the same as the hose diameter in the heating system, however not more than DN 50.

- Turn on the main switch
- Set the boiler controller to the system type.
- Load the boiler default values.

NOTICE! For the keypad layout and instructions for modifying the parameters, see the instruction manual for the boiler controller.

- Check the system pressure of the heating system.
- Check that the heating system is fully ventilated
- Check all quick vent valves of the entire heating system for leaks
- Check that all water connections are tightly sealed
 - ↳ Pay particular attention to those connections from which plugs were removed during assembly.
- Check the entire return temperature control for leaks and correct function
- Check that all necessary safety devices are in place
- Check that there is sufficient ventilation in the boiler room.
- Check the seal of the boiler.
 - ↳ All doors and inspection openings must be tightly sealed.
- Check all blanking plugs (e.g. drainage) for tightness
- Check that the drives and servo motors are working and turning in the right direction
- Check safety switch of ash box is working correctly

NOTICE! Check the digital and analogue inputs and outputs - See the instruction manual for the boiler controller.

7.2 Initial startup

7.2.1 Permitted fuels

Wood pellets

Wood pellets made from natural wood with a diameter of 6 mm

Note on standards

EU:	Fuel acc. to EN ISO 17225 - Part 2: Wood pellets class A1 / D06
and/or:	ENplus / DINplus certification scheme

General note:

Before refilling the store, check for pellet dust and clean if necessary.

7.2.2 Non-permitted fuels

The use of fuels other than those defined in the "Permitted fuels" section, and particularly the burning of refuse, is not permitted

NOTICE

In case of use of non-permitted fuels:

Burning non-permitted fuels increases the cleaning requirements and leads to a build-up of aggressive sedimentation and condensation, which can damage the boiler and also invalidates the guarantee! Using non-standard fuels can also lead to serious problems with combustion!

For this reason, when operating the boiler:

- Use only the permitted fuels

8 Decommissioning

8.1 Mothballing

The following measures should be taken if the boiler is to remain out of service for several weeks (e.g. during the summer):

- Clean the boiler thoroughly and close the doors fully

If the boiler is to remain out of service during the winter:

- Have the system completely drained by a qualified technician
 - ↳ Protection against frost

8.2 Disassembly

To disassemble the system, follow the steps for assembly in reverse order.

8.3 Disposal

- Ensure that they are disposed of in an environmentally friendly way in accordance with waste management regulations in the country (e.g. AWG in Austria)
- You can separate and clean recyclable materials and send them to a recycling centre.
- The combustion chamber must be disposed of as builders' waste.

Manufacturer's address

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