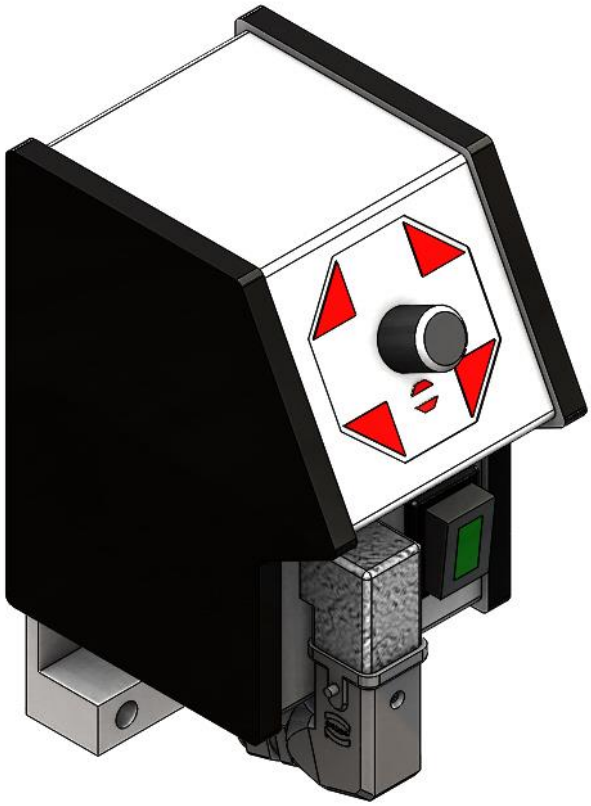


Operating Instructions

Controller for Vibratory Drive Systems

ESG 1000

Table of Contents

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

CE

1. Technical data

1.1. Functional description

The compact controller can operate all RNA vibrating motors up to a load current of 6 amps. It is designed for individual installation right local to the vibrating drive. All connections are plug-and-socket style. The setting range of the front-mounted potentiometer has been tuned in our factory using a reference drive and enables you to adjust the output voltage between 40 and 208 $Volt_{eff}$.
The illuminated rocker switch on the controller front panel disconnects all poles from power supply. For frequent switching applications or when operating with a higher-level control system provision is made for no-load switching-off both by floating contact and by a 16-30 VDC voltage signal. The required procedure is described in section 3.5 **Enabling of operation by external components**.
Soft start, i.e. time-controlled ramp-up to the set power after power ON, is set to 0.5 seconds. This time can be changed in the device as needed.

1.2. Applicable directives and standards

The controller is compliant with the following standards:

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

The applicable standards are specified in the Declaration of Conformity.

1.3. Technical data

- Mains connection:	230 V AC, 50/60 Hz, +10 -15% or 110 Volt AC, 50/60 Hz, +15 -10% (can be switched internally)
Output voltage:	40...208 Volt (eff.), adjustable, (for 230V mains) 20...105 V(eff), adjustable, (for 110V mains)
Load current:	max. 6 A(eff)
Internal fuse:	Miniature fuse, 5 x 20; M 6.3A
Operating modes:	1) Symmetric full-wave mode (vibrating frequency = double the mains frequency) 2) Asymmetric half-wave mode (vibrating frequency = mains frequency)
Mode change:	Coding jumper in load connector
Enabling of functions:	can be selected internally (via jumper) or externally
Enabling via external contact:	floating normally open contact, loading approx. 6 mA
Enabling by external 24 V signal:	input protected against reverse polarity, voltage level 16...30 VDC Signal current at 24 V approx. 8 mA
Soft start:	can be adjusted internally, default setting approx. 0.5 sec.
Degree of protection:	IP 54
Radio interference suppression:	acc. to EMC directive
Dimensions:	104 x 213 x 153 (width x height x depth)
Ambient temperature	0°-50°C
Cooling	free convection
Mounting	vibration-free
Leakage current	Less than 2mA
Power loss	max. 20W

When using the UL/CSA version of the ESG1000 controller:
We recommend to install a back-up fuse for additional protection of the device.
The back-up fuse must fulfil following requirements:
Interrupt rating: 200 kA
Fuse class: RK5
Nominal current/nominal voltage: 10A/250VAC Cat. No. TR10R
Manufacturer: Ferraz Shawmut

2. Safety Information

Be sure to read and understand all safety information. Compliance with safety information will help to preserve valuable materials and equipment and prevent health issues.
Make sure that all persons working with this controller are familiar with all safety directives and observe them fully.
The device described here is a controller for operation of RNA's vibratory and linear feeders. Observe the limits indicated in the technical specification.

Notice!
This symbol indicates important facts or circumstances and particularly useful information.

Attention!
This symbol indicates potential damage to property and/or environment.

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.

Observe all safety and hazard notes and signs local to the equipment!

Inspect/check the electrical equipment of the machine/system periodically. Remedy defects such as loose connections or damaged cables at once.

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.

3. Notes on start-up

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

- Is the controller casing properly closed with all screws tightened?
- 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? (See description under "Modes of Operation")

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.

3.1. Explanations regarding MODE OF OPERATION

RNA vibratory drive systems employ mechanical spring vibrators which are set to a vibrating frequency near the mains frequency depending on weight and/or size. Two modes of operation are available:

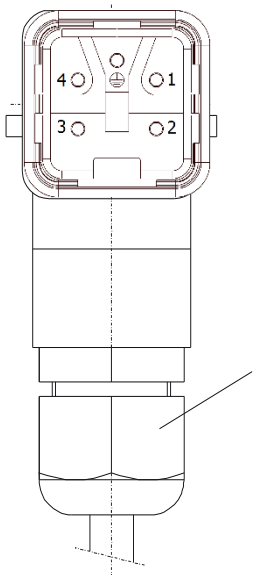
1. Asymmetric half-wave mode - the vibratory drive operates at mains frequency.

2. Symmetric full-wave mode - the vibratory drive operates at twice the mains frequency.

In terms of the vibrating frequency this means:

mains frequency	50 Hz	60 Hz
Mode 1	50 Hz vibrating frequency = 3000 min^{-1}	60 Hz vibrating frequency = 3600 min^{-1}
Mode 2	100 Hz vibrating frequency = 6000 min^{-1}	120 Hz vibrating frequency = 7200 min^{-1}

On a 50 Hz mains supply you can only operate vibratory drives with 50 Hz or 100 Hz vibrating frequency, whereas with a 60 Hz mains supply you can only operate vibratory drives with 60 Hz or 120 Hz vibrating frequency. The controller can be used for both modes. However, it is mandatory to switch it to the correct mode of operation. The mains frequency has no relevance for the controller.



M20 gland

Black: 50/60Hz vibrating frequency
Grey: 100/120Hz vibrating frequency
(EMC metal gland if frequency controllers are used.)

3.2. Mode change

The operating mode is determined by coding in the load plug of the vibrating drive. A wire jumper connected between pins 3 and 4 inside the connector switches the controller to mode 2 = 100 or 120 Hz. In the absence of this wire jumper the controller operates in mode 1 = 50 or 60 Hz.
The RNA vibratory feeders are delivered with correctly coded connectors. To help the user, the cable gland on the feeder's connector is colour-coded as follows.
BLACK for mode 1, 50 Hz or 60 Hz,
GREY for mode 2, 100 Hz or 120 Hz,

3.3. Setting the minimum or maximum output voltage

The controllers have been set in our factory using a reference drive. In special situations, or following modifications, it may be necessary to readjust these settings. Be sure to observe the following:

Notice!
The output voltage can only be measured with the vibrating drive connected!
The measuring device must be designed for **true root mean square measurement** (true RMS). Other measuring devices would show random values. The load connector must be plugged in because otherwise the measurement may perhaps be made in the wrong operating mode.

As the presence of mains voltage is required for setting the output voltage requires, it is imperative to observe following safety notice:

Attention!
The power supply voltage must imperatively be connected via a **safety isolating tranformer**!
The measurement must take place exclusively in rooms / zones that are approved for this purpose!
This measurement must be made by qualified professionals only. After completing the measurement, take utmost care in re-assembling the controller because otherwise the series approval will become void!

It is also important to know that the adjusters for output voltage are not completely isolated from each other. This means that changes to the maximum voltage will result in minor changes to the minimum voltage, and vice versa. Accordingly, you may need to readjust the two trimming potentiometers several times.
(See component locations drawing in Fig. 3.)

3.4. Switching to another mains voltage

The controller can be operated on both 230 V, 50/60 Hz and 110 V, 50/60 Hz, but must be switched over to the respective supply voltage.

Switching from 230V to 110V:
Disconnect the device from power supply and open the left side panel of the device. Select the switch to the correct voltage (up position for 110V, down position for 230V) and close the side panel. Make a trial run. U_{MAX} may have to be re-adjusted.

3.5. Enabling of operation by external components

The standard setup of the controller is configured so that the vibratory drive will start as soon as the power switch is set to ON. If you want the controller to work in Start - Stop operation without disconnecting it from the mains supply, open the right-hand side panel of the controller, observing above safety precautions, and change over the jumper S1 (see component location diagram in Fig. 3). Remove the blanking plug in the side of the casing and install a size M16 strain-relieved cable gland in its place, through which you can then feed the cable for the enabling signal. There are two ways of enabling:

3.5.1. Enabling via a contact

With this simple and inexpensive solution a contact is closed to enable the controller and activate the vibratory drive. The connection is made at terminals 33 - 34. Be sure to observe the following:

- Mains voltage is present at this connection! Take care to observe cable type and colour as well as insulation requirements. The contact must of course be a potential-free (floating) contact.
- Cables that are longer than 2m must be shielded. The shield must be connected to the protective earth conductor on the controller side.
- The cable length should not exceed 5 meters.
- Avoid routing this cable in the immediate vicinity of high-energy switching devices or strong interference fields.

3.5.2. Enabling via voltage signal.

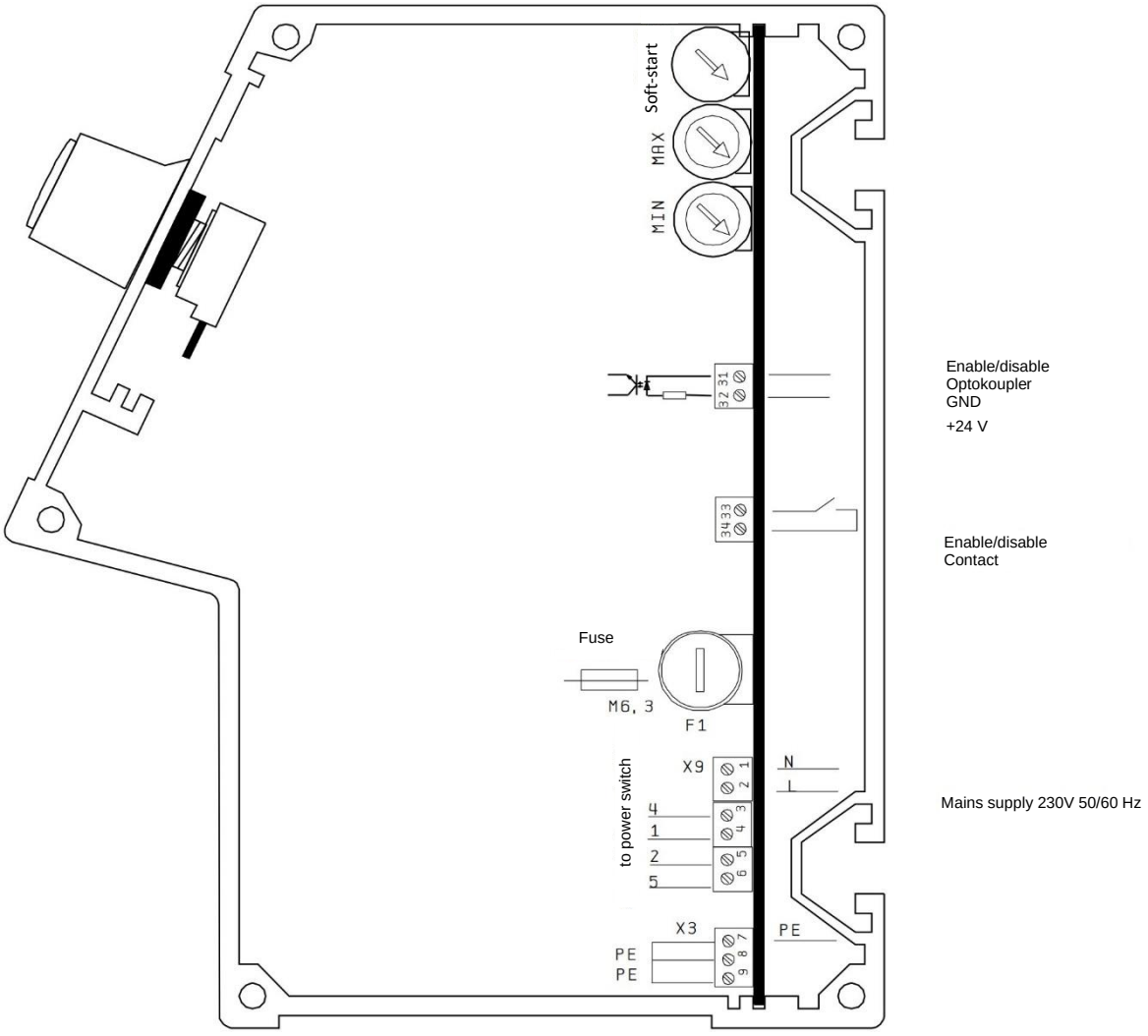
Connection is made at terminals 31 (GND) and 32 (+ 24 VDC.) The drive starts as soon as a signal between 10 and 30 volt of direct current is available with the correct polarity. The input is protected against polarity reversal. Using an optocoupler in the controller provides for an isolated input and also permits the installation of shielded cables of almost any length. Here too, take care to avoid high-energy interferences.

3.6. Changing the soft-start time

Soft-start, i.e. time-controlled ramp-up to the set power, provides effective protection of the vibratory drive against the armature striking the electromagnets. In case of small vibratory drives that start up at high cycle rates, the default time is not necessarily required, and may even hinder the work flow. The trimmer labelled SOFT START allows you to set the ramp-up time. As this change also requires you to open the device casing be sure to observe above-mentioned safety precautions.
(See component locations drawing in Fig. 3.)

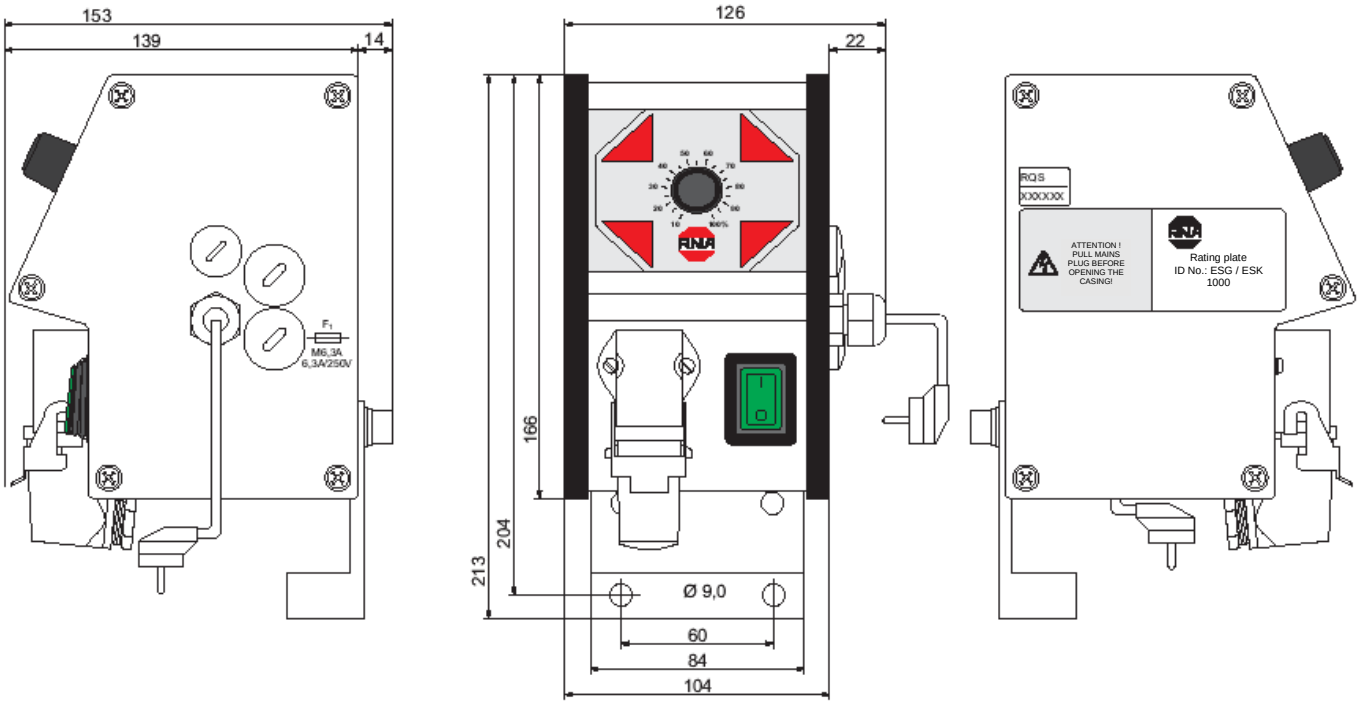
4. Pilot device locations on the circuit board

Fig. 3: ESG1000 controller shown with opened right side panel

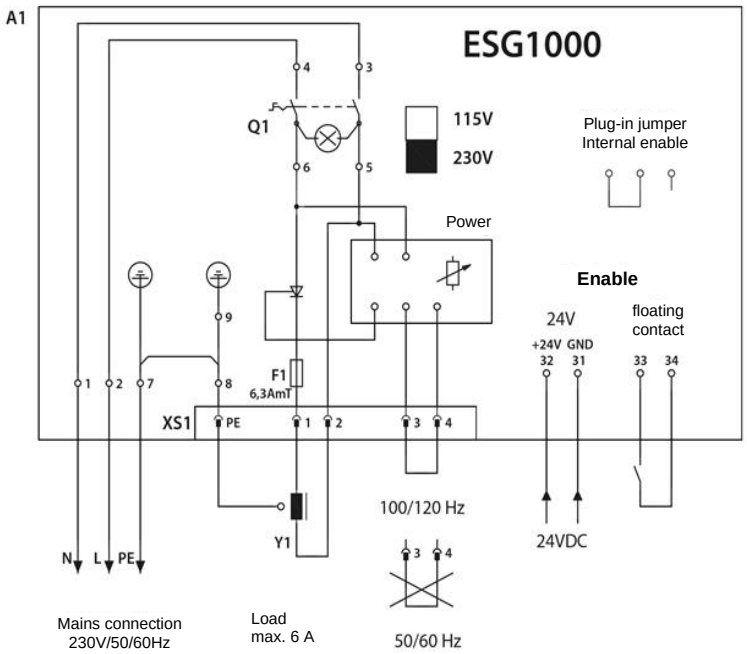


Notice!
When changing the fuse be sure to use the specified rating of M 6.3A.
Too high a fuse rating will result in destruction of the controller.

5. Dimensioned drawing



6. Connection diagram



To use an external enabling signal you must change over the jumper.

ATTENTION ! The connections for the enabling contact are energized!

The vibratory feeder runs when the enabling signal is present or the enabling contact is closed.

Mode selection:

Connection XS1 / 3 -> 4 made, vibrating frequency = double the mains frequency

Connection XS1 / 3 -> 4 open, vibrating frequency = mains frequency

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