Operating Instructions

Controller

IRG1-S

Translation of the Original Operating Instructions EN

- Controller IRG1-S (230 V/50 Hz) ⇨ Order no: 50360105
- Controller IRG1-S (115 V/60 Hz) ⇨ Order no: 50360106

Dear Customer

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

This software manual contains 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 controller or other options.

We wish you every success with our products!

With kind regards

Your Afag team

© Subject to modifications

The controllers have been designed by Afag GmbH 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 assembly instructions contain important information on assembly, commissioning, functioning and maintenance of the controller IRG1-S to ensure safe and efficient handling and operation.

Consistent compliance with these operating instructions will ensure:

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

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

1.2 Explanation of symbols

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

DANGER

Danger!

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

WARNING

Warning!

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

CAUTION

Caution!

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

NOTICE

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

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

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 feeding 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 design changes carried out without prior technical instructions of Afag.
- 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 controllers 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 controllers and optimal protection of personnel.

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

Every person carrying out installation, commissioning, maintenance work or operating the controllers 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 electronic controllers are designed for use in industrial systems. The IRG1-S controller is intended for use in electromagnetic vibratory conveyors and is used for the continuous control of inductive loads such as bowl feeders, linear feeders, and hoppers.

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.

Improper use of the controller will invalidate the warranty.

2.3 Foreseeable misuse

Any use other than or beyond the intended use described is considered a misuse of the controller.

WARNING

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

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

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

2.4 Obligations of the operator and the personnel

2.4.1 Follow these instructions

A basic prerequisite for safe and proper handling of the controllers 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 controllers.

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 controller.

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 controllers,
- 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 operating instructions are observed,
- ensure that the operating instructions are always kept at hand at the installation in which the controllers 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 operating 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).

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2.5 Personnel requirements

2.5.1 Personnel qualification

The activities described in the operating 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 controllers thus exposing himself and others to the risk of serious injury. Therefore, only qualified personnel may be permitted to carry out the described activities on the controllers.

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

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

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

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

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

2.6 Personal protective equipment (PPE)

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

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

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

2.7 Changes and modifications

No changes may be made to the controller which have not been described in these operating instructions or approved in writing by Afag GmbH.

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

2.8 General hazards / residual risks

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

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

2.8.2 Danger due to electricity

DANGER

Risk of injury due to electric shock!

Work on the electrical system carried out unprofessionally can 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.

3 Technical data

3.1 Dimensional drawing controller IRG1-S

Type	IRG1-S
A	175 mm
B	80 mm
C	60 mm
D	24 mm
E	25 mm

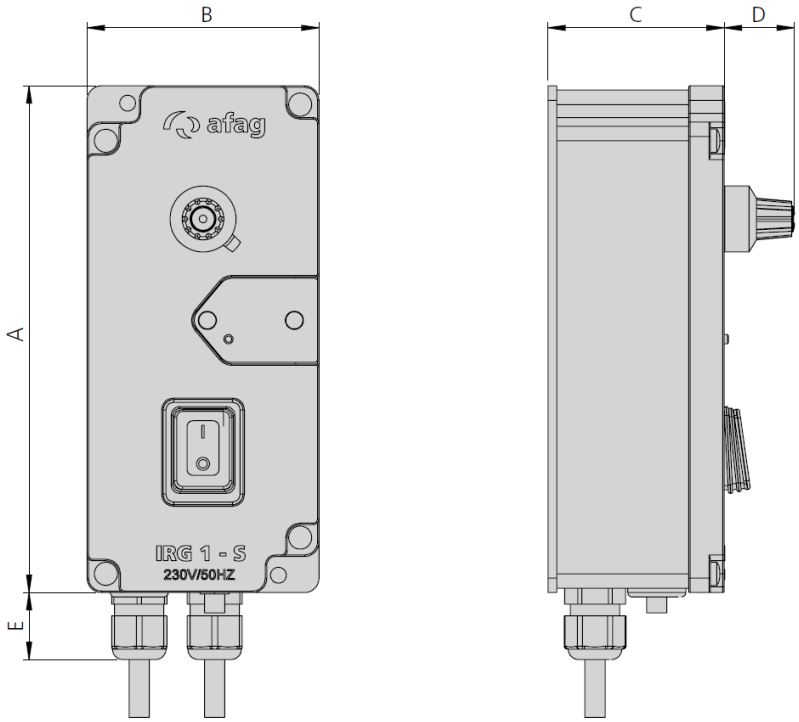


Fig. 1 Dimensional drawing of IRG1-S controller

3.2 Technical data controller IRG1-S

IRG1-S	
Operating temperature	0 - 45 °C

Type	IRG1-S	IRG1-S
Order number	**50360105**	**50360106**
External target value preset	0 - 20 mA (DC), 0 - 10 VDC	0 - 20 mA (DC), 0 - 10 VDC
Nominal output current	6 A AC	6 A AC
Input voltage	230 VAC	115 VAC
Output voltage	40 - 228 VAC	20 - 100 VAC
Supply voltage compensation	•	•
Net weight	1.3 kg	1.2 kg
Alternation operation	•	•
Smooth start	0 - 4 s	0 - 4 s
Continous operation	•	•
Operating mode display	LED	LED
Input of optical coupler invertable	•	•
Refillable vibratory hopper NVB	•	•
Vibratory hopper NVD	•	•
Industrial belt hopper IBB	---	---
Vibrator	•	•
Plug connector/pins	M8/4-pol.	M8/4-pol.
Protection type	IP54	IP54

Note: • = existent/suitable for --- = not suitable for

3.3 Accessories

3.3.1 Support

Type	Designation	Order Number
Support	for 1 IRG	50450178
	for 2 IRG	50450179
	for 1 IRG extended	50450145
	for 2 IRG extended	50450147

4 Transport and storage

4.1 Scope of supply

The corresponding documentation is supplied with each controller.

Fig. 2 Scope of delivery IRG1-S

[Unt]	Designation
1 x	Controller
1 x	Operating Instructions

4.2 Transport

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

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

- Storage temperature: 0-+45 °C
- Relative air humidity: < 90%, non condensing

4.3 Storage

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

- Store the controller in the transport packaging in a place.
- 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 controller from dirt and dust.

5 Design and function

5.1 Design of the controller

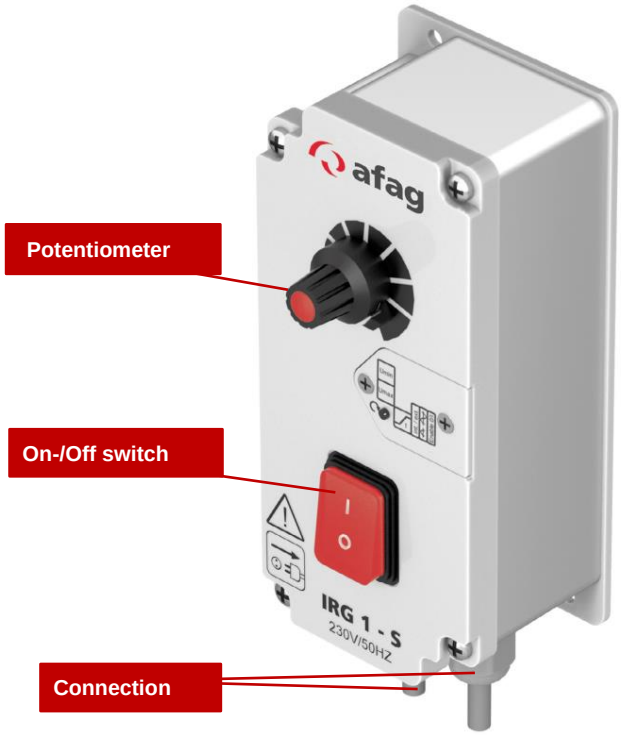


Fig. 3 Design of the IRG1-S controller

5.2 Functional description

The electronic controller IRG1-S is used for the control of inductive loads such as bowl feeders and linear feeders.

The controller operates according to phase-angle control and thus generate a variable output voltage for the drive solenoid.

The performance is adjusted using the potentiometer integrated in the front panel. The control curve of the potentiometer can be adapted to the conveyor device via internal trimming potentiometers Umin/Umax, so that the full control range of 0...100 % can always be utilised.

The IRG1-S controller can be used to operate vibratory conveyors with a vibration frequency of 6000 S/min (100Hz) or 7200 S/min (120Hz) or 3000 S/min (50Hz) or 3600 S/min (60Hz) (full-wave or half-wave operation). The operating mode can be set via an internal switch.

An adjustable smooth start ensures that when the unit is switched on via the mains switch or the control input, the feeder starts up without jerks.

The controller can be switched on or off by a higher-level system, e.g. PLC, using a 24 V, DC signal voltage via an enable input. With the factory setting, the control unit switches "Off" when a control voltage is applied.

Mains voltage fluctuations are eliminated via an internal compensation circuit, so that a constant performance is guaranteed.

6 Mounting and installation

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

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

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

6.1 Safety instructions

WARNING

Danger! Risk of electric shock!

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

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

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

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

6.2 Mounting the controller

Two fastening options are available for mounting the controller. The associated mounting holes are located on the lower part of the housing and are separate from the inside of the housing.

NOTICE

Damage to the circuit board!

Incorrect adjustment of the slide switches can cause a malfunction or damage the circuit board!

- Set the slide switch only for the respective application!

Connection option type 230V/50Hz

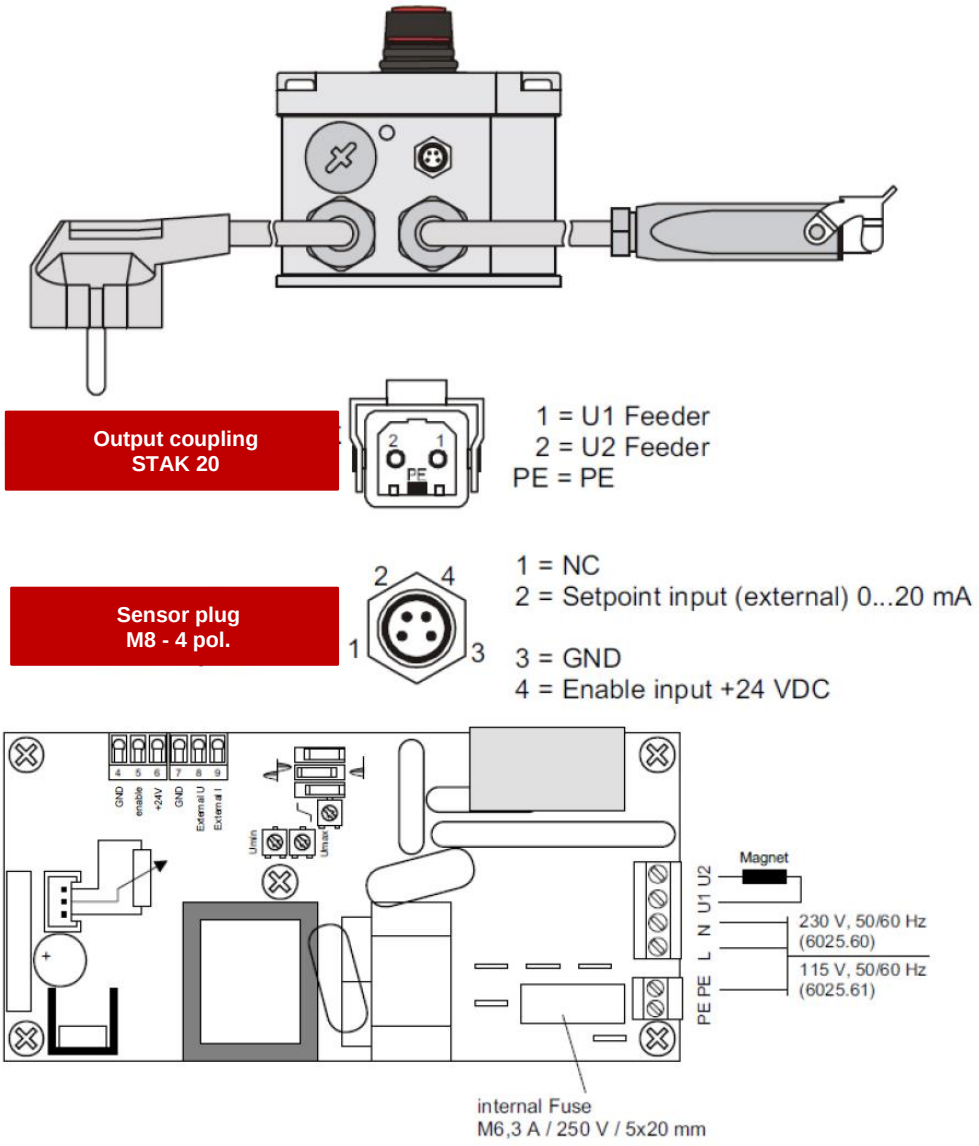


Fig. 4 Fastening of controller type 230V/50Hz

Connection option type 115V/60Hz

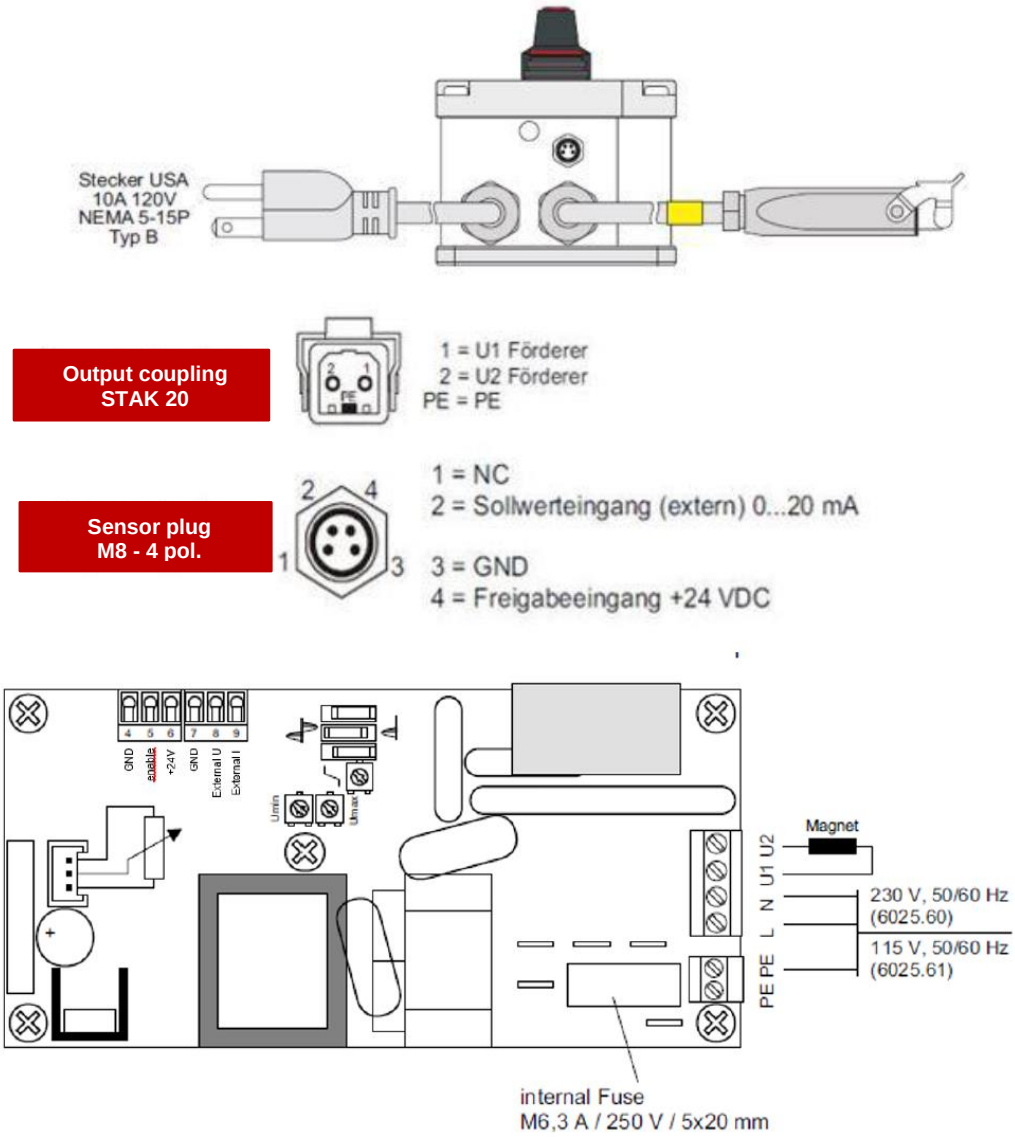


Fig. 5 Fastening of controller type 115V/60Hz

6.3 Installation

WARNING

Danger! Risk of electric shock!

Unprofessional work can lead to serious or fatal injuries and damage to property.

- 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.

NOTICE

Damage to the controller due to incorrect control input!

If the load circuit is interrupted via a switch or relay, the controller may be damaged in certain applications if the wrong control input is used!

- For applications that require constant ON and OFF switching of the vibratory drive (e.g. accumulation shutdown, hopper control, etc.), the control input provided for this purpose must be used!

Important notes on the electrical connection

- Disconnect the supply voltage before assembly or disassembly work, as well as when changing fuses or modifying the structure.
- Before commissioning, check whether the rated voltage of the device matches the local mains voltage.
- Emergency-STOP devices must remain effective in all operating modes. Unlocking the Emergency-STOP devices must not cause an uncontrolled restart!
- The electrical connections must be covered!
- Protective conductor connections must be checked for proper function after installation!

7 Operation and settings

7.1 Safety instructions

DANGER

Risk of injury due to electric shock!

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

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

NOTICE

Damage of the controller!

If the controller plug is plugged in or unplugged from the vibratory drive when the controller is switched on, the controller may be damaged!

- Never connect or disconnect the device plug to the vibratory drive when the controller is switched on!

7.2 Settings

The standard settings can be made without removing the front panel. The adjustment elements are accessible after unscrewing the flap on the right-hand side of the front panel.

Setting options:

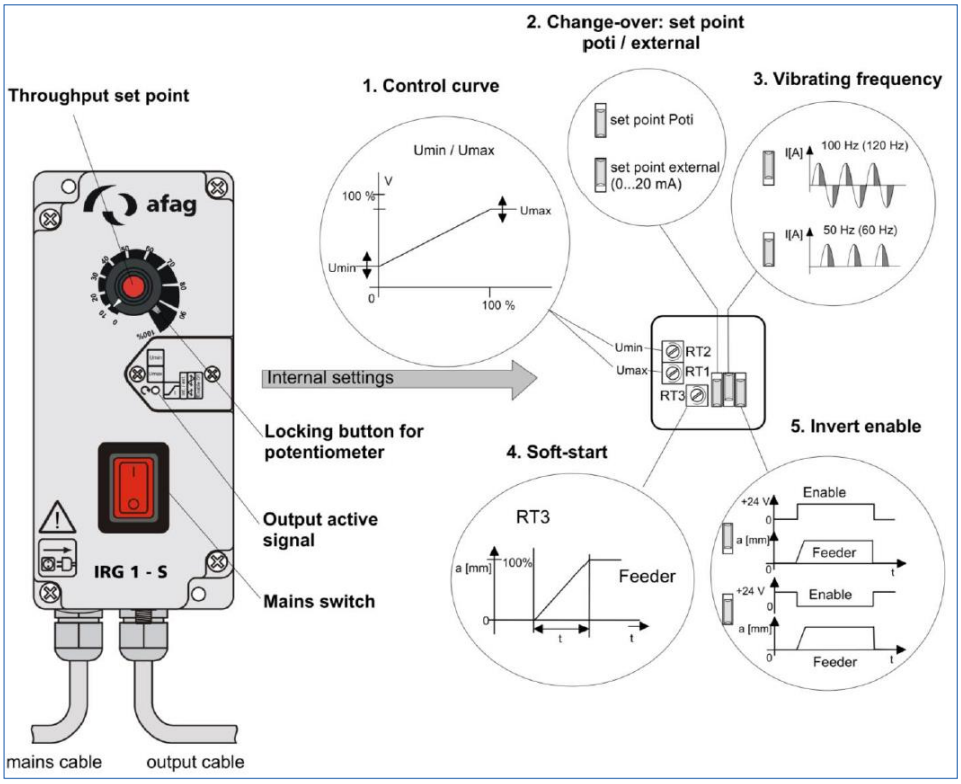


Fig. 6 Setting options on the IRG1-S

7.2.1 Setting of control characteristic (internal potentiometer)

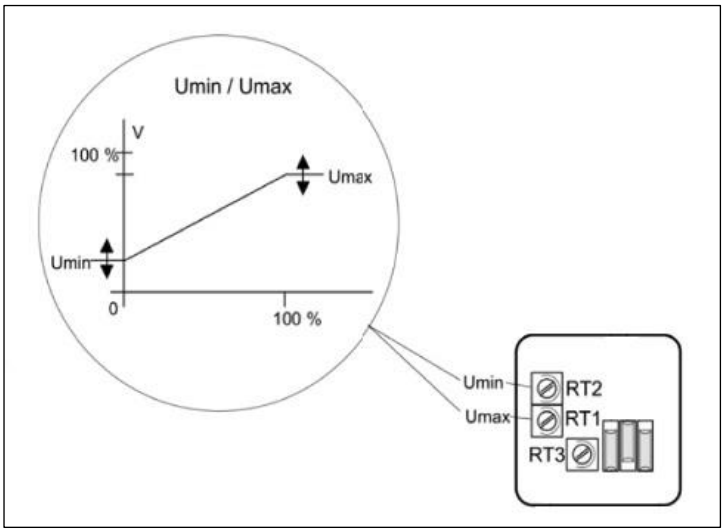


Fig. 7 Setting the control characteristic

Adjustment process:

To adapt the controller to the conveying behaviour of different vibratory bowl feeders, the control characteristic of the setpoint potentiometer can be adjusted using the Umin or Umax trimmers.

The Umax trimmer specifies the 100% value of the output voltage, while the Umin trimmer is used to limit the setting range of the setpoint potentiometer downwards.

The trimmers are factory-set to Umin approx. 40 V, Umax approx. 210 V (for 115 V devices: Umin 20 V, Umax 105 V).

As the Umax trimmer influences the Umin trimmer, the Umax trimmer should be adjusted first and then the Umin trimmer when changing the setting.

7.2.2 Setting the setpoint

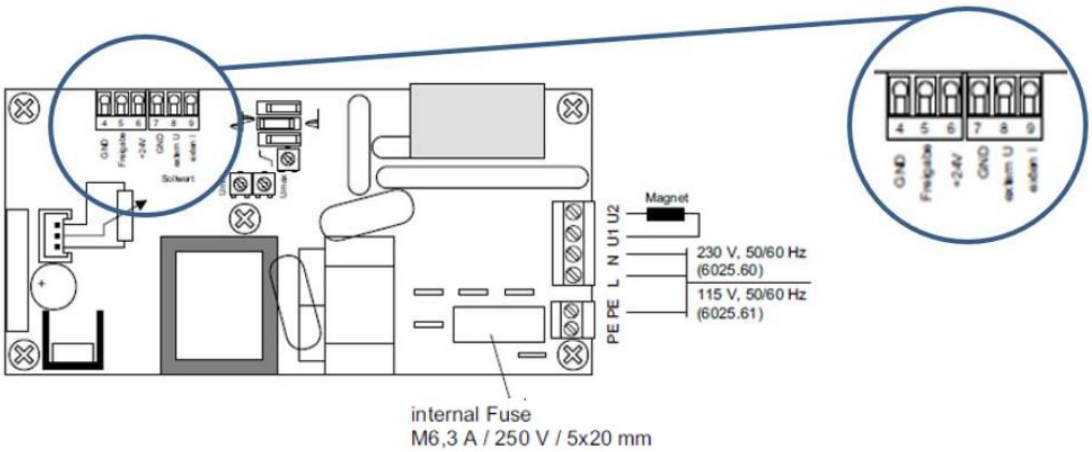


Fig. 8 Setpoint specification

Adjustment process:

The setpoint is specified by selecting Setpoint potentiometer or Setpoint external (control current 0... 20 mA).

Please note the following when selecting the control voltage: For operation via the control voltage, the wiring must be switched from terminal 9 to terminal 8.

7.2.3 Set vibration frequency (full and half wave)

Setting the correct oscillation frequency is crucial, as the wrong frequency can lead to thermal overload of the magnets.

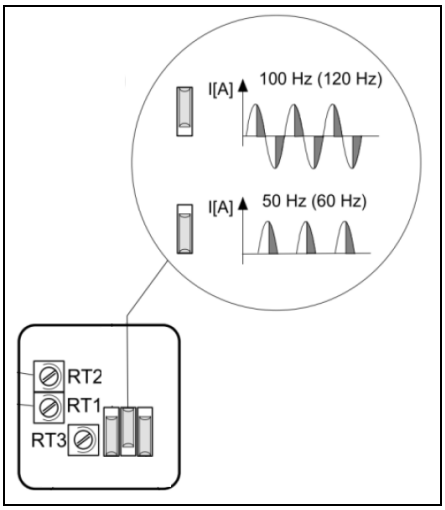


Fig. 9 Setting the vibration frequency

Adjustment process:

To set the vibration frequency, the mechanical vibration frequency of the conveyor must be known. The setting is made using an internal slide switch.

7.2.4 Adjusting soft-start

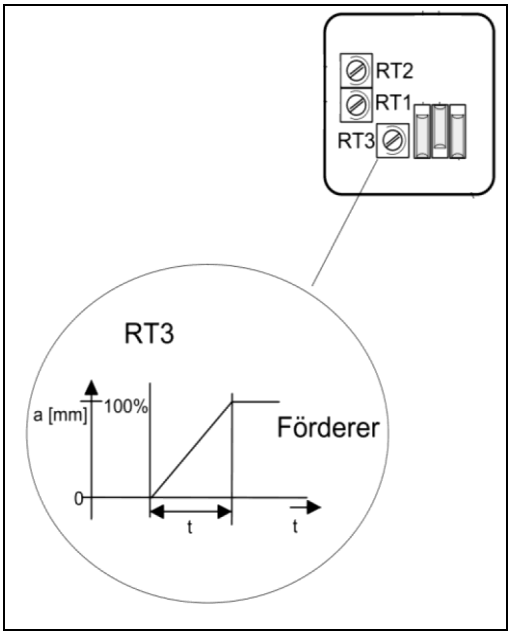


Fig. 10 Adjusting soft-start

The soft-start of the output voltage is set on trimmer RT3 **(0...4 sec)**.

7.2.5 Carry out release inversion

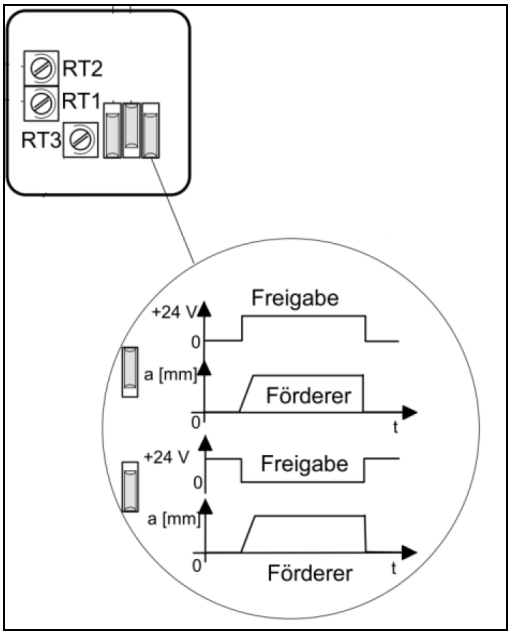


Fig. 11 Setpoint specification

Logical function reversal of the enable input

8 Maintenance

8.1 Safety instructions

DANGER

Risk of injury due to electric shock!

Work on the electrical system carried out unprofessionally can 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.

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

8.2 Maintenance activities and maintenance intervals

The IRG1-S controller is maintenance-free. Only the fuse needs to be replaced if necessary.

8.2.1 Maintenance point

No.	Maintenance point	Maintenance work	Interval	System [On/Off]	Remarks
1	Fuse	Check, replace if necessary	As required	[Off]	-
			▪ Replace the fuse as needed:		

8.2.2 Replacing the fuse

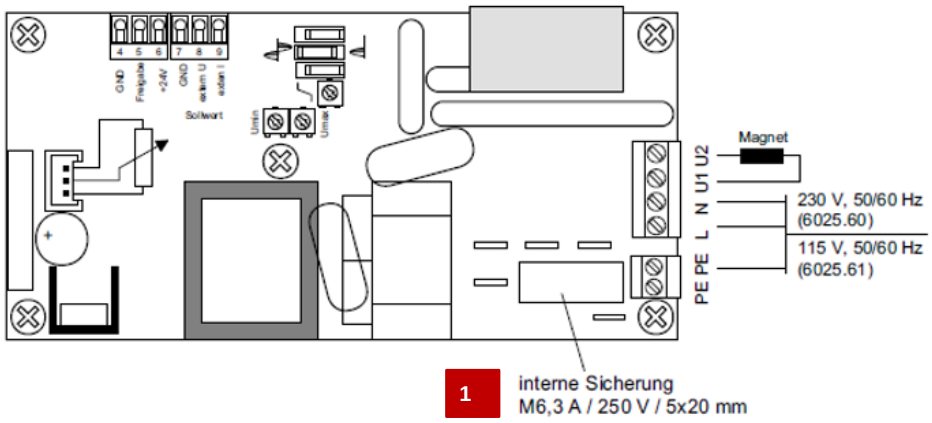


Fig. 12 Replacing the fuse

Procedure:

1. Pull out the mains plug.
2. Open controller unit (remove housing).
3. Replace defective fuse (1).
4. Close the housing again.

⇨ The process is complete.

8.3 Spare and wear parts, repairs

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

Repair work may only be carried out by qualified personnel! We recommend that you have the repair carried out at our premises.

9 Decommissioning and disposal

The controller must be properly dismounted after use and disposed of in an environmentally friendly manner.

9.1 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 dismounting the module!
- Only remove module when the controller is switched off and secured!

9.2 Disposal

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

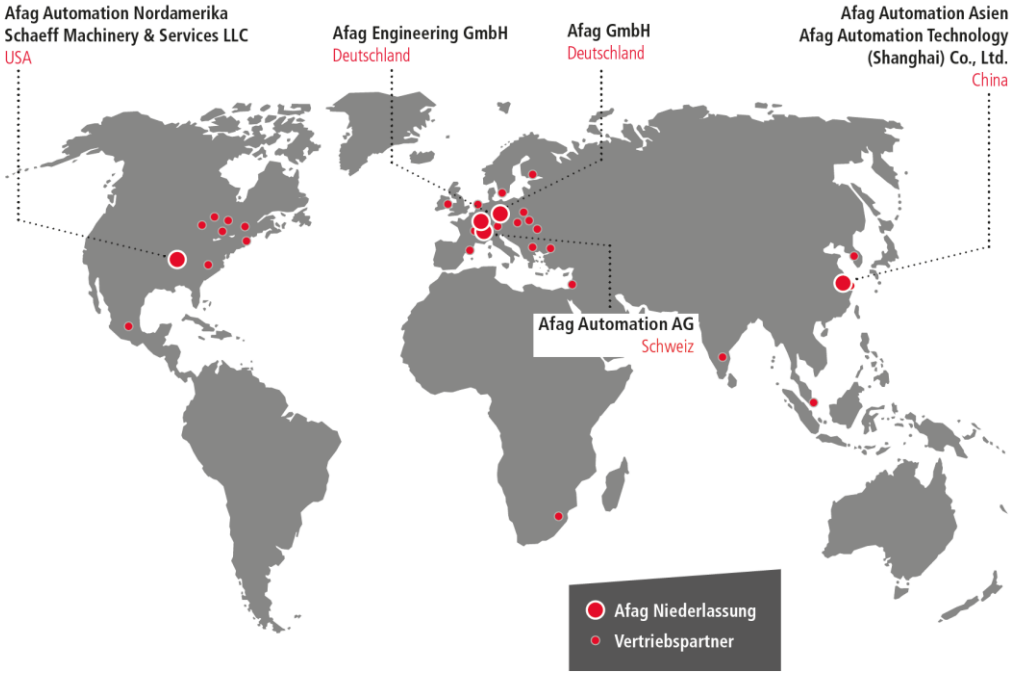
- Scrap the metallic materials.
- Hand over plastic parts for recycling.
- Sort the rest of the components by their material properties and dispose of them accordingly.

NOTICE

Risk to the environment due to incorrect disposal of the controllers!

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.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