

Operating & Installation Instructions

Vibratory hopper

NVD3 | NVD4



Translation of the Original Assembly Instructions EN

- NVD3/5 5.0 litres (230 V / 50 Hz) ⇒ Order no: 50439542
- NVD3/5 5.0 litres (115 V / 60 Hz) ⇒ Order no: 50439547
- NVD4/10 10.0 litres (230 V / 50 Hz) ⇒ Order no: 50439543
- NVD4/10 10.0 litres (115 V / 60 Hz) ⇒ Order no: 50439548
- NVD4/15 15.0 litres (230 V / 50 Hz) ⇒ Order no: 50439544
- NVD4/15 15.0 litres (115 V / 60 Hz) ⇒ Order no: 50439549
- NVD4/20 20.0 litres (115 V / 60 Hz) ⇒ Order no: 50439545
- NVD4/20 20.0 litres (115 V / 60 Hz) ⇒ Order no: 50439550
- NVD4/40 40.0 litres (115 V / 60 Hz) ⇒ Order no: 50439546
- NVD4/40 40.0 litres (115 V / 60 Hz) ⇒ Order no: 50439552

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 stroke module or other options.

We wish you every success with our products!

With kind regards

Your Afag team

© Subject to modifications

The modules 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 essential information on assembly, commissioning, functioning and maintenance of the vibratory hopper to ensure safe and efficient handling and operation.

Consistent compliance with these operating instructions will ensure:

- permanent operational reliability of the module,
- optimal functioning of the module,
- timely detection and elimination of defects (thereby reducing maintenance and repair costs),
- prolongation of the module 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 severe injury.

WARNING



Warning!

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

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 handling system.
- 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 modules 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 gripper and optimal protection of personnel.

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

Every person carrying out installation, commissioning, maintenance work or operating the module 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 vibratory hoppers are designed to store component parts of varied sizes, forms, and types of material.

The following uses of the modules 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 module.

WARNING



Risk of injury if the module is not used for its intended purpose or if it is foreseeable used incorrectly!

The improper use of the module poses a potential hazard to the personnel.

- The modules 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 modules is a good knowledge of the basic safety instructions.



This manual, particularly the safety instructions contained therein, must be observed by all persons working with the module.

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 module.

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 modules,
- the operator of the module must draw up work instructions for handling the product parts.
- 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 modules are 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 module thus exposing himself and others to the risk of severe injury. Therefore, only qualified personnel may be permitted to carry out the described activities on the modules.

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 hazards resulting from electricity.

Operator (trained personnel):

Authorized persons who due to their specialized professional training, expertise and experience can identify risks and preventing 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 module, 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 & Modifications

No changes may be made to the module 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 "Assembly" and ↻chap. 7.3 "Settings".

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



The modules 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 machine and the technical protective measures taken, there 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 modules have been built according to the state-of-the-art and the applicable health and safety requirements. However, improper use of the module 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 module.

WARNING



Danger due to missing or illegible safety instructions on the module!

Missing or illegible safety instructions can lead to dangerous situations.

- The information and labelling attached to the module must be kept in a legible condition.
- Notices and labelling must not be dismantled.
- After replacing cables, lines and components, all labelling on these components must be reapplied.

WARNING



Danger due to removed or bypassed safety devices!

If safety devices are missing or bypassed, there is a risk of personal injury or damage to property!

- The safety devices on the module must not be removed or bypassed!

WARNING



Danger - Do not use in unsuitable environment!

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

- Do **not** use the modules in potentially explosive atmospheres!

CAUTION



Risk of injuries due to uncontrolled parts movements!

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

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

2.8.2 Danger due to alternating magnetic fields

DANGER



Danger due to alternating magnetic fields!

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

Persons with a pacemaker must keep a **safety distance** of **at least 10 cm**.

2.8.3 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.
-

2.8.4 Mechanical hazards

CAUTION



Danger of body parts and clothing being pulled in!

Despite the low belt speed, the use of the appliance may pose a risk to operating personnel due to body parts being drawn in at the points listed below: Fastening strip conveyor belt, tilting conveyor belt, shaft conveyor belt.

- Maintain a sufficient safety distance!
 - Never reach into the system during normal operation!
-

2.8.5 Noise hazards

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!
-

3 Technical data

3.1 Dimensional drawing NVD3 - NVD4

Type	NVD3/5	NVD4/10	NVD4/15	NVD4/20	NVD4/40
A	300 mm	426 mm	426 mm	426 mm	426 mm
B	260 mm	360 mm	360 mm	360 mm	360 mm
C	98 mm	163 mm	163 mm	163 mm	163 mm
D	72 mm	115 mm	115 mm	115 mm	115 mm
E	11 mm	16 mm	16 mm	16 mm	16 mm
F	164 mm	214 mm	214 mm	214 mm	214 mm
G	546 mm	695 mm	740 mm	796 mm	999.5 mm
H	121 mm	141 mm	197 mm	216 mm	310 mm
I	94 mm	124 mm	125 mm	194 mm	194 mm
K	163 mm	229 mm	251 mm	316 mm	369.3 mm
L	295 mm	384 mm	424 mm	444 mm	524 mm
M	180 mm	182.5 mm	207 mm	252 mm	396.5 mm

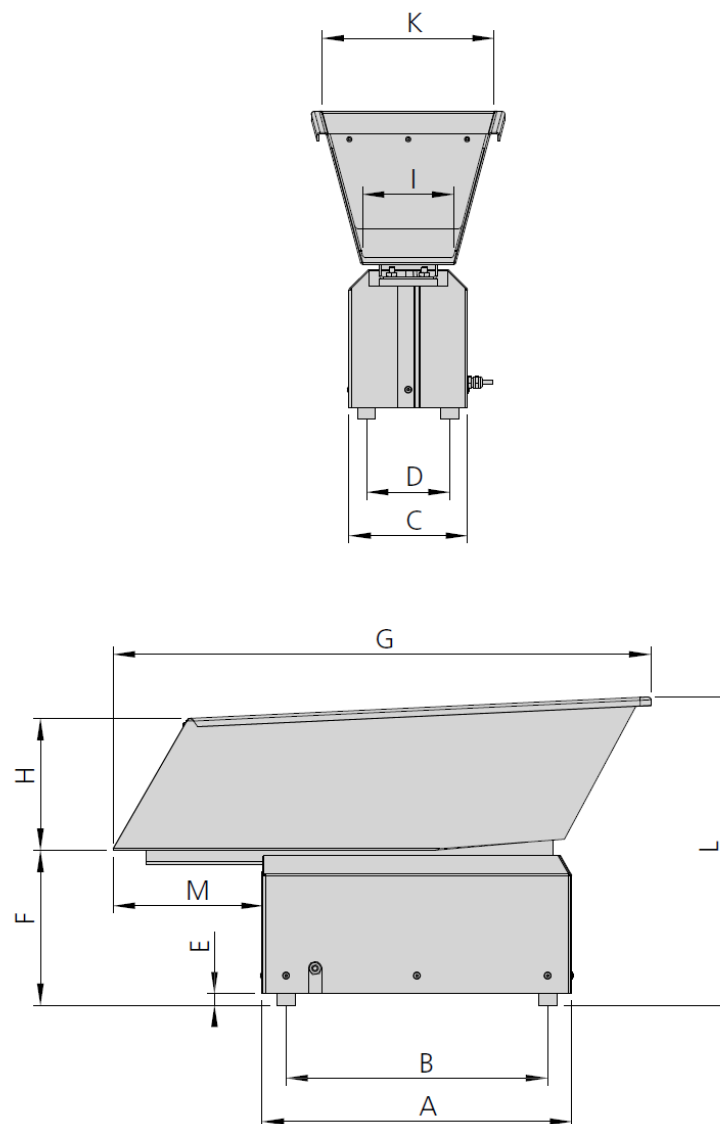


Fig. 1 Dimensional drawing NVD3 - NVD4

Technical data

3.2 Technical data NVD3 - NVD4

NVD	
Operating temperature	10 - 45 °C

Type	NVD3/5	NVD3/5	NVD4/10	NVD4/10	NVD4/15	NVD4/15
Order number	50439542	50439547	50439543	50439548	50439544	50439549
Mains connection (mains voltage/mains frequency)	230 V/50 Hz	115 V/60 Hz	230 V/50 Hz	115 V/60 Hz	230 V/50 Hz	115 V/60 Hz
Max. power consumption	46 VA	23 VA	184 VA	92 VA	184 VA	92 VA
Net weight	15.4 kg	15.4 kg	41 kg	41 kg	42.4 kg	42.4 kg
Load volume	5 l	5 l	10 l	10 l	15 l	15 l
Maximum filling weight	9 kg	9 kg	20 kg	20 kg	20 kg	20 kg
Arithmetical mean roughness value Ra	< 0.8 µm	< 0.8 µm	< 0.8 µm	< 0.8 µm	< 0.8 µm	< 0.8 µm
Mean roughness depth Rz	4.5 µm	4.5 µm	4.5 µm	4.5 µm	4.5 µm	4.5 µm
Protection type	IP54	IP54	IP54	IP54	IP54	IP54

Type	NVD4/20	NVD4/20	NVD4/40	NVD4/40
Order number	50439545	50439550	50439546	50439552
Mains connection (mains voltage/mains frequency)	230 V/50 Hz	115 V/60 Hz	230 V/50 Hz	115 V/60 Hz
Max. power consumption	184 VA	92 VA	184 VA	92 VA
Net weight	44.2 kg	44.2 kg	49.4 kg	49.4 kg
Load volume	20 l	20 l	40 l	40 l
Maximum filling weight	20 kg	20 kg	20 kg	20 kg
Arithmetical mean roughness value Ra	< 0.8 µm	< 0.8 µm	< 0.8 µm	< 0.8 µm
Mean roughness depth Rz	4.5 µm	4.5 µm	4.5 µm	4.5 µm
Protection type	IP54	IP54	IP54	IP54


Note: --- = nonexistent

3.3 Accessories

3.3.1 Controller

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



For more information on the controller, see  chap. 6.3.1 and the controller manufacturer's instructions.

4 Transport, packaging and storage

4.1 Safety instructions



CAUTION

Danger of injury due to improper transport equipment!

Improper use of transport equipment can lead to injuries (e.g. crushing)!

- Observe transport and mounting instructions!
- Use the means of transport properly!

NOTICE

Damage to property due to improper lifting!

The module must not be lifted at the dosing chute! Using the dosing chute as a lifting point can damage the module!

- Lift the module by the base only!



The Afag modules are packed in the original packaging (cardboard box). Carefully remove the module from the original packaging.

4.2 Scope of supply



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

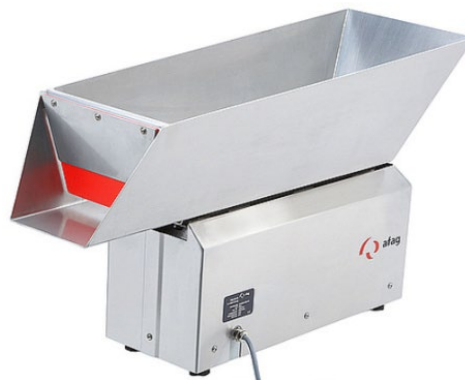


Fig. 2 Scope of delivery NVD

[Unt]	Designation
1 x	Vibratory hopper NVD
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.

Please note the following for transportation:

- The focus is on the middle of the module.
 - Pallet transport using stable transport trolleys.
-



The weight of the mode depends on the respective version and can be taken from the transport documents.

4.4 Packaging

The module is transported packed on a pallet. If Afag packaging is not used, the module must be packed in shock and dust-proof packaging.

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 module is stored for an extended period, observe the following:

- Store the module 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 module from dirt and dust.

5 Design and description

5.1 Design of the vibratory hopper

The NVD is a vibratory hopper that converts electromagnetic vibrations and uses them to transport workpieces.

The basic structure of a vibratory hopper consists of the elements listed below.

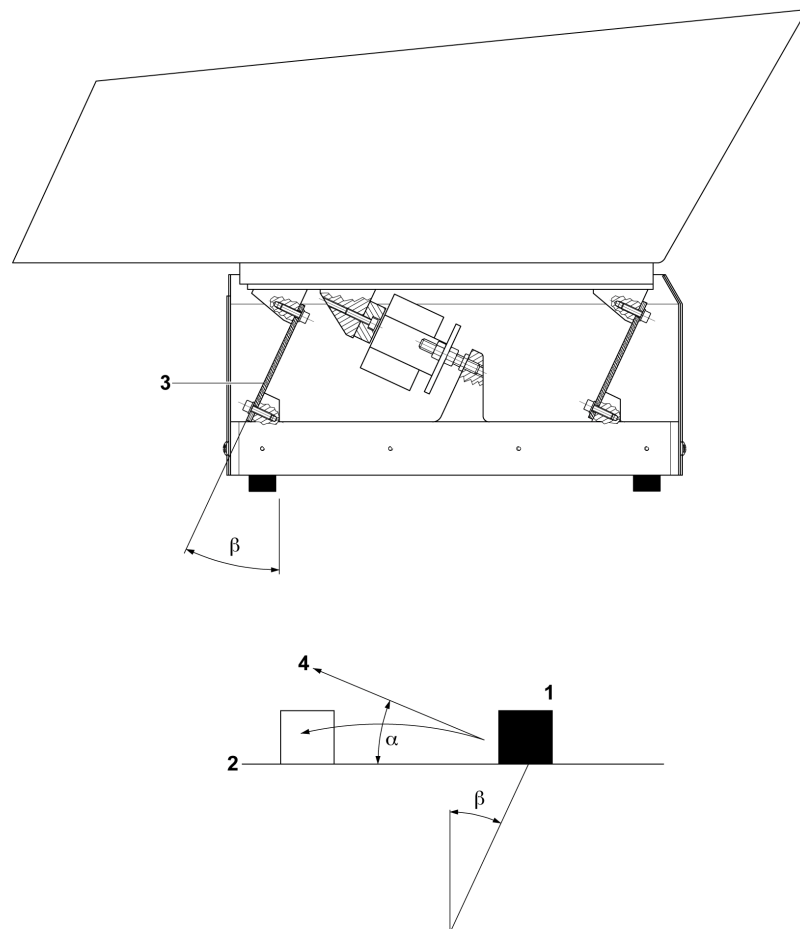


Fig. 3 Design of the NVD (Vibratory hopper)

- 1 Conveyed material
- 2 Feeder rail
- 3 Leaf springs
- 4 Jumping-off direction
- α Jumping-off angle
- β Inclination of leaf springs

5.2 Functional description

The vibrating hopper is used to storage bulk materials. The transport movement is generated by vibration. Here, the parts are moved in the transport direction by micro-jumps.

The magnet, connected to the base, generates a force that attracts or releases the magnetic anchor depending on the oscillation frequency of the mains supply.

As the magnetic anchor is connected to the dosing chute, it also follows the frequenting movement. As a result, the conveyed material, due to the angle of inclination of the leaf spring, lifts off with each oscillation and performs small jumping-off movements in a direction perpendicular to the leaf spring plane.

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 100 Hz. This 100 Hz oscillation is necessary to achieve a smooth or gentle transport.

However, for heavy or larger workpieces, it is necessary to use a vibration frequency of 50Hz. A half wave of the mains supply is thereby blocked.

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 module. This can be achieved through suitable protective measures (e.g. enclosure, light grid).

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 supply voltage before starting work!
- Ensure that the protective earthing of the power supply is in perfect condition.

CAUTION



Danger of injury by moving components!

The module must not be started up by unauthorised persons during installation and adjustment work. Limbs can be crushed by moving parts and cause serious injuries.

- Attach clearly visible signs before starting work!



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 Mounting instruction

For operation, the vibratory hopper must always be mounted on a base that is sufficiently dimensioned for the intended mass. There are four threaded holes on the underside of the drive for connection to the substructure.



When installing the vibratory hopper, make sure that the base is mounted horizontally or tilted forwards (approx. 5°) in the direction of conveying, depending on the material to be conveyed.

6.3 Electrical connection



The modules are operated in combination with an Afag control unit. Third-party control units can also be used, provided they meet the technical conditions.

6.3.1 Connection of the module (control unit)

The IRG1-S controller is available for controlling the NVD modules. The MSG801 and MSG802 can also be used. The NVD is connected to the 230V/50Hz AC mains supply. The design for other mains voltages and frequencies is possible, e.g. 115V/60Hz.

The vibratory hopper operates in full-wave mode at twice the mains frequency, i.e. at 50Hz AC with a mechanical vibration frequency of 50Hz. All IRG and MSG 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.

Notes on the power supply

- The mains supply must be provided by the customer via a residual current circuit breaker.
- The module may only be operated with the mains supply specified on the type plate!

An additional CEE appliance plug is required for the MSG controls (order no.: 11006982)!

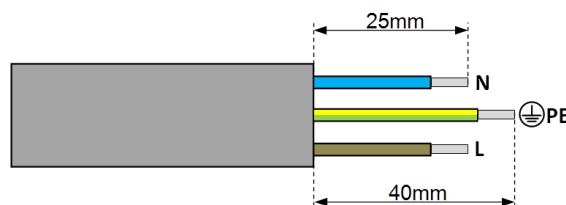


Fig. 4 Cable end additional plug

6.3.2 Concluding activities

After connecting the module, the following points must be observed:

- Refit dismantled protective devices before recommissioning for the first time.
- Carry out a test drive. Check whether there are any hand tools, screws, aids, or other objects in the effective range of the hopper.
- All electrical connections must be covered.
- Protective conductor connections must be checked for proper function after installation.
- Emergency-STOP devices must remain effective in all operating modes. Unlocking the Emergency-STOP devices must not cause an uncontrolled restart.

7 Operation

7.1 Safety instructions



Observe the safety instructions in ➔ chap 2 „Safety instructions“ of these instructions



WARNING

Danger due to removed or bypassed safety devices!

If safety devices are missing or bypassed, there is a risk of personal injury or damage to property!

- The safety devices on the module must not be removed or bypassed!

7.2 Commissioning

7.2.1 Test operation control unit

The NVD is connected to the AC mains 230 V/50 Hz via a control unit type IRG1-MS.

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 the 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.

7.2.2 Preparatory activities



Check before commissioning:

- Is the NVD set up correctly (➔chap. 7.3) and are all protective devices present and functional?
- Do the rated voltage of the appliance and the local mains voltage match?

The following settings must be checked before commissioning:

- **Filling volume:** For the maximum filling volume and maximum filling weight, the permissible limit values of the bunker must be observed (➔ chap. 3).
- **Emergency-STOP** devices must remain effective in all operating modes. Unlocking the Emergency-STOP devices must not cause an uncontrolled restart.

7.2.3 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 (➔ chap 3).
 - 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.

7.2.4 Normal operation

After the control unit is switched on, no further settings are necessary in normal operation. Only the refilling of the dosing chute must be ensured for uninterrupted running.

For trouble-free feeding, the workpieces must fulfil the following conditions:

- Oil-, grease and burr-free.
- Not sticky.
- not statically charged.
- non-magnetic (must not have any intrinsic magnetism).
- dirt-free and not mixed with foreign parts.
- Rubber parts can be talcumed.

7.3 Settings

7.3.1 Adjust air gap

This procedure is only necessary in the following cases:

- The swing bracket to the base was readjusted.
- Springs or spring assemblies were replaced.
- The solenoid coil has been replaced.

To adjust the air gap, proceed as follows:

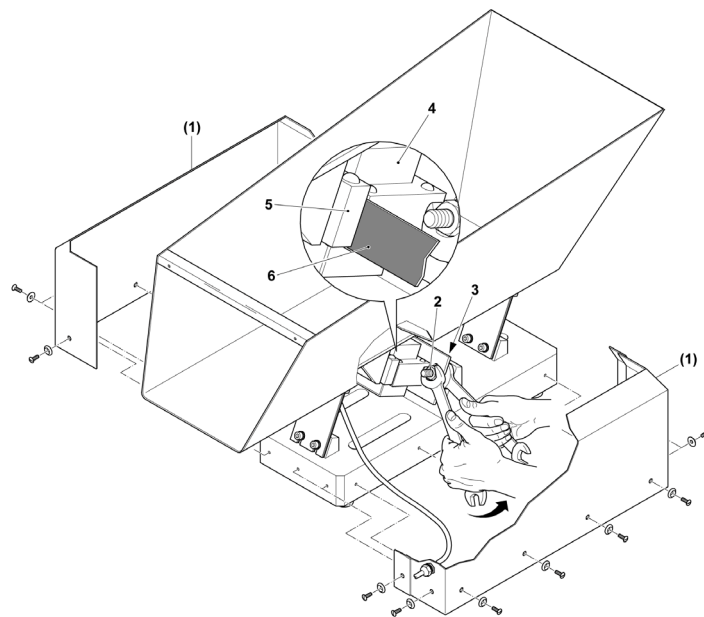


Fig. 5 Adjustment of air gap

1. Pull out the mains plug.
2. Remove the housing (1).
3. Hexagon nuts (2) and (3) with open-end spanner.
 - Open-end spanner size 10 for NVD3, size 15 for NVD4.
4. Turn the hexagon nuts in the respective direction to change the air gap.
5. Lock the hexagon nuts together.
6. Adjust the air gap between the solenoid coil (4) and the anchor (5) using a feeler gauge (6) as follows.
 - NVD3: 0.5 - 1 mm NVD4: 0.5 – 1.5 mm
7. Adjust the anchor so that there is a parallel air gap between the solenoid coil and the anchor.
8. Assembly the housing (1).
9. Measure current consumption:
 - for NVD 3 max. 0.2 [A] for NVD 4 max. 0.8 [A]
 - ⇒ If the measured value is above the max. value: Air gap is too large.
 - ⇒ If the measured value is below the max. value and the solenoid coil and anchor strike together: Air gap is too small.
- ⇒ The process is completed.

7.3.2 Tuning, adjusting the oscillation system

The vibratory hopper and the dosing chute must be coordinated.

The following factors influence the running behaviour of the oscillating system:

- the conveyed material (size, weight, shape, material, and composition),
- the conveying capacity,
- the filling quantity,
- The substructure,
- the environment (are there other vibrating components with a disturbing influence?).

To tune the oscillating system, proceed as follows:

1. Check the settings on the controller (⇒ operating manual).
 2. Pull out the mains plug.
 3. Unscrew the housing and check all spring and fastening screws for tightness.
 4. Check the type of magnets and frequency for correctness.
 5. Check air gap, adjust if necessary (⇒ chap. 7.3.1).
 6. Switch on the NVD and change the parts conveying speed using the controller.
 - Depending on the material to be conveyed, additional springs must be installed or removed (chap. 9.3.3).
 7. Mount the housing again.
- ⇒ The process is completed.

7.3.3 Setting the vibrating bracket distance

This procedure is only necessary in the following cases:

- All spring assemblies were replaced or reassembled.
- The NVD module was dismantled.

To adjust the swing bracket distance, proceed as follows:

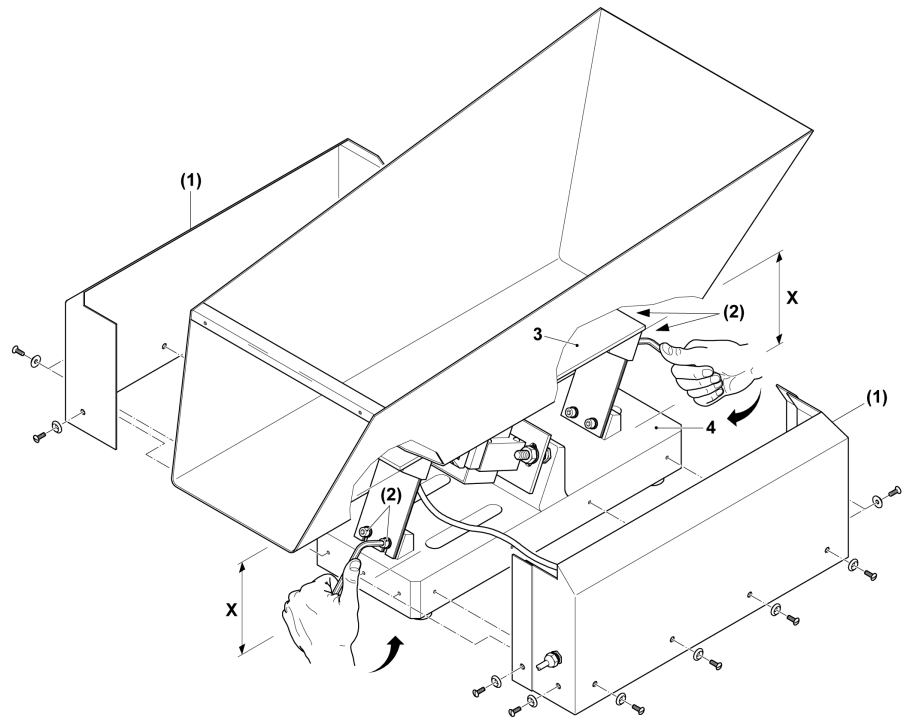


Fig. 6 Adjustment of vibrating bracket distance

1. Pull out the mains plug.
 2. Remove the housing (1).
 3. Loosen the screws (2).
 4. Ensure parallelism between the vibrating bracket (3) and the top edge of the base (4).
 - Check dimension X.
 5. Mount the housing (1) again.
- ⇒ The process is complete.

8 Fault elimination

8.1 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 supply voltage before starting work!
- Ensure that the protective earthing of the power supply is in perfect condition.



Faults caused by defective components may only be rectified by replacing the components concerned!

Only Afag original wear and spare parts may be used!



Also observe the safety instructions in ➔ chap. 2 „Safety instructions“ of these installation instructions and the control unit manufacturer.

8.2 Fault causes and remedy

Fault	Possible cause	Remedy:
NVD does not run after switching on	<ul style="list-style-type: none"> ▪ Plug not connected to mains ▪ Connecting cable between bowl feeder and control unit not plugged in ▪ Set controller on control unit to <0> ▪ Fuse in controller defective 	<ul style="list-style-type: none"> ▪ Plug in the connector ▪ Plug in the connector ▪ Turn the controller to position ▪ Replace fuse
NVD does not provide the required performance after a certain running time	<ul style="list-style-type: none"> ▪ Fastening screws of spring assemblies have loosened ▪ Weld seam between dosing chute and vibrating bracket cracked. ▪ Air gap solenoid coil/anchor misaligned ▪ Spring broken ▪ Regulator on controller misaligned 	<ul style="list-style-type: none"> ▪ Tighten the screws ▪ Re-welding ▪ Readjust the air gap (➔ chap. 7.3.1) ▪ Replace leaf spring (➔ chap. 9.3.3) ▪ Readjust controller
NVD generates strong noise	<ul style="list-style-type: none"> ▪ Housing has loosened ▪ Solenoid coil or anchor loosened 	<ul style="list-style-type: none"> ▪ Tighten the screws of the housing ▪ Tighten the screws (➔ chap. 9.3.4)
Conveying speed not correct	<ul style="list-style-type: none"> ▪ Potentiometer defective ▪ Filling quantity too large 	<ul style="list-style-type: none"> ▪ Replace potentiometer (➔ Instructions) ▪ Reduce mass

9 Maintenance and repair

9.1 General notes

The NVD require minimal maintenance. Subsequent maintenance activities ensure that the modules are in optimum operating condition.

9.2 Safety instructions

DANGER



Risk of injury due to 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.

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 modules, which can cause injury.

- Before starting any work on the module, 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

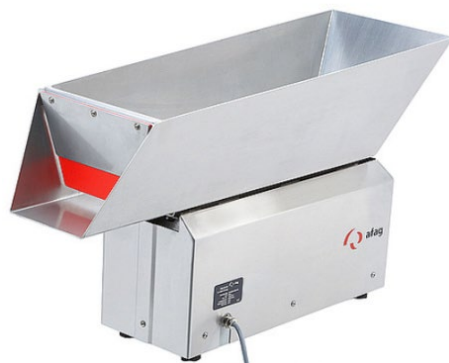






Fig. 7 Maintenance NVD

No.	Maintenance point	Maintenance work	Interval	System [On/Off]	Remarks
1	Feeding bowl	Cleaning 	Regularly	[Off]	- <ul style="list-style-type: none">Observe notes → chap 9.3.2!
2	Leaf spring	Check, remove, if necessary, clean / replace 	Regularly	[Off]	- <ul style="list-style-type: none">Check screws for tightness.Removal, cleaning, replacement → chap. 9.3.3
3	Electrical equipment	Check cable, replace if necessary 	Regularly	[Off]	- <ul style="list-style-type: none">Check cable connectionsRemove loose connections, scorched or defective cables immediately!
4	Solenoid coil	Check, replace if necessary 	Regularly	[Off]	- <ul style="list-style-type: none">Check solenoid coilReplace defective solenoid coil → chap. 9.3.4

9.3.2 Notes on cleaning

NOTICE

Risk of material damage if the following instructions are not observed!

If cleaning agents or cleaning methods other than those listed are used, there is a risk of permanent damage to components and the function of the module can no longer be guaranteed.

- Only use the specified cleaning agents!
- It is essential to observe the cleaning methods!

WARNING



Risk of injury from volatile substances!

The cleaning agents to be used contain volatile substances that can cause irritation or injury to the eyes or respiratory tract.

- Wear safety glasses.
- Ensure sufficient ventilation!

Cleaning the feeding bowl (according to its coating):

Bowl coating	Cleaning agent	Cleaning method
Hard anodised / Inox raw or polished	Benzine or spirit	Ultrasonic bath
Metaline	Soapy water	Wash off with damp cloth, allow to dry, check conveying properties, wet with silicone, if necessary, rub off
Habasite light green	Hoover	Vacuum cleaning
Habasite white, dark green polyurethane red, yellow Nextel	Benzine or spirit	Wipe out with a damp cloth and dry afterwards; cleaning agent must not be poured into the dosing chute. Dosing chute must not be immersed in cleaning bath
PET / Makrolon / Plexi	Hoover and anti-static spray	Vacuum clean before rubbing down, then spray with an anti-static spray and rub off

9.3.3 Replace leaf springs

This procedure is only necessary in the following cases:

- The vibration behaviour of the NVD has changed.
- There is a spring breakage.
- The NVD module is converted for processing another product.

To remove the leaf springs, please proceed as follows:

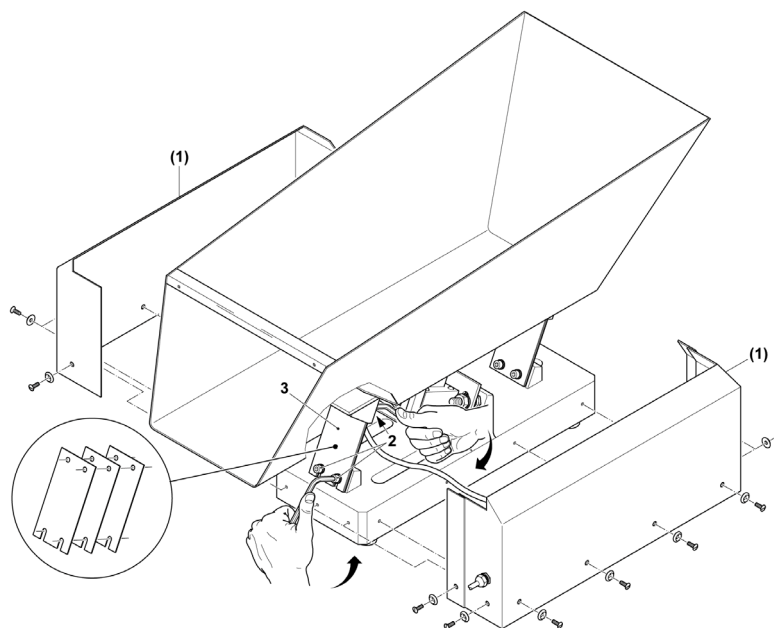


Fig. 8 Removal, replacement of the leaf springs

1. Pull out the mains plug.
 2. Remove the housing (1).
 3. Remove the screws (2) of the spring assembly (3) to be replaced.
 4. Reassemble the spring assembly.
 - In case of spring breakage, the number and thickness of the leaf springs must correspond to the old spring assembly.
 - Opposite spring assemblies must contain identical springs.
 5. Fit the spring assembly and tighten the screws (2).
 6. Check air gap between solenoid coil and anchor and readjust if necessary (➔ chap. 7.3.1).
 7. Fit the housing (1) and carry out a test run.
- ⇒ The process is completed.



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

9.3.4 Replacing the solenoid coil

This procedure is only necessary if the solenoid coil is defective.

To remove the solenoid coil, proceed as follows:

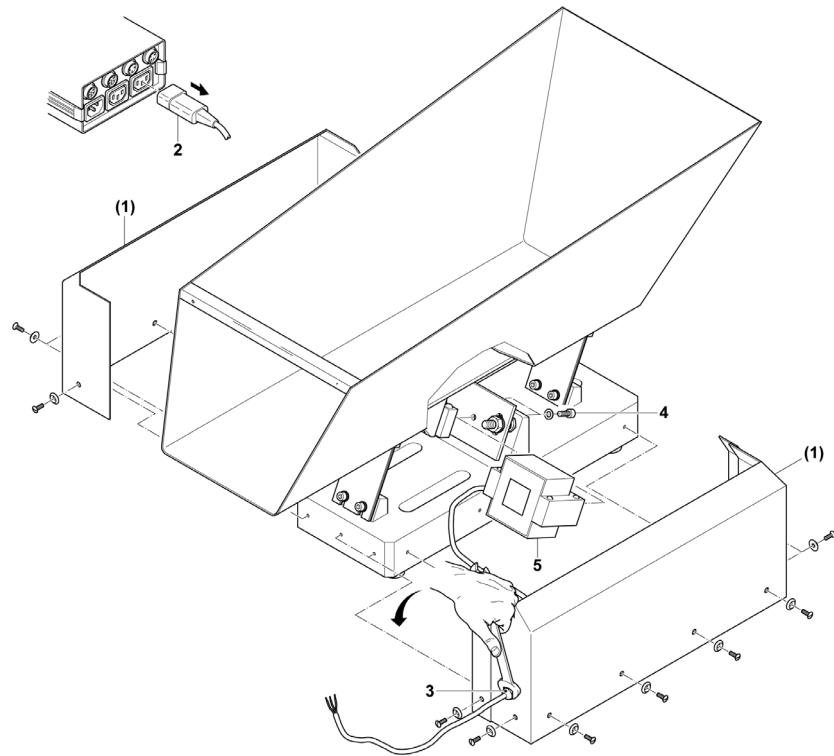


Fig. 9 Replacing the solenoid coil

1. Pull out the mains plug.
 2. Remove the housing (1).
 3. Remove the plug (2) from the controller and dismount it.
 4. Undo the cable strain relief (3) and pull cable through.
 5. Remove screws (4) and replace magnet (5).
 6. Tighten the screws (4).
 7. Refit the cable and retighten the cable strain relief (3).
 8. Refit the Euro plug.
 9. Assembly the housing (1).
 10. Then readjust the air gap between the solenoid coil and anchor (→ chap. 7.3.1.).
- ⇒ The process is completed.



Replacing the solenoid coil always requires readjustment of the air gap between the solenoid coil and the anchor (→ chap. 7.3.1).

9.4 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.

9.5 Spare and wear parts

Afag Automation AG 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, wear parts himself, or send them to the Afag repair service.

9.5.1 Spare parts

Type	Designation	Order Number			
		NVD3		NVD4	
		230V/50Hz	115V/60HZ	230V/50Hz	115V/60HZ
Vibrating magnet	WEH021.500141	50425628	-	-	-
	WEH021.501141	-	50436143	-	-
	WSN007.500119	-	-	50425626	-
	WSN007.500219	-	-	-	50436144
Rubber buffer	M5	11006834		-	
	M6	-		11006838	

9.5.2 Wear parts

Type	Designation	Order Number	
		NVD3	NVD4
Leaf spring	Leaf spring 1.5 mm	11006760	11006761

10 Decommissioning and disposal

The modules 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 module when the controller is switched off and secured!
-

10.2 Decommissioning

If the modules are not used for a longer period, they must be properly commissioned and stored as described in ↻ chap. 4.5.

10.3 Disposal

The module 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 modules must not be disposed of as a complete unit. Dismantle the modules 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 modules!

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.
-

