fröling

Heating with pellets

Planning documents

P4 Pellet

DER BLAUE ENGEL
weil emissionsarm und energieeffizient
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Better heating with pellets

P4 Pellet - The new generation of pellet boilers

From single-family dwellings to multiple-family dwellings; from energy-saving houses to buildings with higher energy consumption: The Froling P4 Pellet comes in a wide range of sizes and, thanks to its modulating operation, it always provides just the right solution for maximum comfort and convenience.
It is even possible to connect several boilers in a cascade to supply heat where demand is high. The P4 Pellet can also be retrofitted to a condensing boiler at any time.
With the P4 Pellet, Froling offers a package of energy efficiency, convenience and flexibility.

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Checklist for planning a pellet system

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Fuel specifications and quality characteristics

Pellets fuel data

Energy content	4.9 kWh/kg
Diameter	6 mm
Length	5 to 30 mm (20% to 45 mm)
Surface	smooth
Density	min. 1.12 kg/dm³
Bulk weight	min. 650 kg/m³
Water content	max. 10%
Proportion of ash	max. 0.5%
Proportion of dust	max. 2.3%
Pressing aid	max. 2%

Comparison of fuels

Wood pellets	4.9 kWh/kg
Wood chips	750 - 850 kWh/cubic metre loose mat.
Wood (soft)	1300 - 1700 kWh/cubic metre
Wood (hard)	1700 - 2400 kWh/cubic metre
Anthracite coal	7 kWh/kg
Coke	7.5 - 8kWh/kg
Natural gas	9.5 - 10.2 kWh/m³
Liquefied gas	12.8 kWh/kg
Heating oil EL	10 kWh/L

Comparison of pellets and heating oil EL

2 kg of pellets - approx. 1 litre of heating oil

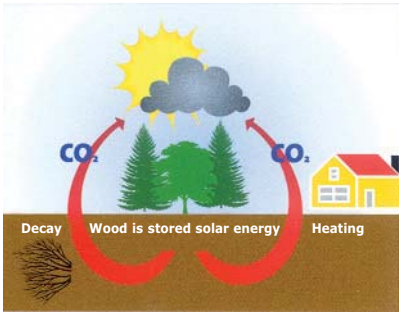
650 kg pellets - approx. 1m³ space required

3 m³ of pellets - approx. 1000 litres of heating oil EL

Wood pellets - Fuel of the future

The ideal fuel for user-friendly, environment-friendly heating. Pellets have a high energy density and are easy to deliver and store. These are just some of the advantages that make pellets the perfect fuel for fully automatic heating systems.
Wood pellets are 100% wood and are made by compressing dry, natural wood waste into cylindrical pellets with a diameter of 6 mm and a length of between 5 to 30 mm. They are sold by weight and 1 m^3 of pellets weighs about 650 kg.

Pellets protect the environment



When trees grow they take CO_2 out of the air. When wood is burnt, exactly this quantity of CO_2 is released, so the amount is no higher than from natural decay of wood. Only about 1% of the energy contained in the fuel is required to produce wood pellets from dry wood shavings. Also there is no environmental or pollution hazard while pellets are stored. This means that heating with wood pellets is an important way to help prevent climate change.

A renewable raw material

Wood for the raw material for pellets is available in domestic forests and it is constantly renewed. There is only limited availability of oil and natural gas, and much of it must be imported.

Crisis-proof energy supply

There are companies specialising in production of wood pellets all across Europe. Pellets are produced and distributed regionally, so the added value stays in the local economy. This creates and secures jobs.

Standards for pellets

The quality of wood pellets for household use, is defined by the following standards.

Austria: Pellets as per ÖNORM M 7135 and/or DIN*plus* certification program

Germany: Pellets as per DIN 51731 and the DIN*plus certification program* and/or ÖNORM M 7135

The actual difference between a standard and certification is that the certifying body continually checks for observance of these definitions. Check the quality when you buy fuel and only accept tested quality from your supplier.

EU standard: In the future the European pellet standard, EN 14961-2, will take over from national standards.

Changing over to pellet heating

More and more owners of oil heating systems are considering changing over to pellets. The reasons are clear. Pellet supplies are plentiful and not subject to the crises and fluctuations of heating oil supplies. The existing system is analysed at the planning stage and integrated to the new system. If there is an oil tank room, this can usually be converted into a pellet store without any problems. In most cases you can continue to use existing radiators and circulation pumps. Pellet-fired boilers need a moisture-resistant chimney so the chimney should be examined and approved by a specialist.

Official support for wood-fired heating

Regional governments have support programmes to encourage people to buy or change over to heating systems using pellets.
For more details on the amount of support available, contact your local government offices or visit our website at **www.froeling.com**.

Wood pellets - On-site quality check

How can you see the quality

The external features of wood pellets give a general impression of the quality. However it should be noted that the actual quality of wood pellets may lower than the external appearance suggests.

The surface:
- a smooth surface
- a shiny surface
- a surface without longitudinal cracks

The three features together indicate optimal pelleting conditions. Analysis is required to know the exact quality of pellets, such as heating value, abrasion, moisture etc.

Inappropriate quality criteria

Some quality tests in common use give no indication of the quality of the pellets:

The water test
Claim: Wood pellets should sink in water and dissolve as slowly as possible.

The truth: Low-quality pellets also sink in water and they may dissolve slowly because they contain too much binding agent.

The repose angle test
Claim: Pellets must have a certain repose angle (< 50°).

The truth: The repose angle is not a reliable indicator of good or bad pellet quality.

Boiler size and fuel requirement

Boiler size, pellet requirement and store size

It is important to choose the right size of heating system for economical and problem-free operation.
The heat output should be calculated precisely, particularly for new buildings with energy-efficient construction. If the boiler is too large, efficiency is lost and costs increase. The boiler size is generally determined by the building heat requirement calculated by the heating engineer.

Example: Calculation of the heat output

Single-family dwelling: 210 m²
Building heat requirement: e.g. 68 W/m²

Living space x heat requirement = Heating load
210 m² x 68 W/m² = 14,280 W

Boiler for this output requirement: P4 Pellet 15

The example is only intended to give a quick overview of the design. The exact calculation is the responsibility of the heating engineer.

Store size for heating load

The store should be able to hold 1 to 1.5 times your yearly pellet requirement. Experience shows that a detached house with 150 m² of living space will need a store with a floor area of 6 - 8 m².
The exact amount of space required depends on the system's heating load. You can use this rule of thumb to calculate the size of the store room (plus the unused space):

1 m³ of store space per kW of heating load

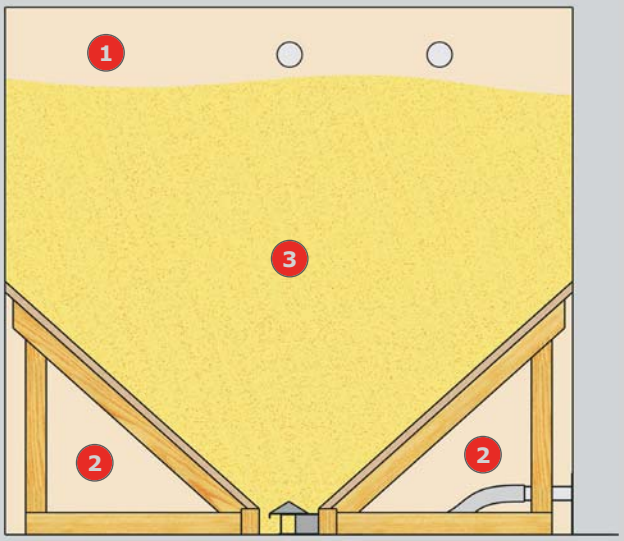
Example: Store for P4 Pellet 15

Boiler heating load	=	Store space
15 kW	=	*15 m³*

Store space	/	Store height	=	Area
15 m³	/	*2.5 m*	=	*6 m²*

Usable volume

For both the suction screw system and the universal suction system, the store room should be narrow and rectangular in order to ensure that the empty, unused space in the corners is kept as low as possible.



1. The store must not be filled to the top. You should leave a gap for the air to circulate above the pellets.
2. The sides of the store need to slope at an angle of 45°; this means that there will be empty, unused space under the store construction.
3. The actual volume storage volume for pellets is the volume of the store minus the volume of the empty space. In most cases two-thirds of a store's volume will be available for storage.

In the example with the P4 Pellet 15 this gives the following results:

Example: Store for P4 Pellet 15

Store space	x 2/3	=	Useful space
15 m³	x 2/3	=	*10 m³*

10 m³ Pellets = approx. 6,500 kg Pellets
(approx. 3250 Litres heating oil)

Pellet delivery and store position

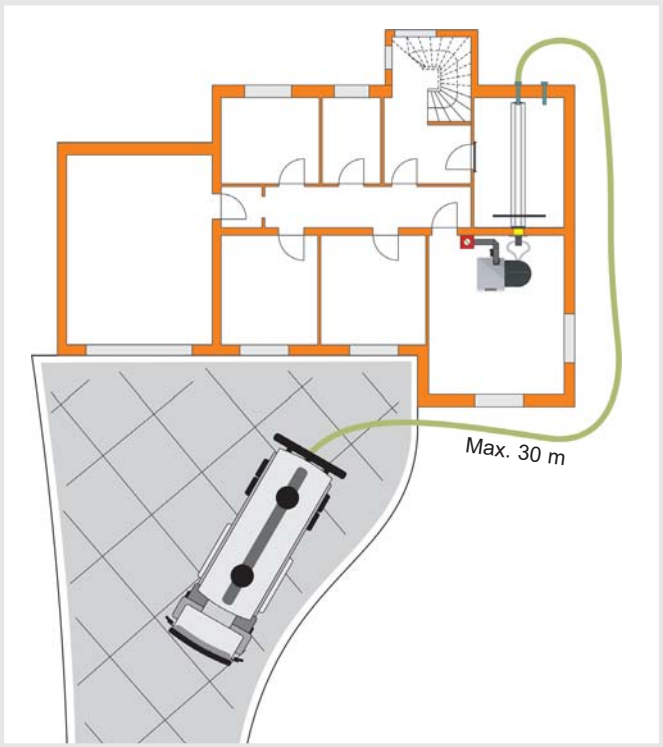
Pellets are generally delivered by silo lorry and blown into the store through an intermediate filler pipe. A second pipe is used to extract dust.

Store position

Ideally, the pellet store should have at least one outside wall where the filler pipes will be installed. The filler pipes should be easily accessible and positioned to prevent abrupt changes in direction and a feed height above 6 m when the pump hose is laid.
Regional regulations for fire prevention should also be observed.

Accessibility of the store

To ensure free access for the silo lorry, the road should be at least 3 m wide, the clearance should be at least 4 m and the permitted total weight should be at least 24 t.



There is a limit to the filler hose length that can be used. The store should be located not more than 30 metres away from where the silo lorry will be pumping.

Protection against moisture and damp

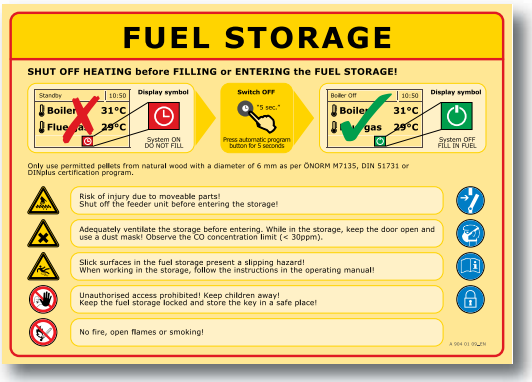
When selecting a store, you must ensure that it is dry. Damp will cause the pellets to swell and break up.
Normal weather-dependent air humidity does not damage the pellets at any time of year. If there is a risk of damp walls, appropriate moisture proofing should be produced (e.g. back-ventilated boarding on the walls). Alternatively you can use a bag silo discharge system (see page 32).

Power supply for extractor fan

To power the necessary extractor fan we recommend that you provide a power supply socket close to the filler pipe coupling, which is accessible from outside. Froling offers a house connection box, which includes the power supply and ensures that the boiler shuts down when the cover is opened.

Switch off the boiler before filling

Depending on the regional regulations, the boiler must be switched off before the store is filled. Froling generally recommends that the store should only be filled when the boiler is switched off.



The fuel store sticker supplied indicates the hazards in the store and explains the necessary steps for filling. The sticker must be applied in a clearly visible position in the area of the store.

P4 Pellet 8 - 25

The P4 Pellet 8/15 and the P4 Pellet 20/25 can be used with an output range from 3.1 - 25 kW both in energy-saving houses and in buildings with rather larger heating requirements.

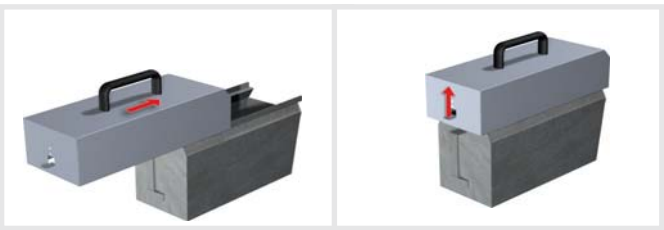
P4 Pellet 8/15	P4 Pellet 20/25

Separate positioning

The option of positioning the parts separately and the uncomplicated installation make the P4 Pellet particularly suitable for renovation.

Version with user-friendly ash drawer

With user-friendly ash removal the ash is automatically fed into two ash drawers.



When the transport lid is put on, it is very easy and dust-free to transport them to the emptying point.

Patented multiple-pass heat exchanger

for variable boiler operation. Variable flow temperatures between 40°C and 80°C mean there is no need for an external heating circuit mixer (e.g. for radiators).

Integrated return lift

for additional cost saving. The special design of the heat exchanger means there is no need for an external return lift. This saves on installation and operating costs.

Speed regulated induced draught fan and Lambda control

for maximum ease of operation. The speed-regulated induced draught fan, which comes as standard, together with the Lambda control ensures optimal combustion conditions.

Automatic cleaning

to simplify cleaning. Sliding grate and heat exchanger cleaning are activated fully automatically, to make operation convenient and maintenance-free.

Comprehensive safety concept

for the highest possible operating safety. Unique burn back protection with a double valve system and automatic system error diagnosis.

Room air-independent operation

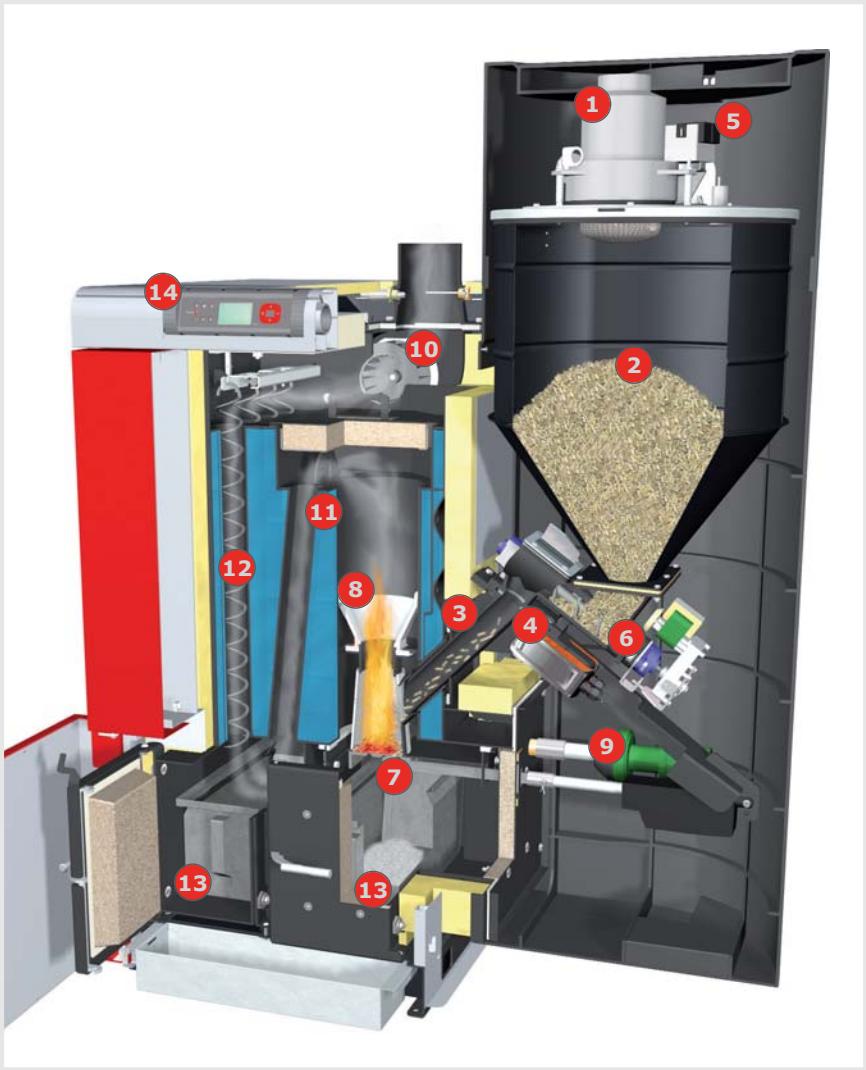
for use in energy-saving houses. A direct air connection prevents penetration of the closed building shell. (See page 22)

Optional condensing boiler technology

for even higher efficiency. The high-quality stainless steel heat exchanger can be retrofitted as an optional module. (See page 12)

Lambdatronic P 3200 controller

for optimal combustion control. With the optional room console expansion, you can navigate the controller conveniently from your living room.



1. Powerful suction turbine
2. Suction cyclone hopper
3. Pellet gravity shaft
4. Burner gate valve
5. Store gate valve
6. Stoker screw for output-dependent dosing
7. Automatic sliding grate
8. Steel combustion chamber
9. Automatic ignition
10. Speed regulated induced draught fan
11. 3-pass heat exchanger
12. WOS (Efficiency Optimisation System)
13. Large ash drawers
14. Lambdatronic P 3200 controller

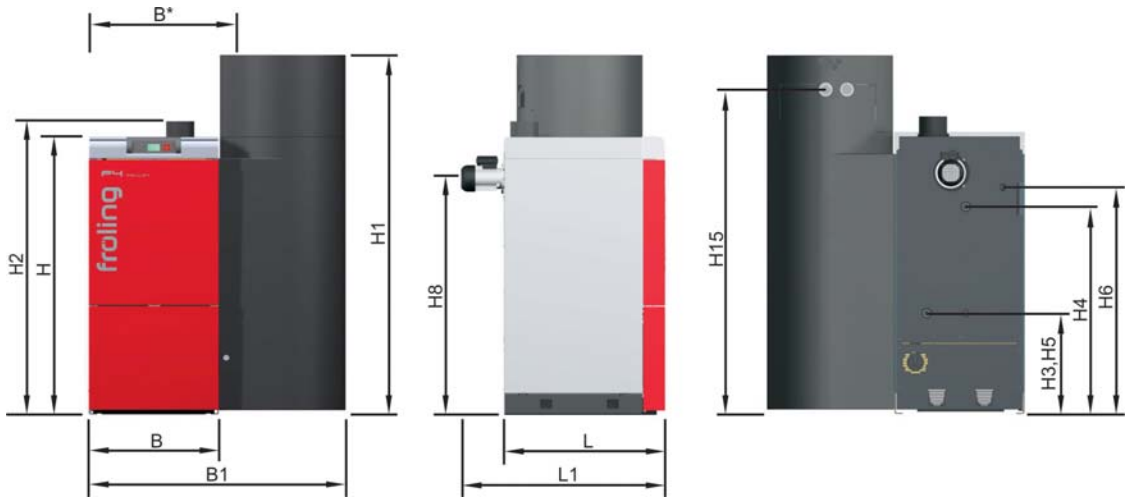
How the P4 Pellet 8-25 works

The pellets are transported by the suction turbine **(1)** via the suction hoses into the large hopper **(2)**, and the start time can be individually adjusted.
A system self-test with automatic diagnostics is carried out each time the unit starts up, ensuring safe, reliable operation.
The drop tube **(3)** in conjunction with the safety-tested, gate valve-fitted combustion chamber **(4)** and the gate valve-fitted store **(5)** creates a double valve system with a unique safety concept.
The pellets are transported to the drop pipe with the stoker screw **(6)** and fall in a metered quantity onto the combustion grate **(7)** of the sturdy steel combustion chamber **(8)**. Hot air is added by the automatic igniter **(9)** to ignite the pellets. The speed-regulated induced draught fan **(10)** and the Lambda control, which comes as standard, ensure optimal combustion conditions.

Another outstanding feature is the patented 3-pass multi-layer heat exchanger **(11)**, which earns the highest possible boiler efficiency rating. Flue gases are passed through the heat exchanger multiple times, thus efficiently separating out the ash.
With the automatic cleaning mechanism, cleaning becomes effortless. The movement of the integrated spiral springs **(12)** automatically cleans the heat exchanger, maintaining the high operating efficiency.
The ash from the steel combustion chamber falls through an automatic sliding grate **(7)** into large easy-access ash drawers **(13)**. These containers require only infrequent emptying; just snap on the lid and remove.
The Lambdatronic P 3200 controller with its clearly arranged control unit **(14)** controls the entire system.

Data and dimensions

Dimensions and connections (P4 Pellet 8-25)



Dimensions			P4 Pellet 8	P4 Pellet 15	P4 Pellet 20	P4 Pellet 25
L	Length of boiler	[mm]	740	740	740	740
L1	Total length inc. induced draught fan	[mm]	940	940	940	940
B	Width of boiler	[mm]	600	600	770	770
B*	Width of boiler inc. support[1)]	[mm]	705	705	875	875
B1	Total width inc. suction cyclone	[mm]	1185	1185	1355	1355
H	Height of boiler[2)]	[mm]	1280	1280	1280	1280
H1	Total height inc. suction cyclone	[mm]	1660	1660	1660	1660
H2	Height of flue gas pipe connection	[mm]	1350	1350	1350	1350
H3	Height of flow connection	[mm]	460	460	460	460
H4	Height of return connection	[mm]	940	940	955	955
H5	Height of drain connection	[mm]	460	460	460	460
H6	Height of air vent connection	[mm]	1030	1030	1030	1030
H8	Height of induced draught fan connection	[mm]	1090	1090	1090	1090
H15	Height of suction system connection	[mm]	1480	1480	1480	1480
	Flue gas pipe diameter	[mm]	130	130	130	130

1) Width of the boiler inc. support for positioning unit. Corresponds to the minimum positioning width after removing the stoker assembly, suction cyclone and position-
2) ing unit.
Corresponds to the minimum positioning height after removing the stoker assembly, suction cyclone and positioning unit.

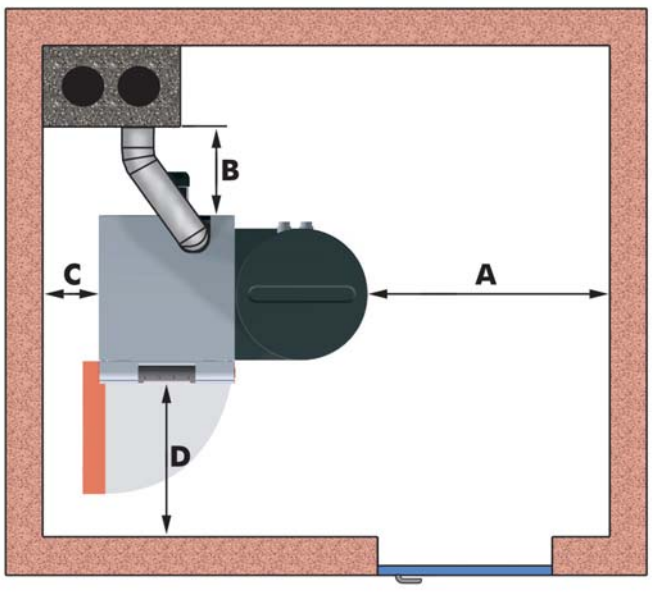
Dimensions of the boiler connections		P4 Pellet 8	P4 Pellet 15	P4 Pellet 20	P4 Pellet 25
Boiler flow connection	[Inches]	1	1	6/4	6/4
Boiler return connection	[Inches]	1	1	6/4	6/4
Drain	[Inches]	1/2	1/2	1/2	1/2
Air vent	[Inches]	1/2	1/2	1/2	1/2
External diameter of pellet suction pipe	[mm]	60	60	60	60
External diameter of return air line	[mm]	60	60	60	60

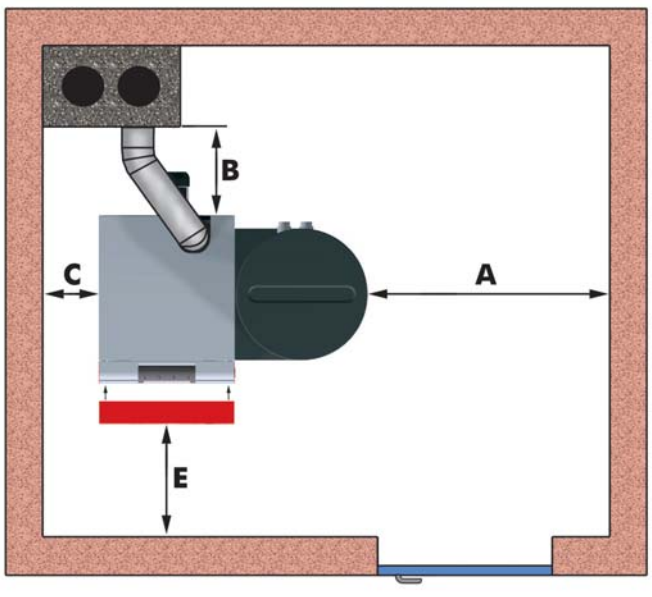
Technical specifications (P4 Pellet 8-25)

Technical specifications		P4 Pellet 8	P4 Pellet 15	P4 Pellet 20	P4 Pellet 25
Rated heat output	[kW]	10.5	14.9	20.0	25.0
Heat output range	[kW]	3.1 - 10.5	3.1 - 14.9	6.0 - 20.0	7.5 - 25.0
Electrical connection		230V / 50Hz / fused 16A			
Electrical power consumption	[W]	96	123	110	110
Boiler weight	[kg]	345	355	425	435
Suction cyclone hopper (gross volume)	[L]	90	90	90	90
Suction cyclone hopper (net capacity, approx.)	[kg]	50	50	50	50
Water capacity	[L]	70	70	80	80
Upstream resistance (ΔT=20°C)	[mbar]	4.3	6.1	4.5	2.9
Minimum return temperature		Not applicable due to internal return lift			
Minimum flow quantity	[L/h]	180	260	340	430
Maximum boiler temperature setting	[°C]	80	80	80	80
Minimum boiler temperature setting	[°C]	40	40	40	40

Further technical details and emission values can be found in the relevant test report.

Recommended minimum distances in the boiler room (P4 Pellet 8-25)

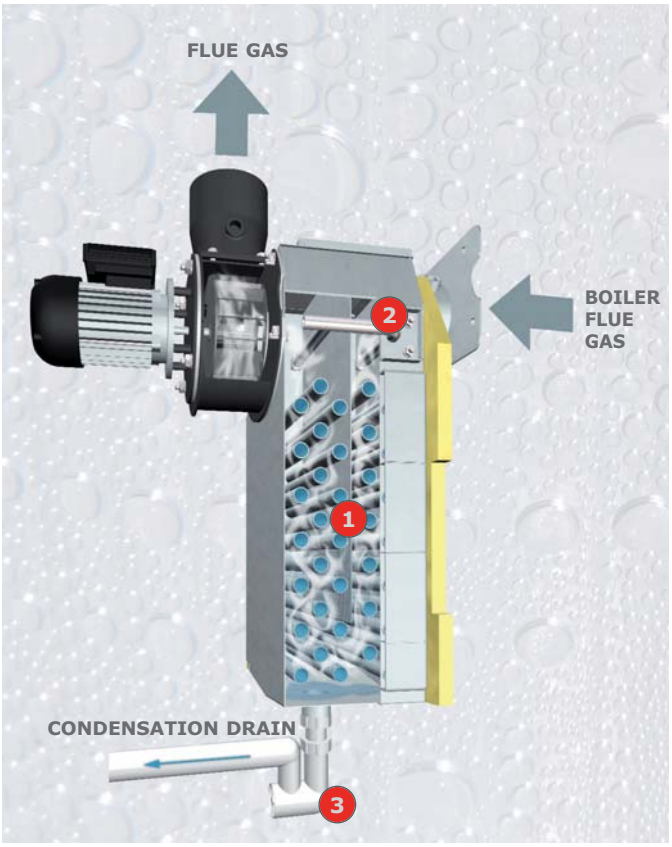




Recommended distances in the boiler room		P4 Pellet 8	P4 Pellet 15	P4 Pellet 20	P4 Pellet 25
A Minimum distance to suction cyclone assembly	[mm]	300	300	300	300
B Maintenance area for induced draught fan	[mm]	300	300	300	300
C Minimum distance to side of boiler	[mm]	200	200	200	200
D Space for insulated door	[mm]	550	550	720	720
E Space with plug-in insulated door	[mm]	400	400	400	400

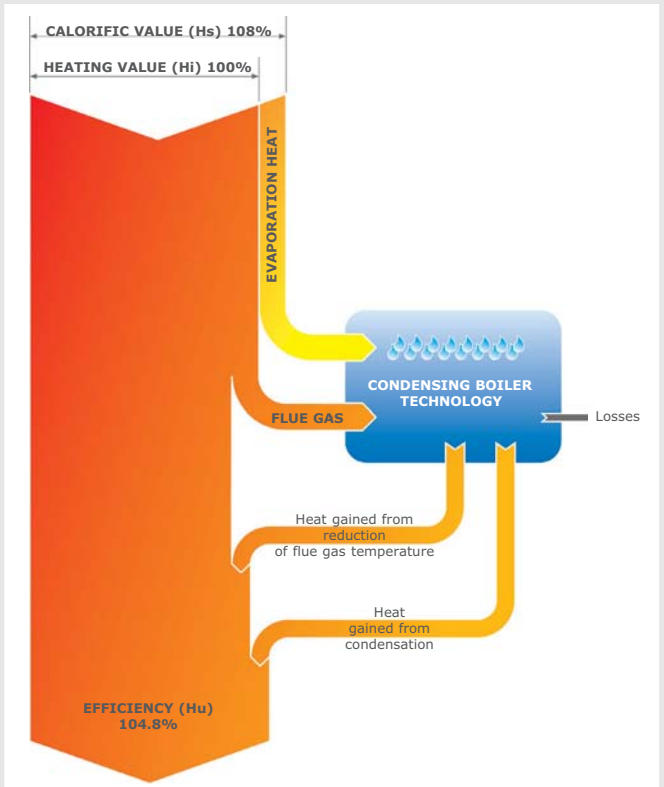
P4 Pellet with condensing boiler technology

For output sizes from 8 to 25 kW, the P4 Pellet boiler is also available with innovative condensing boiler technology. The flue gas contains energy, which escapes unused up the chimney with conventional solutions, but an additional heat exchanger positioned on the back of the boiler makes use of it for the heating system. This helps to increase the **boiler efficiency rating to over 104 percent (Hi)**.
The heat exchanger is made of high-quality stainless steel. It is cleaned using a water flushing system. The module can also be retrofitted.



1. Stainless steel heat exchanger
2. Automatic flushing device for regular cleaning
3. Drain with siphon to remove condensation

Heat flow diagram for condensing boiler technology - P4 Pellet 15

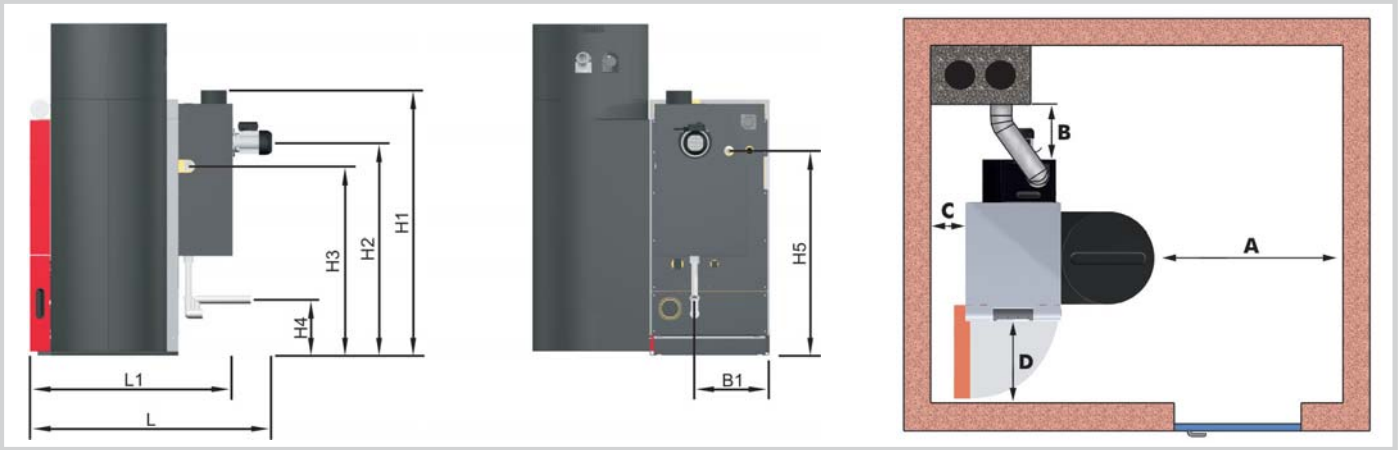


The heating value (Hi) defines the amount of heat, which is released during combustion. The water that is produced is contained as steam in the flue gas. The calorific value (Hs) defines the amount of heat that is released during combustion including the evaporation heat.
The evaporation heat has not yet been used. For this reason the efficiency calculation was based on the heating value (Hi). With condensing boiler technology the additional evaporation heat is used, giving efficiency ratings of over 100%.

Requirements for optimal use of condensing boiler technology:

- Lowest possible return temperature (e.g. floor or wall heating)
- Moisture resistant and soot fire-resistant flue gas system
- Duct connection for drainage of condensation and flushing water

Dimensions, minimum distances and technical specifications



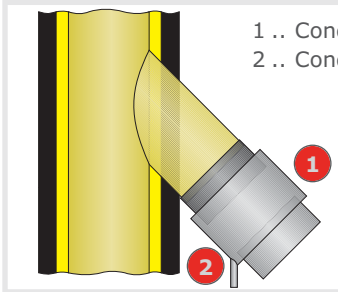
Dimensions - Condensing boiler technology			P4 Pellet 8/15	P4 Pellet 20/25
L	Total length	[mm]	1210	1280
L1	Length of boiler inc. condensation heat exchanger	[mm]	1015	1085
B1	Distance between condensation drain and side of boiler	[mm]	380	520
H1	Height of flue gas pipe connection	[mm]	1330	1330
H2	Height of induced draught fan connection	[mm]	1060	1060
H3	Height of return connection	[mm]	950	950
H4	Height of condensation drain connection	[mm]	170 - 460	170 - 460
H5	Height of flushing device connection	[mm]	1020	1050

Recommended minimum distances in the boiler room			P4 Pellet 8/15	P4 Pellet 20/25
A	Minimum distance to suction cyclone assembly	[mm]	300	300
B	Maintenance area for induced draught fan	[mm]	300	300
C	Minimum distance to side of boiler	[mm]	200	200
D	Space for insulated door	[mm]	550	720
	Space for plug-in door	[mm]	400	400

Technical specifications - Condensing boiler technolo-		8	15	20	25
Boiler efficiency rating	[%]	104.8	104.8	105.1	105.3
Condensation / rated load hour	[Litres]	0.8 - 1.2	1 - 1.5	1.8 - 2.2	2 - 2.5
Flushing device connection	[inches]	1/2	1/2	1/2	1/2
Condensation drain connection		DN 40	DN 40	DN 40	DN 40

Fitting a condensation trap

A sufficiently large condensation trap should be fitted at the start of the flue gas line, to prevent any condensation from flowing back into the boiler from the chimney system. The condensation can be drained into the duct.



1 .. Condensation trap
2 .. Condensation drain nozzle

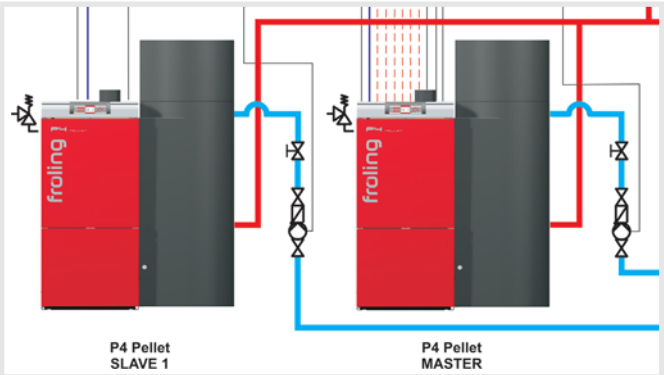
P4 Pellet 32 - 60

The P4 Pellet 32/38 and P4 Pellet 48/60 are an ideal solution for greater heat requirements, with an output range from 8.5 - 58.5 kW.

P4 Pellet 32/38	P4 Pellet 48/60

P4 Pellet with cascade controller

The optional cascade controller enables a combined boiler output of up to 240 kW.



Version with automatic ash removal

With automatic ash removal the ash is fed into two external ash boxes.

With the smart locking mechanism it is quick and simple to remove the ash box. A cover can be put on to ensure clean transport to the emptying point.

Multi-layer heat exchanger in 3-pass design

for maximum boiler use The 3-pass design guides the path of the flue gases several times around the boiler, ensuring exceptionally efficient ash separation. The special design of the boiler prevents the temperature falling below the dew point and ensures it has a long service life.

Automatic ash removal

for even greater ease of operation. In addition to the proven boiler self-cleaning system, from the P4 Pellet 32 onwards the ash is fed into two closed ash containers. Cleaning is more convenient because of the longer emptying interval.

Integrated return lift

for additional cost saving. The special design of the heat exchanger means there is no need for an external return lift. This saves installation and operating costs.

Froling bus system

to keep wiring to a minimum. The Froling bus system makes it possible to install expansion modules at any location. Controls in multiple house systems are fitted where required.

Intelligent system technology

for optimum energy consumption. Up to 4 storage tanks, up to 8 hot water tanks and up to 18 heating circuits can influence heat management. With the option of linking in other energy sources, Froling offers a complete solution for all requirements.

Froling display software

for convenient remote monitoring. All operating values and customer parameters can be displayed and changed from any location using the display software interface. It is also possible for Froling customer services to carry out remote diagnostics on problems.

1. Powerful suction turbine
2. Suction cyclone hopper
3. Pellet gravity shaft
4. Burner gate valve
5. Store gate valve
6. Stoker screw for output-dependent dosing
7. Automatic sliding grate
8. Steel combustion chamber
9. Automatic ignition
10. Speed regulated Induced draught fan
11. 3-pass heat exchanger
12. WOS (Efficiency Optimisation System)
13. Ash screw with stirrer
14. High volume ash container
15. Lambdatronic P 3200 controller

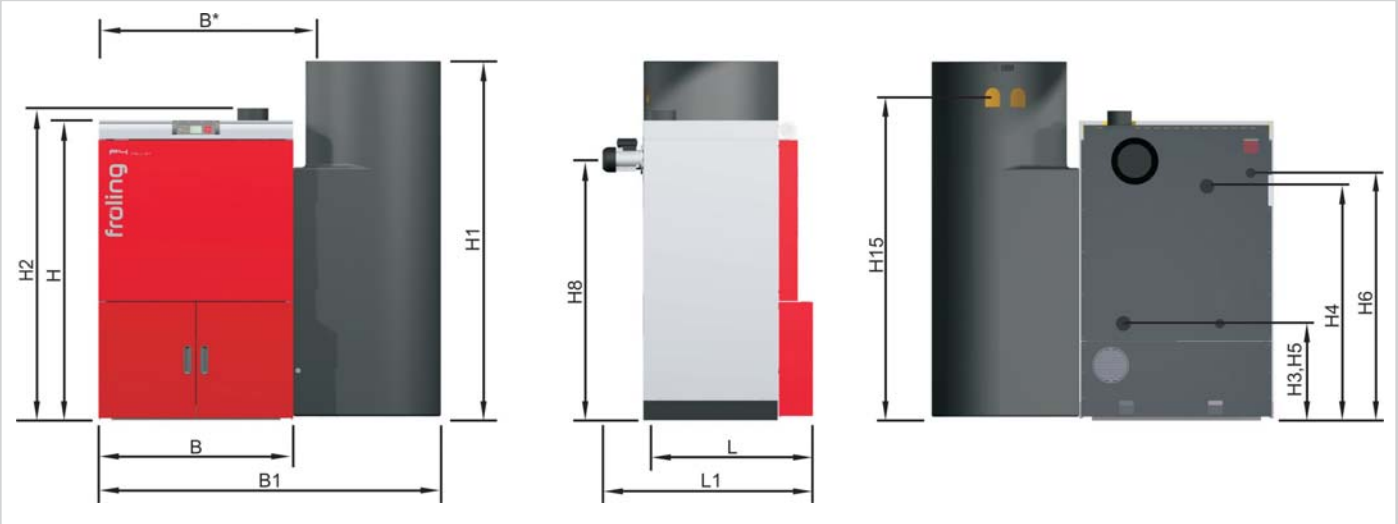
How the P4 Pellet 32-60 works

The pellets are transported by the suction turbine **(1)** via the suction hoses into the large hopper **(2)**, and the start time can be individually adjusted.
A system self-test with automatic diagnostics is carried out each time the unit starts up, ensuring safe, reliable operation.
The drop tube **(3)** in conjunction with the safety-tested, gate valve-fitted combustion chamber **(4)** and the gate valve-fitted store **(5)** creates a double valve system with a unique safety concept.
The pellets are transported to the drop pipe with the stoker screw **(6)** and fall in a metered quantity onto the combustion grate **(7)** of the sturdy steel combustion chamber **(8)**. Hot air is added by the automatic igniter **(9)** to ignite the pellets. The speed-regulated induced draught fan **(10)** and the Lambda control, which comes as standard, ensure optimal combustion conditions.

Another outstanding feature is the patented 3-pass multi-layer heat exchanger **(11)**, which earns the highest possible boiler efficiency rating. Flue gases are passed through the heat exchanger multiple times, thus efficiently separating out the ash.
With the automatic cleaning mechanism, cleaning becomes effortless. The movement of the integrated spiral springs **(12)** automatically cleans the heat exchanger, maintaining the high operating efficiency.
The ash falls into the ash chamber, where it is transported by the ash screw **(13)** into large ash containers **(14)**. The containers require only infrequent emptying; just snap on the lid and remove.
The Lambdatronic P 3200 controller with its clearly arranged control unit **(15)** controls the entire system.

Dimensions and data

Dimensions and connections (P4 Pellet 32-60)



Dimensions			P4 Pellet 32	P4 Pellet 38	P4 Pellet 48	P4 Pellet 60
L	Length of boiler[1)]	[mm]	820	820	900	900
L1	Total length inc. induced draught fan	[mm]	1020	1020	1100	1100
B	Width of boiler	[mm]	860	860	1030	1030
B*	Width of boiler inc. support[2)]	[mm]	965	965	1275	1275
B1	Total width inc. suction cyclone	[mm]	1445	1445	1790	1790
H	Height of boiler[3)]	[mm]	1430	1430	1585	1585
H1	Total height inc. suction cyclone	[mm]	1900[4)]	1900[4)]	1900	1900
H2	Height of flue gas pipe connection	[mm]	1530	1530	1685	1685
H3	Height of flow connection	[mm]	460	460	515	515
H4	Height of return connection	[mm]	1085	1085	1240	1240
H5	Height of drain connection	[mm]	460	460	515	515
H6	Height of air vent connection	[mm]	1155	1155	1310	1310
H8	Height of induced draught fan connection	[mm]	1215	1215	1375	1375
H15	Height of suction system connection	[mm]	1720	1720	1720	1720
	Flue gas pipe diameter	[mm]	150	150	150	150

1) If the insulated door(s) and the control bars (only for P4 Pellet 48/60) are removed, all boilers can be brought in through a doorway that is 80 cm wide.
2) Width of the boiler inc. support for positioning unit. Corresponds to the minimum positioning width after removing the stoker assembly, suction cyclone and positioning unit.
3) Corresponds to the minimum positioning height after removing the stoker assembly, suction cyclone and positioning unit.
4) When using the small suction cyclone (optional) the dimension is reduced to 1660 mm.

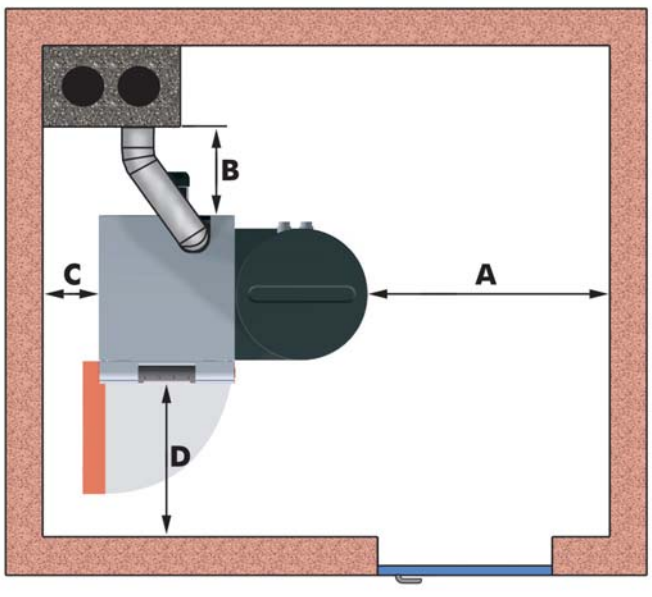
Dimensions of the boiler connections		P4 Pellet 32	P4 Pellet 38	P4 Pellet 48	P4 Pellet 60
Boiler flow connection	[Inches]	6/4	6/4	6/4	6/4
Boiler return connection	[Inches]	6/4	6/4	6/4	6/4
Drain	[Inches]	1/2	1/2	1/2	1/2
Air vent	[Inches]	1/2	1/2	1	1
External diameter of pellet suction pipe	[mm]	60	60	60	60
External diameter of return air line	[mm]	60	60	60	60

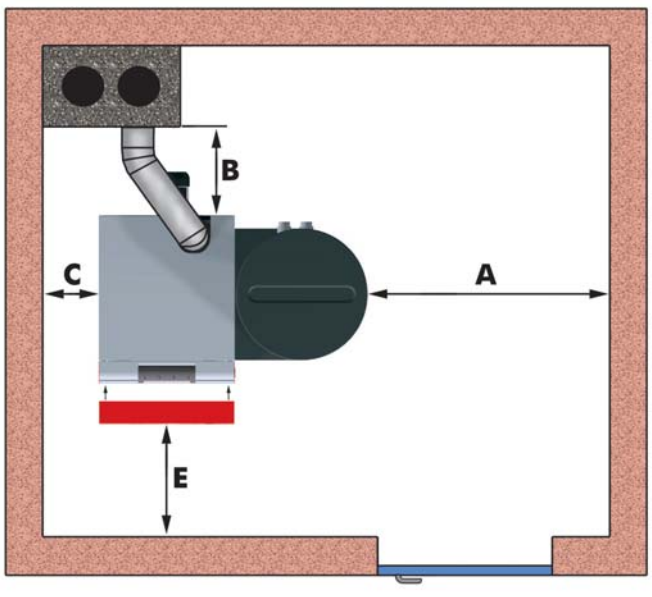
Technical specifications (P4 Pellet 32-60)

Technical specifications		P4 Pellet 32	P4 Pellet 38	P4 Pellet 48	P4 Pellet 60
Rated heat output	[kW]	32.0	38.0	48.0	58.5
Heat output range	[kW]	8.9 - 32.0	8.9 - 38.0	14.4 - 48	17.3 - 58.5
Electrical connection		230V / 50Hz / fused 16A			
Electrical power consumption	[W]	110	110	120	120
Boiler weight	[kg]	525	535	750	760
Suction cyclone hopper (gross volume)	[L]	140	140	205	205
Suction cyclone hopper (net capacity, approx.)	[kg]	80	80	120	120
Water capacity	[L]	125	125	170	170
Upstream resistance (ΔT=20°C)	[mbar]	1.5	2.1	3.6	5.3
Minimum return temperature		Not applicable due to internal return lift			
Minimum flow quantity	[L/h]	550	650	830	1030
Maximum boiler temperature setting	[°C]	80	80	80	80
Minimum boiler temperature setting	[°C]	40	40	40	40

Further technical details and emission values can be found in the relevant test report.

Recommended minimum distances in the boiler room (P4 Pellet 32-60)





Recommended distances in the boiler room		P4 Pellet 32	P4 Pellet 38	P4 Pellet 48	P4 Pellet 60
A Minimum distance to suction cyclone assembly	[mm]	300	300	300	300
B Maintenance area for induced draught fan	[mm]	300	300	300	300
C Minimum distance to side of boiler	[mm]	200	200	200	200
D Space for insulated door	[mm]	830	830	490	490
E Space with plug-in insulated door	[mm]	300	300	-	-

Design information for construction of heating system

The following legal regulations should be observed for construction and operation of a heating system.

Installation and approval for the heating system

The boiler should be operated in a closed heating system. The criteria for design and construction are based on EN 12828 "Heating systems in buildings". The implementing heating engineer is responsible for compliance with these regulations. Construction or conversion of a heating system must be approved by the building authorities.

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

Germany: Report new installations to an approved chimney sweeper and to the building authorities.

In addition to the binding regulations applicable for construction and operation of the boiler system in the country of use, fire and building regulations, electrical regulations and noise protection measures (ÖNORM H 5190) must be observed. The professionals carrying out the work are responsible for compliance with the regulations.

Requirements for central heating water

To prevent damage from corrosion and deposits, the following standards should be observed:

Austria: ÖNORM H 5195-1

Germany: VDI 2035

Depending on the total output of the heat producing component, the following values for the total hardness should not be exceeded:

- up to 150 kW: 17 °German hardness
- from 150 kW to 1000 kW: 3 °German hardness

When filling with make-up water, bleed the filling hose before connecting to prevent air from entering the system. If significant components or the entire system must be repeatedly filled, for systems with a total output of up to 150 kW the filling water should be softened to 3 ° German hardness. If these values cannot be observed, suitable softening systems should be provided.

General information for boiler room

The boiler room, pipes carrying water and district heating pipes must guaranteed to be frost-proof. There must not be a potentially explosive atmosphere in the boiler room as the boiler is not suitable for use in potentially explosive environments.
The boiler does not provide any light, so the customer must provide sufficient lighting in the boiler room in accordance with national workplace design regulations.

Danger of fire due to flammable materials:
No flammable materials should be stored near the boiler. Flammable objects (e.g. clothing) must not be put on the boiler to dry.

Damage due to impurities in combustion air:
Do not use any solvents or cleaning agents containing chlorine in the room where the boiler is installed.

The doorway of the boiler room should be 75 cm wide (P4 Pellet 8-25) or 80 cm wide (P4 Pellet 32-60). Ideally all doorways leading to the boiler room should be 100 cm wide.

Ventilation of the boiler room

Ventilation air for the boiler room should be taken from and expelled directly outside, and the openings and air ducts should be designed to prevent weather conditions (foliage, snowdrifts...) from having any effect on the air flow.
Unless otherwise stipulated by the building regulations applicable to the boiler room, the following standards shall apply:

- TRVB H 118
- ÖNORM H 5170

According to ÖNORM H 5170, fan-assisted boilers should have a supply air cross section of 2 cm² per kW of rated output, and a minimum total cross section of 200 cm². If the minimum air exchange is not guaranteed by the flue gas system, an exhaust air opening with a minimum cross-section of 180 cm² must be supplied.
Supply and exhaust air openings that go through other rooms must be covered with materials with fire resistance rating F90.

Electrical connection and EMERGENCY STOP

The boiler is supplied ready to plug in. All that remains to be carried out on site is for a qualified electrician to connect it to the mains and install the external wiring.
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.
A marked emergency stop switch should be installed outside the boiler room in the area of the boiler room door in accordance with local regulations. The switch must be connected as an N/C switch (terminal EMERGENCY STOP 24 VDC) and it must not interrupt the 230V power line of the boiler.

Fire prevention regulations during construction of a heating system

AT In Austria the fire prevention technical directive TRVB H 118 applies. Local variations to these regulations should also be taken into account. The responsible heating engineer will be happy to provide you with information.

DE In Germany the Muster-Feuerungsverordnung (Example heating regulations - MFeuVO) apply, and regional variations also apply. For more information you should contact the authorities responsible.

Fire prevention in the boiler room

The materials for the floor, walls and ceiling must be fire resistant (F90). The doors to the boiler room and fuel store must be self-closing and fire retardant (T30). The boiler room door must be installed to open in the direction of the escape route. Doors to rooms with an increased fire hazard (e.g. garage), to escape routes and to rooms above must be fire resistant (T90). It must not be possible to open boiler room windows and they must have fire resistance rating G30.

DE Exception: In Germany there are no requirements for boiler rooms for systems up to 50 kW.

Fire extinguishers

AT Austria: A 6kg manual fire extinguisher of fire classes A,B and C should be placed outside the boiler room in the access area.

DE Germany: Fire extinguishers are only compulsory for commercial and public buildings. However a fire extinguisher in the house is recommended.
Fire extinguishers should generally be checked every two years.

Fire prevention for fuel storage

The same building regulations generally apply for fuel stores as for the boiler room. For pellet storage containers in the open air, minimum distances from buildings and property boundaries should be observed in accordance with regional building regulations.
Pellet feed hoses should be insulated with fire protection choke collars in the area of penetrations through walls that separate fire areas.

Exceptions:

AT Austria - stored quantity less than 15 m³:
In Upper Austria only, the fire authorities specify that for systems smaller than 50 kW and a storage container smaller than 15 m³ (9.5 t) a pellet storage container is permitted in the boiler room or in the open air directly next to the building.

DE Germany - stored quantity up to 10,000 L:
In Germany, according to the example heating regulations, up to 10,000L (6.5 t) of pellets can be stored in the boiler room itself at a distance of 1m from the boiler. When using a radiation plate, the distance can be reduced.

Chimney connection/chimney system

The flue gas system is designed in accordance with the thermal and fluid dynamic calculation methods as per EN 13384-1. The calculation method of this standard applies for flue gas systems with a connection for one appliance. The calculation method as per part 2 of this European standard applies for flue gas systems with several connections and for a connection with several appliances.
When installing the connection you should take into account local standards and regulations.

Moisture resistant chimney system

In the permitted operating range of the boiler, flue gas can reach temperatures of less than 160K above room temperature. If the temperature falls below the dew point the flue gas may condense in the chimney. For this reason the boiler should be connected to a moisture resistant chimney system.

Using an existing chimney

Thanks to the high efficiency of modern boilers, flue gas temperatures are considerably lower. The water contained in the flue gas condenses and can destroy a brick chimney.
If the existing chimney is not condensation-resistant, renovation is essential. There are various systems for cladding depending on the path of the smoke. Find out more from your chimney sweep or chimney manufacturer.
Alternatively, the minimum flue gas temperatures can be increased for low chimneys, to prevent the temperature falling below the dew point. The chimney should then be checked at regular intervals. This option must be clarified with the chimney sweep and Froling customer services.

Before installing the boiler, you should discuss the suitability of the existing flue gas system and possible renovation with a qualified technician.

Short and insulated flue gas pipe connection

The flue gas pipe should be as short as possible. The upward incline of the connection should not exceed 30 - 45°. Changes in direction should be avoided as far as possible.
Appropriate, easily accessible cleaning openings should be provided for cleaning the flue gas pipe. The flue gas line to the chimney should be sealed to prevent any smoke escaping. To prevent heat loss, which leads to condensation, the flue gas line should be provided with thermal insulation (e.g. rock wool).

Draught limiter generally recommended

A draught limiter should generally only be used if the chimney draught is too strong. A draught limiter is a device, which automatically supplies ambient air to the flue gas system or the connecting piece to balance the pressure.
Froling generally recommends that you install a draught limiter.

The optimum position for installation of a **draught limiter (1)** is in the chimney directly below the mouth of the flue gas line.

Installing the draught limiter in the flue gas pipe is not recommended.

Fitting an explosion flap

AT In Austria it is obligatory to install an explosion flap. It should be fitted in the flue gas pipe or the chimney below the mouth, so no people are endangered. Some chimney manufacturers offer draught limiters combined with an explosion flap, which considerably simplifies installation.

Separation to prevent noise

There must be no fixed connection between the flue gas pipe and the chimney, so a sound separation is maintained, preventing sound transfer to the chimney or the masonry. If the flue gas system is not soundproofed, this is achieved by cladding the gaps at the mouth with stone wool or ceramic fibre.

Boiler data for planning the flue gas system

Chimney data - P4 Pellet 8-25			8	15	20	25
Flue gas temperature		[°C]	140	150	150	150
Flue gas mass flow	*RL/PL*	[kg/h]	25 / 11	36 / 15	52 / 20	65 / 25
Flue gas mass flow	*RL/PL*	[kg/s]	0.007 / 0.003	0.010 / 0.004	0.014 / 0.006	0.018 / 0.007
Feed pressure required	*RL/PL*	[Pa]	8 / 6	8 / 6	8 / 6	8 / 6
Feed pressure required	*RL/PL*	[mbar]	0.08 / 0.06	0.08 / 0.06	0.08 / 0.06	0.08 / 0.06
Flue gas pipe diameter		[mm]	130	130	130	130

Chimney data - P4 Pellet 32-60			32	38	48	60
Flue gas temperature		[°C]	160	160	160	170
Flue gas mass flow	*RL/PL*	[kg/h]	78 / 32	92 / 41	140 / 60	155 / 70
Flue gas mass flow	*RL/PL*	[kg/s]	0.022 / 0.009	0.025 / 0.011	0.039 / 0.017	0.043 / 0.019
Feed pressure required	*RL/PL*	[Pa]	8 / 6	8 / 6	8 / 6	8 / 6
Feed pressure required	*RL/PL*	[mbar]	0.08 / 0.06	0.08 / 0.06	0.08 / 0.06	0.08 / 0.06
Flue gas pipe diameter		[mm]	150	150	150	150

Data for design of flue gas systems for condensing boilers

Chimney data - P4 Pellet condensing boiler			8	15	20	25
Flue gas temperature[1)]		[°C]	40 - 70	40 - 70	40 - 70	40 - 70
Flue gas mass flow	*RL/PL*	[kg/h]	24 / 12	34 / 12	48 / 20	63 / 22
Flue gas mass flow	*RL/PL*	[kg/s]	0.007 / 0.003	0.009 / 0.003	0.013 / 0.006	0.017 / 0.006
Feed pressure required[2)]	*RL/PL*	[Pa]	1 / 1	1 / 1	1 / 1	1 / 1
Feed pressure required[2)]	*RL/PL*	[mbar]	0.01 / 0.01	0.01 / 0.01	0.01 / 0.01	0.01 / 0.01
Maximum feed pressure[3)]	*RL/PL*	[Pa]	30 / 15	30 / 15	30 / 15	30 / 15
Maximum feed pressure[3)]	*RL/PL*	[mbar]	0.30 / 0.15	0.30 / 0.15	0.30 / 0.15	0.30 / 0.15
Flue gas pipe diameter		[mm]	130	130	130	130

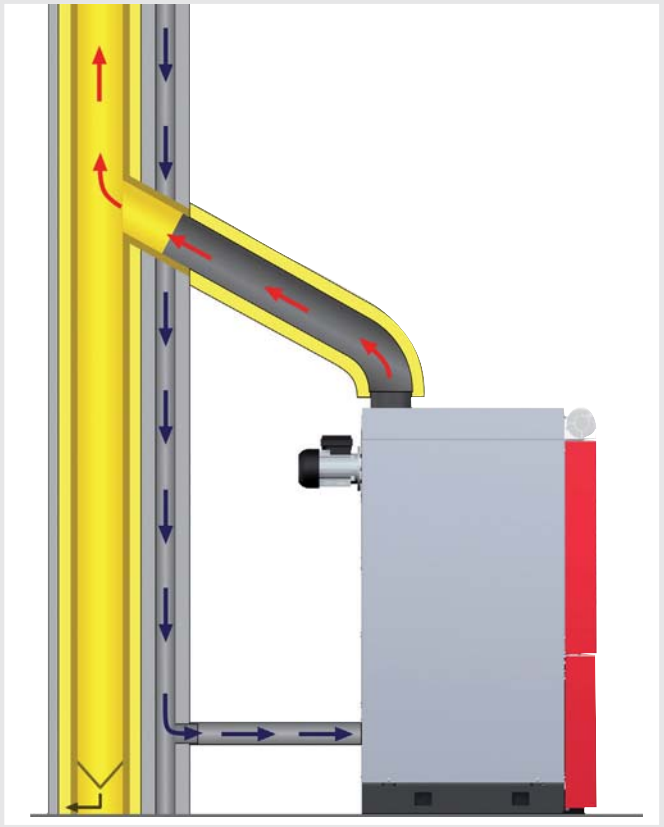
RL = Rated Load, PL = Partial Load

1) Flue gas temperatures indicated are dependent on heater return temperatures.

2) Draught requirement that must be provided for underpressure systems by the chimney system.

3) Only with room air-independent operation.
Maximum feed pressure provided by the device in overpressure systems, also described as max. feed output.

P4 Pellet with room-air independent operation



Energy-saving houses have a closed building shell. In traditional heating spaces there can be uncontrolled heat loss from the necessary ventilation openings. This is avoided with room air-independent heating boilers because of the direct air connection. The combustion air that is fed in is also heated with an integrated pre-heating system, increasing the efficiency of the system.

The P4 Pellet boiler has a central air connection on the back of the boiler. If appropriate supply air and flue gas connections are installed, the boiler can be operated independently of room air as a type C42 or type C82 in the sense of EN 15035.

All output sizes of the P4 Pellet meet the requirements for room air-independent operation. This has been confirmed by tests by TÜV SÜD.

Definitions for room air-independent operation as per EN 15035

Definition of type C4 as per EN 15035:
Boiler that is connected via its combustion air supply and flue gas outlet, with a connecting piece that may be supplied, to a shared chimney with a shaft for combustion air supply and a shaft for flue gas outlet. The mouths of the air and flue gas chimney are either concentric or so close to each other that similar wind conditions apply.

Air is supplied by an air and flue gas system.

Definition of type C8 as per EN 15035:
A boiler that is connected via its combustion air supply and flue gas outlet, with a connecting piece, to a wind protection device and a single or shared chimney.

Air is supplied by a supply air line that is independent from the chimney system.

This design requires a wind protection device. If a protective grating is fitted, you must ensure that the mesh size is sufficiently large to prevent a significant loss of pressure and/or seal from dirt.
If the supply air is routed through other rooms, the line must be covered with materials with fire resistance rating F90.

The second index "2" (C42 / C82) indicates type C boilers with a blower fan behind the combustion chamber or the heat exchanger.

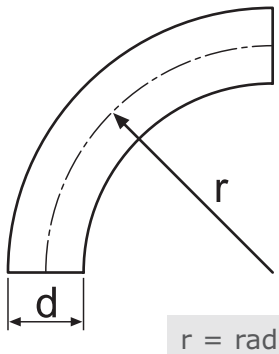
Notes on pipe dimensioning

When dimensioning pipe bends in the supply air line you should note that:

The ratio of the radius of curvature (r) to pipe diameter (d) should be greater than 1:

$$r:d \geq 1$$

For example P4 Pellet 8/15:
- Diameter of supply air connection = 80 mm
- Minimum radius of pipe bends = 80 mm



r = radius of curvature
d = pipe diameter

Install the supply air line in as straight a line as possible and over the shortest path. The number of pipe bends should be kept to a minimum (ideally a maximum of 4 bends).

Also: The resistance of the supply air line can be a maximum of 20 Pa.

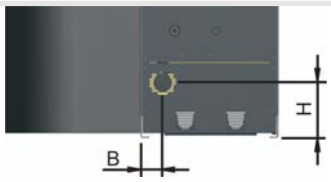
Minimum specification of connection lines

Combustion air supply:
EN 1856-2 - T080 - N2 - D

Flue gas outlet:
EN 1856-2 - T200 - P1 - W

TXXX	... Temperature class (specified in °C)
N2	... Pressure class with test pressure = 20 Pa
P1	... Pressure class with test pressure = 200 Pa
D	... Condensation resistance not required (dry)
W	... Condensation resistance required (damp)

Supply air connections P4 Pellet



Supply air connection - P4 Pellet		8/15	20/25	32/38	48/60
B Distance to edge of boiler	[mm]	100	115	115	170
H Connection height	[mm]	235	230	215	305
Connection - External diameter	[mm]	80	100	125	160

Layered tanks for even greater efficiency

Biomass boilers are almost always combined with a layered tank. This combination has many advantages, including fewer burner starts, reduced wear and lower emissions.

Layered tank recommendation

A layered tank helps the system to minimise burner starts, which lessens wear to the igniter fan and reduces the energy consumption of the system. An optimally dimensioned layered tank increases system runtimes for very low emissions, very low fuel consumption and a higher annual rate of use.

Peak load coverage

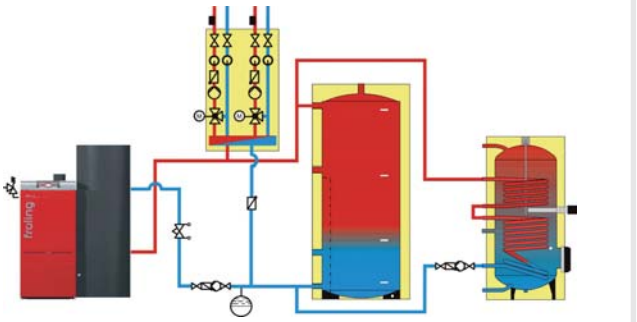
The layered tank also has benefits for peak load coverage. If there is a greater heat requirement briefly, this can be covered for a certain time, depending on the volume of the layered tank. The intelligent concept of the P 3200 boiler controller detects quick heat emission from the system and starts the boiler even before the layered tank runs out of stored heat, so there is no delay in heat supply even for heavily fluctuating hydraulic systems.

Linking other energy sources

A further advantage of linking a layered tank is ease of combination with other energy sources such as solar systems, existing stoves with water pockets etc.

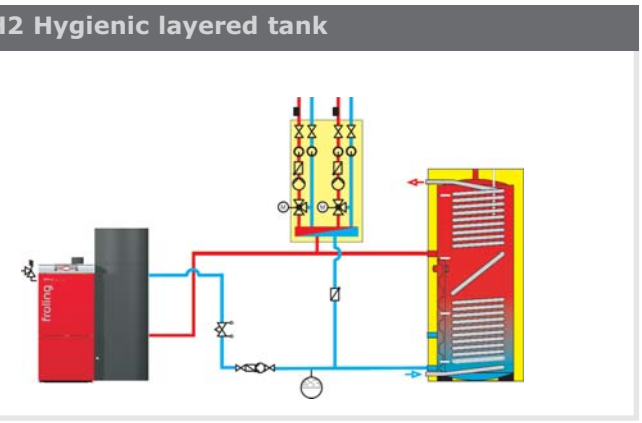
Layered tanks and hot water

Layered tanks and domestic hot water tanks



If, for space reasons, it is not possible to combine a layered tank and domestic hot water tank (see diagram above), Froling also offers layered tanks with integrated element for hygienic domestic hot water preparation.

H2 Hygienic layered tank

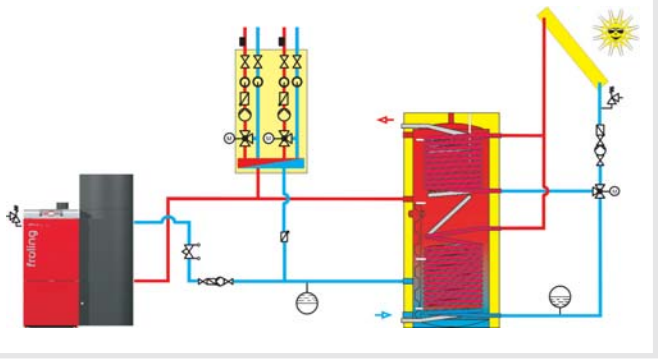


The Froling H2 hygienic layered tank offers this connection option, for hygienic domestic hot water preparation using the flow principle.

Connecting a solar system

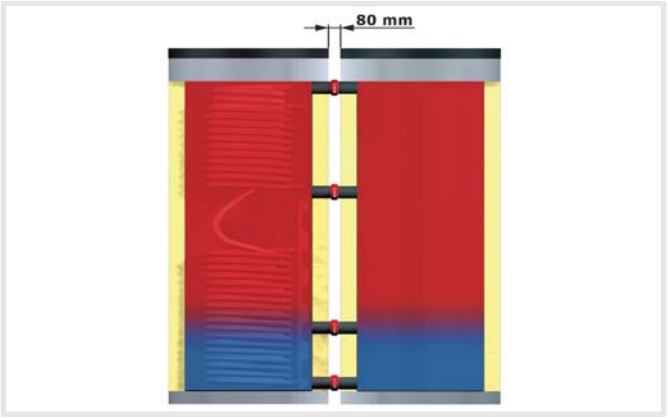
If a solar system is also connected to the system, the Froling H3 hygienic solar layered tank with integrated domestic hot water element and two additional solar elements for domestic hot water and heating support, supports the necessary connection options. This enables optimal system operation, offering a complete solution with minimal space requirements and cost savings over time for maintenance and servicing work.

H3 Hygienic solar layered tank

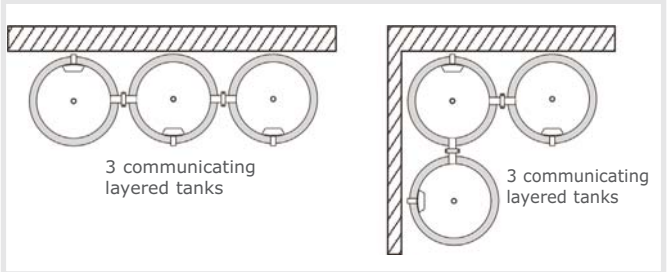


Communicating layered tanks

There is a wide variety of connection options when using one or more layered tanks. If a large layered tank is required due to the boiler output used and the room height in the installation room is too low, up to four communicating layered tanks can be connected in a row. This system has exact temperature layering in all tanks.



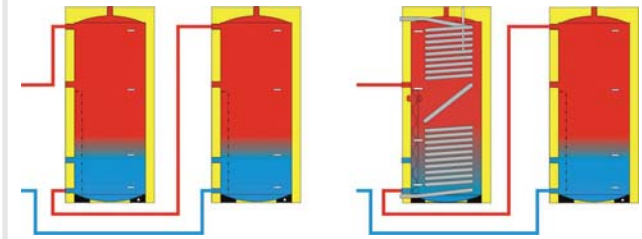
The layered tanks can either be set up in a row or at an angle. In this case the connection couplings are fitted to the layered tank in the middle at an angle of 90°.



Serial connection of layered tanks

Layered tanks are expanded by connecting layered tanks in series, partly because it is possible to connect layered tanks of different sizes and partly because large distances or obstacles can be overcome.
It is also possible to connect a solar system with this system.

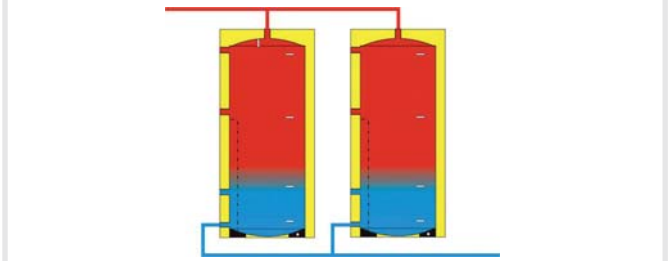
Serial linking



Tichelmann connection

Several layered tanks can also be linked in according to the Tichelmann principle. With this type of connection an optimally regulated system is required to guarantee even charging and emptying of all layered tanks.

Tichelmann connection

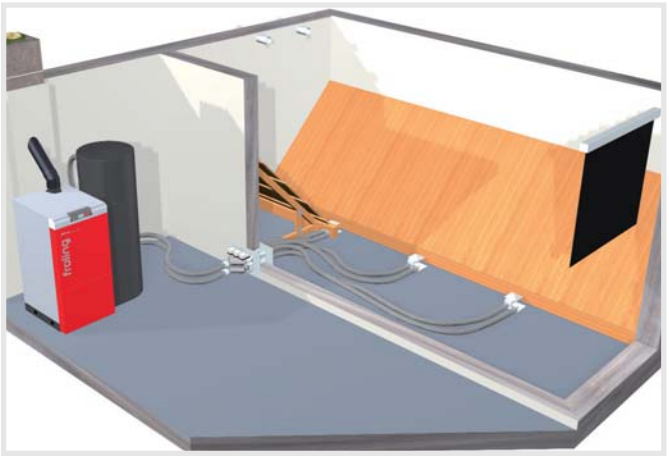


From boiler outputs of 100 kW this system is increasingly used, as the flow and return connections (DN40) at a flow speed of approx. 1 m/s have a flow volume of 4.5 m³/h, which corresponds to an output of approx. 100 kW. If there are several layered tanks the volume flow is divided evenly and boilers with an output of over 100kW can be connected to the system and used.

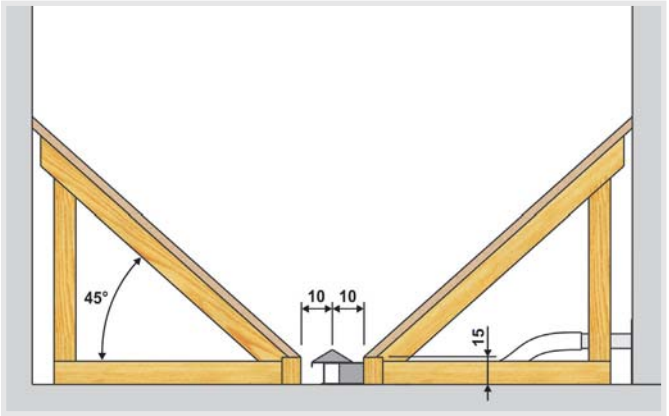
Pellet discharge system from a store

Universal suction system

This system is easy to install and very flexible. The universal suction system can handle even large distances between the store and the boiler room. The position of the suction probes or the transfer unit (pellet box) can be adjusted to fit the conditions of the store optimally. Changeover between suction probes can be manual or automatic.



Notes on store design



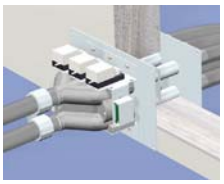
The suction probes must be equidistant and must be fixed to the floor.
The probes must be in the middle between the sloping sides at a distance of 10 cm from the sides. To ensure optimum emptying of the store, the cross-pieces to the left and right of the probes must have a height of 15 cm.

The sloping floor should have an angle of at least 45° and it should have a smooth surface, to guarantee that the pellets slide correctly.

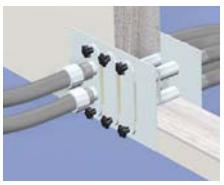
Pellet suction probe

The patented suction probes developed by Froling ensure that emptying is reliable and even. The changeover between the probes can be manual (Eco pellet box) or fully automatic (Komfort pellet box).

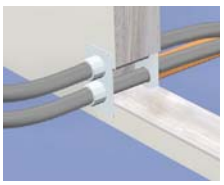
Changeover between probes



Komfort pellet box
The changeover from one suction probe to another is fully automatic and is controlled by three actuators.

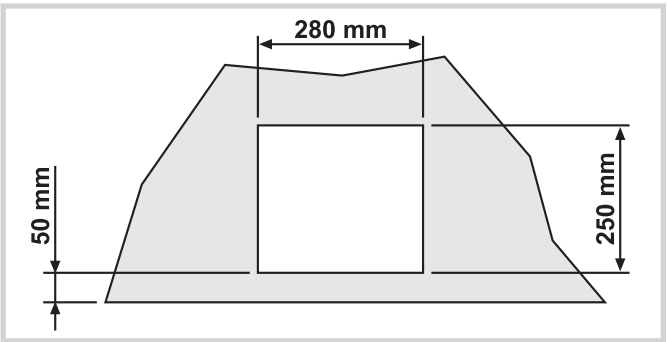


Eco pellet box
The changeover from one suction probe to another is manual and involves simply changing sockets.

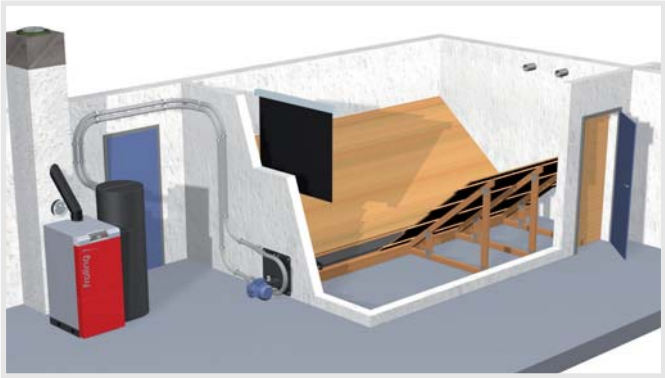


Uno pellet box
There is a version of the universal suction system specially for square rooms with an individual probe.

For the Komfort and Eco pellet boxes, the customer must produce a wall penetration with dimensions of 280 x 250 mm. There should be a distance of at least 50 mm from the finished floor.
For the Uno pellet box two bore holes with a diameter of at least 65mm are sufficient.

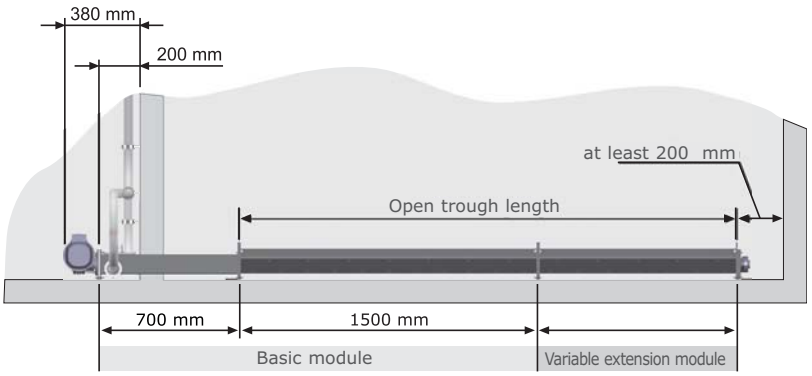


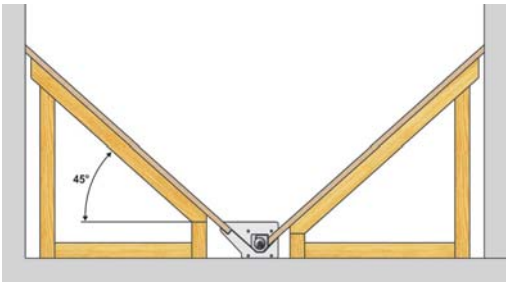
Suction screw system



The Froling suction screw system is the ideal solution for large rectangular rooms with front-end removal. The deep and horizontal position of the discharge screw means the space in the room is used optimally and complete emptying of the store is guaranteed. Combined with a suction system from Froling it also enables flexible boiler setup.

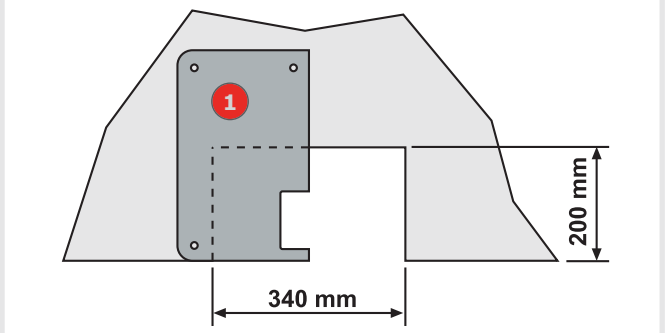
Notes on module selection and store design





Modules	Open trough length in the store							
	1500	2000	2500	3000	3500	4000	4500	5000
Basic module (1500 mm open trough)	4	4	4	4	4	4	4	4
Shaft end	4							
Extension module 500 mm		4						
Extension module 1000 mm			4					
Extension module 1500 mm				4				
Extension module 2000 mm					4			
Extension module 2500 mm						4		
Extension module 3000 mm							4	
Extension module 3500 mm								4

The framework must be able to carry the weight of the pellets and it must not be supported on the discharge duct. The sloping floor should have an angle of at least 45° and it should have a smooth surface, to guarantee that the pellets slide correctly.
A wall penetration of approx. 340 x 200 mm is necessary for positioning, and after installation it is covered by the wall lining (1).



Construction requirements for pellet stores

All walls and load-bearing elements must support the static load. Ceilings and walls should be designed so that the pellets are not damaged or made dirty by abrasion or parts falling off.
The construction requirements should be agreed with a structural engineer. Local fire regulations must be observed.

Clad pipes

Pipes that cannot be removed at justifiable expense and which intersect the path of the pellets during filling should be clad to protect against the flow and prevent breakage (e.g. deflector plate, wooden boarding). The cladding should be designed to divert the pellets without damaging them.

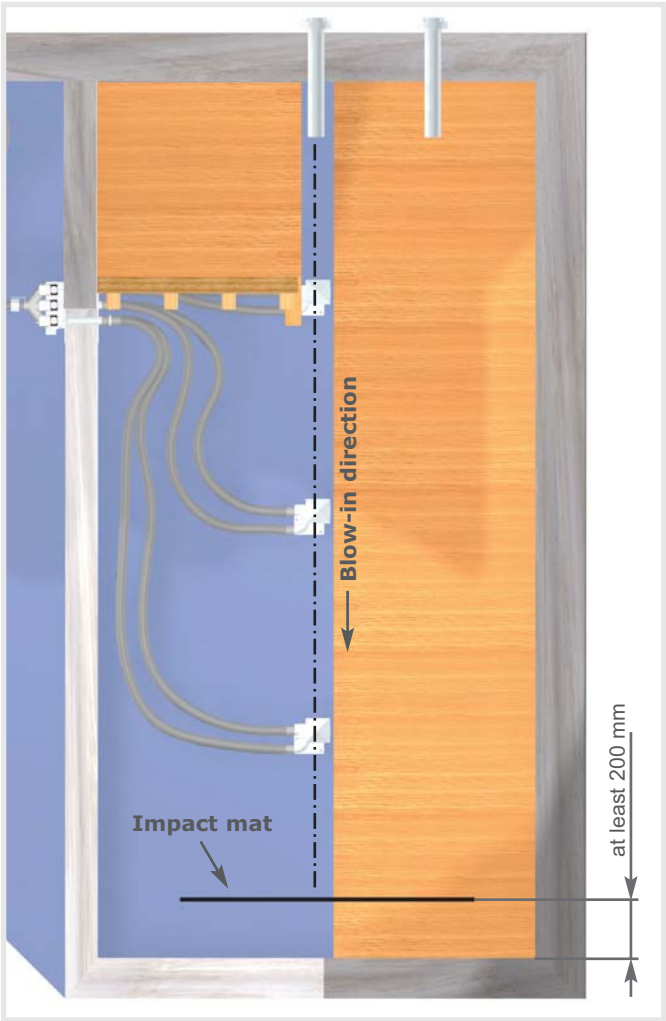
Electrical installations with explosion protection

There must not be any electrical installations such as switches, lights, distribution boxes or other ignition sources in the store. The necessary installations must be installed according to the locally applicable regulations in explosion protected design.

Close the openings to seal out dust

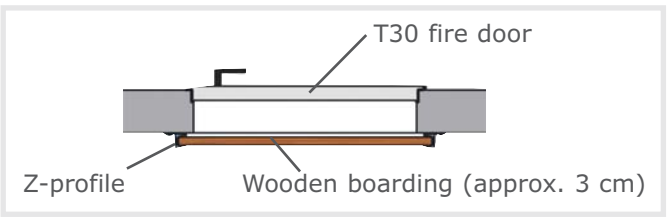
Doors, windows and hatches to the pellet store must open outwards and be provided with a dust-proof seal all the way round, to prevent dust escaping from the store, particularly into other rooms.

Technical equipment of the store



Planking on the store door

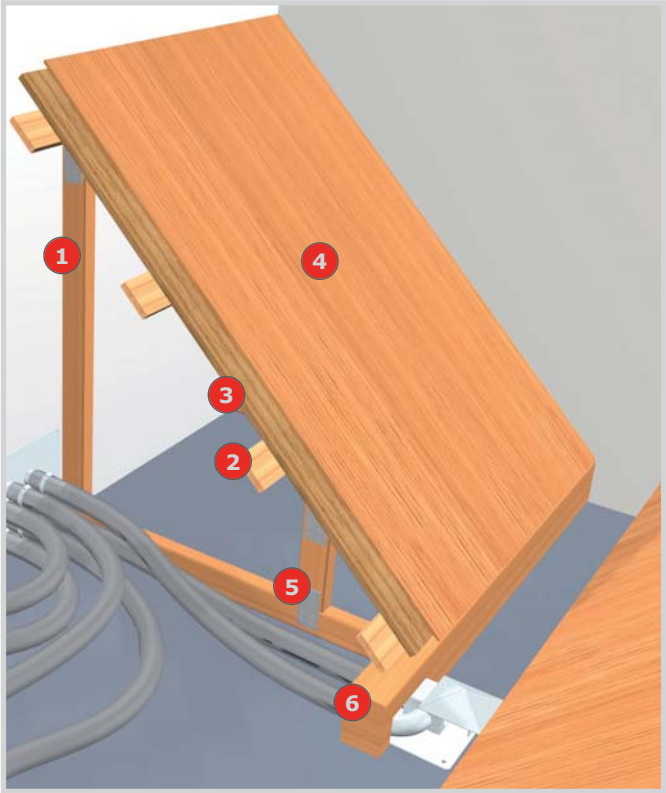
The store door must be a fire door with a Class T30 fire resistance rating; it must have a seal. On the inside of the room you should install wooden boards to stop the pellets pressing against the door. Practice has shown that it is advisable to install an additional inspection window.



Impact mat

The impact mat is made of rubber and should be positioned opposite the filler pipes at least 20 cm from the wall at a right angle to the blow-in direction. During filling the mat stops the pellets from hitting the wall and breaking up. The mat also stops the pellets from knocking plaster or cement rendering off the wall. Froling can supply sections of impact mat measuring 140 x 120 cm.

Sloping floor - Recommendation for dimensioning and design

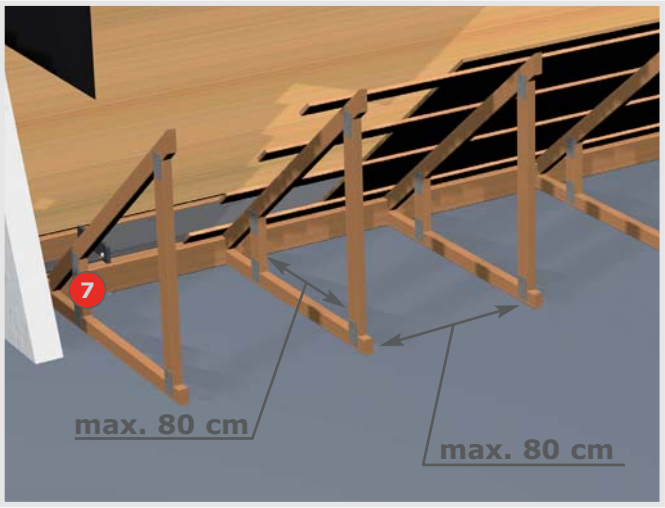


1. Square-timber framework. Wood sizes and the distance between the wooden cross-slats should be chosen according to the static load. (at least square timber 50 x 80 mm)
2. Boarding slats (e.g. 24 mm covering boards)
3. Chipboard underside (or similar)
4. Sloping sides with smooth surface (e.g. Betoplan). If stable plates with a smooth surface are used (e.g. 30 mm cover plates) the underside (3) can be left out.
5. Metal connecting plates (or similar)
6. Cross-piece 100 x 150 mm (for universal suction system)

In order to support the weight of pellets, the sloping sides of the store must have a strong supporting framework.
The framework should be dimensioned so that the sloping sides are not deformed when subject to static loads. A large proportion of the weight must be supported on the floor and it must not be transferred to the surrounding walls. You should remember that 1 m³ of pellets weighs approximately 650 kg.

You should ensure that the pellets can slide down smoothly. This means the sloped floor should be at an angle of at least 45° and have a smooth surface. In order to ensure that the pellets slide downwards smoothly, there should be no edges, projections or steps in the sides.

To prevent any pellets slipping into the empty space below the sloping floor, there should be a seal between the sloping floor and the surrounding walls.



7. Depending on the static load (e.g. excessive distances) intermediate supports may be necessary.

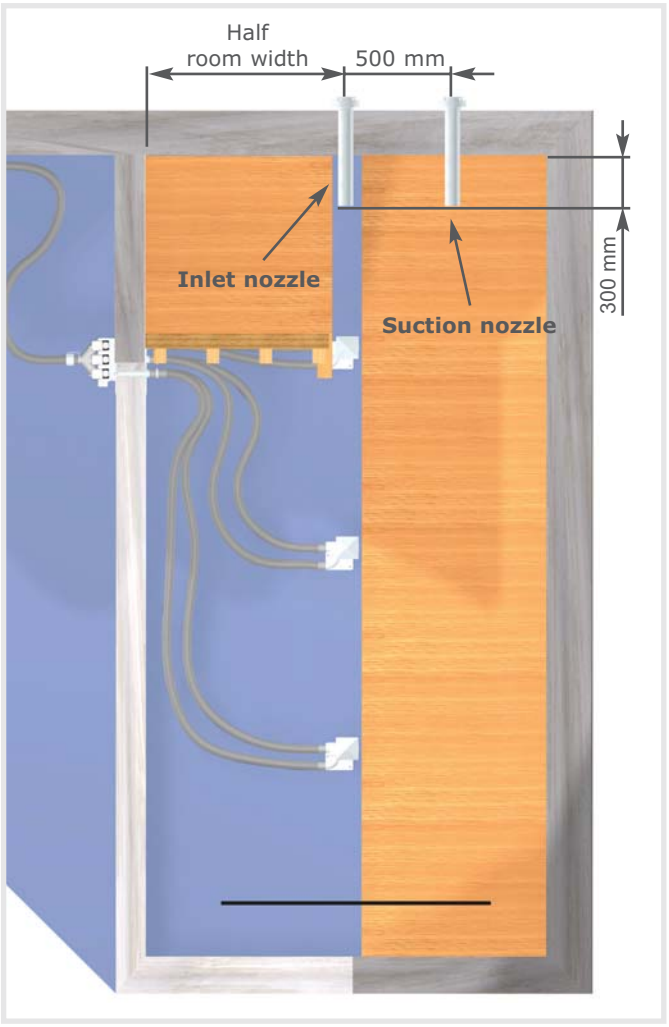
Filler couplings

The filler couplings have Storz Type A - 110 couplings to be fitted when the boiler system is installed. The holes in the wall for the pipes must have a diameter of at least 150 mm. If you are installing the filler pipe in a lighting well you should fit the coupling pipe section with a 45° elbow bend. Both versions are available from Froling in kits complete with a coupling cap and earth screw.

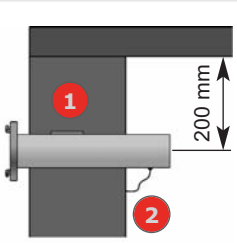
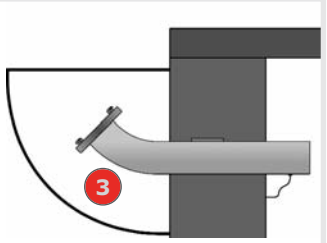
The cap is vented to regulate the concentration of CO in the fuel store. The cap can be secured with a normal padlock to prevent unauthorised opening.

Froling can supply any pipe extensions or 45° bends necessary.

Position of the filler couplings

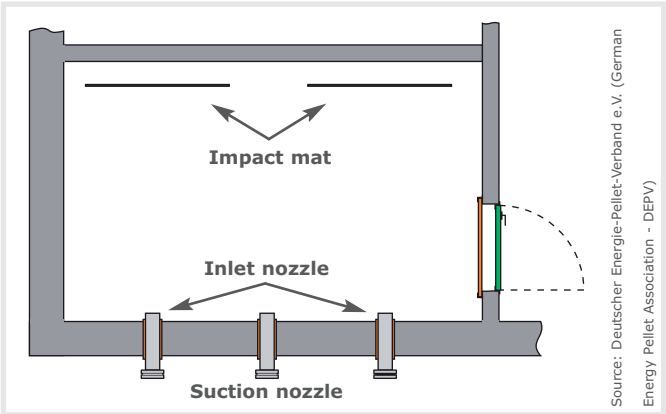


To fix the filler couplings in the masonry, they must be bricked in or cemented in with rotation protection **(1)**. Filler couplings that are fixed in place using foam compounds may be loosened when the filling hose is coupled.
The filler couplings must be earthed **(2)** in order to prevent the build up of electrostatic charge.

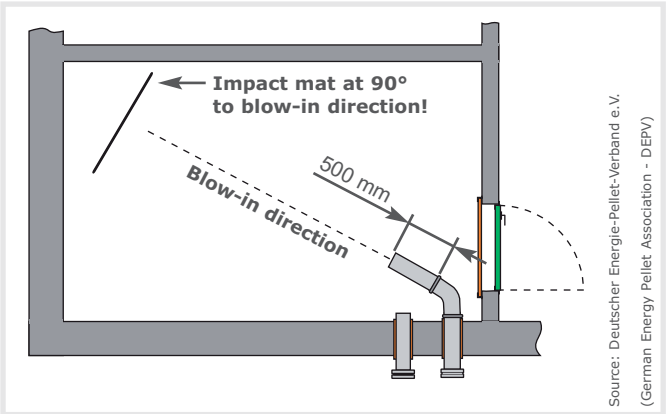
Without lighting well	With lighting well
	

When installing a lighting well, filler couplings with 45° bends **(3)** are used, so the filling hose can be connected in a straight line.

Filler coupling - Examples of special solutions



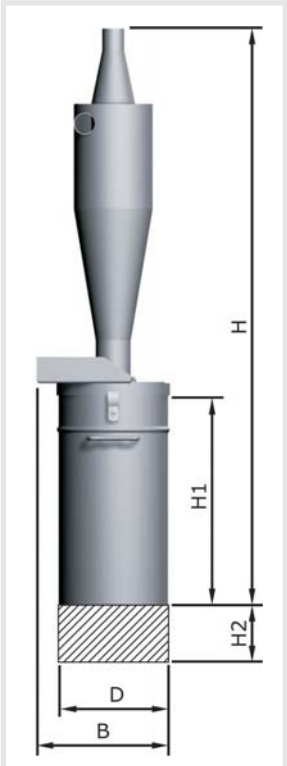
If it is not possible to install the filler couplings on the narrow side of a rectangular room, several inlet nozzles can be positioned with a separation of approx. 1.5 m. An impact mat should be fitted opposite every inlet nozzle. The main disadvantage of this solution is that the filling process must be interrupted to reconnect the filler line.



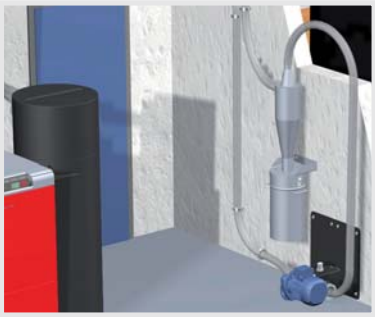
Solutions with an angled inlet nozzle must be built with a settling section of at least 50 cm after the bend and the impact mat must be opposite, perpendicular to the blow-in direction.

In any case, you should consult a specialist company for special solutions.

Suction system accessory: Pellet deduster PST



The PST pellet deduster is fitted in any position in the return air line of the pellet suction system. The suction cyclone design means that the dust particles are separated from the return air and deposited internally. The container is convenient to remove and transport to the emptying point. The system can be retrofitted at any time and it is maintenance-free except for emptying the container.



Technical specifications - PST pellet deduster			
H	Total height of pellet deduster	[mm]	1350
H1	Height of dust container	[mm]	500
H2	Space requirement for removal of dust container	[mm]	100
D	Diameter of dust container	[mm]	250
B	Total width of pellet deduster	[mm]	300
	Total weight of pellet deduster	[kg]	18
	Weight of dust container when empty	[kg]	7
	Weight of dust container when full, approx.	[kg]	13.5

From the P4 Pellet 48 we urgently recommend that you fit the PST pellet deduster as standard to guarantee a long and reliable service life for the boiler system.

Bag silo discharge system

The bag silo system is a flexible, simple way of storing pellets.

There are other advantages to using a bag silo. It is easy to assemble and dustproof. You can fit rainproof and sun proof covers and install the silo outside. The pellets are fed into the hopper of the boiler via the suction box and two flexible hoses. You should position and install the bag silo in conformity with local fire prevention regulations.

Bag silo sizes

The silo size is selected according to the heating load. The following bag silo types are available:

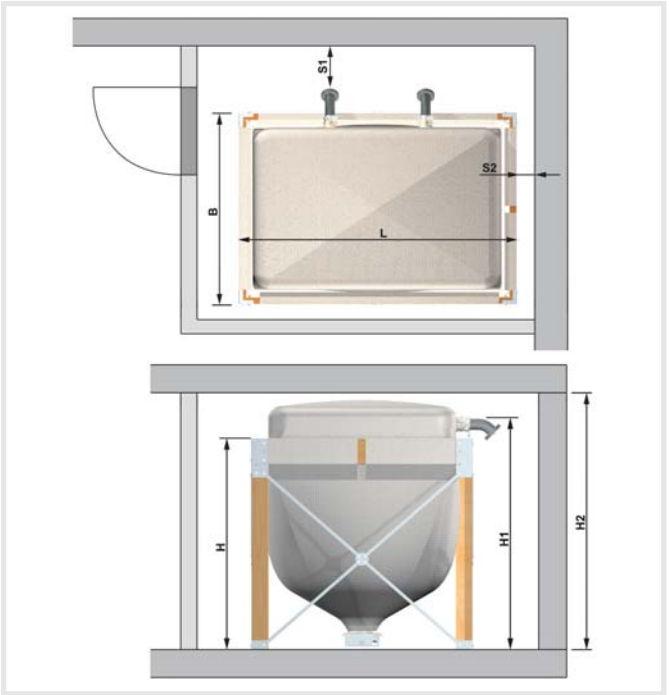
BAG SILO	VOLUME	CAPACITY
TYPE I	4.3 m³	approx. 2.8 t
TYPE II	4.7 m³	approx. 3.1 t
TYPE III	7.3 m³	approx. 4.7 t
TYPE IV	5.3 m³	approx. 3.4 t
TYPE V	6.0 m³	approx. 3.9 t

The specified volume applies to the top edge of the frame. The capacity corresponds to the tonnage calculated with a specific pellet weight of 650 kg/m³.

Large bag silo types (Type III, Type IV and Type V) have two filler couplings, to guarantee optimal use of the volume.

The second filler coupling is not used to connect a suction device!

Dimensions and minimum distances in the installation room



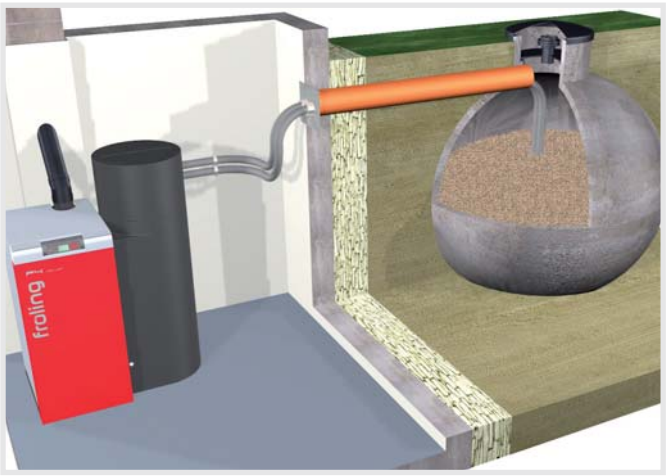
	TYPE I	TYPE II	TYPE	TYPE IV	TYPE V
B	200	230	290	200	230
L	200	230	290	290	290
S1	at least 30				
S2	at least 10				
H	185		190		
H1	215		220		
H2	230[2)]				

All dimensions in cm.

2) When full, the bag silo forms a "hood" shape. The ideal height shown is for a bag silo completely filled with pellets with a loose bulk density of 650kg/m³

Underground tank discharge system

If you have no storage space indoors then the underground tank is a good alternative. The underground tank is buried outside the building in the ground. The pellets are fed to the boiler using a suction line. The suction pipes should be laid inside a hollow pipe from the underground tank to the building. Filling takes place through a shaft installed above the pellet tank.



You should consult Froling to ensure that your system will work correctly with a discharge system from a third party manufacturer.

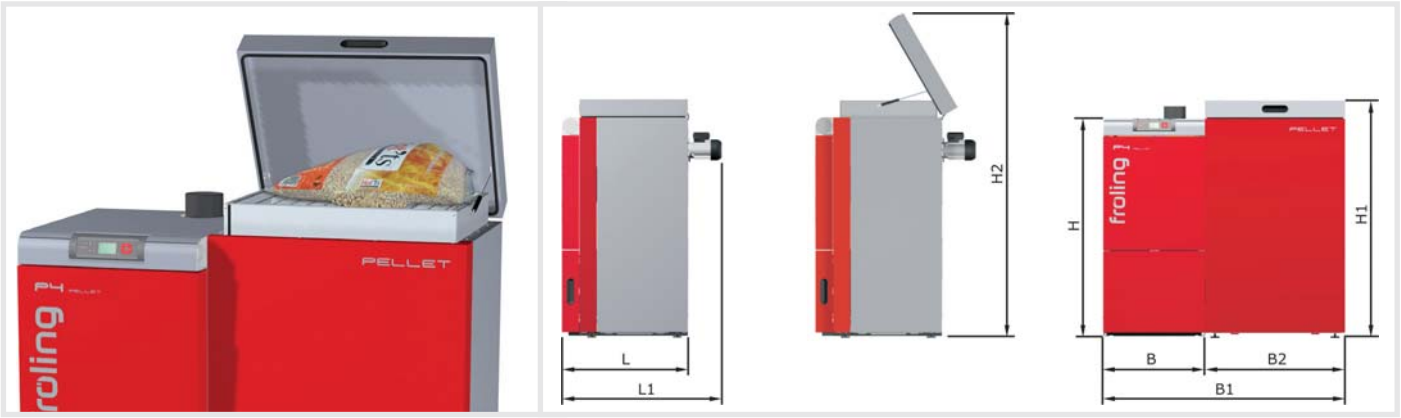
Control of third party discharge units

To offer the customer even more flexibility, the Lambdatronic has been specially tested for controlling third party discharge units with the latest systems.

The connections are made available by adding an additional board.

Supply bin

If it is not possible to set up a store, a supply bin is the perfect alternative. The modular construction means that an automatic feed system can be retrofitted at any time.



Dimensions and data			P4 Pellet 8	P4 Pellet 15	P4 Pellet 20	P4 Pellet 25
L	Length of boiler	[mm]	740	740	740	740
L1	Length inc. induced draught fan	[mm]	940	940	940	940
B	Width of boiler	[mm]	600	600	770	770
B1	Width inc. supply bin	[mm]	1425	1425	1595	1595
B2	Width of supply bin	[mm]	825	825	825	825
H	Height of boiler	[mm]	1280	1280	1280	1280
H1	Height of supply bin	[mm]	1400	1400	1400	1400
H2	Height of supply bin when open	[mm]	1890	1890	1890	1890
	Capacity	[L]	235	235	235	235
	Total weight inc. boiler	[kg]	396	406	470	480

Functions of the Lambdatronic P 3200

Lambdatronic P 3200 controller

The Lambdatronic P 3200 microprocessor controller regulates the fuel transport and combustion sequence of the P4 Pellet.

The control unit is optimised to fit requirements, with an individually adjustable viewing angle to guarantee that all operating statuses are clearly shown. The important functions can be selected simply by pressing a button.

Heating circuit control

Connections for two heating circuit pumps, two mixers and two flow sensors are available to the heating circuit controller on the basic board (core module).
The heating circuits are weather-activated by default. The flow temperature is established on the basis of the outside temperature and the specified heating curve. Analogue room sensors can optionally be installed for each heating circuit, so you can influence the room temperature. For even more convenience, Froling allows you to connect digital room consoles via a bus system.

Hot water, storage tank, solar

Standard delivery includes a hydraulic module, which has two pump outputs that can be configured as required and six sensor inputs, for controlling layered tank charging, hot water preparation and oil boiler or solar connection.
With a pump output on the core module, a total of three pump outputs are available in the standard delivery.

As the boiler can be operated variably, the sensors for the layered tank are not included in standard delivery.

Components of the Lambdatronic P 3200

Core module (standard):
The basic board of the Lambdatronic with connections for the combustion control sensors and the peripheral expansion modules. Connections for two heating circuits are available for heating circuit control.

Pellet module (standard):
Expansion board for connections for hardware components for pellet feed and pellet combustion.

Hydraulic module (standard):
Expansion board for connecting sensors and pumps for hydraulic components of the system (DHW tank, storage tank, ...).
A hydraulic module is included in delivery. The system can be expanded with seven additional modules depending on requirements.

Contact sensor (standard):
Sensor for the heating circuit controller. One unit is included in delivery. An additional sensor is required for the second heating circuit.

Immersion sensor (standard):
Sensor for connection to the hydraulic module. One unit is included in delivery for DHW tank management.

Pellet module expansion (optional):
Expansion board for connecting discharge systems from third party manufacturers or for controlling a room air flap.

Heating circuit module (optional):
Expansion board for controlling two further heating circuits (including a contact sensor). The system can be expanded with eight additional modules depending on requirements.

Storage tank management (optional):
Two immersion sensors for evaluation of a layered tank.

Collector sensor (optional):
Sensor for the solar controller.

Carrying out hydraulic balancing

Hydraulic balancing should be carried out to ensure that the heating system is supplied with the necessary amount of water / heat. It is particularly important to adjust the flow volume in the pipe network and the pump output during the balancing, to prevent faults such as undersupply, excessive quantities of water or flow noises.

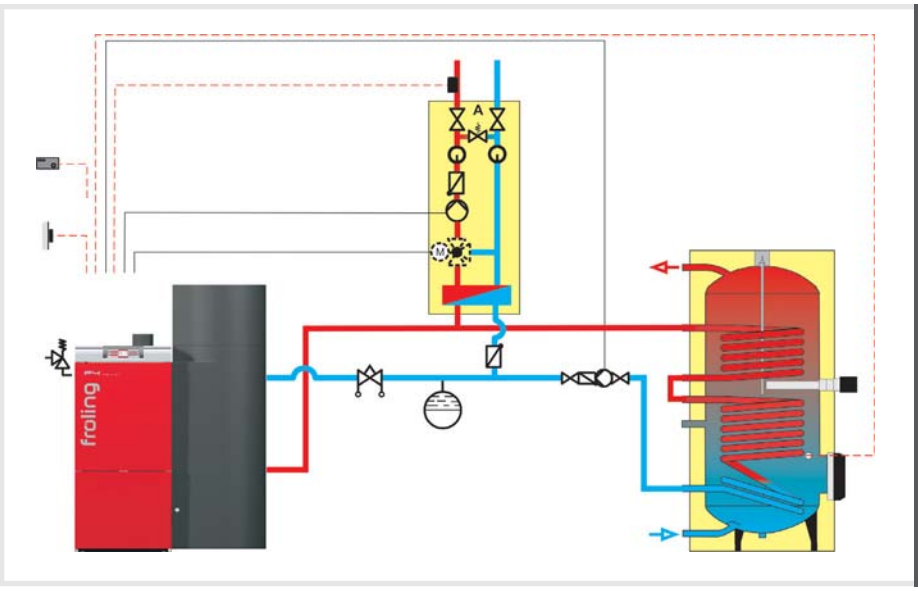
Thermostat valves without presets (just thermostat heads) do not represent hydraulic balancing.

Floor heating with vapour-permeable pipes

When the boiler is connected to floor heating with oxygen-permeable (vapour-permeable) heating pipes (DIN 2746) a system separation should be installed in the hydraulic system. The separation prevents air entering the system.

Connection example of the controller in the standard delivery

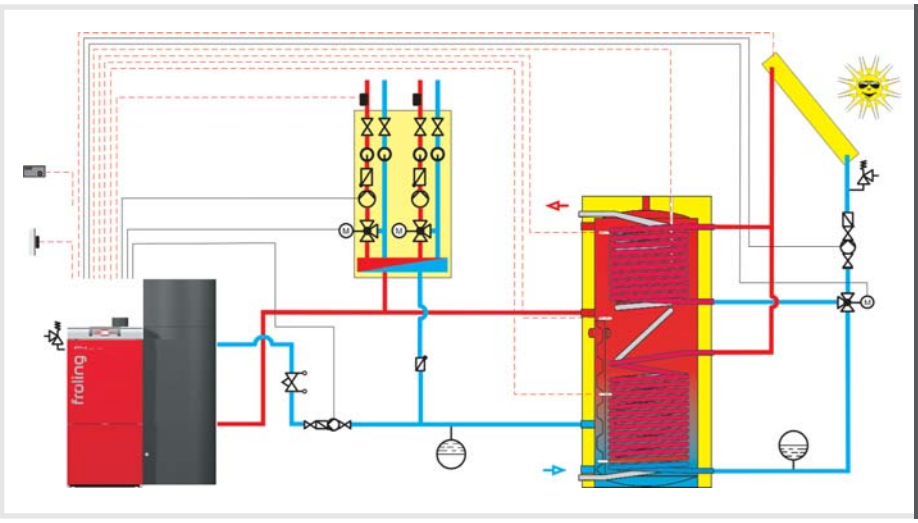
It is possible to control a water heater and a weather-activated heating circuit with the system provided in the standard delivery. With an additional contact sensor, the system can optionally be expanded to two weather-activated heating circuits.
With this system particular attention should be paid to the minimum flow volume of the boiler (e.g. using a relief valve).
The flow volumes should be taken from the technical specifications. (Page 11 or 17)



P4 Pellet with Unicell NT-S

Connection example of controller with extra sensor

With storage tank management, an additional contact sensor, a collector sensor and two immersion sensors, the system can easily be expanded to include two heating circuits and a hygienic layered tank with solar connection.



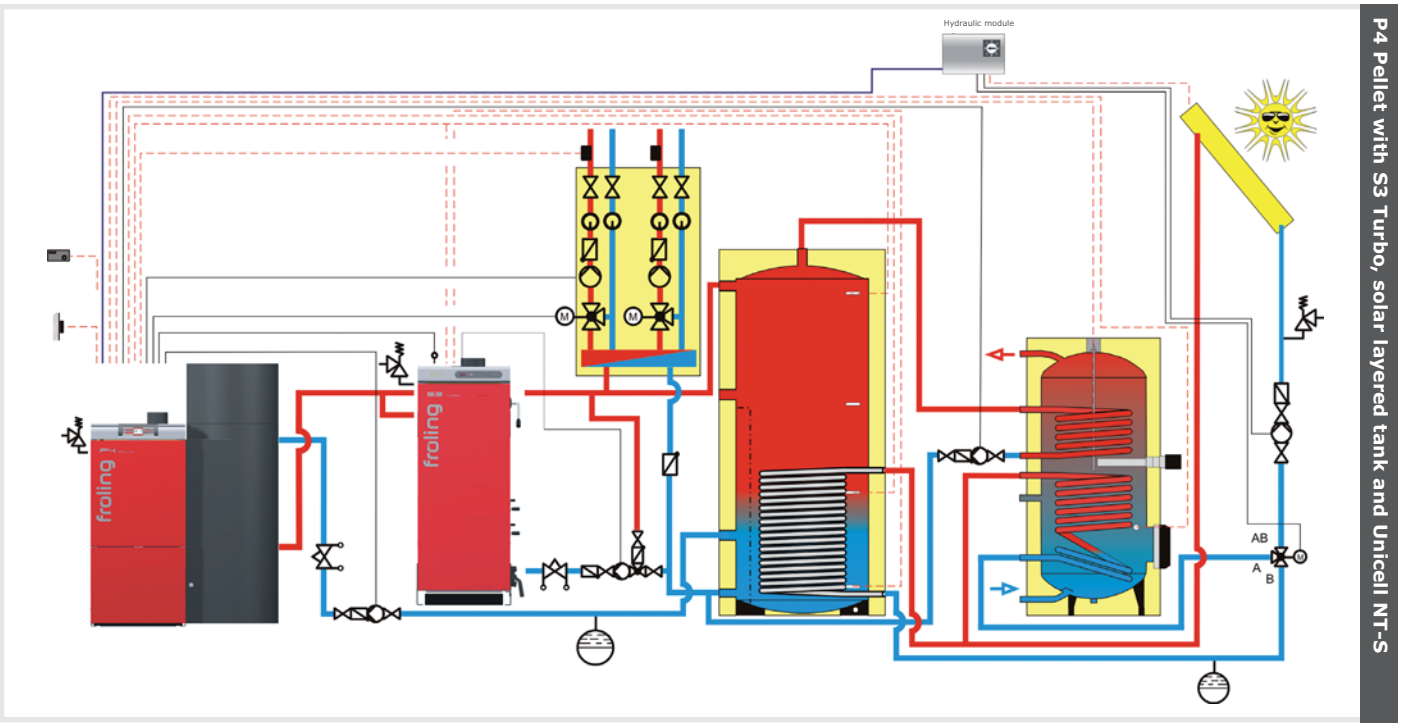
P4 Pellet with H3 and link to solar panel system

Module expansion and multiple house system

Efficient energy management through module expansion

The control concept of the Lambdatronic P 3200 has a modular structure to cover even highly demanding systems. This makes it possible to connect and control up to eight additional heating circuit modules with two heating circuits each. With the heating circuit controller that is integrated to the core module, it is possible to connect 18 heating circuits to the system.

To control the necessary number of hot water tanks, solar systems, feeder pumps etc. there is the option of connecting seven further hydraulic modules (one unit is already included in delivery). With the maximum expansion of eight hydraulic modules, 16 pumps can be controlled and 48 sensors can be analysed.



P4 Pellet with S3 Turbo, solar layered tank and Unicell NT-S

Solar heat meter

If a return sensor is also fitted at the solar system, the heat meter that is already integrated to the controller can give a reference for calculating the economy of the solar system. The daily yield and the total yield of the solar system are analysed, among other factors.

Comprehensive planning documents

It is important to have the correct number of modules so the individual systems can be implemented.

Froling offers a wide range of energy system brochures for correct system planning.

A Froling technician will be happy to help you with problem solving.

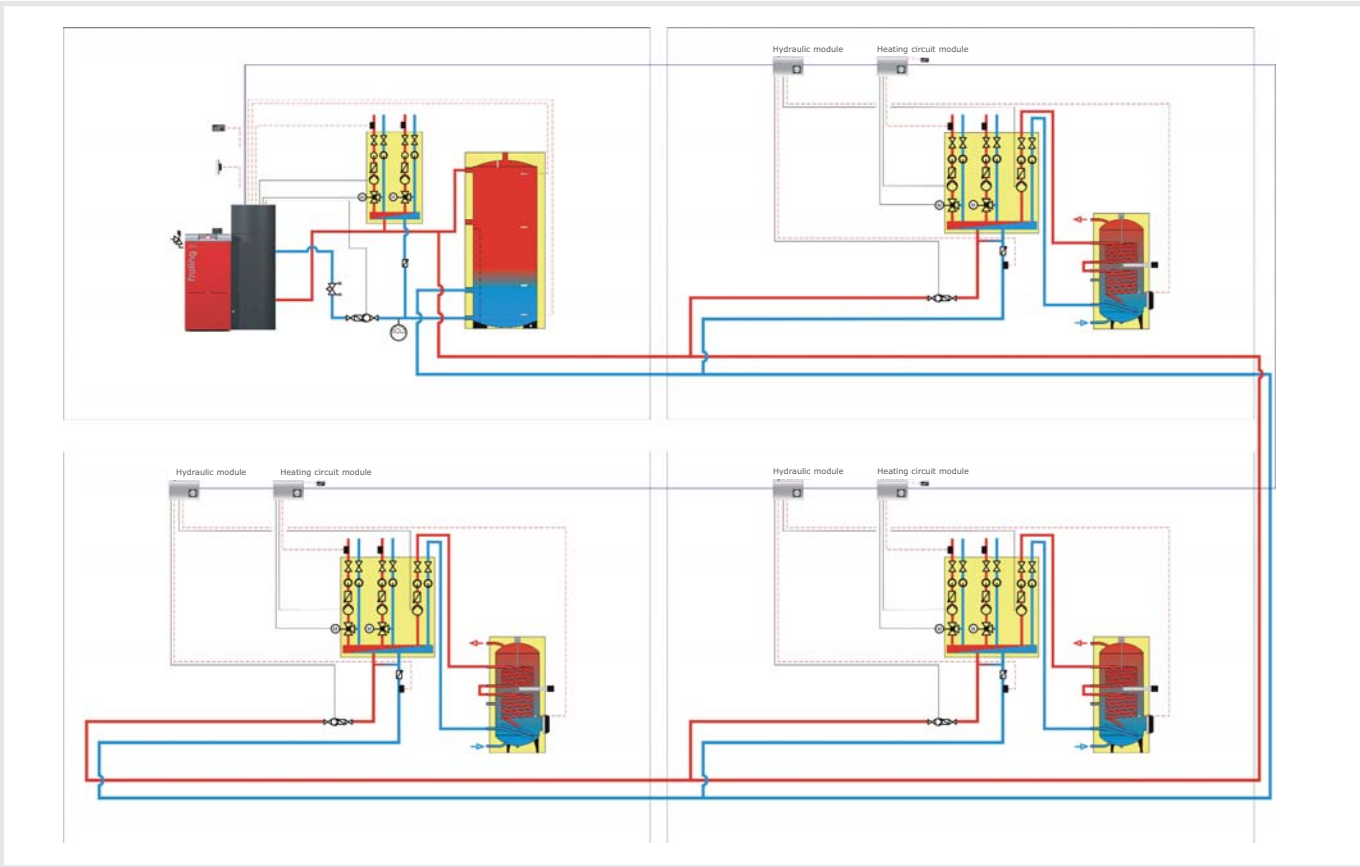
Micro-network - Heat distribution in multiple house systems

Supply using a feeder pump

A feeder pump is allocated to every building. The pump is only activated when heat is requested. The speed regulation with the return sensor prevents excessive circulation in the remote line.

Supply using a network pump

The network pump is activated when a building in the system requests heat. Every building to be supplied is allocated a zone valve, which controls the heat distribution. The speed of the network pump is regulated according to the reduction using a network return sensor.



The Lambdatronic can control four layered tanks and four feeder pumps.. A maximum of four buildings can be controlled in total. There is also the option of connecting a solar system, and the position in the system is flexible (building 1, building 2 ...).

Variant 1

To set the controller for a multiple house system, this variant should be set during commissioning. Five different variables are possible.
Variant 1 is set if there are no layered tanks in any of the buildings. The boiler must start every time heat is required in the system.

Variant 2

You should set variant 2 if there is a layered tank at the boiler, but not in any of the buildings to be supplied. The system is supplied from the layered tank and the boiler only starts when the layered tank requests heat.

Variant 3

If a layered tank is also used at the boiler or in one or more of the buildings that are supplied you should set variant 3. The layered tank at the boiler supplies heat to the individual layered tanks in the buildings, which in turn supply the consumers in the building.

Variant 4

In variant 4 a layered tank is used in all the buildings that are supplied and there is no layered tank at the boiler. Boiler start requests come from the individual layered tanks. To keep the number of burner starts as low as possible, check the controller after charging a tank, to see if another building might also require heat.

Variant 5

Variant 5 is the same as variant 2 for the controller. The only difference between the variants is the system separation between the individual buildings. You can select "Variant 2 and 5" under the boiler parameters.

Multiple boiler systems with Froling cascade controller

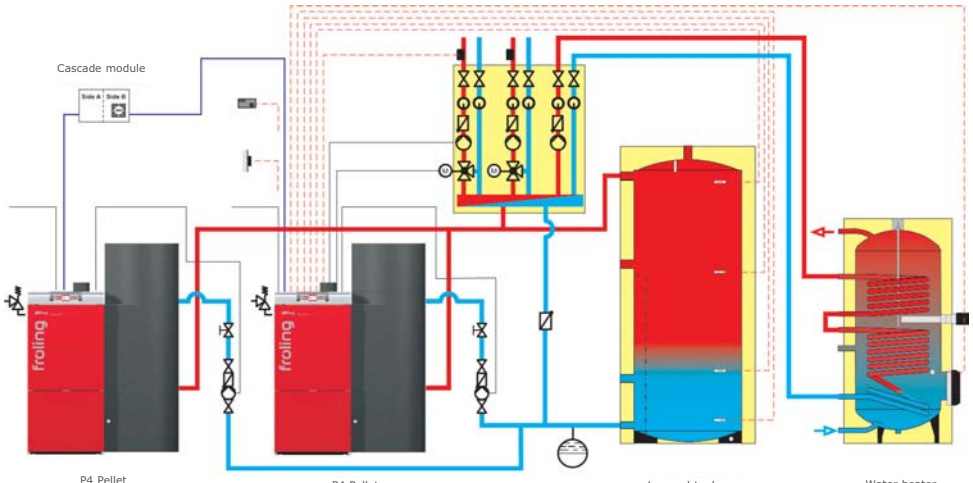
For larger buildings, such as hotels or public buildings, the heat requirement fluctuates considerably. Froling offers the necessary flexibility with a cascade. With this intelligent solution, a cascade module can be added to combine up to four P4 Pellet boilers together, reliably providing a total output of up to 240kW. One advantage is the increased reliability of operation, as the heat is provided by several boilers. You can also see the advantages of a cascade during the warm months. If the heat requirements is low, one boiler is often sufficient for hot water preparation.

Boiler control by priority

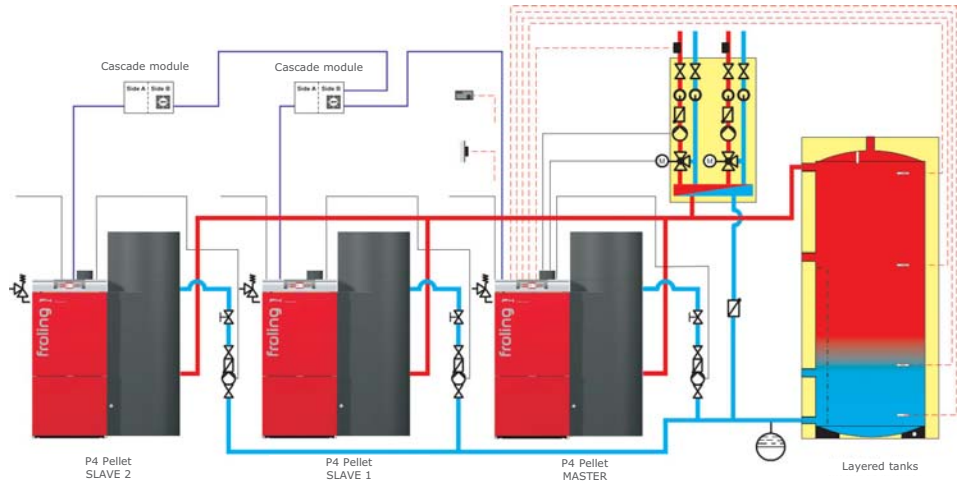
If two or more boiler systems with different rated heat outputs are used, different start priorities are given, so it is not the boiler with the highest rated heat output that starts first, but rather the boiler with sufficient heat output for the current task, e.g domestic hot water preparation. If boilers with the same rated heat output are used and each boiler is given the same start priority, the operating hours are used as a start criterion. This means the load is shared evenly and the heating solution is highly efficient.

Observing flow volumes

Because of the water quantities, with multiple boiler systems that have a total output >100 kW you should ensure that the connections to the standard layered tank (DN40) have a high enough flow rate. In this case special layered tanks with large connections (Froling Heating tank SL) should be used. Alternatively you can connect standard layered tanks using the Tichelmann principle (see page 25).



Two P4 Pellets with layered tank and Unicell



Three P4 Pellets with layered tank

Expansion with external control options

Froling offers a wide range of components for external operation of the Lambdatronic P 3200.

Analogue room sensor FRA

You can set the most important modes for the allocated heating circuits simply using the Froling room sensor FRA. Fine adjustments to the desired room temperature are made using the adjusting wheel, allowing changes to the room temperature of up to ± 3°C.

Digital room console RBG 3200

With the Froling digital room console RBG 3200 you can navigate the heating system conveniently from your living space.
You can read all the important values and status messages and all the settings are available at the push of a button. The RBG 3200 can be connected anywhere in the building using the bus system.

Froling SMS box

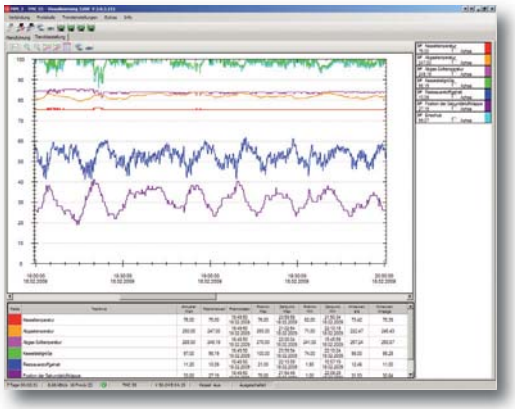
The Froling SMS box offers the option of monitoring and controlling the boiler by SMS. There are two error message inputs and two remote switch outputs, which can be programmed directly from a mobile phone. The functions of the SMS box can range from switching the system on and off to changing from setback mode to party mode (only in connection with room sensor). An automatic response by SMS confirms that the command sent has been carried out.

Froling display software 3200

The optional boiler display software lets you control the boiler easily from a computer. The standard Windows interface and the clear menu structure guarantee ease of use.

Functions of the display software 3200

Display software for showing process images and settings for the heating system, trend recognition and recording current values on the PC.



All adjustable parameters can be entered using the keyboard, checked immediately on the screen and saved in a file if necessary.

Possible types of connection to the boiler

- serial interface
- Network
- Modem

It is possible to connect to the boiler display software over the telephone network using a modem. This means that the heating system can be monitored from any location.
It is also possible for Froling customer services to carry out remote diagnostics on problems.

Better heating with pellet systems from Froling

Further technical details upon request.
We will be pleased to assist and advise you.

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