



Operating Instructions

Control Units of Modular Design

ESM 906
ESM 910

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Declaration of Conformity

According to the Low-Voltage Directive 2014/35/EU
and Electromagnetic Compatibility Directive 2014/30/EU

We hereby declare that the product meets the following requirements:

Low-Voltage Directive 2014/35/EU
Electromagnetic Compatibility Directive 2014/30/EU

Applied harmonised standards:
DIN EN 60204 T1
EN 61439-1

Remarks:

Rhein-Nadel-Automation

Managing Director
Dr. Tobias Hensen



1. About this document



Attention

Read this document carefully and observe the safety directives before commencing any work.

Document description:

This document provides assistance in choosing your product. You will also find information on mechanical and electrical installation, operation, product extensions and accessories.

Non-observance may cause trouble with the product or the environment, reduce the product lifetime or lead to other damage.

2. Safety directives

2.1. Design of safety directives



Notice

This notice identifies useful tips for use of the controller.



Attention!

This symbol identifies hazardous situations.

Non-observance of such warnings may cause irreversible injury or even death!

2.2. Fundamental safety directives

Non-observance of the following fundamental safety measures and directives may lead to severe injury and damage to property!

Meeting the requirements given in the related documentation is a precondition for safe and trouble-free operation and for achieving the product properties specified. Further additional safety directives in the other sections must be observed as well.

2.3. Personnel



Attention!

Any work on electrical equipment of the machine/system shall be carried out exclusively by a professional electrician, or by instructed persons working under the direction and supervision of a professional electrician, according to electrotechnical rules.

Only qualified professionals are allowed to work on or with the product. IEC 60364 or CENELEC HD 384 define the qualification of these persons:

- They are familiar with set-up, installation, commissioning and operation of the product.
- They possess the qualification required for performance of their work.
- They know all regulations for the prevention of accidents, directives and laws applicable to set-up, installation and commissioning on site, and they are able to apply the same.
- They have knowledge and skills of First Aid.

2.4. Intended use

Please observe the following directives for intended use of the controllers:

- The devices herein described must only be stored, fitted and operated under the conditions specified in this documentation.
- These units are intended exclusively to be installed in control cabinets.
- These devices are not for domestic use! They are solely intended to be used as components for commercial or professional applications pursuant to EN 61000-3-2.
- They satisfy the protection requirements of 2014/35/EU: Low Voltage Directive.
- They do not constitute a machine as defined by 2006/42/EU: Machinery Directive.
- A machine comprising the product must not be commissioned or put into operation for the intended use until it has been declared to be in conformity with the EC Directive 2006/42/EU: Machinery Directive; Observe EN 60204-1.
- Commissioning or starting operation for the intended use is only permitted in compliance with the EMC Directive 2014/30/EU.
- Use of the product in living areas may lead to EMC disturbance. The user is responsible for taking interference suppression measures.
- They are optimised for operation of RNA bowl feeders and linear feeders. Observe the limits indicated in the technical specification.

Attention!



- Prior to start-up make sure that the protective earth conductor is connected and in proper condition. Make the PE conductor test with approved test devices only.
- Never start up despite detected damage.
- Do not make any technical modifications to the device, except as described in this document.
- Never start up in an incompletely installed state.
- Never operate the device without the required guards in place.
- Connect, disconnect or change any electrical connections only in the absence of voltage.

2.5. Residual hazards

Residual hazards may remain even if all directives have been observed and protective measures taken. Such residual hazards must be considered by the user in the risk assessment of his machine/equipment. Non-observance may lead to severe injury and damage to property!

2.6. Device

Pay attention to the warning signs fitted to the device!

Symbol	Description
	Hazardous voltage: Prior to commencing any work on the product check for absence of voltage on all power connections.
	Leakage current: Make fixed installation and PE connection according to EN 60204-1!

2.6.1. Protection of the drive system

Certain device parameter settings may cause overheating of the connected drive magnet, e.g., due to prolonged operation with an incorrect voltage setting.

2.6.2. Degree of protection - protection of persons and equipment

- All specifications relate to installed condition ready for operation.
- All slots not used must be closed by protection caps or dummy plugs in order not to reduce the protection against accidental contact.

3. Product information

3.1. Characteristic features

These compact controllers are designed for operation of a vibratory drive system.

The unit offers the following characteristic features:

- One feed rate output: Vibratory feeder max. 6A (ESM906) or 15A (ESM910), variable
- External enabling input, 24 VDC
- Two optocouplers for status messages and other links (ESM906 only).
- Screw-type connections on top
- Exclusively for installation in control cabinets

3.2. EC conformity

The controller is compliant with the following standards:

EC EMC Directive 2014/30/EU
EC Low-Voltage Directive 2014/35/EU

Applied harmonised standards:

DIN EN 60204, part 1
EN 61439-1

The controller is available only in a CE-compliant version.

4. Technical data

4.1. Functional description

The modules are used to regulate the feed rate at the vibrating drive magnet by means of phase control without any other closed-loop control. The feed rate can be set by means of potentiometers, analog voltage setpoint setting (0 to 10 VDC) or analog current injection (0 to 20 mA). If the last mentioned setpoint setting method is used, cable lengths of more than 10 m are admissible, otherwise the maximum cable length is 3 m. If strong interference sources are present, all control cables must be shielded.

The output voltage for the smallest setpoint of 0 V (potentiometer turned all the way to the left) can be set between 0 and 90 Volt using trimming potentiometer U_{MIN} . The maximum output voltage for a setpoint of 100% can be set between 150 and 220 Volt using trimming potentiometer U_{MAX} .

An enabling input makes it possible to switch the modules on and off at no-load. Enabling can be done via NO contact or by 12...24 VDC voltage signal. Floating contacts are used for setpoint and enabling signal.

Notice:

Terminals 19 and 20 are used for selection of operating mode. With these terminals jumpered, the module operates in symmetric full-wave mode (for type '-2 drives'). The vibratory drive then operates at double the mains frequency (100 Hz). A missing connection will result in asymmetric half-wave mode and the drive will then vibrate at the mains frequency (for type '-1' drives).

In addition, the ESM 906 module features two status outputs provided by NPN-doped transistors with a load capability of max. 30 V at 0.1 A which are switched through. Status output 'READY' is valid when mains supply voltage is applied and internal supply voltage is generated. When the enable signal is present as well, 'ACTIVE' status is valid.

The ESM 906 module is provided with a 10 A high-speed miniature fuse (5x20 mm) which is accessible through the front panel. This fuse is intended for **short-circuit protection of the internal semiconductor only**. Overload protection for the entire device is to be provided **externally** ($i = \text{max. } 6\text{A}$).

The ESM 910 does not have an integrated fuse.

Both modules have a firmly set soft start function.

Notes on installation

Both modules generate a certain amount of heat. To ensure proper dissipation of this heat take, care to observe a minimum clearance of 50 mm between the module and adjacent equipment components.

4.2. Type information and technical data

Mains voltage:	230 V AC, 50/60 Hz, +6 / -10% 110 V AC, 50/60 Hz, +6 / -10%
Output voltage:	0 ... 220V at 230V mains voltage; 0 ... 105V at 110V mains voltage
Load current ESM906:	0...6 A
Load current ESM910:	0...15A
Internal fuse (ESM906 only):	10A FF
Backup protection:	C10A
Ext.setpoint specification:	Potentiometer 10 kΩ / 0...10V DC / 0...20 mA DC
Soft start time:	Fixed setting
Enabling input:	24V DC (12-24VDC) or floating contact
Status outputs (ESM906 only):	2 optocouplers, max. 30VDC 100mA,
Ambient temperature:	0 ... 45° C
Cooling:	free convection
Mounting:	vibration-free
Degree of protection:	IP20
Leakage current:	Less than 2mA
Heat loss ESM906:	max. 14W
Heat loss ESM910:	max. 32W

Article numbers:

Device type	Line voltage and output current	RNA article code
ESM 906	110 V; 6 A; 50/60 Hz	31007219
ESM 906	230 V; 6 A; 50/60 Hz	31007218
ESM 910	110 V; 15 A; 50/60 Hz	31007100
ESM 910	230 V; 15 A; 50/60 Hz	31007098

5. Notes on start-up

Make sure that following points are checked prior to making connection to power supply and switching on the controller:



Attention

- Are all screws on the controller tightened properly?
- Are all plug hooks engaged / firmly screwed in place?
- Are all cables and glands in proper condition?
- Is operation for the INTENDED USE made sure?
- Does the supply voltage specified on the controller match the local supply system?
- Does the supply frequency specified on the vibratory drive match the local supply system?
- Is the correct mode set on the controller?
- Is sufficient cooling of the controller ensured?

Only if you can clearly answer all the above questions with "Yes" should the controller be put into operation.



Attention

Set the controller to minimum output before switching-on for commissioning or start-up after repairs or replacement of controllers/vibratory drives. Then check for proper operation while the output is increased.

5.1. Modes of operation

RNA vibratory drive systems employ mechanical spring vibrators which are set to a vibrating frequency near the mains frequency or near double mains frequency depending on weight and/or size.

This is why two modes of operation are possible:

Mode 1: Asymmetric half-wave mode:

The vibratory drive operates at mains frequency (50 resp. 60 Hz).

Mode 2: Symmetric full-wave mode:

The vibrating drive operates at double the mains frequency (100 resp. 120Hz).

For the user's convenience, the magnets of the RNA drives are colour-coded:

Mode 1: red

Mode 2: black

In terms of the vibrating frequency this means:

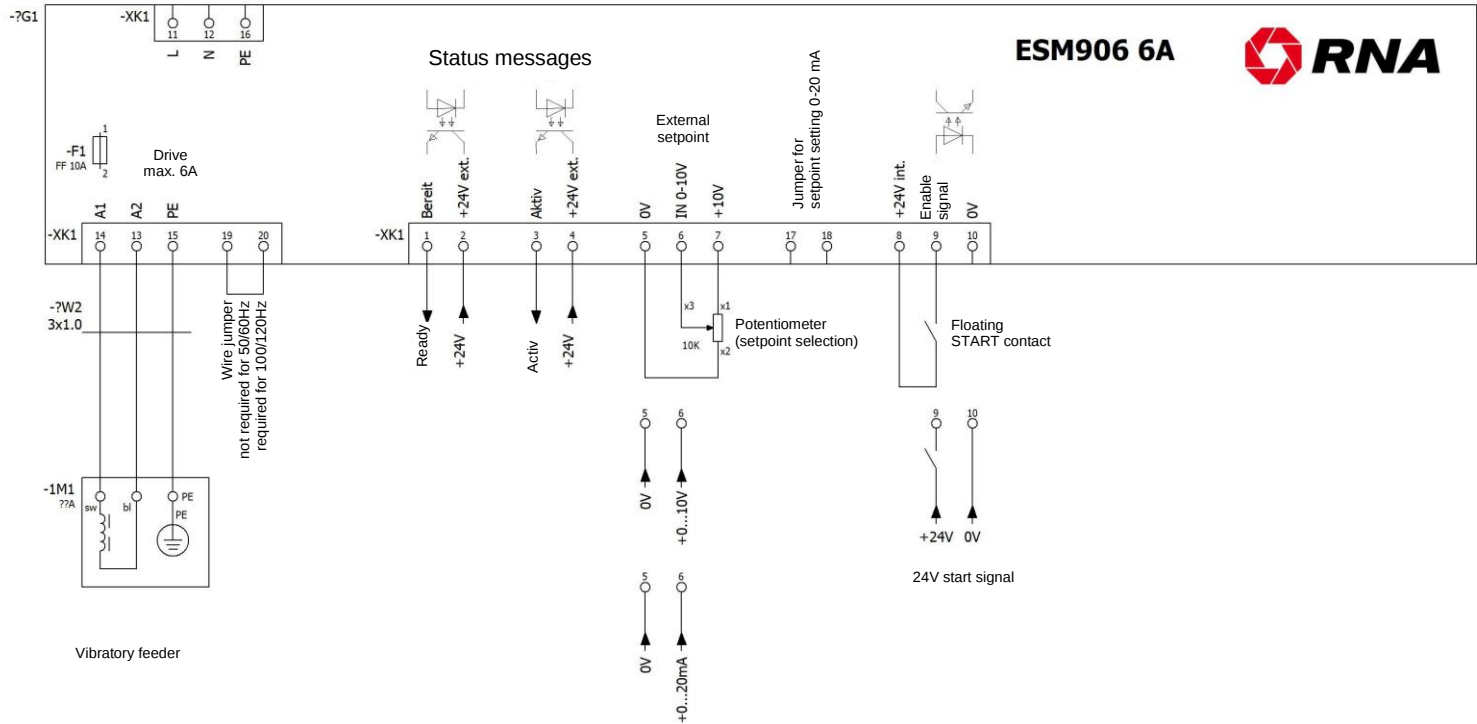
	Mains frequency 50 Hz	Mains frequency 60 Hz	Magnet colour
Mode 1 Half-wave mode	Vibrating frequency 50 Hz $\triangleq$ 3000 min ⁻¹	Vibrating frequency 60 Hz $\triangleq$ 3600 min ⁻¹	Red
Mode 2 Full-wave mode	Vibrating frequency 100 Hz $\triangleq$ 6000 min ⁻¹	Vibrating frequency 120 Hz $\triangleq$ 7200 min ⁻¹	Black

With ESM906 and ESM910 controllers, mode changeover is achieved by inserting/removing a wire jumper between terminals 19 and 20.

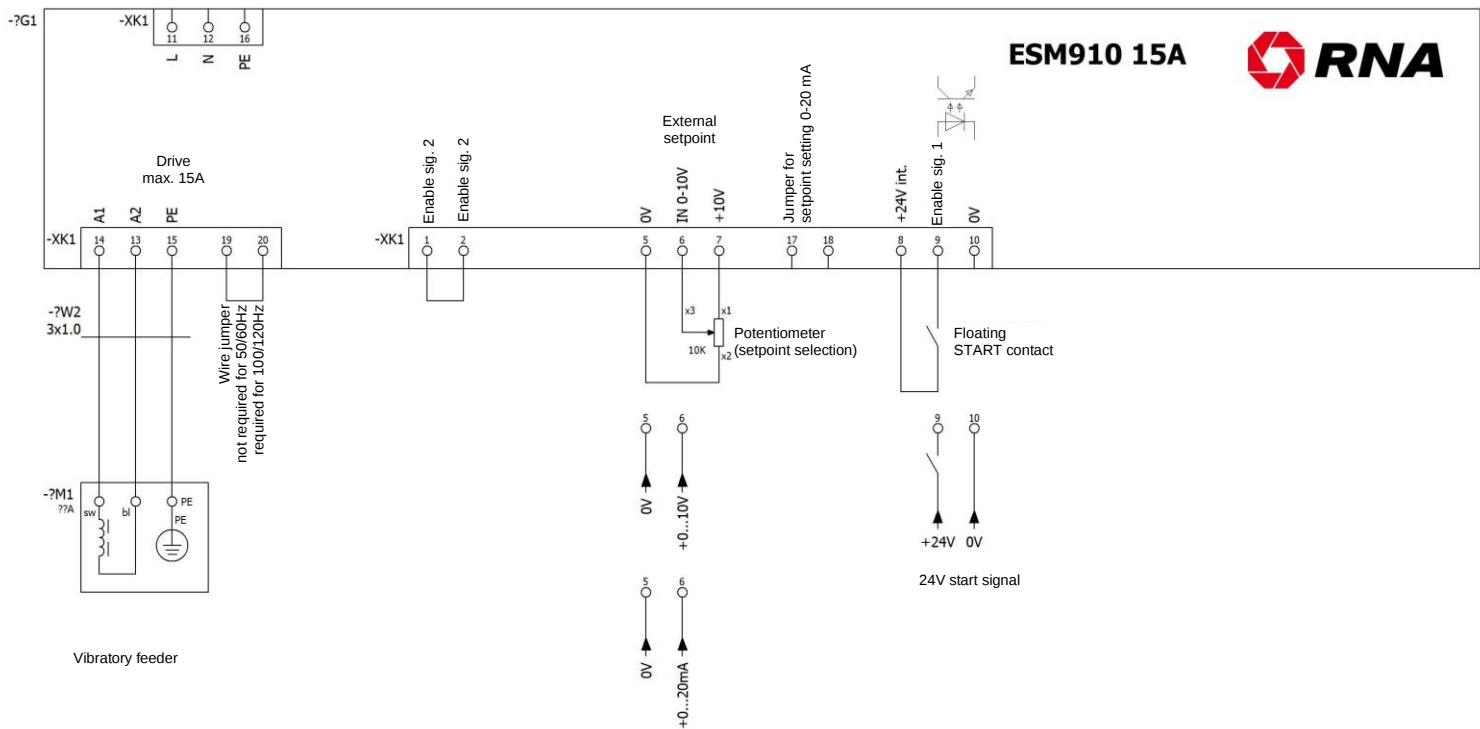
- Wire jumper inserted: vibrating frequency 100/120Hz
- Wire jumper removed: vibrating frequency 50/60Hz

6. Connection diagram

230V, 50/60Hz supply connection
(110 V, 50/60 Hz)

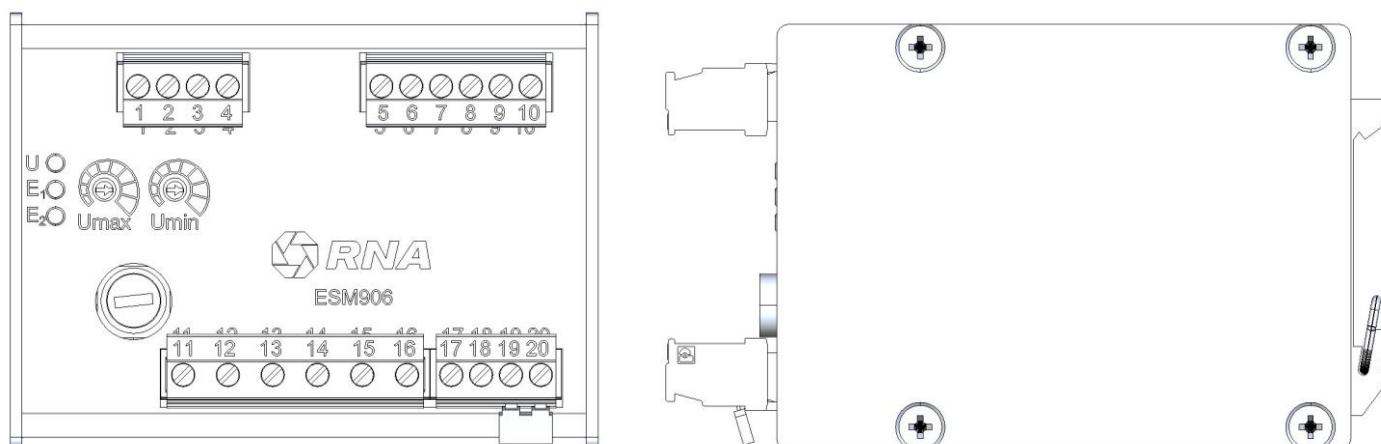


230V, 50/60Hz supply connection
(110 V, 50/60 Hz)

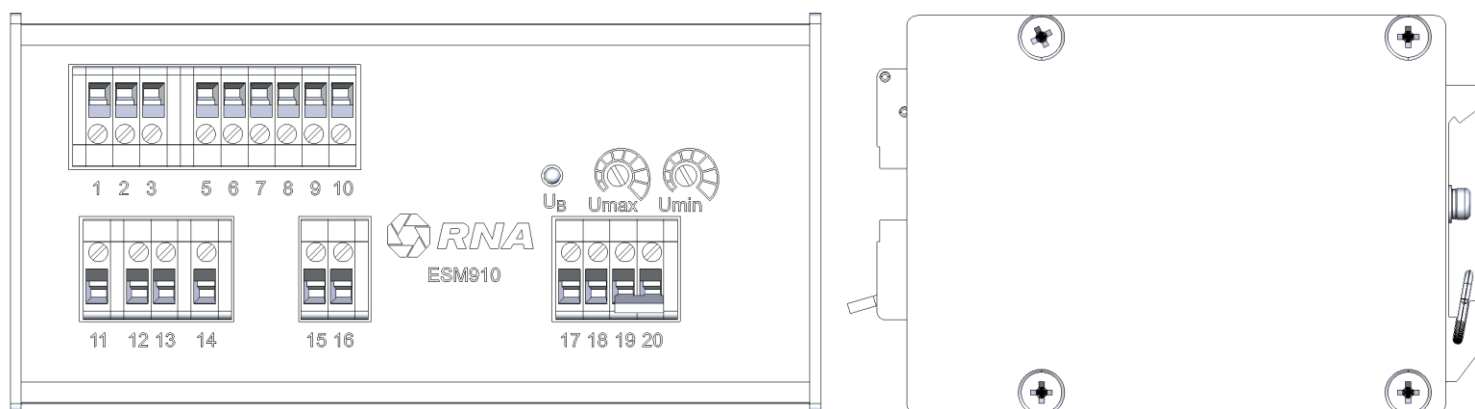


7. Dimensioned drawing

	Width	Height	Depth
ESM906	100	74	126



	Width	Height	Depth
ESM910	150	74	112



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