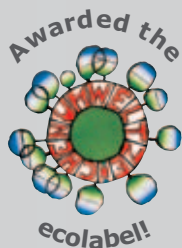




Planning documents

# Turbomatic

TMC 28-100



# Better heating with wood chips



Right from the beginning, Froling has specialised in the efficient use of wood as an energy source. Today the Froling name stands for modern biomass heating technology. Our firewood, wood chip and pellet boilers are used successfully across Europe. All products are produced at our own factories in Austria and Germany. Froling's service network has excellent coverage, ensuring we can deal with queries quickly.

Wood chip boilers from the Turbomatic are not just fully automatic and highly efficient. Froling also offers a complete range of products, including fuel feeder systems to fit almost all requirements.

These planning documents will show you the great advances which have been made in modern wood heating. Our mission is to provide our installers and customers with full technical support and assistance right from the start, from the design stage onwards. This ensures that each Froling system is optimised to meet the individual requirements of each user. This document contains all the detailed information necessary. Here you will find everything from boiler technical data through pellet storage to hydraulic connections.



The data in this brochure represents the current state-of-the-art in woodchip and pellet heating. We operate a policy of continuous improvement and reserve the right to make changes without prior notice. Regional regulations for emissions, fire prevention and feeder systems should also be observed.

Grieskirchen, January 2009

## Turbomatic - the all-round star!

User-friendly, robust, economical and safe:  
The Froeling Turbomatic lives up to all of these fine qualities. With its intelligent fully automatic system, you will be impressed by the versatility of this boiler.

Whether you are using wood chips, shavings or pellets, the Turbomatic processes these fuels optimally. In emergencies you can even burn firewood in a few easy steps once a special grate has been installed, which means the Froeling Turbomatic can ensure safe, high-quality heating!



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# Wood chips

## Wood chips - Energy from domestic forests



Wood chips are a fuel that is domestically produced, unaffected by crises, and environmentally friendly. The production of wood chips also guarantees domestic jobs. That is why wood chips are the perfect fuel, not just economically, but also from an ecological perspective.

Scrap wood in the form of branches, treetops and sawmill waste is broken down to wood chips with shredders. Depending on the wood used, there are various quality classes.

### Permitted wood chips

To achieve the best values when burning wood chips in our Turbomatic series boilers, only certain quality classes were used:

**Austria:** Woodchips as per ÖNORM M 7133 with water content W20 / W30 and size G30 / G50

**Germany:** Wood chips with an edge length of 50 mm in accordance with fuel class 4 (§3 - 1.BImSchV) and ÖNORM M 7133

### Piece size

<b>G30</b>	Fine wood chips	<b>1 - 3 cm</b>
<b>G50</b>	Medium wood chips	<b>3 - 5 cm</b>
<b>G100</b>	Coarse wood chips	<b>5 - 10 cm</b>

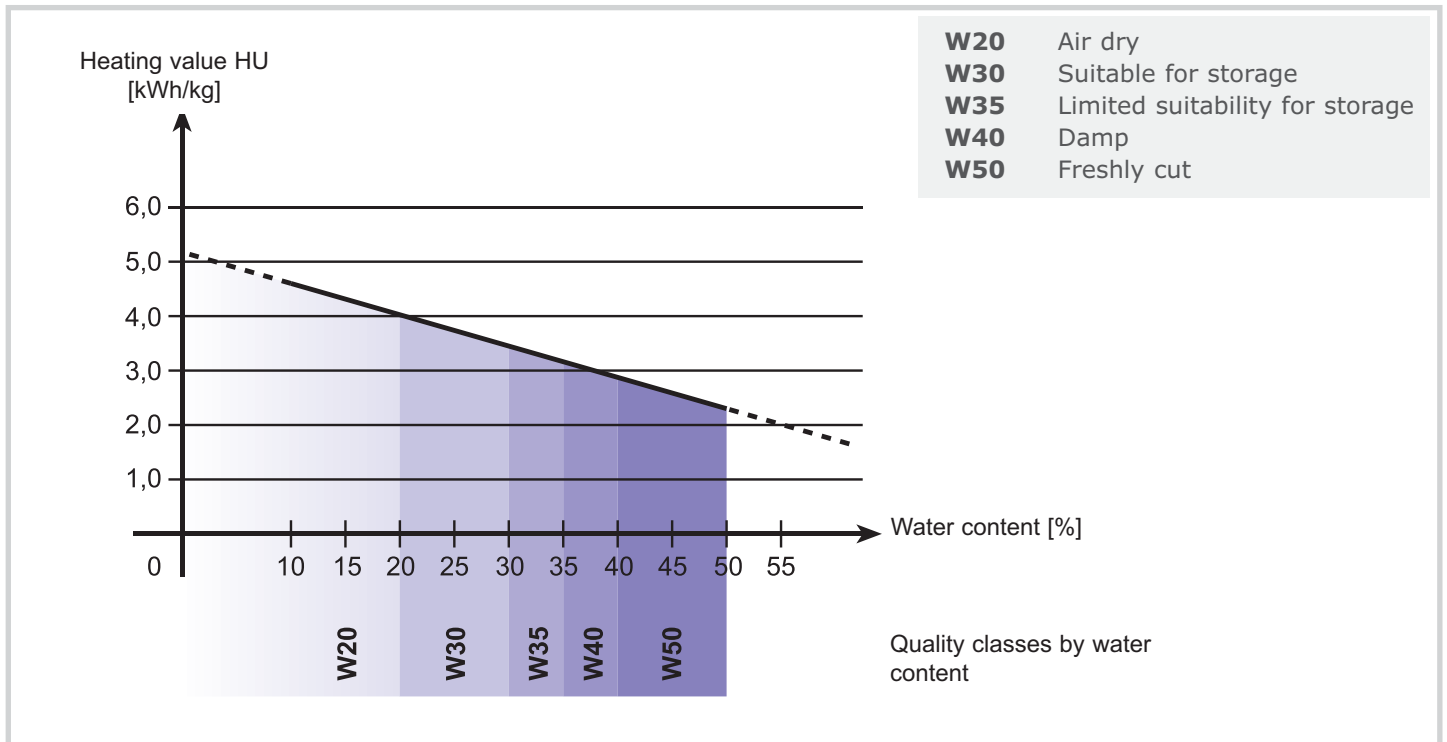
Wood chips are divided into 3 sizes. Using fine woodchips guarantees short runtimes for the feed screws and better venting, reducing the risk of faults.

The following table shows a summary of wood chip classes as per ÖNORM M 7133:

	G30 wood chips	G50 wood chips	G100 wood chips
<b>Fine</b>	max. 20% width < 2.8 mm max. 4% finest material width < 1 mm	max. 20% width < 5.6 mm max. 4% finest material width < 1 mm	This fuel is most commonly used in large systems or for manual boiler infeed.
<b>Main</b>	60 to 100% width 2.8 - 16 mm max. length 30 mm	60 to 100% width 5.6 - 31.5 mm max. length 50 mm	
<b>Coarse</b>	max. 20% max. cross-section 3 cm <sup>2</sup> max. length 8.5 mm	max. 20% max. cross-section 5 cm <sup>2</sup> max. length 12 mm	

## Water content

The water content plays an important role in determining the quality of the wood chips. The higher the water content of the wood, the lower the calorific value. The heating value is increased by appropriate storage.



## Wood chip conversion factors

The usual units of measurement in the forestry and timber business are **solid cubic metres** for round timber and **stacked cubic metres** for stacked wood up to 2m in length. For wood chips, the term **cubic metre loose material** is used. The conversion factors are based on softwood wood chips of size G30 and water content W30.

**1 m<sup>3</sup> loose** a cubic metre loose material  
**1 m<sup>3</sup> stacked** a cubic metre of stacked material  
**1 m<sup>3</sup> solid** a solid cubic metre (without gaps)

**1 m<sup>3</sup> stacked** wood = **1.8 - 2.2 m<sup>3</sup> loose** wood chips  
**1 m<sup>3</sup> solid** wood = **2.5 - 3.0 m<sup>3</sup> loose** wood chips

**1 m<sup>3</sup> loose** wood chips = **210 - 250 kg**  
**1 m<sup>3</sup> loose** wood chips = approx. **65 - 75 Litres** extra light heating oil

**1 kg** wood chips = approx. **3.5 kWh**  
**1 Litre** heating oil = approx. **10 kWh**

# Pellets and other

## Wood pellets - the fuel of the future



2 kg Pellets	.....	approx. 1 Litre heating oil
1 m <sup>3</sup> of pellets	.....	approx. 650 kg

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<sup>3</sup> of pellets weighs about 650 kg.

Pellets are delivered by a tanker, which unloads the pellets directly into the your wood store. When you buy pellets you should pay particular attention to the quality offered. Only use pellets from an approved manufacturer certified to the latest standards. This is your guarantee of pellet quality.

## Permitted pellets

### In Austria the following standards apply:

Pellets approved as per ÖNORM M 7135 standard and/or DIN*plus* standard

### In Germany the following standards apply:

Pellets as per DIN 51731, Certification Scheme DIN*plus* and/or ÖNORM M 7135 standard

## Changing over to pellets

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 it will be necessary to have the chimney examined and approved by a specialist.

## Official support for wood-fired heating

Regional governments have support programmes for encouraging the 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](http://www.froeling.com).

## Sawdust - a valuable raw material

The waste that is produced when wood is processed, in the form of sawdust and wood shavings, should not be burnt on its own because of its low loose bulk density. In practice it is most commonly used as an ingredient in woodchips or pellets.



**It is still important to note that, as a general rule, wood shavings and carpentry waste should only be used in systems with a rotary valve.**

## Miscanthus - Reeds for heating

Switchgrass or elephant grass (Latin name: miscanthus) is a plant from the Poaceae family native to south-east Asia.

Miscanthus is a C4 plant, which has a higher growth rate than the C3 plants native to western Europe. This fast-growing plant grows up to 3 metres high and is increasingly used as a fuel because of its high calorific value and small carbon footprint.



The low heat output per cubic metre means that with miscanthus the full rated output of the boiler cannot be reached.. The boiler should have the appropriate dimensions to make up for the lower heat output. In practice, experience indicates a reduction of about 30% in output.



**The regional regulations for burning miscanthus should be observed. You may have to get individual authorisation to operate this type of system.**

# The right combination

## 1. Which boiler size?

As a general rule, the boiler size is set on the basis of the building heat requirement calculated by the heating engineer plus 20%. The supplement is necessary to compensate for the drop in output from the boiler with low quality wood chips (water content > 25%), and for the necessary interruptions for cleaning intervals. For systems requiring a high constant output (e.g. constant load boiler in multi-boiler systems, 24 hour full load, ...), the model with the next highest output should be used for functional reasons.

### Practical example:

Duplex, 520 m<sup>2</sup>, solid construction and windows with a good K-value.

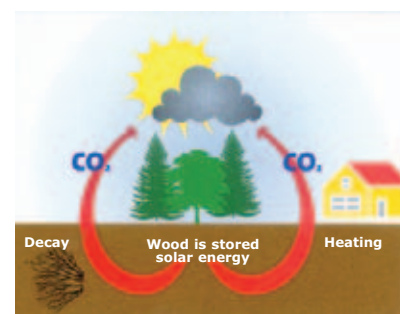
Building heat requirement calculated by expert: approx. 70 W/m<sup>2</sup>

Boiler rating = Area x calculated building heat requirement + 20% supplement  
= 520 m<sup>2</sup> x 70 W/m<sup>2</sup> + 20%  
= 36,400 W + 7,280 W  
= 43,680 W

The ideal boiler for this output requirement is the **Turbomatic TMC 48**.

## 2. Which fuel?

When trees grow they take carbon dioxide (CO<sub>2</sub>) out of the air. When wood is burnt, this CO<sub>2</sub> is returned to the atmosphere. The amount of CO<sub>2</sub> released during combustion is the same as the amount released by normal rotting and decay in forests and woods. Heating with fuels made from wood is therefore heating the natural, environment-friendly way.



The following table shows a comparison of selected fuels based on heating value:



Fuel	Water content [%]	Loose bulk density [kg/m <sup>3</sup> ]	Heating value [kWh/cubic metre loose material]	Heating value [kWh/kg]
Hardwood - wood chips	20 - 25	270	1100	approx. 3.6
Softwood - wood chips	20 - 25	220	970	approx. 3.8
Pellets	10	650	3100	approx. 4.5
Miscanthus*	10 - 15	100	420	approx. 4.2

\*) The regional regulations for burning miscanthus should be observed.

Fuel costs are another important factor in the choice of fuel, although this question cannot be covered here because of possible price fluctuations. The ash content of the material and the resulting variations in cleaning intervals should also be considered, as well as emissions during combustion.

## 3. Which boiler equipment?

A distinction is generally made between the 28-55 kW and 70-100 kW boiler ranges. In both ranges, however, the design of the unit used differs according to the application. The optimum boiler combination depends on the fuel chosen. The following table shows the possible combinations with an explanation of the ideal application.

	Stoker - G30	Stoker - G50	Burn back flap	Rotary valve 125	Rotary valve 180*	Recommended application
 TMC 28/35/48/55	✓		✓			Standard model for use with wood chips up to G30, pellets...
	✓			✓		For use with wood chips up to G30, pellets, sawdust, joinery waste... For connection to the feed system via a drop tube
		✓	✓			For use with wood chips up to G50
		✓		✓		For use with wood chips up to G50 For connection to the feed system via a drop tube
 TMC 70/85/100		✓	✓			Standard model for use with wood chips up to G50, pellets...
		✓			✓	For use with wood chips up to G50, sawdust, joinery waste... For connection to the feed system via a drop tube

## 4. Which storage tank?



**If your storage tank has the right dimensions, this ensures a continuous supply of fuel in the ideal output range of the boiler!**

You should generally contact the installer for the correct dimensions of the storage tank. However for a preliminary rough estimate, you can calculate 30 litres of storage tank capacity per kW of boiler output. For a Turbomatic with 48 kW, this would give a rough estimate of a 1500 litre storage tank volume.

# Mature technology

1 Intelligent primary and secondary air control with its own combustion air blower fan, together with the Lambda probe also guarantee optimum combustion quality even when the fuel is changed (e.g. damp fuel or hardwood instead of softwood). The high efficiency achieved ensures low fuel consumption and protects the boiler and flue gas system from sooting.

2 Automatic grate with vibration and tipping function. The controller can adjust operation of the grate drive to prevent it jamming from lack of use. This ensures the necessary primary air throughput and increases efficiency. The even glowing ember bed improves combustion and also protects the grate and fireclay from wear.

3 Speed regulated induced draught fan for the highest operating safety - even if the chimney is in poor condition.

4 Fireclay-lined retort for even temperature in the combustion zone even with damp material. The boiler continues to operate efficiently even when shutting down. The infeed can be from the left or right as desired.

5 Large combustion area, offering the option of firewood emergency operation.

6 Multi-pass heat exchangers with built-in turbulators ensure the best possible heat transfer. The turbulators are moved regularly by an electric motor to clean the heat exchanger.

7 The automatic ash removal unit in the retort transports the collected ash into the external ash box at regular intervals.

8 When ash is removed automatically from the heat exchanger, the collected ash is also taken to the external ash box. Features that come as standard with the Turbomatic 70-100 are available as optional features for the Turbomatic 28-55.

9 The trapezoidal duct reduces the feed resistance and the screw can move more freely. This reduces the energy consumption of the motor and prevents the stoker screw from breaking. The optimised filling level means the fuel is dosed evenly and also the small diameter means less wrong air passes over the stoker in the combustion chamber. This leads to improved combustion quality and a higher boiler efficiency rating.

# Turbomatic TMC

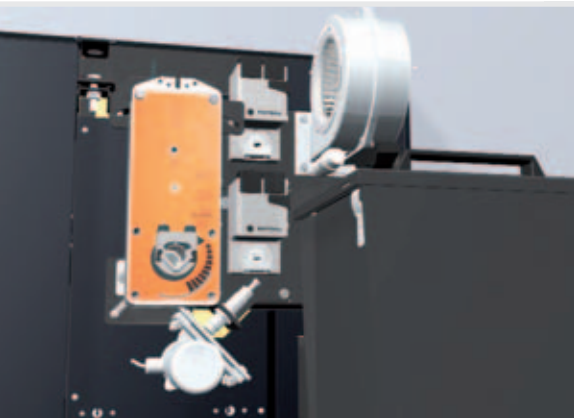


# A well-planned home

## **Feature:** Intelligent modular construction

- Benefits:
- Easy to assemble
  - Flexible to set up
  - High quality from tested modules

As the modules are supplied ready-assembled, installation is easy, cost-efficient and above all user-friendly. The retort and the stoker unit are completely pre-assembled and tested at the factory, which means that time-intensive changes to the settings are not required for the initial start-up. The side on which fuel is fed in can also be chosen during on-site assembly. The pre-wired switch cabinet makes the Turbomatic an intelligent and flexible modular system.



## **Feature:** Independent units

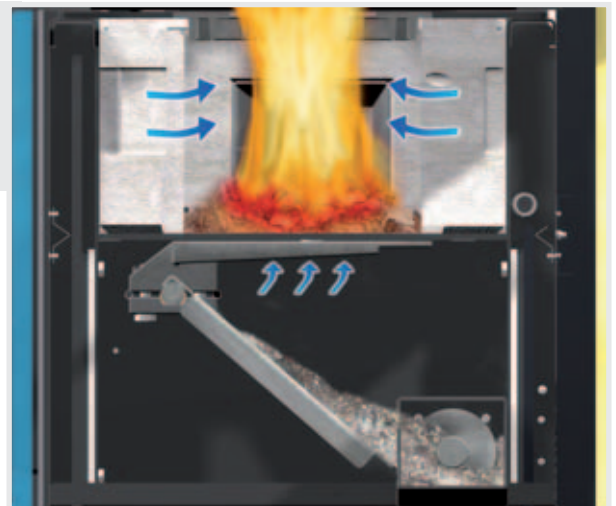
- Benefits:
- High operating safety
  - Optimum fuel adjustment

Individual drives instead of a central drive. Each individual unit is controlled directly, optimising control and enabling them to work together efficiently. Independent units also guarantee a high degree of system stability and perfect adaptation to the fuel and the moisture.

## **Feature:** Ingenious grate concept

- Benefits:
- Automatic self-cleaning
  - Ideal combustion conditions

The automatic grate with vibration drive, combined with the eccentric support, guarantees optimum cleaning, even when using low-grade fuels which tend to form cinders.



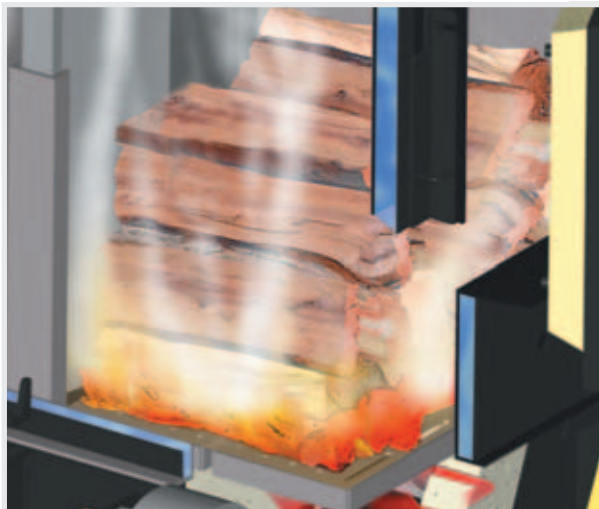
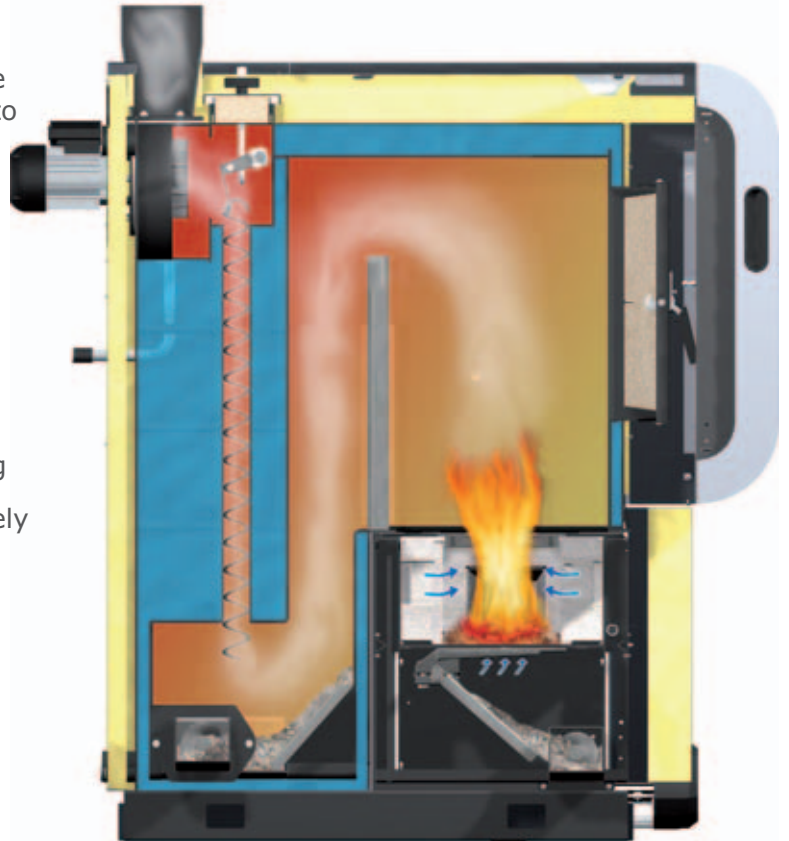
**Feature: Perfect combustion control**

- Benefits:
- Optimum emission values
  - Economical fuel consumption
  - Adapts automatically to changing fuels

The robustly made tipping grate technology, which is not sensitive to foreign bodies, and the optimised air distribution through separate primary and secondary air flaps have proven to be ideal for economical operation.

The best possible combustion conditions leading to low pollution through:

- Hot combustion chamber, with fire-proof cladding
- Lambda control as standard
- Optimum turbulence through injection of secondary air and special burn-through ring
- Large combustion zone guarantees extremely low emissions and dust values





**Feature: Emergency firewood operation**

- Benefits:
- High adaptability
  - Solid reliability

The Turbomatic can be equipped with a special grate insert for emergencies. "Emergency firewood operation" makes it possible to burn pieces of wood with a length of up to 35 cm (TMC 28-55) or 50 cm (TMC 70-100).

# Wood chip feed systems

## Wood chips - Feed systems

Feed system	Size (Ø)	Dumping height*
<p><b>Spring blade feed system</b></p> <p>This is the most common type of wood chip feed system and the cheapest. During filling, the springs lie on the stirring head and reduce the resistance when the store is full. When the fuel is removed, the spring blades swing back out and guarantee the entire store is emptied.</p> 	2000 mm 2500 mm 3000 mm 3500 mm 4000 mm 4500 mm 5000 mm	approx. 4-5 m
<p><b>Articulated arm feed system</b></p> <p>The articulated arm feed system works on the same principle as the spring blade feed system. The arm is folded to reduce the resistance when the store is full. The solid construction enables a higher dumping height and faster feed.</p> 	3000 mm 4000 mm  5000 mm 5700 mm	approx. 7 m  approx. 5 m

\*) The dumping height which is possible depends on the type of fuel used.  
 Dumping heights for use with pellets are available on request.



Froling also offers feed systems for industrial use on request.

The **inclined screw feed system** is mainly used as a silo feed screw in the wood processing industry.

The **horizontal screw feed system** is used for the heavy load of bulk material in high silo feed systems because of its solid construction.

## Size of store

The store should be sufficiently large that it only needs to be filled 4 times a year. If it is not possible to have a round store, which is the ideal shape, you should plan for the store to be as square as possible. The calculation itself depends primarily on the fuel used (type of wood, wood chip size, water content), so it is normally quite complicated. However you can make a rough calculation based on the following factors:



**Softwood G30/W30: 2.5 cubic metres loose material / kW building heating load**  
**Hardwood G30/W30: 2.0 cubic metres loose material / kW building heating load**

**In our practical example (page 8):** Building heating load 36 kW, hardwood wood chips G30

36 kW x 2	= <b>approx. 72 cubic metres loose material wood chips / year</b>
72 cubic metres loose material / 4 fillings per year	= 18 m <sup>3</sup> store capacity
18 m <sup>3</sup> / 2 m room height*	= 9 m <sup>2</sup> store area
Optimum store dimensions	= <b>3.0 x 3.0 x 2.5 m</b>

*\*) net room height (empty spaces from the raised floor and dumping cone have already been taken into account)*

Planning should not just consider the shape of the store, but also the access path to the store, as it must normally be used by agricultural vehicles (tractors and trailers). You should consider the weight of the vehicles, and whether they would be able to drive in, reverse or turn around. The entrance should also be the right size.

# Spring blade stirrer (SBS)

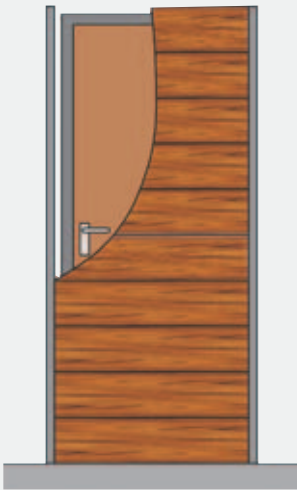
## Walls and ceilings:

The walls and ceilings of the store and of the boiler room must be fire-resistant in compliance with local regulations.

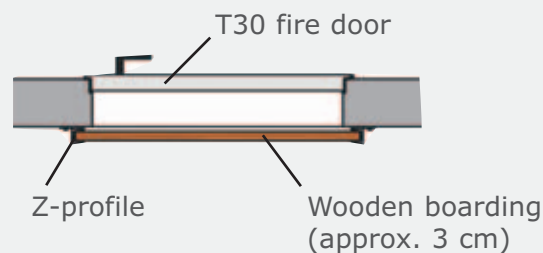
## Wall penetration (500 x 500 mm):

Do not fix or cement the transfer trough to the brickwork. Fixing the transfer trough to the brickwork can create a bridge transferring all mechanical noise and vibration to the brickwork. For this reason any gaps around holes made in walls must be filled with insulating material in compliance with the standards ÖNORM B 3836 or DIN 4102-11.

## Boarding - Store door:



The store door must be a fire door with a Class T30 fire resistance rating; it must have a seal. Wooden boards should also be mounted on the interior of the room so that the fuel does not press against the door. A complete set with Z-profile and wooden boards is available in the Froling range.



## Inspection opening:

Maintenance opening with class T90 fire resistance rating (e.g. chimney door) immediately over the wall penetration so it is simple to deal with possible blockages from excessively long material in the area of the cutting edge of feed duct.

## Lateral wall protection:

If the structure of the store means that the arms come into contact with the wall of the store (rectangular room), we recommend that you apply an approx. 300 mm high covering made of sheet metal or hardwood on the wall of the store. This prevents pieces of the wall and plaster from breaking off and blocking the feed system. A ready-made wall protection package is available in the Froling range.

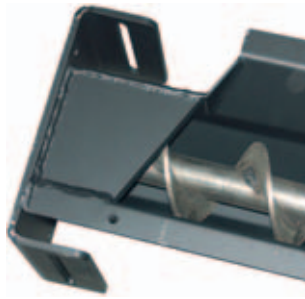
## Raised floor:

This prevents material from remaining below the stirrer arms. This material would decay, and this could affect the heating value. For this reason, we recommend that the customer installs a raised floor. See the next page for details.

# Feed systems

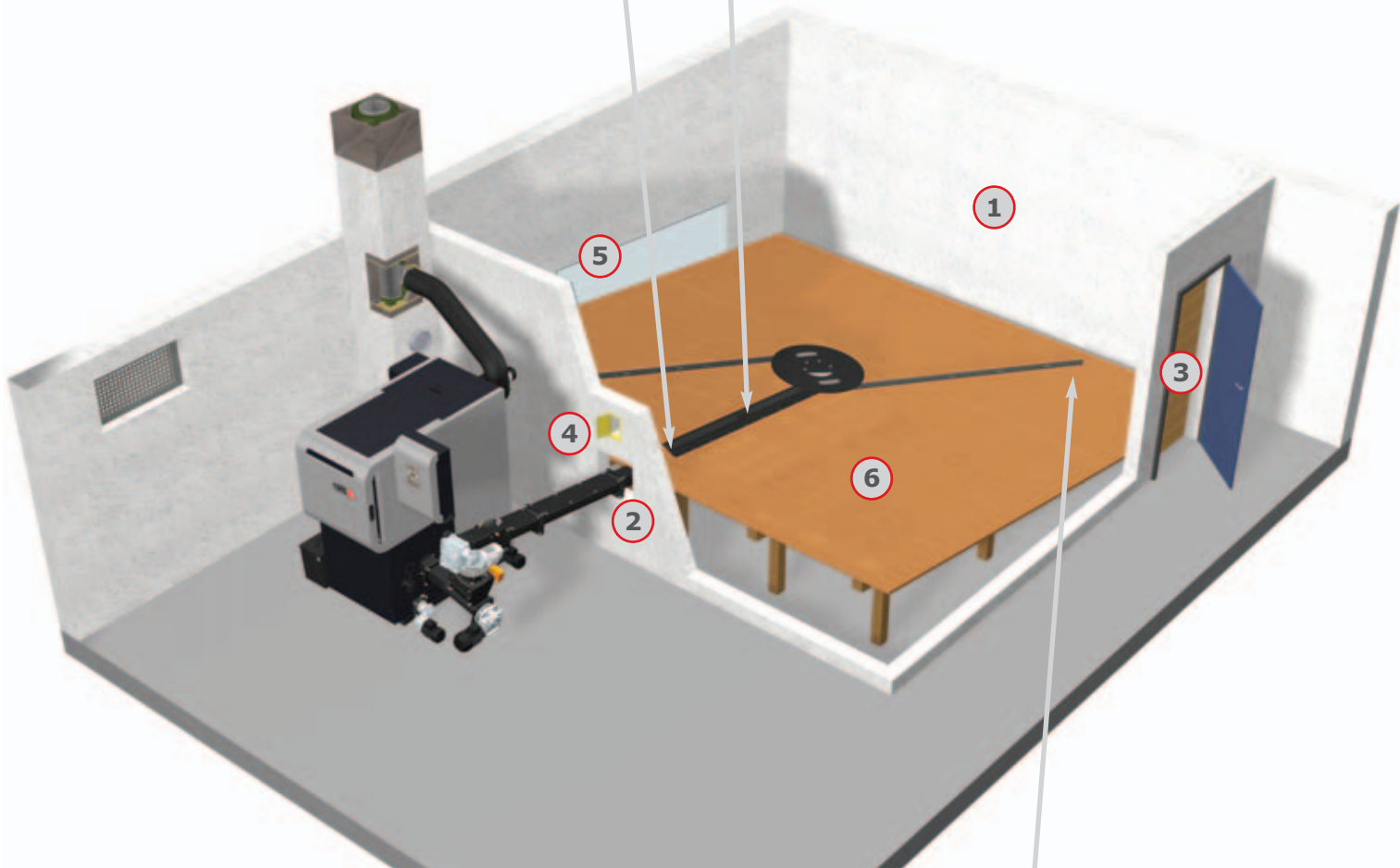
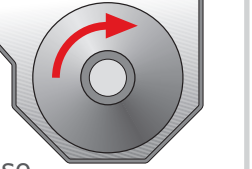
## Shear edge

A robust shear plate with a cutting edge breaks up larger pieces of fuel guaranteeing continuous fuel feed.



## Froeling feeder trough

The special shape of the trough and the feed screw with a progressive screw blade ensures problem-free fuel feed. The system is easy to operate so it saves energy even when feeding in the maximum amount of pellets.



## Spring blades

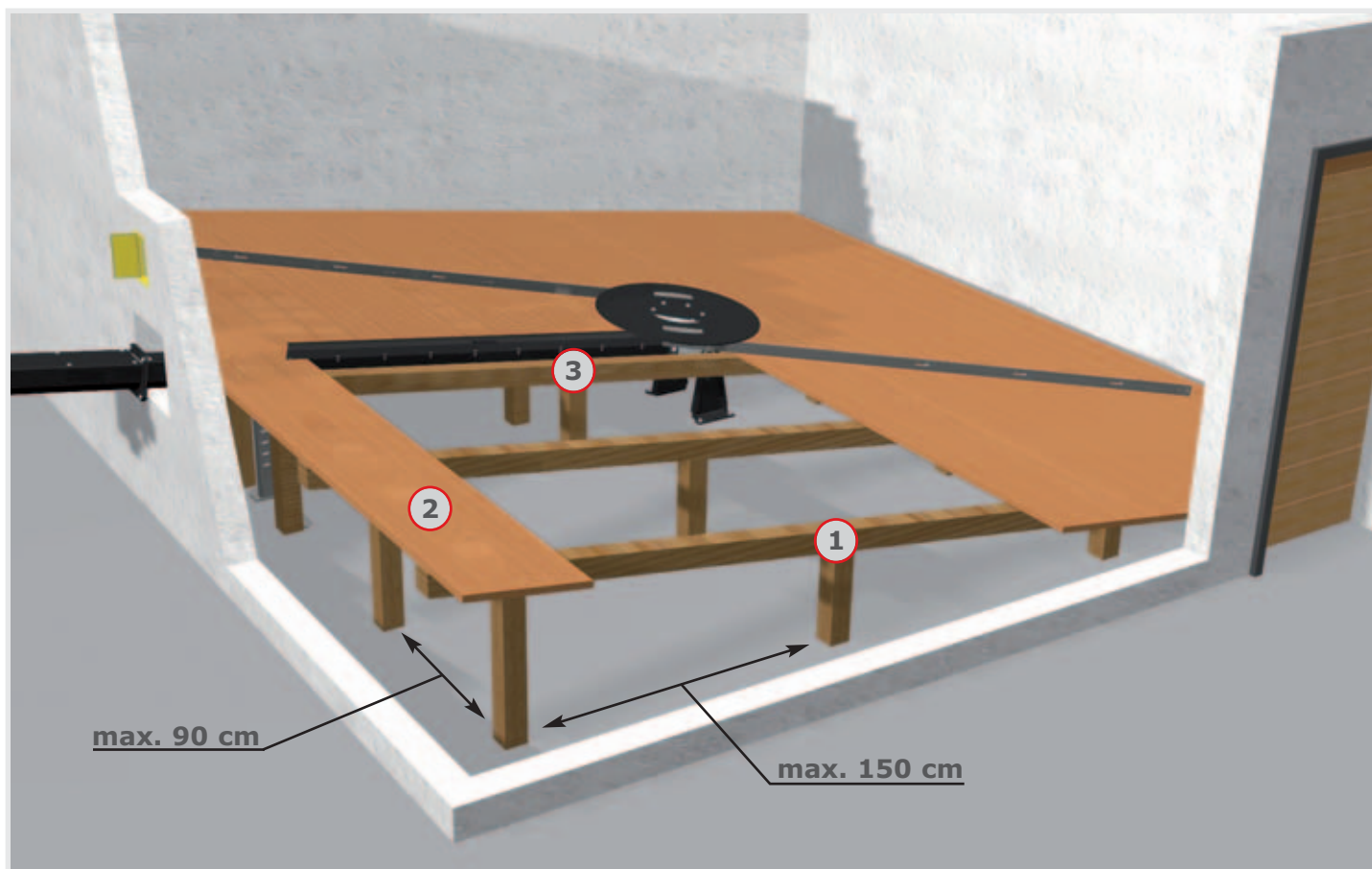
Two strong spring piles ensure the feed screw has an even filling level. The robust tearing hooks loosen the fuel and ensure the store empties.



# Spring blade stirrer

## Design of the raised floor

The sloping floor must be built with a stable substructure to be able to carry the weight of the wood chips. The construction and the strength of the wood must ensure that the sloping sides are not deformed when subject to static loads.



- 1 Framework with beams.
- 2 The entire area should be boarded as a raised floor.
- 3 The raised floor should not be supported by the trough duct, so a beam should be positioned on the left and right of the duct.

## Sprinkler system and temperature monitoring

Required in Austria by the fire prevention regulation TRVB H 118, included by Froling as standard:



*Sprinkler*

### **Water sprinkler system.**

If there is a blow-back despite all the safety devices, the sprinkler system activates. The self-activating extinguisher system limits blow-backs in the area of the gravity shaft.

### **Temperature monitoring device in the fuel store (TMF):**

When the temperature in the store exceeds 70 °C it activates the warning devices installed by the customer. A combination of a visual signal and a sound is recommended.



*TMF*

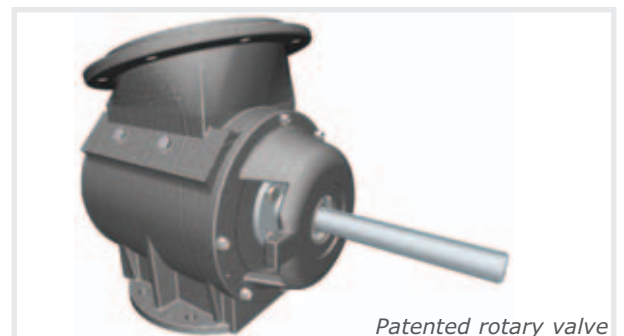
## Burn back protection: Rotary valve or burn back flap - you decide!

Using a burn back protection system is vital for operating safety. During the heating up phase, after infeed has been completed or in the event of a fault it closes off the connection between the feed system and the infeed unit. Opinion is still divided about whether burn back flaps or rotary valves are better. This is where Froling comes in!

As each system has its advantages, Froling offers the optimum protection system according to the setup of the system (location, fuel type, ...).

We determine whether burn back flaps or rotary valves are suitable when we adjust the boiler to suit your heating system. You always get the protection system that fits perfectly.

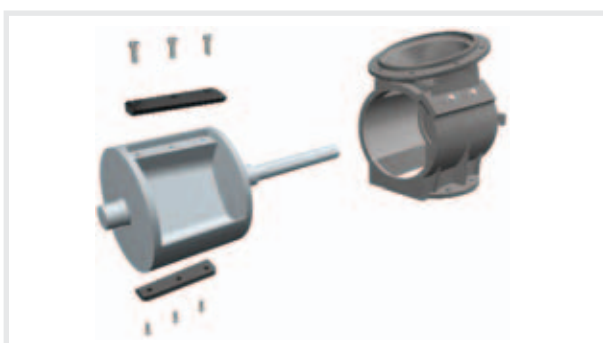
The induced draught fan, which comes as standard, combined with the underpressure monitoring also prevents smoke going back into the store, making the system even safer.



*Patented rotary valve*



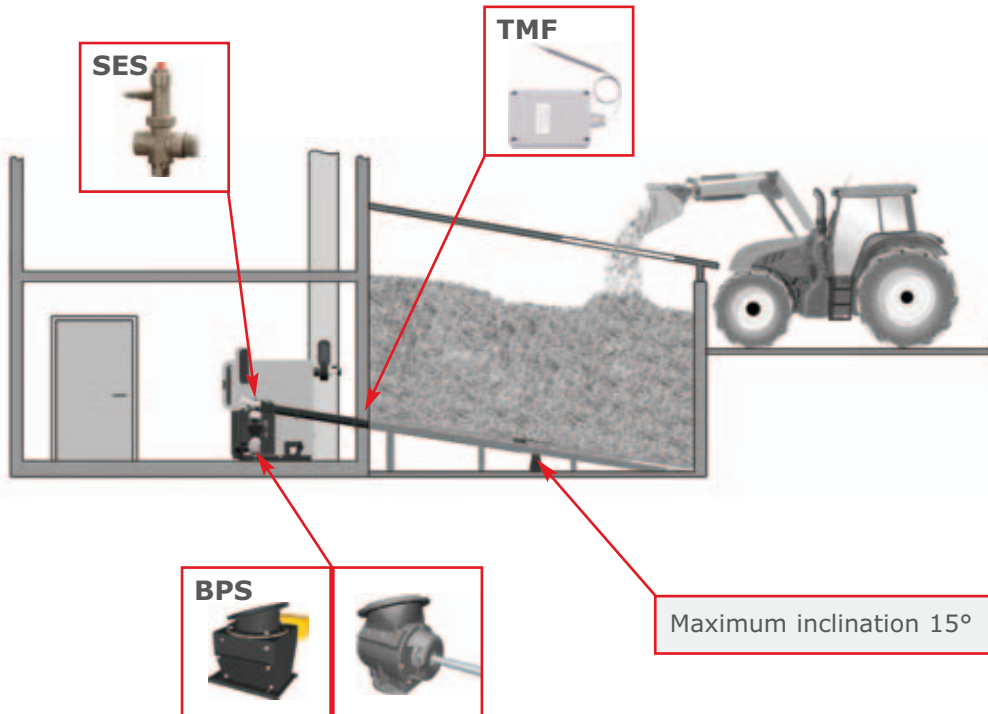
*Burn back flap*



The Froling rotary valve was specially developed with large seal surfaces and it is also suitable for special fuels, such as joinery waste. The hardened cutting edges can be replaced and they can also separate out coarser pieces of fuel.

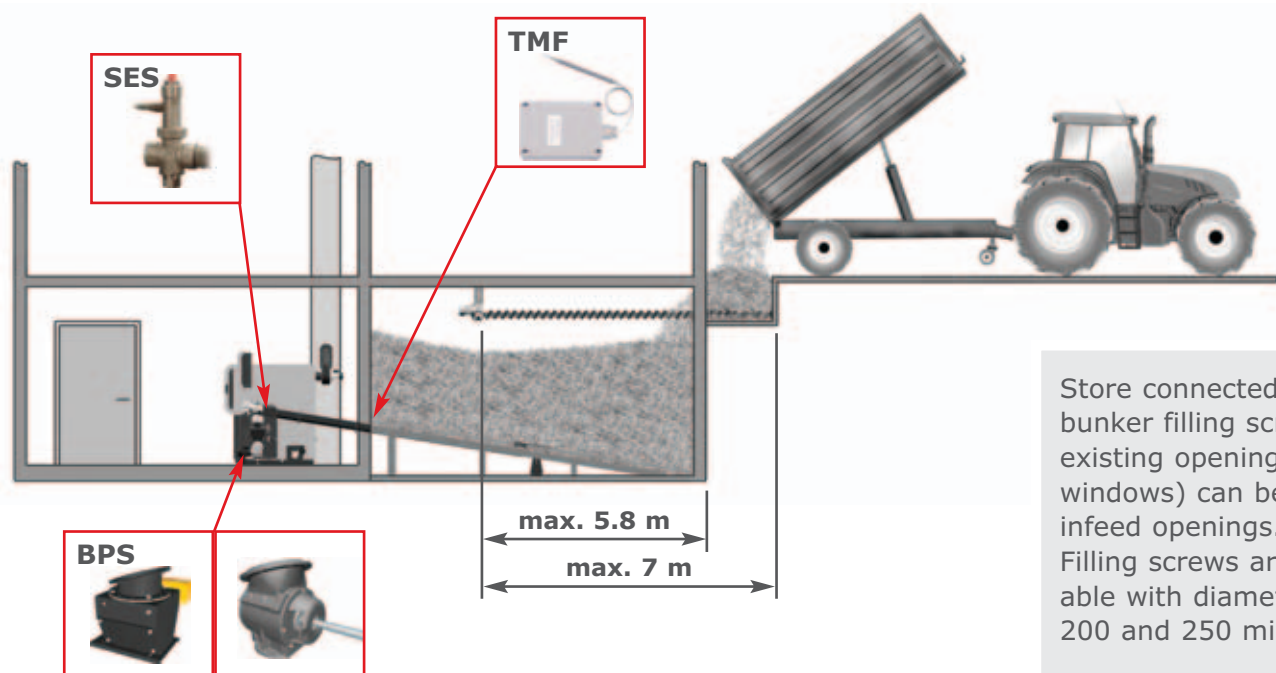
# Store locations

## Location 1 - External store



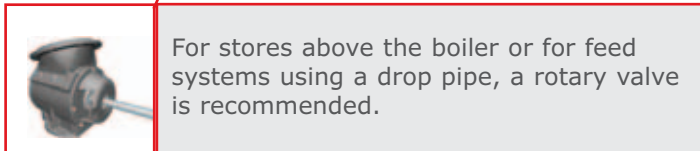
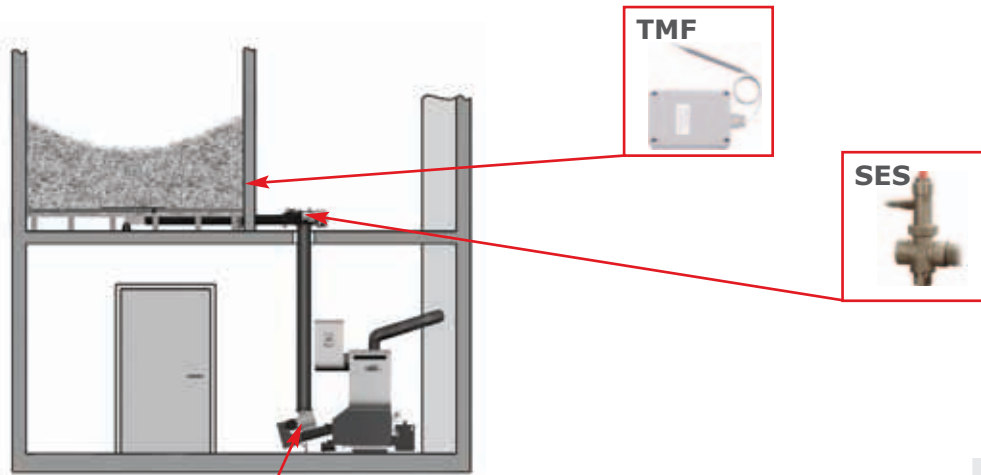
External store with option of direct infeed. The store can normally be made with a cost-effective extension.

## Location 2 - Installation with bunker filling screw



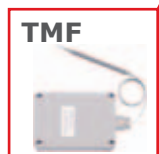
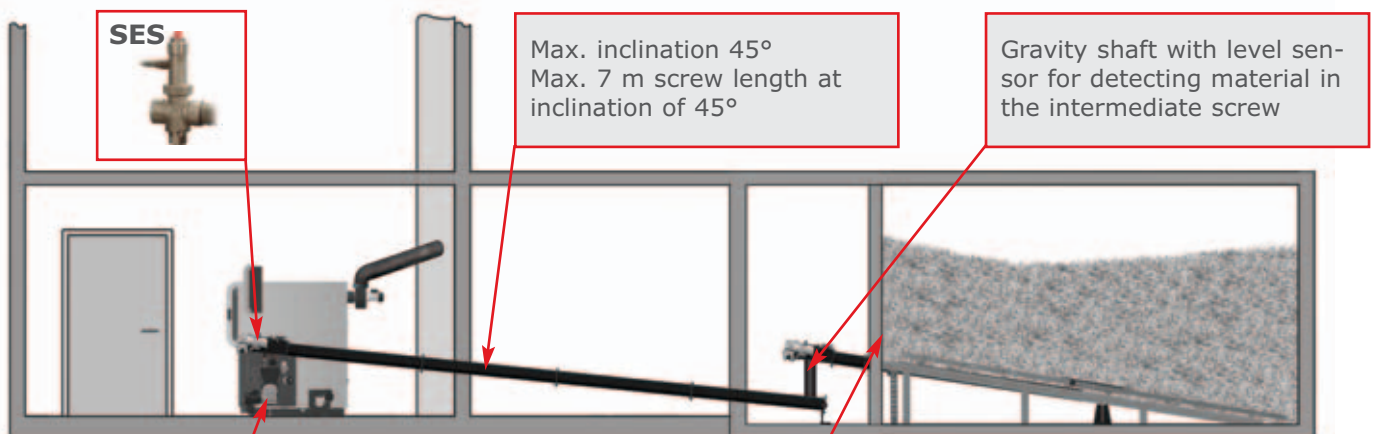
Store connected to bunker filling screw. The existing openings (e.g. windows) can be used as infeed openings. Filling screws are available with diameters of 200 and 250 millimetres.

## Location 3 - Store above boiler



Store above the boiler room. The fuel is supplied to the boiler using a drop tube and rotary valve.

## Location 4 - Feed system using an intermediate screw



Max. inclination 45°  
Max. 7 m screw length at inclination of 45°

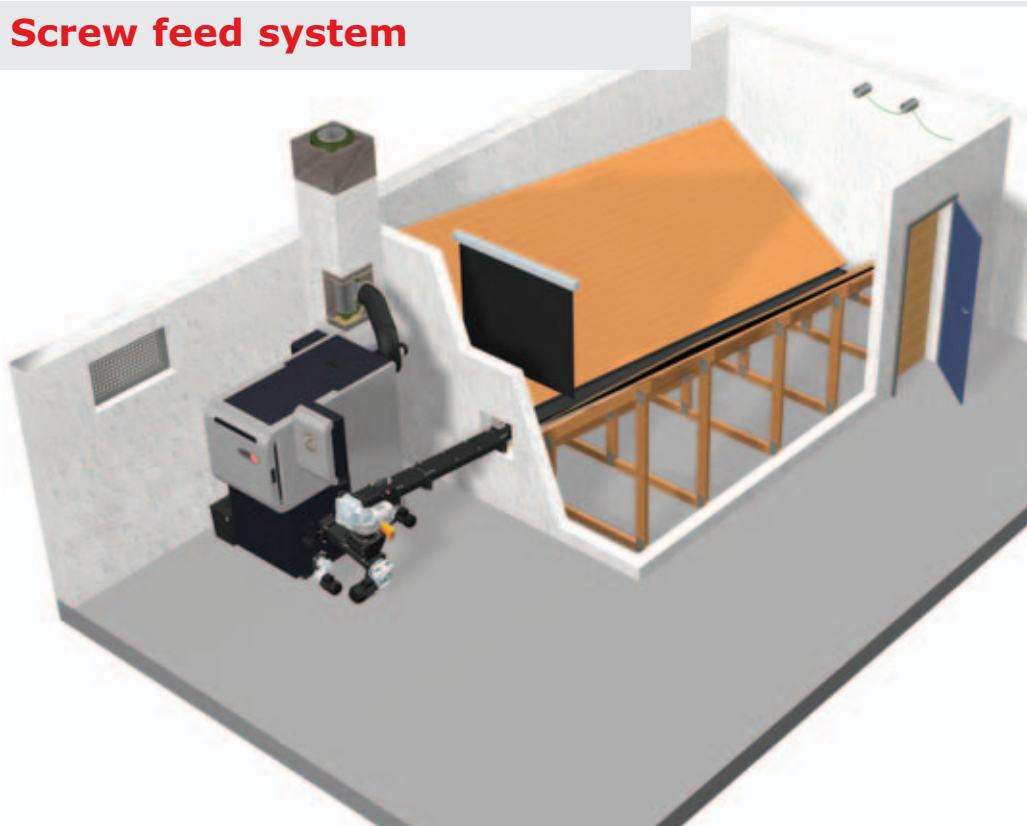
Gravity shaft with level sensor for detecting material in the intermediate screw

For stores that are not directly next to the boiler room, fuel feed is carried out with an intermediate screw.

**TMF** ... Temperature monitoring device in fuel store

# Pellet feeder systems

## Screw feed system

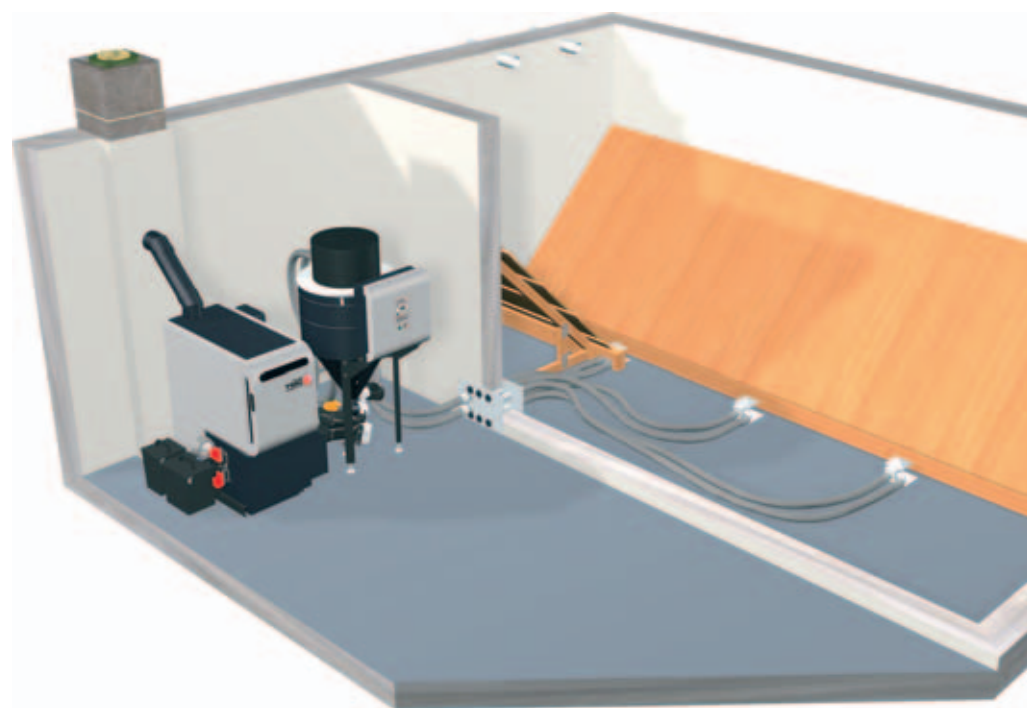


If you decide to use your Turbomatic with pellets, the pellet screw feed system is the most robust and reliable type of fuel feed.

This variant is the ideal solution for rectangular stores, which are directly next to the boiler room.

The screw delivery system can also guarantee complete emptying of the fuel store.

## Pellet suction system



The suction system is designed for those situations where the store is not directly next to the boiler room and the pellets have to be fed over a long distance.

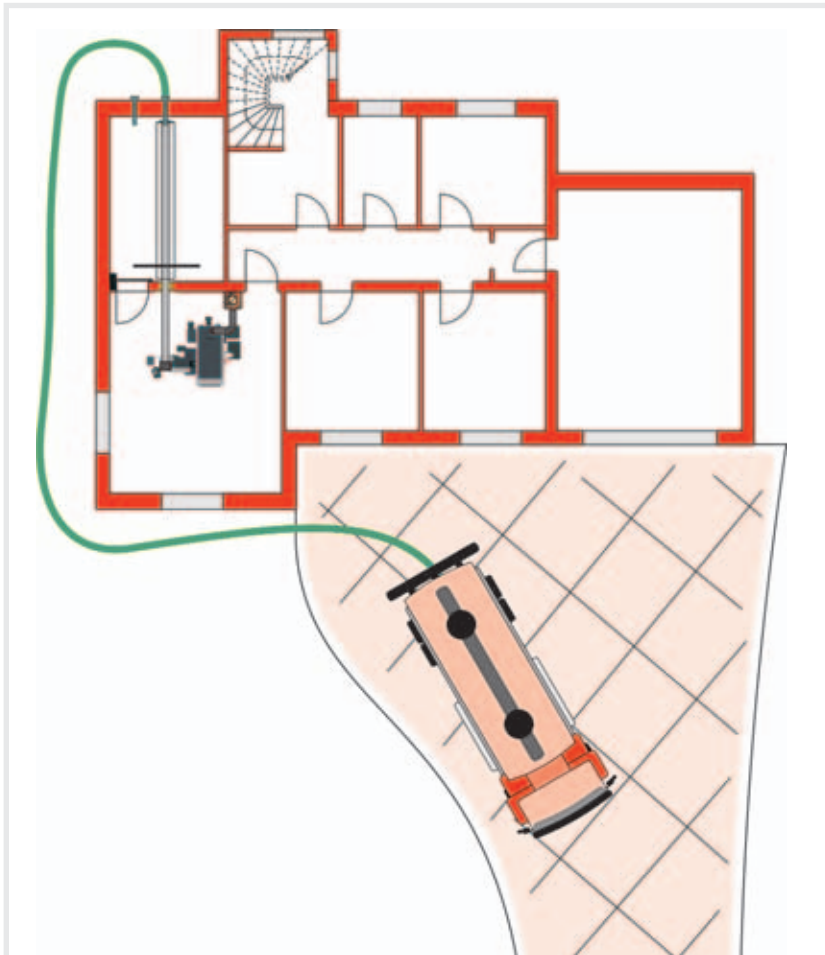
This system is particularly impressive because it is so simple to assemble and it is highly flexible.

The day store that is integrated to the boiler guarantees that the system suction times can be flexibly planned.

## Feeding in the pellets

The store is filled simply with the inlet nozzle.

All the equipment for the store (inlet nozzle, buffer mat, etc.) is included in the broad Froeling range.



The pellets are delivered by tanker and blown into the store through an intermediate filler pipe. A second pipe is used to extract dust. 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 tanker will be pumping.

For a detailed description of the dimensions and shape of the store, please see our detailed **planning documentation, "Heating with pellets"**.

A Froeling specialist adviser will also be glad to provide you with information.

# Systematically user-friendly



## **Feature:** Lambdatronic H 3200 controller

Benefits:

- Exact combustion control lambda control as standard
- Large, clear control unit with graphic display
- Menu-based operation with online help
- Boiler navigation from the living room



With the new H 3200 boiler control, Fröling is taking a step into the future. The control unit, optimised to fit requirements, and the lit graphic display guarantee that all operating statuses are clearly shown. The organised menu structure makes it easy to operate. The important heating and hot water functions can be selected simply using the function keys.

The equipment is pre-wired, saving prolonged electrical installation.

The **Fröling bus system** makes it possible to install extension modules at any location. The local controls can be installed wherever they are needed: at the boiler, at the heat distributor, at the tank, in the living room or in the house next door. Another benefit is that the electrical cables are kept to a minimum.

The new **RBG 3200 room console** makes the system even more user-friendly. The heating system is controlled easily from your living room. It is extremely easy to read off all the important values and status messages and to change settings at the push of a button.



# Lambdatronic H 3200

## Feature: Froling SMS box

- Benefits:
- Alarm messages via SMS
  - Active boiler control

The system offered by Froling for all automatically fed systems provides the option of monitoring and controlling the boiler by SMS. The SMS box can be programmed directly from a mobile phone and has two error message inputs and two remote switch outputs. The alarm and message texts can be configured as required.

They can range from switching heating on and off to changing mode, e.g. from setback mode to party mode (only in connection with room sensor). An automatic response confirms the execution of the command that was sent.

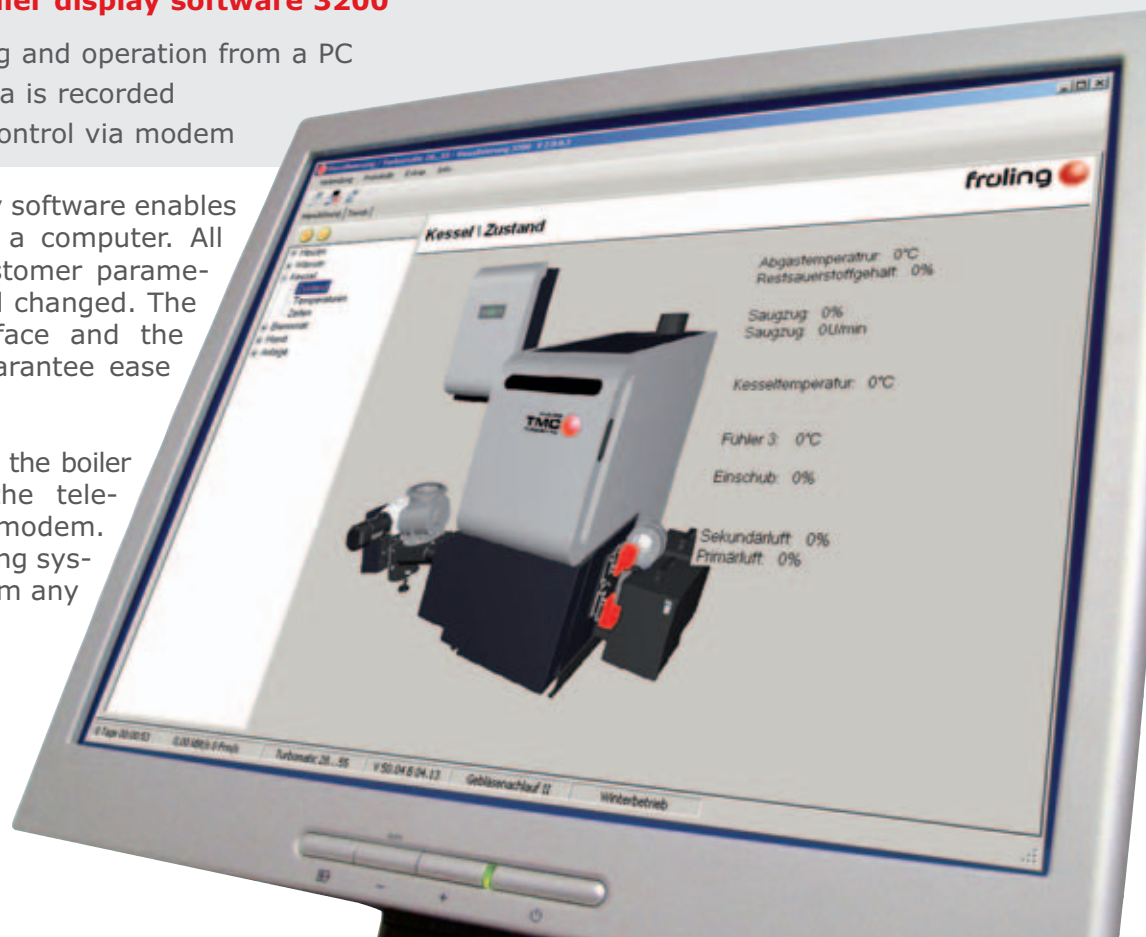


## Feature: Froling boiler display software 3200

- Benefits:
- Monitoring and operation from a PC
  - Boiler data is recorded
  - Remote control via modem

The optional boiler display software enables easy boiler control from a computer. All operating values and customer parameters can be displayed and changed. The standard Windows interface and the clear menu structure guarantee ease of use.

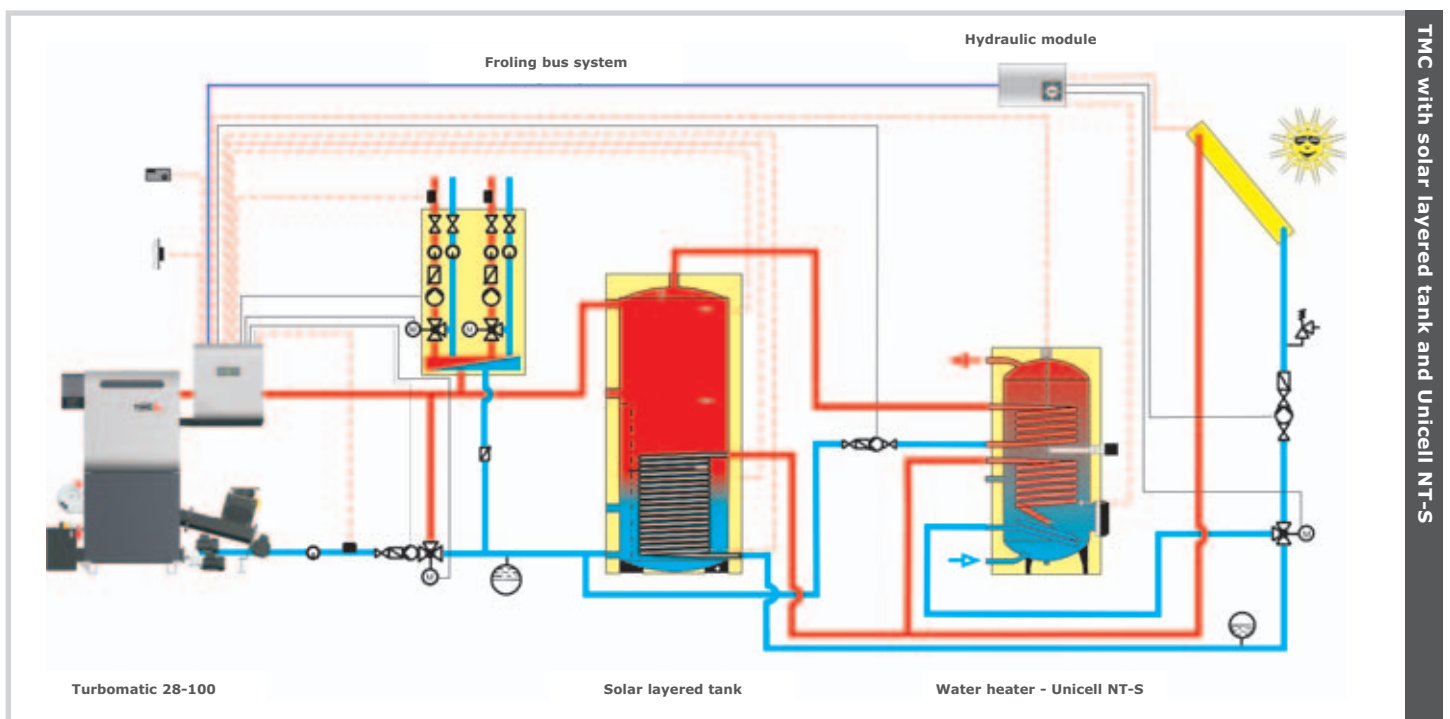
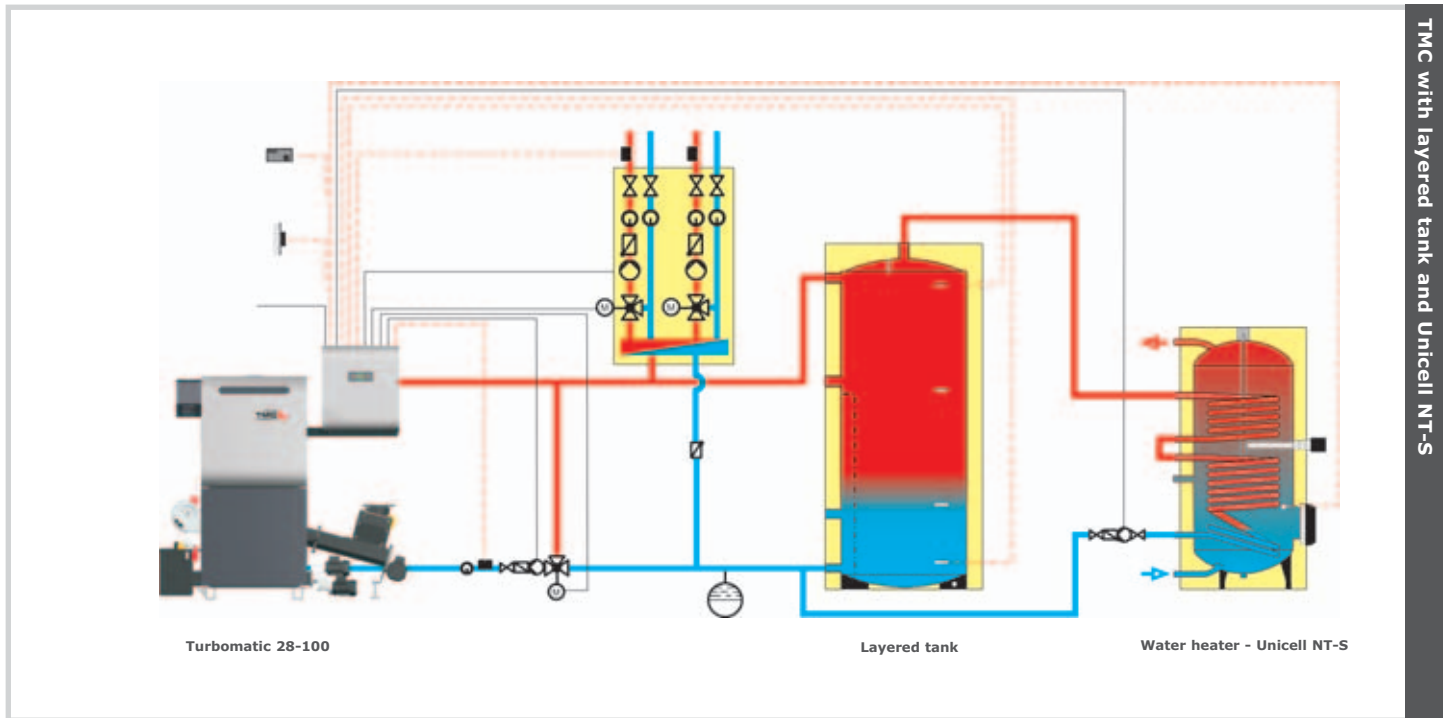
It is possible to connect to the boiler display software over the telephone network using a modem. This means that the heating system can be monitored from any location.



# Hydraulic connections

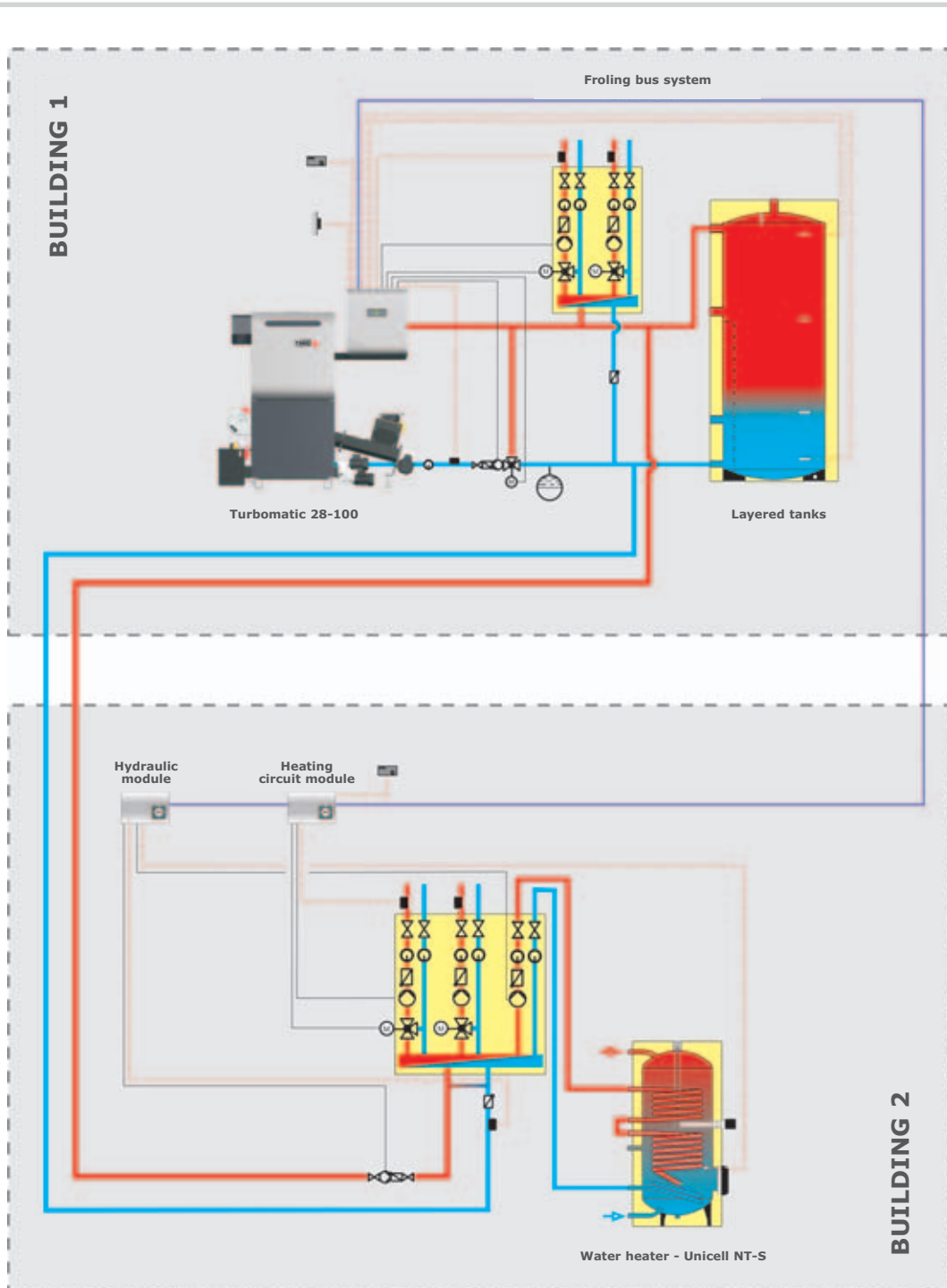
**Feature:** Systems engineering for optimum energy consumption

- Benefits:
- Complete solution for all requirements
  - The components work together perfectly
  - Integrated solar power



# Lambdatronic H 3200

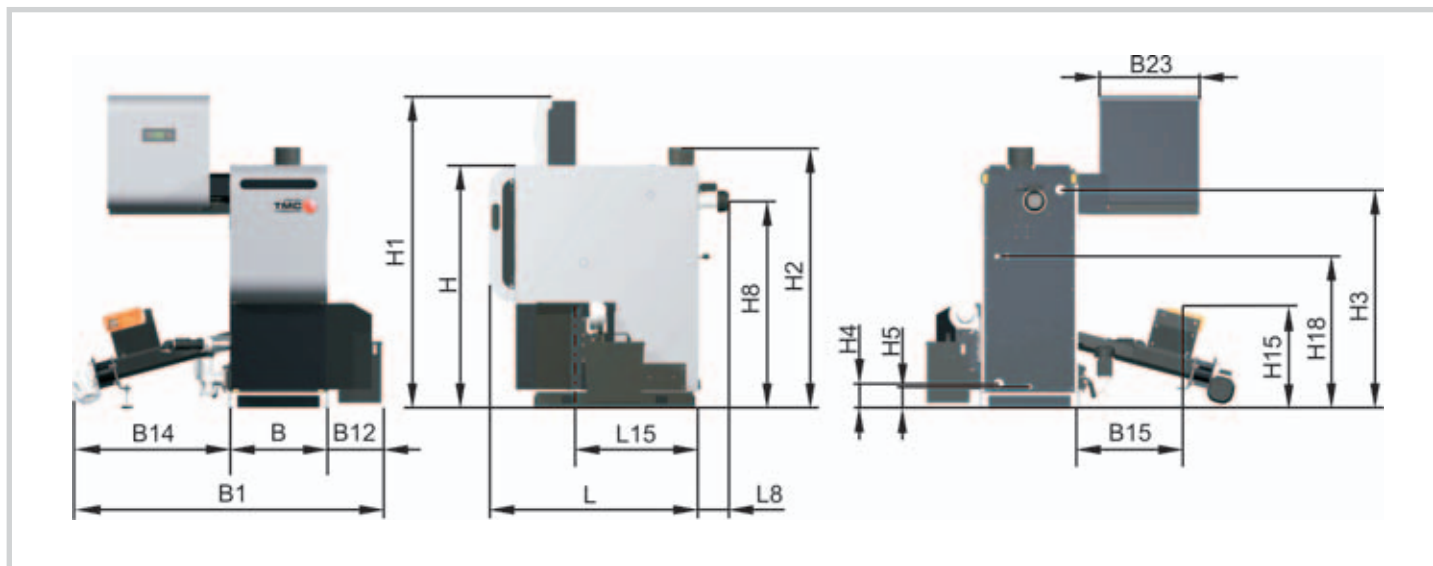
Froeling systems engineering enables efficient energy management. Up to 4 storage tanks, up to 8 hot water tanks and up to 18 heating circuits can influence heat management. You also benefit from the option of linking in other energy sources, such as solar systems.



TMC with Unicell multiple house system

# Technical specifications

## Dimensions TMC 28-55



DIMENSIONS			TMC 28/35	TMC 48/55
L	Length of boiler	[mm]	1225	1315
L8	Length of induced draught fan	[mm]	180	180
L15	Length to gravity shaft connection right / left	[mm]	735 / 710	825 / 800
B	Width of boiler	[mm]	570	670
B1	Overall width with BBF <sup>1</sup> / RV <sup>2</sup>	[mm]	1820 / 1885	1920 / 1985
B12	Width of ash container	[mm]	325	325
B14	Width of stoker unit with BBF <sup>1</sup> / RV <sup>2</sup>	[mm]	925 / 990	925 / 990
B15	Width of gravity shaft connection with BBF <sup>1</sup> / RV <sup>2</sup>	[mm]	595 / 615	595 / 615
B23	Width of switch cabinet	[mm]	600	600
H	Height of boiler	[mm]	1420	1520
H1	Overall height	[mm]	1830	1830
H2	Height of flue pipe connection	[mm]	1520	1620
H3	Height of outfeed connection	[mm]	1280	1380
H4	Height of return feed connection	[mm]	140	140
H5	Height of drain	[mm]	120	120
H8	Height of induced draught fan connection	[mm]	1210	1310
H15	Height of gravity shaft connection with BBF <sup>1</sup> / RV <sup>2</sup>	[mm]	620 / 595	620 / 595
H18	Height of safety battery connection	[mm]	890	980

1) BBF = burn back flap, 2) RV = rotary valve 125, rotary valve 180 on request

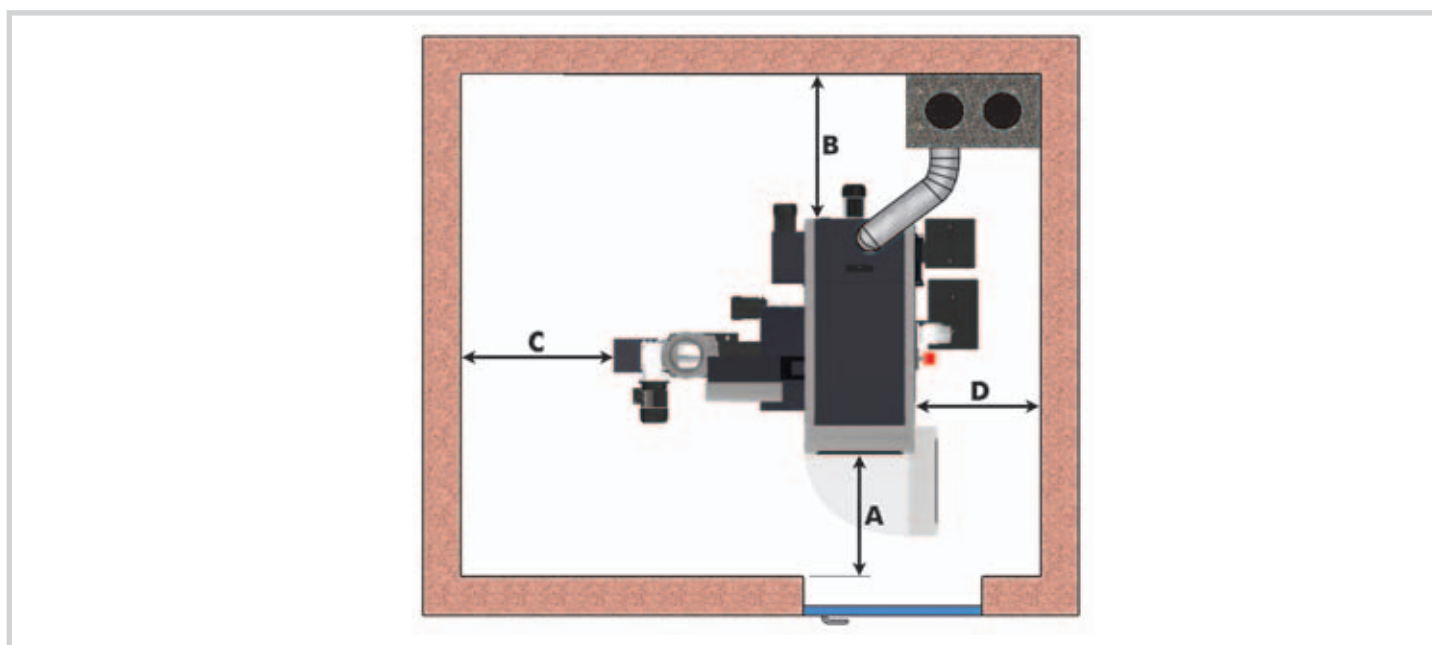
# Turbomatic TMC 28-55

## Performance data - Turbomatic TMC 28-55

TECHNICAL SPECIFICATIONS		TMC 28	TMC 35	TMC 48	TMC 55
Heat output range <sup>1</sup>	[kW]	8,4 - 28	10,5 - 35	14,4 - 48	16,5 - 55
Power supply		400V / 50Hz / fused 20A			
Power output	[W]	430	430	430	430
Boiler weight, approx.	[kg]	600	610	750	760
Boiler water capacity	[L]	114	114	185	185
Permitted operating pressure	[bar]	3	3	3	3
Permitted boiler operating temperature	[°C]	95	95	95	95
Minimum return feed temperature	[°C]	55	55	55	55

1) The specified rated output of the boiler refers to the test fuel.  
When using fuels with high moisture, low heating value or density  
(e.g. wood chips G30/W35, miscanthus, etc.) the output can be reduced.

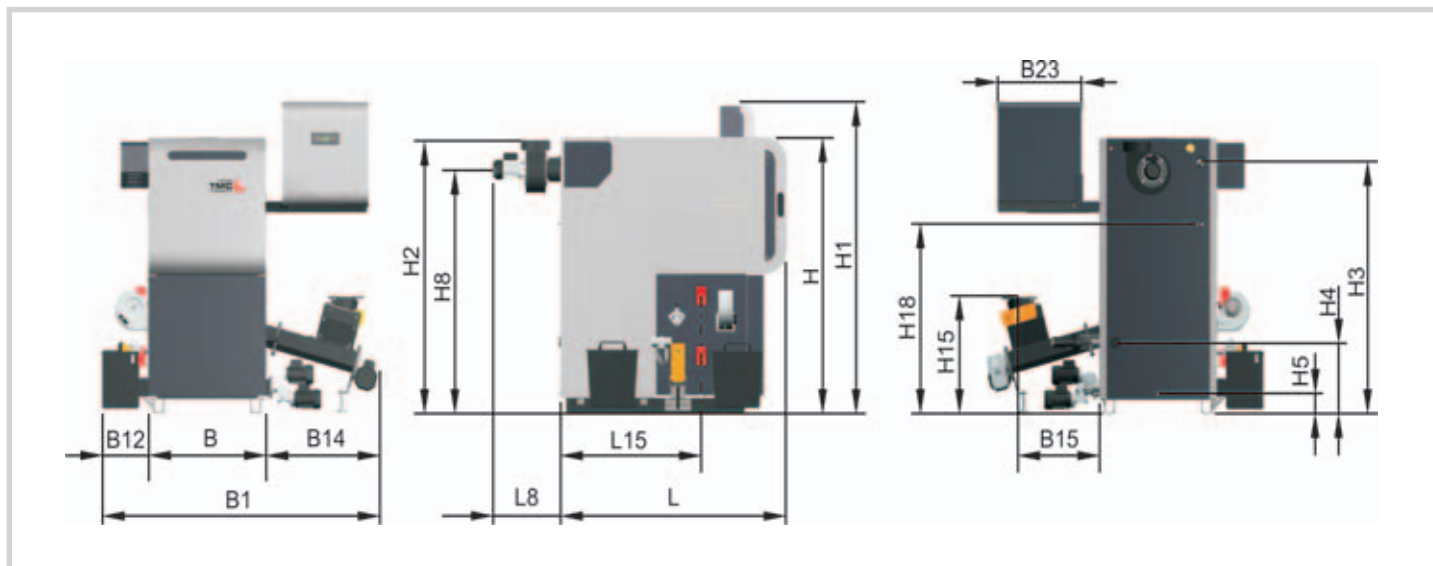
## Recommended minimum distances in the boiler room



Distances in the boiler room			
C	End of stoker drive to wall	[mm]	300
D	Side of boiler to wall opposite the stoker	[mm]	700
B	Back of boiler to wall	[mm]	500
A	Front of boiler to wall (space required for insulated door when opened)	[mm]	800

# Technical specifications

## Dimensions TMC 70-100



### DIMENSIONS

L	Length of boiler	[mm]	1580
L8	Length of induced draught fan	[mm]	470
L15	Length to gravity shaft connection left / right	[mm]	965 / 1015
B	Width of boiler	[mm]	820
B1	Overall width	[mm]	2040
B12	Width of ash container	[mm]	325
B14	Width of stoker unit	[mm]	895
B15	Width of gravity shaft	[mm]	550
B23	Width of switch cabinet	[mm]	600
H	Height of boiler	[mm]	1740
H1	Overall height	[mm]	1980
H2	Height of flue pipe connection	[mm]	1720
H3	Height of outfeed connection	[mm]	1595
H4	Height of return feed connection	[mm]	450
H5	Height of drain	[mm]	125
H8	Height of induced draught fan connection	[mm]	1540
H15	Height of gravity shaft connection	[mm]	730
H18	Height of safety battery connection	[mm]	1200

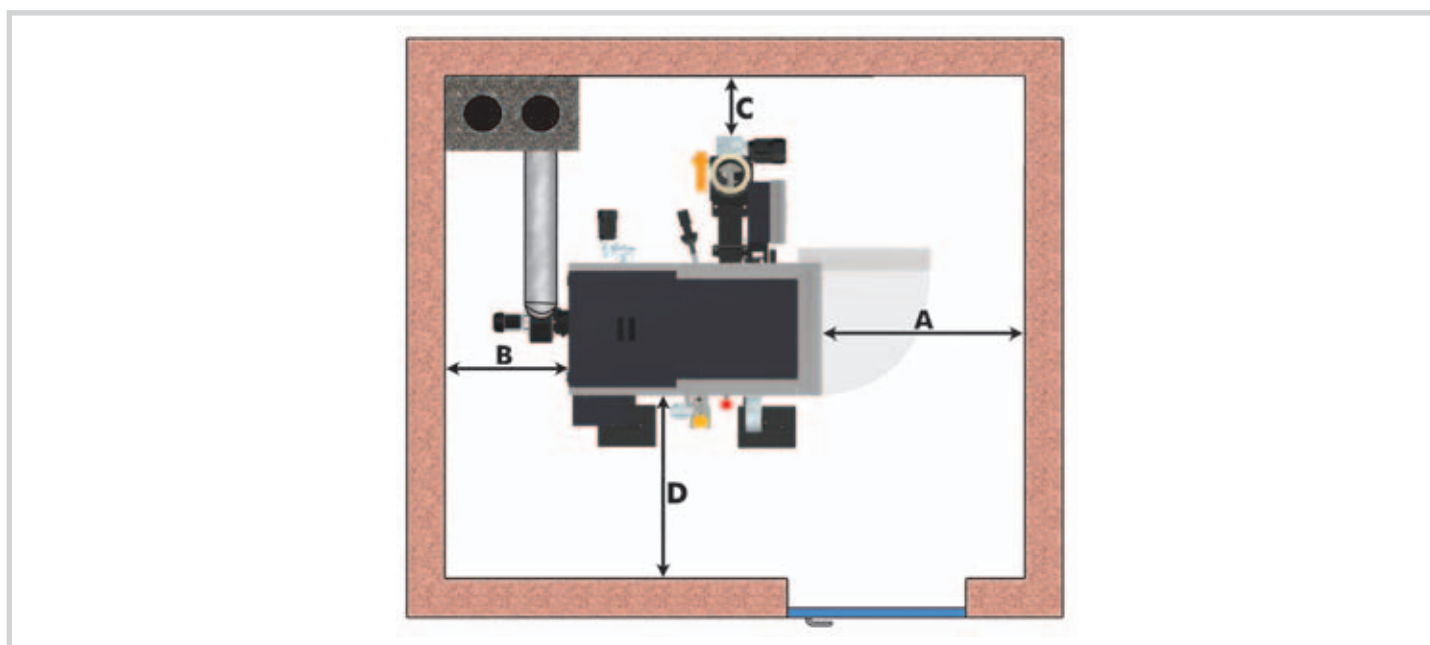
# Turbomatic TMC 70-100

## Performance data - Turbomatic TMC 70-100

TECHNICAL SPECIFICATIONS		TMC 70	TMC 85	TMC 100
Heat output range <sup>1</sup>	[kW]	21 - 70	25,5 - 85	30 - 100
Power supply		400V / 50Hz / fused 20A		
Power output	[W]	650	650	650
Boiler weight, approx.	[kg]	1230	1250	1270
Boiler water capacity	[L]	300	300	300
Permitted operating pressure	[bar]	3	3	3
Permitted boiler operating temperature	[°C]	95	95	95
Minimum return feed temperature	[°C]	55	55	55

1) The specified rated output of the boiler refers to the test fuel.  
When using fuels with high moisture, low heating value or density  
(e.g. wood chips G30/W35, miscanthus, etc.) the output can be reduced.

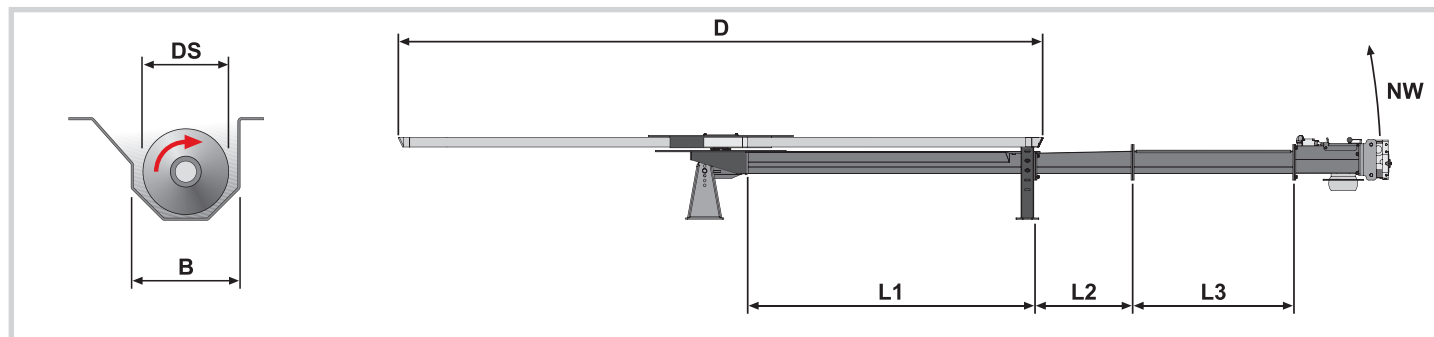
## Recommended minimum distances in the boiler room



Distances in the boiler room			
B	Back of boiler to wall	[mm]	700
A	Front of boiler to wall (space required for insulated door when opened)	[mm]	950
C	End of stoker drive t+o wall	[mm]	300
D	Side of boiler to wall opposite the stoker	[mm]	700

# Technical specifications

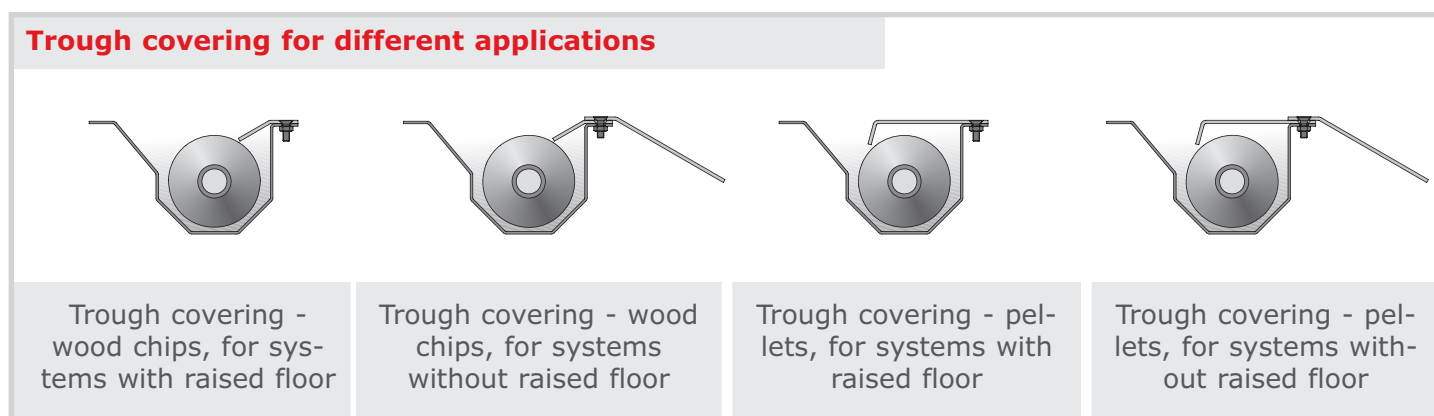
## Technical specifications - Spring blade stirrer (SBS)



DIMENSIONS			SBS 110
L1	Length of open trough	[mm]	795 - 2295
L2	Length of transfer trough	[mm]	600
L3	Length of closed trough	[mm]	from 100
D	Diameter of spring blade	[mm]	2400 - 5600
NW	Angle of inclination	[°]	0 - 15
DS	Diameter of screw	[mm]	110
B	Width of trough channel	[mm]	140

TECHNICAL SPECIFICATIONS		TMC 28-55	TMC 70-100
Power supply to dosing screw drive motor	[V/Hz]	400 / 50	400 / 50
Connected load of dosing screw drive motor	[kW]	0,37	0,55
Power supply to gravity shaft safety switch	[VDC]	24	24
Ratio of dosing gears		i=300	i=168

### Trough covering for different applications



Trough covering - wood chips, for systems with raised floor

Trough covering - wood chips, for systems without raised floor

Trough covering - pellets, for systems with raised floor

Trough covering - pellets, for systems without raised floor

# Spring blade stirrer (SBS)

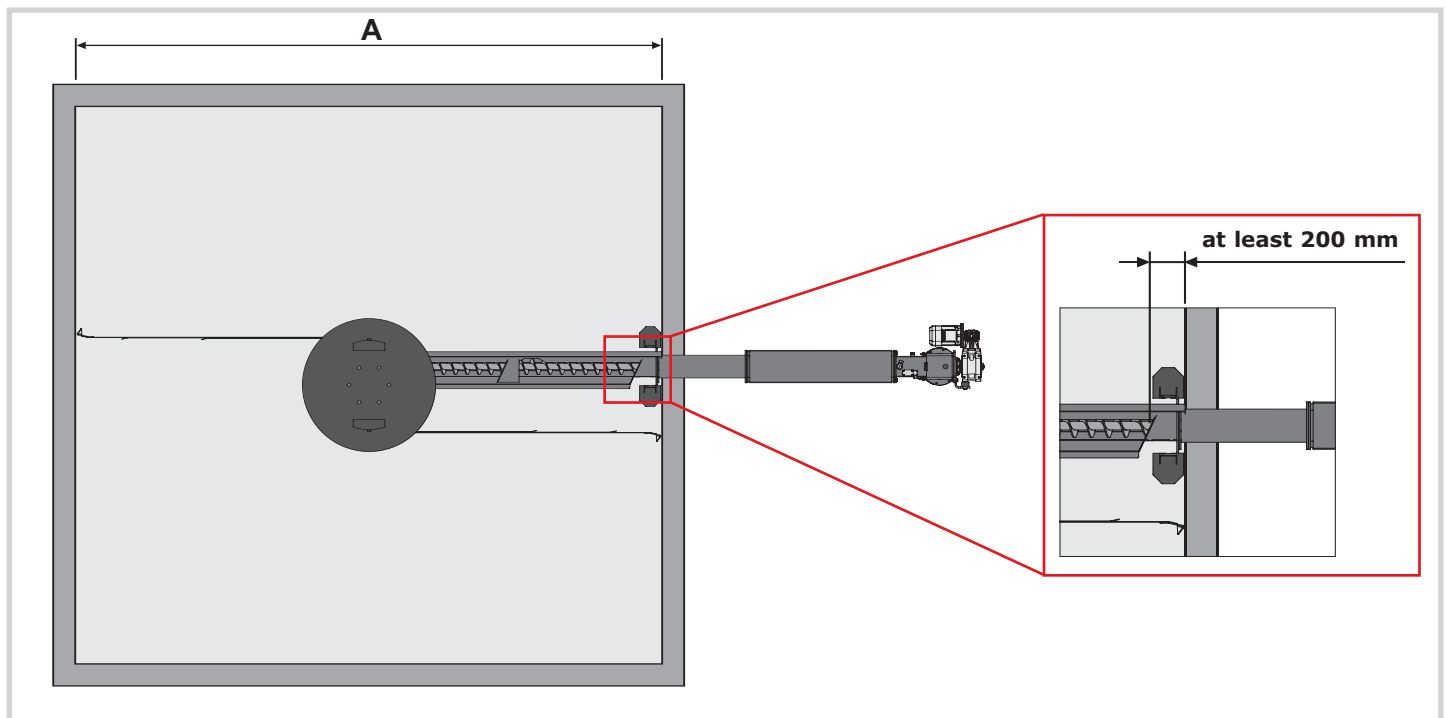
## The correct dimensions of the spring blade stirrer

The spring blade diameter and the length of the open trough varies depending on the size of the store. The following table shows the standard sizes:

Store length in screw direction	< 2.0 m	< 2.5 m	< 3.0 m	< 3.5 m	< 4.0 m	< 4.5 m	< 5.0 m
Nominal diameter [mm]	2000	2500	3000	3500	4000	4500	5000
Spring blade diameter <sup>1)</sup> [mm]	2400	2950	3450	4000	4500	5050	5600
Length of open trough [mm]	795	1045	1295	1545	1795	2045	2295

1) The spring blades have a certain excess to guarantee optimum use of the fuel store.

The nominal diameter of the feed system must be selected according to the **lateral length (A)** of the space that runs parallel to the feed screw. The feed system must be positioned so that the shear edge (transition from open to closed trough) is at least 200 mm away from the wall.



# Standards and guidelines

## Installing the heating system / Standards

The following standards govern the installation of heating systems:

### ÖNORM / DIN EN 12828 Heating Systems in Buildings

- Austria:       - Closed systems as per ÖNORM B 8131  
                  - Open systems as per ÖNORM B 8130  
Germany:       - Closed systems as per DIN 4751 Part 2  
                  - Open systems as per DIN 4751 Part 1

Also to be observed: ÖNORM H 5190 - Soundproofing measures for heating systems

## Ventilation of boiler room

The openings for the supply air and the exhaust air should be arranged as close to opposite each other as possible to achieve a good thermal draught effect. The supply air should be drawn in directly from outside. Exhaust air must be discharged directly outside.

- Applicable standards:**   - TRVB H 118  
                                  - ÖNORM H 5170

According to ÖNORM H 5170, fan-assisted boilers should have a supply air cross section of 2 cm<sup>2</sup> per kW of rated output, and a minimum total cross section of 200 cm<sup>2</sup>.

If the minimum air exchange is not guaranteed by the flue gas system, an exhaust air opening with a minimum cross-section of 180 cm<sup>2</sup> must be supplied.

## Requirements for hot water supplies

There are no special requirements for domestic hot water supplies.

Applicable standards:

- Austria:**        **ÖNORM H 5195, ÖNORM H 5195-2**  
**Germany:**      **VDI 2035**

The water used to top-up or refill boilers must be softened beforehand to prevent the build-up of limescale.

## Fire prevention regulations

### Austria:

In Austria the fire prevention technical directive TRVB H118 applies. Local variations to these regulations should also be taken into account. Your installer will be glad to provide you with further details.

### Germany:

In Germany, systems with an output of less than 50 kW are not subject to the directives but are subject to heating systems legislation. For more information you should contact the responsible authorities.

### Other countries:

Other countries have a variety of directives, reference standards and regulations regarding heating systems. You should contact the responsible local authorities.

## Chimney connection / chimney system

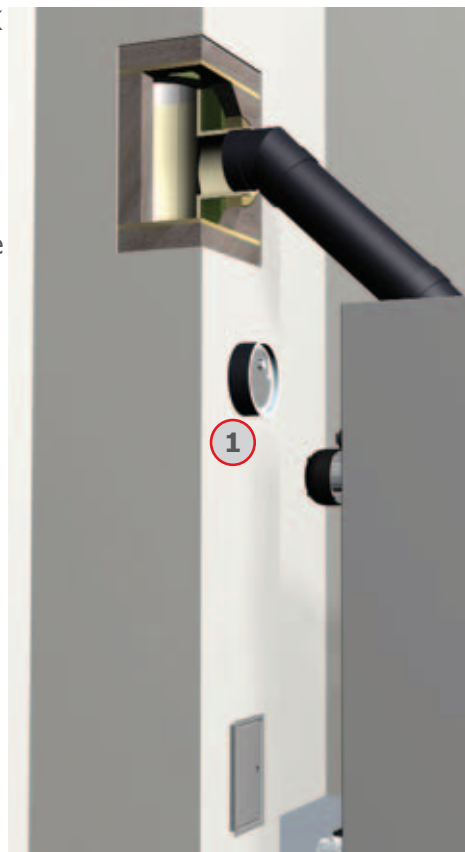
EN 303-5 specifies that the entire flue gas system must be designed to prevent, wherever possible, damage caused by seepage, insufficient feed pressure and condensation.

It should be noted here that flue gas temperatures of less than 160 K above room temperature can occur within the permitted operating range of the boiler.

### Design information:

The connection between the boiler and the chimney system should be as short as possible. The upward angle of the connection should not exceed 30 - 45°. Insulate the flue pipe.

When installing the connection you should take into account local standards and regulations.



1

### Draught limiter:

The best position for installing a draught limiter is in the chimney which is under the flue pipe mouth because there is always under-pressure at this point.

## Boiler data for planning the flue gas system

BOILER DATA			28	35	48	55	70	85	100
Flue gas temperature	[°C]	RL	165	180	170	185	170	170	180
Flue gas mass flow	[kg/h]	RL	87	111	150	175	220	265	315
	[kg/s]	RL	0,024	0,031	0,042	0,049	0,061	0,074	0,088
Feed pressure required	[Pa]	RL	10	10	10	10	10	10	10
		PL	5	5	5	5	5	5	5
Feed pressure required	[mbar]	RL	0,10	0,10	0,10	0,10	0,10	0,10	0,10
		PL	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Flue pipe	[mm]		150	150	150	150	200	200	200

RL = Rated Load, PL = Partial Load

# Better heating with woodchip systems from Froling

Further technical details on request.  
We'll be happy to advise you.

P0030508 - All illustrations intended as a guide only.  
We reserve the right to make technical changes without prior notice. Errors and omissions excepted.

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