

Operating & Installation Instructions

Bowl feeder

BF20 / BF25 / BF30 / BF35 / BF40 / BF50



Translation of the Original Assembly Instructions EN

Bowl Feeder Type		Order Number					
		BF20	BF25	BF30	BF35	BF40	BF50
Right 12°	230 V / 50 Hz	50028117	50028101	50013729	50017360	50026172	50028132
	115 V / 60 Hz	50042193	50042198	50042202	50042206	50042210	50042214
Left 12°	230 V / 50 Hz	50028118	50028100	50013728	50017358	50026171	50028133
	115 V / 60 Hz	50042194	50042199	50042203	50042207	50042211	50042215
Right 18°	230 V / 50 Hz	50042197	50030815	50027880	50029657	50030826	50031622
	115 V / 60 Hz	50042195	50042200	50042204	50042208	50042212	50042216
Left 18°	230 V / 50 Hz	50032808	50030814	50027872	50029648	50030825	50031621
	115 V / 60 Hz	50042196	50042201	50042205	50042209	50042213	50042217

Dear Customer

Thank you for choosing our products and placing your trust and confidence in our company!

These operating and installation instructions contain all essential information you need about your product. Our aim is to provide the required information as concisely and clearly as possible. If, however, you still have any questions on the contents or suggestions, please do not hesitate to contact us. We are always grateful for any feedback.

Our team will also be glad to answer any further question you may have regarding the bowl feeder or other options.

We wish you every success with our products!

With kind regards

Your Afag team

© Subject to modifications

The bowl feeders have been designed by Afag Automation AG according to the state of the art. Due to the constant technical development and improvement of our products, we reserve the right to make technical changes at any time.

Updates of our documentations



Unlike the printed documents, our digital instructions manuals, product data sheets and catalogues are being continuously updated on our website.

Please keep in mind that the digital documents on our website are always the latest versions.

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1 General

1.1 Contents and purpose of this manual

These operating and installation instructions contain important information on assembly, commissioning, functioning and maintenance of the bowl feeder BF to ensure safe and efficient handling and operation.

Consistent compliance with these operating instructions will ensure:

- permanent operational reliability of the bowl feeders,
- optimal functioning of the bowl feeders,
- timely detection and elimination of defects (thereby reducing maintenance and repair costs),
- prolongation of the bowl feeders service life.

The illustrations in this manual shall provide you with a basic understanding of the module and may vary from the actual design of your module.

1.2 Explanation of symbols

The safety notes are marked by a pictogram and a signal word. The safety notes describe the extent of the hazard.

DANGER



Danger!

This safety note indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING



Warning!

This safety note points out a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION



Caution!

This safety note points out a potentially dangerous situation which, if not avoided, can result in minor or slight injuries.

NOTICE

This safety note points out a potentially dangerous situation which, if not avoided, can cause substantial damage to property and the environment.



This note contains important additional information as well as useful tips for safe, efficient and trouble-free operation of the bowl feeders.

Further warning signs:

Where applicable, the following standardised symbols are used in this manual to point out the various potential health risks.



Warning - Dangerous electrical voltage.



Warning - Risk of hand and finger injury due to uncontrolled movements of components.



Warning - Magnetic field

1.3 Additional symbols

In these assembly instructions the following symbols are used to highlight instructions, results, references, etc..

Symbol	Description
1.	Instructions (steps ...)
⇒	Results of actions
↻	References to sections
■	Enumerations not ordered

1.4 Warranty

The warranty terms for Afag handling components and handling systems are the following:

- 24 months from initial operation and up to a maximum of 27 months from delivery.
- Wear parts are excluded from the warranty (The customer is entitled to a product free of defects. *This does also apply to defective accessories and wear parts. Normal wear and tear are excluded from the warranty.*

The warranty covers the replacement or repair of defective Afag parts. Further claims are excluded.

The warranty shall expire in the following cases:

- Improper use of the module
- Non-observance of the instructions regarding installation, commissioning, operation and maintenance.
- Improper assembly, commissioning, operation and maintenance.
- Repairs and design changes carried out without prior technical instructions of Afag Automation AG
- Removing the serial number from the product
- Non-observance of the EC Machinery Directive, the Accident Prevention Regulations, the Standards of the German Electrotechnology Association (VDE) and these safety and assembly instructions.

1.5 Liability

No changes shall be made to the bowl feeders unless described in this manual or approved in writing by Afag.

Afag accepts no liability for unauthorized changes or improper assembly, installation, commissioning, operation, maintenance or repair work.

2 Safety instructions

2.1 General

This chapter provides an overview of all important safety aspects to ensure safe and proper use of the bowl feeders and optimal protection of personnel.

Safe handling and trouble-free operation of the bowl feeder requires knowledge of the basic safety regulations.

Every person carrying out installation, commissioning, maintenance work or operating the bowl feeder must have read and understood the complete user manual, especially the chapter on safety instructions.

Beyond this, there are rules and regulations regarding accident prevention that are applicable to the place of installation which must be observed.



Failure to follow the directions and safety instructions given in this instructions manual may result in serious hazards.

2.2 Intended use

The Afag bowl feeders BF are exclusively designed for storing, conveying, separating and sorting workpieces of different dimensions, design forms and material variants. Intended use also includes observing all the instructions in the operating manual.

The following uses of the BF are considered as **improper use** :

- Use in damp and wet areas
- Use at temperatures below 10°C or above 45°C
- Use in areas with highly flammable media
- Use in areas with explosive media
- Use in heavily polluted or dusty environments
- Use in aggressive environment (e.g. salty atmosphere)



The intended use of the module also includes:

- observance of all instructions given in this manual.
 - compliance with the inspection and maintenance work and the specifications in the data sheets,
 - using only original spare parts.
-

2.3 Foreseeable misuse

Any use other than or beyond the intended use described above is considered a misuse of the bowl feeder.

WARNING



Risk of injury if the bowl feeder BF is not used for its intended use or if it is foreseeable used incorrectly!

The improper use of the bowl feeder BF poses a potential hazard to the personnel.

- The bowl feeders may only be used in a technically perfect condition in accordance with its intended use and the instructions in this manual as well as in compliance with the safety requirements!

2.4 Obligations of the operator and the personnel

2.4.1 Follow these instructions

A basic prerequisite for safe and proper handling of the bowl feeders is a good knowledge of the basic safety instructions.



This manual, in particular the safety instructions contained therein, must be observed by all persons working with the bowl feeder.

2.4.2 Obligations of the operating company

In addition to the safety instructions given in this manual, the operating company must comply with the safety accident prevention and environmental protection regulations valid for the field of application of the bowl feeder.

The operating company is required to use only personnel who :

- have the necessary professional qualifications and experience,
- are familiar with the basic rules regarding occupational safety and accident prevention,
- have been instructed in the correct handling of the bowl feeder,
- have read and understood these operating instructions.

The operating company is also required to:

- monitor on an ongoing basis that the personnel work safely considering any potential hazard involved and the assembly instructions are observed,
- ensure that the assembly instructions are always kept at hand at the installation in which the bowl feeder is mounted,
- observe and communicate universally applicable laws and regulations regarding accident prevention and environmental protection,
- provide the necessary personal protective equipment (e.g., protective gloves) and instruct the personnel to wear it.

2.4.3 Obligations of the personnel

All personnel working with the modules are required to:

- read and observe these assembly instructions, especially the chapter on safety,
- observe the occupational safety and accident prevention regulations,
- observe all safety and warning signs on the modules,
- refrain from any activity that might compromise safety and health.



In addition, the personnel must wear the personal protective equipment required for carrying out their work. (👉chap. 2.6).

2.5 Personnel requirements

2.5.1 Personnel qualification

The activities described in the assembly instructions require specific requisites at the level of professional qualifications of the personnel.

Personnel not having the required qualification will not be able to assess the risks that may arise from the use of the bowl feeder thus exposing himself and others to the risk of serious injury. Therefore, only qualified personnel may be permitted to carry out the described activities on the bowl feeder.

These operating instructions are intended for skilled personnel (installers, system integrators, maintenance personnel, technicians), electricians and operating personnel.

The following is a description of the professional skills (qualifications) required for carrying out the different activities:

Qualified personnel:

Qualified personnel with appropriate training who are qualified due to their special know-how and fully familiar with the machine and who have been given instructions on how to carry out the task entrusted to them safely.

Qualified electrician:

Persons who have obtained their electrical qualifications through appropriate professional training and complementary courses that enables them to identify risks and prevent possible hazards resulting from electricity.

Operator (trained personnel):

Authorized persons who due to their specialized professional training, expertise and experience can identify risks and preventing possible hazards arising from the use of the machine.

2.6 Personal protective equipment (PPE)

The personal protective equipment serves to protect the personnel from hazards affecting their safety and health at work.

When working on/with the bowl feeder, the personnel must use the protective equipment assigned by the safety officer of the operating company or as required by safety regulations. In addition, the personnel are required to:

- wear the personal protective equipment provided by the operating company (employer),
- check the personal protective equipment for proper condition, and
- immediately notify the person responsible on site of any defects found on the personal protective equipment.

2.7 Changes and modifications

No changes may be made to the BF which have not been described in these operating instructions or approved in writing Afag Automation AG.

Exceptions to this are the processes described in ➡ chap. 6.2.4 "Assembly the bowl" and ➡ chap. 6.4 "Device-specific adjustment".

Afag Automation AG accepts no liability for unauthorised changes or improper assembly, installation, commissioning, maintenance or repair work.



The bowl feeders may not be changed or modified in any way, except with the prior written consent of Afag.

2.8 General hazards / residual risks

Despite the safe design of the BF and the technical protective measures taken, there still remain residual risks that cannot be avoided, and which present a non-obvious residual risk when operating the rotary modules.

Observe the safety instructions in this chapter and in the other sections of this manual to avoid damage to property and dangerous situations for the personnel.

2.8.1 General hazards at the workplace

The bowl feeder BF has been built according to the state-of-the-art and the applicable health and safety requirements. However, improper use of the bowl feeder may cause the following hazards to the personnel:

- danger to life and limb of the operator or third parties,
- on the modules themselves,
- property damage.



Always keep the operating instructions ready at hand at the workplace!
Please, also observe:

- the general and local regulations on accident prevention and environmental protection,
- the safety information sheet for the bowl feeder.

WARNING



Danger - Do not use in unsuitable environment !

The BF are designed for use in **non**-explosive atmospheres.

- Do **not** use the BF feeders in potentially explosive atmospheres!

CAUTION



Risk of injuries due to uncontrolled parts movements!

When operating the BF uncontrolled movements may occur which can cause personal injury or property damage.

- Only qualified personnel may work with or on the BF.
- Read this manual carefully before carrying out any work on or with the BF.

2.8.2 Danger due to electricity

WARNING



Danger! Risk of electric shock!

If work on electrical components is required, ensure that the work is carried out properly, failure to do so will cause serious or fatal injuries.

- Work on the machine's electrical equipment may only be performed by skilled electrician or trained personnel under the supervision of a skilled electrician in accordance with all relevant electrical regulations.

2.8.3 Mechanical hazards

CAUTION



Danger of injury by moving components!

Limbs can be crushed by moving components!

- Work on and with the BF may only be carried out by qualified personnel.
- Never reach into the system during normal operation!

2.8.4 Danger due to alternating magnetic fields



DANGER

Danger due to alternating magnetic fields!

The alternating magnetic fields occurring in the immediate vicinity of the HLF can affect the proper functioning of e.g., pacemakers and defibrillators.

- Persons with a pacemaker must keep a **safety distance** of **at least 5 cm**.

3 Technical data

3.1 Dimensional drawing BF20 / BF25 / BF30 / BF35 / BF40 / BF50

Type	BF20	BF25	BF30	BF35	BF40	BF50
A	180 mm	224 mm	265 mm	305 mm	350 mm	440 mm
B	146 mm	194 mm	194 mm	294 mm	294 mm	340 mm
C	2 mm	2 mm	2.5 mm	3 mm	3 mm	5 mm
D1	3 x M6	3 x M6	3 x M8	3 x M8	3 x M8	3 x M8
D2	4H7	4H7	5H7	5H7	5H7	6H7
D3	---	---	M6	M6	M6	M6
D4	---	5H7	5H7	5H7	---	M6
D5	M8	M10	M10	M10	M12	M16
E1	120 mm	120 mm	195 mm	195 mm	195 mm	280 mm
E2	87 mm	140 mm	140 mm	162 mm	214 mm	302 mm
E3	---	---	---	---	---	320 mm
E4	---	162 mm	162 mm	214 mm	---	---
E5	---	---	186 mm	186 mm	320 mm	400 mm
H	90 mm	93 mm	100 mm	103 mm	112 mm	150 mm
X1	120 °	120 °	120 °	120 °	120 °	120 °
X2	---	---	90 °	90 °	30 °	30 °
X3	---	---	---	---	---	30 °
X4	---	---	---	---	15 °	---

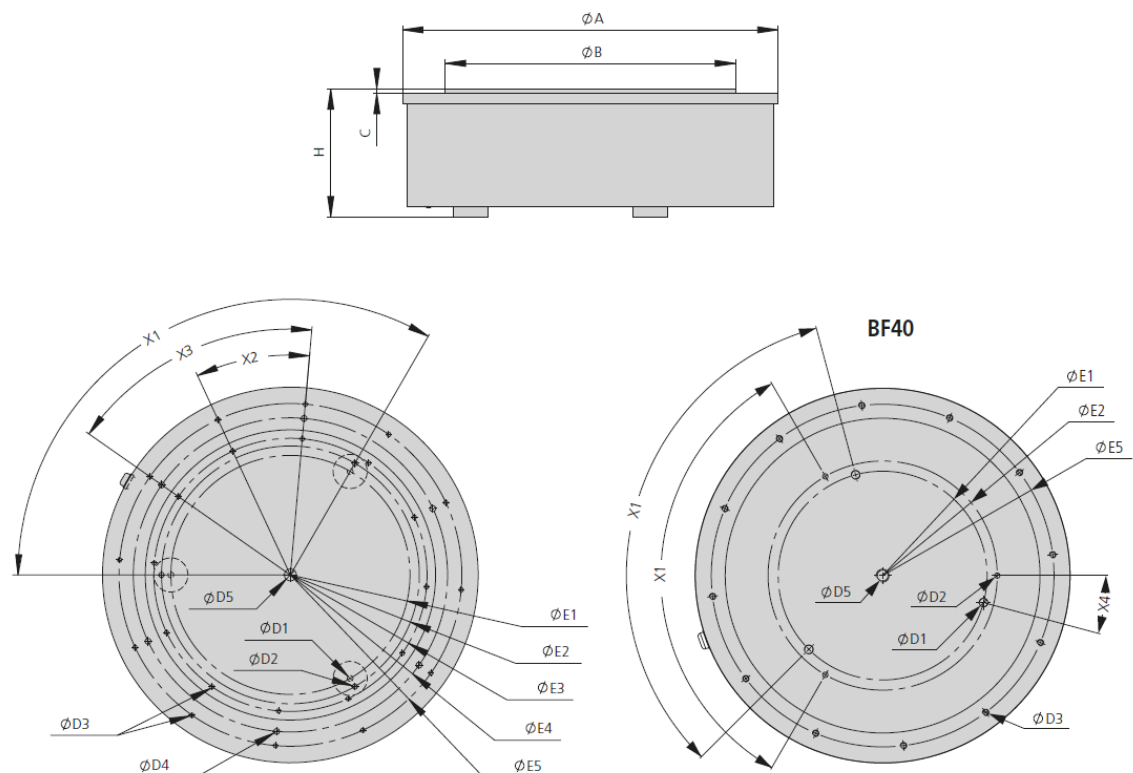


Fig. 1 Dimensional drawing - BF20 - BF50

Technical data

3.2 Technical data

3.2.1 Technical data BF20 / BF25

BF20 - BF25								
Operating temperature	10 - 45 °C							
Type	BF20	BF20	BF20	BF20	BF20	BF20	BF20	BF20
Order number	50028117	50028118	50042197	50032808	50042193	50042194	50042195	50042196
Mechanical vibration frequency	100 Hz	100 Hz	100 Hz	100 Hz	120 Hz	120 Hz	120 Hz	120 Hz
Mains connection (mains voltage/ mains frequency)	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz
Max. power consumption	69 VA	69 VA	69 VA	69 VA	69 VA	69 VA	69 VA	69 VA
Net weight	6.9 kg	6.9 kg	6.8 kg	6.8 kg	7 kg	7 kg	6.9 kg	6.9 kg
Admissible bowl weight ± 30 %	2 kg	2 kg	2 kg	2 kg	2 kg	2 kg	2 kg	2 kg
Admissible moment of inertia ± 10 %	1 kgdm ²	1 kgdm ²	1 kgdm ²	1 kgdm ²	1 kgdm ²	1 kgdm ²	1 kgdm ²	1 kgdm ²
Angle of the gradient of the leaf springs	12 °	12 °	18 °	18 °	12 °	12 °	18 °	18 °
Delivery direction	right	left	right	left	right	left	right	left
Protection type	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54
Type	BF25	BF25	BF25	BF25	BF25	BF25	BF25	BF25
Order number	50028101	50028100	50030815	50030814	50042198	50042199	50042200	50042201
Mechanical vibration frequency	100 Hz	100 Hz	100 Hz	100 Hz	120 Hz	120 Hz	120 Hz	120 Hz
Mains connection (mains voltage/ mains frequency)	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz
Max. power consumption	69 VA	69 VA	69 VA	69 VA	69 VA	69 VA	69 VA	69 VA
Net weight	10.3 kg	10.3 kg	10.2 kg	10.2 kg	10.6 kg	10.6 kg	10.4 kg	10.4 kg
Admissible bowl weight ± 30 %	3 kg	3 kg	3 kg	3 kg	3 kg	3 kg	3 kg	3 kg
Admissible moment of inertia ± 10 %	2.2 kgdm ²	2.2 kgdm ²	2.2 kgdm ²	2.2 kgdm ²	2.2 kgdm ²	2.2 kgdm ²	2.2 kgdm ²	2.2 kgdm ²
Angle of the gradient of the leaf springs	12 °	12 °	18 °	18 °	12 °	12 °	18 °	18 °
Delivery direction	right	left	right	left	right	left	right	left
Protection type	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54

Included in delivery

- 6x Leaf spring BF
- 12x Spacer BF

3.2.2 Technical data BF30 / BF35

BF30 - BF35								
Operating temperature								10 - 45 °C
Type	BF30	BF30	BF30	BF30	BF30	BF30	BF30	BF30
Order number	50013729	50013728	50027880	50027872	50042202	50042203	50042204	50042205
Mechanical vibration frequency	100 Hz	100 Hz	100 Hz	100 Hz	120 Hz	120 Hz	120 Hz	120 Hz
Mains connection (mains voltage/ mains frequency)	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz
Max. power consumption	135 VA	135 VA	135 VA	135 VA	135 VA	135 VA	135 VA	135 VA
Net weight	14.4 kg	14.4 kg	14.3 kg	14.3 kg	14.8 kg	14.8 kg	14.6 kg	14.6 kg
Admissible bowl weight ± 30 %	4 kg	4 kg	4 kg	4 kg	4 kg	4 kg	4 kg	4 kg
Admissible moment of inertia ± 10 %	4.5 kgdm ²	4.5 kgdm ²	4.5 kgdm ²	4.5 kgdm ²	4.5 kgdm ²	4.5 kgdm ²	4.5 kgdm ²	4.5 kgdm ²
Angle of the gradient of the leaf springs	12 °	12 °	18 °	18 °	12 °	12 °	18 °	18 °
Delivery direction	right	left	right	left	right	left	right	left
Protection type	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54
Type	BF35	BF35	BF35	BF35	BF35	BF35	BF35	BF35
Order number	50017360	50017358	50029657	50029648	50042206	50042207	50042208	50042209
Mechanical vibration frequency	100 Hz	100 Hz	100 Hz	100 Hz	120 Hz	120 Hz	120 Hz	120 Hz
Mains connection (mains voltage/ mains frequency)	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz
Max. power consumption	135 VA	135 VA	135 VA	135 VA	135 VA	135 VA	135 VA	135 VA
Net weight	21.1 kg	21.1 kg	21 kg	21 kg	21.5 kg	21.5 kg	21.3 kg	21.3 kg
Admissible bowl weight ± 30 %	6 kg	6 kg	6 kg	6 kg	6 kg	6 kg	6 kg	6 kg
Admissible moment of inertia ± 10 %	8.8 kgdm ²	8.8 kgdm ²	8.8 kgdm ²	8.8 kgdm ²	8.8 kgdm ²	8.8 kgdm ²	8.8 kgdm ²	8.8 kgdm ²
Angle of the gradient of the leaf springs	12 °	12 °	18 °	18 °	12 °	12 °	18 °	18 °
Delivery direction	right	left	right	left	right	left	right	left
Protection type	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54

Inlcuded in delivery

- 6x Leaf spring BF
- 12x Spacer BF

Technical data

3.2.3 Technical data BF40 / BF50

BF40 - BF50								
Operating temperature								10 - 45 °C
Type	BF40	BF40	BF40	BF40	BF40	BF40	BF40	BF40
Order number	50026172	50026171	50030826	50030825	50042210	50042211	50042212	50042213
Mechanical vibration frequency	100 Hz	100 Hz	100 Hz	100 Hz	120 Hz	120 Hz	120 Hz	120 Hz
Mains connection (mains voltage/ mains frequency)	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz
Max. power consumption	180 VA	180 VA	180 VA	180 VA	180 VA	180 VA	180 VA	180 VA
Net weight	30.3 kg	30.3 kg	30.3 kg	30.3 kg	31.1 kg	31.1 kg	30.9 kg	30.9 kg
Admissible bowl weight ± 30 %	9 kg	9 kg	9 kg	9 kg	9 kg	9 kg	9 kg	9 kg
Admissible moment of inertia ± 10 %	17 kgdm ²	17 kgdm ²	17 kgdm ²	17 kgdm ²	17 kgdm ²	17 kgdm ²	17 kgdm ²	17 kgdm ²
Angle of the gradient of the leaf springs	12 °	12 °	18 °	18 °	12 °	12 °	18 °	18 °
Delivery direction	right	left	right	left	right	left	right	left
Protection type	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54
Type	BF50	BF50	BF50	BF50	BF50	BF50	BF50	BF50
Order number	50028132	50028133	50031621	50031622	50042214	50042215	50042216	50042217
Mechanical vibration frequency	100 Hz	100 Hz	100 Hz	100 Hz	120 Hz	120 Hz	120 Hz	120 Hz
Mains connection (mains voltage/ mains frequency)	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	230 V/ 50 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz	115 V/ 60 Hz
Max. power consumption	950 VA	950 VA	950 VA	950 VA	950 VA	950 VA	950 VA	950 VA
Net weight	63.3 kg	63.3 kg	62.4 kg	62.4 kg	65.4 kg	65.4 kg	64.4 kg	64.4 kg
Admissible bowl weight ± 30 %	20 kg	20 kg	20 kg	20 kg	20 kg	20 kg	20 kg	20 kg
Admissible moment of inertia ± 10 %	65 kgdm ²	65 kgdm ²	65 kgdm ²	65 kgdm ²	65 kgdm ²	65 kgdm ²	65 kgdm ²	65 kgdm ²
Angle of the gradient of the leaf springs	12 °	12 °	18 °	18 °	12 °	12 °	18 °	18 °
Delivery direction	right	left	left	right	right	left	right	left
Protection type	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54

Included in delivery

- 6x Leaf spring BF
- 12x Spacer BF

3.3 Accessories


3.3.1 Utilities for settings

Type	Order Number					
	BF20	BF25	BF30	BF35	BF40	BF50
Centring angle	50118490	50118517	50118531	50118597	-	-
Distance gauge	50185535	50185535	50185536	50185536	50185537	50185538

3.3.2 Controller

Type	Power supply	Order Number	Note
IRG1-S	230V/50Hz	50360105	Control without timer function
	115V/60Hz	50360106	External setpoint setting
MSG801	230V/50Hz - 115V/60Hz	50391818	Sensor feed, timer function, valve and interface outputs
MSG802	230V/50Hz - 115V/60Hz	50391819	Sensor feed



For more information on the controller, see  chap. 6.3 and the controller manufacturer's instructions.

4 Transport, packaging and storage

4.1 Safety instructions



CAUTION

Danger of injury due to improper transport equipment!

The improper use of transport equipment such as industrial trucks, overhead cranes, slings can lead to injuries (e.g., crushing)!

- Observe transport and assembly instructions.
- Use the means of transport properly!

NOTICE

Damage to property due to improper lifting!

The bowl feeder must not be lifted by the feed bowl or the arrangement elements! This can damage the bowl feeder!

- Lift the bowl feeder by the base only!



The bowl feeders are packed in the original packaging (cardboard box). Carefully remove the bowl feeder from the original packaging.

4.2 Scope of supply



The corresponding documentation is supplied with each bowl feeder (e.g. operating and installation instructions, etc.).



Fig. 2 Scope of delivery BF

[Unt]	Designation
1 x	Bowl feeder BF
1 x	Operating & Installation Instructions

4.3 Transport



No liability can be assumed for damages caused by improper installation on the part of the operating company.



The following conditions must be complied with for transport and storage:

- Storage temperature: 0-50 °C
 - Relative air humidity: < 90%, non condensing
-

4.4 Packaging

The bowl feeder is transported in the Afag Automation AG transport packaging. If no Afag packaging is used, the bowl feeder must be packed in such a way that it is protected against shocks and dust.

NOTICE

Risk to the environment due to incorrect disposal of the packaging material

Environmental damage can be caused by incorrect disposal of the packaging material.

- Dispose of the packaging material in an environmentally sensitive way in accordance with the local environmental regulations.
-

4.5 Storage

If the bowl feeder is stored for an extended period, observe the following:

- Store the bowl feeder in the transport packaging.
- Do not store the telescope spindle axes outdoors or expose them to weather conditions.
- The storage space must be dry and dust free.
- Room temperature of the storage space: 0-50 °C.
- Relative air humidity: < 90% non condensing.
- Protect the bowl feeder from dirt and dust.

5 Design and description

5.1 Structure of the BF20 - BF50

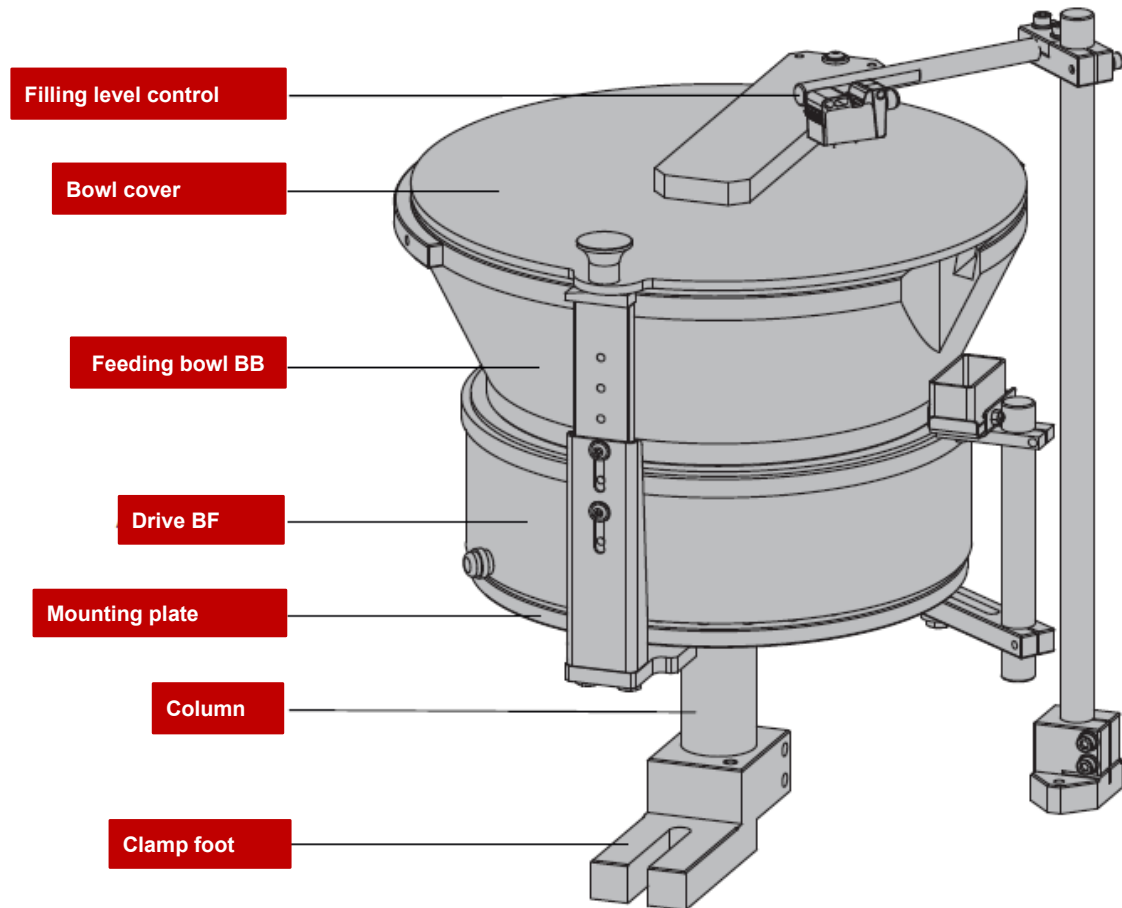


Fig. 3 Structure of the bowl feeder BF20 - BF50

The bowl feeder BF is used in conjunction with a bowl for storing, transporting, separating and sorting bulk goods.

The transport movement is generated by vibration. Here, the parts are moved in the transport direction by micro-jumps.



The bowl feeders are to be operated in combination with an Afag controller. Only in this combination can optimum conveying behaviour be guaranteed.

5.2 Description of the BF20 - BF50

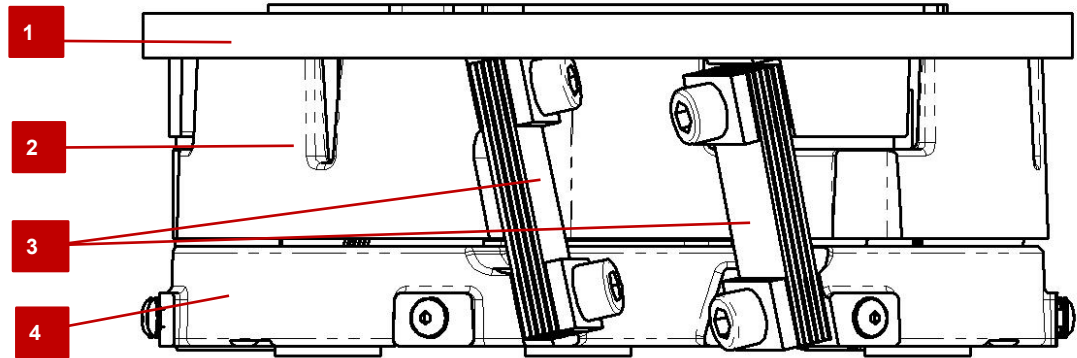


Fig. 4 Bowl feeder BF without cover

- | | |
|---------------------|------------------------|
| 1. Working mass 3. | Leaf spring assemblies |
| 2. Counterweight 4. | Base ring |

Afag BF bowl feeders use a vibration force compensation system based on the counter-vibration principle. In this case a utility weight (1) vibrates exactly opposite to a counterweight (2).

The working mass is essentially formed by the mounting plate, the bowl and the magnetic anchor. The counterweight is formed by the counter ring and the vibration magnet. The utility and counterweights are secured to a base ring (4) by leaf spring assemblies (3).

If the mass moments of inertia and mass specified in ➡ chap. 3 are not exceeded when the utility and counterweights vibrate, exactly equal reaction forces are generated, which are then transferred to the base ring (4) through the leaf spring assemblies (3).

As a result of this opposite vibration of the utility weight and counterweight, these reaction forces almost totally cancel each other on the base ring (4).

6 Installation, assembly and setting

For safe operation, the module must be integrated into the safety concept of the system in which it is installed.

During normal operation, it must be ensured that the user cannot interfere with the working area of the bowl feeder. This can be achieved through suitable protective measures (e.g., enclosure, light grid).

When the system is running in special operating modes, it must be ensured that there is no danger to the operator.



The system operator is responsible for the installation of the bowl feeder in a system!

6.1 Safety instructions

WARNING

Danger! Risk of electric shock!

If work on electrical components is required, ensure that the work is carried out properly, failure to do so will cause serious or fatal injuries.

- Work on the machine's electrical equipment may only be performed by skilled electrician or trained personnel under the supervision of a skilled electrician in accordance with all relevant electrical regulations.
- Disconnect the power supply before assembly and disassembly work and when making changes to the installation!



No liability for damages can be assumed for damages caused by improper installation on the part of the operator.



Observe the safety instructions in ➡ chap. 2 "Safety instructions" of this manual as well as the instructions in ➡ chap. 6.3.

6.2 Assembly

6.2.1 Tightening torques

Tightening torques M_{Sp} in [Nm] for shaft bolts with metric ISO standard threads and head rests according to DIN 912 or DIN 931.

Screw	Tightening torques M_{Sp} in [Nm]		
	Strength class 8.8	Strength class 10.9	Strength class 12.9
M4	2.8	4.1	4.8
M5	5.5	8.1	9.5
M6	9.5	14.0	16.5
(M7)	15.5	23.0	27.0
M8	23.0	34.0	40.0
M10	46.0	68.0	79.0
M12	79.0	117.0	135.0
M14	125.0	185.0	215.0
M16	195.0	280.0	330.0
M18	280.0	390.0	460.0
M20	390.0	560.0	650.0
M22	530.0	750.0	880.0
M24	670.0	960.0	1120.0
M27	1000.0	1400.0	1650.0
M30	1350.0	1900.0	2250.0

6.2.2 Definition of the feed direction

For the bowl feeder, the feed directions are defined as follows:

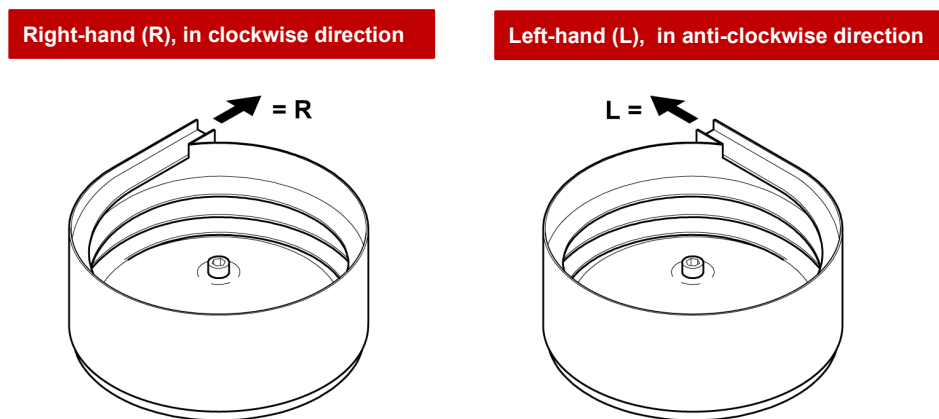


Fig. 5 Defined feed direction

6.2.3 Fixing bowl feeder

There are three vibrating metal buffers on each module to which the bowl feeder can be bolted to the substructure.



Preferably, the units are mounted on a plate that can be rotated and adjusted in height via a centre column.

Corresponding substructure parts are available from Afag.

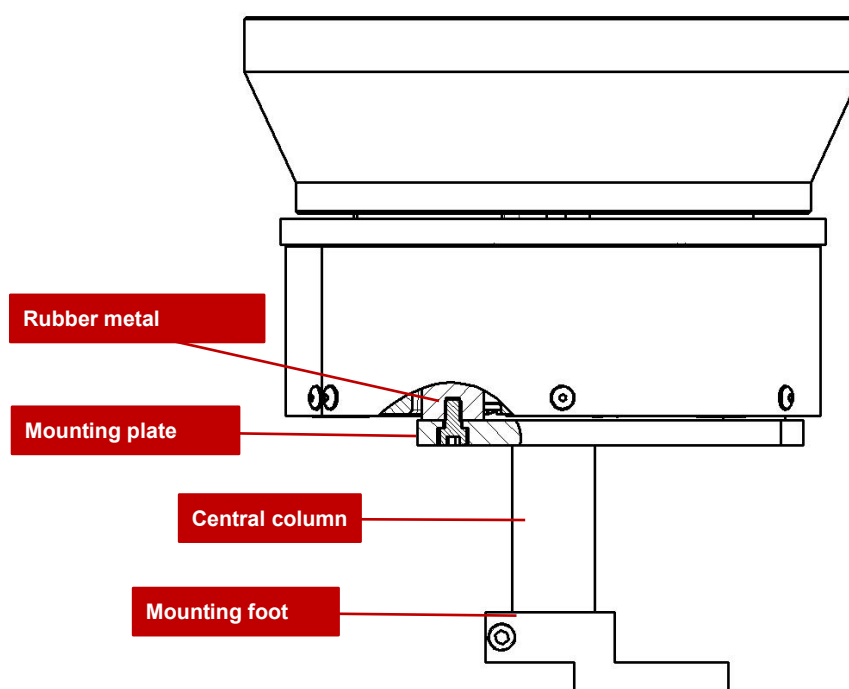


Fig. 6 Drive attachment



Another mounting option is direct mounting on a base plate.

Suitable Afag standard parts are available for complete station set-ups in conjunction with Afag bowl feeders.

6.2.4 Mounting the bowl

The bowl is fixed to the bowl feeder by means of a central fixing screw on the fixing plate provided.

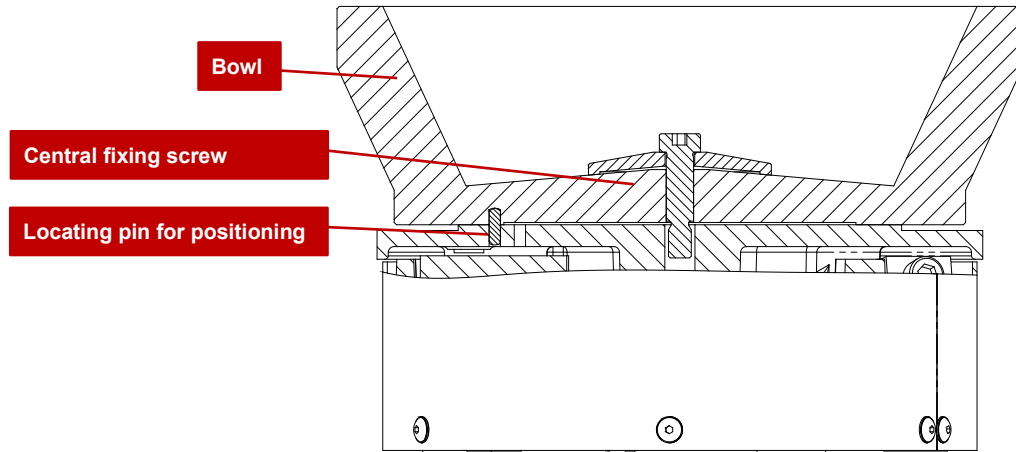


Fig. 7 Bowl fastening

Torques

The fastening screw must be tightened with the respective torque (see table) to generate the required frictional connection.

Types	BF20	BF25	BF30	BF35	BF40	BF50
Tightening torque [Nm]	15	30	30	30	50	80

Positioning

Fitting holes are provided on the mounting plate through which the bowl can be precisely positioned on the BF drive.

This eliminates the need to set up the interface on the bowl outfeed again when changing the bowl, or when reassembling a bowl that has been dismantled for cleaning or repair.

Feeding bowls with other types of fastening, e.g., an edge fastening, require special adapter plates.




To ensure proper functioning of the units, the max. permissible mass moment of inertia and weights of the feed bowl must not be exceeded.

Mass moment of inertia and weights depend on the shape of the feed bowls.

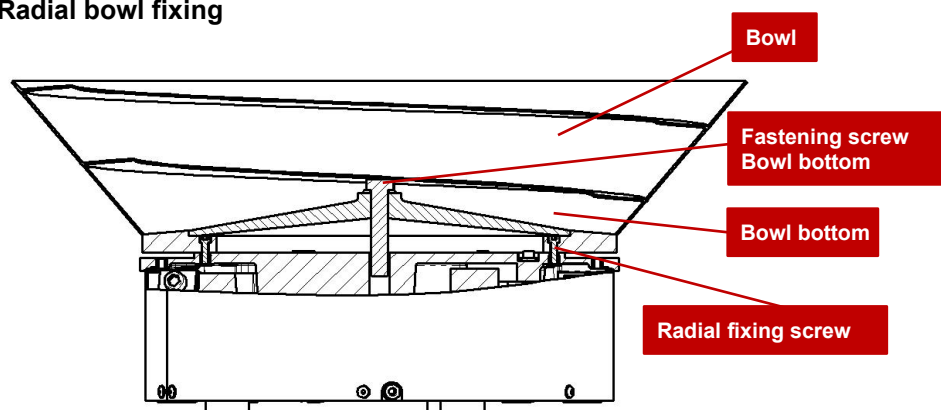
6.2.5 Radial attachment of the bowl

Larger feeding bowl are usually no longer fastened centrally, but by means of several radially arranged screws.

For bowl diameters ($> 500\text{mm}$), the radial bowl fixing should generally be selected. The dimensions for radial bowl fixing are given in  chap. 3.2 .

Depending on the bowl design, the centre bore of the BF bowl feeder can be used to attach a bowl base, or to centrally align the bowl.

Radial bowl fixing



6.3 Electrical connection

WARNING



Danger! Risk of electric shock!

Improperly performed work can result in serious or fatal injuries.

- Work on the machine's electrical equipment may only be performed by skilled electrician or trained personnel under the supervision of a skilled electrician in accordance with all relevant electrical regulations.

Important notes on the electrical connection

- The mains supply must be provided by the customer via a residual current circuit breaker!
- The feeder may only be operated with the mains supply specified on the type-plate!
- Emergency-STOP devices must remain effective in all operating modes. Unlocking the Emergency-STOP devices must not cause an uncontrolled restart!

Power connection via controller

The BF is connected to the AC mains 230 V/50 Hz via a control unit type IRG. The design for other mains voltages and frequencies is possible, e.g., 115V/60Hz.

The IRG1-S controller is available for controlling the BF. For the BF50, use a control unit with 12A RMS load capacity instead of the IRG1-S.

The MSG801 or MSG802 can also be used. An additional CEE appliance plug (Fig. 8) is required for the MSG controls (order no.: 11006982!).

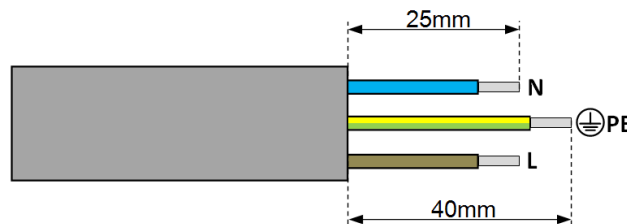


Fig. 8 Cable end additional plug

The bowl feeder operates in full-wave mode at twice the mains frequency, i.e., at 50Hz AC with a mechanical vibration frequency of 100Hz.

Vibration displacement and thus the transport speeds are infinitely adjustable due to magnet current and thus magnetic force variability. All IRG types operate with soft-starting and offer different options for mounting, attachment and control.



A detailed description of the controller can be found in the AFAG general catalogue. Third-party control units can also be used, provided they meet the technical conditions.

6.4 Settings

The BF is a spring and mass vibration system that operates based on its resonance properties. All basic devices are set by the manufacturer to the mass moment of inertia and weight values specified in ➞ chap. 3.2. If you comply with these values and tolerances, there will be no need to adjust the bowl feeder BF.

However, if you fail to comply with these values, the inherent frequency of the BF will have to be adjusted accordingly. Once the assembled feeder bowl has been mounted, the inherent frequency of the drive unit must be tuned to the feeder bowl.

Furthermore, the BF is dimensioned in such a way that mechanical tuning is no longer necessary if the tolerance range for mass moment of inertia and mass specified in (➞ chap. 3.2) are observed.



The mass and the mass moment of inertia of the bowl used must not exceed the values and tolerances specified in chap. 3.2, otherwise optimum pumping behaviour can no longer be ensured!

If the required tolerances are exceeded, mechanical adjustment by installing or removing leaf springs is mandatory. In this case, optimum delivery behaviour is no longer guaranteed. In addition, the vibration force balance deteriorates, introducing more vibration into the substructure, which can affect the whole environment.

Note on setting the natural frequency

The bowl feeder must always be tuned **"subcritical"**, i.e., the **natural frequency** is approx. 5% **above the excitation frequency**.

- With a 100Hz feeder (6000 vibrations per minute), this results in a natural frequency of approx. 104Hz.
- With a 120Hz feeder (7200 vibrations per min.), the natural frequency is approx. 126Hz.
- Only one spring assembly may be loosened at a time.
- The spring assemblies connected to the counter bowl must not be loosened.

Tuning the drive

To tune the output drive, proceed as follows:

1. To tune the drive, the fully set up feed bowl must be screwed onto the basic unit!
2. Unscrew the housing of the BF and attach the feed bowl to the drive.
3. Position the part in the feed bowl and set a low feed speed via the control unit.
4. Slowly loosen the lower fastening screw on one of the three spring assemblies on the bowl side.
 - Observe the conveying speed of the parts inside the bowl.
5. If the conveying speed of the parts increases briefly and then decreases again when the screw is loosened further, the drive is correctly tuned, i.e., the natural frequency is slightly above the excitation frequency.
6. Tighten the fastening screw. Use the assembly aid (➞ chap. 3.3.1) to prevent distortion of the BF feeder.

⇒ The process is completed.

In the following cases, the natural frequency of the bowl feeder is not set correctly and must be readjusted.

- The conveying speed only increases when the screw is loosened and does not decrease even when the screw is completely loosened.
 - the drive is tuned too hard.
 - In this case, a leaf spring must be removed, and the tuning of the frequency repeated.
 - So many leaf springs must be removed until the conveying speed of the part first increases briefly and then decreases again when the screw is loosened further.
 - If several leaf springs must be removed, this must be done as evenly as possible on the three spring packs on the bowl side.
 - The installed leaf springs must be clean and dry.
- ⇒ The process is completed.

- If the conveying speed decreases immediately when the screws are loosened, the bowl feeder is still set too soft.
 - In this case, a leaf spring must be installed, and the tuning of the frequency repeated.
 - So many leaf springs must be removed until the conveying speed of the part first increases briefly and then decreases again when the screw is loosened further.
 - If several leaf springs must be installed, this must again be done as evenly as possible on the three spring packs on the bowl side.
 - The installed leaf springs must be clean and dry.
- ⇒ The process is completed.



After the natural frequency setting, check the magnetic gap.

This can be slightly misaligned when installing or removing the spring. If this is the case, the magnet gap must be readjusted (➡ chap. 6.4.1).

6.4.1 Set magnetic gap

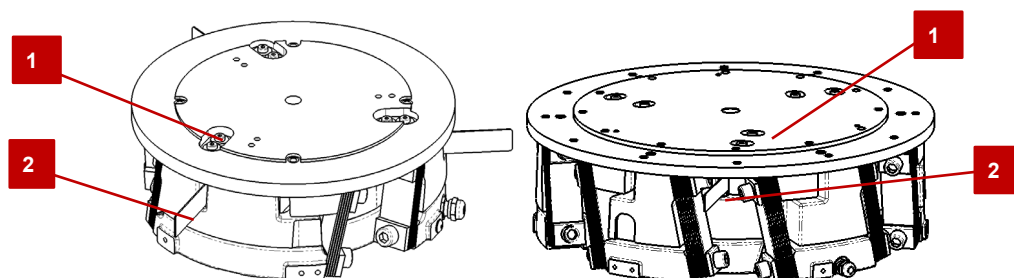


Fig. 9 Adjustment with distance gauge BF20-BF40 (left) and BF50 (right)

1. Magnetic anchor
2. Distance gauge

Procedure to readjust the magnetic gap of the oscillating magnets:

1. Remove the cover.
 2. Loosen the fastening screw of the magnetic anchor (1).
 3. Insert the distance gauge (2) (➡ chap. 3.3.1) into the opening provided on the counterweight.
 - Make sure that a distance gauge has been inserted for each vibrating solenoid and that it protrudes from the drive.
 4. Apply 24 VDC to the drive.
 - Magnet and anchor attract each other.
 5. The desired magnetic gap is set by the inserted distance gauge.
 6. Retighten the fastening screws with the appropriate torque (see table below).
 7. Switch off the 24 VDC voltage and remove the distance gauge out of the opening of the drive.
 - Make sure that the distance gauge can be easily removed, but does not have too much play, otherwise the magnetic gap will be too large.
 - If the magnetic gap is too large, the process must be repeated.
- ⇒ The process is completed.

Tightening torques

Type	BF20	BF25	BF30	BF35	BF40	BF50
Magnet gap [mm]	0.8	0.8	1.2	1.2	1.3	1.5
Tightening torque [Nm]	2.8	2.8	5.5	5.5	5.5	9.5

7 Operation



After the control unit is switched on, no further settings are necessary in normal operation.

Only the refilling of the feed bowl must be ensured for uninterrupted running.

7.1 Safety instructions for commissioning

DANGER



Risk of injury due to electric shock!

Unauthorized removal of the plug cover causes a risk of electric shock!

- Do NOT dismount the plug cover!
- Avoid any action on the module which could endanger safety!

CAUTION



Noise hazards!

In certain cases, an impermissible noise level may result (e.g. when opening the lid of the noise protection hood for filling or refilling the parts).

- Wear hearing protection during noise-critical activities!

NOTICE

Material damage due to jamming of the parts!

If the bulk material is not filled into the centre of the feed bowl, the arrangement device can be damaged or the required output can no longer be achieved, as the falling parts can jam in the arrangement device!

- Fill bulk material into the centre of the feed bowl!

7.2 Preparatory activities for commissioning

The bowl feeder is designed for operation with AFAG - controllers. The modules can also be operated with other control systems.

The operation of the AFAG controllers is described in the separate installation manual for the respective controllers.

Perform a test run in preparation for commissioning. To turn de connectors, proceed as follows:

1. Connect the controller to the computer (operating software must be installed).
 - The use of the operating software is described in the installation instructions for the controllers used.
2. If the module is supplied with an Afag controller, no further action is required (operating parameters already stored in the controller).
3. When using a different controller, special cables must be made, and the operating parameters determined.
 - ⇒ The test operation can now be carried out.

7.3 First commissioning

Proceed carefully and follow the instructions step by step when commissioning the modules for the first time:

1. Observe the permissible technical values (➡ Chapter 2.8).
 - Payload, frequency, moment load
2. First, make sure that there are no persons or tools in the working area.
3. Perform test run:
 - Start with slow movements,
 - Then continue under normal operating conditions,
 - ⇒ Commissioning is completed.

8 Fault elimination

8.1 Safety instructions



Observe the safety instructions in ➡ chap. 2 "Safety instructions" of these installation instructions as well as the safety instructions of the controller manufacturer.

8.2 Fault causes and remedy

The following table contains an overview of possible fault causes and how to proceed to eliminate them.

Fault	Possible cause	Remedy:
Bowl feeder does not run after switching on	<ul style="list-style-type: none"> ▪ Mains voltage too low or unstable ▪ Connecting cable between bowl feeder and control unit not plugged in ▪ Controller is switched off <0> ▪ Fuse in controller defective 	<ul style="list-style-type: none"> ▪ Check mains voltage, adjust feeder if necessary (take existing mains voltage into account) ▪ Checking the connection, plugging in the connector ▪ Switch on control unit <1> ▪ Replace fuse.
Bowl feeder does not provide the required performance	<ul style="list-style-type: none"> ▪ Loosen the fastening screws of the spring assemblies ▪ Loosen the fastening screw between the oscillating plate and the bowl ▪ Air gap between solenoid coil and anchor screw misaligned ▪ Spring broken ▪ Regulator on the controller misaligned 	<ul style="list-style-type: none"> ▪ Remove the housing and tighten the fastening screws ▪ Tighten the fastening screws ▪ Remove housing and readjust air gap ▪ Remove housing and replace broken spring (➡ 9.3.3) ▪ Setting of the reference position
Bowl feeder generates strong noise	<ul style="list-style-type: none"> ▪ Shuttering loosened ▪ Solenoid coil or anchor (yoke) loosened ▪ Foreign body between bowl outlet and linear section ▪ Too small air gap between bowl outlet and linear section ▪ Too small air gap between solenoid coil and magnet anchor 	<ul style="list-style-type: none"> ▪ Tighten the screws of the housing ▪ Tighten the screws ▪ Remove foreign body ▪ Loosen the bowl and turn it a little. Afterwards, the transitions between bowl outlet and the linear section must be checked ▪ Setting of the air gap

9 Maintenance and repair

9.1 General notes

The bowl feeder requires minimal maintenance. Depending on the type and manner of use, signs of wear may occur which can be compensated for by readjusting the adjustment plates.

9.2 Safety instructions

WARNING



Danger of injury due to improper maintenance!

Improperly carried out maintenance activities can cause considerable damage to property and serious injury.

- Only use trained specialist personnel to carry out the activities.
- Always wear personal protective equipment when carrying out maintenance and repair work!

WARNING



Risk of injuries due to uncontrolled parts movements!

Signals from the controller can trigger unintentional movements of the bowl feeder, which can cause injury.

- Before starting any work on the bowl feeder, switch off the controller and secure to prevent it from being switched on.
- Observe the operating instructions of the controller used!



Also observe the safety instructions in ➞ chap. 2 „Safety instructions“ in this manual.

9.3 Maintenance activities and maintenance intervals




The maintenance intervals must be strictly observed. The intervals refer to a normal operating environment.

9.3.1 Overview of the maintenance points



Fig. 10 Maintenance of bowl feeder BF

No.	Maintenance point	Maintenance work	Interval	System [On/Off]	Remarks
1	Leaf spring	Check, clean if necessary 	As required	[Off]	-
■ Check leaf springs for: <ul style="list-style-type: none"> - Wear, oxidation (increased resonance frequency) - Settling behaviour (reduced resonance frequency) 					

9.3.2 Check leaf springs for wear and oxidation

Depending on the operating condition and environment, the leaf springs can develop an oxidation layer on the contact surfaces, which can impair the vibration behaviour in the long term.

In these cases, it is necessary to remove and clean, or replace the leaf springs.

9.3.3 Replace leaf springs

To remove the leaf springs, please proceed as follows:

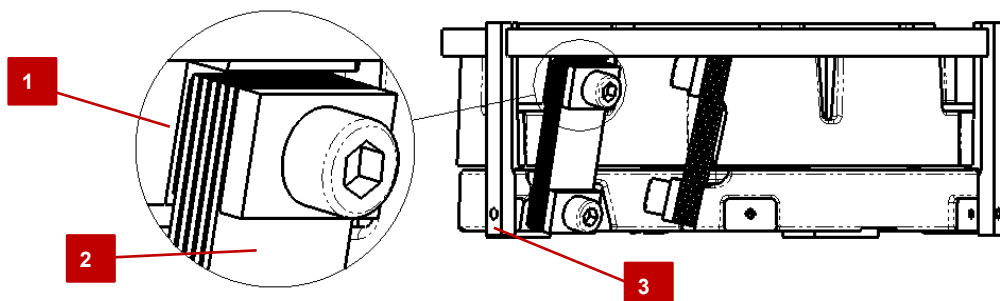


Fig. 11 Spring assembly and centring angle

1. Only one spring assembly may be loosened at a time.
2. Attach the centring angle (3) to the drive.
 - Counterweight and mounting plate are fixed.
 - A sagging or shifting of these parts is prevented.
3. Loosen the screws.
4. Replace leaf springs (2).
 - The number of leaf springs in a spring assembly and the structure of the spring assembly must correspond to the original spring assembly when installed. This is the only way to ensure the function of the module!
5. Retighten the screws with the appropriate tightening torque (see table below).
 - Make sure that the spacers (1) are not twisted.
6. Remove the centring angle (3) again.

⇒ The process is completed.



Do not oil or grease leaf springs! This would lead to the springs sticking together and negatively influence the oscillation behaviour

Type	Unit	BF20	BF25	BF30	BF35	BF40	BF50
Tightening torque	[Nm]	40	40	79	79	79	135

9.3.4 Further maintenance

Further maintenance is not required, if the ambient conditions listed below are complied with:

- Clean working area
- No use of splash water
- No abrasion or process dusts
- Environmental conditions as specified in the technical data

9.4 Spare and wear parts, repairs

Afag offers a reliable repair service. Defective modules can be sent to Afag for warranty repair within the warranty period.

After expiry of the warranty period, the customer may replace or repair defective modules or wear parts himself or send them to the Afag repair service.



Please note that Afag does not assume any warranty for modules that have not been replaced or repaired by Afag!

9.4.1 Spare parts

Designation		Power supply	Order no.
Vibrating magnet	BF20	230 V / 50 Hz	50066426
		115 V / 60 Hz	50066429
	BF25	230 V / 50 Hz	50066426
		115 V / 60 Hz	50066429
	BF30	230 V / 50 Hz	15215514
		115 V / 60 Hz	15138144
	BF35	230 V / 50 Hz	15215514
		115 V / 60 Hz	15138144
	BF40	230 V / 50 Hz	15215514
		115 V / 60 Hz	15138144
	BF50	230 V / 50 Hz	15031196
		115 V / 60 Hz	15160938

9.4.2 Wear parts

Designation		Order Number
BF20	Leaf spring	50030807
	Intermediate layer	50030808
	Rubber buffer	50041329
BF25	Leaf spring	50030807
	Intermediate layer	50030808
	Rubber buffer	50041329
BF30	Leaf spring	15151865
	Leaf spring	50013514
	Intermediate layer	50025641
	Rubber buffer	50041330
BF35	Leaf spring	15151865
	Intermediate layer	50025641
	Rubber buffer	50041330
BF40	Leaf spring	50030852
	Intermediate layer	50025641
	Rubber buffer	50041330
BF50	Leaf spring	50031626
	Intermediate layer	50031627
	Rubber buffer	50041331

10 Decommissioning and disposal

The bowl feeder must be properly dismantled after use and disposed of in an environmentally friendly manner.

10.1 Safety instructions

WARNING



Risk of injury due to improper decommissioning and disposal!

Improperly carried out activities can result in considerable material damage and serious injury.

- Only use trained specialist personnel to carry out the activities.
- Disconnect the media supply before dismantling the module!
- Only remove the bowl feeder when the controller is switched off and secured!

10.2 Decommissioning

If the bowl feeders are not used for a longer period, they must be properly commissioned and stored as described in ➡ chapter 4.5.

10.3 Disposal

The bowl feeders must be disposed of properly at the end of their service life and the raw materials used must be recycled. Observe the legal regulations and company requirements.

The bowl feeder must not be disposed of as a complete unit. Dismantle the bowl feeder and separate the various components according to type of material and dispose of them properly:

- Scrap the metallic materials.
- Hand over plastic parts for recycling.
- Sort the rest of the components by their material properties and dispose of them accordingly.

NOTICE

Risk to the environment due to incorrect disposal of the bowl feeder!

Environmental damage can be caused by improper disposal.

- Electronic parts, electrical scrap, auxiliary and operating materials must be disposed of by approved specialist companies.
- Information on proper disposal can be obtained from the responsible local authorities.

