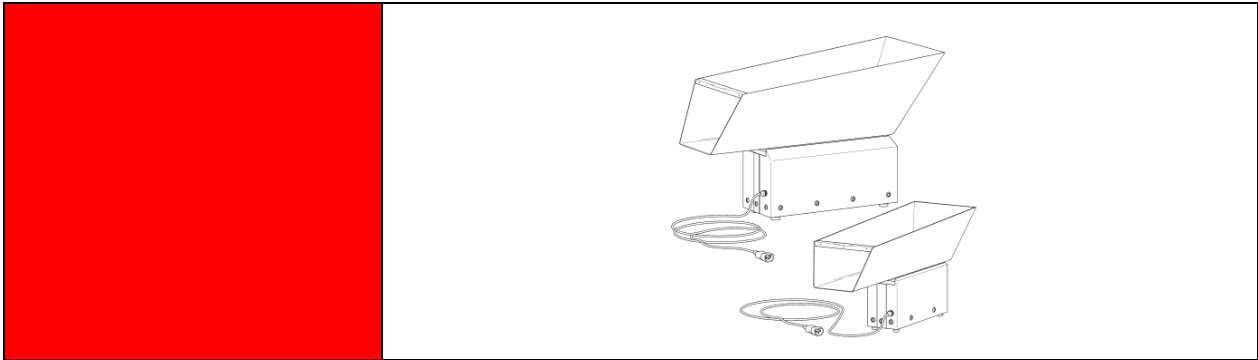


Vibratory hopper unit NVD 3 / NVD 4



Translation of original operating instruction

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This operation instruction applies to:

Type		Order number	
Vibratory hopper unit	NVD3/5	Rust-free V2A	11012083
		Rust-free V2A polished	11012084
	NVD3/10	Rust-free V2A	11012085
		Rust-free V2A polished	11012086
	NVD4/10	Rust-free V2A	11012092
		Rust-free V2A polished	11012093
	NVD4/15	Rust-free V2A	11012094
		Rust-free V2A polished	11012095
	NVD4/20	Rust-free V2A	11012097
		Rust-free V2A polished	11012098
	NVD4/40	Rust-free V2A	11012100
		Rust-free V2A polished	11012101

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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 information</i>	6
2.3	<i>Intended use</i>	6
3	Description of the device	7
3.1	<i>General</i>	7
3.2	<i>Functional description.....</i>	7
3.3	<i>Technical Data</i>	8
4	Assembly instructions	10
4.1	<i>Transport</i>	10
4.2	<i>Installing the unit.....</i>	10
4.3	<i>Power supply.....</i>	11
5	Operating instructions	12
5.1	<i>Standard operation.....</i>	12
5.2	<i>Adjustments and settings of the NVD.....</i>	12
5.3	<i>Setting the distance between the vibrating plate and the support base</i>	13
6	Maintenance instructions	14
6.1	<i>Troubleshooting.....</i>	14
6.2	<i>Cleaning</i>	16
6.3	<i>Replacing springs or spring packages.....</i>	17
6.4	<i>Replacing the magnetic coil.....</i>	19
6.5	<i>Setting the air gap between magnetic coil and Anchor bolt.....</i>	21
6.6	<i>Wear and Spare parts</i>	23
7	Accessories	23
7.1	<i>Control device</i>	23
7.2	<i>Address for orders.....</i>	24
8	Waste disposal	24

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: **Nachfüllvibrationsdosierer**

Designation: **NVD3/5 / NVD3/10 / NVD4/10 / NVD4/15 / NVD4/20 / NVD4/40**

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 vibratory feeder. This operating manual and, in particular, the included safety instructions have to be observed by all individuals working with and on the vibratory hopper. In addition, all rules and regulations regarding 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 vibratory hopper.

2.3 Intended use

The vibratory hopper is intended to store component parts of different sizes, forms and types of material.

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

- 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 may be powdered with talcum

WARNING



The NVD 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 device

3.1 General

In combination with a dosing channel, the vibratory hopper units are used to store bulk material. The material is moved by vibrations. Parts are moved by micro throws in the feeding direction.

3.2 Functional description

The NVD is a unit which transforms magnetic oscillations in order to use the feeding of work pieces. The basic construction of a NVD 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

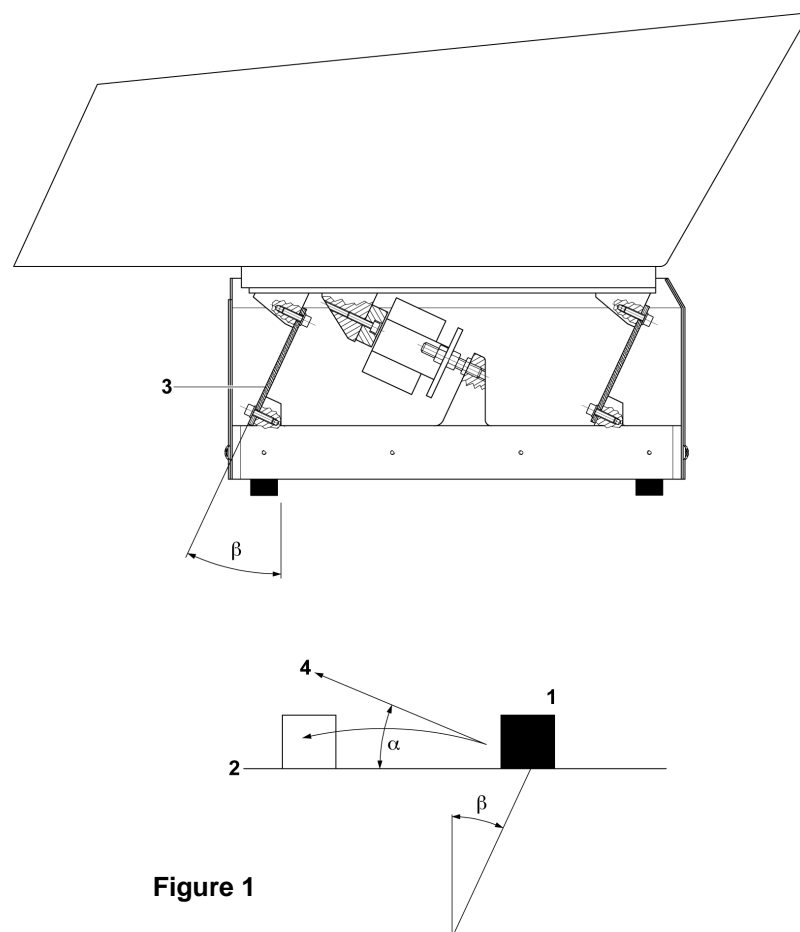


Figure 1

The magnet, connected to the base, creates a force which attracts and releases the armature (Anchor bolt) dependent on the oscillation frequency of the power supply.

As the armature (Anchor bolt) is also connected to the vibrating plate, this also makes the same pulsating movement. The material to be conveyed is therefore raised from the conveyor line on each oscillation as a result of the angle of inclination of the leaf springs and carries out small throwing movements in a vertical direction to the leaf spring level.

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

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 Technical Data

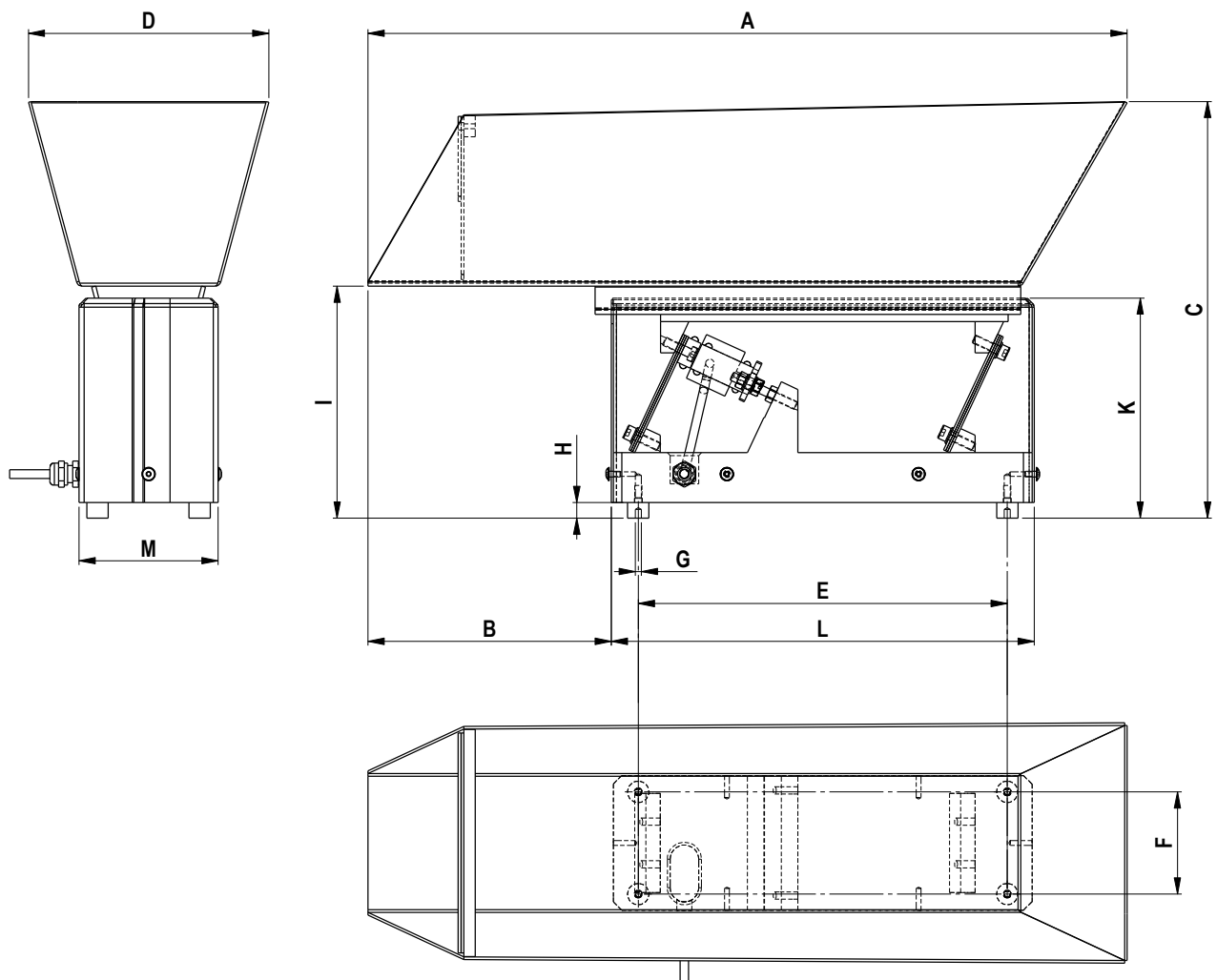



Figure 2


Table 1: Technical Data

Description		Units	NVD3		NVD4			
Channel volume		[l]	5	10	10	15	20	40
Dimensions	A	[mm]	535	680	680	725	794	993
	B	[mm]	172	166	167	201	245	392
	C	[mm]	294	333	384	423	444	524
	D	[mm]	170	221	221	243	347	402
	E	[mm]	260		360			
	F	[mm]	72		115			
	G		M5		M6			
	H	[mm]	11		15			
	I	[mm]	163,5		215			
	K	[mm]	155		206			
	L	[mm]	301		426			
	M	[mm]	98		163			
Operating voltage		[VAC]	230		230			
Mains frequency		[Hz]	50 / 60		50 / 60			
Coil resistance		[Ohm]	140		11,4			
Device fuse		[A]	F0,3		F1,0			
Protection class		IP	54					
Oscillations (full wave)		[min-1]	3000 / 3600					
Weight (without channel)		[kg]	12		33			
Filling weight max.		[kg]	0,8		6			
Spring package thickness max.		[mm]	8		10			
Spring thickness (standard)		[mm]	1,5		0,5-1,5			
Air gap (magnet-anchor bolt)		[mm]	0,4-0,9		0,5-1,5			
Installed magnet type			EL60-20		EL96-33			
Magnetic power		[VA]	45		140			
Environmental conditions for operation: Temperature range		[C°]	-10 to +45					
Noise emission: Continuous noise pressure level (without transported material)		[dB]	<70					
Measuring height / distance		[m]	1.6 / 1					
Measurement direction with respect to the noise source		[°]	90					
Measurement method		-	-10 to +45					

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 NVD must only be held by the base.</p> <p>The feeding channel is not to be held.</p>



4.2 Installing the unit

For operation, the NVD must always be mounted on a sufficiently proportioned foundation.

There are 4 threaded holes located on the bottom side of the drive which are used to connect with the subframe. (See chapter 3.3 Technical Data).

When installing the NVD, it must be ensured that the base is horizontal or negatively inclined $\sim 5^\circ$, depending on the material to be conveyed.

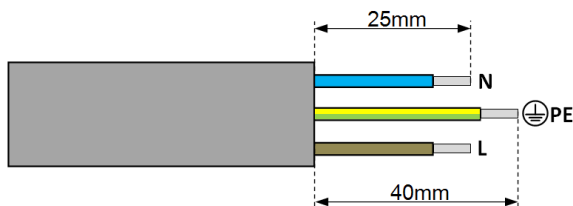
4.3 Power supply

 WARNING	
	<ul style="list-style-type: none"> ▪ Any work 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 (Figure 3) is required for the SE control devices (article no. 11006982).

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

Figure 3: End of the wire for additional plug



5 Operating instructions

5.1 Standard operation

No further settings are required for standard operation mode once the controller is switched on. The only thing required for an uninterrupted operation is the re-filling of the dosing channel.

5.2 Adjustments and settings of the NVD

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

The following factors however influence the combination NVD / channel:

- the parts to be conveyed (size, weight, shape, material and condition)
- the conveying capacity
- the quantity filled
- the foundation
- 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 that the type and frequency of the magnets is correct (see chapter 3.3)
4. check the magnet distance and set if necessary (see Chapter 6.5)
5. Switch on the NVD and alter the transport speed with the controller regulator
6. Depending on the transport material, additional springs have to be installed or removed. (See chapter 6.3)

 CAUTION	
	The casing must be replaced after each procedure!

5.3 Setting the distance between the vibrating plate and the support base

This setting is only necessary when:

- all spring packages have been exchanged or re-assembled
- the NVD has been dismantled

WARNING



Unplug the power cable, before proceeding with further actions!

1. remove the casing **(1)**
2. slightly loosen the spring package screws **(2)**
3. Establish the parallelism between the vibrating plate **(3)** and the upper surface of the support **(4)**. Check the dimension X.
4. retighten the spring package screws **(2)**
5. replace the casing **(1)**

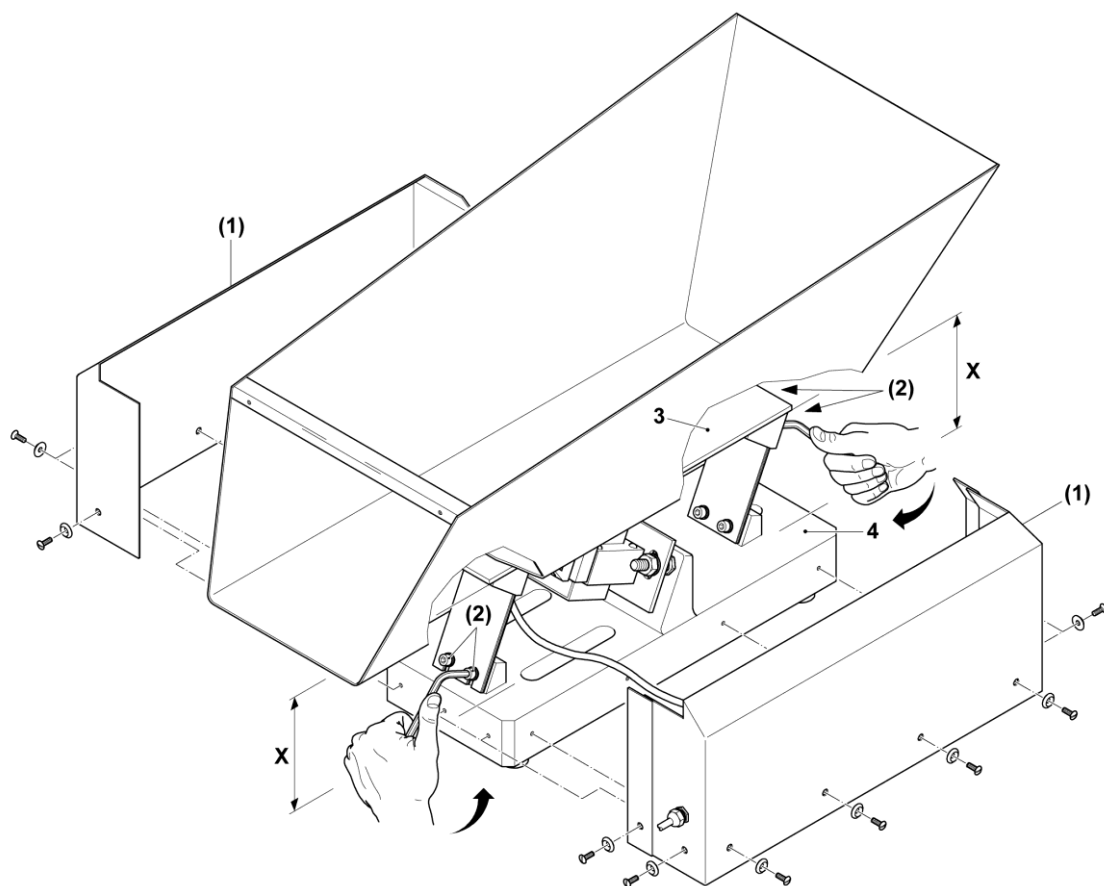


Figure 4

6 Maintenance instructions

WARNING



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

NOTE



check that all visible screws are tightness

6.1 Troubleshooting

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 NVD 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 all casing screws
The magnetic coil or anchor bolt have become loose	Tighten the screws (See chapter 6.4)
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“)
Filled amount too large	Reduce the mass

6.2 Cleaning

Coating:	Detergent:	Cleaning method:
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
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 vibrating hopper is no longer guaranteed.

WARNING



The following requirements must be met when cleaning works are carried out:

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

6.3 Replacing springs or spring packages

(See Figure 5)

This procedure is only necessary when:

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

WARNING



Before removing the casing, unplug the power cable!

1. remove the casing **(1)**
2. Remove the screws **(2)** from the spring package **(3)** to be replaced.
3. Reassemble the spring package.

The relevant spring cross section for the NVD can be taken from Chapter 3.3.

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!

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

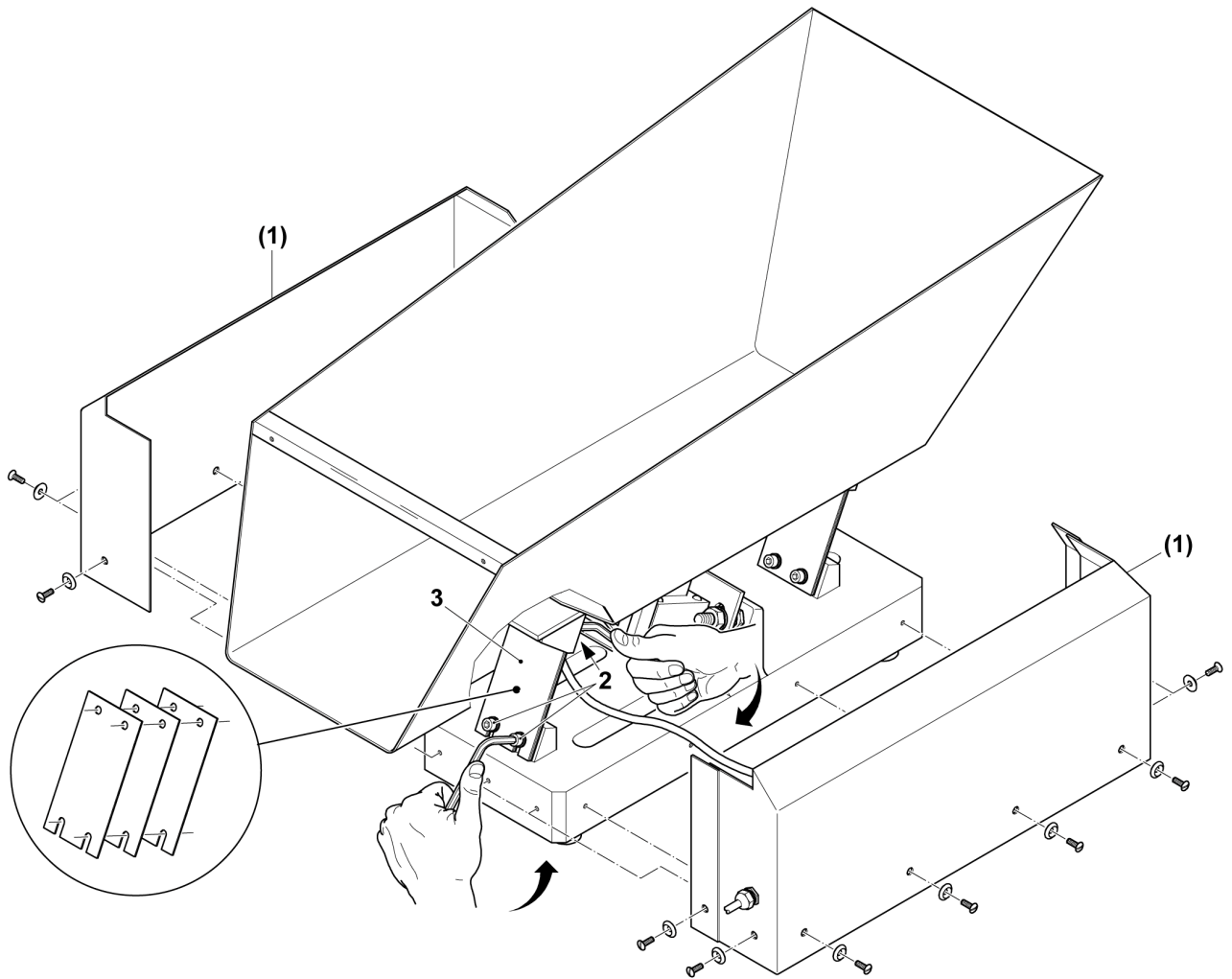


Figure 5

6.4 Replacing the magnetic coil

(See Figure 6)


This procedure is only necessary when:

- the magnetic coil is defective

 WARNING	
	Before removing the casing, unplug the power cable!

 WARNING	
	Electrical work must only be carried out by trained personnel!

1. remove the casing **(1)**
2. unplug the Euro plug **(2)** from the control unit and disassemble
3. loosen the cable clamp **(3)** and pull the cable through
4. remove the screws **(4)** and exchange the magnet **(5)**
5. 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)

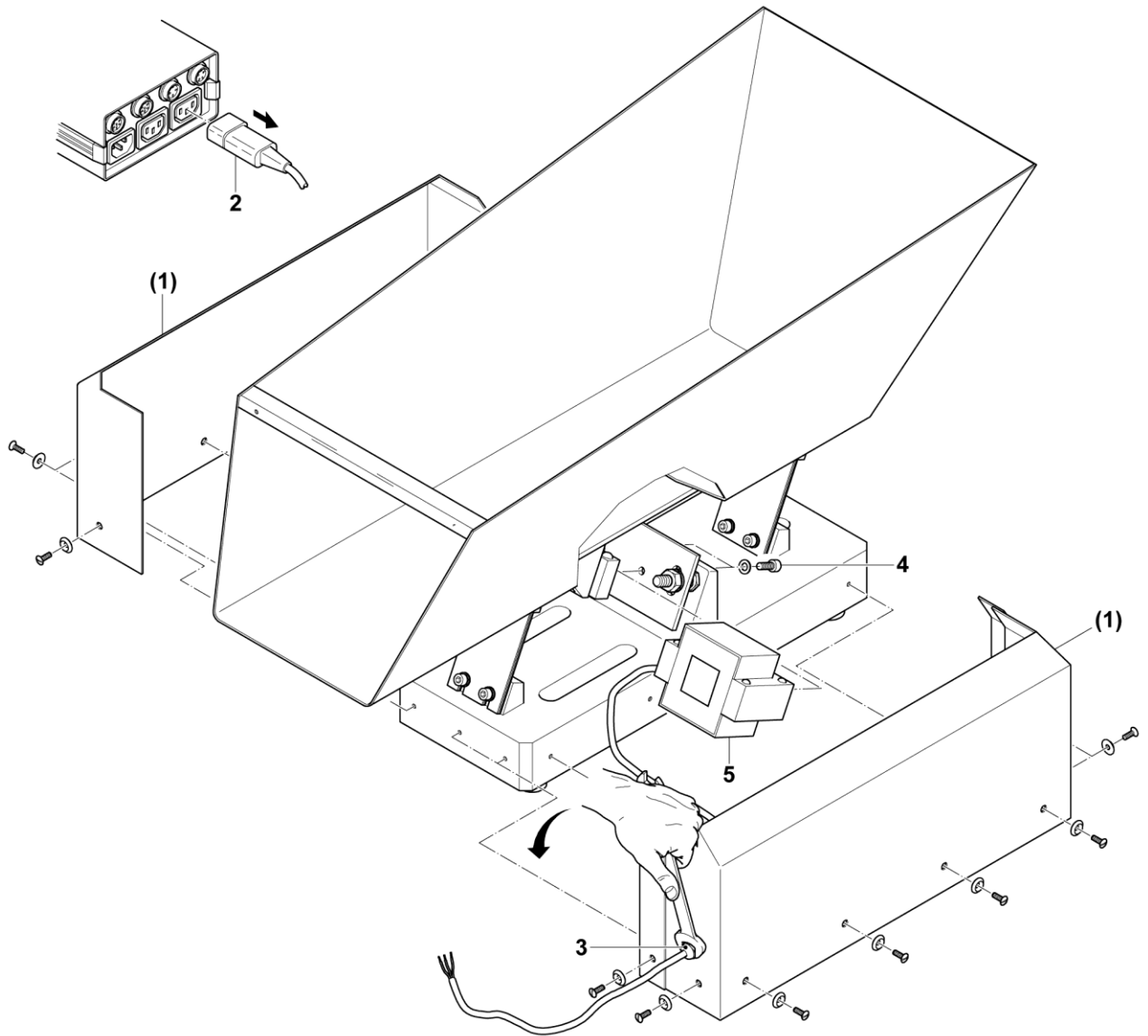


Figure 6

6.5 Setting the air gap between magnetic coil and Anchor bolt

(See Figure 7)

This procedure is only necessary when:

- The distance between the vibrating plate and the support surface has been re-set.
- springs or spring packages have been exchanged
- the magnetic coil has been replaced

WARNING



Before removing the casing, unplug the power cable!

1. remove the casing (1)
2. Place a spanner (size 10 for the NVD 3 and size 15 for the NVD 4) on the hex nuts (2) and (3) turn the hex nut in the desired direction to adjust the gap between the magnetic coil and the anchor bolt. Retighten the hex nuts (2) and (3)
3. use a feeler gauge (4) to set the air gap between the magnetic coil (5) and the anchor bolt (6) to between>

NVD 3: 0,5 – 1 mm

NVD 4: 0,8 – 1,5 mm

NOTE



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

4. mount the casing (1)
5. measure the current consumption
 - for NVD 3 max. 0.2 [A]
 - for NVD 4 max. 0.8 [A]

If the measured value is greater, then the **air gap is too large**.

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

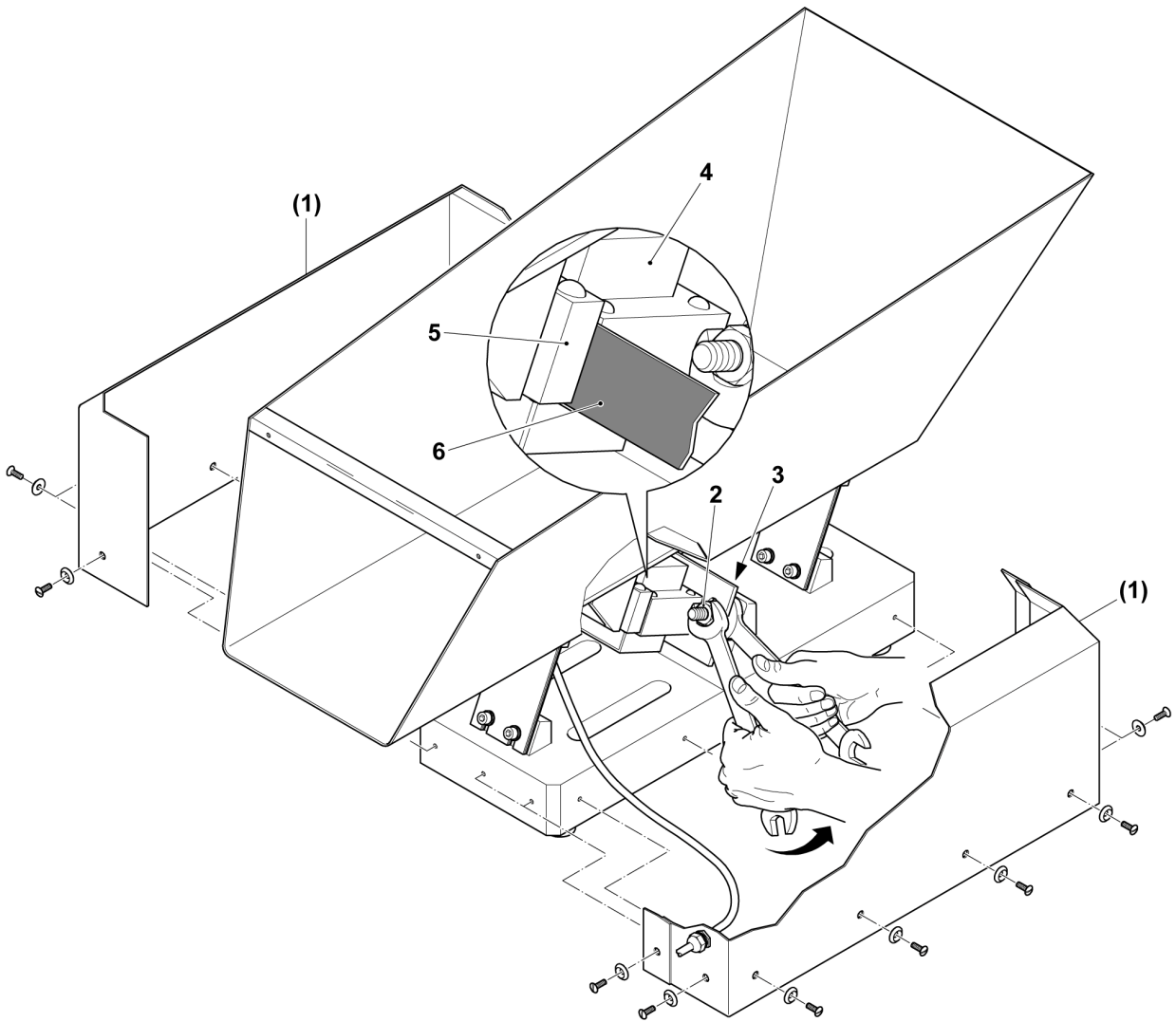


Figure 7

6.6 Wear and Spare parts

Table 2: *Wear parts*

Type	Designation	Order number	
		NVD 3	NVD 4
Leaf spring	1,5 mm thickness	11006760	11006761

Table 3: *Spare parts*

Type	Designation	Order number	
		NVD 3	NVD 4
Magnet	EI 60-20	11008330	-
	EI 96-33	-	11008332
Rubber buffer	M5	11006834	-
	M6	-	11006838

7 Accessories

7.1 Control device

The NVD 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 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 4: *Controllers for NVDs*

Type	Power supply	Order number	Comment
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	

7.2 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 Waste disposal

NVDs 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.