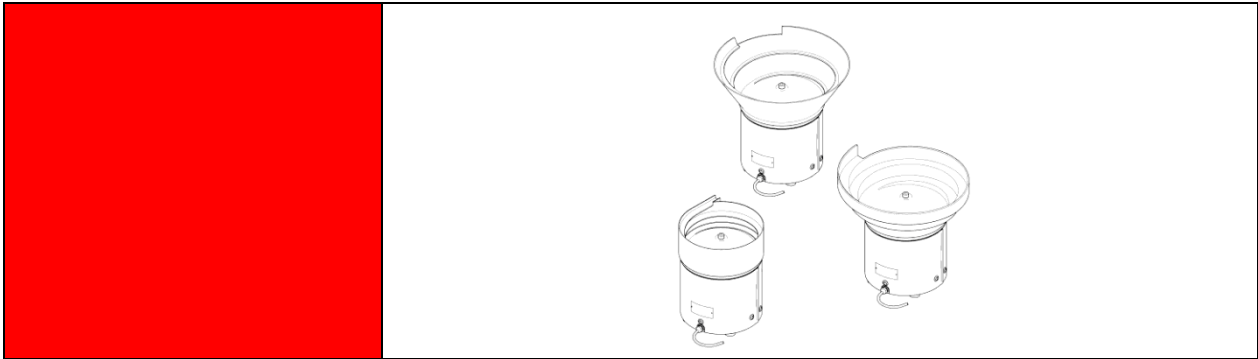


Bowl feeder

WV151-1 / WV201-1 / WV310-1



Translation of original operating instruction

Copyright by Afag GmbH

This operation instruction applies to:

Type			Order number
Bowl feeder WV151-1	25°	left	11005656
		right	11005657
	20°	left	11015890
		right	11015891
Bowl feeder WV201-1	25°	left	11005659
		right	11005660
	20°	left	11015892
		right	11015893
Bowl feeder WV310-1	25°	left	11005665
		right	11005666
	20°	left	11015894
		right	11015895

Version of Documentation:

BA_WV151-310_R3_E.docx

Release:

3.0

Date:

2009-12-23

Table of contents:

1	Declaration of incorporation for the incomplete machine.....	4
2	Safety instructions	5
2.1	<i>Notes on symbols and instructions</i>	5
2.2	<i>Basic safety instructions</i>	6
2.3	<i>Appropriate use</i>	6
3	Description of the Bowl feeder	7
3.1	<i>General</i>	7
3.2	<i>Functional description.....</i>	7
3.3	<i>Definition of the feed direction</i>	8
3.4	<i>Technical Data</i>	9
4	Assembly instructions	11
4.1	<i>Transport</i>	11
4.2	<i>Installing the unit.....</i>	11
4.3	<i>Fixing the bowl on the vibration plat</i>	12
4.4	<i>Power supply.....</i>	13
5	Operating instructions	13
5.1	<i>Correlations between the transport speed and the WV spring packages.....</i>	13
5.2	<i>Setting the distance between the plate and the support base</i>	15
5.3	<i>Standard operation.....</i>	18
6	Maintenance guidelines	19
6.1	<i>Troubleshooting and fault repair.....</i>	19
6.2	<i>Cleaning</i>	21
6.3	<i>Replacing springs or spring packages.....</i>	22
6.4	<i>Replacing the magnetic coil.....</i>	24
6.5	<i>Setting the air gap between magnetic coil and anchor bolt.....</i>	26
6.5.1	<i>Setting the air gap for WV151-1.....</i>	26
6.5.2	<i>Setting the air gap for WV201-1 / 310-1</i>	28
6.6	<i>Wear and Spare parts</i>	30
7	Accessories	31
7.1	<i>Mounting parts.....</i>	31
7.2	<i>Control device</i>	31
7.3	<i>Address for orders.....</i>	32
8	Disposal	32

1 Declaration of incorporation for the incomplete machine

Declaration of incorporation according to the EC-Machinery-Directive 2006/42/EC, Annex II B

The manufacturer: Afag GmbH, Wernher-von-Braun-Straße 5a, D-92224 Amberg
www.afag.com – Tel. +49 (0)9621 650 27-0

hereby declares, that the incomplete machine: **Bowl feeder**

Designation: **WV151-1 / WV201-1 / WV310-1**

Complies with the basic safety and health requirements of the Machinery Directive **2006 /42/EC Annex I**.

The incomplete machine also complies with the following:

Relevant EC Directives:

Machinery-Directive 2006/42/EC

Low Voltage Directive 2006/95/EC

EMC- Directive 2004/108/EC

Applied harmonised standards:

EN ISO 12100-1; EN ISO 12100-2

The technical documentation for this incomplete machine was prepared in accordance with Annex VII, Part B. Upon request, the manufacturer undertakes to transmit these technical documents electronically to national authorities, if requested.

Authorised representative for the compilation of the technical documentation:

Franz Edbauer
Product Development Manager ZTK
Afag GmbH

The start-up of the incomplete machine is prohibited until installed in a complete machine that complies with the regulations of the EC Machinery Directive and until the EC Declaration of Conformity according to Annex II A is available.

City, Date Company: Afag GmbH

Amberg, 23. Dec. 2009 First name, last name
Mr. Klaus Bott



Managing Director
Afag GmbH

2 Safety instructions



2.1 Notes on symbols and instructions


Symbols: Assembly and commissioning must be carried out by qualified personnel only and according to these operating instructions.

Please observe the meaning of the following symbols and notes. They are grouped into risk levels and classified according to ISO 3864-2.

 DANGER	
	<p>Indicates an immediate threatening danger.</p> <p>Non-compliance with this information can result in death or serious personal injuries (invalidity).</p>

 WARNING	
	<p>Indicates a possible dangerous situation.</p> <p>Non-compliance with this information can result in death or serious personal injuries (invalidity).</p>

 CAUTION	
	<p>Indicates a possibly dangerous situation.</p> <p>Non-compliance with this information can result in damage to property or light to medium personal injuries.</p>

NOTE	
	<p>Indicates general notes, useful operator tips and operating recommendations which don't affect safety and health of the personnel.</p>

2.2 Basic safety information

This operating manual provides the basis for the safe use and operation of the bowl feeder. This operating manual and, in particular, the included safety instructions have to be observed by all individuals working with and on the bowl feeder. In addition, all rules and regulations concerning the accident prevention applicable for the site of operation are to be complied with.

The operating manual must always be kept at the site of operation of the bowl feeder.

2.3 Appropriate use

The bowl feeders are intended for storing, transporting, separating and arranging component parts of different sizes, forms and materials.

The workpieces must meet the following requirements in order to ensure a problem-free operation:

- they must be free of oil, grease and burrs
- they must not be sticky
- they must not be statically charged
- they must not be magnetic (no self-magnetism)
- they must be free of dirt and not be mixed with foreign parts
- rubber parts can be powdered with talcum

WARNING



The KLF may not be used:

- a) in damply and wet area
- b) in temperature lower than 10°C or higher than 50°C
- c) in areas where readily flammable media are present
- d) in areas where readily explosive media are present
- e) in heavy polluted or dust- laden area
- f) in aggressive area (e.g. saliferous atmosphere)

3 Description of the Bowl feeder

3.1 General

In combination with a conveyor bowl, the bowl feeder is used for storing, transporting, separating and arranging bulk material. The material is moved by vibrations. Parts are moved by micro throws in the feeding direction.

The mass of the bowl should not exceed the value specified in chapter 3.4 as this cannot ensure optimum transport behaviour.

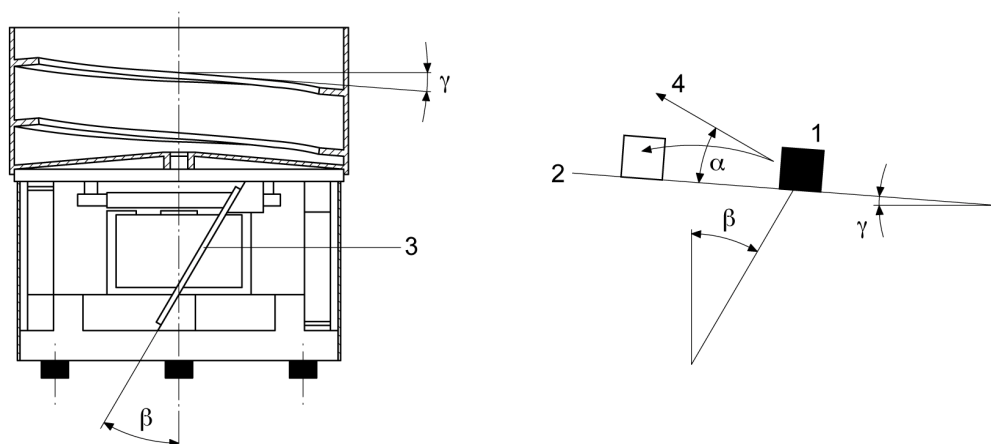
3.2 Functional description

A Bowl Feeder is a unit which transforms magnetic oscillations in order to use the feeding of work pieces.

The basic construction of a bowl feeder comprises the following elements. (See Figure 1)

- 1 Material to be conveyed
- 2 Conveyor line
- 3 Leaf spring
- 4 Projectile direction
- α Projectile angle
- β Angle of leaf spring inclination
- γ Pitch angle of the spiral

Figure 1



The magnet, connected to the support, creates a force which attracts reps. releases the oscillating plate dependent on the oscillation frequency of the power supply.

The pulsating movement of the oscillation plate causes the material to jump from the rail at each oscillation and is conveyed as a result of the angle of inclination of the leaf springs.

On a cycle of the 50 Hz alternating current supply, the magnet achieves twice its maximum pulling force while this is independent of the direction of the current flow. The magnet thereby produces an oscillating frequency of 100Hz. This 100Hz oscillation is necessary to achieve a smooth and gentle transport for small or light work pieces.

With heavy or large work pieces however, it is necessary to use an oscillating frequency of 50Hz. A half-wave of the mains supply is thereby blocked.

3.3 Definition of the feed direction

The feed directions for the WV are defined as follows:

Left-hand (L), in anti-clockwise direction

Right-hand (R), in clockwise direction

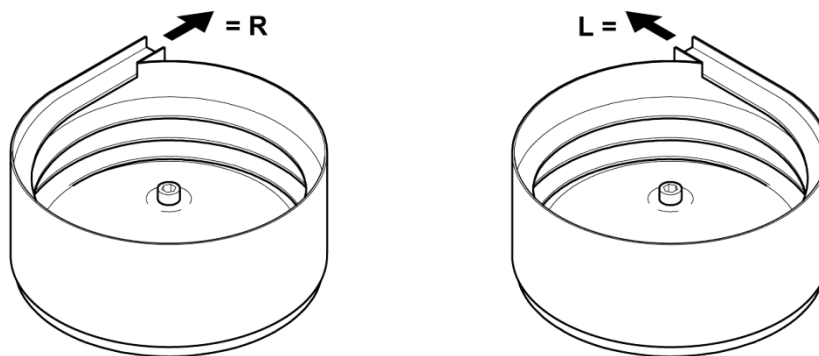


Figure 2

3.4 Technical Data

Figure 3

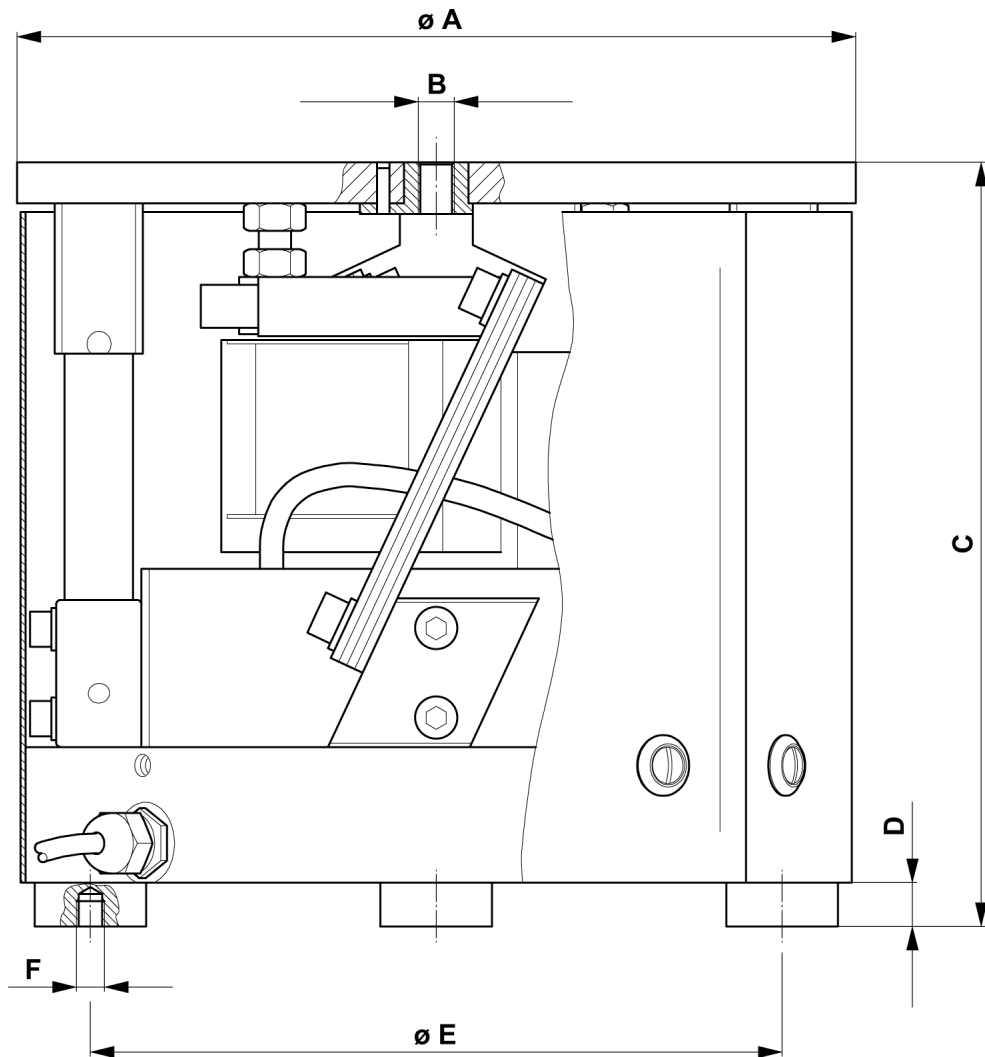


Table 1: Technical Data

Description		Units	WV 151-1	WV 201-1	WV 310-1
Dimensions	A	[mm]	146	194	294
	B	[mm]	M6	M8	M8
	C	[mm]	110	180	180
	D	[mm]	6	10	9
	E	[mm]	120	160	226
	F	-	M5 (4x)	M6 (4x)	M6 (4x)
Operating voltage		[VAC]	230 / 115		
Power frequency		[Hz]	50 / 60		
Coil resistance (single coil)		[Ohm]	80	16	16
Maximum current draw		[A]	0,3	0,8	0,8
Device fuse		[A]	F 0.3	F 0.8	F 0.8
Protection class		[IP]	54		
Oscillation frequency (full wave)		[min-1]	6000/7200	6000/7200	6000/7200
Weight (without bowl)		[kg]	6	17	36
Maximum filling weight		[kg]	0,8	6	8
Thickness of spring package		[mm]	5	14	21
Spring thickness (standard)		[mm]	0.5/1/1.5/2	1/1,5/2/2.5/3	1/1,5/2/2.5/3
Air gap (magnet anchor bolt)		[mm]	0.3-0.5	0.3-0.7	0.3-0.8
Installed magnet type		-	EL 60-20	EL 84-29	EL 84-29
Magnet performance		[VA]	66	176	176
Environmental conditions for operation: Temperature range		[°C]	-10 to +45		
Noise emission: Continuous noise pressure level (without transported material)		[dB]	<70		
Measuring height/measuring distance		[m]	1,6 / 1		
Measurement direction with respect to the noise source		[°]	90		
Measurement method		-	A evaluation		

NOTE





The noise level can be reduced by using noise protection hoods.

4 Assembly instructions

4.1 Transport

 WARNING	
	<p>Improper use of transport means (industrial trucks, cranes, technical aids, sling gear etc.) may lead to bruises and other injuries.</p> <p>Required behaviour:</p> <ul style="list-style-type: none"> - Observe and follow the transport and maintenance instructions - Proper use of transport means

 CAUTION	
	<p>During transport, the bowl feeder must only be held by the base. Neither the bowl nor the selection elements are lifting points.</p>

4.2 Installing the unit

For operation, the WV must always be mounted on a sufficiently pro-portioned foundation. The type of fixing can be seen in the following drawings:

WV with base plate (see Figure 4)

WV with base plate and mounting foot (see Figure 5)

WV with base plate and adjustment foot (see Figure 6)

When assembling the WV, it must be ensured that the base is horizontal.

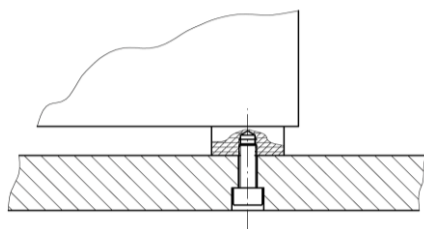


Figure 4

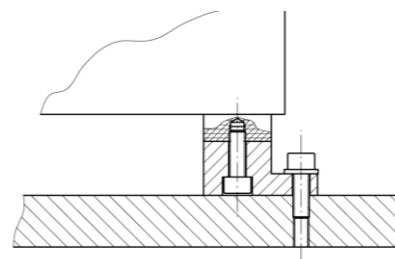


Figure 5

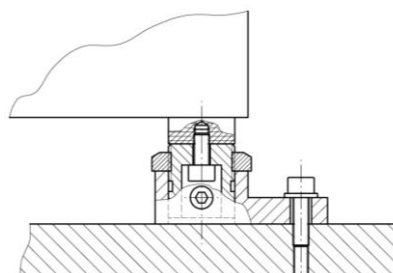


Figure 6

4.3 Fixing the bowl

The bowl is connected to the vibration plate by means of a central screw (1).

There is no prescribed tightening torque.

Tighten the screws securely with Allen key

WV 151-1 **screw M6**

WV 201-1 **screw M8**

WV 310-1 **screw M8**

NOTE



After loosening or removing the bowl from the vibration plate, it must be remounted in exactly the same position.

It is recommended that the positions of the bowl and the vibration plate are marked before removing (see Figure 8).

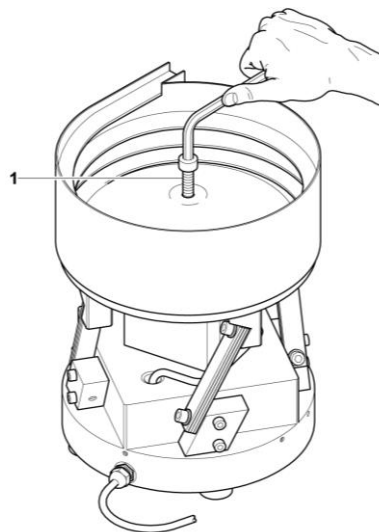


Figure 7

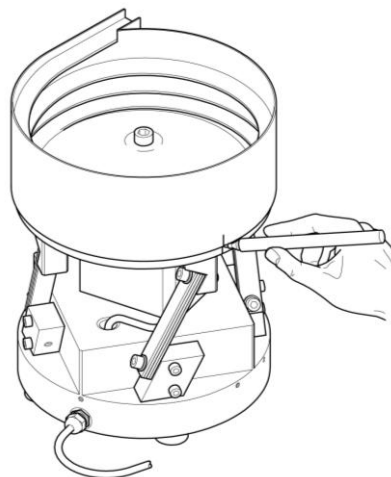




Figure 8

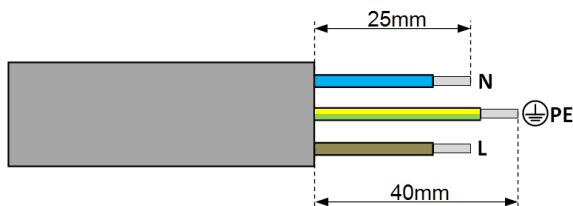
4.4 Power supply

 WARNING	
	<ul style="list-style-type: none"> ▪ Any work performed on the electrical supply may only be performed by trained, authorised, qualified personnel! ▪ The power supply must be protected by an FI switch (provided by the customer). ▪ The bowl feeder may only be operated with the power supply specified on the name plate.

The control devices IRG 1-N or IRG 2-N are used for the activation of the bowl feeder. The SE 601 or SE 602 can also be used. Please note that an additional CEE connector plug is required for the SE controllers (article no. 11006982)

Installation of the plug is only to be carried out by technically qualified personnel.

Figure 9: End of the wire for additional plug



5 Operating instructions

5.1 Correlations between the transport speed and the WV spring packages

Basically the WV and bowl are adjusted in the standard configuration. This means that all oscillating elements are set optimally.

The following factors however influence the combination WV/bowl:

- the parts to be conveyed (size, weight, shape, material and condition)
- the feed rate
- the quantity filled
- the selection elements in the bowl (construction and arrangement). Selection elements always present additional weight
- outlet in the bowl
- support
- surrounding (are there other oscillating components with a disturbing influence)

Procedure for adjustment of the oscillating system

WARNING



Unplug the power cable before proceeding with further actions!

1. check control unit settings (see separate control unit's operating instructions)
2. Remove the casing and check that all springs and fixing screws are tight.
3. check the magnet distance and set if necessary (see Chapter 6.5)
4. Switch on the bowl feeder and set the controller regulator to 90% (SE Position 8).
5. **Slowly** unscrew the lower fixing screw on a spring package (see Figure 10). Loosening this screw alters the transport speed of the parts in the bowl

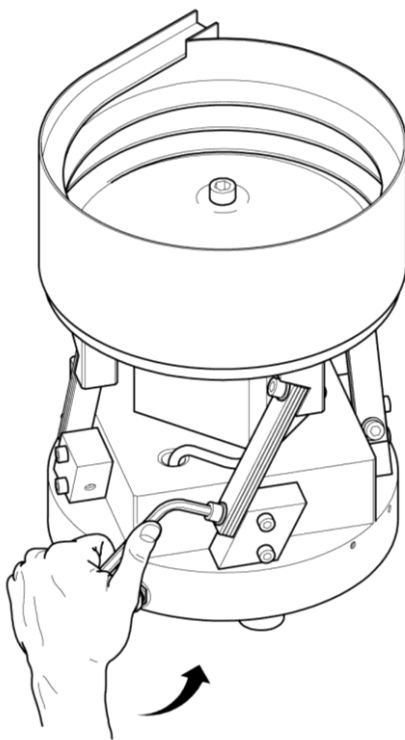


Figure 10

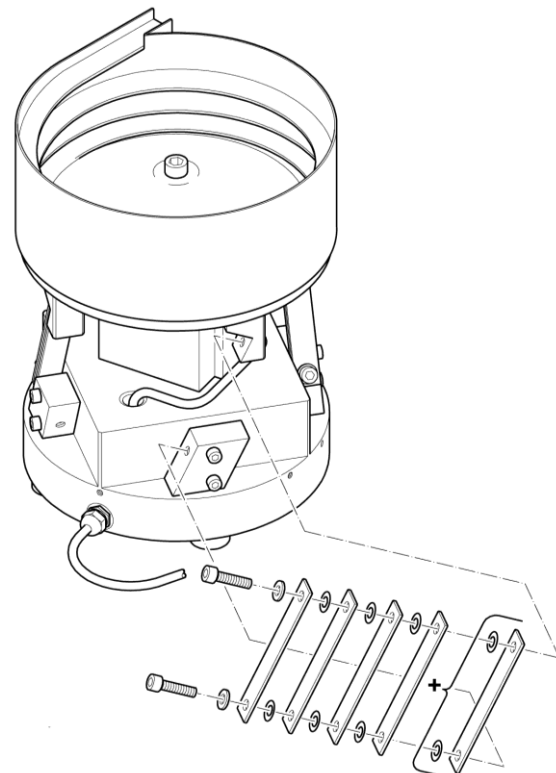


Figure 11

The result:

Transport speed is reduced

- insert additional springs
- at first, one spring in **one spring package**
- if this is insufficient, then one spring with spacer plate is to be inserted into the individual spring packages **one by one** (see Figure 11)

Transport speed is increased

- remove springs (See chapter 6.3)
- the procedure and sequence are the same as for inserting springs

Irregular transport speed at bowl perimeter

- a spring must be removed from the *slower* location
- a spring must be inserted at the *faster* location

Erratic transport speed between two spring packages

- seen, from the direction of transport, a spring must either be removed or inserted behind the area of erratic transport speed.

CAUTION



The casing must be replaced after each procedure!

5.2 Setting the distance between the plate and the support base

This setting is only necessary when:

- all spring packages have been exchanged or reassembled
- the WV has been dismantled

WARNING



Before removing the casing, unplug the mains cable!

NOTE



**It is recommended that the bowl (1) is removed for this procedure!
(See Figure 12)!**

1. Remove the casing (2)
2. Slightly loosen the spring package screws (3).
3. Hammer the oscillating plate (4) first into the upper position (see Figure 13) using a plastic hammer, and then hammer downwards until a height tolerance of $\pm 1.0\text{mm}$ and a parallelism tolerance of 0.1 mm with respect to the support base have been achieved. (see Figure 14)
4. Retighten the spring package screws (3)
5. Replace the bowl (1) and carry out any necessary settings (for this purpose, see chapter 5.1)

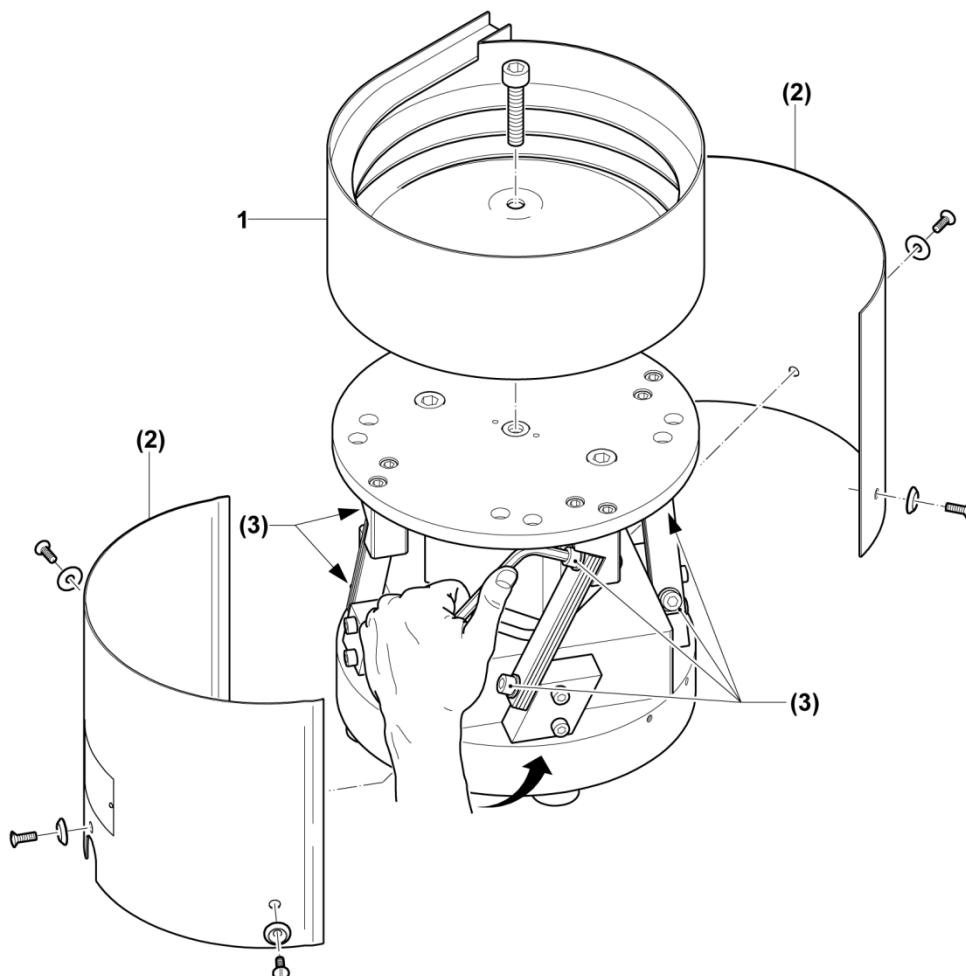


Figure 12

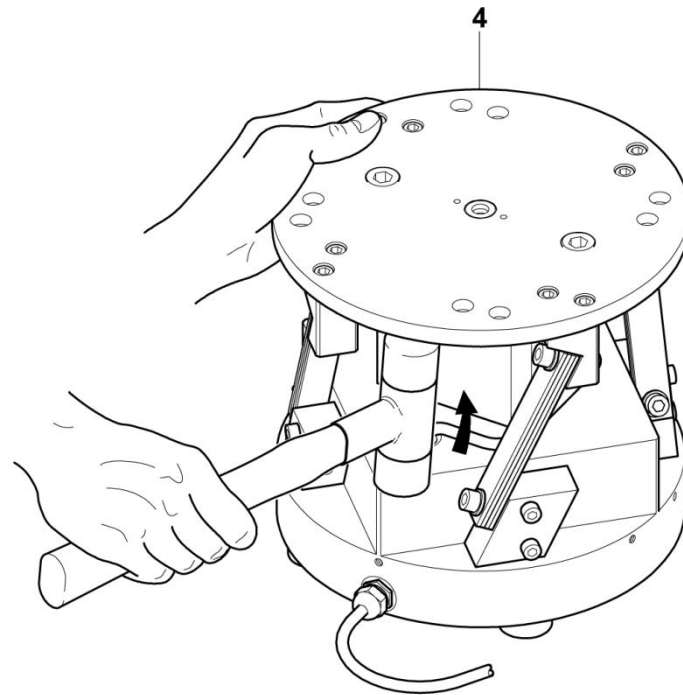


Figure 13

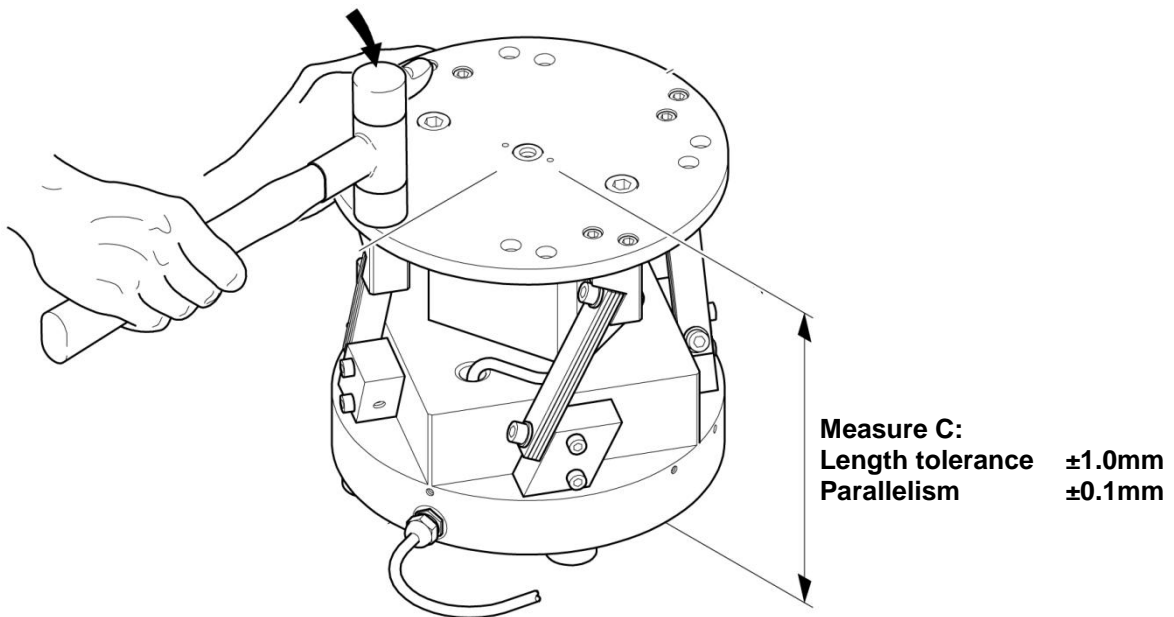






Figure 14

5.3 Standard operation

No further settings are required for standard operation once the control is switched on. An uninterrupted operation only requires the re-filling of the feeder bowl.

 CAUTION	
	<p>The bulk material must be filled into the middle of the conveyor bowl. Otherwise the orientation system might be damaged or the required capacity might not be achieved as falling parts can get jammed in the orientation system.</p>

 CAUTION	
	<p>Under certain circumstances an inadmissible noise level may occur (e.g. when opening the cover of the noise protection hood for filling in parts).</p> <p>Required behaviour:</p> <ul style="list-style-type: none">• Wear ear protection when working at critical sound levels

6 Maintenance guidelines

WARNING



The electrical equipment of the bowl feeder must be checked at regular intervals. Loose connections, burnt or damaged cables are to be removed immediately!

NOTE



Check all visible screws for tightened

6.1 Troubleshooting and fault repair

WARNING



- Electrical work must only be carried out by trained personnel!
- Before removing the casing, unplug the power cable!

Interruptions caused by defective components must be repaired by replacing the defective component, only.

NOTE



Defective components must only be replaced by Afag original spare parts.

Bowl feeder does not run after switch on	
Cause of fault:	Fault repair
Plug not connected	Connect plug
Connecting cable between bowl feeder and controller not plugged in	Connect plug
Regulator on controller set to „0“	Turn regulator to position
Defective fuse in control unit	Replace fuse
Bowl feeder lacks performance after operating for a certain length of time	
Cause of fault:	Fault repair
The spring package fixing screws have become loose	Remove the casing and retighten all spring package screws
The screw securing the bowl to the vibration plate has become loose	Retighten the screw
The air gap between the magnetic coil and the anchor bolt is no longer correct	Remove the casing and readjust the air gap (See chapter 6.5)
Spring broken	Remove the casing and replace the broken spring (See chapter 6.3)
Regulator on control unit has moved	Readjust regulator
Bowl feeder develops loud noises	
Cause of fault:	Fault repair
The casing has become loose	Tighten als casing screws
The magnetic coil or anchor bolt have become loose	Tighten the screws (See chapter 6.4)
Foreign substance between bowl outlet and line	Remove foreign substance
Air gap between bowl outlet and line is too small	Loosen and slightly turn the bowl. <i>Afterwards, make sure</i> to check the bowl outlet / line crossovers
Air gap too tight, magnetic coil and anchor bolt are in contact	Adjust air-gap (see chapter 6.5)
Bowl feeder does not run at certain levels of the regulator scale	
Cause of fault:	Fault repair
Potentiometer defective	Replace potentiometer (See „Controller operating instructions“)

6.2 Cleaning

Coating:	Detergent:	Cleaning methode:
hard-anodised / Inox polished	Alcool or spirit	Ultrasonic bath
Metaline	Soap wather	clean with a damp cloth, let it dry
Habasit light green	neither	vacuum cleaner
Habasit white, dark green Polyurethane red, yellow Nextel	Alcool or spirit	clean with a damp cloth and let it dry. Don't fill detergent into bowl. Don't placed bowl into a cleaning bath
Soft nitrated, blue chromized	Diluent for cellulose lacquers	Clean with a cloth moistened with diluent for cellulose lacquers and wipe
Spray-coated / lacquered / powder-coated	Soap water / universal cleaner	Clean with a moist cloth
PET / Macrolon / plexi-glass	Vacuum cleaner and anti-static spray	Vacuum, then spray with antistatic spray and rub off.

CAUTION



If other cleaning agents or cleaning methods than those mentioned above are used, the components can get permanently damaged so that the proper function of the bowl feeder is no longer guaranteed.

WARNING



The following requirements must be met during the cleaning :

- Wear safety goggles
- Provide sufficient ventilation when cleaning with volatile substances

6.3 Replacing springs or spring packages

(See Figure 15)


This procedure is only necessary when:


- the oscillating behavior of the WV has changed
- a spring is broken
- the WV is to be retooled for a different product


 WARNING	
	Before removing the casing, unplug the mains cable!

1. Remove the casing (1) (see Figure 15)
2. Remove the screws (2) from the spring package to be replaced
3. Reassemble the spring package

The relevant spring cross-section can be taken from chapter 3.4.

NOTE	
	Do not forget the spring spacers (3)!

NOTE	
	If a spring was broken, the number and thickness of the springs must correspond to the old package.

NOTE	
	Opposite opposed spring packages must contain the same springs!

1. mount the spring package and tighten the screws (2)
2. check the air gap between the magnetic coil and the anchor bolt and reset if necessary (see chapter 6.5)
3. replace the casing (1) and carry out a test run (see chapter 5.1)

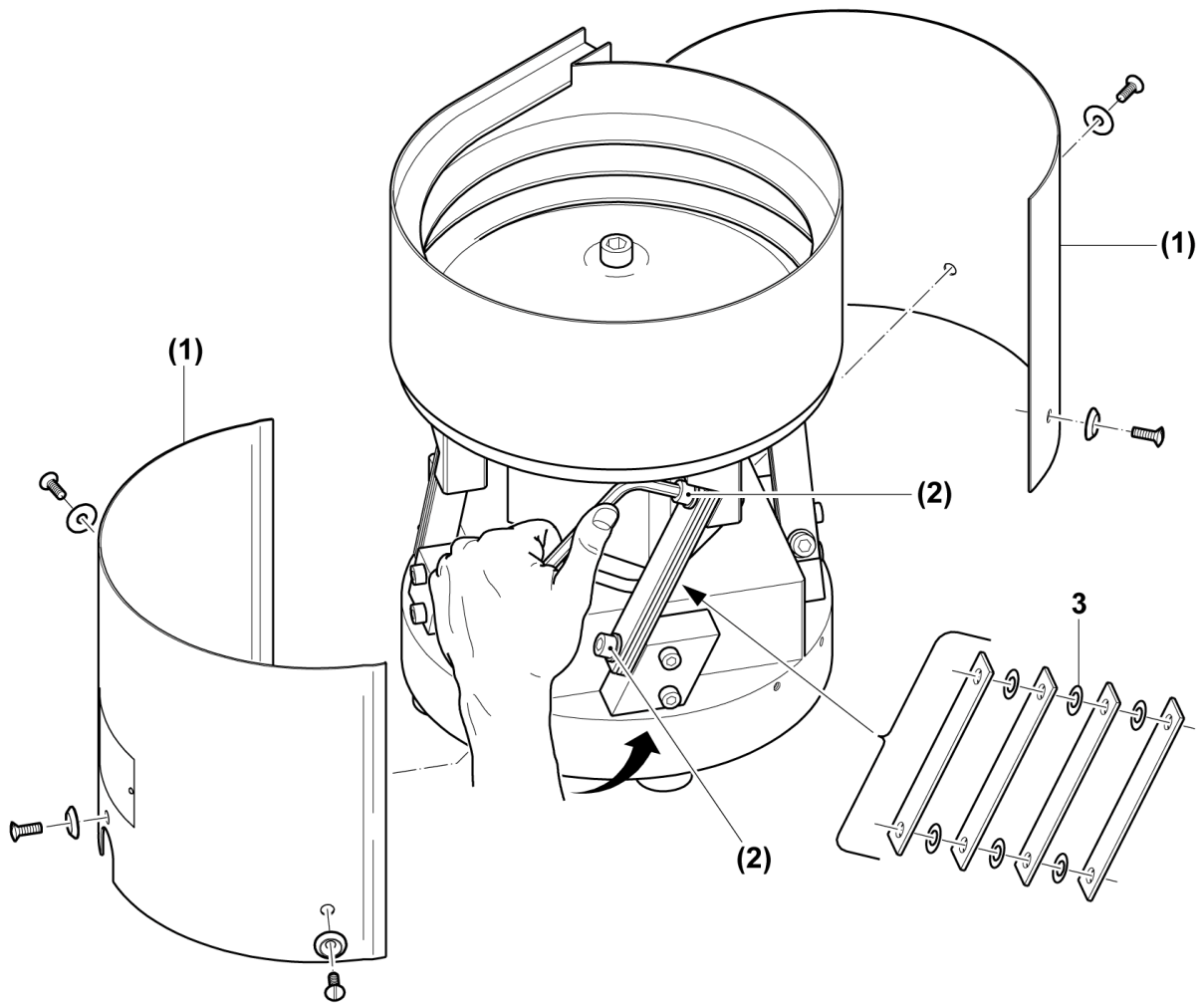


Figure 15

6.4 Replacing the magnetic coil

This procedure is only necessary when:

- The magnetic coil is defective

WARNING



Before removing the casing, unplug the mains cable!

WARNING



Electrical work must only be carried out by trained personnel!

1. Remove the casing (1) (see Figure 16)
2. Unplug the Euro plug (2) from the control unit and disassemble (see Figure 17).
3. Unscrew the cable clamp (3) and pull the cable through (see Figure 17).
4. remove the screws (4) and exchange the magnet (5) (see Figure 18)
5. Insert new magnet and retighten the screws (4) (see Figure 18).
6. Reassemble in the reverse order.

NOTE



This procedure generally includes adjustment of the air gap between the magnetic coil and the anchor bolt (see chapter 6.5)

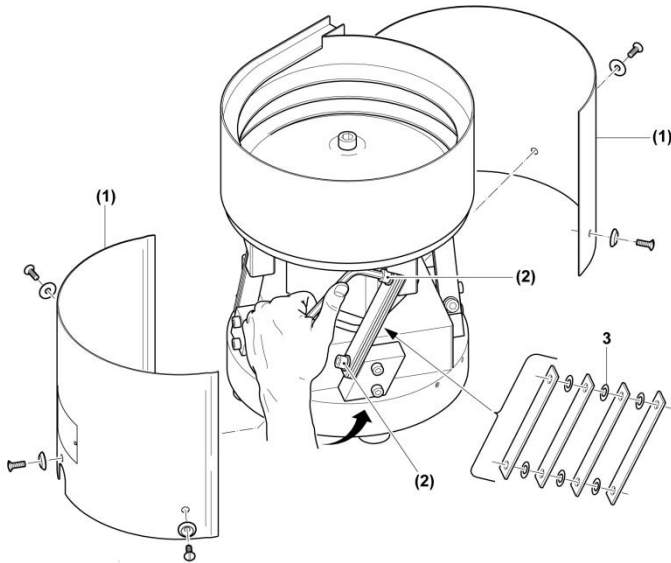


Figure 16

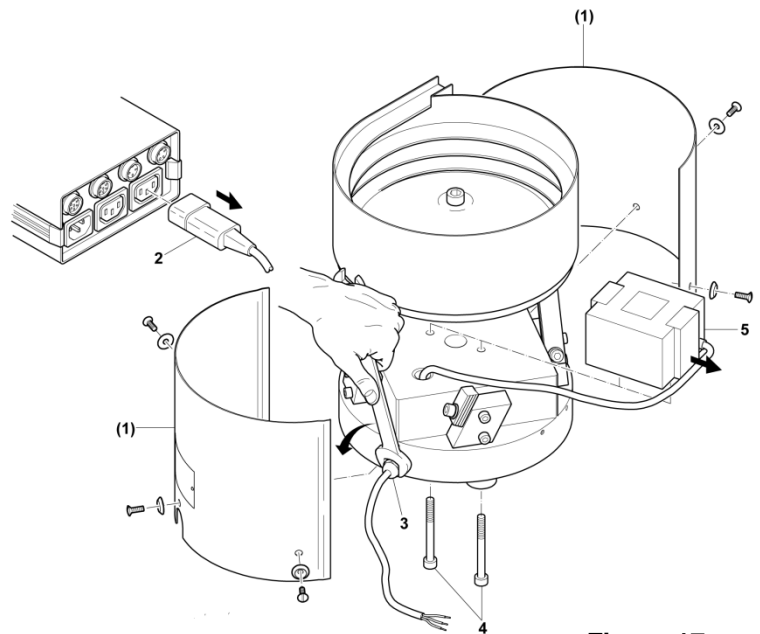


Figure 17

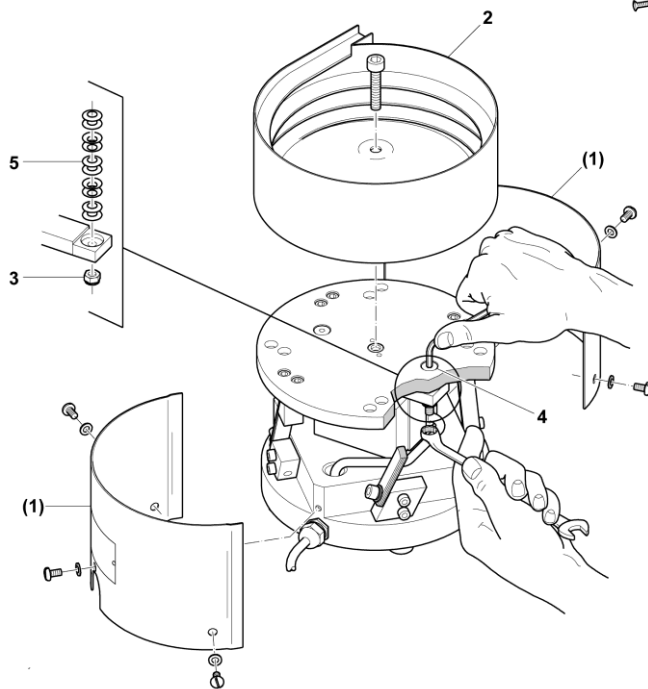


Figure 18

6.5 Setting the air gap between magnetic coil and anchor bolt

6.5.1 Setting the air gap for WV151-1

This procedure is only necessary when:

- the vibration plate has been reset to the support base
- springs or spring packages have been replaced
- the magnetic coil has been replaced

WARNING



Before removing the casing, unplug the mains cable!

1. remove the casing (1) (see Figure 19)
2. remove the bowl (2) (see Figure 19).
3. Place a ring spanner (size 8) on the Hex stop nut (3) and use an Allen key (size 3) to turn the countersunk screw (4) in the desired direction against the disc springs (5) (see Figure 19).
4. Use a feeler gauge (8) to set the air gap between the magnetic coil (6) and the anchor bolt (7) to between 0.3mm and 0.5mm (see Figure 20)

NOTE



Set the anchor bolt so that there is a parallel air gap between the magnetic coil and the anchor bolt.

5. mount the casing (1) and the bowl (2)

If the magnetic coil and anchor bolt clash together, then **the air gap is too small**

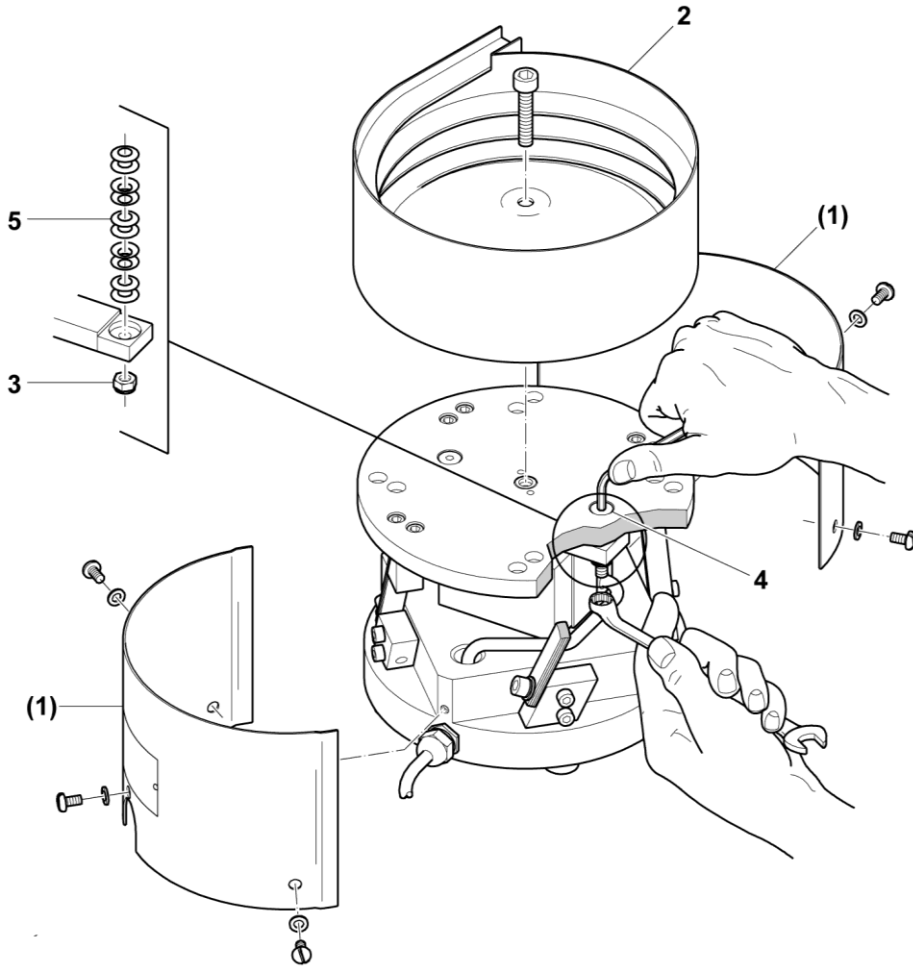


Figure 19

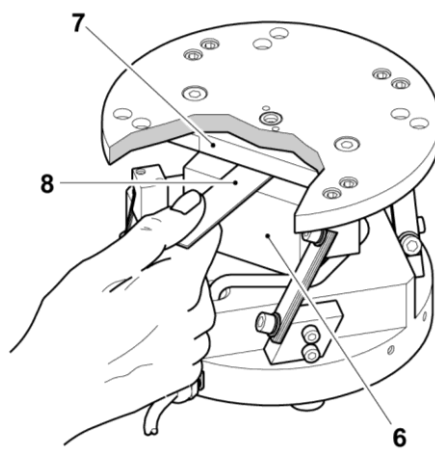


Figure 20

6.5.2 Setting the air gap for WV201-1 / 310-1

This procedure is only necessary when:

- the vibration plate has been reset to the support base
- springs or spring packages have been replaced
- the magnetic coil has been replaced

WARNING



Before removing the casing, unplug the mains cable!

1. remove the casing (1) (see Figure 21)
2. use a ring spanner (size 13) to loosen hex nuts (2) and (3). Now turn the hex nuts in the appropriate direction to alter the air gap. Afterwards, lock the two hex nuts together (see Figure 21).
3. Use a feeler gauge (6) to set the air gap between the magnetic coil (4) and the anchor bolt (5) to between: (see Figure 22)

WV201-1 = 0.3 - 0.7 mm

WV310-1 = 0.3 - 0.8 mm

NOTE



Set the anchor bolt so that there is parallel air gap between the magnetic coil and the anchor bolt.

4. replace the casing (1)

If the magnetic coil and anchor bolt clash together, then **the air gap is too small.**

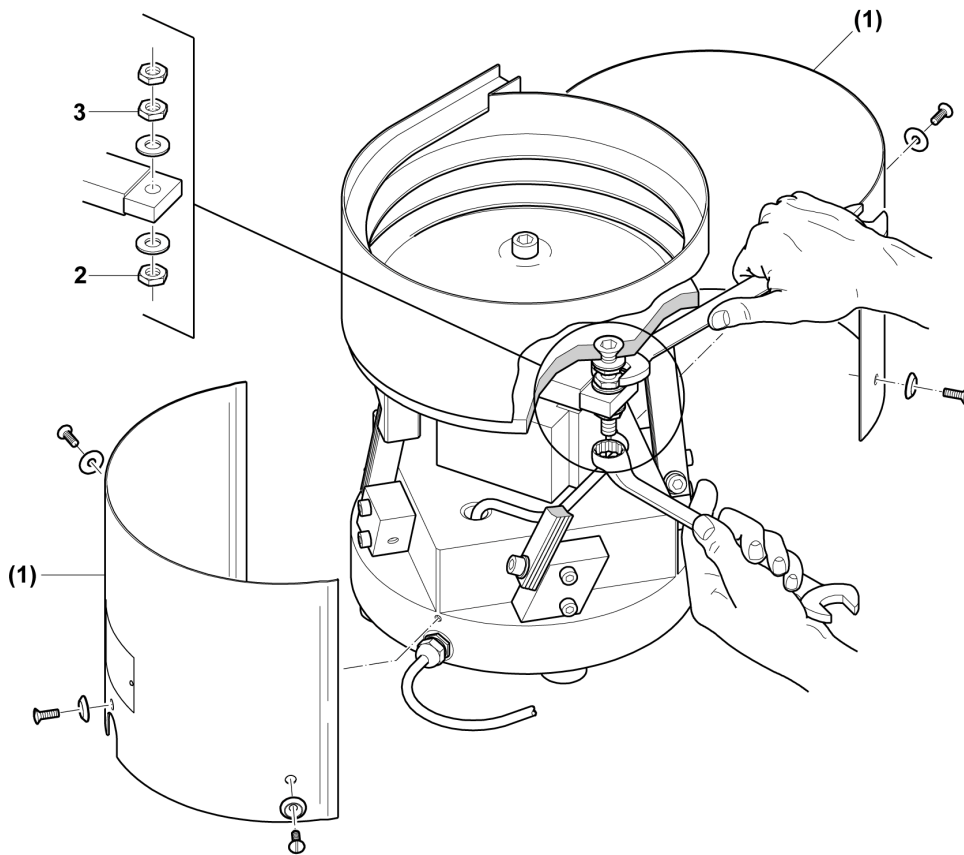


Figure 21

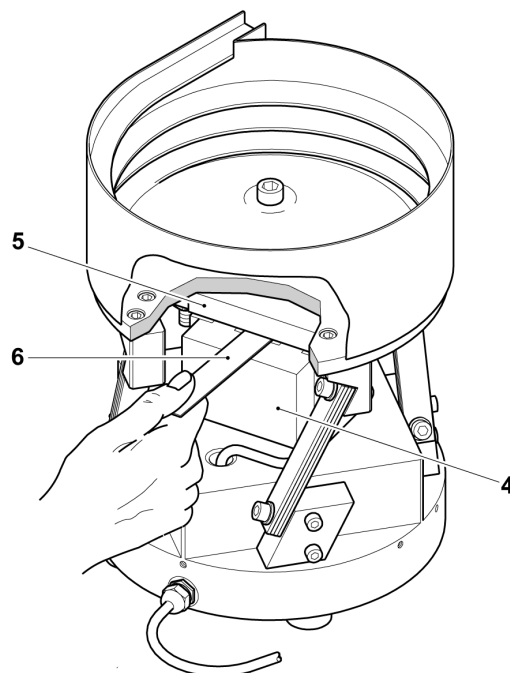


Figure 22

6.6 Wear and Spare parts

Table 2: *Wear parts*

Pos.	Type	Designation	Order number		
			WV151-1	WV201-1	WV310-1
8	Leaf spring	0,5 mm	11006710	-	-
		1 mm	11006711	-	-
		2 mm	-	11006736	
		3 mm	-	11006738	
11	Rubber buffer	M5	11006834	-	-
		M6	-	11006838	
26	Spring pad	0,2 mm	-	11006741	

Table 3: *Spare parts*

Pos.	Type	Designation	Order number		
			WV151-1	WV201-1	WV310-1
3	Magnet	230 V / 50 Hz	11007478	11007482	11007482
		115 V / 60 Hz	On request	On request	On request

7 Accessories

7.1 Mounting parts

Table 4: Order data

Type	Designation	Order number		
		WV151-1	WV201-1	WV310-1
Mounting plate	For sub-structure	50021711	50021709	50021699-
Leveling base	Without spacers	50021496		
Spacers	5 mm	50021483		
	10 mm	50021486		
	20 mm	50021484		

7.2 Control device

The WV is connected to the 230V/50Hz AC system via an IRG or SE controller and can be rated for other mains voltages and frequencies, e.g. 115V/60Hz. They operate in full-wave mode at double mains frequency, i.e. at 50Hz AC, with a vibration frequency of 100 Hz, in half-wave mode at single mains frequency with a vibration frequency of 50 Hz.

Vibration displacement and thus the transport speeds are infinitely adjustable due to magnet current and thus magnetic force variability.

Soft-starting, all IRG and SE types can be mounted in various different ways and offer extra controls for photoelectric barriers, initiator elements, or extern 24VDC signal. For a detailed description of the controllers refer full-range catalogue from AFAG GmbH.

Third-party controllers can also be used as long as they meet the technical requirements.

Table 5: Controllers for WV- Bowl feeder

Type	Power supply	Order number	Comments
IRG1-N	230V/50Hz	15083186	Control with no timer function
	115V/60Hz	15171112	
IRG2-N	230V/50Hz	15204235	Control with timer function using sensors
	115V/60Hz	15182634	
SE 601	230V/50Hz	11015601	With timer function, valve and interface outputs, sensor feed
	115V/60Hz	50018668	
SE 602	230V/50Hz	11015602	With sensor feed
	115V/60Hz	50018674	

7.3 Address for orders

Germany:

Afag GmbH
Wernher-von-Braun-Straße 5a
D – 92224 Amberg
Tel.: ++49 (0) 96 21 / 65 0 27-0
Fax: ++49 (0) 96 21 / 65 0 27-390

Sales

Afag GmbH
Berliner Straße 31
D – 71229 Leonberg
Tel.: ++49 (0) 71 52 / 60 08-0
Fax. ++49 (0) 71 52 / 60 08-10

sales@afag.com

www.afag.com

Switzerland:

Afag Automation AG
Zuführtechnik
Fiechtenstrasse32
CH – 4950 Huttwil
Tel.: ++41 (0) 62 / 959 86 86
Fax: ++41 (0) 62 / 959 87 87

8 Disposal

WF feeders that are no longer in use should not be disposed of as complete units but dismantled into separate materials and recycled. Non-recyclable components must be disposed of correctly.