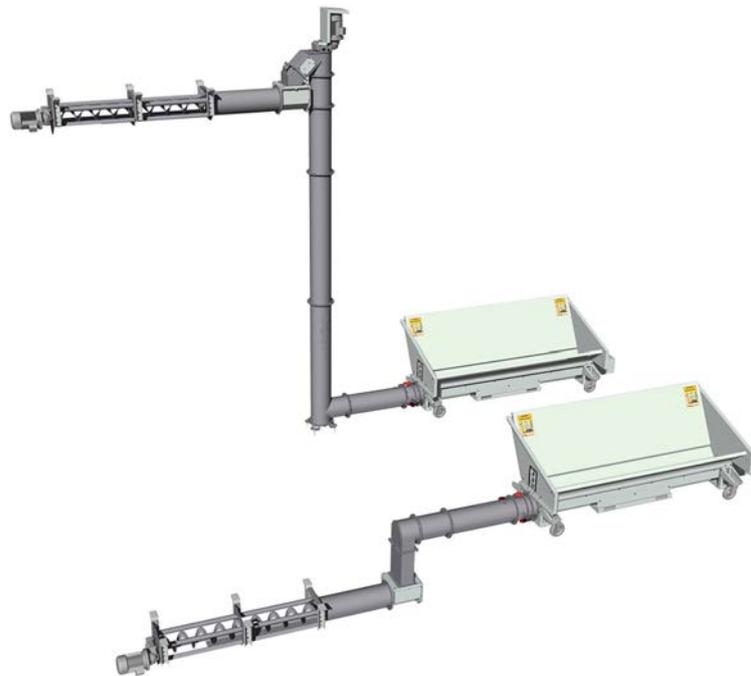


Installation- and Operating Instructions  
**Bunker filling system BFSV-H / BFSU-H**



**Translation of the original German operating instructions for technicians**

Read and follow the instructions and safety information!

Technical changes, typographical errors and omissions reserved!

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## 1 General

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

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

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

Subject to technical change.

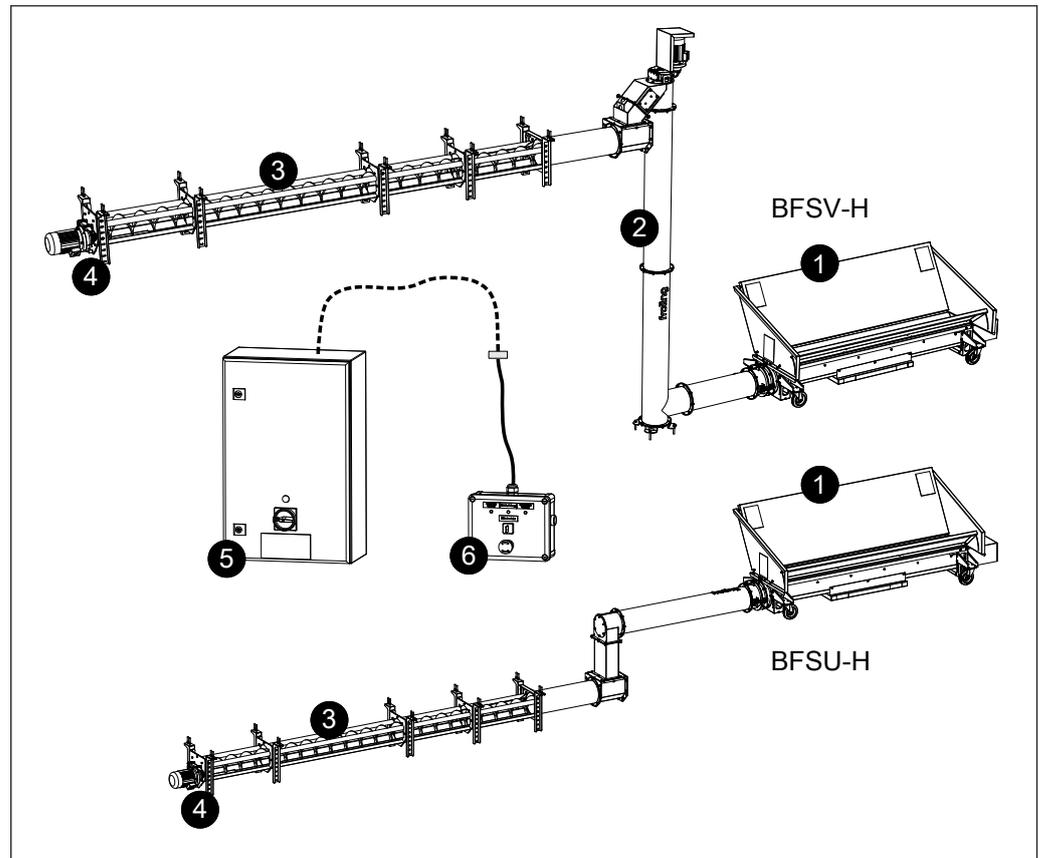
### ***Issuing a delivery certificate***

This is an incomplete machine as defined by the Machinery Directive. The incomplete machine must only be started up when it has been confirmed that the machine, in which the incomplete machine has been installed, conforms to the provisions of Directive 2006/42/EC.

Compliance with the open provisions and verification of the correct installation must be confirmed in the delivery certificate of the declaration of installation (included in documentation).

## 1.1 Functional description

The Fröling bunker filling system comprises:

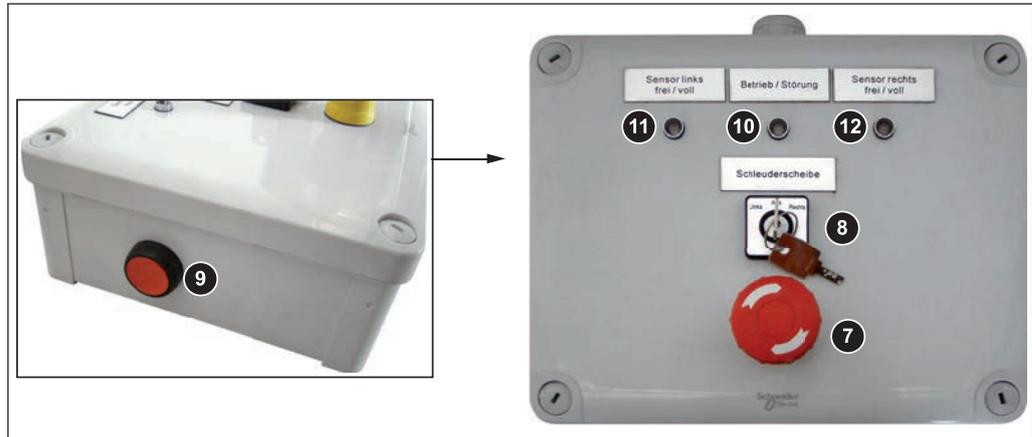


- |   |  |
|---|--|
| 1 | Bulk chute   |
| 2 | Vertical screw                                       |
| 3 | Horizontal distributor screw with geared motor       |
| 4 | Filling level sensor                                 |
| 5 | Control cabinet with main switch                     |
| 6 | Control unit with control line, plug and mating plug |

The Fröling bunker filling system has been designed for the automatic filling of a fuel store. The bunker filling system, which can either be a stationary unit or equipped with wheels, is loaded with fuel via the bulk chute (1) located outside the store space. The system is started using the two-hand tripping device of the mobile control unit (6), which is connected to the stationary control cabinet (5) via a flexible control line to the socket. The horizontal screw of the bulk chute feeds the fuel to the transfer position. From there the fuel is fed to the horizontal distributor screw (3) either directly (with BFSU-H) or via the vertical screw (2 - with BFSV-H). The horizontal distributor screw (3) is powered by the geared motor installed in the fuel store and transports the fuel into the fuel store, where it is discharged through the open trough. The flange plate of the geared motor of the horizontal distributor screw is equipped with a filling level

sensor (4), which stops the fuel store from filling when the fuel store is full. The filling level sensor is connected to the control unit which indicates on the control unit at “Sensor right” whether the fuel store has reached the maximum filling level.

### 1.1.1 Control unit



- |    |   |
|----|---|
| 7  | Emergency stop for shutting down the system immediately with any risk   |
| 8  | Key-operated selector switch (NOT IN USE)   |
| 9  | Start button for two-hand tripping device (one push-button on the left and right-hand side). Both push-buttons have to be pressed to start the system.  |
| 10 | Status LED to display the operating status<br>- GREEN constant: STANDBY<br>- RED constant: FAULT  |
| 11 | Status LED (NOT IN USE)   |
| 12 | Status LED for right filling level sensor (filling level sensor to flange plate of geared motor in fuel store)<br>- GREEN constant: Fuel store can be filled with fuel<br>- RED constant: Fuel store is full, no more fuel can be brought into fuel store |

## 2 Safety

### 2.1 Hazard levels of warnings

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

#### DANGER

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

#### WARNING

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

#### CAUTION

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

## 2.2 Permitted Uses

The Froling bunker filling system is solely designed for transporting fuels into suitable store spaces. Only use fuels specified in the "Permitted fuels" section.

The unit should only be operated when it is in full working order. It must be operated in accordance with the instructions, observing safety precautions, and you should ensure you are aware of the potential hazards. The inspection and cleaning intervals in the operating instructions must be observed. Ensure that any faults which might impair safety are rectified immediately.

The manufacturer or supplier is not liable for any damage resulting from non-permitted uses.

Only original spare parts or specific alternative spare parts authorised by the manufacturer may be used. Any kind of change or modification made to the product will invalidate its manufacturer's CE conformity. In such cases, the product will need to undergo new hazard evaluation procedures by the operator. The operator will then be fully responsible for the declaration of conformity according to the valid guideline(s) for the product and will need to attach the new CE label to the device. This person will then assume all of the rights and responsibilities of a manufacturer.

### 2.2.1 Permitted fuels

#### *Wood chips*

Criterion	Designation as per		Description acc. to ÖNORM M 7133
	ÖNORM M 7133	EN ISO 17225	
Water content	<b>W20</b>	<b>M20</b>	air-dried
	<b>W30</b>	<b>M30</b>	suitable for storage
	<b>W35</b>	<b>M35</b>	limited suitability for storage
Size	<b>G30</b>	<b>P16S</b>	Fine wood chip
	<b>G50</b>	<b>P31S</b>	Medium-sized wood chip

#### *Note on standards*

EU: Fuel acc. to EN ISO 17225 - Part 4: Wood chips class A1 / P16S-P31S

Additional for Germany: Fuel class 4 (§3 of the First Federal Emissions Protection Ordinance (BimSchV) - applicable version)

### 2.2.2 Non-permitted fuels

The use of fuels not defined in the "Permitted fuels" section is not permitted.

#### NOTICE

The system is not permitted to be used for supplying other fuel types, which the underlying heating system may also be suitable for, e.g. pellets, shavings or miscanthus.

## 2.3 Qualification of staff

### 2.3.1 Qualification of assembly staff

#### CAUTION



**Assembly and installation by untrained personnel:**

*Risk of personal injury and damage to property.*

During assembly and installation:

- Observe the instructions and information in the manuals
- Only allow trained staff to carry out assembly and installation

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

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

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

### 2.3.2 Personal protective equipment for assembly staff

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



- For transportation, setup and assembly:
  - suitable workwear
  - protective gloves
  - sturdy shoes

### 2.3.3 Qualification of operating staff



#### CAUTION

If unauthorised persons enter the store / working range:

*Risk of personal injury and damage to property*

- The operator is responsible for keeping unauthorised persons, in particular children, away from the system.

Only trained operators are permitted to operate the unit. The operator must also have read and understood the instructions in the documentation.

### 2.3.4 Protective equipment for operating staff

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



- For inspection and cleaning:

- suitable workwear
- protective gloves
- sturdy shoes



- Additional for operating:

- Hearing protection (sound level > 70 dB)
- Protective goggles

## 2.4 Design information

Carrying out modifications to the system and changing or deactivating safety equipment is prohibited.

Always comply with all fire, building, and electrical regulations when installing or operating the system, in addition to following the operating instructions and mandatory regulations that apply in the country in which the system is operated.

### 2.4.1 Standards

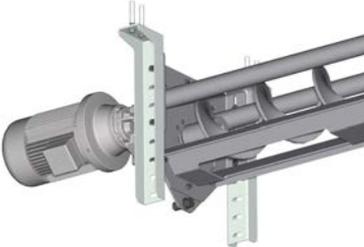
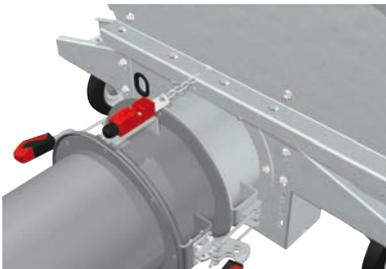
The system must be installed and commissioned in accordance with the local fire and building regulations. The following standards and regulations should be observed in any case:

ÖNORM / DIN EN 60204	Safety of machines; Electrical equipment of machines, Part 1: General requirements
TRVB H 118	Technical directives for fire protection/prevention (Austria)
ÖNORM H 5170	Construction and fire protection requirements (Austria)
ÖNORM H 5190	Heating systems - Acoustic insulation
EN ISO 13857	Safety of machines; Safety distances for maintaining a safe distance from hazardous areas

### 2.4.2 Requirements at the installation site

- The installation site must have a suitable, level surface within the working range of the system (filling area, switching unit with operating elements)
- The operating area must be designed so as to avoid risks posed by the loading vehicle
- The system does not provide any light, so the customer must provide sufficient lighting in accordance with national workplace design regulations.
- The switching unit must be installed indoors with protection from the weather
- The wall duct for the connection cable of the control unit must be positioned so that the length of the cable allows the control unit to be located outside the danger zone. The filling area must be visible during operation
- Protective structures must be designed in accordance with the applicable standards and regulations
- The screw of the mobile bulk chute cannot be divided. To remove the screw, there must be sufficient space behind the bulk chute to pull it out.
- An on-site weather guard must be provided by the customer in order to avoid water ingress into the bunker.
- Provide inspection opening at the end of the horizontal distributor screw for cleaning the filling level sensor  
When working in the fuel store, observe the information on the “fuel store” notice (supplied).
- Low outside temperatures in conjunction with wet wood chips can cause system components to freeze. Protect the system from frost!

## 2.5 Safety devices

Designation	Description
<p>Main switch on the control cabinet</p> 	<p>For switching off the entire system.</p> <p>When working on the system or in the store space, always padlock the main switch to ensure it cannot be switched on without authorisation.</p>
<p>EMERGENCY STOP button</p> 	<p>For shutting down the system with any danger. There is imminent risk:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Press emergency stop on control <ul style="list-style-type: none"> <li>➤ All units will stop immediately</li> <li>➤ The power supply remains switched on</li> </ul> </li> </ul> <p>When there is no longer any risk:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Rest the emergency stop button by rotating</li> </ul>
<p>Safety two-hand tripping device</p> 	<p>Safety switch for operating the system.</p> <p>The bunker filling system can only be activated by constantly pressing the two buttons mounted on each side. When one or both buttons are released, the vertical screw and the horizontal distributor screw runs for a preset delay time.</p>
<p>Filling level sensor</p> 	<p>Protection from overfilling the fuel store.</p> <p>The flange plate of the geared motor of the horizontal distributor screw is equipped with a filling level sensor, which is connected to an LED display on the control. The filling level sensor indicates whether the maximum filling level of the fuel store is reached, or whether fuel can still be transported into the fuel store. If the sensor responds, further operation of the system is not possible.</p>
<p>Safety switch of bulk chute</p> 	<p>Protection from the system being switched on without attachments.</p> <p>When the bulk chute is disconnected, the safety switch is force-actuated, so preventing the system from being used without attached components (vertical screw / horizontal distributor screw).</p>

## 2.6 Residual Risks



**DANGER**

Operating the system without the safety equipment provided by the customer:

*Risk of serious injury from unprotected system components!*

For safe operation of the system:

- Only operate the system once the required safety equipment has been installed
  - Observe the instructions and information about safety equipment to be provided by the customer in the manuals
  - Compliance with open provisions in the declaration of installation as per Machinery Directive 2006/42/EC must be verified.



**DANGER**

If the bunker filling screw is switched on when someone is in the danger zone:

*Risk of serious injury from rotating feed screw!*

Therefore:

- Ensure that there is no one in the filling area of the bunker filling screw and that no one enters the danger zone for the duration of the filling process
- Ensure that no one is in the store and that the entrance to the store is secured against entry for the duration of the filling process
- Only start the filling process once these conditions have been met



**DANGER**

Maintaining the system when the main switch is switched on:

*Risk of serious injury from unauthorised switching on!*

When maintaining the system or in the storage area:

- Switch off the main switch of the bunker filling system and re-secure it against unauthorized restarting using a padlock
- Switch off any other devices in the fuel store which potentially have dangerous movements (e.g. discharge system) and take precautions to prevent accidental switching on.
  - Also observe the information on the notice (supplied) for working in the fuel store.

 **DANGER**



**Delayed automatic start-up of individual components**

*Serious injury possible due to moving parts with automatic start-up!*

When switching on the system, remember the following:

- Check that there is no-one in the danger zone of the system
- Press both push-buttons of the two-hand tripping device
  - Depending on the function time-delayed activation of the individual units will take place
  - This process may take a few seconds and is not a fault

 **DANGER**



**Automatic run-on of individual components**

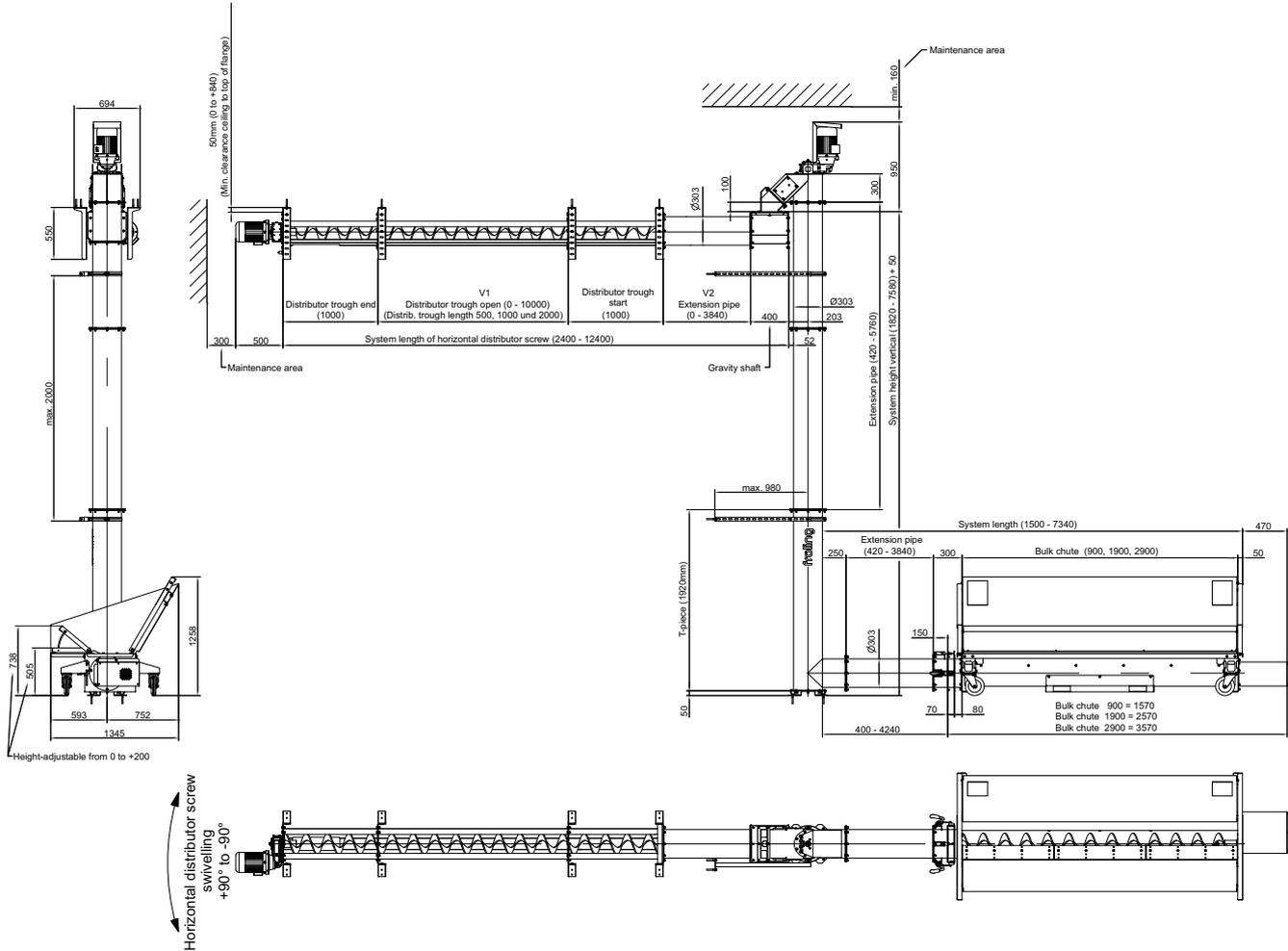
*Serious injury possible due to moving parts with automatic run-on!*

- Release one or both buttons on the control unit
  - Depending on the function, the vertical screw and also the horizontal distributor screw/centrifugal disc are switched off with a time delay
  - This process may take a few seconds and is not a fault

### 3 Technology

#### 3.1 Dimensions BFSV-H

The following diagram with associated matrix lists the possible system lengths and system heights which are important for design of the fuel store and the wall opening. All dimensions are specified in mm.



*System length of horizontal distributor screw*

BM	V1 (in 500 mm steps)	BM	V2	BM
Distributor trough end	Distributor trough open	Distributor trough start	Extension pipe	Gravity shaft
1000	0 – 10000	1000	-	400
	0 – 9000		420	
	0 – 9000		920	
	0 – 8000		1340 (920+420)	
	0 – 8000		1920	
	0 – 7000		2340 (1920+420)	
	0 – 7000		2840 (1920+920)	
	0 – 6000		3260 (1920+920+420)	
	0 – 6000		3840 (1920+1920)	

System length (max. 12400 mm) = GM + V1 + GM + V2 + GM

*Matrix of system heights*

Base unit of vertical screw	Possible system heights	Necessary extension pipes	Screw length	Number of wall fixings	Weight
1920	1820	-	2330	1	244
	2240	420	2750	1	261
	2740	920	3250	2	279
	3160	1340 (920+420)	3670	2	296
	3740	1920	4250	2	315
	4160	2340 (1920+420)	4670	2	332
	4660	2840 (1920+920)	5170	3	350
	5080	3260 (1920+920+420)	5590	3	367
	5660	3840 (1920+1920)	6170	3	386
	6080	4260 (1920+1920+420)	6590	3	403
	6580	4760 (1920+1920+920)	7090	4	421
	7000	5180 (1920+1920+920+420)	7510	4	438
	7580	5760 (1920+1920+1920)	8090	4	457

*Matrix of system lengths*

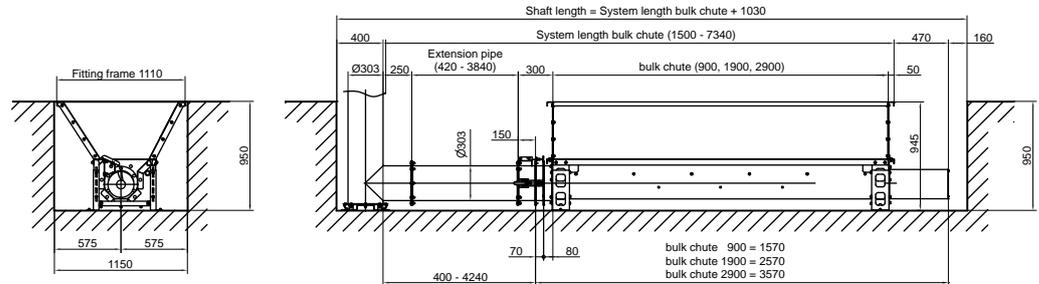
Length of bulk chute	Possible system lengths	Necessary extension pipes	Screw length	Weight
900	1520	-	1560	277
	1920	420	1980	294
	2420	920	2480	312
	2840	1340 (920+420)	2900	330
	3420	1920	3480	348
	3840	2340 (1920+420)	3900	365
	4340	2840 (1920+920)	4400	383
	4760	3260 (1920+920+420)	4820	400
	5340	3840 (1920+1920)	5400	419

Length of bulk chute	Possible system lengths	Necessary extension pipes	Screw length	Weight
1900	2500	-	2560	376
	2920	420	2980	393
	3420	920	3480	411
	3840	1340 (920+420)	3900	428
	4420	1920	4480	447
	4840	2340 (1920+420)	4900	464
	5340	2840 (1920+920)	5400	482
	5760	3260 (1920+920+420)	5820	499
	6340	3840 (1920+1920)	6400	518

Length of bulk chute	Possible system lengths	Necessary extension pipes	Screw length	Weight
2900	3500	-	3560	474
	3920	420	3980	491
	4420	920	4480	509
	4840	1340 (920+420)	4900	526
	5420	1920	5480	545
	5840	2340 (1920+420)	5900	562
	6340	2840 (1920+920)	6400	580
	6760	3260 (1920+920+420)	6820	597
	7340	3840 (1920+1920)	7400	616

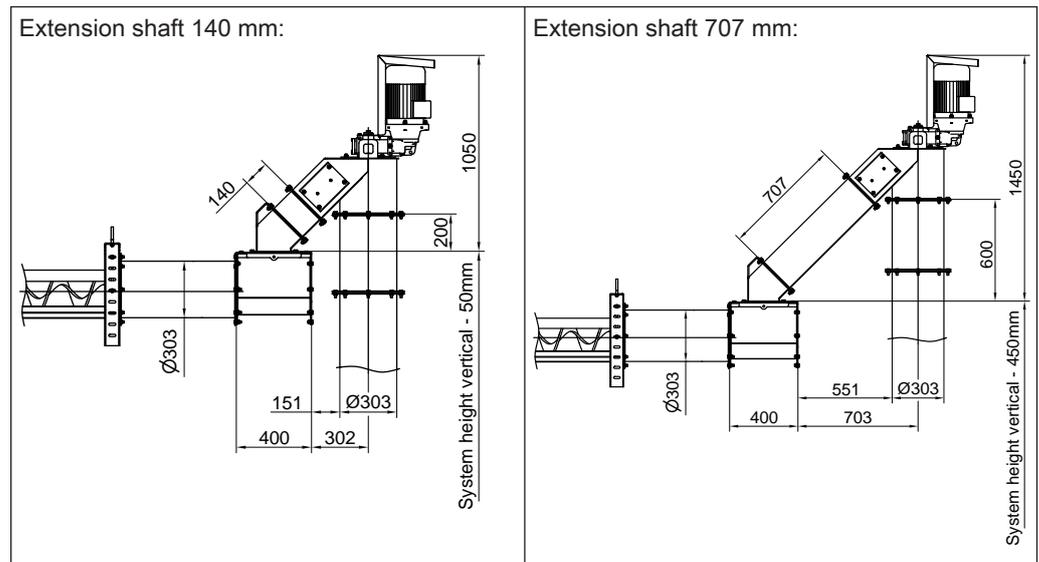
### 3.1.1 Design with recessed bulk chute

The following diagram shows the BFSV-H variant with a recessed bulk chute and is also particularly useful when dimensioning the shaft size. The system lengths possible are based on the matrix given above. All dimensions are specified in mm.



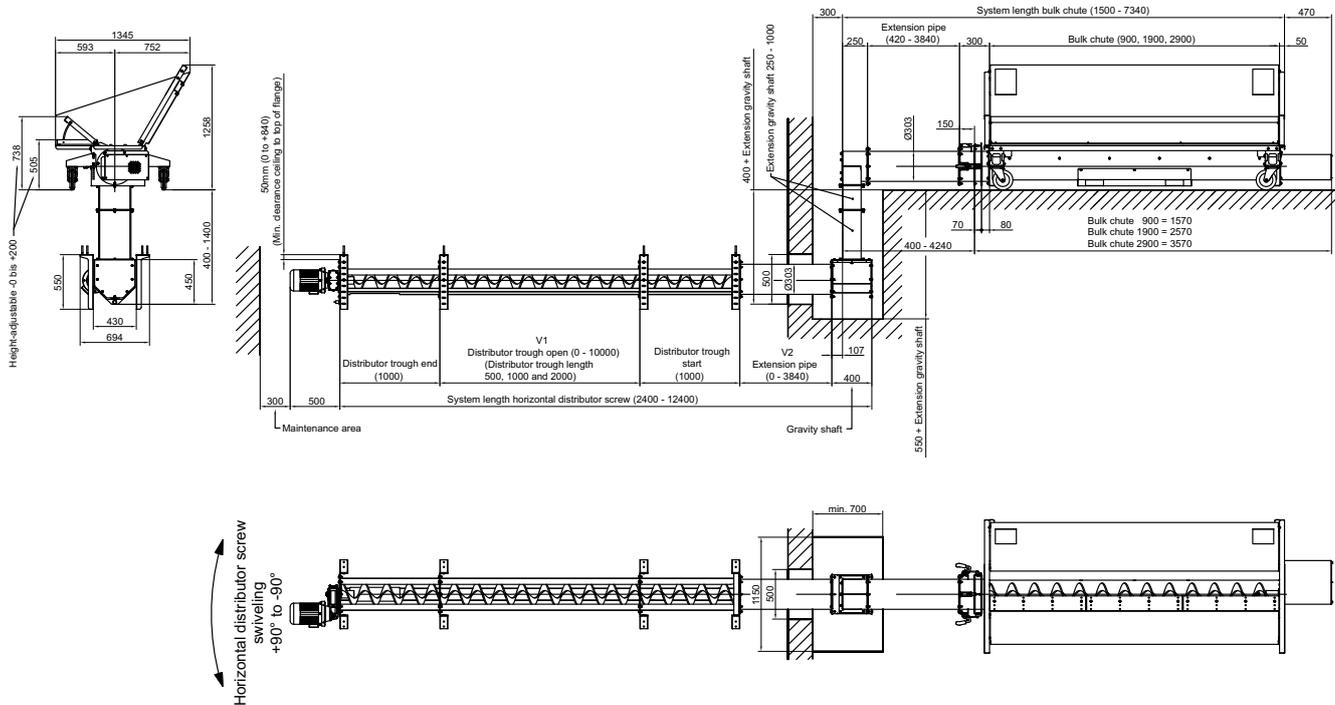
### 3.1.2 Dimensions of extension shaft

An extension is necessary for the wall duct depending on the conditions on site. It should be remembered that depending on the extension shaft used, the system height will reduce by either 50 or 500 mm. All dimensions are specified in mm.



### 3.2 Dimensions BFSU-H

The following diagram with associated matrix lists the possible system lengths and system heights which are important for design of the fuel store and the wall opening. All dimensions are specified in mm.



*System length of horizontal distributor screw*

BM	V1 (in 500 mm steps)	BM	V2	BM
Distributor trough end	Distributor trough open	Distributor trough start	Extension pipe	Gravity shaft
1000	0 – 10000	1000	-	400
	0 – 9000		420	
	0 – 9000		920	
	0 – 8000		1340 (920+420)	
	0 – 8000		1920	
	0 – 7000		2340 (1920+420)	
	0 – 7000		2840 (1920+920)	
	0 – 6000		3260 (1920+920+420)	
	0 – 6000		3840 (1920+1920)	

System length (max. 12400 mm) = GM + V1 + GM + V2 + GM

*Matrix of system lengths*

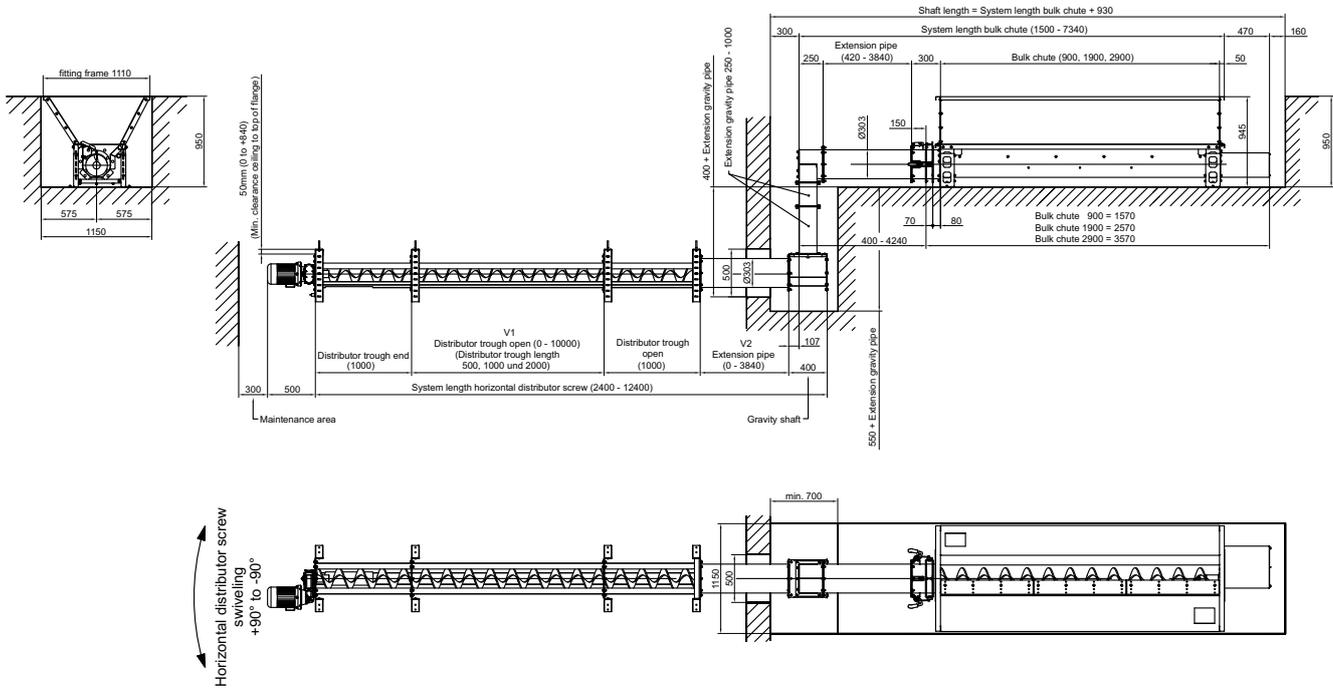
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900	1520	-	1560	277
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### 3.2.1 Design with recessed bulk chute

The following diagram shows the BFSU-H variant with a recessed bulk chute and is also particularly useful when dimensioning the shaft size. The system lengths possible are based on the matrix given above. All dimensions are specified in mm.



### 3.3 Technical data

Designation	Value
Electrical connection	400 VAC / 50Hz
Electric fuses	C35A
Bulk chute drive - Power consumption	3.0 kW
Bulk chute drive - Speed	65 U/min
Vertical screw drive - Power consumption	4.0 kW
Vertical screw drive - Speed	85 U/min
Horizontal distributor screw drive - Power consumption	4.0 kW
Horizontal distributor screw - Speed	108 rpm

## 4 Assembly

### 4.1 Transport and handling

The bunker filling screw comes packed on pallets



#### NOTICE

##### Damage to components if handled incorrectly

- Follow the transport instructions on the packaging.
- Transport components, in particular drive components, with care to avoid damage

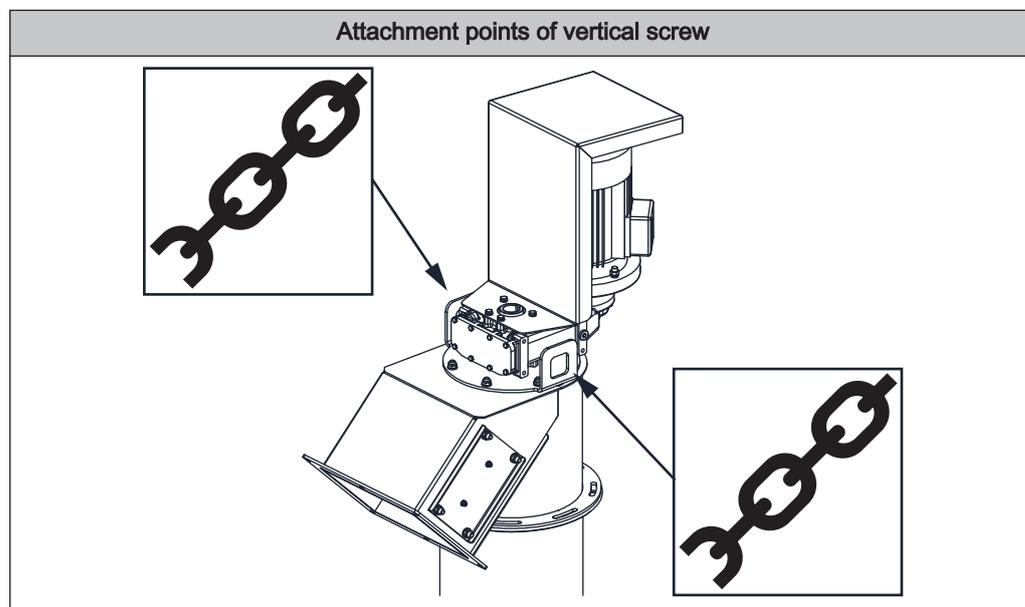
#### 4.1.1 Temporary storage

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

- Store components at a protected location, which is dry and free of dust
  - ➔ Damp can damage components, particularly in the motor.

### 4.2 Assembly Aids

**Lifting** Suitable lifting equipment with sufficient load-bearing capacity is required on site to manoeuvre the individual units. The vertical screw is equipped with eye bolts for transport and assembly.



**NOTICE!** Lifting with suitable lifting equipment should only be carried out by technicians with a specific knowledge of lifting loads!

**NOTICE!** Lifted components must be secured by the lifting equipment until firmly attached!

***Working height*** When performing assembly at great heights, suitable scaffolding or elevating work platforms are necessary on site. Their design and dimensioning in relation to the permissible working height and load capacity should be selected according to the accident prevention regulations!

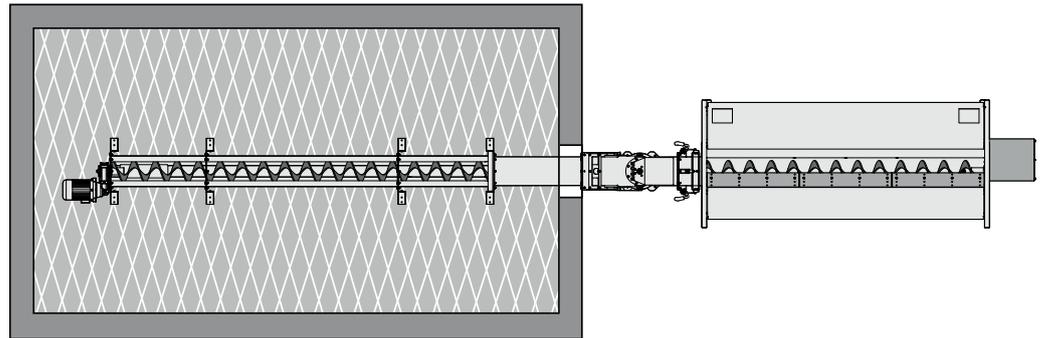
**NOTICE!** Installation and operation should only be carried out by technicians with a specific knowledge of lifting persons!

## 4.3 Installation site

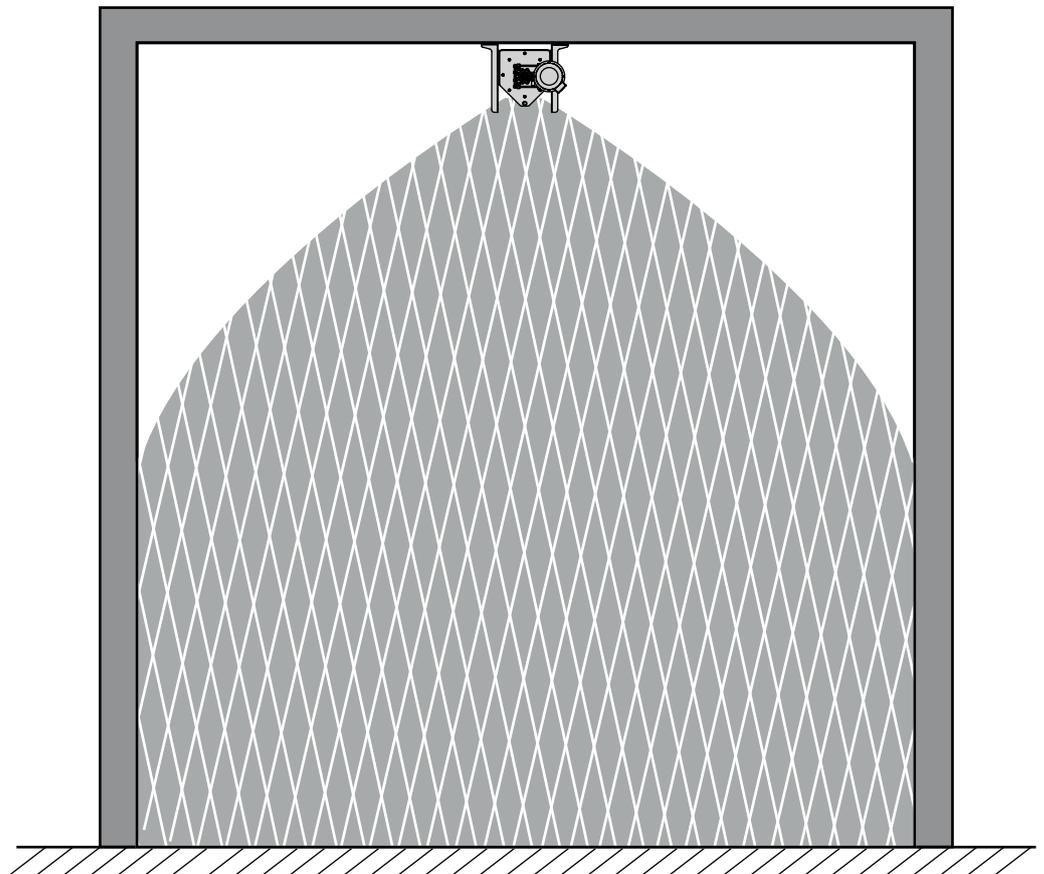
### 4.3.1 Position of horizontal distributor screw

The filling level in the fuel store depends on the position of the horizontal distributor screw. The attempt should always be made to position the horizontal distributor screw as high as possible, as well as centrally, in the fuel store. In the case of rectangular fuel stores, the filling with fuel should preferably be carried out on the narrow side.

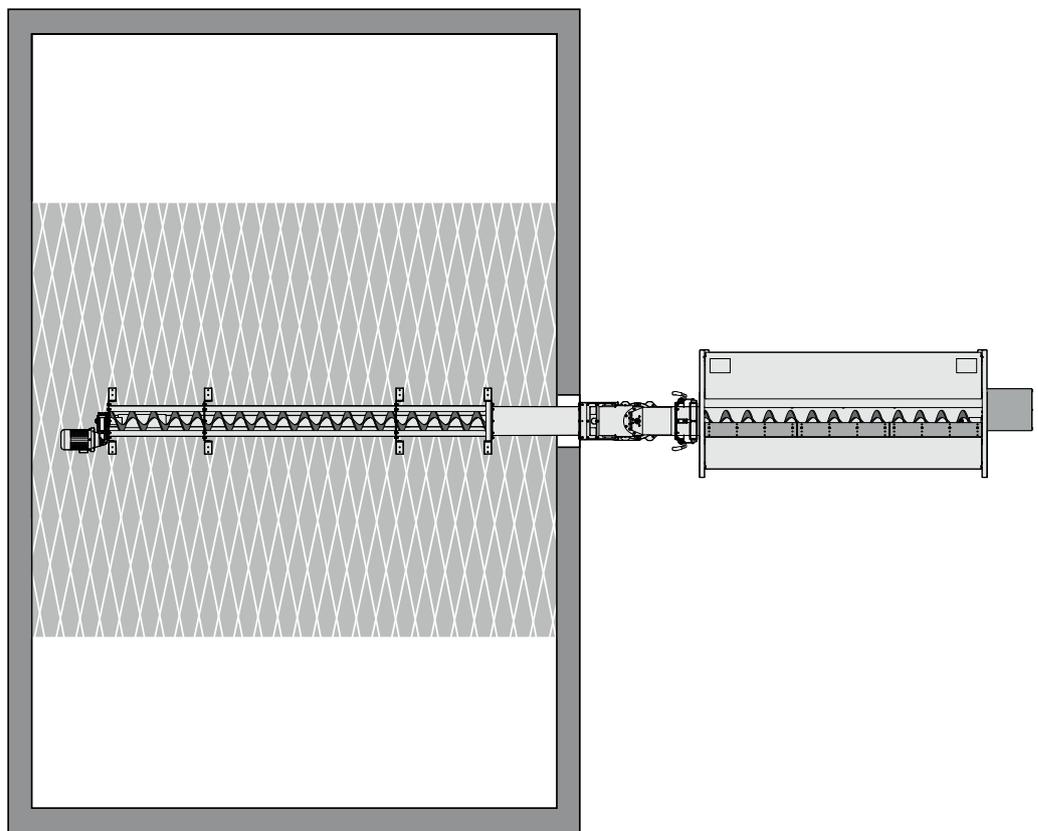
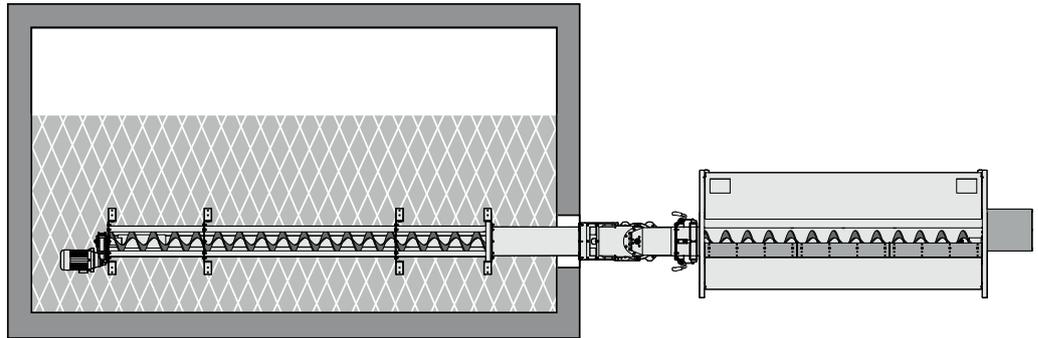
*Positioning in the centre of the narrow side (ideal)*



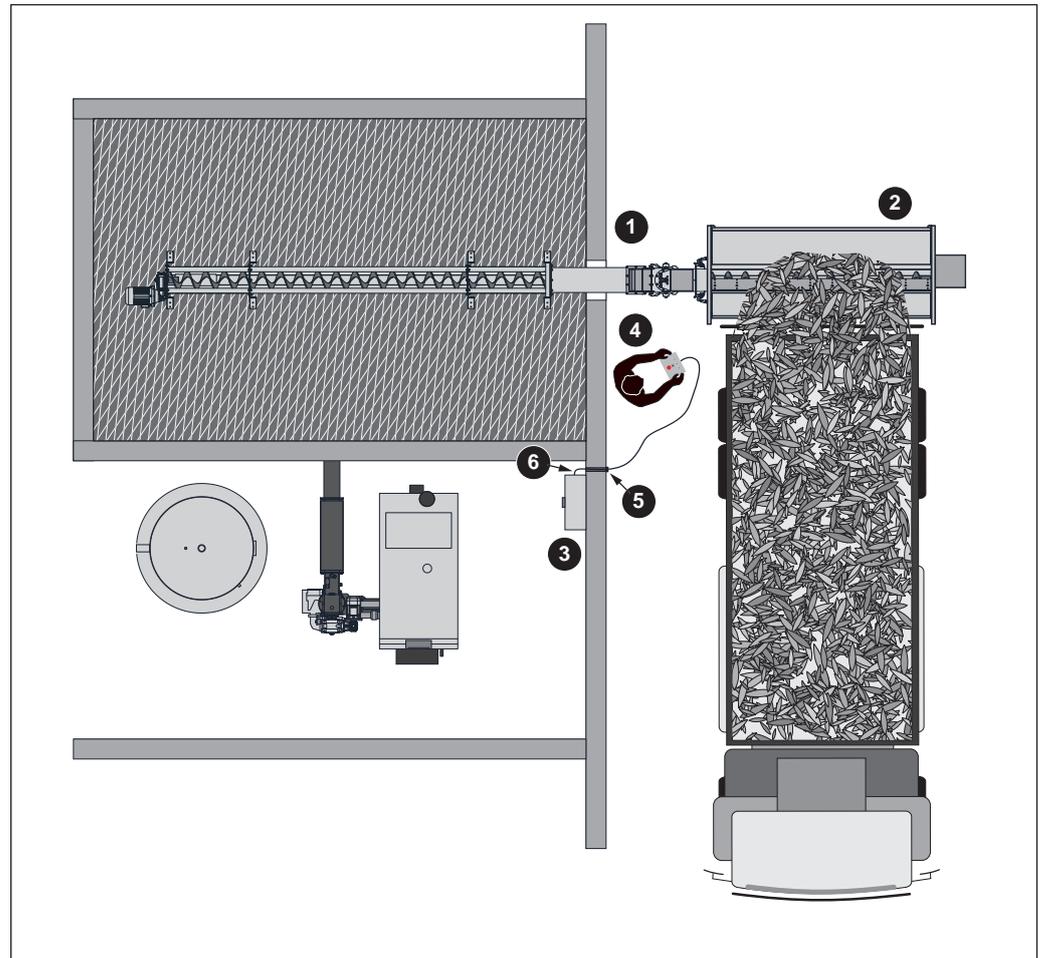
*Fill level*



*Positioning off-centre or on the long side (not ideal)*



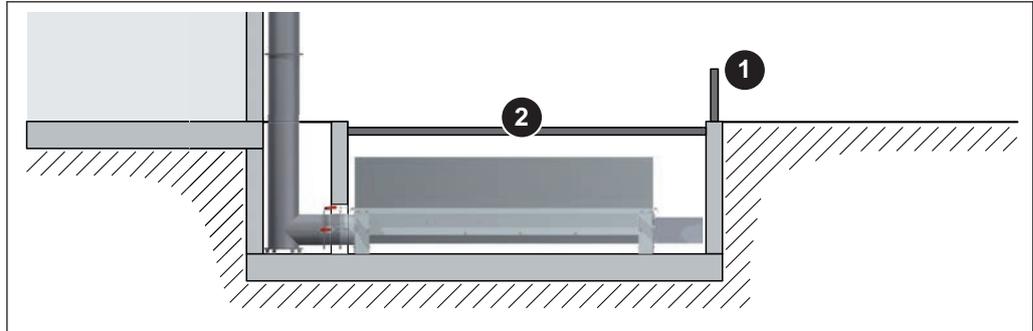
### 4.3.2 Installation with mobile bulk chute



- 1 With all assembly variants of the BFSV-H the vertical screw is secured to the wall of the fuel store with clips and sections. The bracket of the vertical screw is additionally affixed to the floor with heavy duty anchors. Both the brickwork and the floor must have sufficient load capacity.
- 2 The ground around the mobile bulk chute and the access area for the loading vehicle must be even and also have sufficient load capacity.
- 3 The control cabinet must be installed within the protected area.
- 4 During operation of the system the operator must be stationed at all times within view of the bulk chute to be able to respond immediately to any risks which might occur. In the work area guard structures should be used to ensure that falling wood chips or moving platform gates of the dumper do not injure the operator. The necessary protective structures should be dimensioned according to EN ISO 13857.
- 5 16 pin socket (for layout see circuit diagram included in control cabinet)
- 6 A 16 pin cable as a connection line between the control cabinet and socket must be provided by the customer.

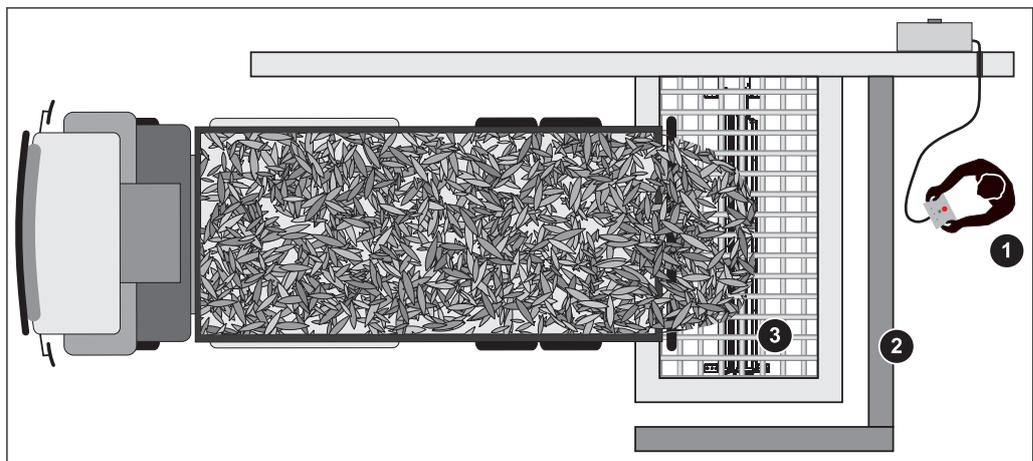
### 4.3.3 Installation with recessed bulk chute

If the filling system is operated with a stationary recessed bulk chute, the following design information should be noted:



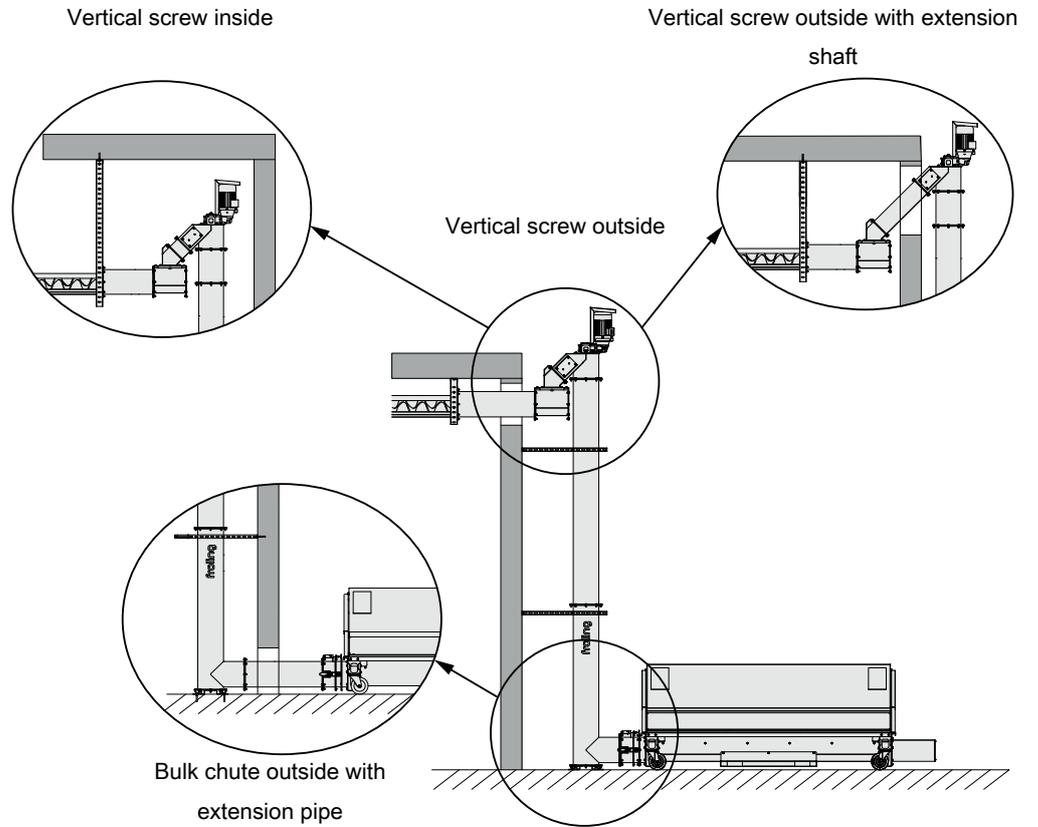
- 1 Protective structure to prevent operator from reaching over during operation. Dimensioning of structure acc. to EN ISO 13857.
- 2 Cover over filling area to prevent operator from climbing in during operation. Dimensioning of structure acc. to EN ISO 13857.

The following figure shows an example of how the bulk chute can be executed in the filling area. It is important that the user can see into the filling area for the entire filling process. The material should be transferred to the bulk chute on the opposite side.

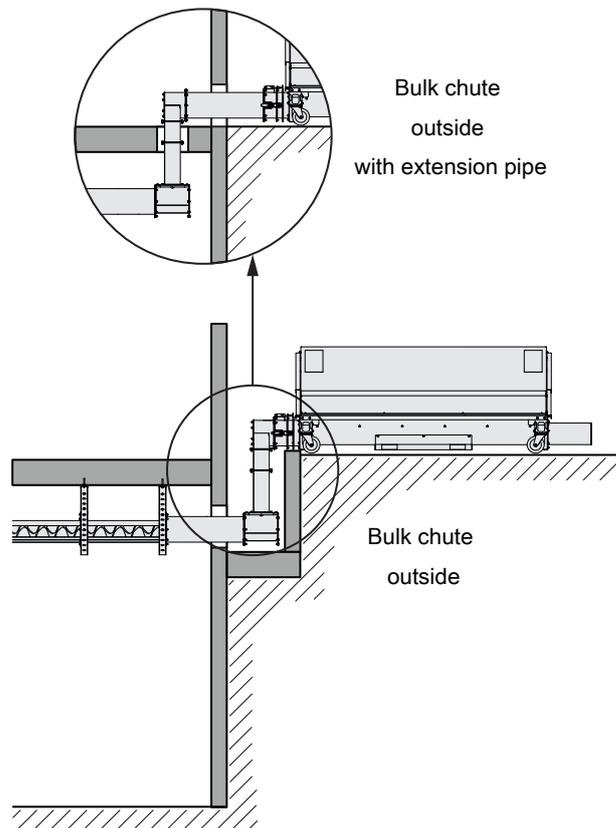


- 1 Operating position within view of the bulk chute
- 2 Protective structure to prevent operator from reaching over during operation
- 3 Cover over filling area to prevent operator from climbing in during operation

### 4.4 Installation variants BFSV - H



### 4.5 Installation variants BFSU - H

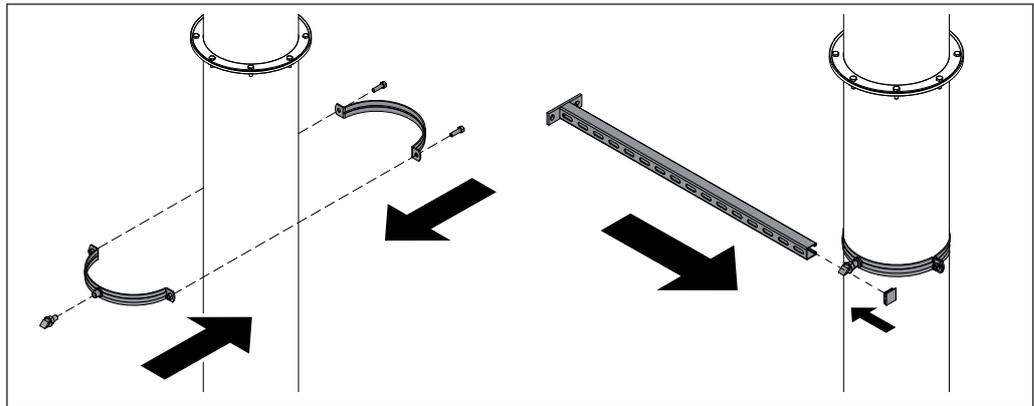


## 4.6 Install Bunker Filling System

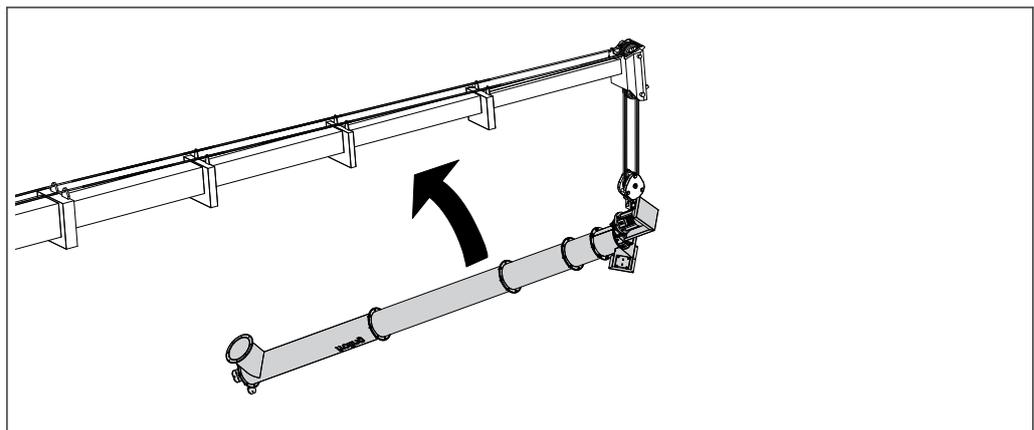
### CAUTION

The suitability of the fasteners supplied (e.g. heavy duty anchor) for the respective attachment basis must be checked by the assembly staff and operator. If the fasteners supplied are not suitable, then responsibility for selecting the fasteners lies with the assembly staff.

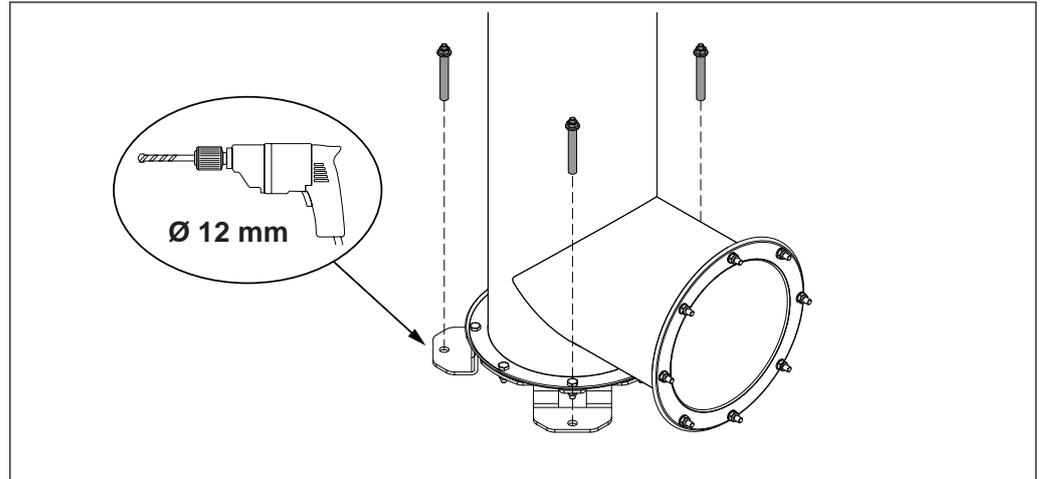
#### 4.6.1 Install vertical screw



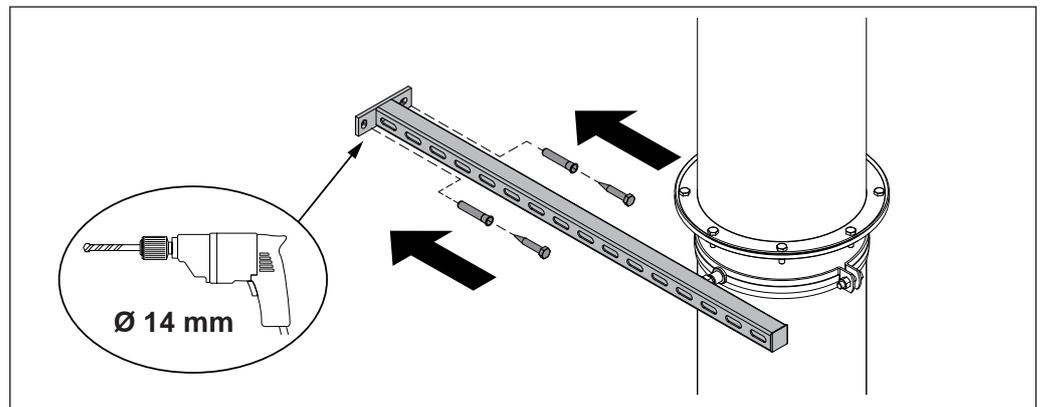
- Space the fixing clips over the height of the vertical screw at equal distances, attach to the vertical screw and screw the hook head with fixing clips
  - The number of fixing clips depends on the system height of the vertical screw
- Slide the cantilever bracket over the hook head and put on the end cap



- Carefully raise vertical screw with suitable lifting equipment and set up vertically
- Align entire unit to wall so it is plumb

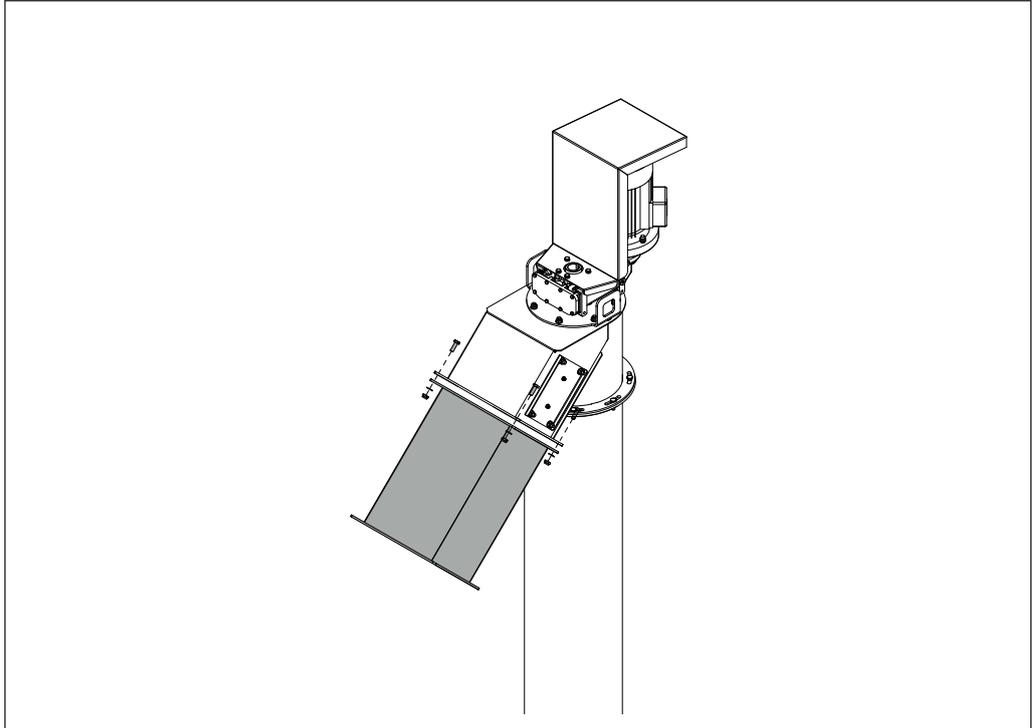


- Drill the holes in the bracket for the foundation
- Hammer in the heavy duty anchors and fix the bracket to the floor



- Mark holes for cantilever bracket on wall and drill
- Hammer dowels into wall and screw the cantilever bracket to the wall using frame screws M12x80

#### 4.6.2 Fitting the extension shaft (optional)

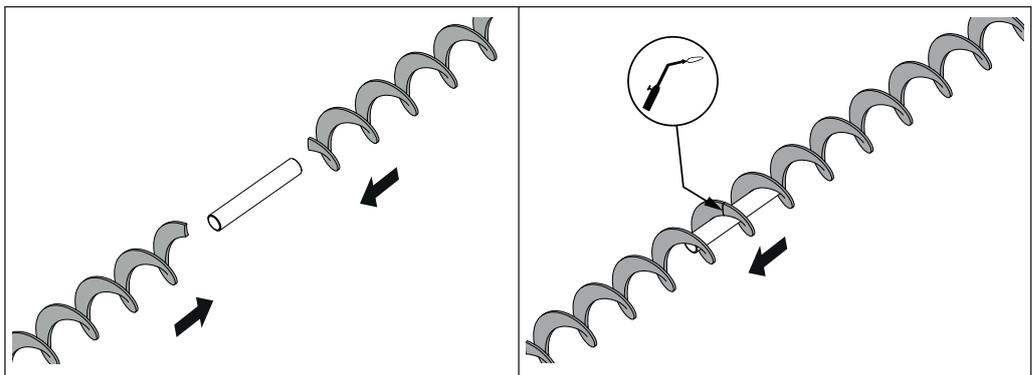


- Screw the extension shaft and vertical screw with the 4 hexagonal screws M10x 30, spacer washers and safety nuts

#### 4.6.3 Installing the horizontal distributor screw

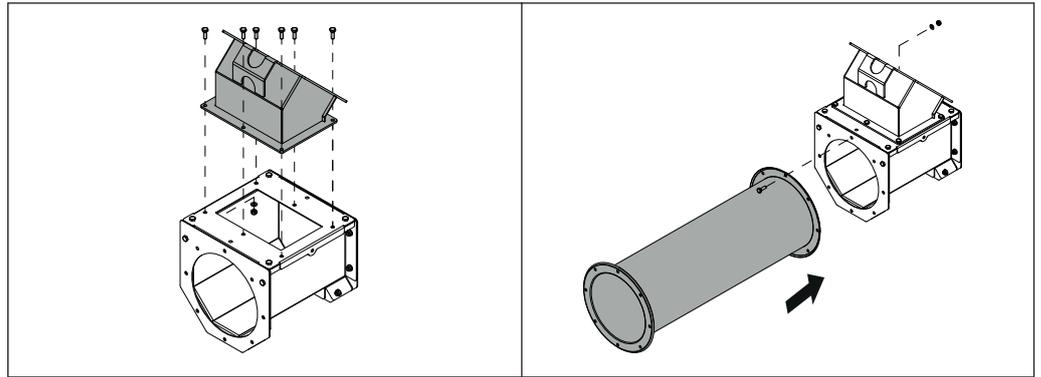
Depending on the conditions on site, the horizontal distributor screw is delivered as individual parts or already fully assembled. If the horizontal distributor screw is already fully assembled, then this can be mounted directly on the ceiling.

##### *Welding the coreless screw together*

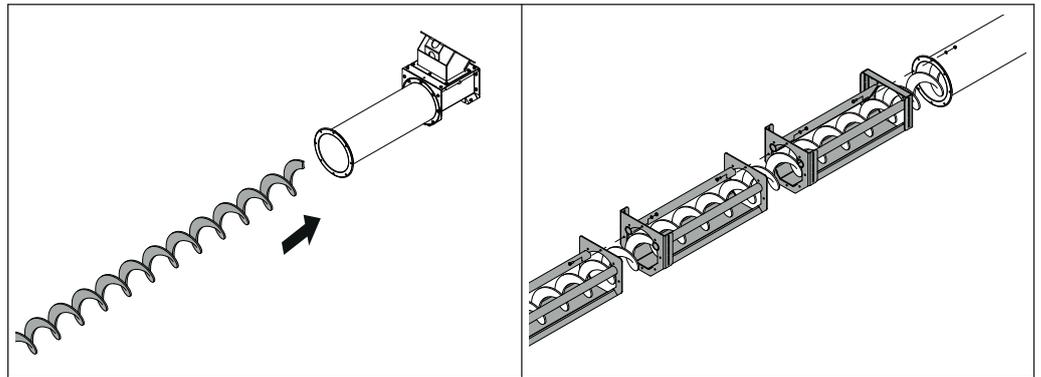


- Slide the coreless screw over the pipe and align the screw blades
- Weld the coreless screw together and remove the pipe again

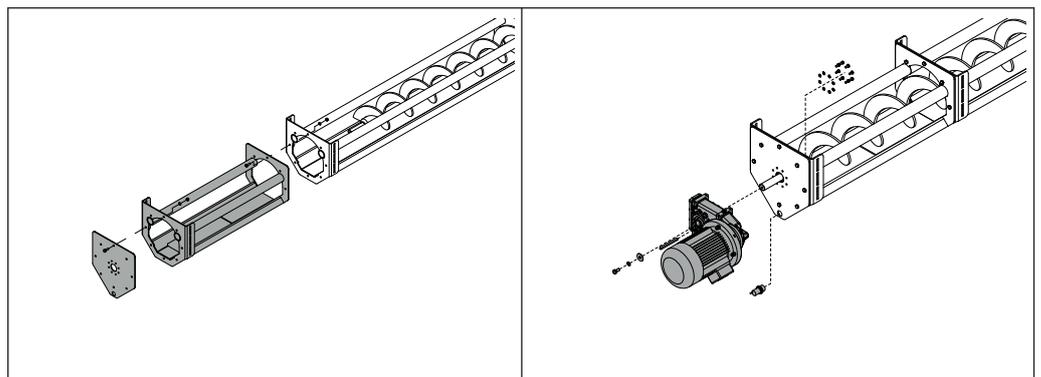
*Assembling the troughs*



- Screw ejection shaft and gravity shaft with the 6 hexagonal screws M10x30, spacer washers and safety nuts
- Screw the extension pipe (if installed) and gravity shaft with the 8 hexagonal screws M10x30, spacer washers and safety nuts

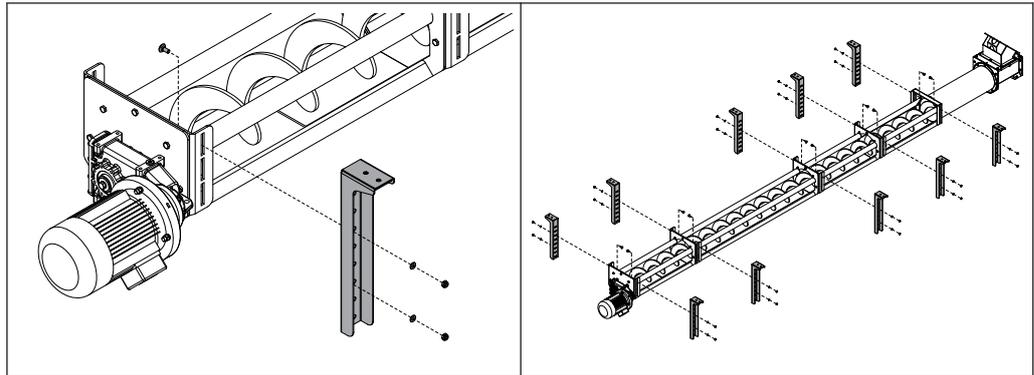


- Push in the coreless screw
- Screw the distributor trough start and distributor troughs open (number depends on the system length of the horizontal distributor screw) with the 8 hexagonal screws, spacer washers and safety nuts



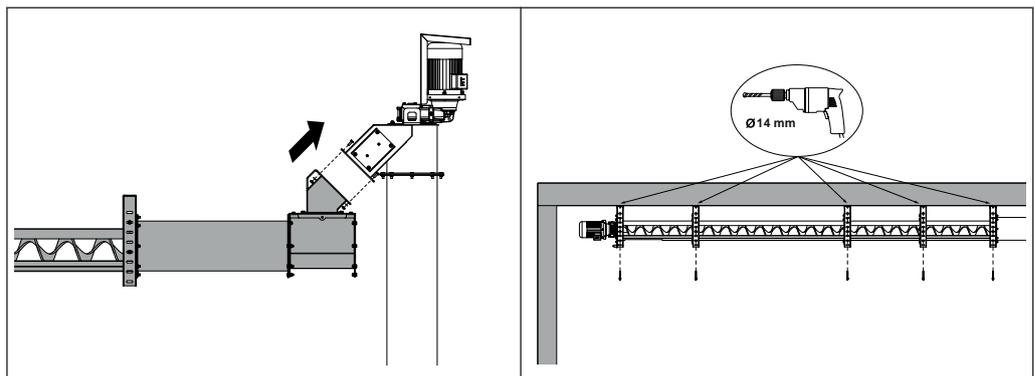
- Screw the gearbox flange and distributor trough end with the 8 hexagonal screws M10x30, spacer washers and safety nuts
- Place the offset geared motor on the shaft stub of the coreless screw and secure it using 8 lock washers and hexagonal screws M8x16 on the gearbox flange
- Insert the fitting key into the groove on the shaft and secure it with a locking screw
- Screw filling level sensor in gearbox flange

### *Installing the adjustable feet*



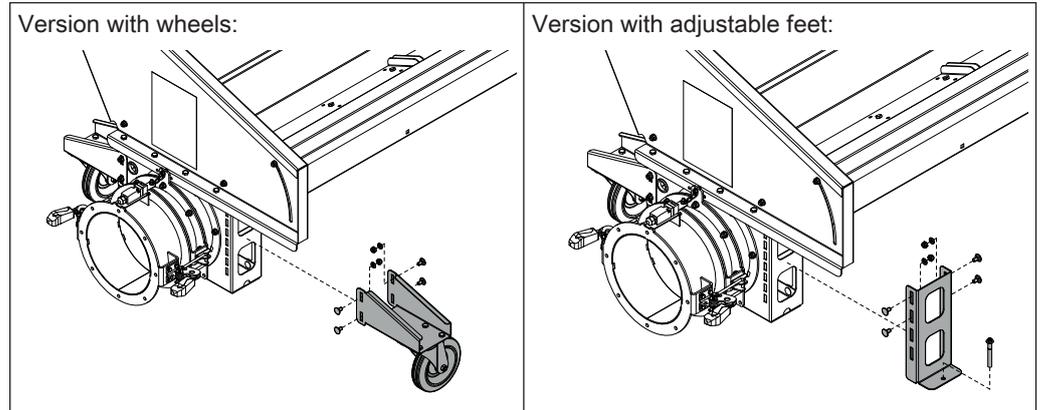
- Attach the adjustable feet on the side of the horizontal distributor screw with cup square bolts, spacer washers and hexagonal nuts
  - The number of adjustable feet depends on the system length of the horizontal distributor screw!

### *Attaching the horizontal distributor screw to the ceiling*

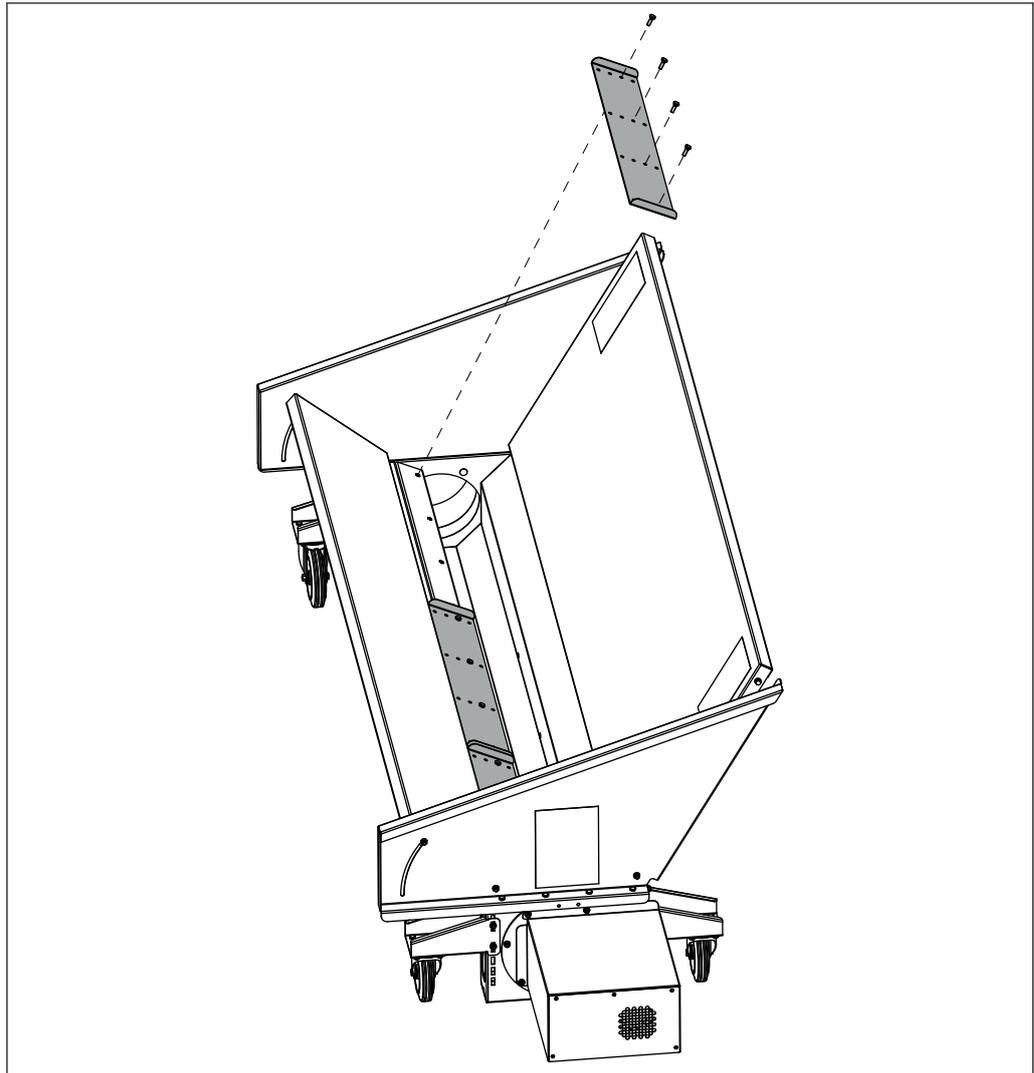


- Carefully raise the assembled horizontal distributor screw with suitable lifting equipment and position on the ceiling
  - When doing so, secure entire unit with lifting equipment
- Screw the horizontal distributor screw and vertical screw (or extension shaft, depending on the version) using the 4 hexagonal screws M10x30, spacer washers and safety nuts
- Align the adjustable feet on the ceiling and drill holes for attaching the horizontal distributor screw to the ceiling
- Hammer the dowels supplied (Gr. 14) into the ceiling
- Attach the horizontal distributor screw with frame screws  $\varnothing 12 \times 80 \text{ mm}$  to the ceiling

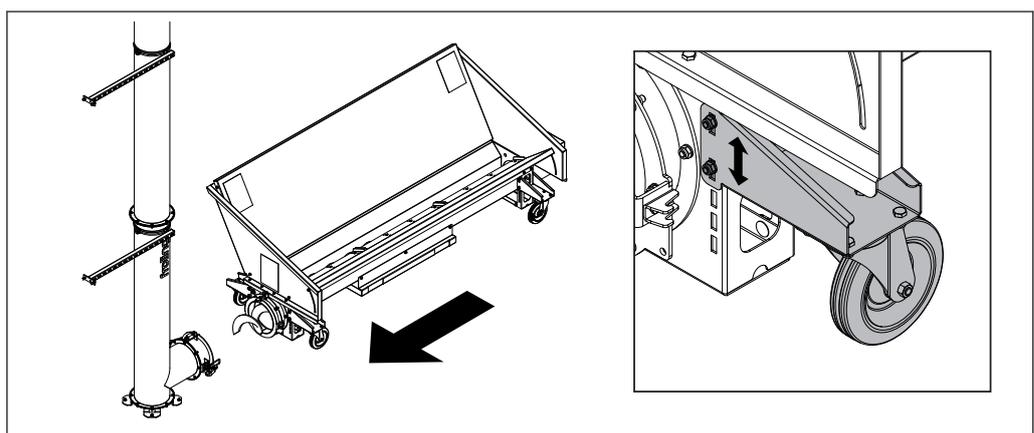
### 4.6.4 Preparing the bulk chute



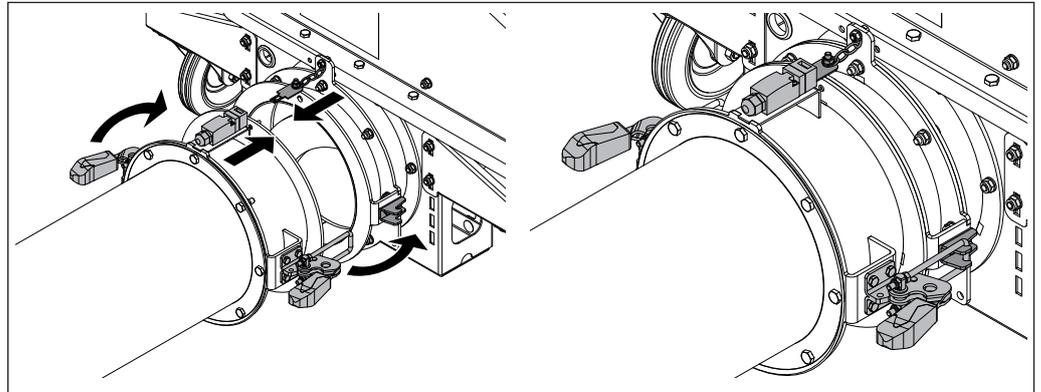
- Depending on the model, screw either the wheels or the adjustable feet using the 4 round-head screws M10x20, spacer washers and safety nuts
  - If the bulk chute is to be installed at fixed points, it can be secured to the floor using heavy duty anchors
- Regulate the height of the bulk chute by adjusting the wheels or adjustable feet to the flange of the extension pipe or vertical screw

*Fit the cover plates*

- Screw the cover plate (number depends on the length of the bulk chute) using the 4 hexagonal screws M10x30 to the bulk chute
  - The position of the cover plate depends on the wood chip size
    - ⇒ See "Adjust the feed output to the fuel" [page 42]

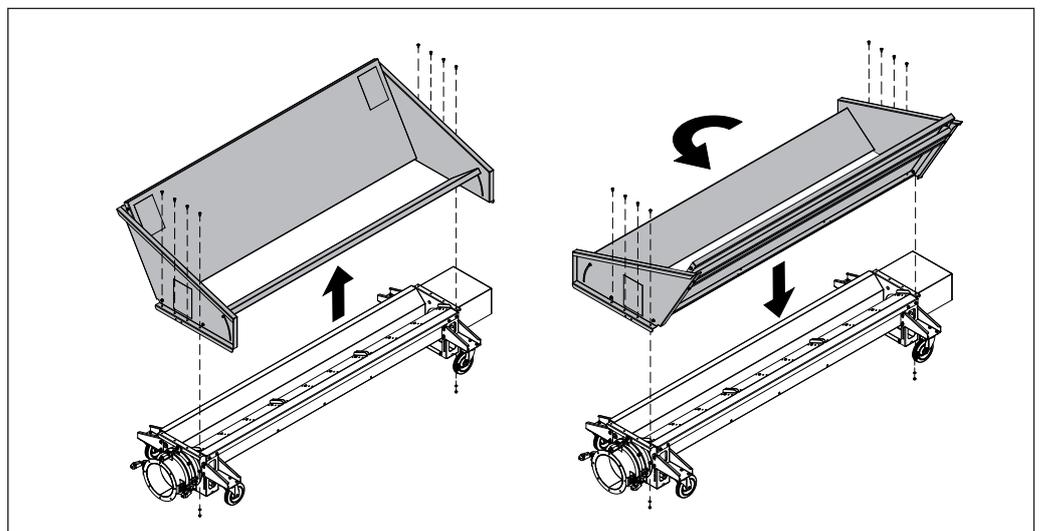
**4.6.5 Position bulk chute**

- Position the bulk chute on the flange of the vertical screw
- Regulate the height of the bulk chute by adjusting the wheels to the flange of the vertical screw



- Move out the hook on the quick fastener
- Move the bulk chute to the flange and secure with the quick fastener
- Snap the key plate into place at the safety limit switch
  - If the key plate does not snap into place at the safety limit switch, it is not possible to operate the system.

### 4.6.6 Turning the fitting frame

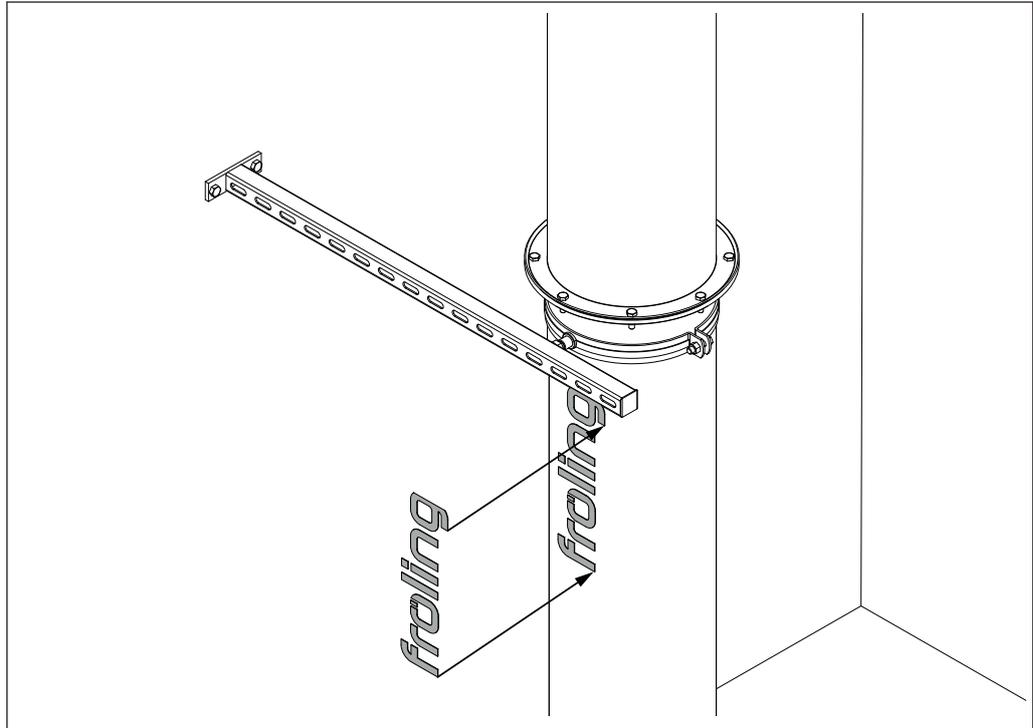


- Loosen the side screws of the fitting frame and lift the fitting frame
- Turn the fitting frame by 180° and place it on the bulk chute
- Screw the fitting frame onto the bulk chute using the previously loosened screws

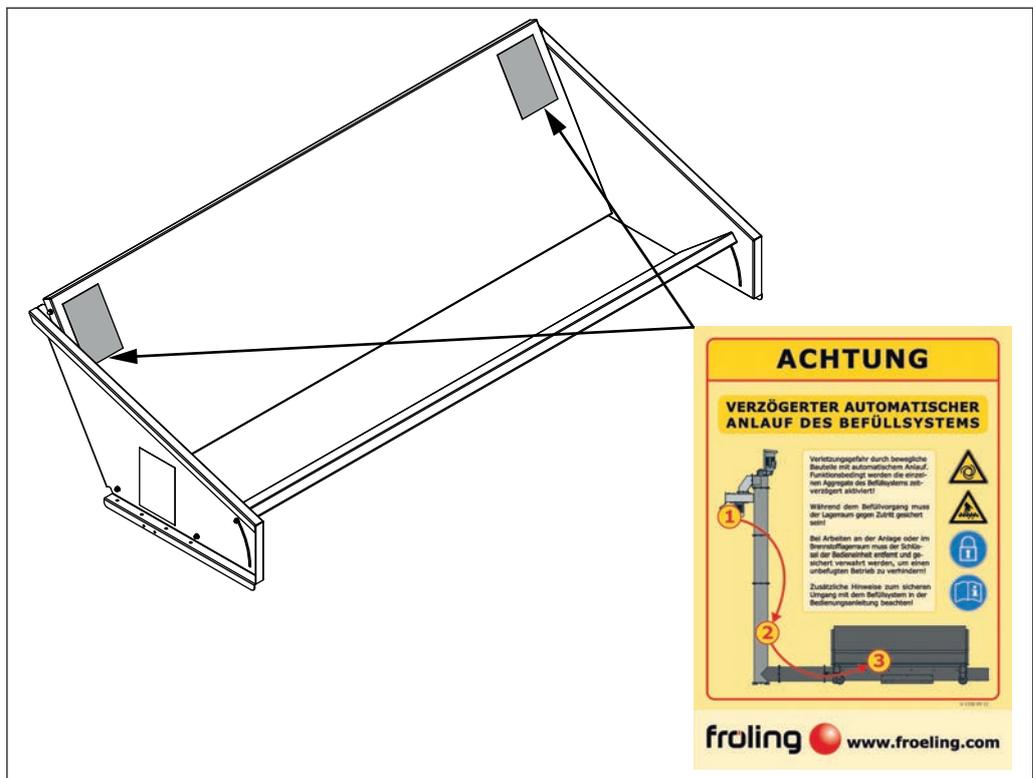
**NOTICE!** The position of the motor for the screw must not be changed!

#### 4.6.7 Final installation steps

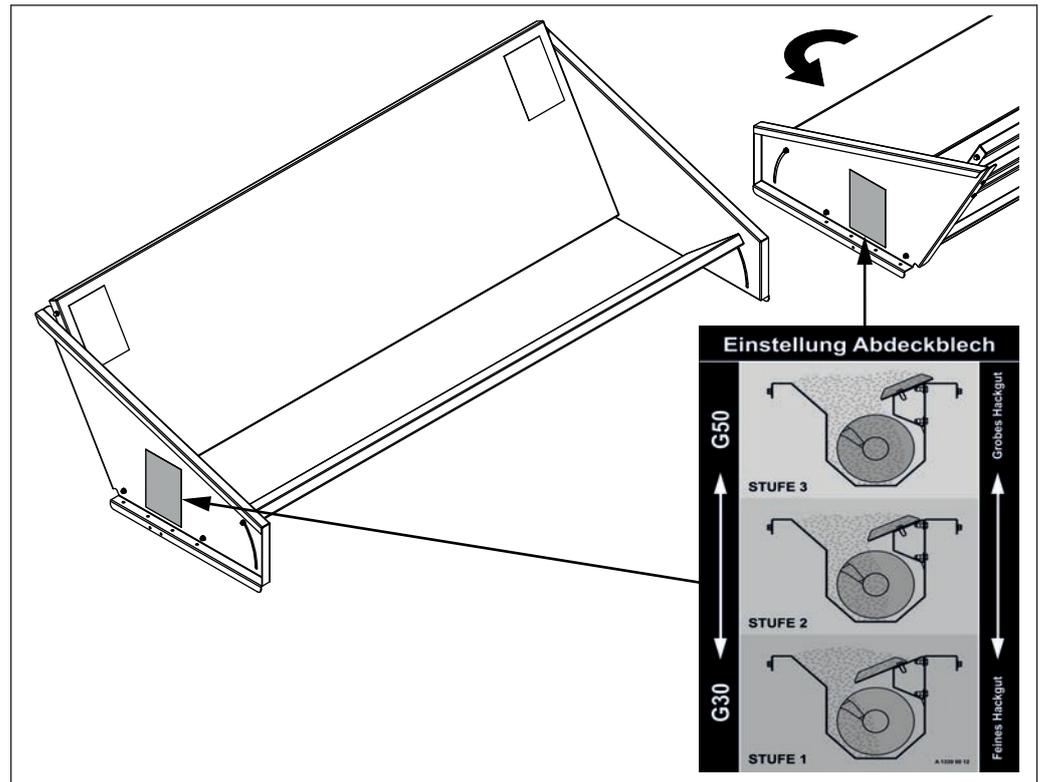
##### *Positioning the stickers*



- Attach the “FRÖLING” sticker to the vertical screw pipe



- Attach 2x stickers “CAUTION – DELAYED AUTOMATIC START-UP OF FILLING SYSTEM” on the inside of the fitting frame



- Attach 2x stickers “Cover plate adjustment” on the left and right outer edge of the fitting frame

## 5 Electrical connection

### DANGER



When working on electrical components:

*Risk of electrocution!*

When work is carried out on electrical components:

- Only have work carried out by a qualified electrician
  - Observe the applicable standards and regulations
    - Work must not be carried out on electrical components by unauthorised persons
- 
- Install the control cabinet supplied within the protected area
  - Install the wiring of the electrical components according to the circuit diagrams supplied

### 5.1 Mains connection

- Lay the mains connection cable to the control cabinet and connect to the main switch and the earth terminal
- Electrical power supply to be fused by customer with C35A

**NOTICE!** Flexible sheathed cable must be used for the wiring; this must be of the correct size to comply with applicable regional standards and regulations.

### 5.2 Time relay settings in the control cabinet

The following table shows the functions and time settings of the time relays which are installed in the control cabinet. The values are also specified in the circuit diagram.

Relay No.	Function	Function setting on the time relay	Time setting [s]
K3.1	Vertical screw shutdown delay	R	30
K1.3	Vertical screw startup delay	ES	10
K1.2	Centrifugal disc/ horizontal distributor screw shutdown delay	R	10
K2.1	Bulk chute startup delay	ES	5

## 6 Operating the system

### 6.1 Initial start-up

#### NOTICE

**Efficient operation can only be guaranteed if the system is set by specialist staff and the default factory settings are observed.**

Therefore:

- Initial startup should be carried out with an installer approved by Fröling Heizkessel- und Behälterbau GesmbH or with Fröling customer services

During initial start-up:

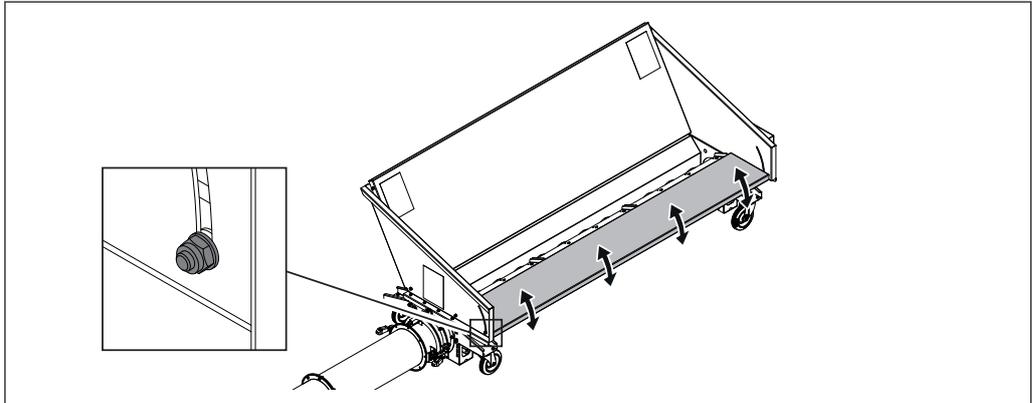
- Check that the system has been assembled correctly
  - Check that all the components supplied have been installed in accordance with the assembly instructions
- Check the supply pipe and electrical fuse
- Check the direction of rotation of the screws
- Check that the motor overload for the drive motor is working
- Check the on-site protective structure of the bulk chute
  - The bulk chute must be secured so that no one is at risk of injury while the system is in operation.
  - Follow the instructions for implementing the protective structure
- Affix the identification plate to the control cabinet
- Affix the “fuel store” warning notice in a conspicuous place in the access area

When the check is finished:

- Perform a test run and fill the store space with fuel
- Observe the fuel transport around the bulk chute (e.g. bridge formation) and if necessary, regulate by adjusting cover plates

## 6.2 Adjust Filling Area to Loading Vehicle

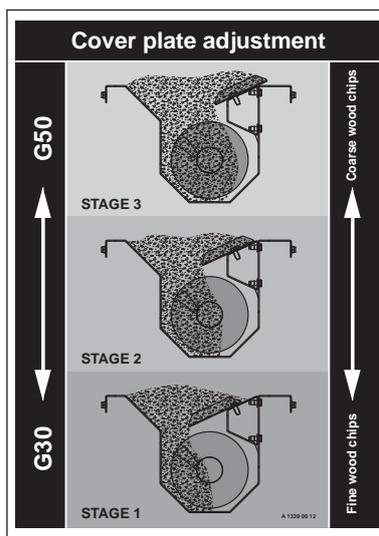
The front part of the bulk chute is adjustable, which means that it can be quickly adapted to the sill of the loading vehicle.



- Loosen the screw connections to the left and right on the inlet plate
- Move the inlet plate into the required position according to the loading height necessary
- Fix in position with the screw connections

## 6.3 Adjust the feed output to the fuel

The inlet area is equipped with adjustable cover plates to regulate the fuel feed in the bulk chute. Depending on the material used, they can be adjusted in three stages as required. It is recommended starting with Stage 1 and then increasing the inlet area if needed:



Adjust cover plates:

- Remove bolts from cover plate
- Move cover plate into the required position and with fix with bolts



## 6.4 Fill the store with fuel

### NOTICE

Before starting with the filling process, check that the bunker filling system is working properly.

### ⚠ CAUTION

If unauthorised fuel types are used:

*Non-standard fuels can cause stiffness and block the system, resulting in the failure/breakage of components.*

*Therefore:*

- Only use fuels specified in the "Permitted uses" section of these operating instructions.

### 6.4.1 Switching on the power supply



- Turn the main switch on the switching unit to "I"
  - The power supply is switched on
  - The components in the switching unit are live

### 6.4.2 Start filling process



### ⚠ DANGER

If the bunker filling screw is switched on when someone is in the danger zone:

*Risk of serious injury from rotating feed screw!*

Therefore:

- Ensure that there is no one in the filling area of the bunker filling screw and that no one enters the danger zone for the duration of the filling process
- Ensure that no one is in the store and that the entrance to the store is secured against entry for the duration of the filling process
- Only start the filling process once these conditions have been met

## DANGER



### Delayed automatic start-up of individual components

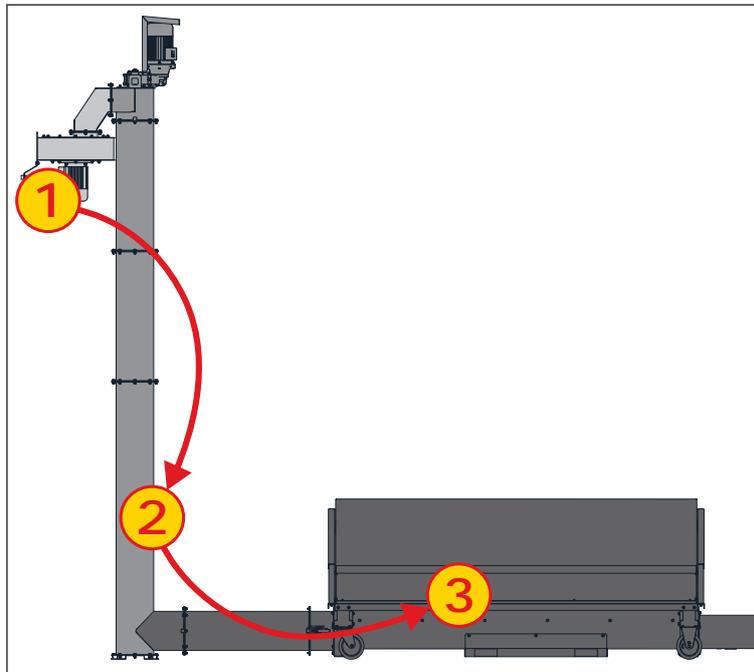
***Serious injury possible due to moving parts with automatic start-up!***

When switching on the system, remember the following:

- Check that there is no-one in the danger zone of the system
- Press both push-buttons of the two-hand tripping device
  - Depending on the function time-delayed activation of the individual units will take place
  - This process may take a few seconds and is not a fault



- Simultaneously press both start buttons of the two-hand tripping device (one button on each side, left and right)
  - Activation of the units is time-delayed, one after the other in the following sequence



- Fill bulk chute with fuel
  - The filling system will continue to feed material until one of the two start buttons is released, or the filling level sensor responds

**NOTICE!** If the filling system is stopped because of the filling level sensor, the bulk chute and the vertical screw are filled with material, which can no longer be brought in the fuel store!

**NOTICE!** When filling the bulk chute with a dumper or front loader, fuel may well fall past the bulk chute. In this case the unloading speed of the loading vehicle has to be adjusted to the feed speed.

### 6.4.3 Stop filling process

The filling process is stopped either via the filling level sensor at the end of the horizontal distributor screw or by releasing one or both start buttons of the two-hand tripping device.

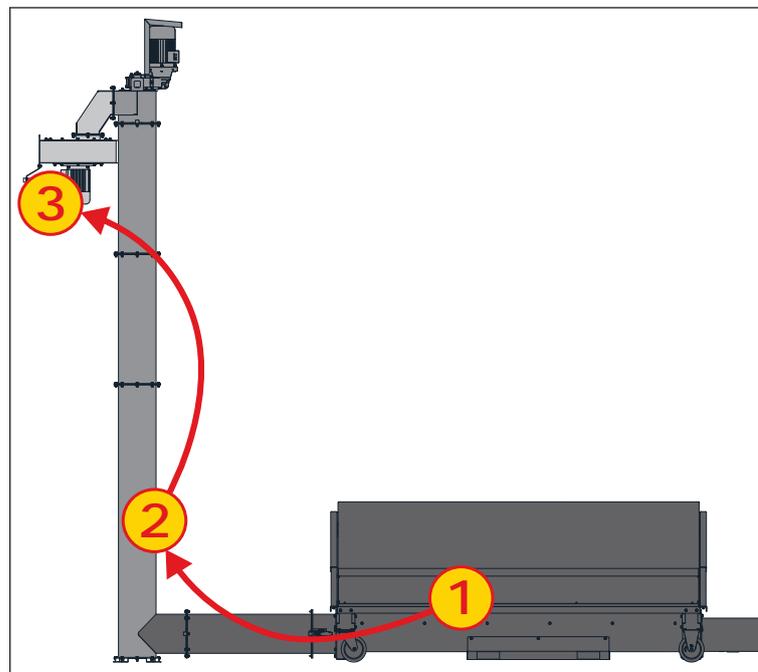
- Filling level sensor at the end of the horizontal distributor screw detects fuel
  - Filling process is stopped immediately
  - **NOTICE!** If the filling system is stopped because of the filling level sensor, the bulk chute and the vertical screw are filled with material, which can no longer be brought in the fuel store!
  
- Release one or both start buttons of the two-hand tripping device
  - Deactivation of the units is time-delayed, one after the other in the following sequence

#### DANGER

##### Automatic run-on of individual components

*Serious injury possible due to moving parts with automatic run-on!*

- Release one or both buttons on the control unit
  - Depending on the function, the vertical screw and also the horizontal distributor screw/centrifugal disc are switched off with a time delay
  - This process may take a few seconds and is not a fault



#### 6.4.4 Switch off the power supply



- Turn the main switch on the switching unit to "O"
  - The power supply is switched off
  - The components in the switching unit are no longer live

**NOTICE! The main terminal in the switching unit is still live!**

- Padlock the main switch to ensure it cannot be switched on
- Remove the key from the padlock and keep in a safe place

## 7 Servicing the system

### DANGER



**Maintaining the system when the main switch is switched on:**

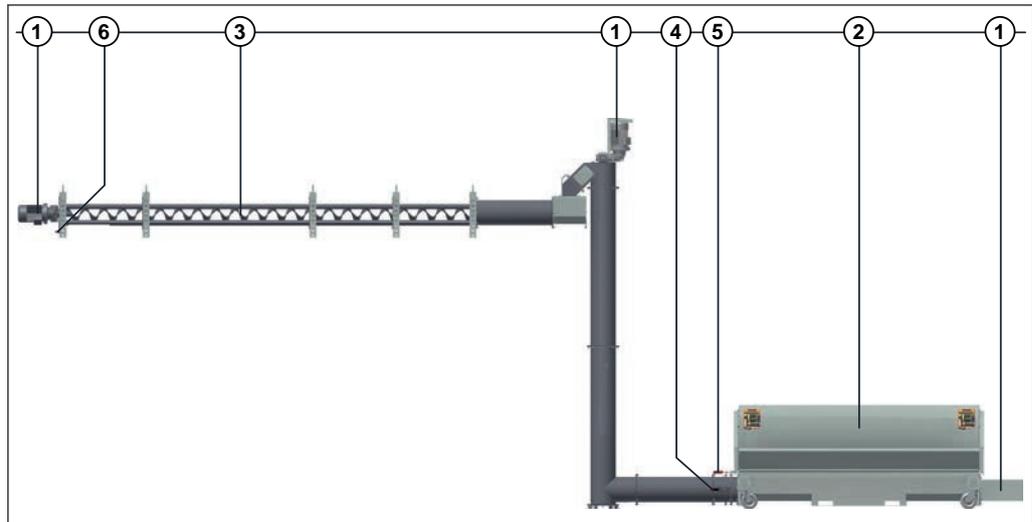
***Risk of serious injury from unauthorised switching on!***

When maintaining the system or in the storage area:

- Switch off the main switch of the bunker filling system and re-secure it against unauthorized restarting using a padlock
  - Switch off any other devices in the fuel store which potentially have dangerous movements (e.g. discharge system) and take precautions to prevent accidental switching on.
- Also observe the information on the notice (supplied) for working in the fuel store.

Regular inspection and cleaning prolongs the lifespan of the system and is essential for proper operation. The points listed in the maintenance plan below must be carried out at the appropriate intervals, however at least once a year, depending on the hours of operation and fuel quality. We recommend performing each point after every filling process. You should also check for visible signs of damage after the filling process.

## 7.1 Maintenance schedule



Item	Component	Operation
1	Motor/gears	<input type="checkbox"/> Carry out a general visual inspection of the drive motors and gears ↳ No major oil leaks should be visible!
2	Bulk chute / trough / feed screw	<input type="checkbox"/> Check bulk chute and trough for dirt and damage <input type="checkbox"/> Check coreless screws for damage and wear
3	Horizontal distributor screw	<input type="checkbox"/> Check ejection area for dirt <input type="checkbox"/> Check horizontal distributor screw for wear and ease of movement <input type="checkbox"/> Check horizontal distributor screw for true running
4	Fastener	<input type="checkbox"/> Check fastener for damage <input type="checkbox"/> Check for correct tension when in closed position
5	Safety limit switch	<input type="checkbox"/> Check limit switch is working properly
6	Filling level sensor	<input type="checkbox"/> Check that proximity switch of filling level measurement is clean and working properly

## 8 Troubleshooting

Error	Possible cause	Error resolution
Motor circuit switch has activated	<ul style="list-style-type: none"> <li>▪ Feed screw blocked</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Check screw for blockage and free up</li> <li><input type="checkbox"/> Wait until the motor protection switch has cooled down and switch back on</li> </ul>
Vertical screw blocked	<ul style="list-style-type: none"> <li>▪ Wood chips frozen in vertical screw</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Activate the screw briefly several times</li> </ul>
Horizontal distributor screw stops	<ul style="list-style-type: none"> <li>▪ Filling level sensor has activated</li> </ul>	

## 9 Appendix

### 9.1 Addresses

#### 9.1.1 Address of manufacturer

**FRÖLING**  
Heizkessel- und Behälterbau GesmbH

**Industriestraße 12**  
**A-4710 Grieskirchen**  
**AUSTRIA**

TEL 0043 (0)7248 606 0  
FAX 0043 (0)7248 606 600  
INTERNET [www.froeling.com](http://www.froeling.com)

#### 9.1.2 Address of the installer

Stamp