

Installation instructions



- Biomat
- MultiMix
- Rondomat



We are Fliegl.



**Read these installation instructions prior to initial installation
and observe them at all times!
Retain for future reference!**

Contents

Contents	3
Identification	5
Declaration of conformity.....	6
1. User instructions	7
1.1 Purpose of this document.....	7
1.2 Duty to inform	8
1.3 Illustrations used.....	8
1.4 Cross references	8
1.5 Terminology: "machine".....	8
1.6 Figures.....	8
1.7 Modifications and changes.....	8
1.8 Replacement and wear parts and auxiliary materials	9
1.9 Product monitoring	9
1.10 Presentation of safety instructions	9
1.11 Liability and damages.....	9
2. Basic safety instructions.....	10
2.1 Risks when working with the machine.....	10
2.2 Residual risks	10
2.3 Obligations of the operating company.....	11
2.4 Obligations of personnel.....	11
2.5 Qualification of specialist personnel.....	11
2.6 Personal protective equipment.....	11
2.7 Operational safety	12
2.7.1 Operation without correct start-up.....	12
2.7.2 Safeguarding perfect technical condition	12
2.7.3 Danger due to machine damage.....	12
2.7.4 Technical limits	12
3. Functional description	13
3.1 Combination of Biomat & Multimix or Rondomat	13
3.1.1 Actuators	13
3.1.2 Function.....	13
3.2 Biomat	14
3.2.1 Technical diagram	14
3.2.2 Functional description	14
3.2.3 Optional equipment	14
3.3 Rondomat.....	15
3.3.1 Technical diagram	15
3.3.2 Functional description	16

Contents

3.3.3	Optional equipment.....	16
4.	Biomat & Rondomat assembly.....	17
4.1	Preparation.....	17
4.2	Assembly process.....	17
4.2.1	90° bottom feed.....	17
4.2.2	Side feed.....	19
4.3	Top feed.....	20
4.4	Final inspection.....	21
5.	MultiMix assembly.....	22
5.1	Scope of delivery.....	22
5.2	Basic assembly sequence.....	23
6.	Start-up.....	25
6.1	First-time start-up.....	25
6.2	Check before start-up.....	25
6.3	Conducting a trial run.....	26
6.3.1	Objective.....	26
6.3.2	Prerequisites.....	26
6.3.3	Procedure.....	26
7.	Conversion table.....	27
8.	Index.....	28

Identification

Machine identification data

Manufacturer:	Fliegl Agrartechnik GmbH
Product:	Biogas feeder
Type:	Biomat Rondomat MultiMix

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Enter dealer & customer service contact details here

Formal details of installation instructions

Document no.:	7-602105211.0
Version/revision:	1.1
Creation date:	22/03/2021
Last revision:	25/08/2021

Declaration of conformity

Declaration of conformity

As stipulated in EC Machinery Directive 2006/42/EC, Annex II, 1.A (ORIGINAL)

Manufacturer:

Fliegl Agrartechnik GmbH
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84453 Mühldorf am Inn, Germany

Person residing in the European Community authorised to compile the relevant technical documentation:

Josef Fliegl jun.
Fliegl Agrartechnik GmbH
Bürgermeister-Boch-Straße 1
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Description and identification:

Product: Biogas feeder

Type: Biomat, Rondomat & MultiMix

Serial number: BIOXXXxxxxxx (FXXXXX) [X = placeholder for letters/numbers]

Project designation: Biogas supply

Trade name: Feed system for biogas plants

Function: Storage and supply of different substances and solid materials to the biogas fermenter

It is expressly stated that this machine complies with all relevant provisions of the following EC directives:

2006/42/EC:2006-05-17	EC Machinery Directive 2006/42/EC
2014/34/EU:	Directive 2014/34/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast)
2014/35/EU:	Directive 2014/35/EU of the European Parliament and of the Council 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/EU:	Directive 2014/30/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

Source of the harmonised standards applied in accordance with Article 7(2):

EN ISO 12100:2010-11	Safety of machinery – General principles for design – Risk assessment and risk reduction (ISO 12100:2010)
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 (IEC62031:2008+A1:2012)
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 DIN 60079-18:2015-10	Explosive atmospheres – Part 18: Equipment protection by encapsulation "m" (IEC 60079-18:2015)
EN DIN 60079-7:2014-04	Explosive atmospheres – Part 7: Equipment protection by increased safety "e" (IEC 31/973/CD:2011).

Source of other technical standards and specifications applied:

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

Mühldorf am Inn

25/08/2021

Place,

date



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1. User instructions

This manual provides information about the:

- Function
- Installation/assembly

of the feeders and ensures long, problem-free operation if it is carefully observed.

Operation of the feeders is described in the corresponding separate operating instructions.

Fliegl assumes no liability and honours no warranty for damage and malfunctions resulting from failure to comply with the installation instructions.

This information is required to ensure a smooth replacement parts ordering process:

Copy the relevant information from the type plate into the box below:

Machine ID no. (serial number)	
Type	
First-time start-up	
Order no.	

Contact:

Fliegl Dosiertechnik
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1.1 Purpose of this document

These installation instructions:

- Describe the installation and assembly of the machine
- Provide important advice for safe and efficient handling of the machine

1.2 Duty to inform

These installation instructions are to be considered part of the feeders.

If the machine is passed on to another party by the customer, the installation instructions must also be passed on and the party receiving the machine must be instructed regarding the regulations specified above.

Only the procedures described in the installation instructions are safe.

- Read and observe the contents of chapter 2 Basic safety instructions before first using the machine.
- Before performing any work with the machine, always read and observe the contents of the relevant sections of the installation instructions.
- The installation instructions must be stored such that they are always on hand for the machine user.

1.3 Illustrations used

Instructions and system responses

The steps to be performed by installation personnel are presented in the form of a (numbered) list. These steps must be followed in the correct order. The system response to each installation step is marked with an arrow. Example:

Operator action step 1

→ System response to operator action step 1

1.4 Cross references

Cross references to other points in the installation instructions appear in the text along with the relevant chapter and subchapter or section.

1.5 Terminology: "machine"

Within this document, the feeders are also referred to as the "machine".

1.6 Figures

The figures in this document do not always depict the exact machine type.

The information relating to the figures always corresponds to the machine type described in this document.

1.7 Modifications and changes

Any unauthorised modifications and changes to the machine (such as welding onto bearing parts) *will void all liabilities and the manufacturer's warranty.*

Additions or modifications of any kind can affect the electro-magnetic behaviour of the machine.

Therefore, do not make any changes or add anything to the machine without consulting and receiving written agreement from the manufacturer.

1.8 Replacement and wear parts and auxiliary materials

The use of replacement and wear parts or auxiliary materials from third parties can lead to dangers. The manufacturer accepts no liability for damage resulting from the use of these parts. Therefore, use only original parts or parts approved by the manufacturer.

1.9 Product monitoring

Please inform us as soon as possible if you encounter faults or problems when operating the feeders, or if accidents occur or are narrowly avoided. We will endeavour to establish a solution to the problem, potentially with your assistance, and incorporate our findings in our ongoing work. Refer to page 7 for the relevant contact details.

1.10 Presentation of safety instructions



Danger! Imminent risk that will lead to serious bodily harm or death.



Warning! Potentially hazardous situation that could lead to serious bodily harm or death.

Caution! Potentially hazardous situation that could lead to minor bodily harm. Also warns against potential damage to property.



Notice! Potentially harmful situation in which the product or other property in its vicinity could be damaged.

Important! For usage instructions and other helpful information.

1.11 Liability and damages

The product must only be operated by persons who are familiar with the installation instructions, the product and national laws, directives and regulations relating to health and safety at work as well as accident prevention. We accept no liability for personal or material damage caused, or contributed to, by untrained persons due to non-compliance with regulations regarding health and safety at work as well as accident prevention.

Based on the specifications in these installation instructions, Fliegl Agrartechnik GmbH assumes no liability for direct or consequential damage attributable to improper operation or maintenance.

For your own safety, you should only use original replacement parts and accessory products.

Fliegl Agrartechnik GmbH assumes no liability for the use of other products and any resulting damage.

No claims for modification of delivered products can be made on the basis of the information, images and descriptions provided in this manual.

2. Basic safety instructions



- The machine must be set up by specialist personnel.
- All safety instructions are provided in the installation instructions.
- In addition, the personnel responsible for start-up and decommissioning must always wear personal protective equipment.



- Changes to the feeders must only be carried out following consultation and with express permission of the manufacturer.
- In the case of damage that affects safety, have the feeders repaired immediately.
- In the event of any faults that affect safety, the feeders must be stopped immediately. Take measures to prevent reactivation.
- Use only original replacement parts.
- In addition to this manual, the operating instructions included for third-party components must be observed.



- **Instruct unauthorised persons to leave the danger area.**
- **Protective devices must not be removed or modified.**



- **Entering or remaining in the feeders is only permitted when it is stopped and the main switch is locked.**

2.1 Risks when working with the machine

Risks and impairments can arise when using the machine:

- Risk to life and limb of the operator or third parties
- Risks for the machine itself
- Risks for other material assets

Safe and fault-free operation of the machine requires knowledge of the safety and user instructions set out in this manual.



Always store the installation instructions at the usage location of the machine. The installation instructions must be available to operators and installation personnel at all times. Also be aware of the following:
General and location-specific regulations regarding accident prevention and environmental protection.

2.2 Residual risks

The machine is built according to the state of the art and recognised safety rules.

However, during use there is a risk to life and limb for the user or third party, or risk of damage to the machine or other property.

In addition to the manufacturer's countermeasures against dangers caused by residual energy, the operator must also take appropriate countermeasures. Personnel must be briefed about these dangers and the measures to be taken to prevent them.

2.3 Obligations of the operating company

The operating company is required to instruct its personnel regarding:

- Basic regulations regarding work safety and accident prevention
- Correct operation of the machine
- The installation instructions (ensure that personnel have read and understood them)

The requirements of the EC Directive for the use of work equipment 2007/30/EC must be observed.

2.4 Obligations of personnel

Before starting work, all personnel tasked with working on the machine undertake to:

- Comply with the basic regulations regarding work safety and accident prevention
- Read and comply with the safety section and warnings in these installation instructions

Please contact the manufacturer with any questions; see section 1.

2.5 Qualification of specialist personnel

If the required work on the machine (assembly, alteration, conversion, extension, repairs, retrofits) is performed incorrectly, this can lead to serious injury or death. To avoid accidents, any person performing work in accordance with these operating instructions must meet the following minimum requirements:

- He or she is a qualified specialist with the requisite training.
- Based on their technical expertise, he or she is able to assemble the (partially) disassembled machine as described in the manufacturer's assembly instructions.
- Based on their technical expertise, he or she is able to expand, alter or restore the function of the machine as prescribed in the relevant instructions of the manufacturer.
- He or she can perform the work described in these operating instructions in a safe manner.
- He or she understands the function of the required work as well as the machine and can recognise and avert the dangers arising from this work.
- He or she has read these operating instructions and can apply the information contained therein in an appropriate manner.

2.6 Personal protective equipment

Installation personnel must use the following personal protective equipment:

- Safety footwear with protective toe caps
- Close-fitting protective clothing
- Work gloves
- Safety and protective devices



The machine must only be operated if all safety and protective devices are complete and fully functional.



Personal protective equipment must be worn in the danger and working area of installation personnel.

2.7 Operational safety

2.7.1 Operation without correct start-up

Without a correct start-up in accordance with these installation instructions (section 6), the operational safety of the machine is not guaranteed. This can result in accidents involving personal injury.

2.7.2 Safeguarding perfect technical condition

Incorrect installation and adjustments can impair the operational safety of the machine and lead to accidents involving personal injury.

- All installation and adjustment work must be performed as described in the relevant sections.
- Shut down and secure the machine before performing any installation and adjustment work.

2.7.3 Danger due to machine damage

Damage to the machine can impair its operational safety and lead to accidents involving personal injury. The following machine components are particularly safety-relevant:

- Safety devices
- EMERGENCY STOP systems

In the case of doubts regarding the operational safety of the machine, e.g. due to leaking fluids, visible damage or unexpected changes in driving behaviour:

- Shut down and secure the machine.
- Eliminate potential causes of damage immediately.
- Establish the cause of the damage as per these installation instructions.
- Repair the damage as per these installation instructions.
- In the case of damage that cannot be rectified independently based on these installation instructions:
 - Have the damage repaired by a qualified workshop.

2.7.4 Technical limits

If the technical limits of the machine are not maintained, this can lead to machine damage.

This can result in accidents involving personal injury.

Compliance with the following technical limits is particularly important from a safety perspective:

- Maximum permissible power requirement
- Maximum permissible hydraulic pressure

3. Functional description

3.1 Combination of Biomat & Multimix or Rondomat

3.1.1 Actuators

- Two solenoids on the hydraulic unit (24 V as before)
- The hydraulic unit
- The drive of the Rondomat 7.5 kW – 10.1 kW
Alternatively: Multimix 24.2 kW
- The sensors are:
 - The two MGS 200 magnetic switches at the front and rear in the side wall of the container
 - The measurement of the current draw of the Rondomat drive
 - The current weight of the scales in kg

3.1.2 Function

Once the screw conveyor has started, the Rondomat drive starts.

The blade in the RDM* rotates until the desired quantity has been supplied or the screw conveyor moves too sluggishly (because it cannot shift enough material).

The RDM drive then pauses. Once the screw conveyor has run clear again, the RDM starts up again. The current draw of the RDM drive is measured and the sliding floor stops moving as of an adjustable value exceeding $x A^*$. The solenoids remain in idle position.

As of an adjustable value less than $x A$, the sliding floor moves since it can be assumed that the fill level of the RDM is low and substrate must therefore be replenished by the push-off unit. The solenoid valve for forward travel is actuated. In this case, the push-off process should ideally proceed at adjustable intervals: Push for 1 to 5 seconds and wait for 3 to 10 seconds.

Then push again briefly before waiting again. Push until the measured current draw has risen above the adjustable value of $x A$. Then the solenoid valve of the hydraulic unit must pause. Once material has been conveyed out of the RDM and the drive can move freely again, the pushing operation continues at intervals.

Once the push-off process is completed and the push-off unit has reached the end of its travel, the magnetic sensor issues a signal, after which the moving panel should reverse for approx. 10 seconds (solenoid for reverse travel is actuated) before moving forwards again to ensure that any residue is pushed off.

This process should occur one to five times (adjustable). This function is necessary to ensure that 100% of the container capacity can be used and to keep the push-off unit clear of residue, which would otherwise become stuck and dry out or rot after a few days. The process is referred to as the emptying stroke.

Once the push-off container is completely empty after one to five strokes and has reached the rear magnetic sensor, it automatically travels all the way back to the front, where another magnetic sensor deactivates the solenoid valve and stops the hydraulic unit.

(For clarity, "rear" means at the RDM and "front" means at the hydraulic unit.)

* RDM = Rondomat

* A = Ampere

Functional description

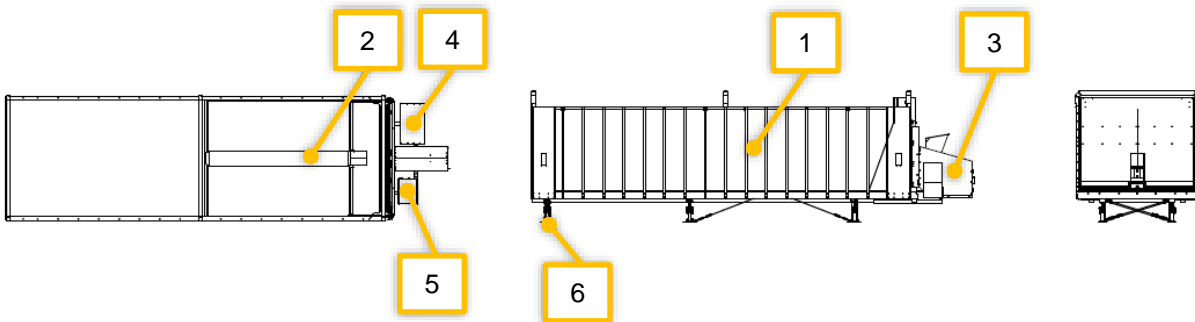
3.2 Biomat

3.2.1 Technical diagram

Overview of the main assemblies:

- i) PolyPro
- ii) SteelPro

- ① Container
- ② Push-off system
- ③ Front cover
- ④ Switch cabinet
- ⑤ Hydraulic unit
- ⑥ Supporting foot



3.2.2 Functional description

The machine described above is a time- and weight-controlled (optional equipment) stationary storage facility made from polyethylene or steel and designed for short-term storage of solid substrate to be used, for example, in biogas plants (renewable materials, e.g. corn silage). The machine is ideally combined with a suitable attachment / feeder unit (e.g. Fliegl Rondomat, Multimix etc.).

The material stored in the Biomat is transferred to the corresponding modular attachment by means of the push-off system. The Fliegl Biomat is available in different sizes.

The Biomat is generally filled using a front loader or similar, though automated feeding is also possible, e.g. using a screw conveyor or conveyor belt. The push-off system (moving panel + sliding floor, or independently) is activated by means of the thrust cylinders, which are controlled by the hydraulic unit, and the material is pushed towards and ultimately transferred to the modular attachment. The push-off system detects its start and end points by means of the limit switches / magnetic sensors located at either end of the container.

3.2.3 Optional equipment

- PLC control unit with DigiTouchBio weighing and metering system
- Radio remote control
- Supporting foot with load cell (height-adjustable)
- Large text display
- Roof (hydraulic)

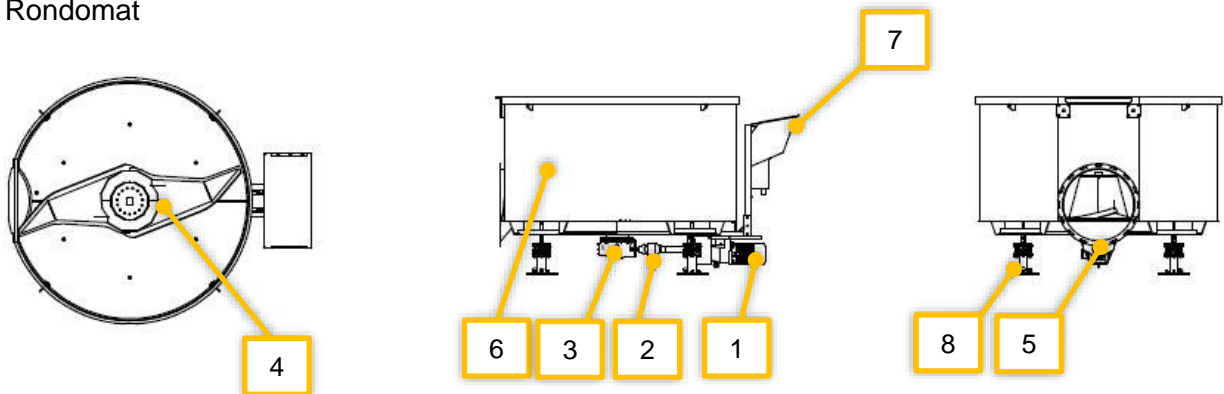
3.3 Rondonat

3.3.1 Technical diagram

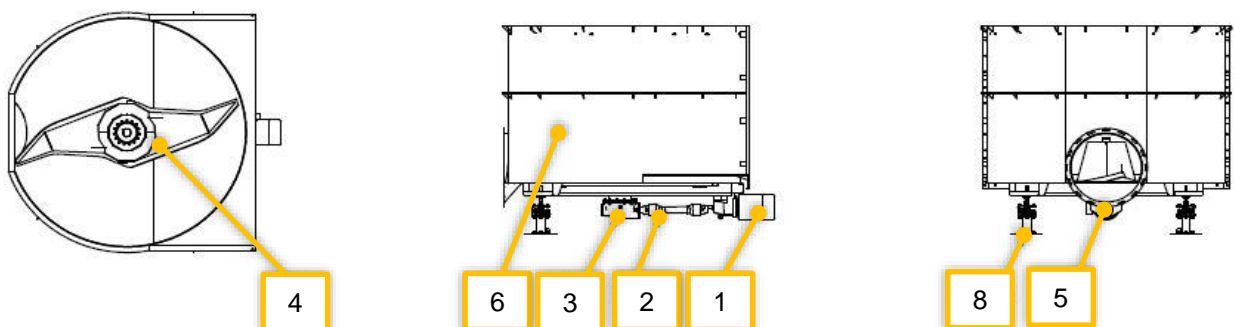
Overview of the main assemblies:

- ① Spur gear motor
- ② Drive shaft with shear bolt
- ③ Planetary gear
- ④ Extractor blade
- ⑤ Discharge opening
- ⑥ Container
- ⑦ Switch cabinet with control system
- ⑧ Supporting foot

i) Rondonat



ii) Rondonat



3.3.2 Functional description

The machine described above enables time- or weight-controlled (optional equipment) metering or transfer of solid substrate e.g. for biogas plants (renewable materials, e.g. corn silage).

The Rondomat is available either as a stand-alone machine (Rondomat, supplied via front loader, for example) or as a modular attachment (Rondomat, supplied via Fliegl PolyPro, for example) in different sizes. The Rondomat can also be expanded into a double unit (two adjacent, mechanically linked Rondomat units).

The Rondomat is generally filled using a front loader or similar, though automated feeding is also possible, e.g. using a screw conveyor or conveyor belt.

The spur gear motor powers the planetary gear in the specified direction via a drive shaft with shear bolt (predetermined breaking point). The sickle-shaped extractor blade, which is attached to the planetary gear, transports the filled material to the discharge unit and, if applicable, onward to the conveying system.

3.3.3 Optional equipment

Weighing foot:

Enables analogue or digital weight measurement of the filled storage volume or output quantity (via the Fliegl FWS weighing system).

Extension hopper (Rondomat only):

Increases the storage capacity

4. Biomat & Rondomat assembly

4.1 Preparation

- Check that all necessary parts and mounting components are present (screws, nuts, pipework, etc.).
- After the check, verify that the dimensions of the system match the drawing.

4.2 Assembly process

4.2.1 90° bottom feed

Step 1:

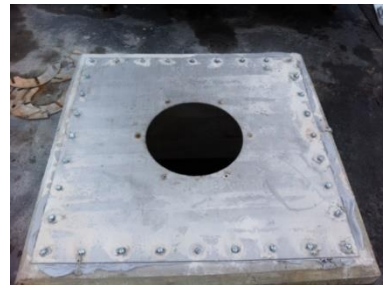
Start by checking the fit of the opening flange without the feed pipe.

If the opening flange fits, apply the sealing compound (Sikaflex) to the flange or to the opening itself.



Step 2:

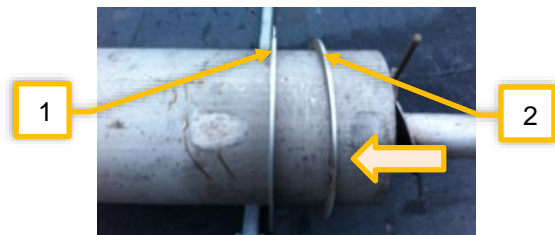
Then place the flange on top and anchor it in place. After fitting the flange, position the container and screw it in place provisionally.



Step 3:

Slide the clamping flange (1) with the seal onto the feed pipe.

Then slide on the welding flange (2).



Step 4:

The next step is to screw the feed pipe to the container.

Assembly

Step 5:

Seal the connection point and tighten the sealing clamps.



Step 6:

Adjust the weighing feet and anchor them in place.



Step 7:

Once everything is in position, weld on the welding flange.

Step 8:

Check the pendular compensation elements (stabilisers) to ensure that they are still loose.

Step 9:

Then fit the drive motors and complete all electrical work such as wiring and electrical connections, or have this work performed by an electrician.

4.2.2 Side feed

Step 1:

Slide the opening flange onto the feeder auger and secure it with lashing straps.



Step 2:

Then position the container and screw it in place provisionally.

Step 3:

Seal the opening flange to the fermenter with sealing compound (Sikaflex) and screw it tight.

Move the container to its end position and weld the feed pipe to the opening flange. Only perform the welding work on the fermenter if the latter is free of gas. Otherwise, perform all welding work before attaching the opening flange.



Step 4:

Adjust the weighing feet and anchor them in place. Then check the pendular compensation elements (stabilisers) and fit the drive motors.

Complete all electrical work, such as cable routing and connection of the weighing feet.



4.3 Top feed

Step 1:

Fit the inclined conveyor auger together with the feeder auger and secure them with lashing straps as in the case of side feed assembly.

Step 2:

Then position the container and screw it in place provisionally.

Step 3:

Apply the inclined conveyor to the opening before sealing it to the fermenter using sealing compound (Sikaflex) and screwing it tight.



Step 4:

Fit the trough auger and adjust the height via the trough auger support.



Step 5:

Then adjust the weighing feet, anchor them in place and check the pendular compensation elements (stabilisers).

Step 6:

Move the container to its end position and weld the feed pipe to the opening flange. Only perform the welding work on the fermenter if the latter is free of gas. Otherwise, perform all welding work before attaching the opening flange.

Step 7:

Fit the drive motors before completing the electrical work, such as cable routing and connection of the weighing feet.

4.4 Final inspection

After completing assembly, conduct a final trial run of the system. If everything is OK, remove any residual sealing compound and paint any unpainted, scratched surfaces.

As the last step, complete the final inspection and handover to the client.

(See final inspection report)



5. MultiMix assembly

5.1 Scope of delivery



The wooden crate contains the following items:

- Sealing material (foam rubber and Sikaflex sealing compound)
- Screws
- Tension cables
- Drive shaft guard
- Cable ties
- Paint (primer and nova grey)



Use the sealing material (foam rubber or Sikaflex sealing compound) on all screw joints.

5.2 Basic assembly sequence

Step 1:

Assembly of the supplied components generally starts with the last screw auger to be delivered (*screw 2* in the drawing) since its end point is generally fixed and cannot be moved.



Step 2:

The screw auger (*screw 2*) is pre-assembled such that, in order to connect it to the second supplied screw auger (*screw 1*), you need to pull it out of the casing tube and slide it through the joint on "*screw 1*" in arrow direction.



Stabilising/supporting the screw auger is the responsibility of the customer, and no corresponding parts are included in the scope of delivery.

Assembly

Step 3:

After positioning the Multimix, connect the hopper at the lower end of "screw 1" to the counter piece on the Multimix.



Step 4:

Once the Multimix is in position, apply the hopper.



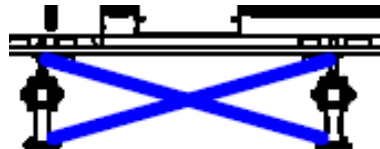
Step 5:

Attach the guard plate provided in the wooden crate to the holes above the electric motor such that the highlighted area is covered.



Step 6:

Attach the tension cables diagonally between the eyelets on the feet. This will counteract the forces that are produced during loading.



The electrical connection is the responsibility of the customer.

6. Start-up

6.1 First-time start-up



- All setting and adjusting tasks must be performed for first-time start-up.
- Before starting work, the operator must familiarise himself with all actuating devices and their function.
- It is too late to do so once work has started.
- Before every start-up, check the feeders for operational safety.
- Before start-up, instruct persons to leave the danger area.
- Before starting up the machine, ensure that there are no persons in the danger area.
- Also comply with the instructions in the relevant sections and in the appendix of these operating instructions.

The following steps must be completed for first-time start-up:

- Check setup
- Check power supply
- Test EMERGENCY STOP systems
- Fill and/or check auxiliary and operating materials



The control system must only be configured by authorised personnel or under the direction or on the part of the manufacturer. Alteration of the control parameters can result in significant dangers. The start-up process for the control system is covered in a separate manual.

6.2 Check before start-up

The points below will facilitate start-up of the feeders.

For more detailed information, refer to the relevant sections in the corresponding operating instructions. Check to ensure that all safety devices (covers, panels etc.) are in proper condition and are applied to the feeders in protective position.

- Check the general condition of the feeders.
- Check the machine for loose parts.
- **Check the function of the EMERGENCY STOP systems on a daily basis**

6.3 Conducting a trial run

After the machine is set up and prepared and before work begins, a trial run must be conducted.

6.3.1 Objective

Check to ensure the machine is set up correctly and functioning properly.

6.3.2 Prerequisites

- Machine is ready for operation
- Machine is fully set up



Before the trial run, familiarise yourself with the basic safety information specified in the relevant operating instructions as well as the information regarding first-time start-up and take all the prescribed safety precautions.

6.3.3 Procedure

- Turn on the machine as specified
- Perform all functions of the machine individually
- Adjust the settings if necessary

7. Conversion table

The following table facilitates the conversion of specific units

Variable	SI units (metric)		Factor	Imperial units	
	Unit name	Abbreviation		Unit name	Abbreviation
Area	Hectare	ha	2.47105	Acre	acres
Volume flow rate	Litres per minute	l/min	0.2642	US gallons per minute	gpm
	Cubic metres per hour	m ³ /h	4.4029		
Force	Newton	N	0.2248	Pound-force	lbf
Length	Millimetre	mm	0.03937	Inch	in.
	Metre	m	3.2808	Foot	ft.
Power	Kilowatt	kW	1.3410	Horse power	hp
Pressure	Kilopascal	kPa	0.1450	Pounds per square inch	psi
	Megapascal	MPa	145.0377		
	Bar (non-SI)	bar	14.5038		
Torque	Newton metre	Nm	0.7376	Pound-foot	ft·lbf
			8.8507	Pound-inch	n·lbf
Temperature	Degrees Celsius	°C	°C x 1.8 + 32	Degrees Fahrenheit	°F
Speed	Metres per minute	m/min	3.2808	Feet per minute	ft/min
	Metres per second	m/s	3.2808	Feet per second	ft/s
	Kilometres per hour	km/h	0.6215	Miles per hour	mph
Volume	Litre	L	0.2642	US gallon	US gal.
	Millilitre	ml	0.0338	US ounce	US oz.
	Cubic centimetre	cm ³	0.0610	Cubic inch	in ³
Weight	Kilogramme	kg	2.2046	Pound	lbs

8. Index

A		O	
Actuators	13	Obligations of personnel	11
		Obligations of the operating company	11
C		Opening flange	19; 20
Clamping flange	17	P	
D		Pendular compensation	18; 19; 20
DigiTouchBio	14	Personal protective equipment	11
E		Push-off system	14
Emptying stroke	13	Q	
F		Qualification of specialist personnel	11
Feed pipe	17	R	
Fermenter	19; 20	Replacement parts	7
First-time start-up	25	Residual risks	10
FWS weighing system	16	S	
G		Screw conveyor	13
Guard plate	24	Sealing clamps	18
I		Solenoid valve	13
Illustrations	8	Solenoids	13
L		Stabilisation	23
Liability	9	T	
M		Trial run	26
Magnetic sensor	13	Trough auger	20
		W	
		Welding flange	17



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