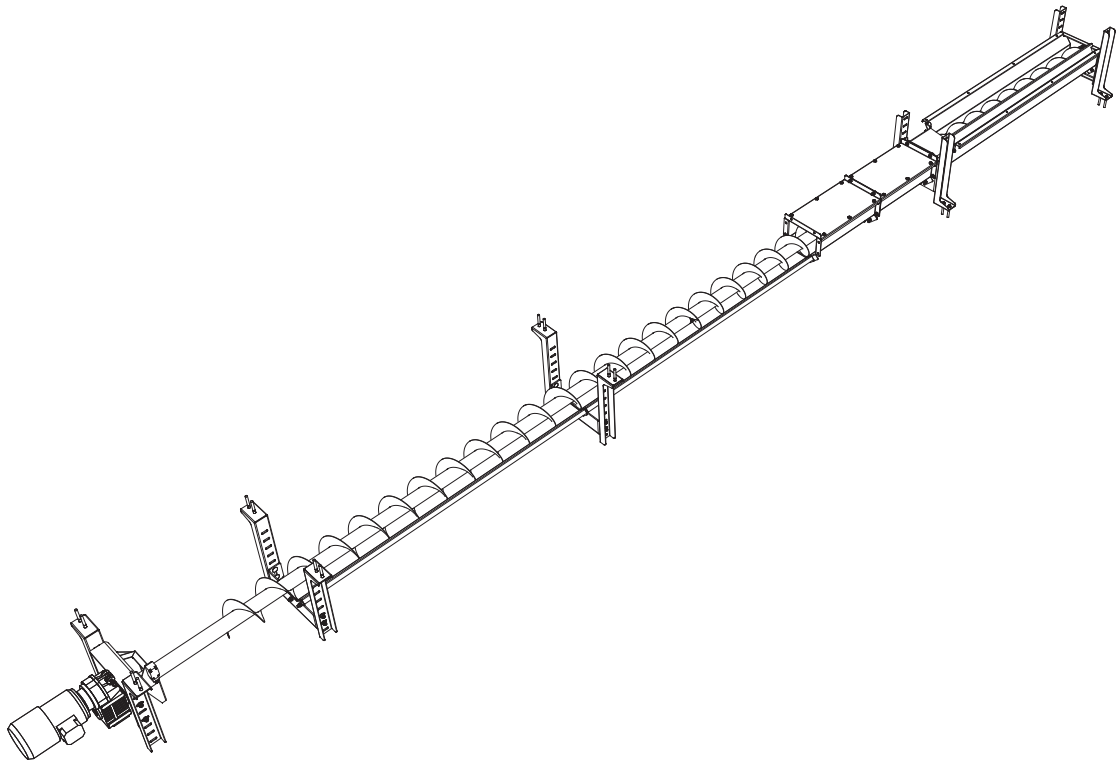
Installation- and Operating Intructions

Bunker filling srew BFS 200



Translation of the original German operating instructions for technicians and operators

Read and follow the instructions and safety informations!

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. It contains important safety information and all the operation and maintenance specifications needed to operate the system safely, properly and cost-effectively.

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.

Subject to technical change.

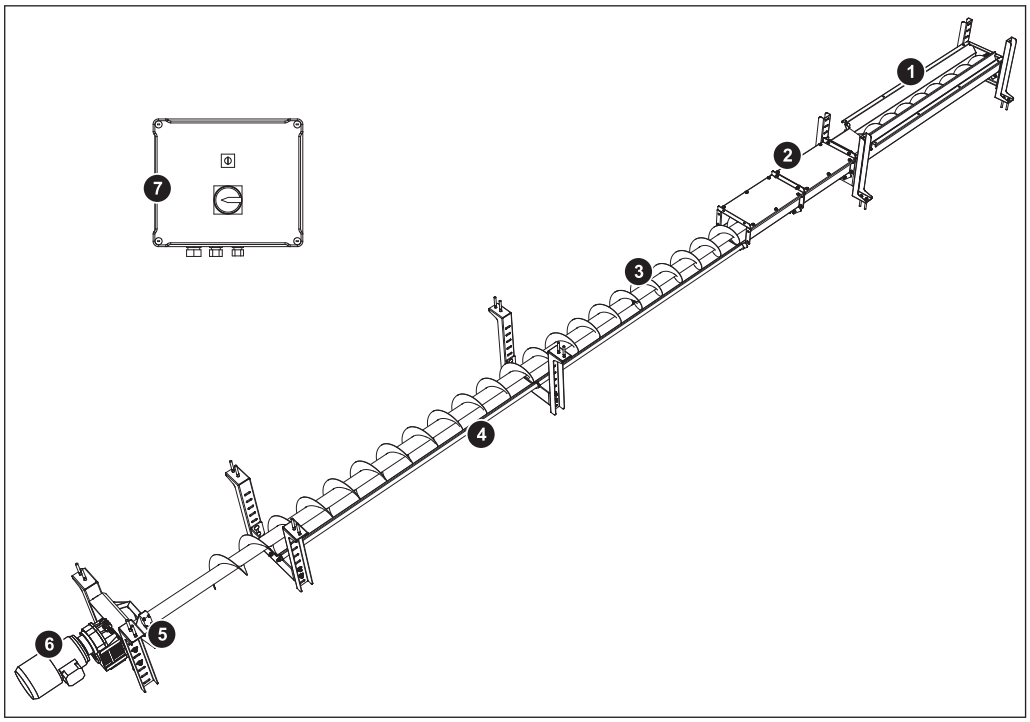
Issuing a delivery certificate

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 Froling bunker filling screw comprises:



1	Bulk chute
2	Wall duct
3	Feed screw
4	Open trough
5	Rocker switch with final cut-out switch
6	Geared motor
7	Switching unit with main switch and key switch

The Froling bunker filling screw has been designed for the automatic filling of a fuel store. The bunker filling screw is loaded with fuel via the bulk chute (1) located outside the store. The process is started via the switching unit (7) fitted within view of the bulk chute. The feed screw (3) is powered by the geared motor (6) installed in the store and transports the material through the wall duct (2) into the store area, where it is discharged through the open trough (4). If the store is full, the material presses against the rocker switch (5) and the bunker filling process stops.

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 screw is exclusively designed for transporting fuels into suitable stores. Only use fuels specified in the "Permitted fuels" section.

The bunker filling screw should only be operated when it is in full working order. It should be operated in accordance with the instructions, observing safety precautions, and you must ensure you are aware of the potential hazards. The inspection and cleaning intervals in these operating instructions should be observed. Ensure that any malfunctions, which might impact safety are traced and removed immediately.

The manufacturer or supplier are not liable for any damages resulting from non-permitted uses.

⚠ DANGER

If the device is used incorrectly:

Incorrect use of the system can cause severe injury and damage.

When operating the system:

- ❒ Observe the instructions and information in the manuals
- ❒ Observe the details on procedures for operation, maintenance and cleaning, as well as troubleshooting in the individual manuals.
- ❒ Any work above and beyond this should be carried out by authorised heating engineers or by Froling customer services.

2.2.1 Permitted fuels

NOTICE! Always consult the manufacturer before loading with fuels other than those listed here!

Wood chips

Criterion	ÖNORM M 7133	CEN/TS 14961	Description as per ÖNORM M 7133
Water content	**W20**	**M20**	air dried
	W30	**M30**	suitable for storage
Size	**G30**	**P16**	Fine wood chips
	G50	**P45**	Medium wood chips

Note on standard

Austria:	ÖNORM M 7133 or EN 14961
Germany:	Waste wood as per §3 (1) point 4 of the First Federal Emissions Protection Ordinance (BImSchV) - applicable version Specifications as per DIN CEN/TS 14961 and/or ÖNORM M 7133

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 only 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 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 tank 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

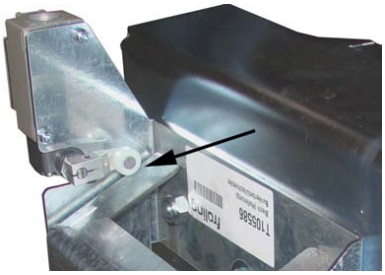
2.4.2 Requirements at the installation site

- 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 the boiler room in accordance with national workplace design regulations.
- The switching unit and operating elements must be easily accessible and positioned ergonomically within view of the bulk chute
- The switching unit must be positioned outside of the danger zone and the filling area must be visible during operation

- Protective structures must be designed in accordance with the applicable standards and regulations

Further information on the design ⇨ See "Installation site" [page 14]

2.5 Safety devices

Name	Description
Main switch on switching unit 	For switching off the entire system. When working in the store, always padlock the main switch to ensure it cannot be switched on without authorisation.
Key switch on switching unit 	Safety switch for operating the system. The bunker filling screw can only be activated by constantly turning the key switch. The bunker filling screw stops when you release the key switch.
Rocker switch with final cut-out switch 	Protects the system against damage. If the store is full, the material presses against the rocker switch and the bunker filling process stops.

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:

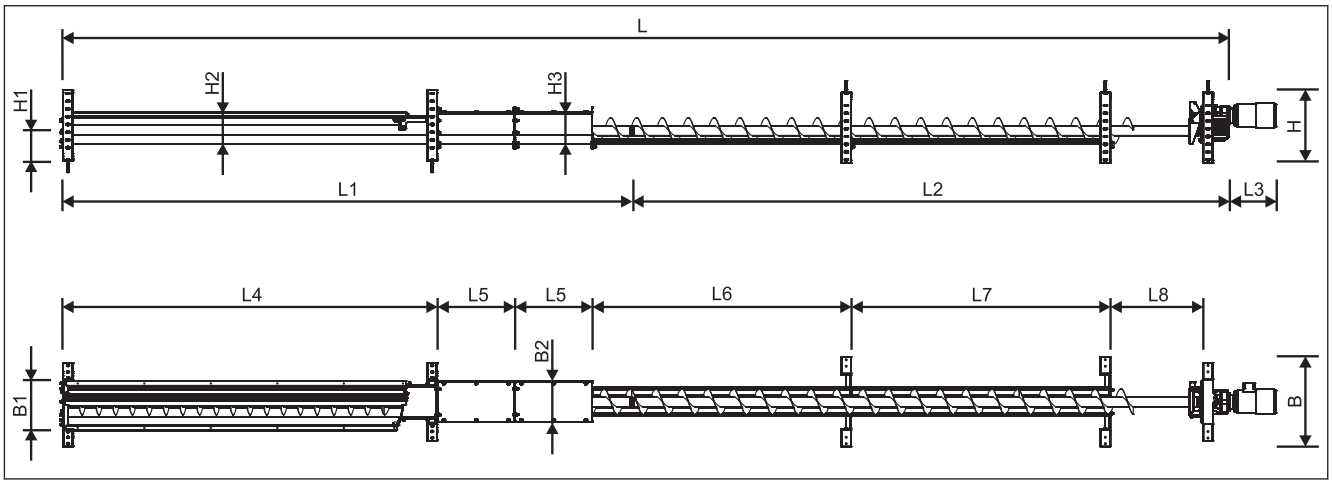
Risk of serious injury possible from unauthorised switching on!

When maintaining the system or in the storage area:

- ❒ Turn off the main switch
- ❒ Padlock the main switch to ensure it cannot be switched on

3 Technology

3.1 Dimensions



Pos.	Name	Unit of measurement	Value
L	Total length excluding geared motor	mm	3600 - 9000
L1	Length, main screw		2500 / 3500 / 4400
L2	Length, extension screw		1100 / 1600 / 2100 / 2600 / 3100 / 3600 / 4100 / 4600
L3	Length, geared motor		390
L4	Length, bulk chute		1000 / 2000 / 2900
L5*)	Length, wall duct		600
L6	Length, trough open		1000 / 1500 / 200 / 2500
L7	Length, trough open		1500 / 2000
L8	Distance between trough attachment and drive		700 - 800
H	Overall height	mm	550
H1	Distance between base and centre of screw (= adjustment range)		150 - 480
H2	Height, bulk chute		250
H3	Height, wall duct (excluding flange)		255
B	Overall width	mm	650
W1	Width, bulk chute		385
B2	Width, wall duct		320

3.2 Technical specifications

Name	Value
Drive motor supply	400 VAC / 50 Hz
Drive motor power consumption	3.0 kW / 4.0 kW (optional)
Supply pipe fuse	16A
Speed of bunker filling screw	140 rpm
Weight of bunker filling screw extended to maximum (9m total length)	Approx. 350 kg

4 Installation

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

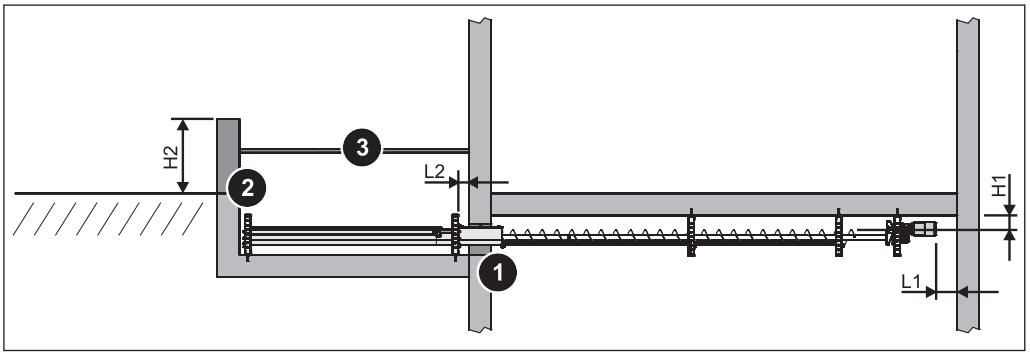
4.1.1 Temporary storage

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 Installation site

Note the following for the bunker filling screw when planning the fuel store:

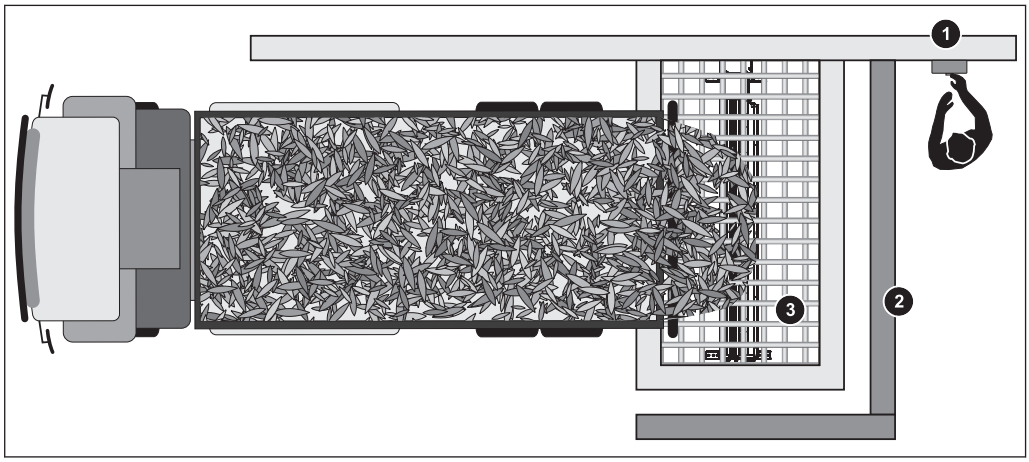


1	Allow a hole in the wall of approx. 60 cm x 60 cm for the wall duct
2	Protective structure to prevent reaching over when in operation. Structure dimensions (H2) as per EN ISO 13857
3	Cover to prevent climbing into the filling area when in operation. Structure dimensions as per EN ISO 13857

Pos.	Name	Value
H1	Minimum distance between feed screw and store ceiling	200 mm
L1	Geared motor maintenance area	300 mm
L2	Minimum distance between bulk chute and store wall	100 mm

NOTICE! The angle of inclination of the bunker filling screw must not exceed 10°. Ideally the system should be fitted horizontally.

The diagram below illustrates how the bunker filling screw might be implemented 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.

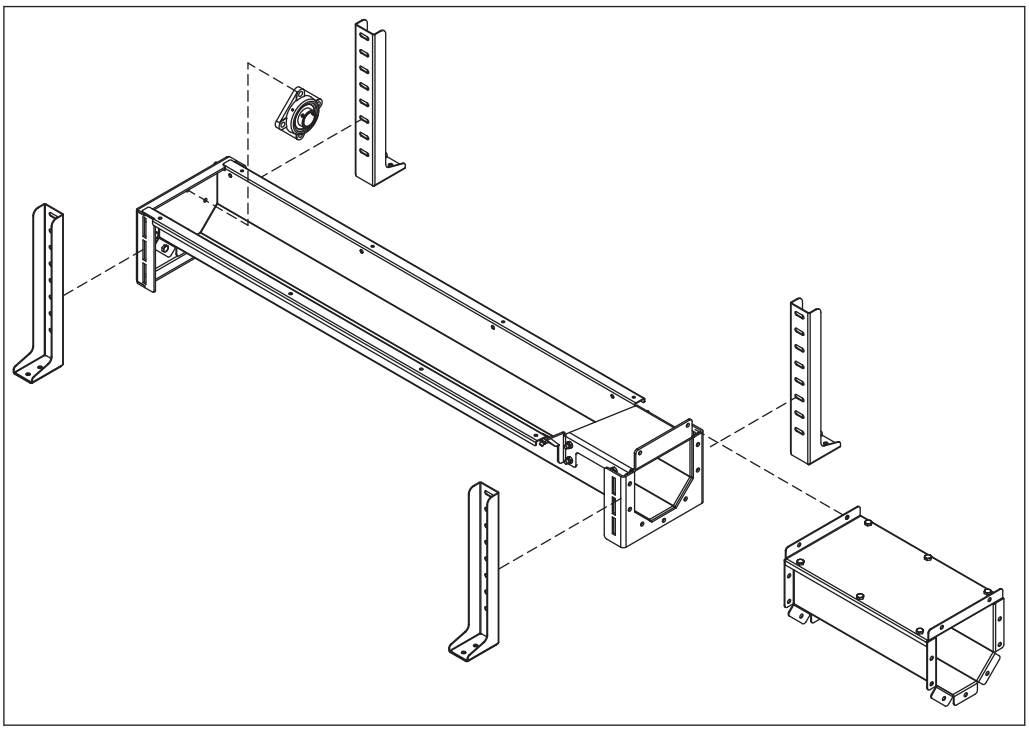


1	Switching unit and operating elements within view of bulk chute
2	Protective structure to prevent reaching over when in operation
3	Cover to prevent climbing into the filling area when in operation

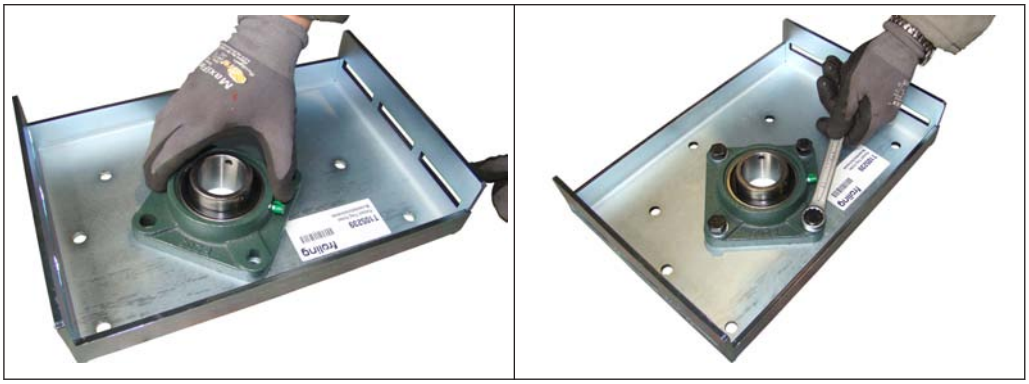
4.3 Fitting the bunker filling screw

4.3.1 Fitting the bulk chute

Overview diagram



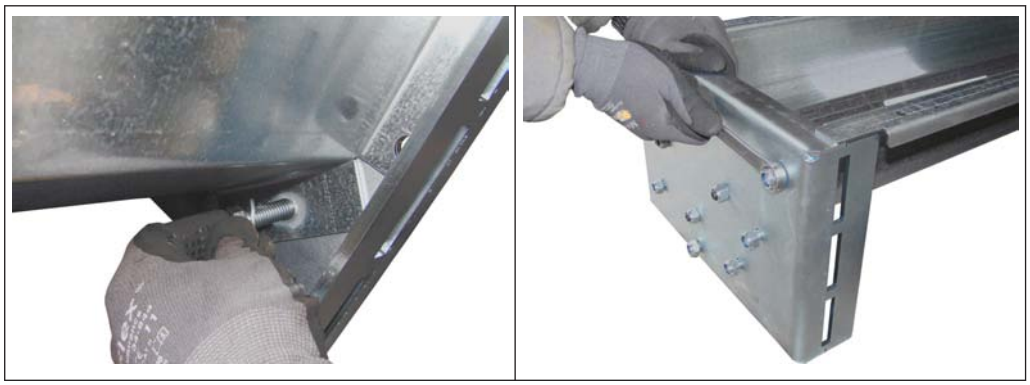
Assembly steps



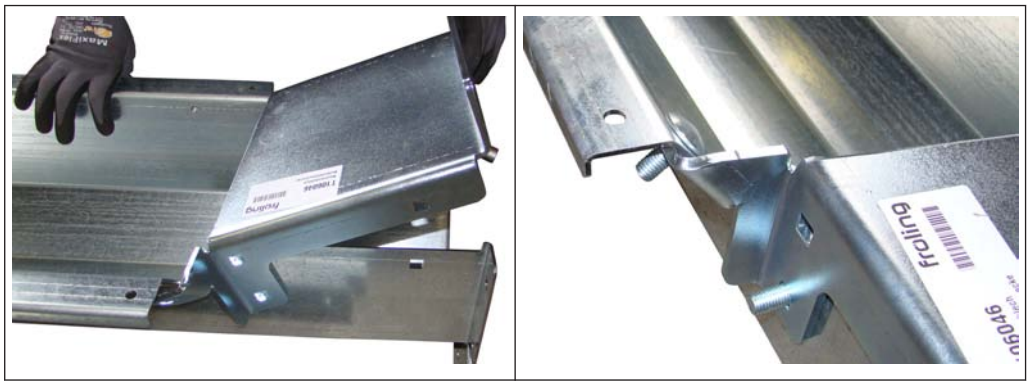
❒ Fit the flange bearing on the inside of the flange plate as shown
- 4x hexagonal screws M12 x 45 mm
- 4x Spacer washers M12

NOTICE! Lubricating nipple must face up when fitted!

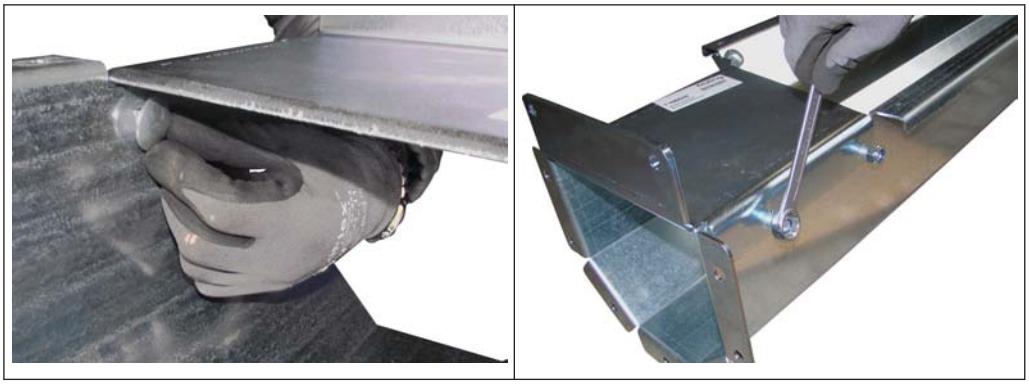
❒ Place flange unit on trough of bulk chute
❒ Insert the edge of the flange plate into the trough, as shown on the right



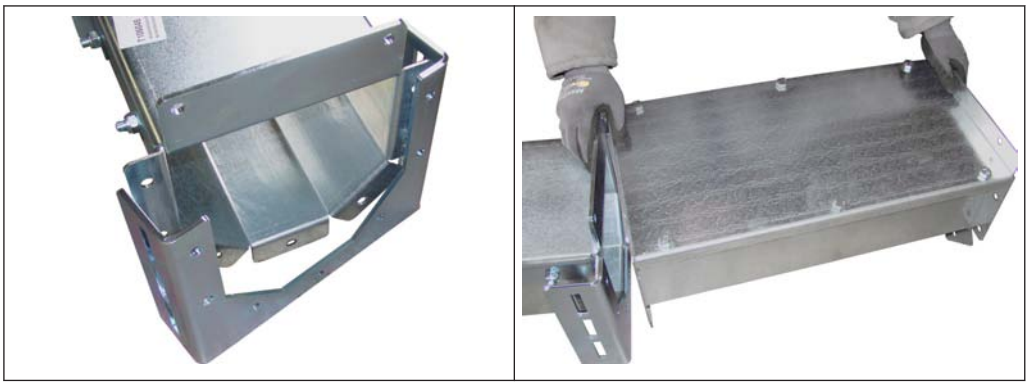
❒ Push hexagonal screws into the back of the inner flange and screw
- 7x hexagonal screws M12 x 30 mm
- 7x spacer washers M12
- 7x safety nuts M12



❒ Insert the end plate with cutting edge into the channel of the bulk chute as shown
❒ Push the round-head screw through the channel of the bulk chute and lug of the end plate



❒ Push the round-head screws through from the inside and tighten with safety nuts
- 6x round-head screws M12 x 30 mm
- 6x safety nuts M12



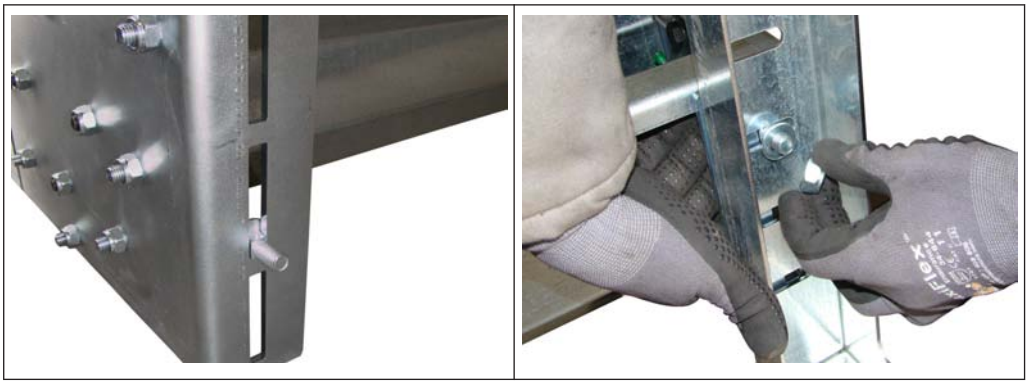
❒ Place the support flange on the trough of the bulk chute as shown and position wall duct

NOTICE! Support flange must face the back!

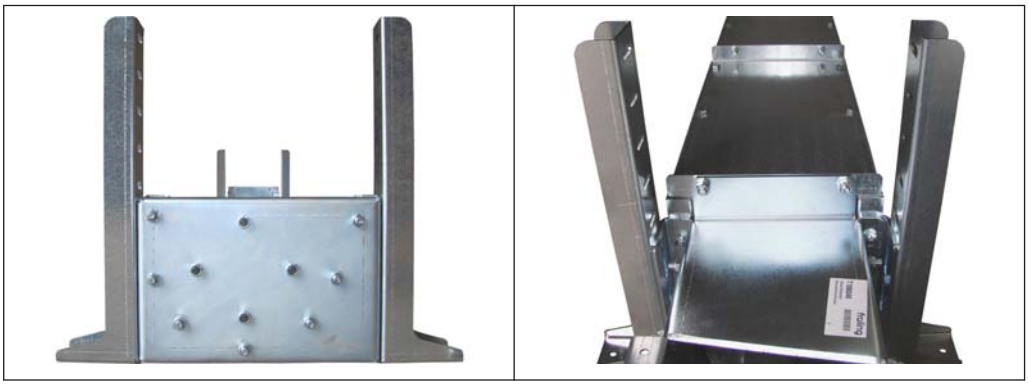
❒ Screw the trough of the bulk chute to the support flange and wall duct
- 7x hexagonal screws M12 x 30 mm
- 7x safety nuts M12

❒ If necessary, extend using a wider wall duct

❒ Insert the entire unit into the filling area of the fuel store at the hole in the wall



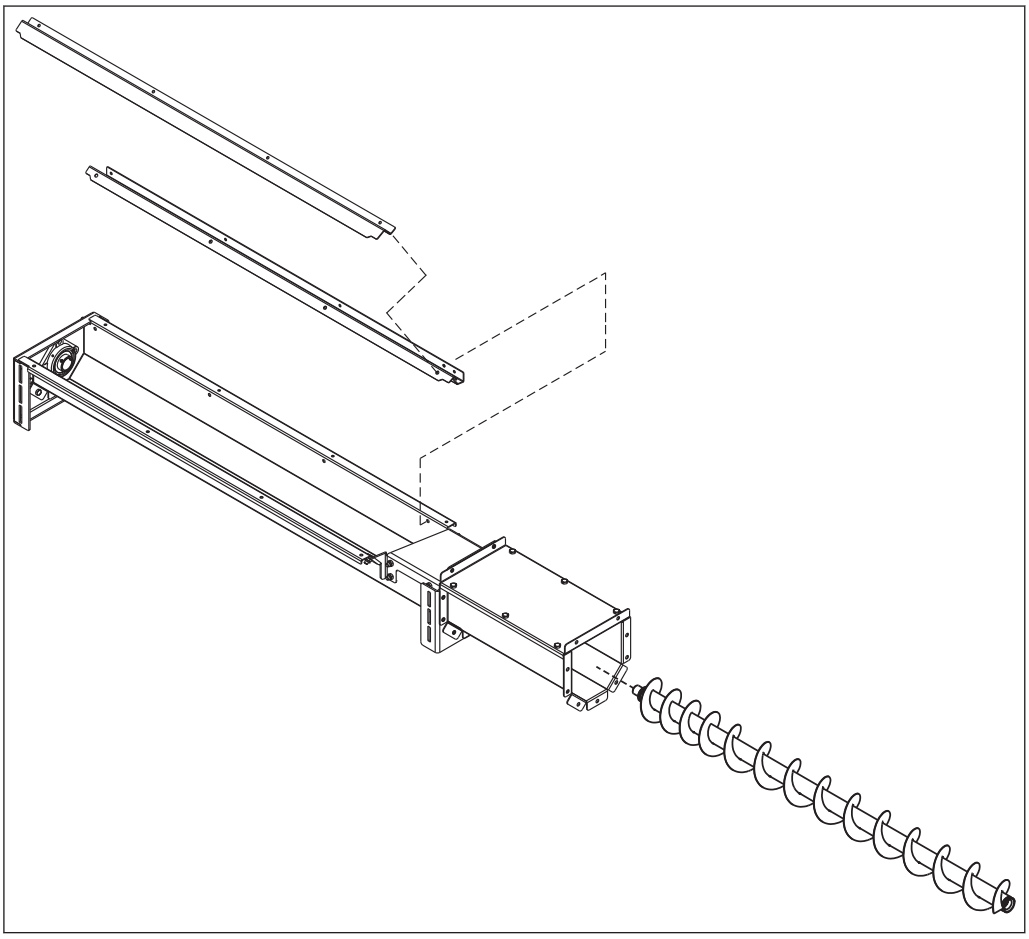
❒ Push 2x round-head screws through each support from behind
❒ Position the support, raise the bulk chute to the required height and insert the round-head screw through the slot



❒ Position two supports at both the back flange plate and at the junction with the wall duct
❒ Adjust the height of the bulk chute and fix the screw connections of the supports
- 8x round-head screw M12 x 30 mm
- 8x spacer washers M12
- 8x safety nuts M12

4.3.2 Fitting the screw and cover plates

Overview diagram

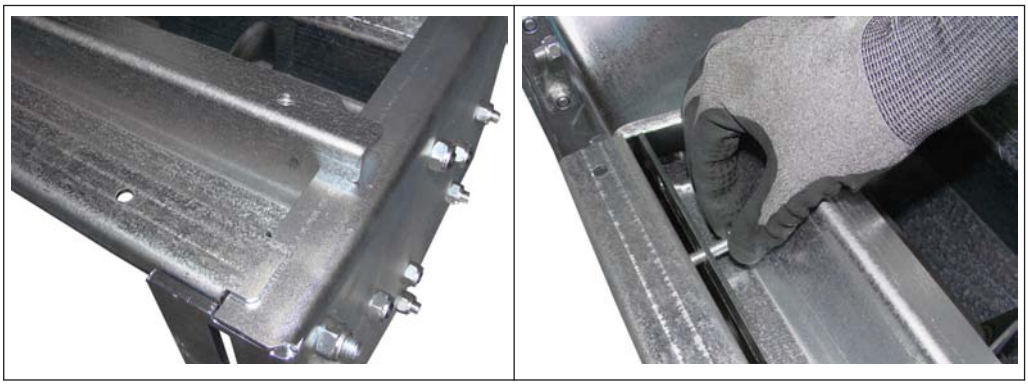


Assembly steps

❒ Insert the first part of the split screw into the bulk chute through the wall duct but do not yet push it in the whole way

❒ Remove the sticky tape from the shaft stub

❒ Grease the shaft stub, insert the screw through the flange bearing and push in as far as the stop
❒ Secure the position of the screw by tightening the grub screw



❒ Position the cover plate (triple angled) at the bulk chute and screw to the trough
- 6x hexagonal screws M8 x 25 mm
- 6x toothed washers M8

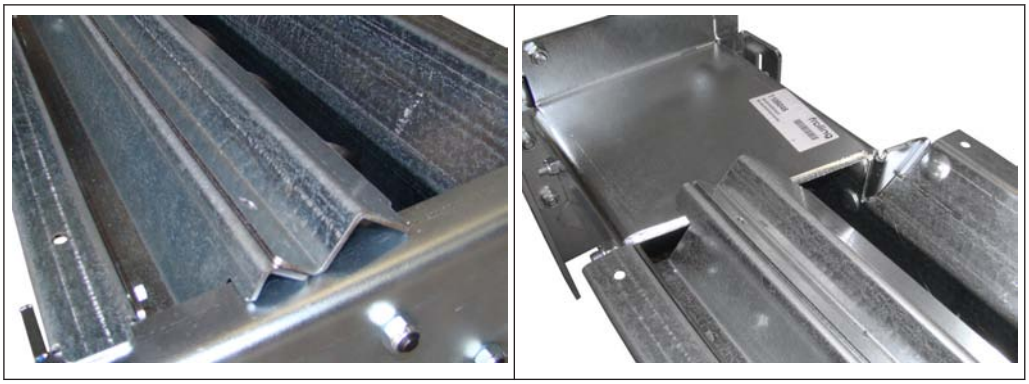
NOTICE

Selecting the cover plate depending on the fuel quality:

It is recommended to always fit the first cover plate and if the system does not move smoothly, add the cover plate extension.

As a general rule:

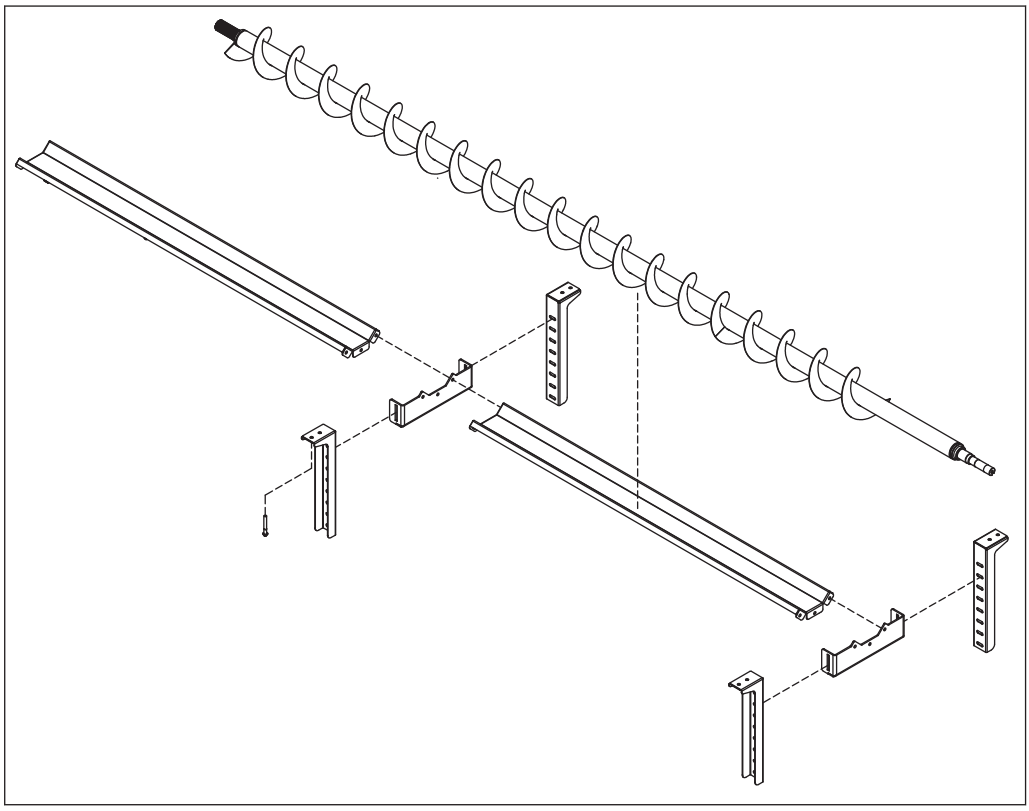
❒ The finer the fuel, the more covering the screw requires. Vice versa: In the case of bridge formation remove the cover plate



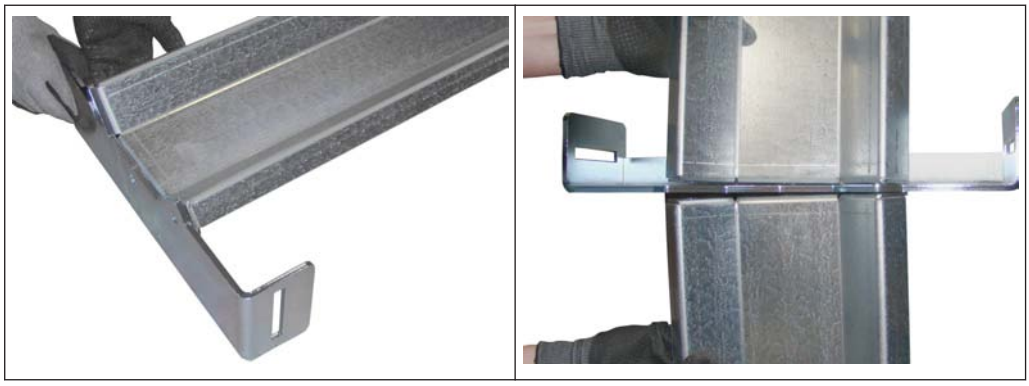
❒ If necessary, position the cover plate extension (double angled) and screw to the bottom cover plate
- 6x hexagonal screws M8 x 25 mm
- 6x toothed washers M8

4.3.3 Fitting the troughs

Overview diagram



Assembly steps



- ❒ Position the flange plate at the first trough
- ❒ Position the second trough at the flange plate and screw all three components together
  - 3x hexagonal screws M12 x 30 mm
  - 3x safety nuts M12

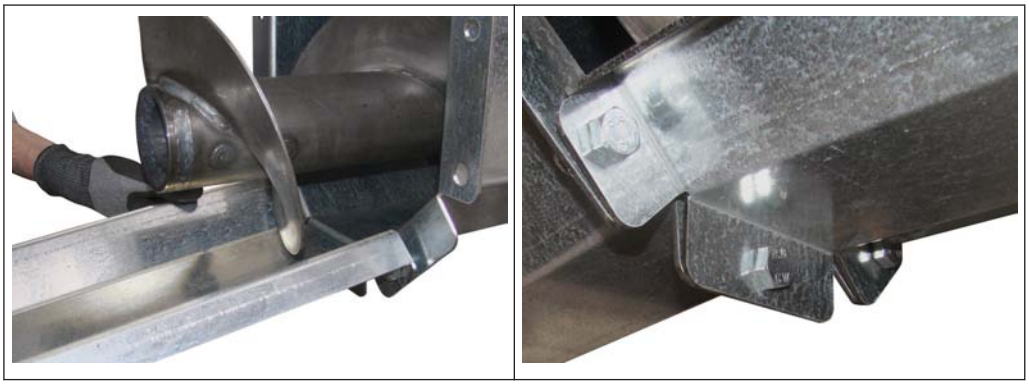
❒ Fit the second flange plate to the end of the second trough
- 3x hexagonal screws M12 x 30 mm
- 3x safety nuts M12

❒ Fit a support to each of the two flange plates
- 4x round-head screws M12 x 30 mm
- 4x spacer washers M12
- 4x safety nuts M12

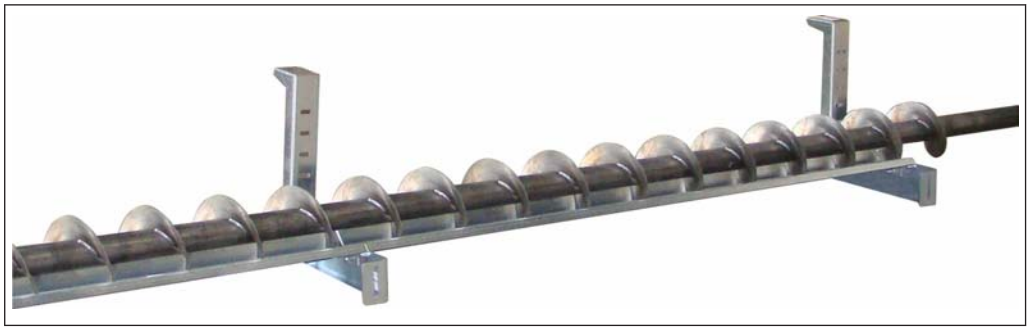
❒ When the unit has been screwed together, position it flush with the bulk chute on the ceiling (measure any gap to the side panel) and mark two holes on the ceiling for the supports

❒ Drill holes of ø 12 mm at the marked spots

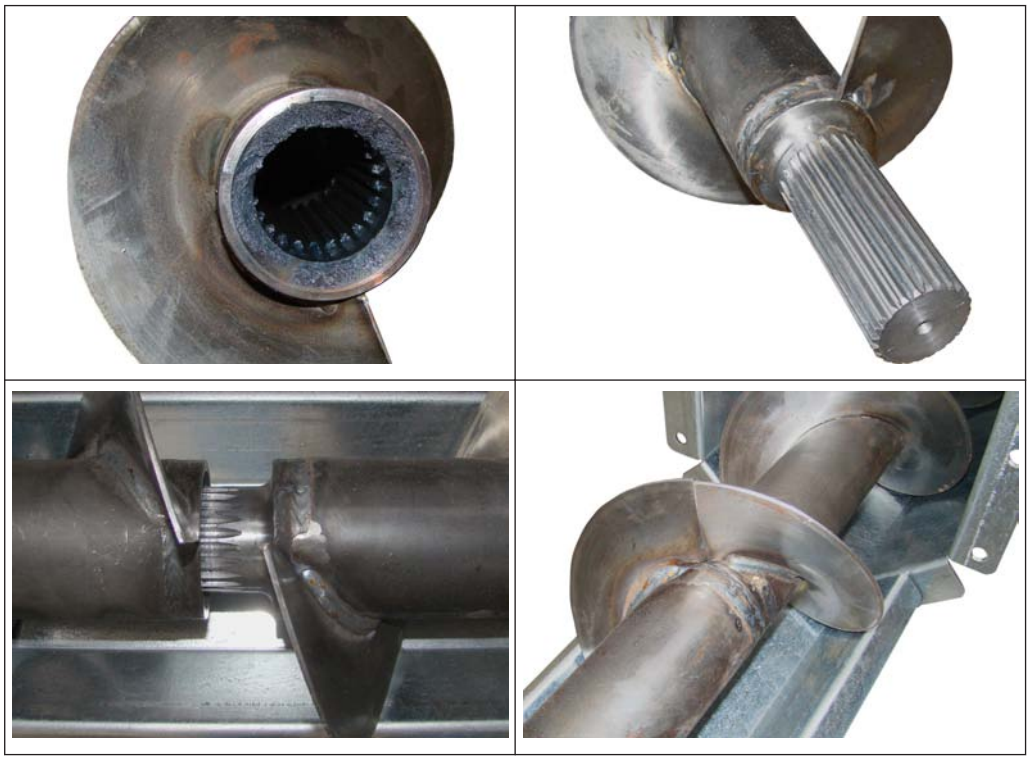
❒ When the trough unit has been screwed together, secure it to the ceiling with the heavy load anchors provided
- 4x heavy load anchor ø 12 mm



❒ Screw the trough to the bulk chute
- 3x hexagonal screws M12 x 30 mm
- 3x safety nuts M12

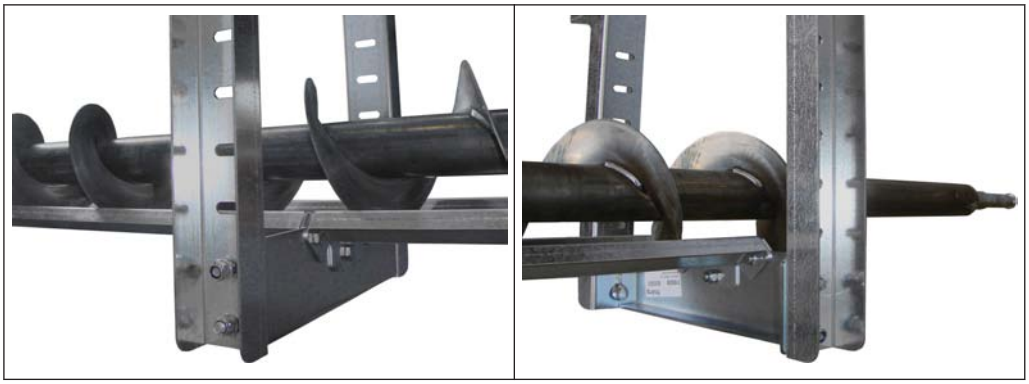


❒ Place extension screw on trough



The main screw and extension screw are joined by a toothed shaft.

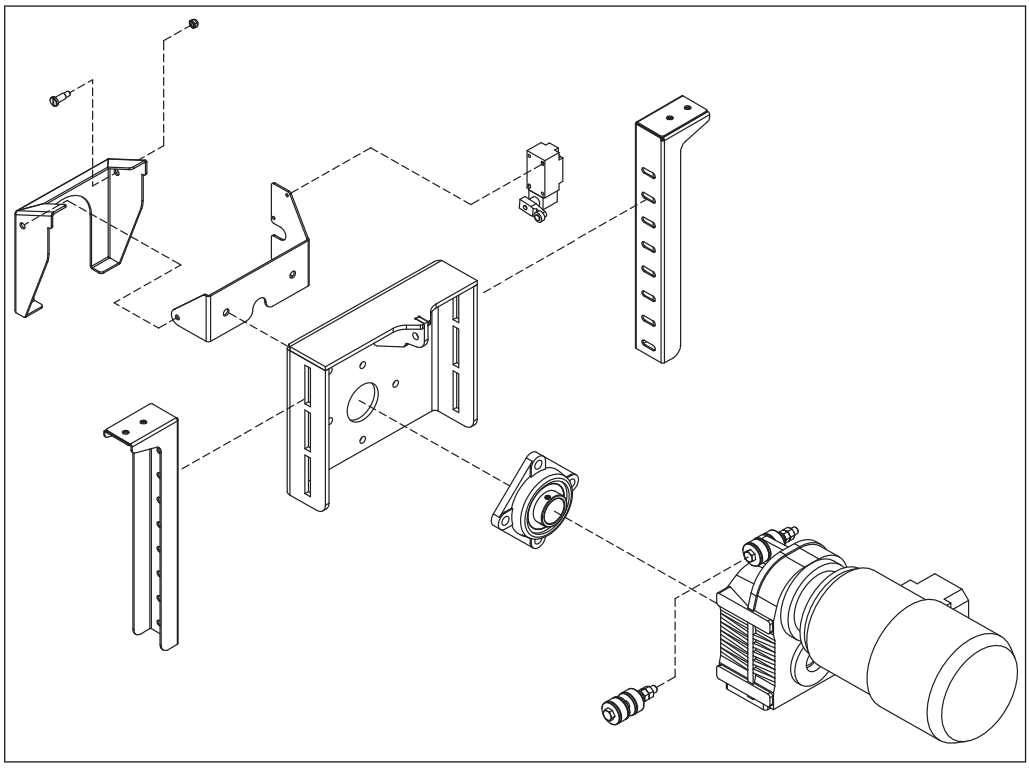
❒ Turn the extension screw until the two ends of the screw blades are aligned and the two screws slide into each other



- ❒ Position the supports at the flange plates and mark two holes at each on the ceiling
- ❒ Drill holes of ø 12 mm at the marked spots
- ❒ Fit the supports to the ceiling with the heavy load anchors provided and screw the flange plates to the trough unit
  - 4x heavy load anchor ø 12 mm
  - 4x round-head screws M12 x 30 mm
  - 4x spacer washers M12
  - 4x safety nuts M12

4.3.4 Fitting the drive

Overview diagram



Assembly steps

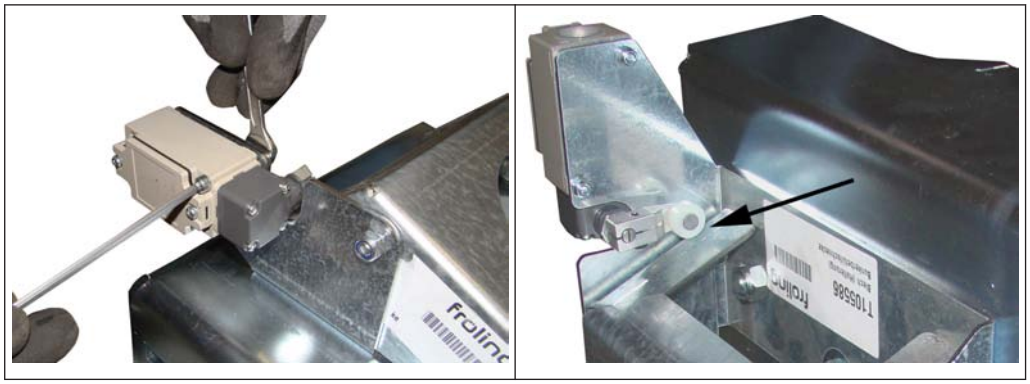
❒ Fit the flange bearing on the inside of the flange plate as shown
- 4x hexagonal screws M12 x 45 mm
- 4x spacer washers M12
- 4x safety nuts M12

❒ Fit the bracket of the end rocker switch to the back of the flange plate as shown
- 2x hexagonal screws M12 x 30 mm
- 2x safety nuts M12

Modify the limit switch if necessary

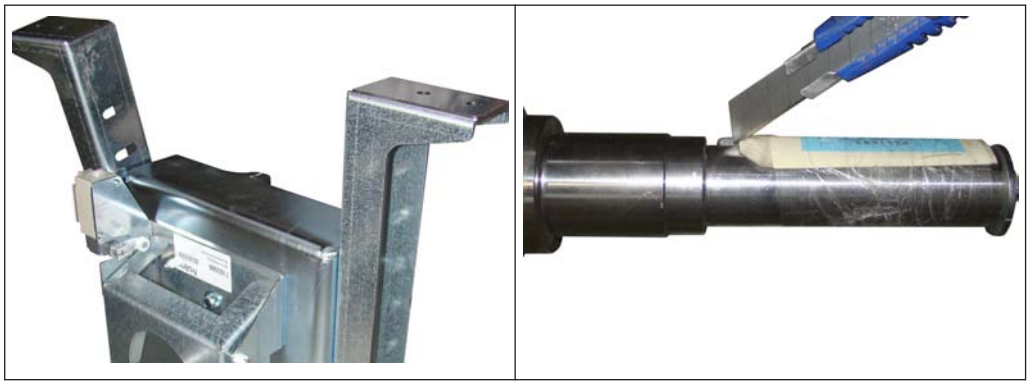
If the limit switch provided is the same as the first of the following pictures, it must be modified before further assembly:

❒ Remove the switch head of the limit switch by undoing the four screws
❒ Turn the switch head 180° and refit
❒ Loosen the Allen screw on the operating lever
❒ Turn the operating lever 90° anticlockwise and fix with the Allen screw



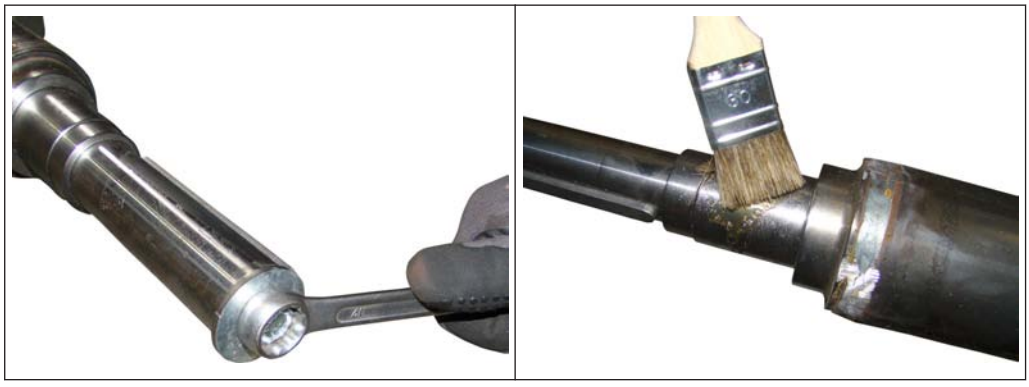
❒ Fit the limit switch as shown at the lug of the bracket
- 2x cheese-head screws M5 x 40 mm
- 2x safety nuts M5

NOTICE! The limit switch must be fitted in such a way that the limit rocker switch activates the lever



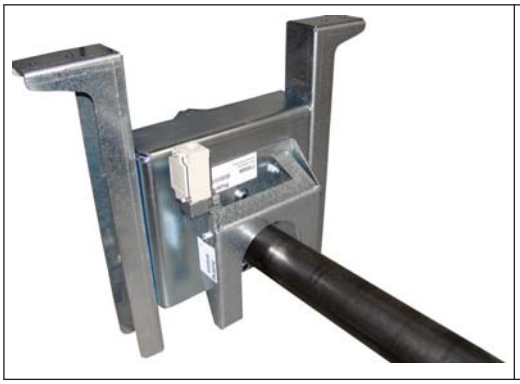
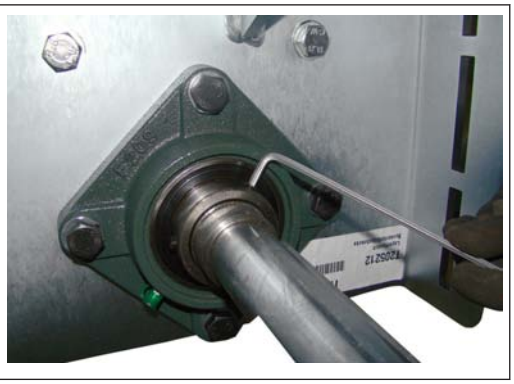
❒ Fit the supports on the left and right of the flange plate
- 4x round-head screws M12 x 30 mm
- 4x spacer washers M12
- 4x safety nuts M12

❒ Remove the sticky tape from the shaft stub



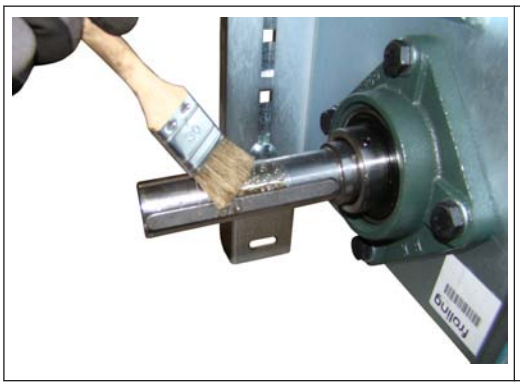
❒ Remove the retaining screw from the shaft stub of the screw and keep in a safe place for reuse

❒ Grease the back edge of the shaft stub

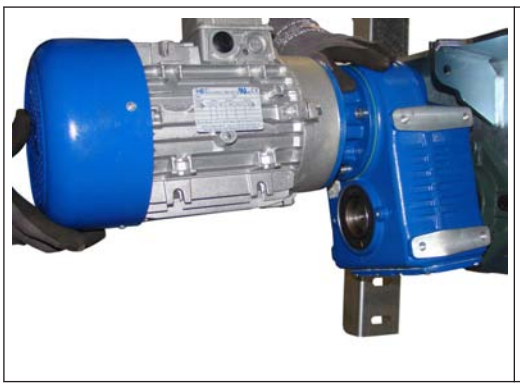
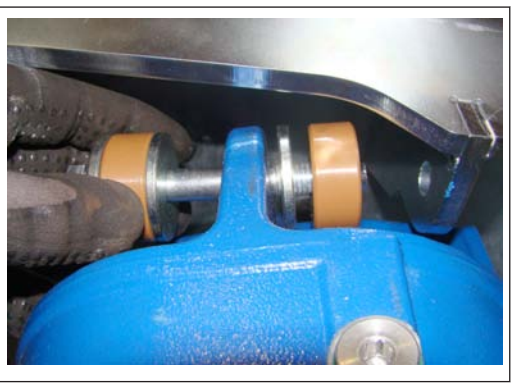
❒ Push the drive unit onto the screw as shown and secure to the ceiling on the right and left each with two heavy load anchors
- 4x heavy load anchor ø 12 mm

❒ Tighten the grub screw to the flange bearing



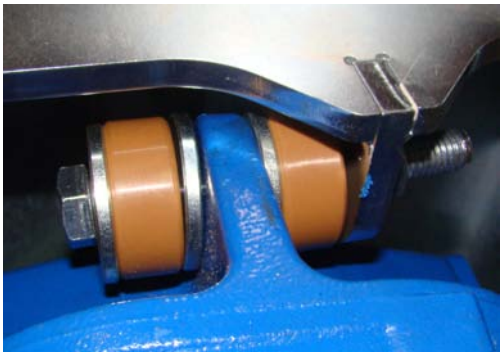

❒ Grease the shaft stub

❒ Remove the buffer stop from the geared motor

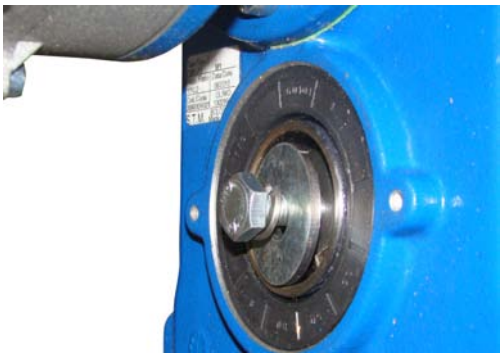



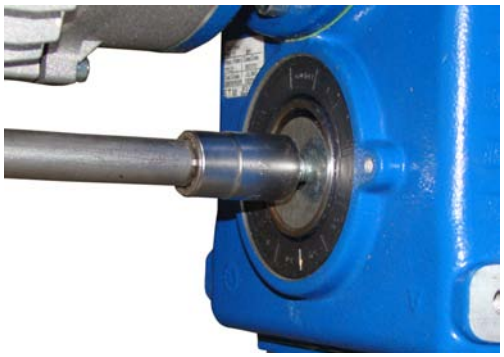
❒ Fit the geared motor onto the shaft stub of the screw

❒ Turn the geared motor upwards and fit the buffer stop as shown



❒ Screw the buffer stop to the drive unit and tighten the screw connections





❒ Fit the previously removed retaining screw with the spacer washer and snap ring to the shaft stub

4.4 Electrical connection

DANGER

When working on electrical components:

Risk of electrocution!

When work is carried out on electrical components:

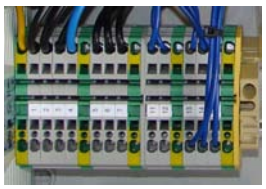
- ❒ Only have work carried out by a qualified electrician
- ❒ Observe the applicable standards and regulations
  - ➥ Work must not be carried out on electrical components by unauthorised people

- ❒ Fit the switching unit provided within view of the bulk chute
  - ➥ Follow the instructions on positioning the switching unit
    - ⇨ See "Requirements at the installation site" [page 9]
    - ⇨ See "Installation site" [page 14]

4.4.1 Laying cables

- ❒ Lay the cables from the geared motor and limit switch to the switching unit
  - ➥ Lay the cables so that nobody will trip over them!
  - ➥ Do not lay the cable over or around sharp edges!
- ❒ Wire the connections according to the wiring diagram
  - ➥ Wiring diagrams are enclosed with the switching unit

4.4.2 Mains connection



- ❒ Lay the mains connection cable to the switching unit and connect terminals 1-4 as well as the earth terminal
- ❒ Electrical power supply to be fused by customer with 16A

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 Operating the system

5.1 Initial startup

NOTICE

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

Therefore:

❒ Initial start-up should be carried out with an authorised installer or with Froling customer services

During initial start-up check the following:

❒ 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 screw

❒ Check that the safety limit switch of the rocker switch is working properly

❒ Check that the motor overload for the drive motor is working

❒ Check the protective structure of the bulk chute provided by the customer

➥ 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

⇨ See "Requirements at the installation site" [page 9]
⇨ See "Installation site" [page 14]

When the check is finished:

❒ Perform a test run and fill the store with fuel

❒ Observe the fuel transport around the bulk chute (e.g. bridge formation) and if necessary adjust by adding/removing cover plates

5.2 Filling the store with fuel

⚠ 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.

5.2.1 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

5.2.2 Activating the bunker filling screw

For safety reasons the bunker filling screw is fitted with a key switch. The screw can only start the filling process/move when the key switch is activated. If you release the key switch, the bunker filling screw will stop.

⚠ 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

❒ Insert the key provided into the key switch
❒ Turn the key switch to "Forwards" ("Vor") and hold in this position
➥ The screw will start feeding material to the store
➥ The screw will continue to feed material until you release the key switch

If the material is congested:
❒ Turn the key switch to "Back" ("Zurück") and hold in this position
➥ The screw will start feeding material out of the store
➥ The screw will continue to feed material out until you release the key switch

NOTICE! Do not hold the bunker filling screw at the "Back" position for any longer than 1-3 seconds. Otherwise this could damage the system.

After the material feed:
❒ Remove the key from the key switch and keep in a safe place

5.2.3 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

6 Servicing the system

DANGER

Maintaining the system when the main switch is switched on:

Risk of serious injury possible from unauthorised switching on!

When maintaining the system or in the storage area:

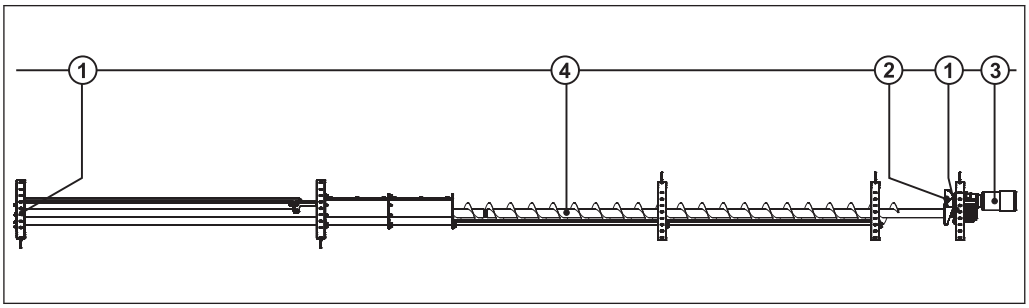
❒ Turn off the main switch

❒ Padlock the main switch to ensure it cannot be switched on

6.1 Maintenance schedule

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.



Pos.	Component	Operation
1	Flange bearing	❒ Lubricate the bearing at the lubricating nipple with a grease gun
2	Rocker switch / safety switch	❒ Check that the rocker switch moves freely ❒ Check that the safety switch is working properly
3	Motor / Gears	❒ Carry out a general visual inspection of the drive motor and gears ➥ No oil leaks should be visible!
4	Trough / feed screw	❒ Check trough and feed screw for dirt and damage ❒ Check the screw blades for wear

7 Troubleshooting

Error	Possible cause	Solution
Motor circuit switch has activated	▪ Feed screw blocked	❒ Check screw for blockage and free up ❒ Wait until the motor protection has cooled down and switch back on

8 Appendix

8.1 Addresses

8.1.1 Address of manufacturer

FRÖLING
Heizkessel- und Behälterbau GesmbH

Industriestaße 12
A-4710 Grieskirchen
AUSTRIA

TEL 0043 (0)7248 606 0
FAX 0043 (0) 7248 606 600
INTERNET www.froeling com

8.1.2 Address of the installer

Stamp