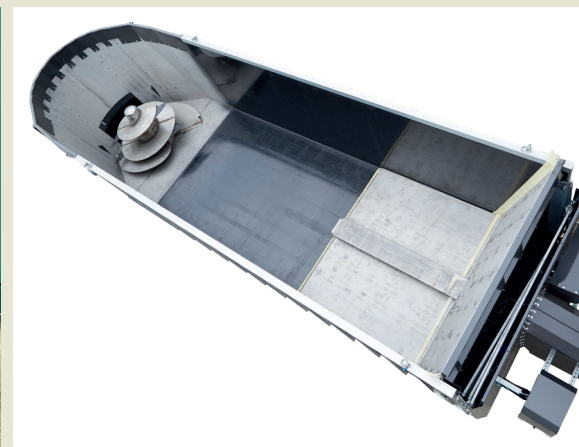


# Operating instructions

## Biogas feed



**We are Fliegl.**



## EC Declaration of Conformity

As defined by the EG machinery directive 2006/42/EC, Annex II, 1.A

**Manufacturer:**

Fliegl Agrartechnik GmbH  
Bürgermeister-Boch-Straße 1  
DE - 84453 Mühldorf am Inn

The person established within the Community  
who has been authorized to assemble all  
relevant technical documents:

Krauss Christian  
Fliegl Agro-Center  
Maierhof 1

DE-84556 Kastl

**Description and identification of the machine:**

Produc: Biomat, Rondomat & Ökomat  
Model: SteelPro, Polypro, Doppel-, Rondomat, Ökomat  
Serial no: BIOXXXXxxxxx (FXXXXX) (X= Place-holder for characters / numbers)  
Project number: PRJ-2010-11-15-0002  
Project title: Biogas feed  
Trade name: Solid matter input container for biogas plants  
Function: Holding and feeding of different substances and solid materials in the biogas fermenter

**Is expressly declared that the machines conform to all relevant provisions of the following EC directives:**

2006/42/EC:2006-05-17 EC Machinery Directive 2006/42/EC  
2014/34/EC: Directive 2014/34/EC of the European Parliament and the Council of 26 February 2014 on the harmonization of laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast)  
2014/35/EC: Directive of the European Parliament and the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.  
2014/30/EC: Directive of the European Parliament and the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

**National standards transposing the harmonized standards according to article 7 paragraph 2:**

EN ISO 12100:2010-11 Safety of machinery - General principles for design - Risk assessment and risk reduction  
EN DIN 50495:2010 Safety devices required for the safe functioning of equipment with respect to explosion risks.  
EN DIN 60079-20-1:2010 Explosive atmospheres - Part 20-1: Material characteristics for gas and vapour classification - Test methods and data  
EN DIN 62031:2013 LED modules for general lighting - Safety specifications (IEC 62031:2008 + A1:2012 + A2:2014)  
EN DIN 61204-7:2007-07 Low-voltage switch mode power supplies - Part 7: Safety requirements (IEC 61204-7:2006)  
EN DIN 15089:2009-07 Explosion isolation systems  
EN DIN 1127-1:2011-10 Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology.  
EN 60079-18:2015-10 Explosive atmospheres - Part 18: Equipment protection by encapsulation "m" (IEC 60079-18:2014)  
EN 60079-7:2014-04 Explosive atmospheres - Part 7: Equipment protection by increased safety "e" (IEC 31/973/CD:2011)

**Reference to the use of any other technical standards and specifications:**

EN DIN 60204-1:2014-10 Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 44/709/CDV:2014)



Krauss Christian  
CE-Bevollmächtigter-TÜV

Mühldorf am Inn, July 25<sup>th</sup> 2016

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### Identification

#### Identification data

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Manufacturer:	Fliegl Agrartechnik GmbH
Products:	Biomat, Rondomat & Ökomat
Model:	..... SteelPro, Polypro, Double Rondomat, Double Ökomat
Serial number:	..... See identification plate, front right next to the control cabinet

Product serial number: .....  
(Please fill in immediately)

#### Manufacturer

---

Fliegl Agrartechnik GmbH  
Bürgermeister-Boch-Str. 1  
D – 84453 Mühldorf am Inn, Germany  
Telephone: 0049 (0) 8631 307 0  
Telefax: +49 8631 307 550  
Email: info@fliegl.com

#### Operating manual format

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Documentation no: 2010-11.001  
Version/Revision: 1.0  
Date of creation 28 Nov. 2010  
Last modified: 28/ Sep/ 2016

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## 1 User Information



### ATTENTION !!!

*Unauthorized persons are not allowed on or near the plant.*

*Use only from operating workstation (Switch, control cabinet of the feed).*

*Operating with electronic implants, such as heart pacemakers, is not permitted.*

*Access or entry to the filling equipment is forbidden.*

*Before using, training must be carried out by the manufacturer.*

*Set-up the system in accordance with Ex-zones and safety measures.*

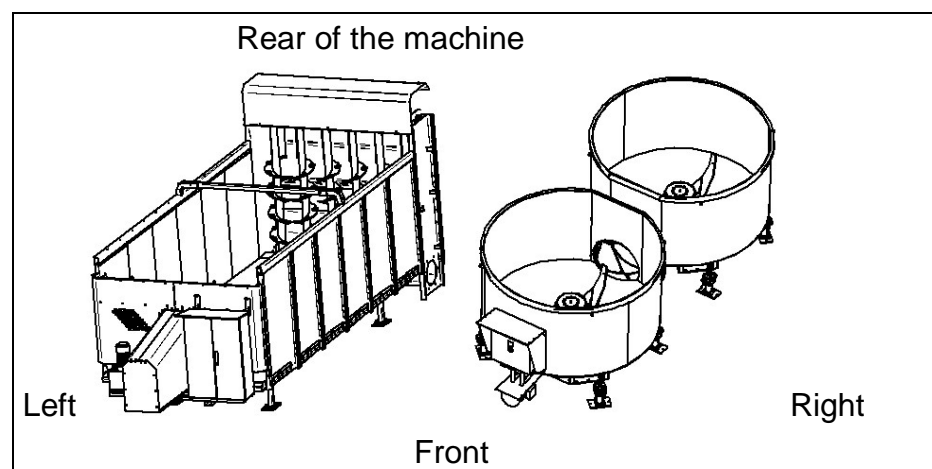
### 1.1 Purpose of the Document

These available operating instructions:

- Describes the operation, service and maintenance of the machine.
- Offer valuable tips for using the machine safely and efficiently.

### 1.2 Location details in the operating manual

All directional and location details in this guide relate to the uses workstation.



*Figure 1: Location details in the documentation*

## BGE

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### 1.3 Presentation used

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#### Guides and system reactions

---

Specific operations by the operating personnel are presented as a numerical list. The order of the steps must be maintained. The reaction of the system to a particular operation is marked with an arrow.

Example:

1. Operation step 1  
→ Reaction of the system to operation 1

#### Lists

---

Lists without a strict sequence are represented as a list with bullet point. Example:

- Point 1
- Point 2

### 1.4 Representation of safety guidelines

---

Safety guidelines are identified with a pictogram and a signal word. The signal word describes the seriousness of the imminent risk.



**DANGER**

**Direct** immediate risk to life and health of personnel (serious injury or death).



**WARNING**

**Possible** immediate risk to life and health of personnel (serious injury or death).

**CAUTION**

**Chance** of a dangerous situation (slight injuries or material damage)



**HINT**

Application tips and particularly useful information.














**IMPORTANT**

Commitment to a specific behavior or action for safe operation when using the machine.

**BGE**

**Warning of specific risks**

		
Access forbidden	Risk from a naked flame	
		
Risk from electrical voltage	Read the operating instructions	Risk from automatic starting
		
Risk from crushing	Risk of slipping	Risk of being pulled in
		
Risk of falling	Risk of eye injury	Risk of skin injuries

## **2 Basic Safety Instructions**

---



### **IMPORTANT INFORMATION ABOUT USING THE DOSING UNIT!**

---

#### **2.1 Warning of injury/damage to people, items and the environment**

---



Use the feeding device exclusively for feeding and collecting of renewable raw materials in biogas plants.

Please pay attention to the relevant accident prevention regulations for agricultural biogas plants and any other regulations concerning the technology, safety and installation information.

In addition to these operating instructions the regulations of the Statutory Accident Insurance Institutions of the Agricultural Sector and the German regulations on health and safety at work (BetrSichV) also apply.

In addition to the operating instructions, generally accepted and local regulations for accident prevention and for environmental protection should also be observed.

Persons who are under the influence of alcohol, drugs, or medication, may not transport, set-up, put into operation, operate or repair the feeding device.

The minimum allowable age for operating personnel is 18.

Pay attention to the warning and information signs on the feeding device.

Tightly fitting clothes should be worn when operating, servicing or repairing the feeding device.

The required personal protective equipment should also be used when working with the feeding device.

Every person who has been assigned with the transport, setting up, operation, maintenance or repair of the feeding device, must have read and understood the operating instructions.

We recommend that the operator obtain written confirmation from the operating personnel confirming that they have read and understood the contents of the operating instructions.

All users who work with the feeding device must be instructed in its operation and safety precautions.

## BGE

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The operators should confirm in writing that they have received these instructions.

In addition to these operating instructions the operating instructions for external components as well as the operating instructions for the biogas plant, which are also provided, should also be read.

Pay attention to the warning and information signs on the feeding device.

Never turn the device on when it is not mounted in the pit opening, or if there are people in the feeding device or in the pit.

Remove the pit or inspection cover, or the entrance to the fermenter and the protective grille on the feeding device immediately before starting any installation or maintenance work.

Close the pit or inspection cover, or the entrance to the fermenter and the protective grille immediately after completing any installation or maintenance work.

Never leave the device unsupervised during installation or maintenance work.

During work on the feeding device the device should be taken out of service and made safe against starting-up again.

The feeding device may not be put into operation unless safety installations and protective covers have been provided by the manufacturer or installed on site by the customer.

Any disturbances that occur must be reported immediately. In the case of disturbances that compromise safety, the feeding device may not be operated until the disturbance has been remedied.

In the case of any faults the feeding device must immediately be shut down.

Defects in the feeding device must be dealt with without delay. The feeding device may only be put back into operation when all faults have been eliminated.

All people and animals should be kept away from the pit and the working area of the device during all installation and maintenance work.

Pay particular attention to any children that may be playing!

Installation and maintenance work on machines in an environment where there is a risk of explosions must be carried out in compliance with the German Ordinance on Industrial Safety and Health (BetrSichV) as well as following the safety, installation, and maintenance conditions in these operating instructions.

Carrying out operating instructions. The explosion prevention work must be carried out by a trained specialist or through Fliegl Agrartechnik GmbH. The special permit (see chapter 8.5) must be filled out and signed by those responsible prior to any work on the feeding device.

## BGE

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If the work is not carried out via the company Fliegl Agrartechnik GmbH, it must be inspected, approved and carried out by an approved specialist. He must provide written confirmation to this effect and the machine must be provided with his mark of conformity.

Do not accept any changes or modifications to the feeding device: In the case of any unauthorized modifications the declaration of conformity form the manufacturer will be invalid!

The maintenance intervals in the operating instructions should be strictly adhered to!

If any defective components need changing these should be replaced with original components with the same electrical and mechanical data, otherwise the security, functionality and explosion prevention cannot be properly maintained.

All safety installations (e.g. protective grille), attachments, electrical connections, cables and hydraulic lines should be regularly checked to see that they are in a flawless condition.

The bypassing of safety-related components is forbidden.

The position of separating protection devices may not be altered.

Work on the hydraulics may only be carried out by trained specialists.

All hydraulic components, lines, hoses and screw connections should regularly be checked for leaks and any externally recognizable damage. Leakages and damage should immediately be dealt with!

The hydraulic lines should be replaced every six years at the latest (after the date of the installation of the feeding device).

Pay particular attention that no lubricants, hydraulic or transmission oil reach the floor or get into the water or the fermenter.

Dispose of lubricant residue, alcohol contaminated containers and cleaning rags in the prescribed way.

After decommissioning the assemblies should be disposed of in accordance with the legal stipulations regarding recycling.

## BGE

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### 2.2 Warning of dangerous electrical voltage

---



All electrical work, that is not described in these operating instructions, should be thoroughly checked by an electrical expert.

*Work on the electrical equipment should only be carried out without power applied.*

The main switch should be switched off prior to the commencement of work and secured with a padlock to prevent unintentional switching on. Remove key and display a warning shield.

*Only use electrically insulated tools.*

After commissioning, maintenance, testing, setting-up and repair work, all electrical equipment and all security relevant circuits and assemblies should be checked for correct operation. Loose connections should be made secure and damaged cables and lines should be exchanged.

### 2.3 Warning of automatic start-up

---



Risk of injury from moving and rotating parts (because of the push-off system and the screw conveyors).

During operation entry into the housing of the feeding device is forbidden!

The feeding device may not be opened during operation (e.g. protective grille, coverings etc.).

### 2.4 Warning of crushing

---



Danger of injury from the sliding floor and / or push off wall.

During operation entry into the housing of the feeding device is forbidden!

The feeding device may not be opened during operation.

## BGE

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### 2.5 Warning of tripping and falling hazard

---



Risk of injury from tripping on the sliding floor or one the slide axis.



Risk of injury from falling down from the housing of the feeding device (if the device is open) and during installation or maintenance work.

forbidden!

During operation entry into the housing of the feeding device is

### 2.6 Warning of explosion hazardous atmosphere

---



Gas can escape from the fermenter.

Heightened danger of explosion!

Under no circumstances may the feeding device be positioned within a minimum distance of 3 m from a fermenter opening that had not been permanently sealed. Special attention must be paid to the protected zones of the biogas plant (which should be created by the plants operators – see BetrSichV).

The feed opening opposite the fermenter must be permanently sealed and checked for leaks every six months with leak detection spray.

The level switch, to switch off the feeding device (in the case of a short fall of the immersion depth of the feeding pipe by a minimum of 1 m) is not included in the delivery from Fliegl Agrartechnik GmbH, should defiantly be installed in the fermenter on site and connected to the control system.

Gas can escape when opening or removing the feeding device. Heightened danger of explosion!

Do not introduce a source of ignition (e.g. non explosion-proof electrical equipment).

Only use non-sparking tools.

Do not smoke and do not use naked flames in the vicinity of the pit.

Poisonous gas can escape from the fermenter!

Ventilate the pit sufficiently before all installation and maintenance work.

Pay attention to all instructions for the biogas plant!



## 2.7 Hazards from residual energy

---



During maintenance and repair work, instances mechanical or hydraulic residual energy may occur in the feeding device. The residual energy can be safely discharged. Get advice on suitable measures from your operating personnel.

Before starting any repair work make sure open system sections and pressurized lines are depressurized.

Only personnel who have special knowledge and experience with hydraulics may be allowed to work on hydraulic equipment!

Unauthorized installations and installation work is not permitted. Considerable danger may arise from any faulty installations.

Working with hydraulic systems:

Before any inspection, maintenance and repair work the hydraulic system should be depressurized and vented. In this case special attention should be paid to any possible residual energy.

After repair and maintenance on the components of the hydraulic system, the system should be checked for functional efficiency before it is returned to service.

## 2.8 Hazard of eye injury

---



The opening of, or damage to, hydraulic lines and screw connections can allow hydraulic oil to escape. Use eye protection!

## 2.9 Exclusion of liability

---

Fliegl Agrartechnik GmbH assumes no liability for damage or injury to persons, materials, the environment and / or operational damage, that are caused by the operating instructions not being adhered to in the correct way.

*In the case unauthorized interventions the warranty is forfeited.*

Fliegl Agrartechnik GmbH will not assume the responsibility nor guarantee, when instead of one of the original replacement components, as recommended in the operating instructions, a different replacement component has been used, and as a

## BGE

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result of this non-original component personal injury, material damage and / or a breakdown results.

Guarantees and liability claims for persons, items and environmental damage are excluded when they are caused by one or more of the following causes:



Improper transport, installation, commissioning, operating, or maintenance of the feeding device, operating the device with defective safety installations or not correctly installed or not correctly working safety and safety systems. Not paying attention to the instructions in the operating instructions relating to: Installation, implementation, operation and maintenance, unauthorized changes to the motors (e.g. operating conditions: power and RPM), inadequate monitoring of parts that are subject to wear and tear, inadequate repairs, using the feeding device in a way for which it was not intended. Effects and influences from extraneous elements, such as: bringing solid bodies into the fermenter, for which the biogas process is not suitable.

Details about the guarantee are available in our delivery conditions or in your contract documents.

### 2.10 Intended use

---

Storing and feeding of different substances and solid materials in the biogas fermenter.

The following goods may not be feed into or placed in the feeding device:

- Bulky solids
- Whole or roughly cut round or square bales, this may only be done in combination with a MultiMix vertical mixer.
- Sharp-edged goods, that could damage the sealing of the feeding device.

A different usage or use exceeding this application is deemed to be improper. Any damage that occurs due to improper use is the responsibility of the operator or user of the feeding device.

Proper usage includes:

The setting up and usage outside the Ex zones of the biogas plant, the feeding device only being operated while the substrate level is monitored, due notice is taken of all information in the operating instructions and that all inspection and maintenance intervals are adhered to.

## BGE

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Proper usage also includes:

- All information provided in the operating instructions is adhered to.
- Compliance with all inspection and maintenance work.
- The exclusive use of original parts.



### **IMPORTANT**

Only use the machine properly and in safety-related good technical order and condition.

Only in this way is the operational safety of the machine guaranteed.

---

## **2.11 Reasonably foreseeable misuse**

---

Any use other than that specified under “proper use”, or usage that goes beyond this is regarded as improper use!

For damage that arises from improper use:

- The operator takes all responsibility.
- The manufacturer accepts no responsibility nor liability.



### **HINT**

Risks can arise from improper use. Improper use is for example:

- The use of the switching cabinet and the hydraulic units in a potentially explosive atmosphere.
- that exceeds the predetermined technical values for normal usage.

## **Alterations and modifications**

---

Any improper alterations and modifications to the machine eliminates any responsibility and warranty from the manufacturer. This also covers any welding on supporting parts.

## BGE

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The electromagnetic behaviour of the machine can be affected by any additions or modifications.

Do not accept any modifications or additions to the machine without consultation and the written consent of the manufacturer.

### Replacement parts and parts subject to wear such as auxiliary materials.

---

The use of replacement parts and parts subject to wear from third party vendors can lead to risks. Use only original parts or parts approved by the manufacturer.

The manufacturer will not assume any liability for damage resulting from the use of parts, parts subject to wear or auxiliary materials not approved by the manufacturer.

## 2.12 Risks when using the machine

---

Risks and damages may arise when using the machine.

- Risks to life and limb of operators or third parties.
- Damage to the machine itself.
- Damage to other material assets.

The basis for the guaranteed safe handling and fault free operation of this machine, is knowledge of the safety guidelines and user guide in this manual.



### **IMPORTANT**

Always keep the operating instructions close to where the machine is operated! The operating instructions must be freely accessible for operators and maintenance personnel.

Notice should also be taken of:

- General and local regulations for accident prevention and environmental protection.

## 2.13 Residual risks

---

The machine is constructed to state of the art technology and to generally acknowledged rules on safety.

**DANGER!**

It should be noted that there may well be occurrences of mechanical, pneumatic or electrical residual energy in the machine as well as pressure in cylinders and valves after bringing the device to an emergency standstill, or after the machine has been switched off!

In addition to the countermeasures of the manufacturer, suitable countermeasures must be taken by the operator against the risks posed by residual energy. The personnel should be introduced to the risks of residual energy in training and the countermeasures that can be taken.

**2.14 The obligation of the operator**

---

The operator is obliged only to let persons work on the machine who:

- Are acquainted with the fundamental instructions about safety at work and with accident prevention.
- Who have been instructed to work with the machine.
- Have read and understood these operating instructions.

The requirements of the EC directives about the use of working materials 2007/30/EC must be observed.

**2.15 Obligation of personnel**

---

All personnel, who are contracted to work on the machine, are obliged, from the commencement of work:

- To observe the fundamental instructions about safety at work and accident prevention.
- To read and follow the chapter on safety and safety guidelines in these operating instructions.

Any open questions should be directed to the manufacturer, see page 7.

## BGE

### 2.16 Personnel qualifications

The minimum age for operating the equipment is  
18 years

Personnel Activity	Specially trained personnel	Skilled operating personnel	Skilled personnel with professional training (Mechanics/Electro technology)
Transport	X	--	--
Implementation	X	X	--
Fault finding and elimination	X	--	X
Setup, preparation	--	--	X
Operation	--	X	--
Maintenance	--	X	X
Destruction/Recycling	X	--	--

Key: X..Allowed      --..Not allowed

### 2.17 Personal protective equipment

The operator must provide the following personal protective equipment.

- Safety helmet
- Safety glasses
- Protective gloves
- Safety boots
- Skin protective agent

### 2.18 Safety and protection devices



#### IMPORTANT

Only operate the machine when all safety and protective devices are complete and functioning correctly!

## BGE

### 2.18.1 Position of the safety and monitoring devices

Gives an overview of the most important safety and monitoring devices and shows their installed position on the machine:

- |                            |                       |   |                       |
|----------------------------|-----------------------|---|-----------------------|
| 1                          | Small control cabinet | 2 | Large control cabinet |
| Depending on configuration |                       |   |                       |



Figure 2: Safety and monitoring devices

### 2.18.2 Description of the safety and protection devices

The following safety and protection devices are installed on the machine:

#### Command device for an emergency standstill.

Command devices for an emergency standstill are installed on the machine:

- EMERGENCY STOP button
- Lockable main switch

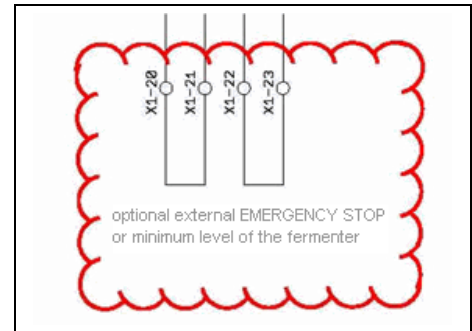


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### Description of additional safety and protective devices.

There can be an additional level switch in the control cabinet, which in the case of a low substrate level can clamp (as engaged) the EMERGENCY STOP button:

- External EMERGENCY STOP operation, see the circuit diagram in the equipments control cabinet.
- EMERGENCY STOP via the filling level in the fermenter (with the lowering of the filling level the EMERGENCY STOP disengages).



### In case of faulty safety and protection devices.

Faulty Safety and protection devices can lead to dangerous situations. For this reason.

- Switch the machine off immediately.
- Secure against re-starting.
- If required, disconnect the hydraulic and electrical supplies.

### Check the safety and protection devices

All safety and protection devices must be checked regularly.

Test intervals:

Safety and protection devices	Test intervals
Complete plant	Visual inspection before each power up
Impermeability of the plant to the fermenter	Weekly

For this procedure see chapter 9.2.1.

### Check the command device for an emergency standstill

The command device for an emergency standstill should be checked regularly.



## BGE

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Test intervals:

Protection devices	Test interval
Command device for an emergency standstill	Weekly

For the procedure see chapter 9.2.1.

### 2.19 Workstations of the operating personnel

---

The machine is designed to be exclusively operated by one individual.

The most important workstations are:

- Control panel the switching cabinet of the feeding equipment.



*Figure 3: Workstations at the machine*

### 2.20 Machine markings

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You will find various pictograms in chapter 1.4.

On the machine are warnings for the following residual risks, which are constructed so they cannot be removed.  
Mounted warning signs:

Pictos / information	Meaning
	Risk from electrical voltage. Only electrical specialists may work on the electric machine.
	Explosion prevention of the drive motors. See also the type plate on the motor.
	Pay attention to the local Ex protection zones.

Pay attention to all machine attachments.

- Warnings and safety guidelines.
- Additional markings, such as rotation or transport direction.

Apart from this you will find the following markings on the machine:

	CE marking , in the type plate Markings showing conformity with valid EU guidelines. <ul style="list-style-type: none"> <li>• That the product pertains to and prescribes to CE markings.</li> </ul>
	Type plate for the specific identification of the machine.

### **3 Machine Description**

This chapter gives an comprehensive overview about the construction and function of the machine. If possible read it at the machine. You can make yourself very familiar with the machine.

#### **3.1 Range of application**

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The feeding device is intended solely for the purpose of feeding compacting and bringing renewable raw materials (NAWAROs) into the elevated tank (liquid manure pit, fermenter) in biogas plants.

- Solid material intake.
- Conveying the filling products into the fermenter.

#### **3.2 Design variants**

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Variants of the solid material intake.

##### **3.2.1 SteelPro container in steel finish**

---

Solid matter input container for stocking and feeding of different substrates and solid materials (e.g. corn silage, grass silage, whole plant silage and solid manure). Available as a standard product: SPS control – metered application over time. External width 2.55 m or 3.02 m.

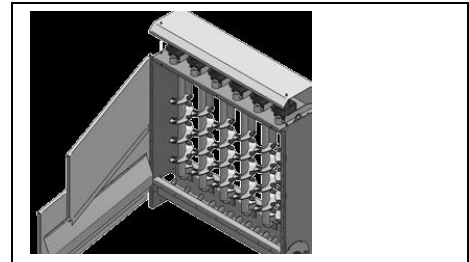
##### Advantages

Highest gas yield through uniform and reliable dosing. Energy-efficient, approx 0.41 kW power requirement per tonne. Low-maintenance, because of its stable construction with low-wear parallel shaft gearmotor (electric) push-off technology, which has been proven for years in agriculture. Rear collection channel for liquids with connection potential for a Ø125 mm outlet.

##### Technology

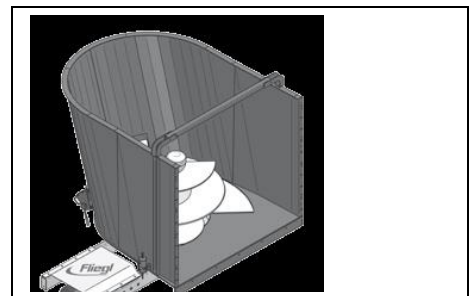
Divided roll-off apparatus, sliding wall with interchangeable side and lower polyurethane seals, sliding floor with interchangeable plastic guides as the wear material, steel skeletal frame – galvanized or painted with primer, side wall material S 235 JR, side wall thickness 6 mm, floor material S 235 JR, floor thickness 8 mm, wear rail sliding floor material PE 300, wear rail thickness 15 mm, maximum apparent density approx. 700 kg/m<sup>3</sup>, push-off amount depending on the requirement of the dosing unit.

**3.2.1.1 Dosing and grinding unit for Steelpro/Polypro**



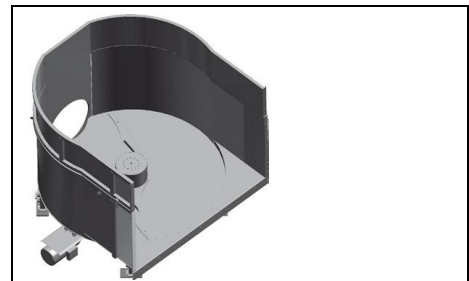
Duplex narrow	Height 2000 mm	Width 2380 mm
Duplex	Height 2000 mm	Width 2850 mm
Duplex Mega Wide	Height 2800 mm	Width 2850 mm

**3.2.1.2 Grinding ATTACHMENT »MULTI MIX« for Steelpro/Polypro**



Duplex narrow	Height 2000 mm	Width 2380 mm
Duplex	Height 2000 mm	Width 2850 mm
Duplex Mega Wide	Height 2800 mm	Width 2850 mm

**3.2.1.3 Attachment - Rondomat for Steelpro/Polypro**



*Attachent Rondomat Ø 2400 mm      Volume Approx: 14 m<sup>3</sup>, inner/outer Ø 2400/2500 mm; height inner/outer 2000/2700 mm*

*Attachent Rondomat Ø 3000 mm      Volume Approx: 17 m<sup>3</sup>, inner/outer Ø 2900/3000 mm; height inner/outer 2000/2700 mm*

*Attachment Rondomat Mega Ø 3000 mm, height 2800 mm  
Volume Approx: 23 m<sup>3</sup>, inner/outer Ø 2900/3000 mm; height inner/outer 2800/3500 mm*

*Attachent Rondomat for Smart      Volume Approx: 10 m<sup>3</sup>, inner/outer Ø 2400/2500 mm; height inner/outer 1500/2200 mm*

*Finish V2A (1.4301) or steel (S 235 JR)*

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### 3.2.2 PolyPro container in plastic

Solid matter input container for stocking and feeding of different substrates and solid materials (e.g. corn silage, grass silage, whole plant silage and solid manure). Available as a standard product: SPS control – metered application over time. External width 2.55 m or 3.02 m.

#### Advantages

Highest gas yield through uniform and reliable dosing, energy efficiency approx 0.41 kW per tonne. Low-maintenance – stable construction with low-wear parallel shaft gearmotor (electric), push-off technology proven over years of use in agriculture. Over three decades of experience using plastics with abrasive materials in sewage treatment technology, polyethylene floor and side walls are imperviously bonded together with a special welding technique. Stable outer steel framework and parking feet, rear liquid collection channel with connector. For Ø 125 mm drain, roll-off container Made of shatter-proof PE plastics · water resistant · alcohol resistant · acid resistant · alkaline resistant.

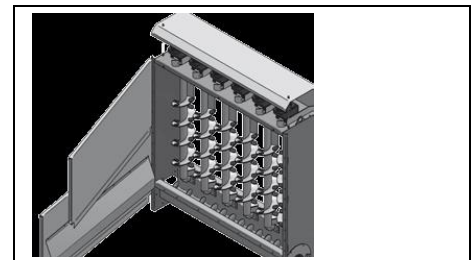
UV light resistant, temperature resistant from -85°C to +90°C, divided roll-off apparatus.

#### Technology

Sliding wall with interchangeable side and lower polyurethane seals, sliding floor with interchangeable plastic guides as the wear material, steel skeletal frame – galvanized or painted with primer, side wall material PE 300, side wall thickness 20 mm, floor material PE 500, floor thickness 20 mm, wear rail sliding wall material PVC, floor thickness 20 mm, wear rail sliding floor material PE 300, wear rail thickness 15 mm, maximum apparent density. approx. 700 kg/m<sup>3</sup>, Push-off amount depending on the requirement of the dosing unit.

*The hydraulic power unit is mounted as standard on the front of the container.*

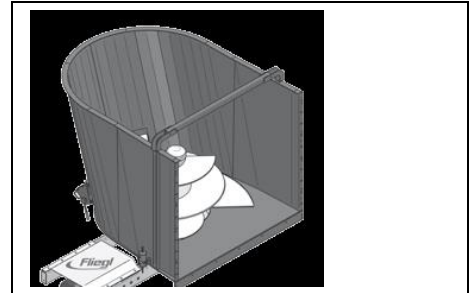
#### 3.2.2.1 **Dosing and grinding device for Steelpro/Polypro**



Duplex narrow	Height 2000 mm	Width 2380 mm
Duplex	Height 2000 mm	Width 2850 mm

Duplex Mega Wide    Height 2800 mm    Width 2850 mm

**3.2.2.2    Grinding  
ATTACHMENT  
»MULTI MIX« for  
Steelpro/Polypro**

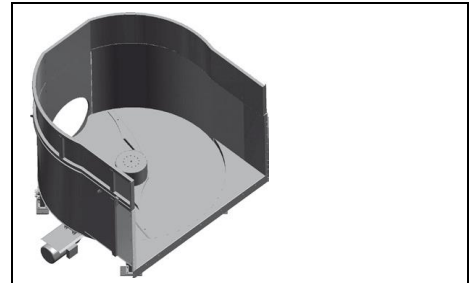


Duplex narrow    Height 2000 mm    Width 2380 mm

Duplex    Height 2000 mm    Width 2850 mm

Duplex Mega Wide    Height 2800 mm    Width 2850 mm

**3.2.2.3    Attachment -  
Rondomat for  
Steelpro/Polypro**



*Attachent Rondomat Ø 2400 mm    Volume Approx: 14 m<sup>3</sup>, inner/outer Ø 2400/2500 mm; height inner/outer 2000/2700 mm*

*Attachent Rondomat Ø 3000 mm    Volume Approx: 17 m<sup>3</sup>, inner/outer Ø 2900/3000 mm; height inner/outer 2000/2700 mm*

*Attachment Rondomat Mega Ø 3000 mm, height 2800 mm  
Volume Approx: 23 m<sup>3</sup>, inner/outer Ø 2900/3000 mm; height inner/outer 2800/3500 mm*

*Attachent Rondomat for Smart    Volume Approx: 10 m<sup>3</sup>, inner/outer Ø 2400/2500 mm; height inner/outer 1500/2200 mm*

*Finish V2A (1.4301) or steel (S 235 JR)*

**3.2.3    Roof for PolyPro / Steel Pro Container and according dosing unit**

PolyPro or SteelPro container as well the dosing unit are optionally available with a solid roof structure consisting of a frame made of steel or stainless steel and a PVC covering. The roof is continuously adjustable and connected to the existing hydraulic unit. Controlling of the roof is done via the overall control unit.

**DANGER!**

In order to ensure proper functioning of the roof construction, the roof may only be opened up to wind force 5! During winter, the roof must be kept free of snow and ice.

**3.2.4 Rondomat or double Rondomat, the helper for small biogas plants**

Extremely low-maintenance stainless steel and long service life container (available in steel finish as an option). The slowly rotating output blades have a very low energy requirement. The Ø 3 m container with a loading sill height of just 2.10 m can be optimally filled. Available as a standard product: SPS control – metered application over time.

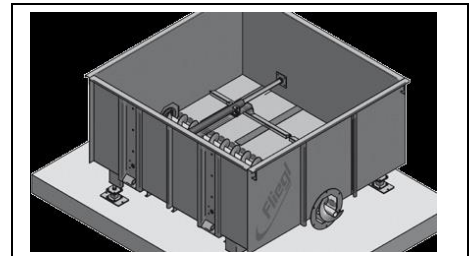
**3.2.4.1 Rondomat****3.2.4.2 Doppelrondomat**

<b>Tecnology:</b>	
Height inside / outside	1500 mm / 2100 mm
Width	Ø 3000 mm
Unladen weight	Approx. 2.8 t
Total weight	Approx. 10 t
Capacity each container/total	Approx. 10.5 m <sup>3</sup> / approx. 21 m <sup>3</sup>
Material container	4 mm / V2A
Material floor	6 mm / V2A
Material thickness Output blade	Approx. 20 mm
Control	Automatic control over time or optionally with a weighing device

### 3.2.5 Ökomat container in steel finish

Solid matter input and dosing apparatus for stocking and dosing of different occasional short cut substrates and solid materials (e.g. corn silage, grass silage, whole plant silage and solid manure). Available as a standard product: SPS control – metered application over time and 3 kW hydraulic power unit.

#### 3.2.5.1 Ökomat



Ökomat 140 steel finish / V<sub>2</sub>A finish

Solid matter metered feeder with 4 pushing devices for transporting the substrate into the trough auger.

Torsionally stiff trough auger, Length: 3000 mm, 2 hydraulic cylinders, length inside/outside: 3000 mm / 3180 mm, width inside/outside: 2820 mm / 3000 mm, height inside/outside: 1400 mm / Approx. 2000 mm with support feet, unladen weight approx. 4.5 t, total weight approx. 15 t.

#### Ökomat 200 steel finish / V<sub>2</sub>A finish

Solid matter metered feeder with 4 pushing devices for transporting the substrate into the trough auger.

Torsionally stiff trough auger Length: 3000 mm, 2 hydraulic cylinders, length inside/outside: 3000 mm / 3180 mm width



## BGE

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inside/outside: 2820 mm / 3000 mm, height inside/outside: 2200 mm / approx. 2670 mm with support feet, assembly S 235 JR, 1 x 800 mm, unladen weight approx. 5.2 t, total weight approx. 20.5 t.

### 3.2.6 Ökomat container in stainless steel finish

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Solid matter input and dosing apparatus for stocking and dosing of different occasional short cut substrates and solid materials (e.g. corn silage, grass silage, whole plant silage and solid manure). Available as a standard product: SPS control – metered application over time with a 3 kW hydraulic power unit.

Description see 4.2.4.1 (Ökomat)

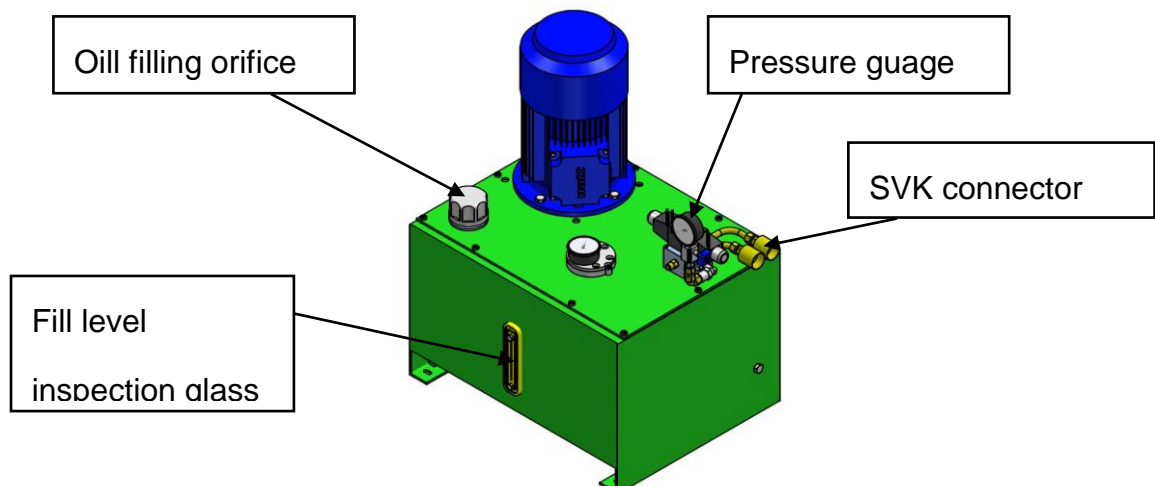
### 3.2.7 Hydraulic power unit

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The hydraulic power is produced by the mounted hydraulic power unit. The hydraulic lines are connected to the hydraulic power unit with quick action (SVK) connectors.

The sliding table is moved forward by an hydraulic cylinder on the sliding floor. The sliding wall is operated by two hydraulic cylinders arranged one behind the other. The extending order of the hydraulic cylinders cannot be controlled.

The pressure gauge on the hydraulic power unit shows the feed pressure. Th pressure can on instruction be corrected at the pressure control valve. The control of the machine is carried out via the entire device control.



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### 3.3 Scope of delivery

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Description	Number
Feeding device (Including dosing unit (Rondomat / Duplex dosing unit / MultiMix – vertical mixer) / conveyor screws / drives / stores / hydraulics)	1
Support feet (including a fastening anchor on each alternate foot)	Depending on container size
High screw conveyor with 90° delivery nodes (only with elevated feeds)	1
Placements screw with 45° delivery nodes	1
If necessary Trough auger including Feed	1
Collection pipe with 45° opening flange + Ø 95 end bearing	1
- Sealing material (Sikaflex)	6
- Fixing material (heavy duty anchor)	42
Switch cabinet (including control cable / canopy)	1
Operating unit control	1
Hydraulic power unit	1

The scope of delivery is dependent on the version and implementation.

### 3.4 Functional description

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#### Machine loading

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The filling materials are manually loaded into the container by the operator with the help of a loading device (wheel loader, front loader etc.).

- Manually loaded into the container.

#### Machine emptying

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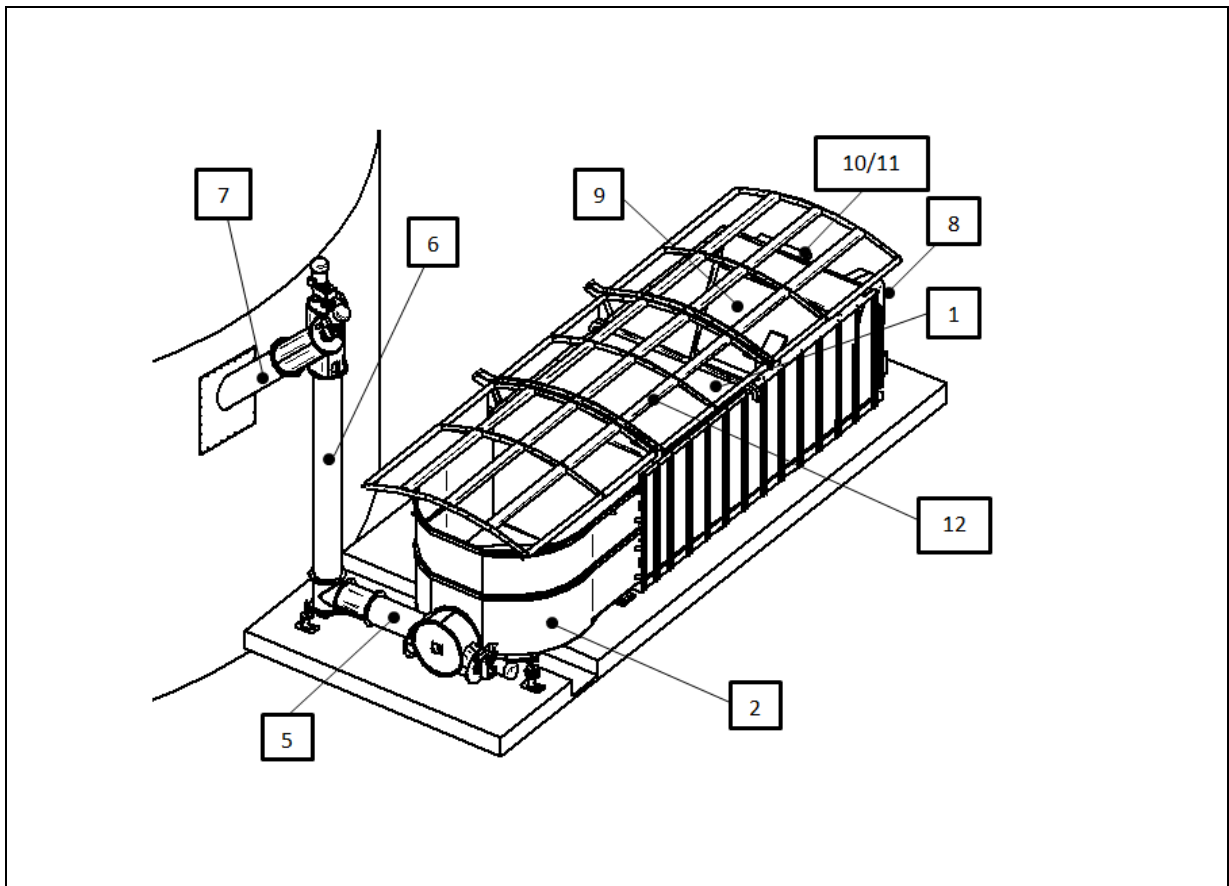
Discharge takes place automatically controlled by time or weight.

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### 3.5 Assembly of the machine

Provides an overview of the important components and assemblies and shows their installation locations on the machine:

1	Biomat	8	Front cover
2	Rondomat	9	Sliding table
3	Duplex dosing	10	Main control cabinet
4	MultiMix – vertical mixer	11	Hydraulic power unit
5	Trough auger	12	Roof
6	High screw conveyor		
7	Placement screw		



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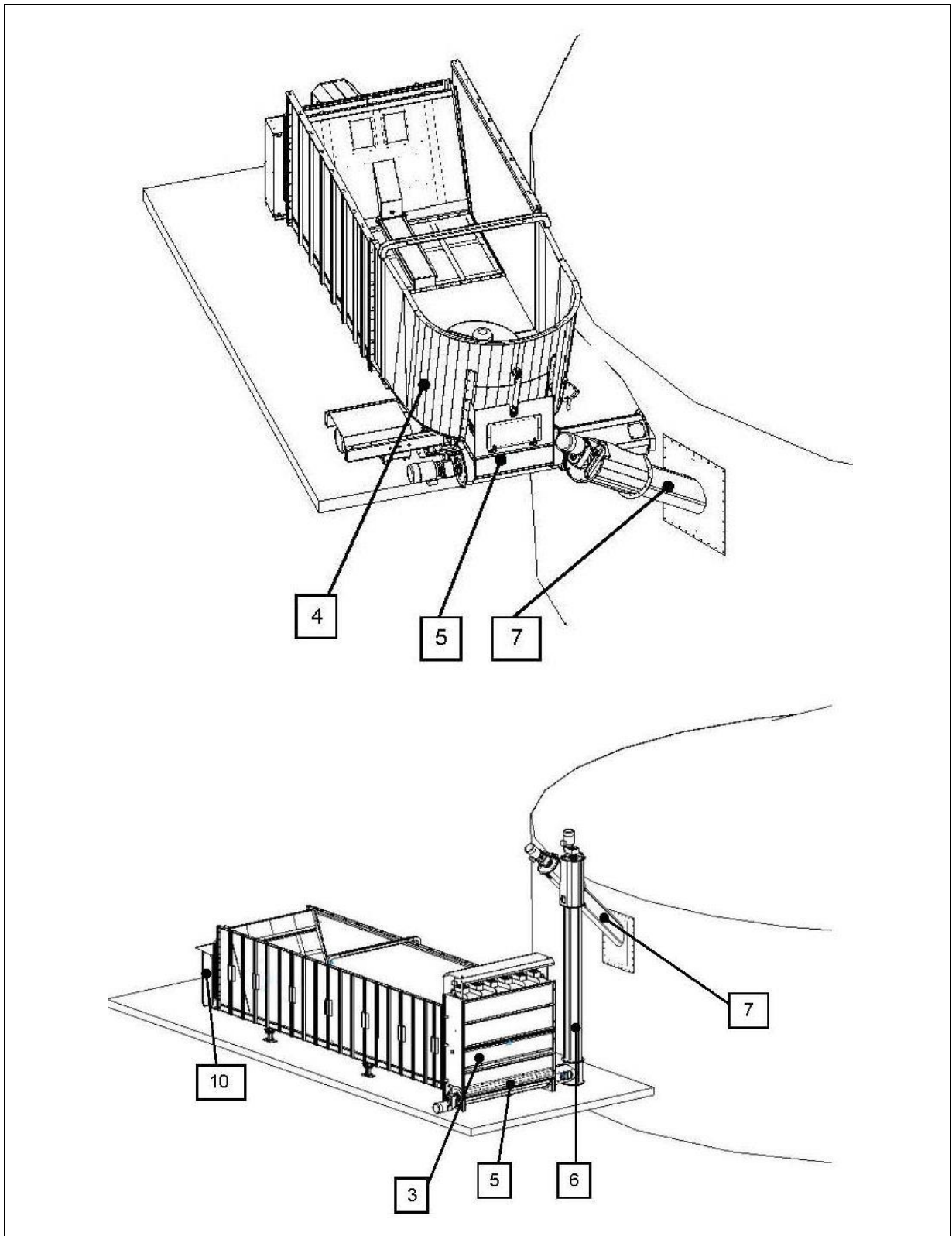


Figure 4: Assembly and components

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### 3.6 Assemblies and components

#### 3.6.1 Assembly 7

Slide in and align the flange in front of the fermenter opening and apply sealing material “Sikaflex TS plus” to the underside of the flange, carefully follow processing instructions.

- Slide the placement screw pipe into the flange opening, check injection tube depth in the fermenter and seal weld.
- Plug the flange while screwing tight at the same time.

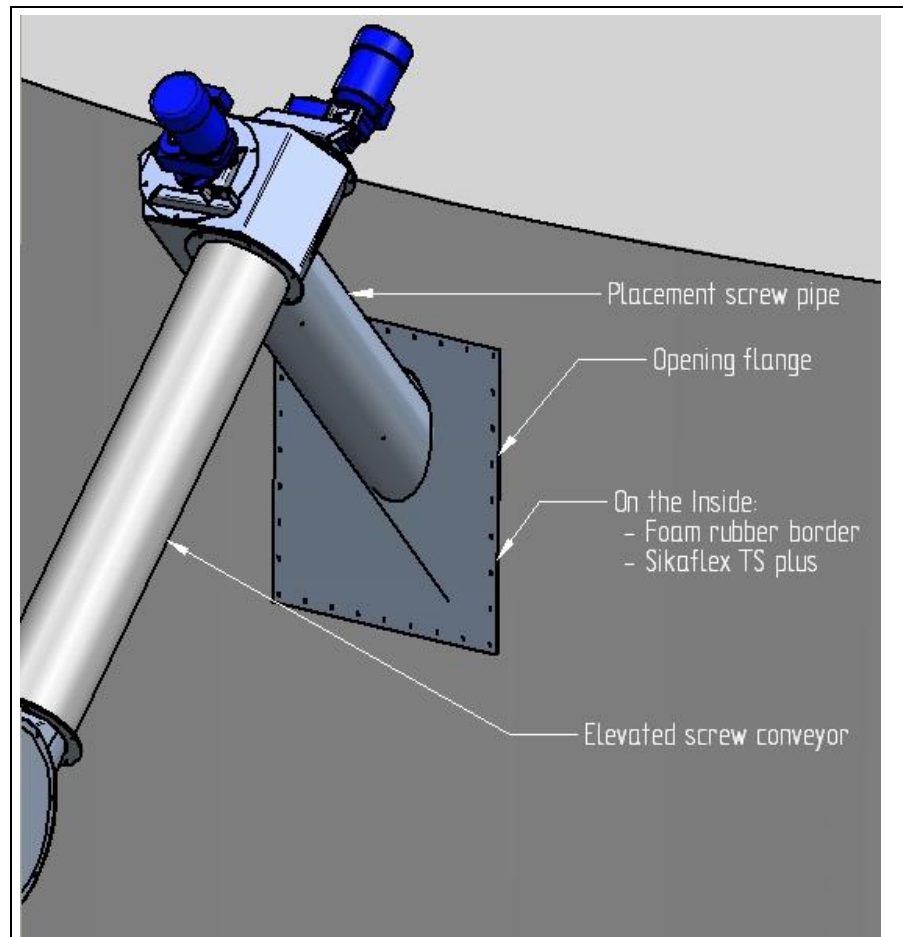


Figure 5: Assembly 7

**Construction: Technically permanently sealed, for maintenance see chapter 10.7**

## BGE

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### 3.6.2 Push-off system

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The push-off system (Biomat) pushes the filling material into the Rondomat trough (2) / for duplex dosing (3) or in the MultiMix – vertical mixer (4) and this in turn agitates the substrate in the trough auger (5) in the area of the rear side.

For feeding the container, the sliding table (9) needs to be moved to the front end position.

In adjustable time intervals or after operating the control and according to requirement, the push-off system pushes the filling material to the screw conveyor. As soon as the amperage of the trough auger or one of the dosing augers goes up, the pushing process stops automatically. When the material jam has been cleared, the pushing process continues after the preset time interval.

After reaching the final position and completing the last feeding portion the sliding floor and sliding wall are once again moved to the starting position.

The sliding wall is on top of the sliding floor. A trapeze bearing in the sliding floor drives the sliding wall during the push-off process.

The sliding table is positioned with the sliding rails on the container floor. The sealing strips are on both sides of the container walls, as well as in the front lower part of the sliding floor. The sealing strip prevents leakage of the filling material. Container and push-off system are equipped with a front hood (8) to prevent unauthorized access.

### 3.6.3 Feeding

---

The mixing blade in the Rondomats feeds the material to the trough auger (5) which subsequently applies pressure on the interconnection point of the elevated screw conveyor. The elevated screw conveyor transfers the filling material to the input auger (7), which then pushes the substrate into the elevated container (fermenter). In the case of a low feed the elevated screw conveyor falls away and the trough auger transfers the material directly to the placement screw. Because of the danger of an explosion from escaping methane gas the feeding tube protrudes up to the underside of the substrate surface in the fermenter.

The dosing augers duplex metered feeder feeds the material to the trough auger (5) which subsequently puts pressure on the interconnection point of the elevated screw conveyor(6). The elevated screw conveyor transfers the filling material to the input auger (7), which then pushes the substrate into the elevated container (fermenter). In the case of a low feed the elevated screw conveyor falls away and the trough auger transfers the material directly to the placement screw. Because

of the danger of an explosion from escaping methane gas the feeding tube protrudes up to the underside of the substrate surface in the fermenter.

The vertical screw of the Multimix – vertical mixer, feeds the material to the trough auger (5) which in the end, as described in the other feeding systems, transfers it to the following screw conveyors and then feeds it into the fermenter.

### **3.6.4 Control system**

---

The feeding device is controlled automatically by the main control box (10) by the higher order SPS control system (master controller).

In addition the push-off system can be manually controlled to move backwards and forwards using the control unit, as well as introducing additional portions of feed. After switching on the feeding container the placement screw (7) starts with an adjustable lead time. After completing the lead time the elevated screw conveyor starts and following this the trough auger. After an additional lead time the push-off system moves forward, controlled over time (independent of the amperage of the screw conveyor). The speed is dependent on the filling material and the requirement of the of the biogas plant and can be adjusted by the operator. After a break the feeding device can start up again to its own, or depending on the requirement of the control system. After completing the feeding portion, the screw conveyors elevate their positions in the reverse order to the start.

A limit switch monitors the foremost and rearmost position of the sliding table.

When the end position is reached the push-off system is automatically switched off (variations are possible using the master control system).

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### 3.7 Technical Details:

#### Mechanical data

Model	Outer Length (mm)	Inside Length (mm)	Width (mm)	Inside height (mm)	Total height (mm)	Volume
Okomat140	3180	3000	2820	1400	1900	Approx. 14 m <sup>3</sup>
Okomat200	3180	3000	2820	2200	2700	Approx. 20 m <sup>3</sup>
SteelPro/PolyPro18	6400	3800	2380	2000	2700	Approx. 18 m <sup>3</sup>
SteelPro/PolyPro22	7400	4800	2380	2000	2700	Approx. 22 m <sup>3</sup>
SteelPro/PolyPro25	7900	5300	2380	2000	2700	Approx. 25 m <sup>3</sup>
SteelPro/PolyPro27	7400	4800	2850	2000	2700	Approx. 27 m <sup>3</sup>
SteelPro/PolyPro30	7900	5300	2850	2000	2700	Approx. 30 m <sup>3</sup>
SteelPro/PolyPro36	8900	6300	2850	2000	2700	Approx. 36 m <sup>3</sup>
SteelPro/PolyPro39	10900	8300	2380	2000	2700	Approx. 39 m <sup>3</sup>
SteelPro/PolyPro42	9900	7300	2850	2000	2700	Approx. 42 m <sup>3</sup>
SteelPro/PolyPro45	11900	9300	2380	2000	2700	Approx. 45 m <sup>3</sup>
SteelPro/PolyPro48	10900	8300	2850	2000	2700	Approx. 48 m <sup>3</sup>
SteelPro/PolyPro54	11900	9300	2850	2000	2700	Approx. 54 m <sup>3</sup>
SteelPro/PolyPro60	11900	9300	2850	2300	3000	Approx. 60 m <sup>3</sup>
SteelPro/PolyPro75	11900	9300	2850	2800	3500	Approx. 75 m <sup>3</sup>
SteelPro/PolyPro82	11900	10300	2850	2800	3500	Approx. 82 m <sup>3</sup>
SteelPro/PolyPro90	11900	11300	2850	2800	3500	Approx. 90 m <sup>3</sup>
SteelPro/PolyPro100	11900	12300	2850	2800	3500	Approx. 100 m <sup>3</sup>
Add-on Vertical mixer 9m <sup>3</sup>	+3250	+3200	+2340	+1710	+2700	Approx. 9 m <sup>3</sup>

#### Electrical data

Operating voltage 400 V (AC)

Control voltage 12 – 24 V (DC)

Power consumption Depending on the number of drive motors

Mains fuse Must be provided by the operator

#### Hydraulic supply

Unit(s) In the delivery

#### SPS control

Switching cabinet In the delivery

#### Sound level

75 dBA



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### Example : Dimensions and weights of the PolyPro54 + Dosing system

Component	Biomat		Dosing system	
	PolyPro54	Rondomat	Duplexdoser	Multimix
- Length (container) [mm]	11.900	3.040	875	2.980
- Total length [mm]	15.000		12.800	15.000
- Width [mm]	2.850	3.010	3.000	3.000
- Height (side wall) [mm]	2.000	2.200	3.500	2.130
- Total height [mm]	3.010	2.870	3.760	2.800
- Volume [m <sup>3</sup> ]	Approx. 54	Approx. 17	---	Approx. 9
- Unladen weight [kg]	Approx. 10.500	3.800	Approx. 2.100	Approx. 2.700
- Total weight [kg]	49.000	17.500	---	15.000
<b>Placement screw</b>				
- Placement pipe length [mm]	3.000			
- Diameter (inside) [mm]	456			
<b>Elevated fermenter</b>				
- Feed opening (height x width)	1.200 mm x 800 mm			

### Connection data – Power

Component	Technical data
<b>Electronics</b>	
Requirements on the control of the biogas plant	
- Profi BUS	BUS control of the control system
Requirement of the switching cabinet	Total supply current 80 A
- Sequence	Programmable parameters
<b>Hydraulics</b>	
- Hydraulic oil	HLP ISO VG 46 (DIN 51524)
- Oil pressure	180 bar
- Push-off pressure	Max. 180 bar
- Volume flow	5.221/min.
- Connections	SVK connectors
<b>Hydraulic cylinder (double action)</b>	
- Sliding floor lift [mm]	6.000
- Sliding wall lift [mm]	1 x 3.000

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	2 x 2.500		
Flat geared motor	1 x Trough auger	1 x Elevated screw conveyor	1x Placement screw
- Power	5.5 kW	5.0 kW-Ex	3.6 kW-Ex
- Rotation	45 RPM	45 RPM	45 RPM
Flange bearing			
- Upper / driving side	UCFC 216	UCfc 216	UCFC 216
- Lower / diving side	Ø 95 PU	Ø 95 PU	Ø 95 PU
Duty cycle	Max. 100% LED		




For detailed technical information see the separate handbook in the documentation folder of the machine or in chapter delivery documentation.

### Environmental conditions

Component	Technical data
Storage and transport temperature	-25 – +100°C
Function at ambient temperature	-25 – +75°C
Relative humidity (non-condensing)	Max. 100%

### Emissions and explosion protection

Explosion protection method and CE symbol	
Sound pressure level (at a distance of 1m)	< 75 dB (A)

3.8 Dangers at the feeding device

Danger points	Danger
Screw conveyor	<p>Danger of being pulled in and crushing danger via automatic start-up!</p> <ul style="list-style-type: none"> <li>• When working in the housing, turn off the main switch and Secure against re-starting.</li> </ul>
Sliding floor and sliding wall	<p>After removing the front hood there is a danger of injuries through crushing from the in and out movement of the push-off cylinder!</p> <ul style="list-style-type: none"> <li>• Never grab any moving parts in the vicinity of the push-off cylinder while it is moving in or out.</li> </ul> <p>When working inside the housing there is a danger of injuries through crushing from the automatic start-up of the system!</p> <ul style="list-style-type: none"> <li>• When working in the housing Turn off the main switch and secure against re-starting.</li> </ul>
Sliding floor	<p>When working inside the housing there is danger from stumbling!</p>
Push-off cylinder and hydraulic lines	<p>When working in the rear outside area there is the danger of getting caught up in the push-off cylinder and the hydraulic lines.</p>
Housing	<p>When climbing on the feeding device there is the danger of falling</p> <ul style="list-style-type: none"> <li>• Use the purpose built climbing aids</li> <li>• Turn off the main switch and secure against re-starting.</li> </ul>

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Hydraulic system	<p>There is the danger of injury from the discharge of pressurized hydraulic fluid in the whole area of the hydraulic system!</p> <ul style="list-style-type: none"> <li>• Wear eye protection!</li> <li>• Hydraulic connections and lines should be regularly checked for leaks and damage!</li> <li>• The Max. hydraulic pressure is 185 bar.</li> </ul>
<b>Danger points</b>	<b>Danger</b>
Rondomat – Output blades	<p>Danger of being pulled in and crushing danger via automatic start-up of the blade!</p> <ul style="list-style-type: none"> <li>• When working in the housing turn off the main switch and secure against re-starting.</li> </ul>
MultiMix – vertical mixer	<p>After entering the container there is a danger of cutting and crushing injuries from the blades of the vertical screw conveyor!</p> <ul style="list-style-type: none"> <li>• Never climb into or grab anything when the vertical screw conveyor is running!</li> <li>• When working in the housing Turn off the main switch and secure against re-starting.</li> </ul>
Power take-off on the Rondomat and vertical mixer	<p>Never grab or climb under the feeding system when the feeding system is running.</p> <p>When carrying out installation work under the feeding system switch off at the main switch and secure against re-starting.</p>

## 4 Transport and installation

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**ATTENTION, TRANSPORT THE MACHINE ON THE MARKED ELEVATED TRANSPORTER.**

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### 4.1 Transport machine to installation location

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**USING LOW LOADER, MOBILE CRANE ETC.**

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#### 4.1.1 Means of transport

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For the transport of the machine the following transport is required:

- A crane or suitable lifting device
- Suitable cable harness
- A forklift truck
- For the accessory components a lift trolley

#### 4.1.2 Before transportation

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#### **HINT**

The exact positions of the individual components can be taken from the location plan (explosion prevention plan).

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This plan is available from the owner of the plant.

The power supply can be found:

- On the underside of the electrical cabinet, for the electrical supply.

See chapter 4.2.2.

- Precisely locate and mark the installation location.
- Define the transport route and remove possible obstacles.
- Unauthorized persons should be kept away from the transport route and installation location. Close off area.
- Check the transportation locks on the machine.

## BGE

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### 4.1.3 Machine transportation

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Any lifting of the feeding device may only be carried out with a suitable forklift truck / crane on the specifically designated points on the frame.

1. The sling system for the crane transport should be fixed to the marked suspension loops. Pay attention that the sling system does not run over the protective grille or any other attachments. Use at least one crane trolley for both the forward and rear suspension loops.
2. Lift the machine carefully and only by a small amount. Pay attention to the centre of gravity! When necessary set the rope lengths so that the machine is just hanging from the crane.
3. Transport the machine as close as possible to the ground over the installation location.
4. Lower the machine slowly and carefully.

A flat horizontal installation surface such as an appropriate foundation is a prerequisite for trouble free operation of the feeding device.

An opening of 1200 mm x 800 mm is required in the container wall for mounting the feeding device. Apart from this a size of outer insulation measuring 1700 mm x 1400 mm must be removed.



#### HINT

Please help to relieve the burden on our environment.

The packaging material of the machine fully reusable.

---

### 4.2 Installing and assembling the machine

---

Please leave the inspection, approval and assembly to customer service of Fliegl Agrartechnik GmbH.

## BGE

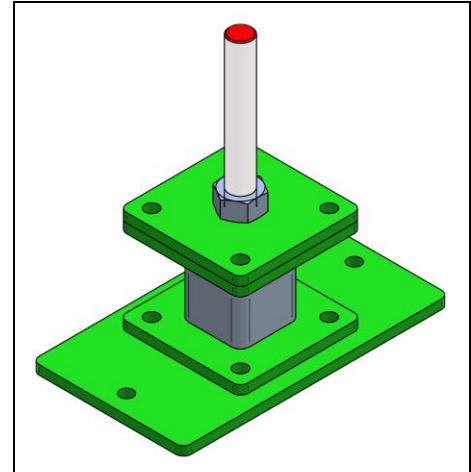
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### 4.2.1 Erection, support feet

---

The machine must be erected to be level in both directions. Adjustable automatic leveling elements are mounted on the under-frame of the machine for this purpose.

The number is dependent on the version of the feeding device.



1. Set out all components relative to each other according to the location plan.
2. Place a machine spirit level on the under-frame of the machine.
3. Loosen all locking nuts on all automatic leveling elements.
4. Set the height on the hexagonal nut.
5. Turn in a clockwise direction: higher.
6. Turn in an anti-clockwise direction: lower:
7. Turn the machine spirit level by 90°.
8. Set up the machine level in this direction.
9. Turn the machine spirit level by 90° again. Check for levelness and correct where necessary.
10. When the assembly is completely level in both directions, fasten the locking nuts.

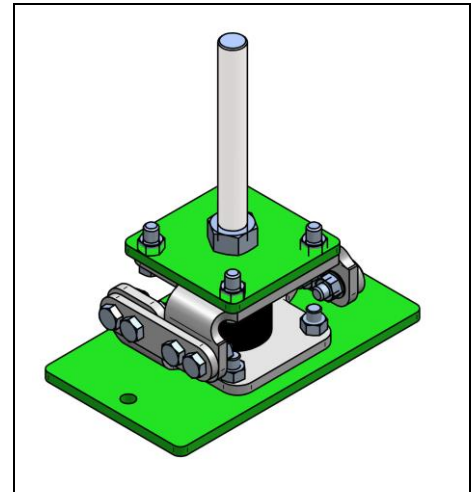
## BGE

---

### 4.2.1.1 *Optional support feet with weighing cells*

Mounting and setting up as in chapter 5.2.1.

The number is dependent on the version of the feeding device.



### 4.2.2 **Assembly**

---

The machine is partly assembled from the manufacturer and delivered in a partially assembled condition. Final assembly on location.

### 4.3 **Supply and installation**

---



**THE ELECTRICAL SUPPLY FOR THE PLANT MUST BE INSTALLED ON SITE, THE CONNECTIONS MUST BE SET UP BY A SPECIALIST.**

---

#### 4.3.1 **Make electrical connections**

---

The electrical connections are made in the switch box.

Connections must conform to the applicable standards and guidelines at the installation location and according to the wiring schematic. Voltage and current requirements see chapter Technical Data.

#### **Procedure**

---

1. Feed the supply cables through the screw connections on the underside of the electrical cabinet.



## BGE

---

2. Connect the supply cables to the marked terminal strips in the electrical cabinet.
3. Check the power supply.

### 4.3.2 Connection of the components

---

#### Electrical connections

---

- The connections must be made according to the wiring schematic.
- Do not create any problems with loosely fitted cables.
- Protect the cables from damage.

#### Hydraulic connections

---

The hydraulic power unit is in the scope of the delivery.

The electrical supply is made by means of the electrical cabinet delivered with the charging equipment.

#### Procedure

---

1. Connect Both SVK plugs of the containers with both SVK sockets at the hydraulic power unit, the connections should snap into place.
2. Connect the supply cables to the marked terminal strips in the electrical cabinet, see circuit diagram.
3. Check the power supply.

## 5 Commissioning



**COMMISSIONING SHOULD TAKE PLACE IN THE PRESENCE OF AN INSTALLER OF FLIEGL AGRARTECHNIK GMBH OR THEIR CUSTOMER SERVICE.**

### 5.1 Initial commissioning

#### ***“Safety-oriented” starting up of the biogas plant***

Fill the fermenter with raw liquid manure (min. 60% of the working volume) Heat up the fermenter to the intended working temperature.

After reaching the target temperature inoculate the medium by adding the fermenter contents of an active biogas plant (approx. 20% of the working volume). The material should originate from a plant with a similar operating mode or substrate composition.

The first substrate addition should significantly exceeding the methane concentration of 50% in the produced biogas. The feed should correspond to the planned substrate mixture from the beginning.



Increasing the volumetric loading based on the starting directions, but under continual control of the process data.

Guideline: Increase the volumetric loading by 0.3 to 0.4 [kg oTS/m<sup>3</sup>\*d] per week; the tendency should be to reduce the growth rate with increasing volumetric loading.

#### **Possible dangers, emissions and error sources when commissioning a bioas plant:**

Prior to the first filling of the fermenter all work on this and the associated pipelines should be completed to prevent potential damage.

A more precise knowledge of the loading on the plant requires a correct weighing of the feed material. This is of great importance for the start up operation as well as for the continuous process control.

The lack of regular chemical analysis of the feed material and in particular the fermentation mixture can be risky for a secure and quick start-up.

To fast (impatient) increase of the volumetric loading can drastically overload the process in the build up of the fermentation biology phase; in this way the duration of the start-up can be severely delayed.

Low emissions start-up: Proportionally filled containers can lead to the uncontrolled escape of biogas. It should therefore be noted during filling, it must be ensured that at a corresponding filling level, the substrate feeding technology is completely immersed in the liquid phase.

During the start-up of the plant, because of the increase in the proportion of methane in the biogas, there is a transitional explosive gas mixture present (of approx. 4 – 17 % vol CH<sub>4</sub>). □ A smaller proportion of the gas compartment in the container volume would be an advantage.

*Warning of injury to people, materials and environmental damage!*

Please make sure that prior to the initial commissioning all foreign bodies (tools, metal objects etc.) have been removed from the fermenter.

Prior to the initial commissioning the manufacturer of the ready-to-use machine should attach the the European CE standard marks and issue the declaration of conformity. The manufacturer is responsible that all relevant EC directives have been conformed with.

**ATTENTION THE FERMENTER MUST BE GAS-TIGHT**

---

Filling the fermenter with starting solution e.g. cow manure.

For the initial commissioning, the following operations are necessary.

- Check the setting-up.  
See chapter 4.2.1.
- Check the power supply.  
See chapter 4.2.2.
- Fill or check auxiliary and operating materials.  
See chapter 9.2 and 9.4.
- Turn on machine.  
See chapter 0.
- Check safety installations.  
See chapter 9.2.1.
- Perform a trial run.  
See chapter 6.2

**HINT**

The controls may only be operated by persons authorized or engaged under instruction from Fliegl Agrartechnik GmbH.

- The timer (time regulator) should be adjusted for the rest time of the feeding cycle of the filling material and the operating conditions of the biogas plant.
- Considerable danger may arise from adjusting any other parameters!
- Not observing this may invalidate any warranty claim.

For details on how to adjust the timing of the push-off cycle see the operating instructions for the switching box. The capacity of the feeding device is constructed by default for a daily filling.

- The timer (time regulator) for the rest time of the feeding cycle can be adjusted at the controls of the control box. This setting is dependent of the power level and size of the biogas plant.

For putting into operation using the controls see separate manual. This can be found in the documentation folder in the switch cabinet of the machine.

---

**5.2 Restart**

---

After a long term break e.g. cleaning the fermenter, the same procedure as used for the initial start-up is required. See chapter 5.1.

## 6 Setup and Preparation



### ATTENTION

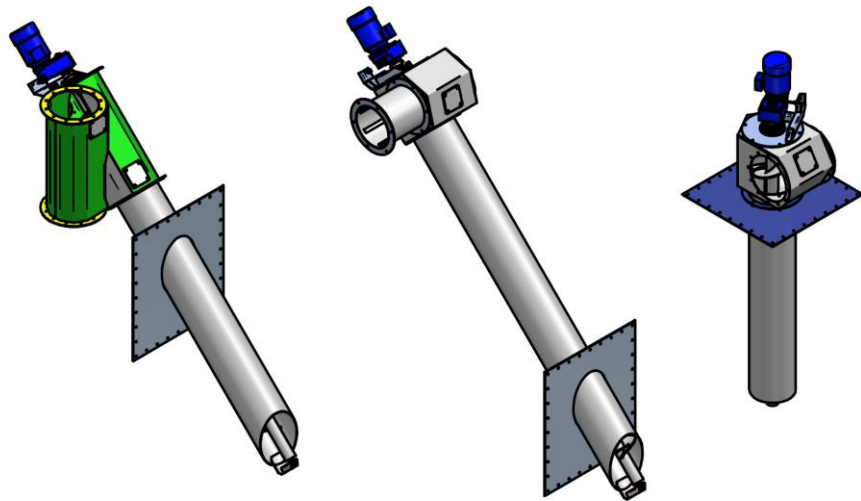
The machine can be equipped with different components.

- Height extension panels
- Central lubricating station for the bearing
- Weighing electronics with different displays
- Roof structure for the Biomat



**THE COMPONENTS CAN BE INDIVIDUALLY COMBINED, PLEASE ASK FOR DETAILS.**

### 6.1 Placement screw



*Figure 6: Placement screw models*

### Objective

Bringing the substrate into the biogas fermenter.

## BGE

---

### Prerequisites

---

- Fermenter is operational.
- Placement screw has been mounted gas tight.
- Feeding equipment is operational.

## 6.2 Perform a trial run

---

A trial run should be performed after setup and preparation and before beginning production.

### Objective

---

The correct setup of the machine should be checked.

### Prerequisites

---

- Machine is operational.
- Machine is fully equipped.
- The correct filling substrate is available.

### Procedure

---

1. Turn on the machine.
2. For further settings see the operating instruction display in the control cabinet.

## 7 Control and Display Elements



### ATTENTION

#### 7.1 Position of the control and display elements

The switching cabinet is mostly on the front side of the plant, outside the explosion hazard area.

**Error! Reference source not found** provides an overview of the important control and display elements and shows their installation locations on the machine.

A detailed description of the individual control and display elements can be found in the switching cabinet attachment.

See illustrations fig 8 and fig 9.

##### 7.1.1 Mains isolation

Turn the electrical power supply for the machine on or off. In position 0 the mains isolation can be locked with a separate padlock.

- Position 0 (off): Power supply off
- Position 1 (on): Power supply on



*Figure 7: Mains isolation*

## BGE

### 7.1.2 Malfunction list with regard to control

Display:		Possible cause:	Action
Collective fault	Will always display a fault	A fault consists of	Fault under display read alarm
Fault Placement screw	Motor circuit breaker has triggered	Screw stuck / electric motor defective	Switch-on circuit breaker, check motor!
Fault right feed	Motor circuit breaker has triggered	Screw stuck / electric motor defective	Switch-on circuit breaker, check motor!
Fault feed-feed right	Motor circuit breaker has triggered	Screw stuck / electric motor defective	Switch-on circuit breaker, check motor!
Fault elevated screw conveyor	Motor circuit breaker has triggered	Screw stuck / electric motor defective	Switch-on circuit breaker, check motor!
Fault trough auger	Motor circuit breaker has triggered	Screw stuck / electric motor defective	Switch-on circuit breaker, check motor!
Fault metering screw1-6	Motor circuit breaker has triggered	Screw stuck / electric motor defective	Switch-on circuit breaker, check motor!
Fault hydraulic unit	Motor circuit breaker has triggered	Screw stuck / electric motor defective	Switch-on circuit breaker, check motor!
Fault Sicherung Ventile	Fuse Q.. has triggered	Short-circuit – hydraulic solenoid or	Check solenoid or change plug, check for moisture
		valve plug defective	
Fault mixer I	Motor circuit breaker has triggered	Motor running slow	Check material, foreign bodies (paving stones/tyres)
Fault mixer II	Motor circuit breaker has triggered	Motor running slow	Check material, foreign bodies (paving stones/tyres)
Fault switch-off after time	Feeding through timer (dosing time has	Dosing time set too short	Increase dosing time
	switched off.)		
Fault mixer motor FC	Fault frequency converter	Power failure / overload etc.	Faulty code in the instructions, read FC!
Faulty CAN Master	Faulty touch panel		Contact Fliegl Service
Faulty CAN FC mixer	Faulty connection FC to CAN Master	Faulty patch cable / plug connection	Check patch cable
Fault switch-off after time	Timer dosing time has interrupted feeding	Dosing time set too short	Increase dosing time
Fault Phoenix	Faulty Phoenix SPS	Faulty Phoenix SPS or connection	Contact Fliegl Service
Fault emergency stop		Emergency stop button pressed	Unlock emergency stop

***For further details see Description of the Control System in the equipments switching cabinet.***



## 8 Control and Operation

---



### ATTENTION

---

#### ***Warning of injury to people, materials and environmental damage!***

Only trained personnel are allowed to use the controls.

Poisons, inflammable or explosive gases can escape from the fermenter.

Smoking and the use of naked flames is forbidden.

#### **Fisk of damage to the feeding device.**

Do not run the feeding device during filling or emptying.

Listen for unusual noises during operation (e.g. insufficient lubrication, loose parts or damage to the motor, bearings or shafts etc.).



### 8.1 Switch the machine on and off

---



### IMPORTANT

---

#### 8.1.1 Before switching on

---



- Clear all unauthorized persons away from the machine.
- Carry out a visual check of the entire machine and tools.
- Check the lubrication and process materials.
- Unlock all devices for the emergency stop (EMERGENCY – HALT button).

## BGE

---

### 8.1.2 Turn on machine

---

1. Switch on the MAINS ISOLATOR (main switch).
2. Press the weight indicator in the main switching cabinet to "OK" turn on the control. Also press the OPERATION ON button on the switching cabinet.
3. Switch on the clearance for start-up. Also press the button on the switching cabinet for the display to ON.
4. The clearance for start-up is on, the indicator OPERATE lights-up.

### 8.1.3 Switch off the machine

---

1. Stop the feed of the substrate or
2. the machine is in the starting position or
3. drive the machine into the starting position manually.
4. Switch off the display off. Turn the switch display on the switching cabinet to OFF.
5. Switch off the control. Turn the main switch in the switching cabinet to the OFF position. The control voltage is switched off, the indicator OPERATE is no longer lit.
6. Switch off the MAINS ISOLATOR.  
→ The machine is switched off.

## 8.2 Emergency procedure

---

Emergency procedure comprises individual or combinations of events:

- Emergency still-stand
- Emergency switch-off
- Emergency switch-on

### 8.2.1 Emergency still-stand

---

An emergency procedure that is designed to stop a process or a movement that could result in risk.

Press the EMERGENCY STOP button on the control console (control cabinet).

## BGE

---

### 8.2.2 Emergency switch-on

---

An emergency procedure that is designed to switch on electrical power to a part of the plant, which is required because of the emergency situation.



#### **IMPORTANT**

Before re-starting the machine after an emergency still-stand.

- Determine the reason for the emergency still-stand
  - Eliminate risks.
- 

1. Remove all obstacles from the machine.
2. Make sure once more that all risks have been eliminated.
3. Check the tools. Tool that were actively in use at the time of the emergency still-stand may have been damaged.
4. Unlock the active device for the emergency still-stand, depending on the version with
5. a quarter turn clockwise on the push-button and
6. then pull the push-button up.
7. Select MANUAL OPERATION.
8. Drive the machine into the starting position. Also press the STARTING POSITION button on the control console.  
→ You may now continue with the normal operational procedure.

## 8.3 Operating modes

### 8.3.1 Drive back the push-off system (hand operation)

---



#### **Risk of damage at the feeding device!**

There should not be any foreign bodies inside the blocking grid.

## BGE

The sliding floor and the sliding wall can be manually driven backwards and forwards together.

- Turn the lever (Hand – O – Auto) to “Hand”.
- Touch display “hand operation” => see “Overview visualization”
- Turn off automatic operation at the switching cabinet (manual operation).
- Drive the sliding floor and sliding wall fully to the starting position.

### 8.3.2 Automatic

The automatic operation allows automatic substrate feeding over time or optional weight control.



#### ATTENTION

Please read the operating instructions for the setting at the console, this can be found in the switching cabinet of the equipment.

#### Prerequisites for operation

- Machine active
- Machine in starting position
- No error message

### 8.3.3 Electrically controlled monitoring variations

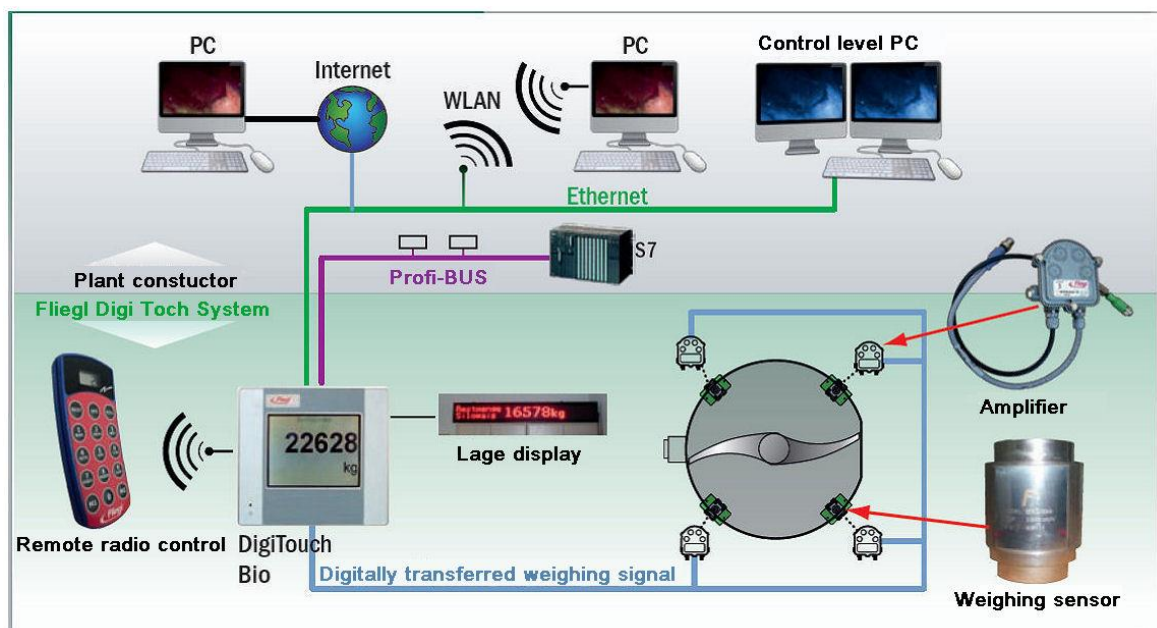


Figure 8: Controlled monitoring possibilities

BGE

---

8.3.3.1 *Display types*



## **9 Maintenance and Service**

---



### **IMPORTANT**

---

In the following information can be found about troubleshooting and maintenance of the machine. Regular maintenance following the maintenance plan is an indispensable prerequisite for efficient running of the machine.

- Chapter 9.5 describes this.
- Chapter 9.3 contains details of all work to be carried out and the maintenance cycles.
- Chapter 9.4 describes, how the individual maintenance work is carried out.
- Chapter 9.6 provides and overview about all auxiliary and raw materials.

### **9.1 Customer Service**

---

Fliegl Agrartechnik GmbH.  
Söderbergstraße 5  
84513 Töging a. Inn, Germany  
Tel.: +49 (0)8631 307 242  
Fax +49 (0)8631 307 552  
Email: [biogas@fliegl.com](mailto:biogas@fliegl.com)

### **9.2 Operational maintenance**

---

Operational maintenance helps to ensure a smooth and efficient operation during production. The operating personnel can carry out this work after receiving appropriate instructions.

## BGE

Maintenance work	Interval	Comments
Change hydraulic oil.	After the first 50 hours operation. Following this, yearly.	Hydraulic oil is special waste and should be disposed of correctly.
Suction filter in hydraulic power unit.	After the first 50 hours operation. Following this, yearly.	The suction filter is special waste and should be disposed of correctly.
Back flow oil filter in the hydraulic power unit.	After the first 50 hours operation. Following this, yearly.	The back flow oil filter is special waste and should be disposed of correctly.
Check hose guide for dirt.	Daily	
Check the hydraulic system for leaks	Daily	The hydraulic lines should be renewed every six years.
	After the first 10 hours of operation.	
Clean <sup>1)</sup>	Weekly	Outdoor area / drainage channel  Gap between sliding wall and front fairing, access by dismantling the front fairing.
	Pre-maintenance	
Check to make sure all screw connections are secure.	After the first 10 hours of operation.	If necessary Tighten up all loose screw connections.
	Every 50 operating hours.	
Lubricate lubrication points <sup>1)</sup>	Every 50 operating hours.	
Check seals of push-off wall and floor.	Every 100 operating hours.	
Check the slide rails from push-off wall and sliding floor.	Every 100 operating hours.	Visual examination
Check the screw conveyors for wear	Every 100 operating hours.	Visual examination
Check the oil level of the transmission <sup>2)</sup>	Every 200 operating hours.	If necessary Top up transmission oil <sup>2)</sup>

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Check the oil level of the hydraulic unit.	Every 50 operating hours.	If necessary Top up hydraulic oil.
Check the flange bearings for wear and the housing for breakage.	Every three months.	
Check the flange cover of the fermenter for leaks.	Every three months.	Using leak detection spray to find leaks and repair with "Sikaflex".
Check the retaining ring of the placement screw for wear or breaks.	Every six months.	
Check placement screw bearing.	Yearly.	If necessary during the maintenance of the fermenter.



### HINT

Some of the tasks described above are heavily dependent on use and ambient conditions.

The cycles described above are the obligatory minimums. In some cases variations on the maintenance cycles are possible.

In this case:

- Correct the entry in these operating instructions.
- Inform the operating personnel.

## 9.2.1 Check safety installations



### IMPORTANT

All appliances for the emergency still stand and protecting doors should be checked individually and separately from each other.

In the case of faulty safety installations, put machine immediately in still stand and secure against re-starting.

### 9.2.1.1 *Functional test of device for an emergency standstill.*

1. Turn on machine
2. Operate device for an emergency standstill.



## BGE

---

- Operating the device for an emergency standstill must result in switching off certain machine functions:
- Clearance for start
  - Motors and pumps
  - Pneumatically operated parts

### 9.2.1.2 Check the limit switch monitoring

1. Turn on machine.
2. Operated the limit switch manually.
  - The valve travels to the start position.
    - Clearance for start
    - Motors
    - Pneumatically operated parts

### 9.2.2 Check display elements

---

1. Check the lamps on the switching cabinet.
  - All indicator lamps on the switching cabinet and on the control panel must light up.

### 9.2.3 Check monitoring devices

---

The following monitoring devices have an influence on the correct working of the controller and so should be regularly checked.

***Optional devices, see operating instructions in switching cabinet.***

### 9.2.4 Machine cleaning

---



#### **Caution!**

When cleaning the feeding device there is the danger of damaging the paintwork.

Only clean the feeding device with water jets (not steam jets).

#### **Procedure**

---

1. Switch off the machine.
2. Clean the equipment using just water!

## BGE

---

3. Only clean the feeding device with water jets (not steam jets).

---



### HINT

Some of the tasks described above are heavily dependent on use and ambient conditions.

The cycles described above are the obligatory minimums. In some cases variations on the maintenance cycles are possible.

---

In this case:

- Correct the entry in these operating instructions.
- Inform the operating personnel.

## 9.3 Maintenance plan

---



### IMPORTANT

Carry out maintenance work following the table below and then enter the noted time interval in it.

---

## 9.4 Carrying out maintenance work

---



### IMPORTANT

## 9.5 Troubleshooting and fault clearance

---

The following summary gives information about faults, their causes and correction.

- Inform qualified service personnel.
- where necessary notify the customer service of the manufacturer.



**ATTENTION**

**9.5.1 Faults and troubleshooting**

<b>Faults</b>	<b>Possible cause</b>	<b>Action</b>
Delivery rate is too low.	Push, pause time incorrectly set.	Contact customer service of Fliegl Agrartechnik GmbH.
	Screw conveyor is hindered or blocked by foreign bodies (e.g. wood, stones, tyres etc.).	Remove foreign body.
	Hydraulic pressure is too low.	Check hydraulic system and if necessary repair or get it repaired.
	Meter or conveyor screws are worn or damaged.	Repair.
Hydraulic motor, drive or bearings getting too hot.	Internal fault.	Get help from Fliegl Agrartechnik GmbH, a specialized company or your handler.
Drive loses oil out of the bleed screw (during operation).	Fill level too high.	Reduce fill level.
	Pressure fan defective.	Change the pressure fan screw, if necessary top up lubricant.
Drive loses oil through the seals (during operation).	Hardening of the seals due to too longer storage time.	Clean the area and re-check for leaks after some days. If the leakage persists, get help from Fliegl Agrartechnik GmbH, a specialized company or your handler.

## BGE

	Seals damaged or worn.	Get help from customer service Fliegl Agrartechnik GmbH, a specialized company or your handler.
The motor circuit-breaker of the placement screw continually cuts out.	Material accumulation underneath the placement screw.	Increase the running time of the agitator, or if necessary clear the accumulation with an external agitator.
The flange bearing of the placement screw rises and lowers.		
<b>Fault</b>	<b>Possible cause</b>	<b>Action</b>
The hydraulic power units motor is running, but creates no pressure.	Hydraulic cylinder leaking.	Disconnect the hydraulic lines on the SVK connectors and turn on the plant.
	Defective control / actuation of the 4/3 way valve.	If the actuation cable diodes do not light, get help from customer service, Fliegl Agrartechnik GmbH.
	Defective magnet of the 4/3 way valve.	Drive the valve forwards and backwards by hand, if necessary change the plug of the magnetic valve, finally get help from customer service, Fliegl Agrartechnik GmbH.
	Hydraulic screw connection inside the tank loose / leaking.	Unscrew hydraulic tank, partially lift the cover, make a short test run, (the pump must be immersed in the hydraulic oil), tighten up the screws.
	Push, pause time set too short, the pusher does not push forward enough, because the	Get help from customer service, Fliegl Agrartechnik GmbH.

## BGE

	running time is too short.	
The hydraulic power units motor groans and creates too little or no pressure.	Oil suction pump and return filter dirty.	Clean the oil suction pump and return filter with petrol or replace if needed.
	Faulty pump.	Get help from customer service, Fliegl Agrartechnik GmbH, a specialized company or your handler.
No Function.	Limit switch misaligned or possibly broken.	Adjust the limit switch and using magnets test if the the diode lights up. If necessary get help from customer service, Fliegl Agrartechnik GmbH, a specialized company or your handler.
	Motor protection has triggered, plant goes into fault mode.	Operate the motor protection of the faulty auger at intervals, search for the cause of the error. Put the plant back into operation. In the case of repeated triggering get help from customer service, Fliegl Agrartechnik GmbH.

### 9.5.2 CONTROL ON not possible

The control cannot be switched on.

Possible cause	Remedy
Supply voltage not present.	Find the reason for the missing supply voltage.  Establish supply voltage.
Motor circuit-breaker or fuse has triggered.  Faulty motor.	Find cause of the problem.  Eliminate fault.

## BGE

Mechanical blockage. Faulty cable.	Turn-on Motor circuit-breaker or fuse.
Fault in control system.	Inform the customer service of the manufacturer.  Consult with electronic control technology specialists.

### 9.5.3 START ON not possible

The free to start cannot be switched on.

Possible cause	Remedy
Command device for emergency standstill has been pressed.	Find out the cause of the triggering of the device for an emergency standstill.  Eliminate risks.  Unlock the device for an emergency standstill. See chapter 8.2.2.
Protection or service door open.	Close door.  Check safety switches.
Fault in control system.	Inform the customer service of the manufacturer.  Consult with electronic control technology specialists.

## BGE

### 9.5.4 Automatic start not possible

The machine cannot be started in automatic mode.

Possible cause	Remedy
Control not switched on.	Switch on control.
Start not switched on.	Turn on clear to start.
Machine not in starting position.	Put machine in starting position.
Machine not in operation start AUTOMATIC.	Switch selector switch AUTOMATIC to position 1.

### 9.6 Auxiliary and operating materials

Components	Operating materials / lubricants
General lubrication locations.	Lubricating grease DIN 51 825-1 to 4 (e.g. SM11 K2E-20, L 71V, FAG, ISO VG 100 or biodegradable grease CEC Test L-33 T-33)
Flange bearing	Standard grease for bearing ISO VG 100 (-30 - +140°C)
Transmission	Mineral oil ISO VG220
Hydraulics	Hydraulic oil HLP ISO VG 46 (DIN 51524)

### 9.7 Change the lower bearing of the placement screw (option)



Warning of personal injuries!

Remove the pit or inspection cover, or the entrance to the fermenter on the feeding device, always immediately before starting any installation or maintenance work.

Close the pit or inspection cover, or the entrance to the fermenter immediately after finishing any installation or maintenance work.

The pit must be emptied, aired and cleaned.

## BGE

*Always use the required personal protective equipment when working in the pit (see German regulations on health and safety at work BetrSichV)!*



## Procedure

1. The fermenter must be empty, void of gas and well aired.
2. Move the push-off system back (see section moving back the push-off system (manual operation)), turn off the feeding device and empty the housing.
3. Demount the placement screw upwards, lift by about 500 mm and secure, unscrew the lower placement screw bearing from the console and remove downwards.
4. Reassemble the screw conveyor.

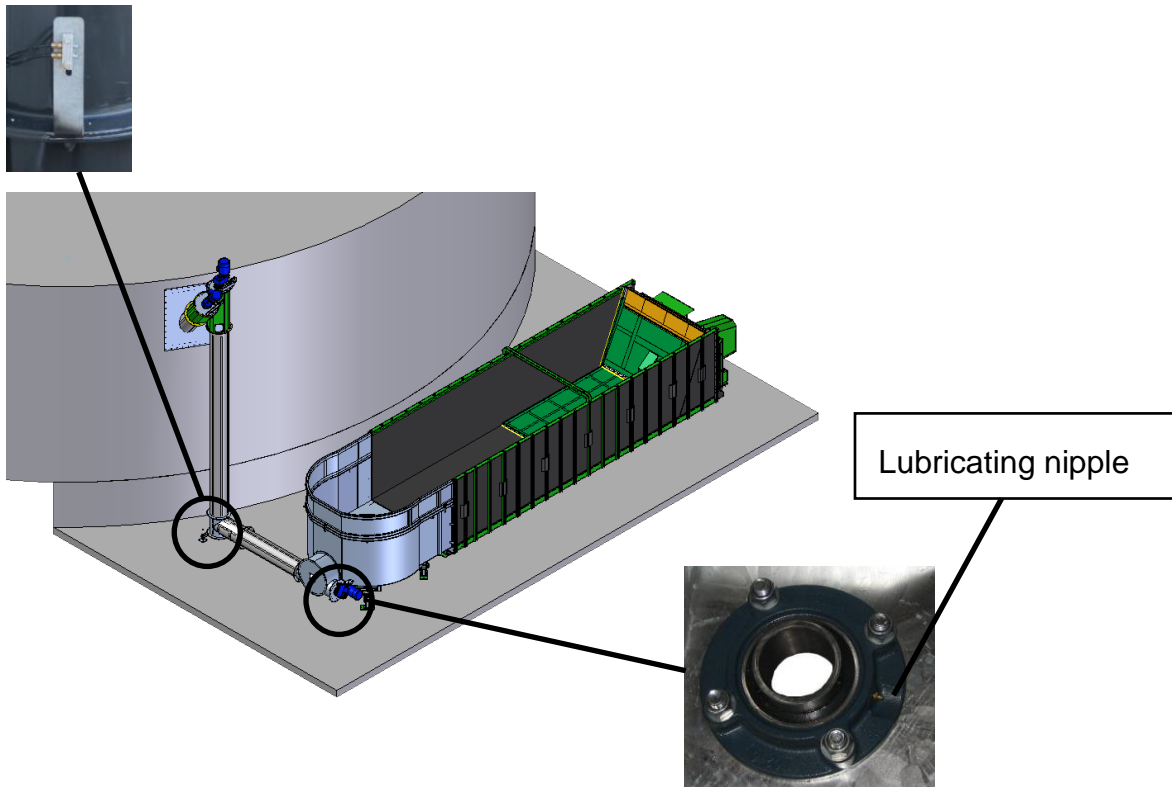
## 9.8 Lubrication locations with lubricating nipple





## BGE

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### 9.9 Maintenance instructions

---

**Rondomat planetary gear:** We recommend changing the transmission oil initially after six months, and then about every two years. Oil filler hole, oil level etc. Use the instruction sketch on the underside of the cap. 10.2.

**Hydraulic power unit:** Here we recommend to initially change the oil after six months. With each oil change the suction and return filters should also be renewed.

**Rondomat discharge blade:** Please tighten the 12 mounting screws on the output blade on a regular basis, consequential damages caused by loosening or moving screws can be avoided.

## BGE

---

### 9.10 Change the feeding pipe

---



Warning of personal injury and property damage!

Changing of the feeding pipe may only be exclusively carried out by Fliegl Agrartechnik GmbH.

Not observing this may invalidate any warranty claim. The fermenter pit must be emptied, aired and cleaned.

Please note, when working in the pit all respective accident prevention regulations must be observed and the necessary personal protective equipment used (see also the operating instructions of the biogas plant)!

### 9.11 Change the placement screw

---



Warning of personal injury and material damage!

Changing of the placement screw may only be exclusively carried out by a specialized company or by Fliegl Agrartechnik GmbH.

Not observing this may invalidate any warranty claim. The fermenter pit must be emptied, aired and cleaned.

Please note, when working in the fermentation pit all respective accident prevention regulations must be observed and the necessary personal protective equipment used (see also the operating instructions of the biogas plant)!

The placement screw may be changed together with the flange bearing, the gear motor and the lower bearing.



***Explosion danger due to escape of methane gas!***

Using leak detection spray to find leaks in the container opening and if necessary repair the seals.

**9.12 Tightening torque for screws in Nm**

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Thread	Torque		
	8.8	10.9	12.9
M8	25	36	43
M12 <sup>1)</sup>	85	125	145
M16 <sup>1)</sup>	210	310	365
M20 <sup>1)</sup>	430	615	719
M24 <sup>1)</sup>	730	1050	1220
M30 <sup>1)</sup>	1500	2100	2550

Tightening torque for screws in Nm

<sup>1)</sup> Setscrews with a total coefficient of friction of 0.14 according to Roloff / Matek.

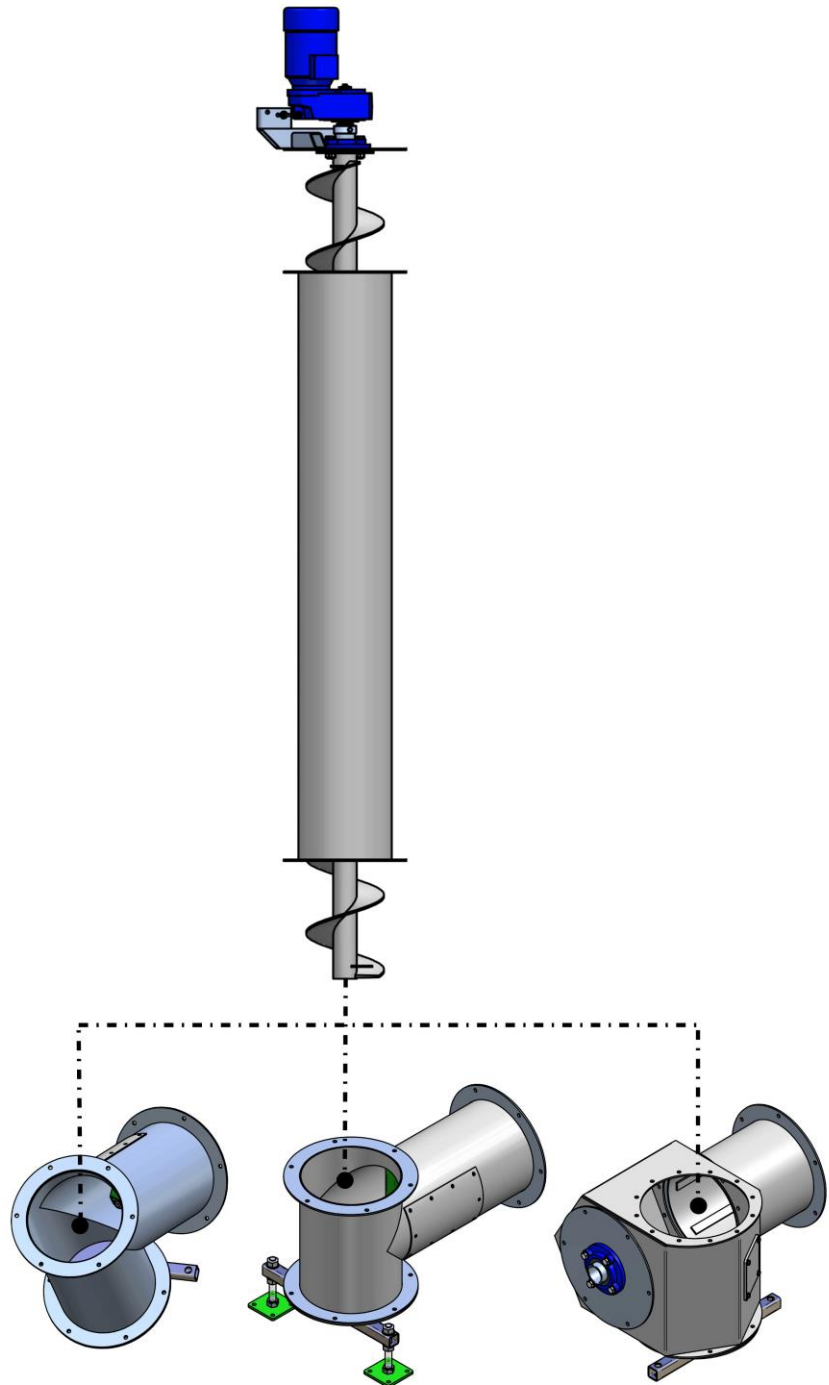
BGE

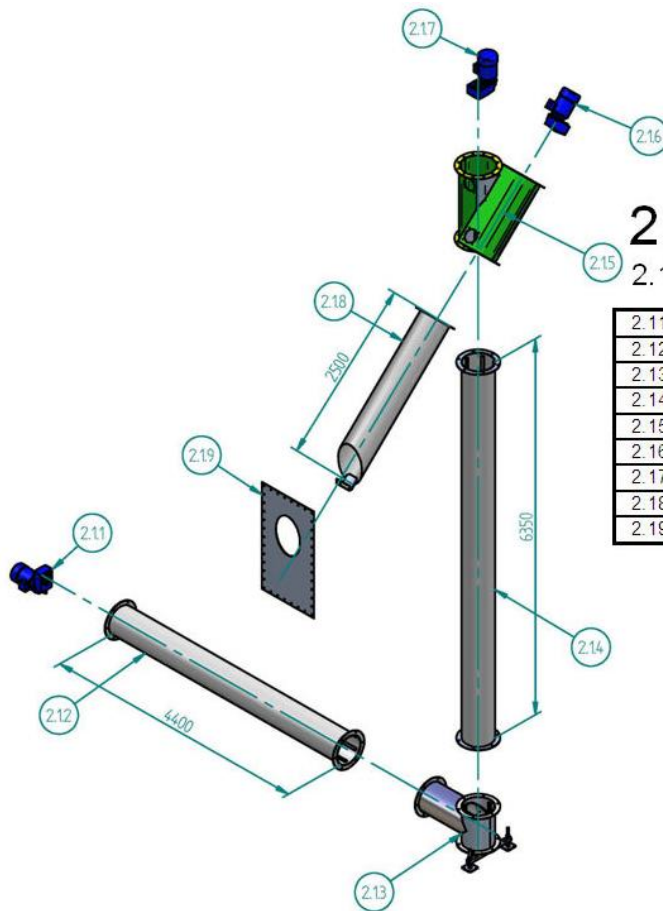
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## 10 Spare Parts

### 10.1.1 High screw conveyor

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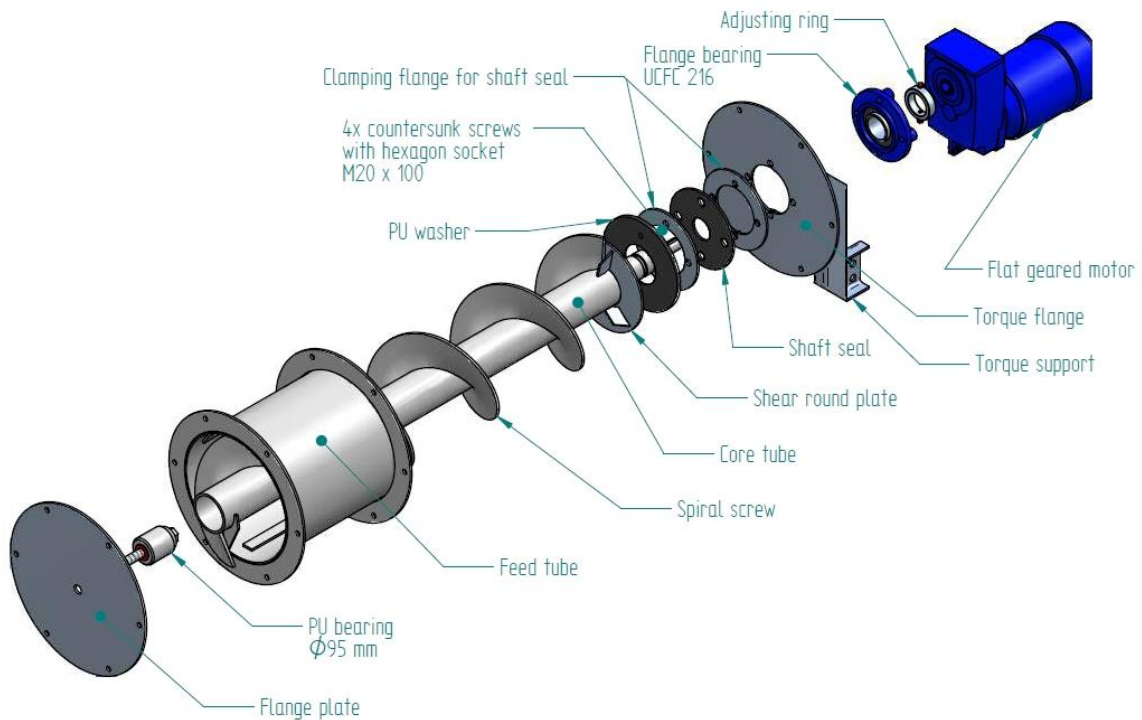




## 2. Feed system

### 2.1 Pipe connections

2.11	Flat geared motor - 5.5 kW / 36 RPM / 11.4 A / HL Ø40
2.12	Ø456 - Pipe - 4400
2.13	Stop node 90°
2.14	Ø456 - pipe - 6350
2.15	Pipe in Pipe node 45° left
2.16	Flat geared motor - 3.6 kW Ex / 45 RPM / 7.2A / HL Ø40
2.17	Flat geared motor - 6.8 kW Ex / 45 RPM / 13.5A / HL Ø60
2.18	Placement pipe 45° OEB - 2500
2.19	Opening flange AREVA

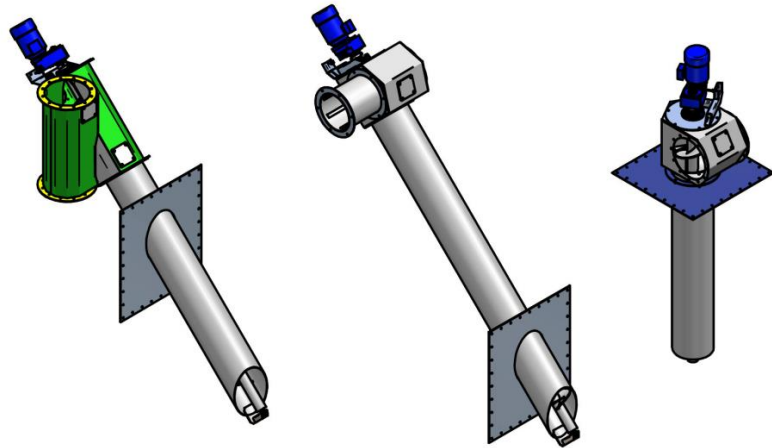


## BGE

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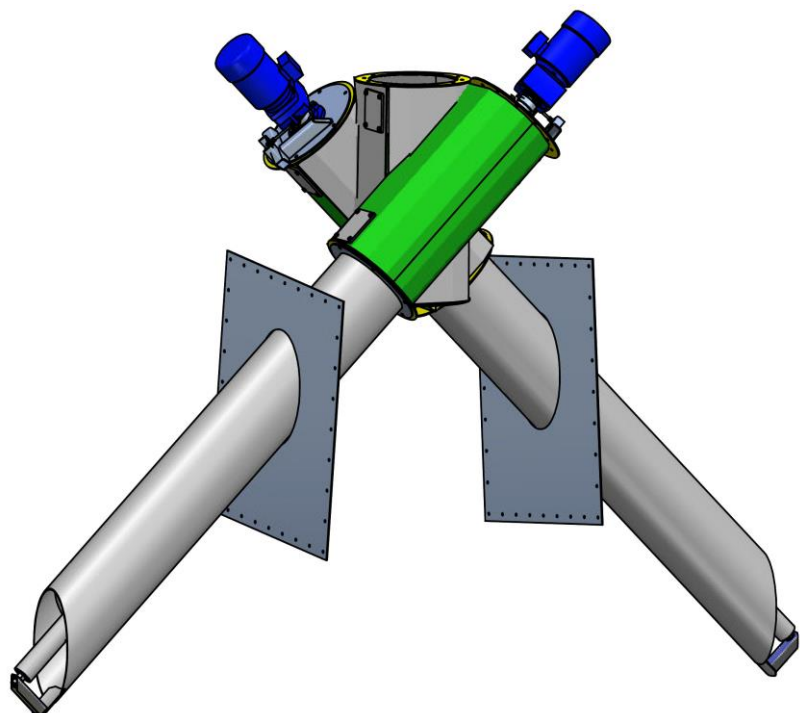
### 10.1.2 Variations of the placement screw

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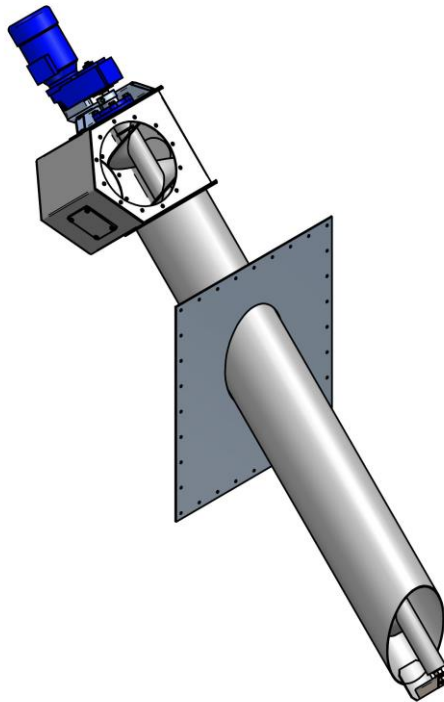
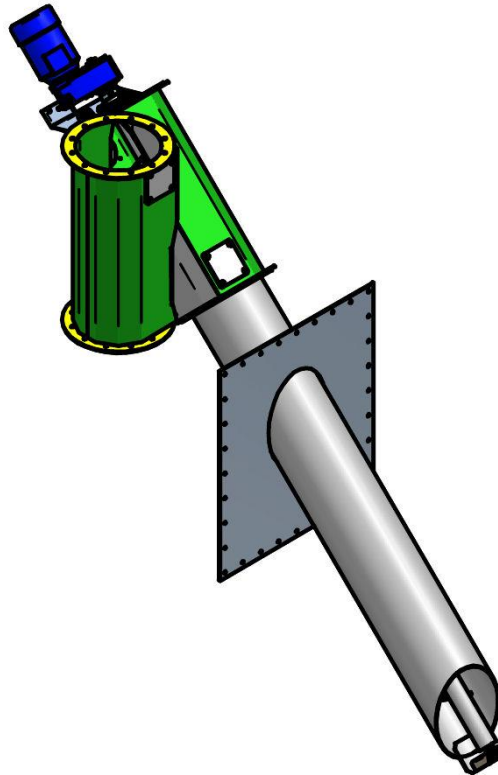
### 10.1.3 Variations of the substrate delivery nodes

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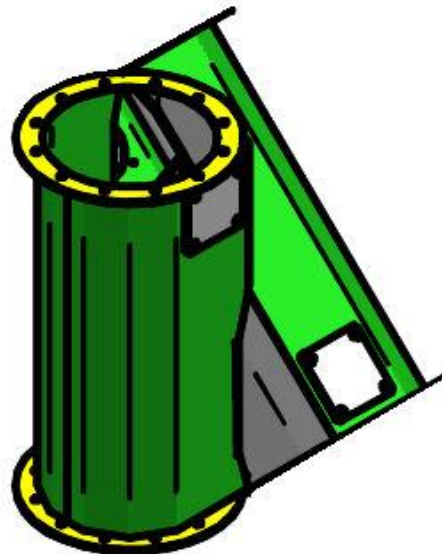
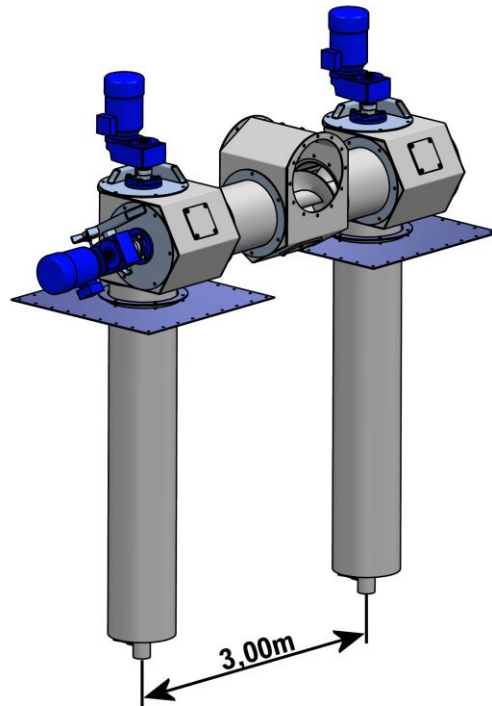
BGE

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**BGE**

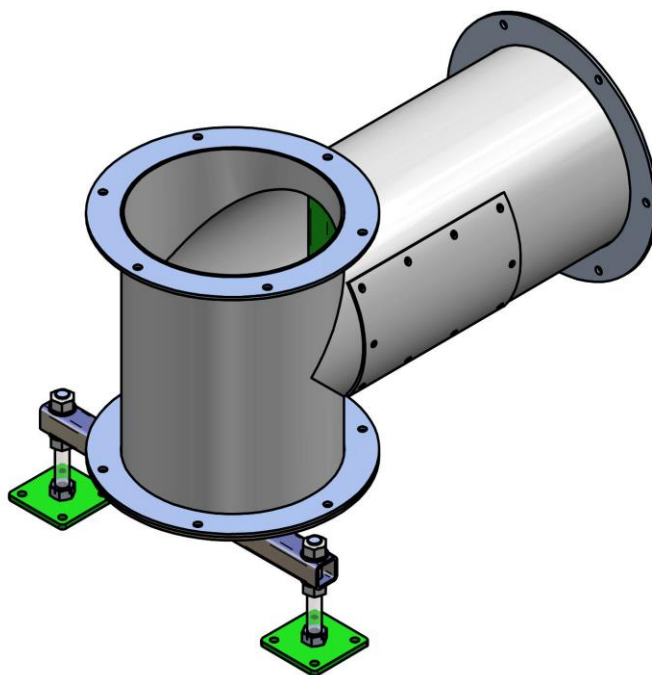
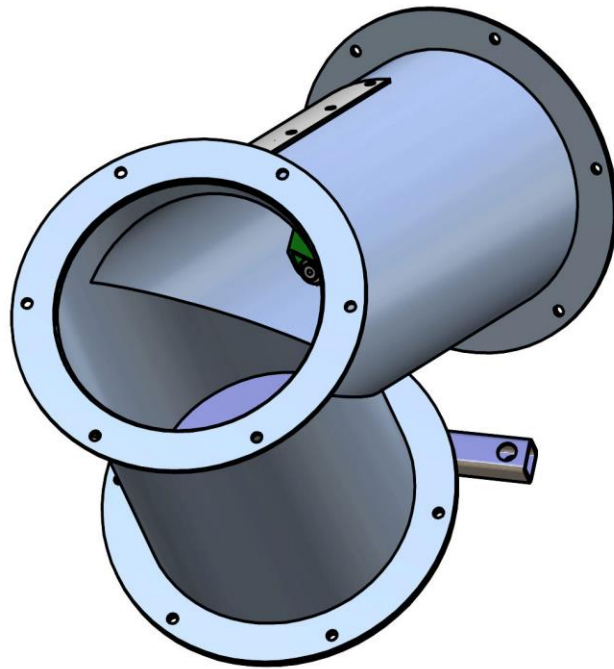
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**BGE**

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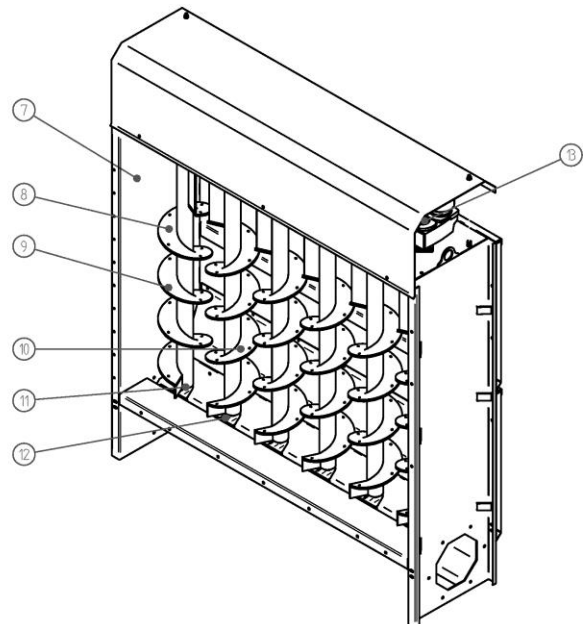
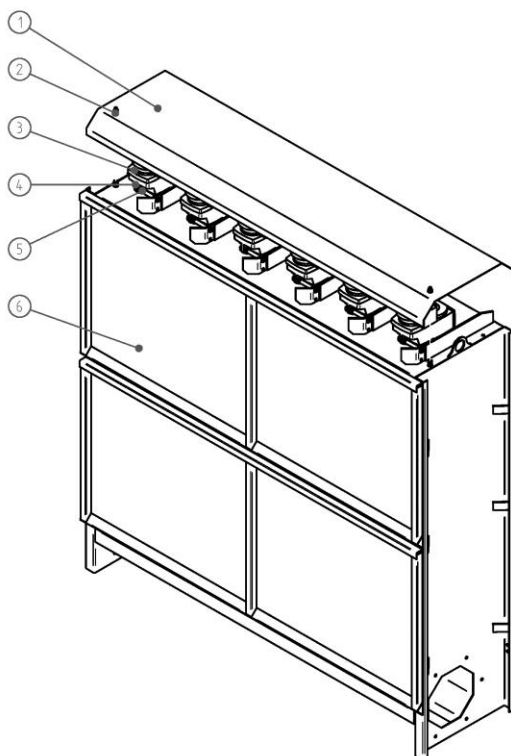
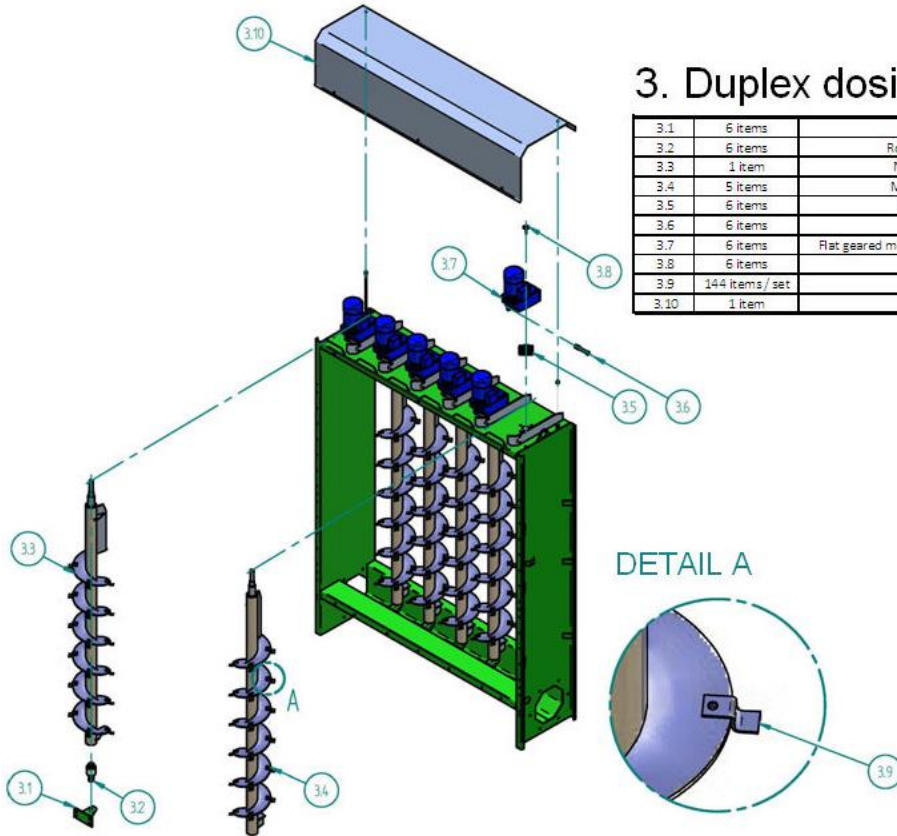


**BGE**

**10.1.4 Variations of the discharger**

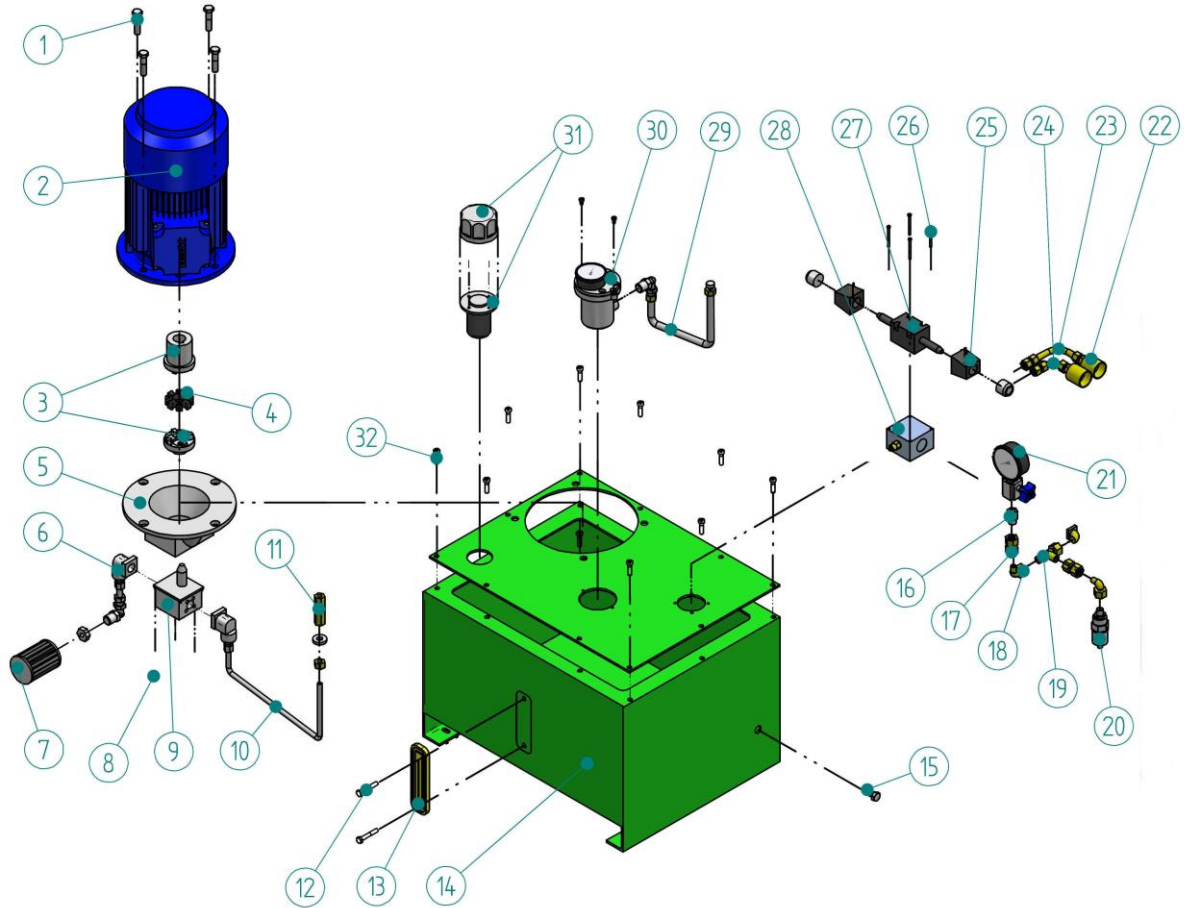
**3. Duplex dosing MEGA**

3.1	6 items	Screw on console
3.2	6 items	Roller bearing Ø95 m. screw
3.3	1 item	Metering screw Mega left
3.4	5 items	Metering screw Mega right
3.5	6 items	Flange bearing UCF210
3.6	6 items	Torque support
3.7	6 items	Flat geared motor -3.6kW / 45 RPM / 6.4A / HL Ø40
3.8	6 items	Locking screw
3.9	144 items/ set	Ripping tool
3.10	1 item	Roof duplex dosing



**BGE**

**10.1.5 Hydraulic power unit(s)**



The power of the drive motors is dependent on the size of the plant.

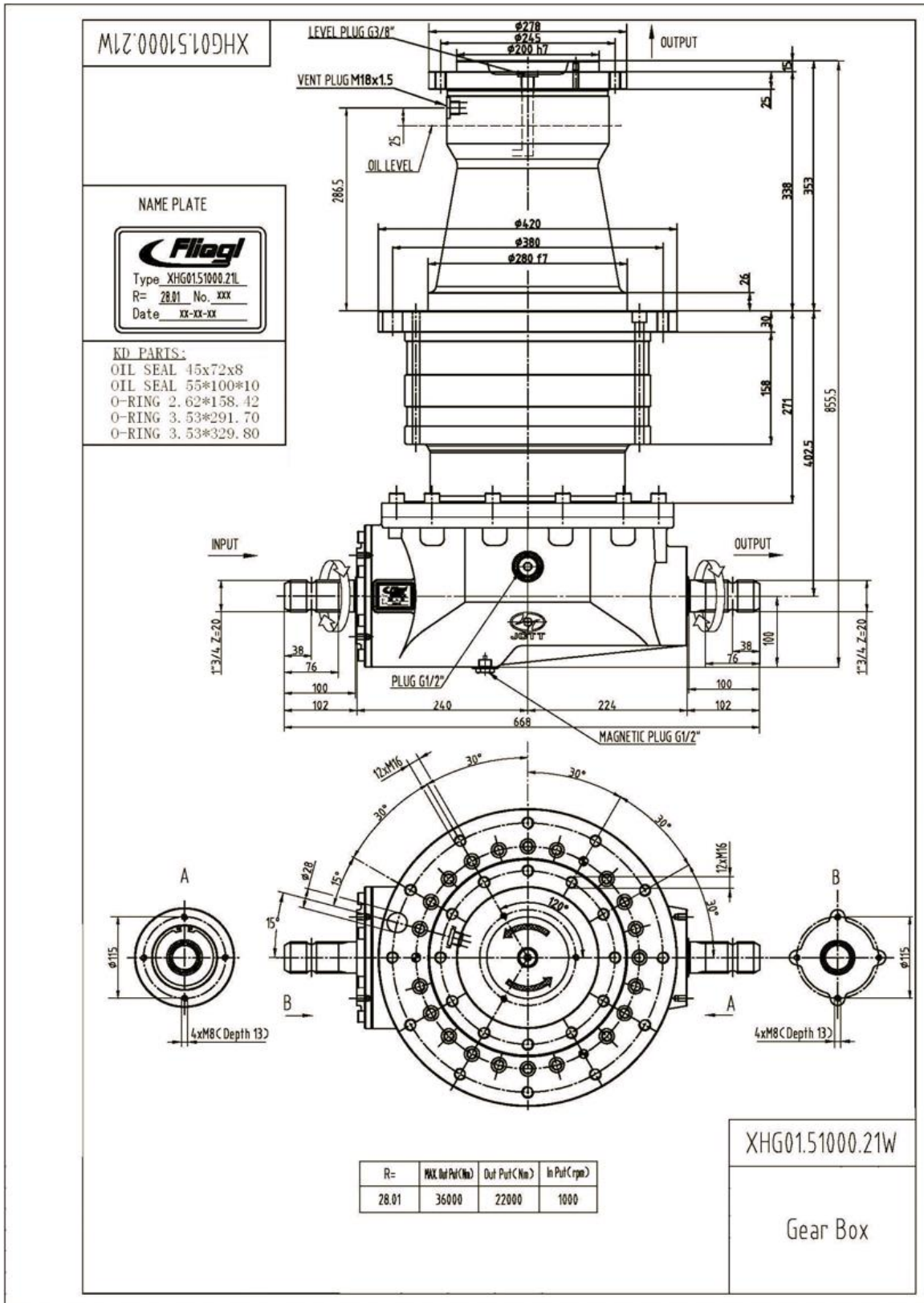
*Please provide the kW power rating of the motors when ordering!*

**BGE**

Hydraulic power unit 3 kW - 6.2 cm <sup>3</sup> - TANK 55 litre Code 900FSC006-05-02 and Fliegl part 439135					
Pos.	Fliegl P/N	Description	Order code	Number	Net price
1	-	Hexagon screw	Not provided	4	
2	Unknown	Electric motor EF100LB4B5 3kW	902EF100LB4B5	1	
3	Unknown	Complete ELASTIC COUPLING model ND11	222ND11	1	
4		(also ND65C+ND65PU1P+R-62)			
5	Unknown	Pump supports for electric motor hole Ø250	222LS250	1	
6 7	Unknown	Angle flange RIA 3/8 " in hole Ø30	222RIA30-038-M	1	
		Connecting piece M-F 3/4 GAS- 1/2 GAS	036TR05120800	1	
		Filter FI 2.15 M90	054F1215M90	1	
8	Unknown	Hexagon screw	Not provided	4	
9	439198	Pump OT100 P65 D/B 18 P1 with 6.2 cm <sup>3</sup>	917PS1007090D	1	
10	Unknown	Angle flange RIA 3/8 " on hole Ø30	222RIA30-038-M	1	
	Unknown	Galvanized Suction pipe, diameter 12x1.5	000P84003700	1	
	Unknown	NIPPLE M/M 3/8" - 3/8"	036GI05060600	2	
	Unknown	BONDED GASKET 3/8"	000CT120320	2	
11	HZBXX	NON-RETURN VALVE V.U. 3/8	877V0600	1	
12	405781	OIL LEVEL INSPECTION GLASS + thermometer, complete with screws	041SLVT/127	1	
13	420827				
14	Unknown	55 litre TANK wiht holes for SLVT/127	222CF55-LG2	1	
		SEAL for FILLER CAP GS 55-75	222GS100-75	1	
15	420374	SCREW PLUG for tank drain	222XXXXXX	1	
		BONDED GASKET 1/2"	036CT120326	1	
16	419429	Extension M - F 1/4 G.H. 35	036PRO5040035	1	
17	419643	GCO SCREW CONNECTION	See pos. 16	1	
18	Unknown	NIPPLE M/M 1/4" - 1/4"	036GI05040400	1	
	Unknown	ADAPTOR 90° MK-F 1/4"	703AD90MKF04	1	
	Unknown	ADAPTOR 90° MK-FG-FG 1/4"	703AD90FGFG04	1	
19	414396	T-piece (not from Fer hydraulics)	Not from Fer hydraulica	1	
20	Unknown	Sensor (not from Fer hydraulics)	Not from Fer hydraulica	1	
21	Unknown	PRESSURE GUAGE MG1-INOX 63 0-250 BAR	881PE3660014LF	1	
	Unknown	PRESSURE GUAGE STOP VALVE FPE 1G 1/4 B	086FPE40000	1	
22	Unknown	SKV SOCKET (not from Fer hydraulics)	Not from Fer hydraulica	2	
23	Unknown	LARGE CONNECTION PIPE (not from Fer)	Not from Fer hydraulica	1	
24	Unknown	SMALL CONNECTION PIPE (not from Fer)	Not from Fer hydraulica	1	
25	436889	MAGNETIC COIL RPE3-06 23050 E5 BS06	111516194400	2	
26	407944	CYLINDER HEAD SCREW M4 x 50	Not provided	4	
27	419167	ELECTRONIC VALVE RPE3 06 3 C11RPE3-063C11	111515757600	1	
28	419175	GROUND PLATE with DBV P06-39-VMSB	900H551112103004	1	
29	Unknown	PIPE FOR BACK FLOW OIL FILTER Ø 12x1.5	000P84003600	1	
		SCREW CONNECTION TN92GG-12LR	464TN92GG-12LR	4	
		SCREW CONNECTION TN94-12LR-1/2"	464TN94-12LR-12	2	
30	420704	BACK FLOW FILTER AFR30R60NR	222AFR30R60NR	1	
		PRESSURE GUAGE Axial 1/8"	222PV1	1	
31	420588	FILLING and VENT STOPPER with FILTER	222TR-2	1	
32	408687	CYLINDER HEAD SCREW M8 x 25	Not provided	x	

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## 10.2 Drive for the Rondomat



## BGE

Oil amount:	Approx. 30 litre
Recommended gear oil	VG 220
Alternative gear oil:	80/90 GL4 / GL5
Gear oil level:	10 - 20 mm below the bleed screw (see drawing)
Maximum torque:	36,000 Nm

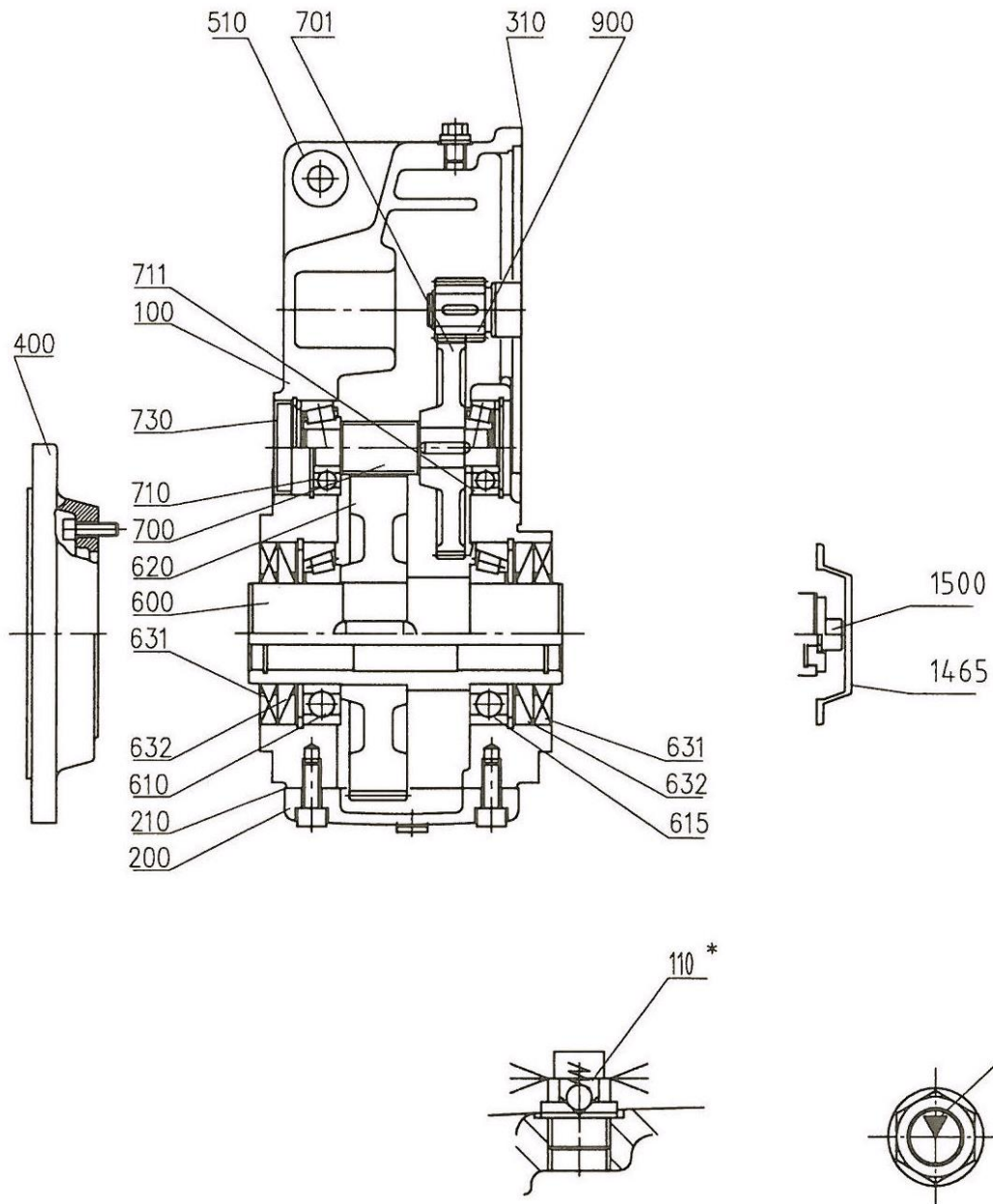
SK5282AG-132M/4

Abtriebsdrehzahl: 43,000 1/min  
 Übersetzung: 33,43  
 Bauform Getriebe: M1  
 Schmierstoffart: Mineralöl ISO VG 220

0100	085212000	FLACH-AUFSTECK-GEH	SK 5282A	DMST	A	1	ST
0110	022012056	DRUCKENTLSCHR M12 X1,5	FA.HUNGER	TRSP.S		1	ST
0200	085218000	GEHAEUSEDECKEL	SK 5282			1	ST
0210	085297000	GEHS-DICHT FA SK5282			S=0,5	1	ST
0310	051597020	MOTORDICHT FA SK52	S300			1	ST
0510	029606000	MET-GUMMI-FEDERS	60/21,0X30	SK4282/5282		2	ST
0600	085237000	Hohl-W 60H7	SK 5282			1	ST
0610	024621700	BEARING 6217		C 83,0		1	ST
0615	024621700	BEARING 6217		C 83,0		1	ST
0620	085273040	ABTRIEBSRAD Z=101	M=2,50	SK5282		1	ST
0631	025085070	WDR 85X150X12 AS		WST.:NBR		2	ST
0632	025085080	WDR 85X150X12 A		WST.:NBR		2	ST
0700	051572040	RITZEL-W Z=10	M=2,50			1	ST
0701	051571030	ANTRIEBSRAD Z=86	M=1,75	SK52		1	ST
0710	024323060	BEARING 32306	A			1	ST
0711	024303061	BEARING 30306				1	ST
0730	025807201	VERSCHLUSSKAPPE 72X 9	SK52/5282			1	ST
0900	050870020	ANTR-RITZEL Z=26	D=24	M=1,75		1	ST

**BGE**

Flachgetriebe SK 1282 - SK 5282  
 Parallel Shaft Gear Unit SK 1282 - SK 5282



Bei Ersatzteilbestellungen bitte den Typ und die Fertigungsnummer angeben.  
 Schmierstoffe und Schmierstoffmenge der Tabelle im Katalog entnehmen.  
 \*optional

When ordering spare parts please give the type and the production number.  
 See lubrication table for type and quantity of oil  
 \*optional

EB100025

## BGE

SK5282AG /2G-132M/4 2G TF RD

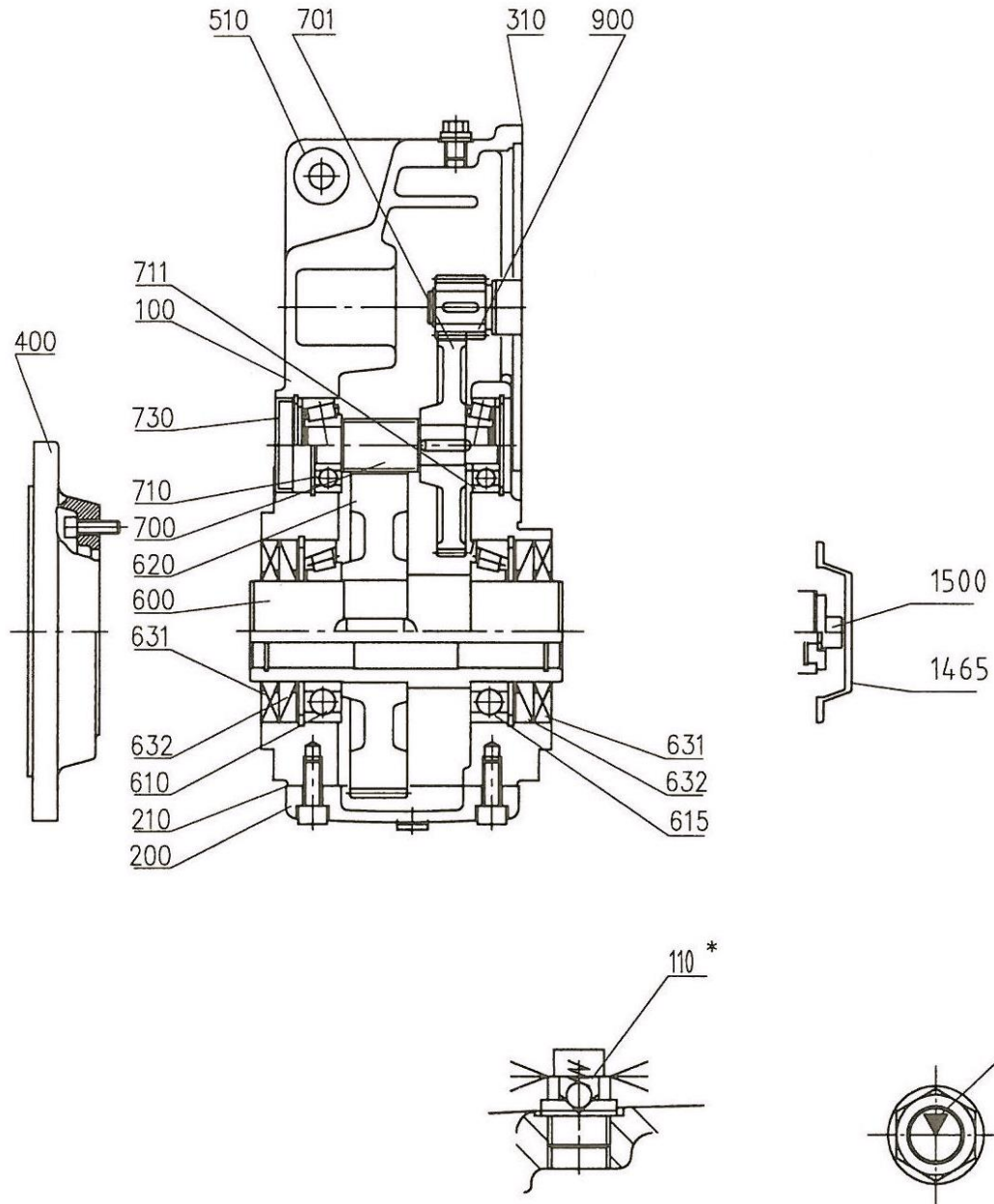
Abtriebsdrehzahl: 44,000 1/min  
 Übersetzung: 33,43  
 Bauform Getriebe: M4  
 Atex Berechnung: DE-091005-1553-0113  
 Schmierstoffart: Mineralöl ISO VG 220

0100	085212000	FLACH-AUFSTECK-GEH	SK 5282A	DMST	A	1	ST
0110	022012056	DRUCKENTLSCHR M12 X1,5	FA.HUNGER	TRSP.S		1	ST
0200	085218000	GEHAEUSEDECKEL	SK 5282			1	ST
0210	085297000	GEHS-DICHT FA SK5282			S=0,5	1	ST
0310	051597020	MOTORDICHT FA SK52	S300			1	ST
0510	029606000	MET-GUMMI-FEDERS	60/21,0X30	SK4282/5282		2	ST
0600	085237000	Hohl-W 60H7	SK 5282			1	ST
0610	024621710	BEARING 6217 Z		C 83,0		1	ST
0615	024621710	BEARING 6217 Z		C 83,0		1	ST
0620	085273040	ABTRIEBSRAD Z=101	M=2,50	SK5282		1	ST
0631	025085070	WDR 85X150X12 AS		WST.:NBR		2	ST
0632	025085080	WDR 85X150X12 A		WST.:NBR		2	ST
0700	051572040	RITZEL-W Z=10	M=2,50			1	ST
0701	051571030	ANTRIEBSRAD Z=86	M=1,75	SK52		1	ST
0710	024323060	BEARING 32306 A				1	ST
0711	024303061	BEARING 30306				1	ST
0730	025807201	VERSCHLUSSKAPPE 72X 9	SK52/5282			1	ST
0900	050870020	ANTR-RITZEL Z=26	D=24	M=1,75		1	ST



**BGE**

Flachgetriebe SK 1282 – SK 5282  
 Parallel Shaft Gear Unit SK 1282 – SK 5282



Bei Ersatzteilbestellungen bitte den Typ und die Fertigungsnummer angeben.  
 Schmierstoffe und Schmierstoffmenge der Tabelle im Katalog entnehmen.  
 \*optional

When ordering spare parts please give the type and the production number.  
 See lubrication table for type and quantity of oil  
 \*optional

EB100025

## BGE

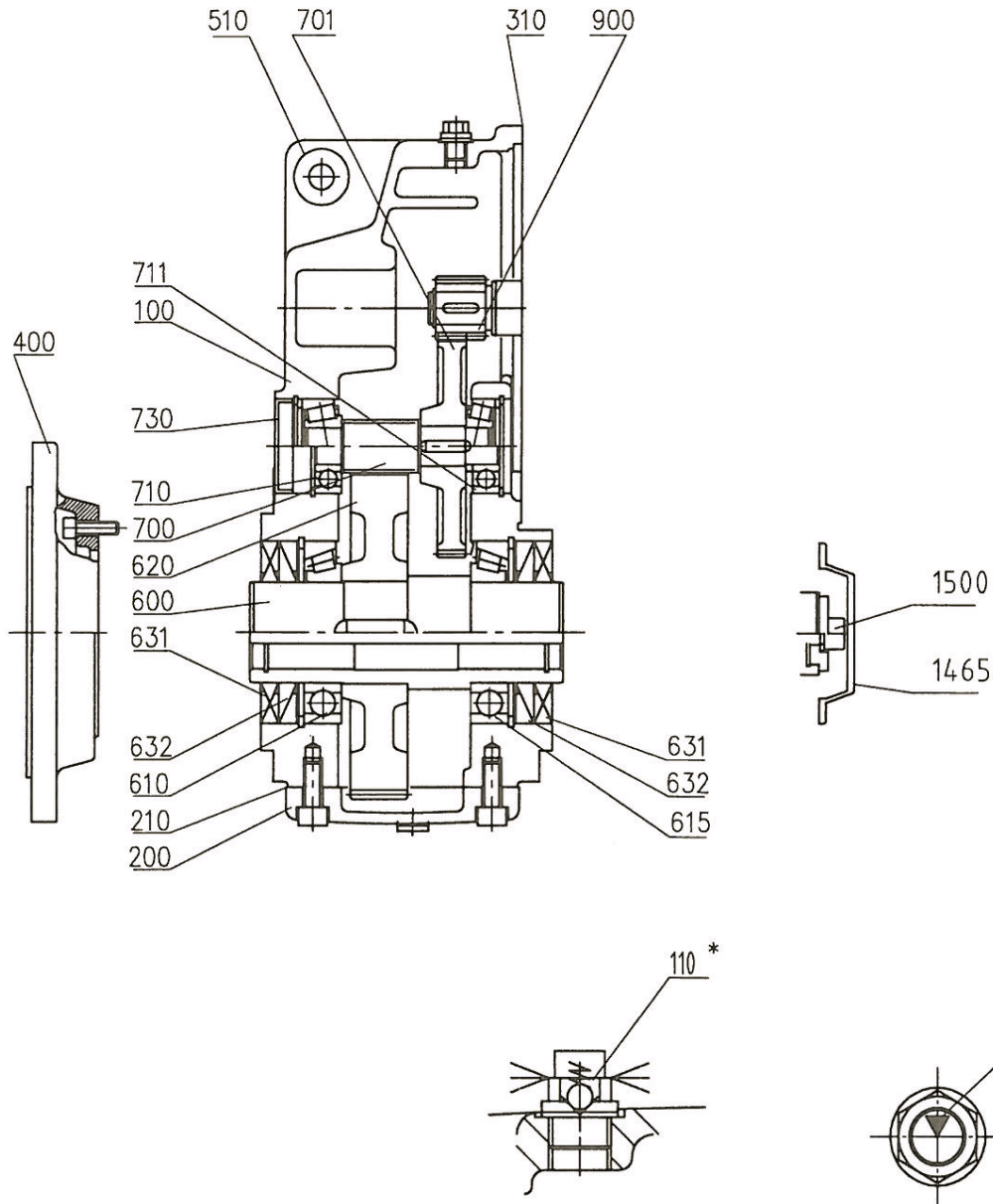
SK5282AG-132S/4 TF

Abtriebsdrehzahl: 26,000 1/min  
 Übersetzung: 55,90  
 Bauform Getriebe: M1  
 Schmierstoffart: Mineralöl ISO VG 220

0100	085212000	FLACH-AUFSTECK-GEH	SK 5282A	DMST	A	1	ST
0110	022012056	DRUCKENTLSCHR M12	X1,5	FA.HUNGER	TRSP.S	1	ST
0200	085218000	GEHAEUSEDECKEL	SK 5282			1	ST
0210	085297000	GEHS-DICHT FA	SK5282		S=0,5	1	ST
0310	051597020	MOTORDICHT FA	SK52	S300		1	ST
0510	029606000	MET-GUMMI-FEDERS	60/21,0X30	SK4282/5282		2	ST
0600	085237000	Hohl-W 60H7	SK 5282			1	ST
0610	024621700	BEARING 6217		C 83,0		1	ST
0615	024621700	BEARING 6217		C 83,0		1	ST
0620	085273010	ABTRIEBSRAD Z=80	S	M=3,00	SK5282/9052	1	ST
0631	025085070	WDR 85X150X12	AS		WST.:NBR	2	ST
0632	025085080	WDR 85X150X12	A		WST.:NBR	2	ST
0700	051572010	RITZEL-W Z=13		M=3,00		1	ST
0701	051571000	ANTRIEBSRAD Z=100		M=1,75	SK52	1	ST
0710	024323060	BEARING 32306	A			1	ST
0711	024303061	BEARING 30306				1	ST
0730	025807201	VERSCHLUSSKAPPE	72X 9	SK52/5282		1	ST

**BGE**

Flachgetriebe SK 1282 - SK 5282  
 Parallel Shaft Gear Unit SK 1282 - SK 5282



Bei Ersatzteilbestellungen bitte den Typ und die Fertigungsnummer angeben.  
 Schmierstoffe und Schmierstoffmenge der Tabelle im Katalog entnehmen.  
 \*optional

When ordering spare parts please give the type and the production number.  
 See lubrication table for type and quantity of oil  
 \*optional

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## BGE

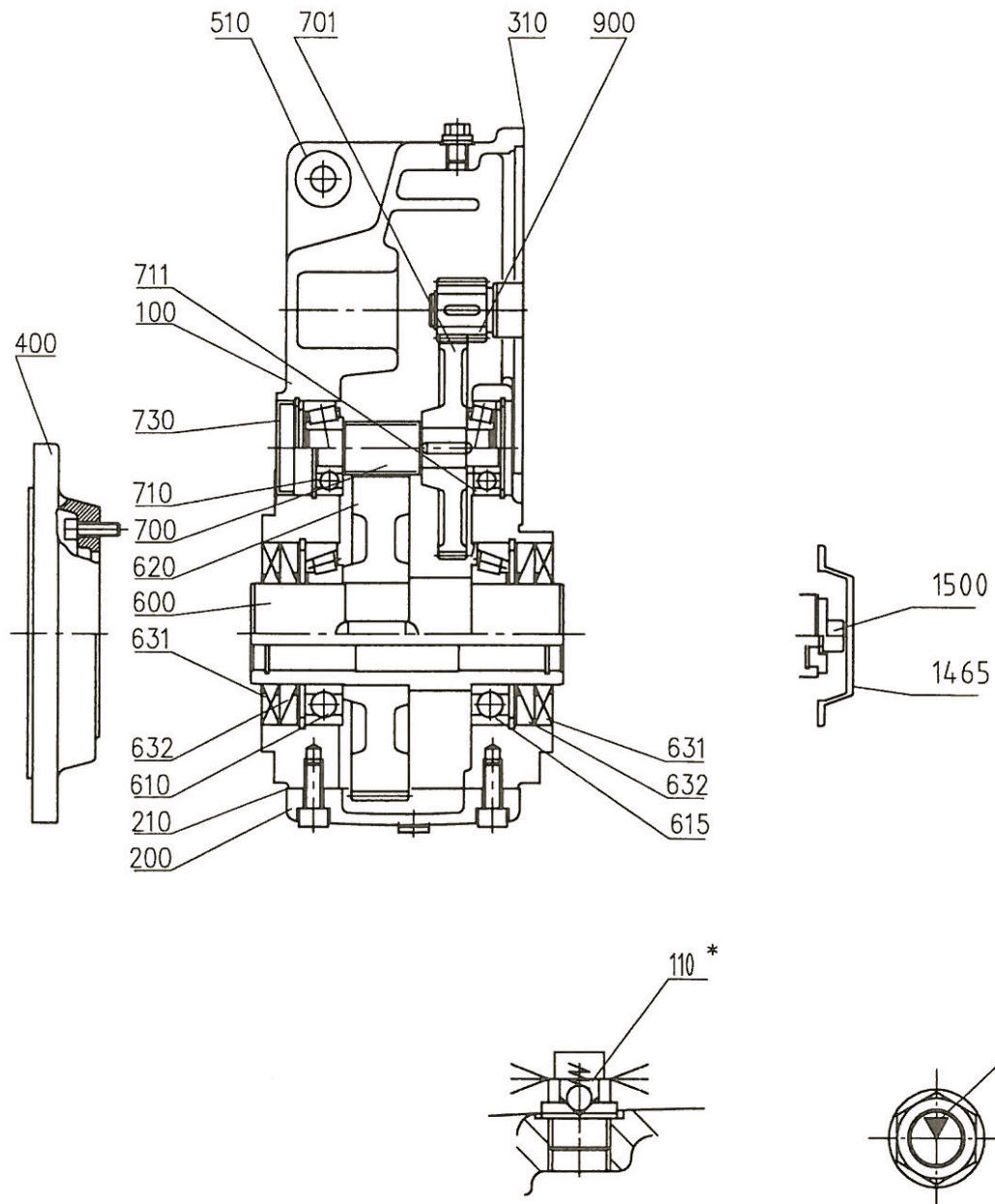
SK4282AG-132S/4 TF

Abtriebsdrehzahl: 35,000 1/min  
 Übersetzung: 40,74  
 Bauform Getriebe: M1  
 Schmierstoffart: Mineralöl ISO VG 220

0100	084212000	FLACH-AUFSTECK-GEH	SK 4282A	DMST	A	1	ST
0110	022012056	DRUCKENTLSCHR M12 X1,5	FA.HUNGER	TRSP.S		1	ST
0200	084218000	GEHAEUSEDECKEL	SK 4282			1	ST
0210	084297000	Gehs-Dicht FA SK4282			S=0,5	1	ST
0310	051597020	MOTORDICHT FA SK52	S300			1	ST
0510	029606000	MET-GUMMI-FEDERS	60/21,0X30	SK4282/5282		2	ST
0600	084237060	HOHL-W 40H7	SK 4282		S	1	ST
0610	024621400	BEARING 6214		C 62,0		1	ST
0615	024621400	BEARING 6214		C 62,0		1	ST
0620	084273040	ABTRIEBSRAD Z=105	M=2,00	SK4282		1	ST
0631	025070090	WDR 70X125X12 AS			WST.:NBR	2	ST
0632	025070100	WDR 70X125X12 A			WST.:NBR	1	ST
0700	051472040	RITZEL-W Z=10		M=2,00		1	ST
0701	051471110	ANTRIEBSRAD Z=101		M=1,25	SK42	1	ST
0710	024323050	BEARING 32305 A				1	ST
0711	024323050	BEARING 32305 A				1	ST
0730	025806200	VERSCHLUSSKAPPE 62X 8	SK42/4282			1	ST
0900	050870050	ANTR-RITZEL Z=26	D=18	M=1,25		1	ST

**BGE**

Flachgetriebe SK 1282 - SK 5282  
 Parallel Shaft Gear Unit SK 1282 - SK 5282



Bei Ersatzteilbestellungen bitte den Typ und die Fertigungsnummer angeben.  
 Schmierstoffe und Schmierstoffmenge der Tabelle im Katalog entnehmen.  
 \*optional

When ordering spare parts please give the type and the production number.  
 See lubrication table for type and quantity of oil  
 \*optional

EB100025

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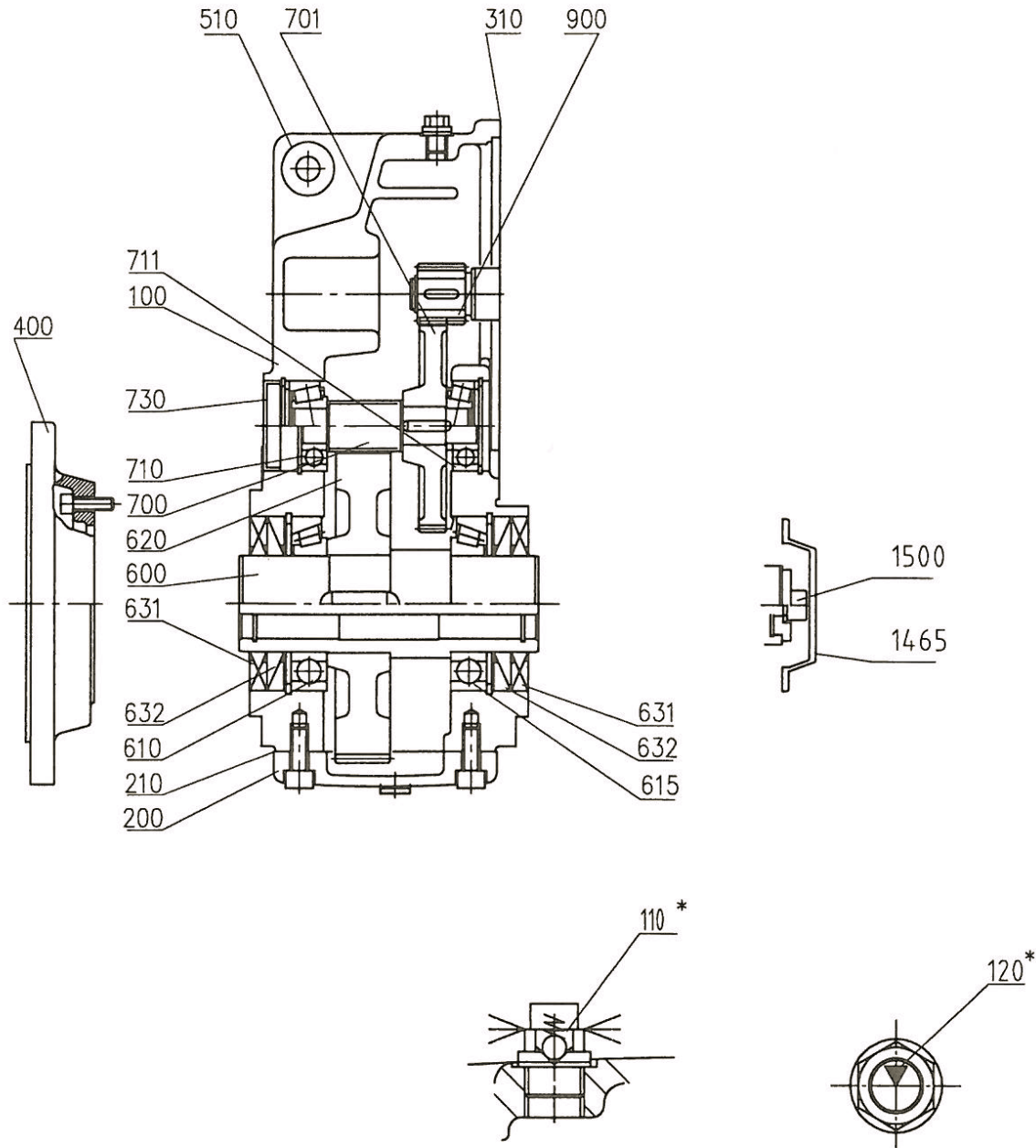
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SK3282A-132S/4

Abtriebsdrehzahl:	45,000	1/min		
Übersetzung:	31,93			
Bauform Getriebe:	M4			
Schmierstoffart:	Mineralöl	ISO VG 220		
0100	083212000	FLACH-AUFSTECK-GEH	SK 3282A DMST	A 1 ST
0200	083218000	GEHAEUSEDECKEL	SK 3282	1 ST
0210	083297000	GEHS-DICHT FA SK3282	S=0,5	1 ST
0310	082297040	MOTORDICHT FA SK22	S250X180 GRAPHI.S=0,8	1 ST
0600	083237000	HOHL-W 40H7	SK 3282	1 ST
0610	024621110	BEARING 6211 Z	C 43,0	1 ST
0615	024621110	BEARING 6211 Z	C 43,0	1 ST
0620	083273060	ABTRIEBSRAD Z=87	M=2,00 SK3282	1 ST
0631	025055080	WDR 55X100X10 AS	WST.:NBR	2 ST
0632	025055090	WDR 55X100X10 A	WST.:NBR	2 ST
0700	050872050	RITZEL-W Z=10	M=2,00	1 ST
0701	050871030	ANTRIEBSRAD Z=88	M=1,25 SK32	1 ST
0710	024323040	BEARING 32304 A		1 ST
0711	024303040	BEARING 30304		1 ST
0730	025805200	VERSCHLUSSKAPPE 52X10	SK32/652SU/3282	1 ST
0900	050870040	ANTR-RITZEL Z=24 D=18	M=1,25	1 ST

**BGE**

Flachgetriebe SK 1282 - SK 5282  
 Parallel Shaft Gear Unit SK 1282 - SK 5282



Bei Ersatzteilbestellungen bitte den Typ und die Fertigungsnummer angeben.  
 Schmierstoffe und Schmierstoffmenge der Tabelle im Katalog entnehmen.

\*optional

When ordering spare parts please give the type and the production number.  
 See lubrication table for type and quantity of oil

\*optional

EB100025

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SK3282AG-100L/4 TF

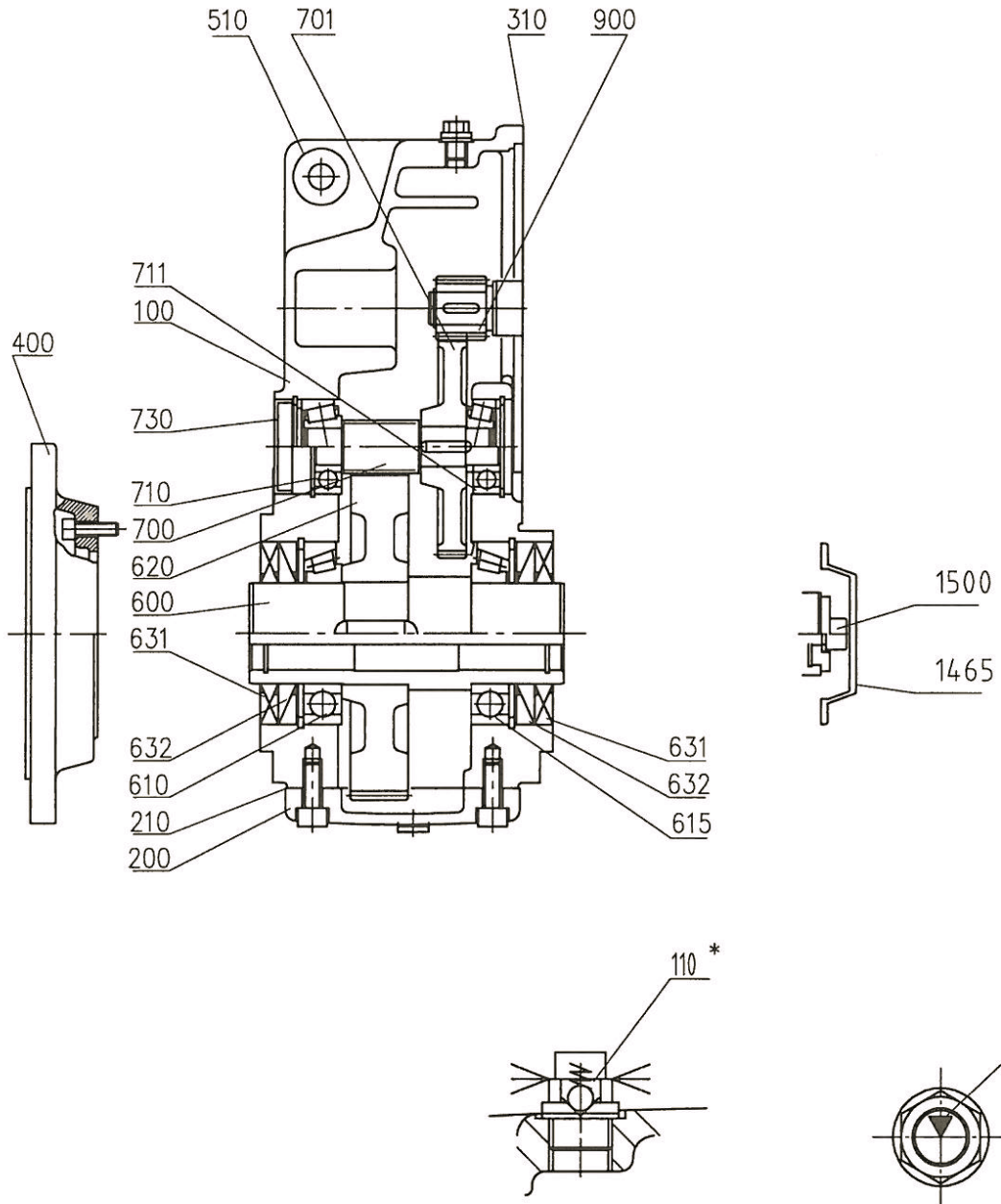
Abtriebsdrehzahl: 22,000 1/min  
 Übersetzung: 64,12  
 Bauform Getriebe: M4  
 Schmierstoffart: Mineralöl ISO VG 220

0100	083212000	FLACH-AUFSTECK-GEH	SK 3282A	DMST	A	1	ST
0110	022012056	DRUCKENTLSCHR M12	X1,5	FA.HUNGER	TRSP.S	1	ST
0200	083218000	GEHAEUSEDECKEL	SK 3282			1	ST
0210	083297000	GEHS-DICHT FA	SK3282		S=0,5	1	ST
0310	082297040	MOTORDICHT FA	SK22	S250X180	GRAPHI.S=0,8	1	ST
0510	029604000	MET-GUMMI-FEDERS	40/12,5X15	SK2282/3282		2	ST
0600	083237000	HOHL-W 40H7	SK 3282			1	ST
0610	024621110	BEARING 6211 Z		C 43,0		1	ST
0615	024621110	BEARING 6211 Z		C 43,0		1	ST
0620	083273000	ABTRIEBSRAD Z=86 S		M=2,00	SK3282	1	ST
0631	025055080	WDR 55X100X10 AS			WST.:NBR	2	ST
0632	025055090	WDR 55X100X10 A			WST.:NBR	2	ST
0700	050872000	RITZEL-W Z=11		M=2,00		1	ST
0701	050871100	ANTRIEBSRAD Z=82		M=1,50	SK32	1	ST
0710	024323040	BEARING 32304 A				1	ST
0711	024303040	BEARING 30304				1	ST
0730	025805200	VERSCHLUSSKAPPE	52X10	SK32/652SU/3282		1	ST



**BGE**

Flachgetriebe SK 1282 - SK 5282  
 Parallel Shaft Gear Unit SK 1282 - SK 5282



Bei Ersatzteilbestellungen bitte den Typ und die Fertigungsnummer angeben.  
 Schmierstoffe und Schmierstoffmenge der Tabelle im Katalog entnehmen.

\*optional

When ordering spare parts please give the type and the production number.  
 See lubrication table for type and quantity of oil

\*optional

EB100025

## BGE

SK42 /2G-132M/4 2G TF

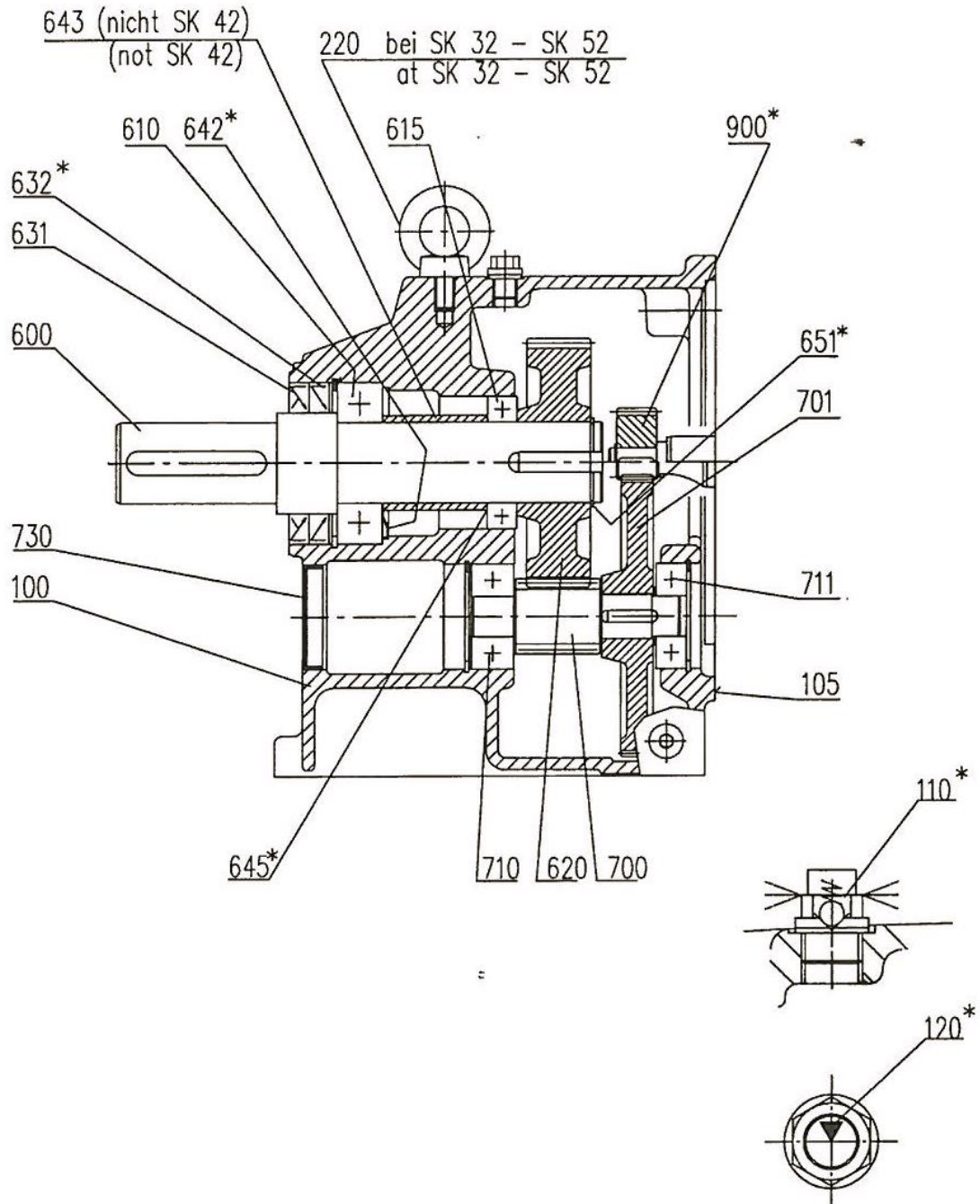
Abtriebsdrehzahl: 68,000 1/min  
 Übersetzung: 21,50  
 Bauform Getriebe: M3  
 Atex Berechnung: DE-100519-1442-0113  
 Schmierstoffart: Mineralöl ISO VG 220

0100	051410000	FUSSGEHAEUSE	5OEL SK 42		1	ST
0105	051597020	MOTORDICHT FA	SK52 S300		1	ST
0110	022012056	DRUCKENTLSCHR	M12 X1,5 FA.HUNGER TRSP.S		1	ST
0220	022401200	RINGSCHRAUBE		DIN580 M12 C15E VZ	1	ST
0600	051430000	ABTR-W 42	45X90		1	ST
0610	024621010	BEARING	6210 Z	C 36,5	1	ST
0615	024020819	BEARING NUP	208 E	C 63,0	1	ST
0620	051473010	ABTRIEBSRAD	Z=53	M=2,50 SK42	1	ST
0631	025060000	WDR 60X 90X 9 AS		WST.:NBR	1	ST
0700	051472010	RITZEL-W	Z=13	M=2,50	1	ST
0701	051471120	ANTRIEBSRAD	Z=58	M=2,25 SK42	1	ST
0710	024230529	BEARING NJ	2305 E	C 57,0	1	ST
0711	024630500	BEARING	6305	C 22,4	1	ST
0730	025806200	VERSCHLUSSKAPPE	62X 8 SK42/4282		1	ST

0100	051410000	FUSSGEHAEUSE	5OEL SK 42		1	ST
0105	051597020	MOTORDICHT FA	SK52 S300		1	ST
0110	022012056	DRUCKENTLSCHR	M12 X1,5 FA.HUNGER TRSP.S		1	ST
0220	022401200	RINGSCHRAUBE		DIN580 M12 C15E VZ	1	ST
0600	051430000	ABTR-W 42	45X90		1	ST
0610	024621010	BEARING	6210 Z	C 36,5	1	ST
0615	024020819	BEARING NUP	208 E	C 63,0	1	ST
0620	051473010	ABTRIEBSRAD	Z=53	M=2,50 SK42	1	ST
0631	025060000	WDR 60X 90X 9 AS		WST.:NBR	1	ST
0700	051472010	RITZEL-W	Z=13	M=2,50	1	ST
0701	051471120	ANTRIEBSRAD	Z=58	M=2,25 SK42	1	ST
0710	024230529	BEARING NJ	2305 E	C 57,0	1	ST
0711	024630500	BEARING	6305	C 22,4	1	ST
0730	025806200	VERSCHLUSSKAPPE	62X 8 SK42/4282		1	ST

Stirnradgetriebe  
Helical Gear Units

SK 02 - SK 52  
SK 02 - SK 52



Bei Ersatzteilbestellungen bitte den Typ und die Fertigungsnummer angeben.  
Schmierstoffe und Schmierstoffmenge der Tabelle im Katalog entnehmen.

\*optional

When ordering spare parts please give the type and the production number.  
See lubrication table for type and quantity of oil

\*optional

EB100002

## BGE

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### 10.3 Destruction/Recycling

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Before transporting dismantle and decommission machine.

For transport pay attention to the hint in chapter 4.1.

Sort out machine and electronic parts, sort clean and dispose of in an authorized manor.



#### IMPORTANT

All parts and auxiliary and operating materials of the machine:

- Grade and separate.
- Dispose of according to local regulations and guidelines.



#### HINT

Hydraulic lines and oil are special waste!



#### HINT

All open questions regarding destruction/recycling should be referred to the manufacturer!

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**BGE**

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# 11 Attachment

## 11.1 Ordering spare parts

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**Ordering spare parts**

**Date:**

Fliegl Agrartechnik GmbH

F.A.O. Biogas department

Fax: +49 (0)8631/307-552

Device indent. no.: **F**.....

Model: .....

Year of manufacture: .....

Contract no.: .....

Customer / Name: .....

Street / House number: .....

Postcode / City: .....

Tel / Fax: .....

Email: .....

Pos.	Part description	Number	Order number
1.			
2.			
3.			
4.			
5.			
6.			
7.			

Comments:

\_\_\_\_\_  
(Signature)

**BGE**

**11.2 Permit for potentially explosive areas**

Please mark applicable points. Delete marked lines where not applicable.

Permission for welding, burning and other work involving spark generation, drilling, grinding, hammering and ripping out work and deploying non-explosion-protected devices.

**A**

1. Customer: ..... Construction: ..... Tel.: ..... Master:

2. Work and nature of work.  
.....  
.....

4. For workshop/company Construction Master

**B Hazardous places in the area**

The workplace, constructions, apparatus etc.	Competent authority	Construction	Telephone
1			
2			
3			
4			

**C Security measures** ..... carried out by: ..... finished.

1. Checking for leaks in pipelines and apparatuses in the work area ..... -

2. Extinguishing and other security measures

a. Providing water for fire fighting and fire extinguishers at the workplace ..... -

b. Connect fire hose ..... -

c. Establish safety attendants ..... -

- hand worker - employees - supervisors - firemen

d. Removing inflammable material, vapours, gases or dust deposits ..... -

e ..... -

3. Identifying the workplaces (street, railway track etc.)

a. With red flags (20 m on either side of the workplace) ..... -

b. With signs (e.g. work with fire on pipe bridge) ..... -

c. Cordoning off, diversions for tanker vehicles, blocking track vehicles ..... -

4. Securing the area from welding sparks

a. Covering neighbouring cables and power lines ..... -

b. Install protective screen, protect roof cladding, maybe stop dampness ..... -

c. Cease work in the case of rail transport ..... -

d. With tank wagons where there is a fire risk, keep a minimum distance of ..... m. .... -

e. Cover or seal from burst pipes, gratings, light and sewer systems ..... -

f ..... -

5. For work in and on containers, apparatuses, pits, pipelines, system parts removed from plants and in small rooms etc. Supplementary measures are needed:

a. Travel permit ..... No. .... from ..... -

b. Work permit ..... No. .... from ..... -

c. Security note for electrical equipment ..... No. .... from ..... -

d ..... -

6.

a. Before starting work register **daily** at B 1, 2, 3, 4 ..... -

b. At the end work register **daily** at B 1, 2, 3, 4 ..... -

7.

a. Control of the marked safety measures by (name) ..... -

b. Control of the workstation by completion of the work by (name) ..... -

**D Understanding of the responsibilities for the hazard areas**

Start of work registered ..... at: ..... by: .....

For B 1 Security measures C number .....

For B 1 Security measures C number .....

For B 1 Security measures C number .....

For B 1 Security measures C number .....

Permit issued

Date

Signature of the works manager

**Further spare parts lists and documents can be obtained by asking for the model and serial number, from the manufacturer, Fliegl Agrartechnik GmbH.**

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**We are Fliegl.**