

Installation and Operating Instructions

Vibratory Feeders

SRC-N 160-2
SRC-N 200-2
SRC-B 200-2
SRC-N 250-2
SRC-B 250-2
SRC-N 400-1
SRC-N 400-2
SRC-N 630-1
SRC-N 800-1
SRHL 400-1
SRHL 400-2

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Declaration of Incorporation

According to the Low-Voltage Directive 2014/35/EU

We hereby declare that the product meets the following requirements:

Low-Voltage Directive 2014/35/EC

Applied harmonised standards: DIN EN 60204 T1

Remarks:

We assume that our product will be incorporated into a stationary machine.

Rhein-Nadel-Automation

Managing Director
Jack Grevenstein



1. General

1.1. Technical data

Vibratory feeder type ¹	SRC-N 160-2	SRC-N 200-2	SRC-B 200-2	SRC-N 250-2	SRC-B 250-2	SRC-N 400-1
Dimensions Ø x H (mm)	157 x 132.5	180 x 165	180 x 165	290 x 215	290 x 215	440 x 228
Weight	7 kg	11 kg	11 kg	40 kg	40	103
Degree of protection	IP 54	IP 54	IP 54	IP 54	IP 54	IP 54
Connecting cable length	1.4 m	1.4 m	1.4 m	0.5 m	0.5	0.5
Power input ² (VA)	110	240	240	519	519	753
Current ² (A)	0.55	1.2	1.2	2.6	2.6	3.75
Nominal magnet voltage ² / Frequency	200 V / 50 Hz					
Number of magnets	1	1	1	3	3	3
Magnet type/ Article number	WZAW 040 35000714	WZUW 080 35000721	WZUW 080 35000721	WZAW 060 35000727	WZAW 060 35000727	YZAW 080 35000739
Magnet colour	black	black	black	black	black	red
Air gap (mm)	0.3 - 0.5	0.4 - 0.5	0.4 - 0.5	1 - 1.2	1 - 1.2	2.3 - 2.8
Vibration frequency (Hz ⁻¹)	100	100	100	100	100	50
Number of spring packs	3	3	3	3	3	3
Standard spring set No. of springs per pack	3 x 4	3 x 4	3 x 4	1 x 4 2 x 3	3 x 6	3 x 6 1 set of
Spring dimensions Length (borehole gauge) x width	87 (67) x 20	87 (67) x 20	87 (67) x 20	106 (86) x 35	106 (86) x 35	139 (116) x 40
Spring thickness (mm)	1	1	1.5	2	2	2
Property classes of spring fastening bolts	8.8	8.8	8.8	8.8	8.8	8.8
Tightening torque of spring fastening bolts	25 Nm	25 Nm	25 Nm	100 Nm	100 Nm	100 Nm
Max. weight of vibrating units, depending on mass moment of inertia and de- sired feeder speed	2.5 kg	3.5 kg	3.5 kg	13 kg	13 kg	35 kg

Vibratory feeder type ¹	SRC-N 400-2	SRHL 400-1	SRHL 400-2	SRC-N 630-1	SRC-N 800-1
Dimensions Ø x H (mm)	440 x 228	470 x 249	470 x 249	660 x 225	805 x 315
Weight	103	140	140	168	270
Degree of protection	IP 54	IP 54	IP 54	IP 54	IP 54
Connecting cable length	0.5	0.5	0.5	0.5	1.4
Power input ² (VA)	786	1140	1060	1000	1700
Current ² (A)	4.05	5.7	5.3	5	8.5
Nominal magnet voltage ² / frequency	220V / 50Hz				
Number of magnets	3	2	2	4	4
Magnet type/ Article number	WZAW 080 35000733	YZUW 090 35000745	WZUW 090 35000753	YZAW 080 35000739	YZUW 090 35000750
Magnet colour	black	red	black	red	red
Air gap (mm)	1 - 1.2	2 - 2.8	1 - 1.5	2.3 - 2.8	2.0 - 3.0
Vibration frequency (Hz ⁻¹)	100	50	100	50	50
Number of spring packs	3	6	6	4	12
Standard spring set No. of springs per pack	2 x 10 1 x 9	4 x 4 2 x 3	5 x 6 1 x 5	4 x 8	12 x 12
Spring dimensions Length (borehole gauge) x width	106 (86) x 35	139 (116) x 40	139 (116) x 40	139 (116) x 40	180 (156) x 60 (30)
Spring thickness (mm)	2	2	3	2	2
Property classes of spring fastening bolts	8.8	10.9	10.9	12.9	12.9
Tightening torque of spring fastening bolts	100	120	120	120	145
Max. weight of vibrating units, depending on mass moment of inertia and de- sired feeder speed	35 kg	45 kg	45 kg	50 kg	80 kg

¹ The last digit of the type designation indicates the vibration frequency: 1=50 Hz, 2=100 Hz

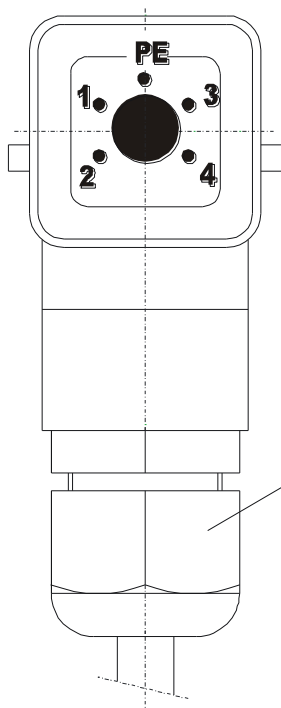
² For special connected loads (voltage / frequency) see rating plate on the magnet

Notice



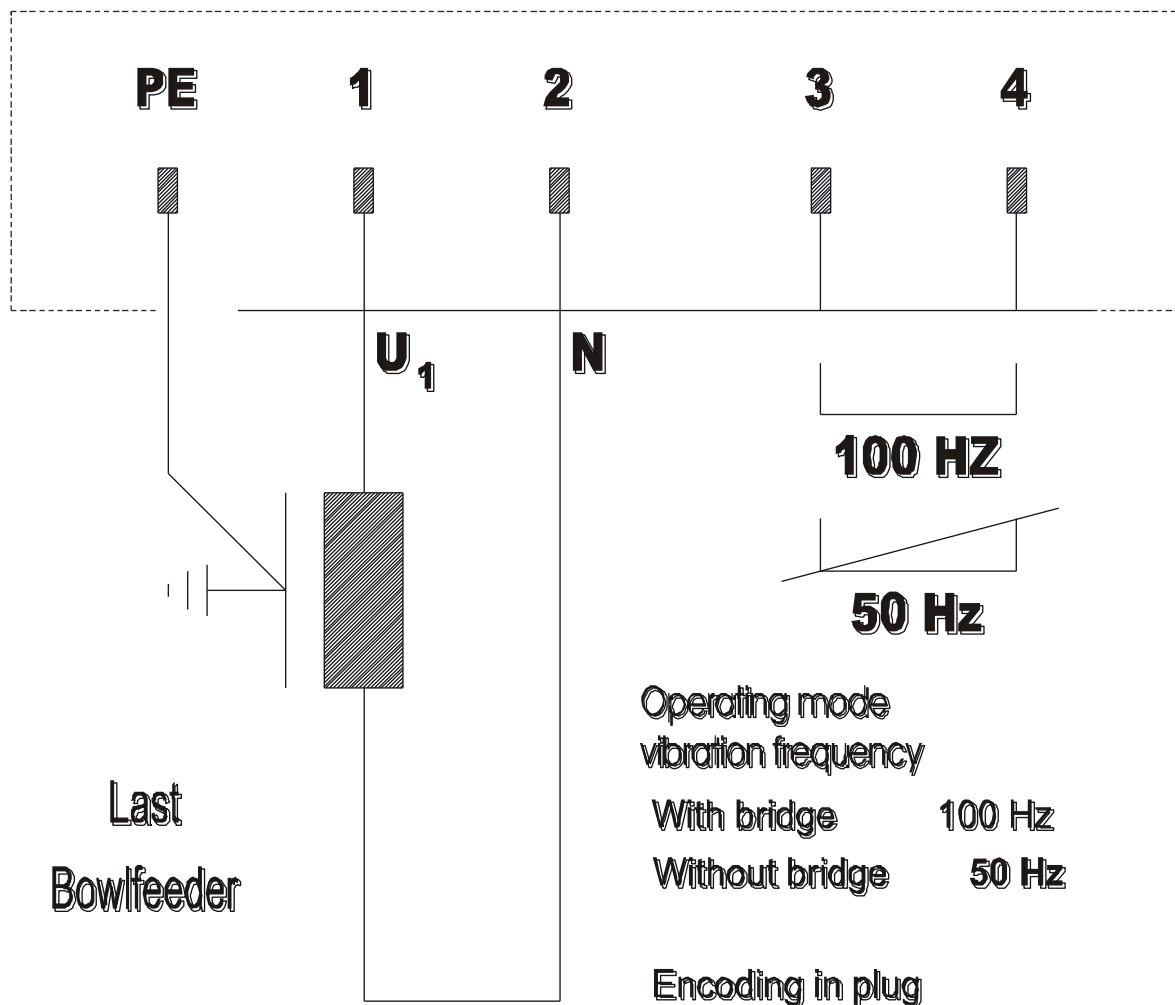
All vibratory feeders listed in this table shall be operated only in conjunction with an RNA controller and with a mains voltage of 230 V / 50 Hz. For special voltages and frequencies please refer to the separate data sheet.

Pin assignment



Screw connection M20
Grey-2, 100 Hz

Black-1, 50 Hz
Metal-EMV-screw connection
For frequency controlled equipment



With jumper: The jumper must be inserted between connections 3 + 4.

2. Safety directives

We have taken great care in design and manufacture of our vibratory feeder in order to ensure smooth and safe operation. You, too, can make an important contribution towards safety at work. We therefore ask you to read the operating instructions completely prior to commissioning the system. Observe the safety directives at all times!

Make sure that all persons working with or at the equipment also read the following safety directives carefully and follow them!

These Operating Instructions only apply to the equipment types indicated on the cover page.



Notice

This hand indicates useful tips for operation of the vibratory feeder.



Attention

This warning triangle indicates safety notices. Non-observance of such warnings may cause serious injury or even death.

- Make sure that protective earthing of the power supply system is in perfect condition!
- Never operate the vibratory feeder without guards and cover panels in place!

Intended use

The intended use of the vibratory feeder is the driving of sorting systems. They serve for linear transfer as well as correctly oriented and metered supply of bulk products.

Any other use, for example as vibrating screen or for material inspection applications, is considered contrary to intended use.

Intended use also includes observance of the operating instructions and compliance with the maintenance rules.

For the technical data for your vibratory feeder please refer to the table 'Technical Data' (Section 1). Make sure that the ratings of the vibratory feeder, control system and power supply are compatible.



Notice

Operate the vibratory feeder in perfect condition only.

Never operate the vibratory feeder in areas subject to explosion hazards or in wet areas.

Operate the vibratory feeder only in the configuration of drive unit, control unit and bowl agreed with the manufacturer.

The vibratory feeder must never be subjected to any loads other than the products to be handled for which this special type has been rated and dimensioned.



Attention

It is strictly forbidden to disable any guards or safety devices!

Equipment user's duties

- Observe the directives given in the operating instructions for any kind of work (operation, maintenance, repairs, etc.).
 - Refrain from any working practice that affects the safety at the vibratory feeder.
 - Make sure that only authorised personnel work at the vibratory feeder.
 - Give immediate notice to the management of any changes that have occurred on the vibratory feeder affecting safety.
-



Attention

The vibratory feeder must be installed, put into operation and maintained by professional personnel only. Observe the legally binding provisions for the qualifications of qualified electrical workers and instructed workers as defined by standards IEC 364 and DIN VDE 0105, part 1.



Notice

Electrical protection is provided by RNA's controller.

Noise emission

The noise level at the place of use depends on the complete line in which the hopper will be incorporated and on the material to be sorted. For this reason, sound pressure levels in accordance with the 'Machinery' directive can only be determined at the place of installation.

If the noise level at the place of use exceeds the permissible, sound-insulating hoods can be installed which we can offer on request (see our catalogue).

2.1. Applicable directives and standards

The vibratory feeders have been manufactured in accordance with the following directives:

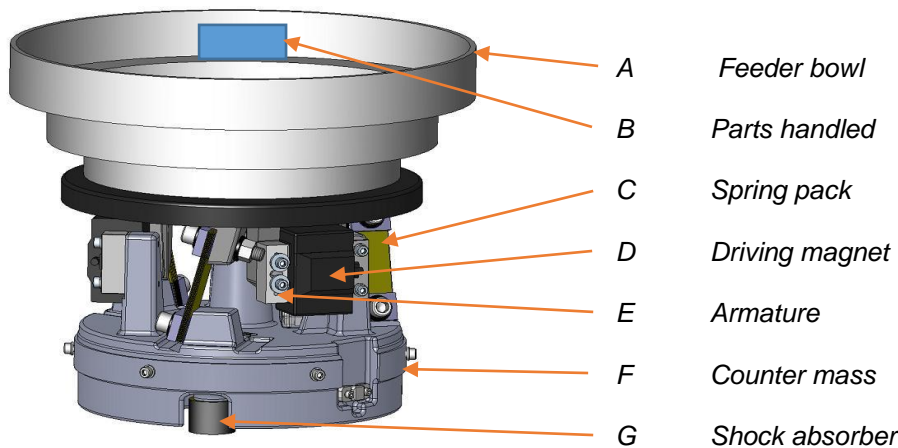
- EC Low-Voltage Directive 2014/35/EU
- Electromagnetic Compatibility Directive 2014/30/EU

We assume that our product will be incorporated into a stationary machine. The requirements of the EMC Directive must be satisfied by the user.

The applicable standards are specified in the Declaration of Conformity.

3. Design and functional description

Vibratory feeders serve for feeding and orienting parts. The driving force is provided by an electromagnetic coil. The figure below is a schematic representation of a vibratory feeder:



Driving magnet D is rigidly connected to counter mass F. When the driving magnet is energized it exerts a force on armature E. This force is transmitted to bowl A mounted on spring packs C, causing the bowl to vibrate. The angle of the spring packs defines the direction of bowl movement.

Due to these vibrations the parts are lifted off the spiral feed track inside the bowl and thrown forward in tiny steps (micro throw principle). The direction of this throwing movement is perpendicular to the plane of the spring packs.

The driving magnet achieves its maximum power of attraction twice within each period of the alternating current. Consequently, the vibration frequency is double the mains frequency (100/120 Hz).

If heavy orienting tooling is mounted, the alternating current is changed to obtain a low vibration frequency (50/60 Hz). The vibration frequency of your feeder is indicated by the last digit of its type designation:

- 1: 50 Hz-50 vibrations / sec.
- 2: 100 Hz-100 vibrations / sec.

A vibratory feeder is a resonant system (spring-mass system). As a result, its factory set-up will rarely meet your on-site requirements. Section 5 describes in detail how you can adapt the vibratory feeder to your specific requirements.

Our optional accessories include a range of bowls covering a wide field of applications. For special applications we offer customized solutions.

The vibratory feeder is controlled by a low-loss electronic control unit. The choice of the control unit depends on the power input of the feeder. The following table indicates which control units can be used for which type of vibratory feeder:

	ESG 1000 SCU 1000 /2000	ESG 2000	ESK 2000	ESK 2001	ESK 2002	ESR 2000	ESR 2500	ESR 2800
SRC-N 160 SRC-N 200 SRC-B 200	√	√	√	√	√	√	√	
SRC-N 250 SRC-B 250 SRC-N 400	√	√	√	√	√	√	√	
SRHL 400 SRC-N 630	√	√	√	√		√		√
SRC-N 800		√	√					√

The controller has a 5-pin connector on its front panel for connection to the vibratory feeder.

Connector pin assignment is shown in the table 'Technical data' in chapter 1 of this operating instructions manual.



Notice

For comprehensive information on the full range of control devices please refer to the 'Control Units' operating instructions.

All control devices have two essential operating elements:

- The **power switch** is used to energize and de-energize the vibratory feeder.
- A **rotary knob** (or buttons) can be used to set the feed rate of the orienting device.

Frequency controllers: For tuning of the vibratory feeders you may also use frequency controllers. For detailed description of the tuning procedure refer to the frequency controller operating instructions.



Caution: Electromagnetic field

Magnetic fields may affect a cardiac pacemaker. Therefore, persons wearing a cardiac pacemaker are recommended to keep a distance of at least 25 cm.

4. Shipment and installation

Shipment

Vibratory feeders are packed in sturdy wooden crates for shipment. After opening the lid, first remove the screws at the bottom of the crate securing the feeding system in place.

An eye bolt is provided for handling of the vibratory feeder. You can attach a sling to this eye bolt and transport the feeder to its place of installation by means of suitable hoisting equipment.



Notice

When unpacking and handling the vibratory feeder please observe the enclosed instruction sheet.

Depending on the feeder type we distinguish between following situations:

- For vibratory feeders whose bottom rests on the counter mass you must pull out the bottom to the top before you can screw in the eye bolt.
- For vibratory feeders with vibrating bottom (bottom bolted in place), it is mandatory to remove the central plug in order to screw in the eye bolt.
- For feeder bowls with central fastening, the bowl must be dismantled in order to screw on the eye nut.
- For vibratory feeder SRC-N 800 you can screw on the eye nut after removing the central plastic cap and domed nut (M16).



Attention

Do not sling or handle the vibratory feeder at or on the orienting device.
Take care that the vibratory feeder cannot collide with other objects during handling operations.



Attention

Make sure that nobody is under the vibratory feeder during handling operations.

Before commencing any handling operations be sure to verify that the hoisting equipment has a sufficient load carrying capacity. For the weight of the vibratory feeder please refer to the table 'Technical Data' (Section 1).



Notice

The enclosed eye bolt is provided solely for purposes of handling the unit. Be sure to remove it before starting up.

Installation

At the place of installation the vibratory feeder should be mounted on the specially designed RNA support. If other supports are used make sure that they have sufficient load carrying capacity. This support must be dimensioned to ensure that no vibrations from the vibratory feeder can be transmitted.

Depending on the feeder type we distinguish between three mounting situations:

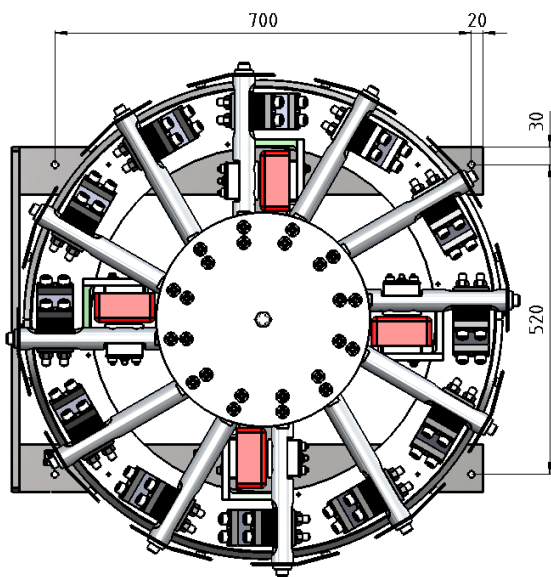
- Vibratory feeders with baseplate can be fastened from top. The required dimensions of SRG and USJ baseplates are specified in our Vibratory Feeders Catalogue on page 20.(Baseplates)
- Vibratory feeders without baseplate are fastened to shock absorbers (part G in overview drawing on page 9) from below.

Following table gives an overview of the drilling data for the drive units used:

Vibratory feeder type	Bolt circle Ø	Bolt circle angles in °	Shock absorber thread
SRC-N 160-2	120	3 x 120	M 6
SRC-N 200-2	130	3 x 120	M 6
SRC-B 200	130	3 x 120	M 6
SRC-N 250-2	220	3 x 120	M 8
SRC-B 250	220	3 x 120	M 8
SRC-N 400-1	350	3 x 120	M 10
SRC-N 400-2	350	3 x 120	M 10
SRHL 400-1	350	3 x 120	M 10
SRHL 400-2	350	3 x 120	M 10
SRC-N 630-1	560	3 x 120	M 10

Table: Drilling data

- Type SRC-N 800 is always supplied with a substructure. This substructure is fastened with M10 anchors.



Make sure that the vibratory feeder cannot touch other devices during operation.

For further details on the control unit (drilling template, etc.), please refer to the separate operating instructions manual of the controller.

5. Commissioning

Preparations



Attention

Make sure that the machine frame (rack, substructure, etc.) is connected to the protective earth conductor (PE). Protective earthing has to be provided by user as necessary.



Attention

It is imperative that the vibrating motor be connected to the equipotential bonding system of the overall equipment before commissioning.

The adaptation points are marked with earth symbols.

See also: DIN EU 60204 / VDE 0100-540



Attention

Electrical connection of the vibratory feeder must be made by trained professional electricians only! When making any change to the electrical connection make absolutely sure that the 'Control Units' operating instructions are duly observed.

Verify that

- the vibratory feeder is arranged freely without contact to any solid body.
- the bowl is firmly bolted in place
- the vibratory feeder connecting cable is plugged into the control unit.
- The available electricity supply (frequency, voltage, power) must correspond to the connection data of the control system (see rating plate on the control unit).

Plug the cable of the control unit into a power socket and operate the power switch to energize the control unit.



Notice

For vibratory feeders that are supplied as a completely set-up system the optimum feed rate has been factory-set. It is marked with a red arrow on the dial of the rotary knob. In this case set the rotary knob (or keys) to this mark.

Optimum tuning is achieved when the desired feeder speed is obtained with a controller setting of 80 %. In case of larger deviations (> +/- 15%) you should re-tune the system.

Tuning

Vibratory feeders are factory-tuned for standard feeder bowls (without orienting devices).

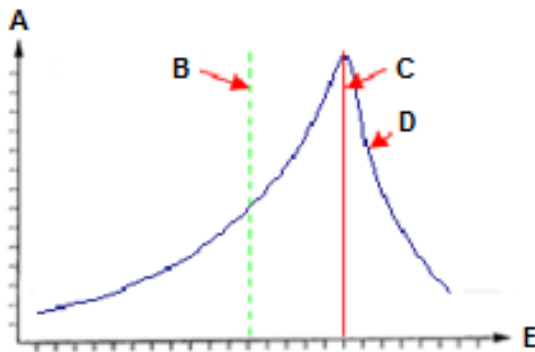
To ensure optimum sorting behaviour the vibratory feeder has to be fine-tuned for the actual local operating conditions.

Tuning is done by adding or removing leaf springs and spacers.

First check that the correct control unit is connected (see table with frequency, voltage and power ratings in Section 1). Now perform following steps:

- Unscrew the sheet metal enclosure. Firmly tighten all spring and bowl fastening screws. For the tightening torque of spring fastening screws refer to section 1 'Technical data'.
- Check that the magnets are compatible with the voltage and frequency ratings specified under Technical Data.
- Measure the air gap. Adjust the air gap to the correct setting if it doesn't match the values specified under Technical Data.
- Fill the bowl with parts. Switch the vibratory feeder on and set the feeding capacity to 90% via the rotary knob (or keys).
- Loosen the bottom fastening screw on one spring pack (by about a quarter turn or half turn).

When you loosen the spring fastening screw you can observe a change in feeder speed. The following graph shows the resonance curve of a vibratory feeder.



- A Feed rate
- B Desired feeder speed
- C Resonance frequency of the system
- D Resonance curve
- E Spring force (number of springs) increasing

Notice



The resonance frequency of the vibratory feeder must not be equal to the mains frequency, it should be lower than the driving frequency of the current.

If the feeder speed decreases after you loosen the spring fastening screw, proceed as described in **section 5.1**.

If, on the contrary, the feeder speed increases, proceed as described in **section 5.2**.

Notice



Tuning is facilitated by the use of an electronic frequency controller that is part of our standard product range.

The vibratory feeder should be tuned so that the desired feeder speed is obtained with a controller setting of approx. 80%. This is to ensure sufficient magnetic saturation.

5.1. Feeder speed decreases?

Install additional springs. Start by adding one spring (including spacers) to **one** spring pack. If the feeder speed continues to decrease after you loosen a fastening screw anew, install additional springs one by one progressively in another spring pack until the desired speed is obtained with the controller set at 70 - 80%.

5.2. Feeder speed increases?

Remove springs. Start by removing one spring (including spacers) from **one** spring pack. If the feeder speed continues to increase after you loosen a fastening screw anew, remove springs one by one progressively from another spring pack until reaching a range where the feeder speed decreases when you loosen the spring fastening screws. In this range the resonance frequency of the system is lower than the driving frequency of the current. Now proceed with the actual tuning procedure as described in Section 5.1.

Notice



As the tuning procedure is done with the enclosure removed, be sure to add one more spring after finding the optimum setting. This compensates the influence of the sheet metal enclosure on the frequency. With type SRC-N 800 feeders, install 6 additional springs (one each in every 2nd spring pack).

Objective of the tuning procedure:

To set a stable feed rate matching the requisite amount of product.

When the desired feeder speed is obtained at a controller setting of 80 %, the feeder speed must always decrease when the spring fastening screw is loosened.

Notice



Make sure that the number of springs per spring pack will not deviate by more than 2 – 3 springs. Otherwise the feeder speed at the circumference of the bowl is no longer constant.

Feeder speed is not constant?

If the feeder speed in the bowl is no longer constant you can balance the bowl by adding counter-weights.

- Attach a counterweight to the side that is running fast.

If the addition of counter-weights is not possible, you can also proceed as follows:

- Remove a spring from the spring pack located on the 'slow' side.
- Add a spring to the spring pack located on the 'fast' side.

Noise emission

The noise level at the place of use depends on the complete line in which the hopper will be incorporated and on the material to be sorted. For this reason, sound pressure levels in accordance with the 'Machinery' directive can only be determined at the place of installation.

If the noise level at the place of use exceeds the permissible, sound-insulating hoods can be installed which we can offer on request (see our catalogue).

6. Maintenance

Vibratory feeders basically require no maintenance. They should only be cleaned when soiled or after coming into contact with liquids.

- Before starting such work pull the mains plug.
- Remove the enclosure.
- Clean the inside of the vibratory feeder, and in particular the air gap of the coil.
- After remounting the enclosure and plugging in the mains plug the vibratory feeder is again ready for operation.

7. Spare parts and customer service

For an overview of genuine spare parts available please refer to the separate spare parts list.

In order to make sure that your order is processed swiftly and correctly please specify the device type (see rating plate), the quantity required, the spare part designation and the spare part number.

- Device type (see rating plate)
- Required quantity
- Spare part designation
- Spare part number


For a list of Service Center addresses refer to the back cover page of this manual.

8. What if...Advice on troubleshooting



Attention

The control unit or terminal box must only be opened by a professional electrician. Pull the mains plug before opening!

Fault	Potential cause	Remedy
Vibratory feeder does not start on power up	<p>Mains connector of control unit not plugged-in</p> <p>Connecting cabled between vibratory feeder and control unit not plugged-in</p> <p>Only in conjunction with controller ESK 2000 Sensor erroneously indicates part accumulation due to defect or misalignment (green LED illuminated = vibratory feeder 'STOP')</p> <p>Defective fuse in control unit</p> <p>Power switch off</p>	<p>Plug in the mains connector</p> <p>Plug 5-pin connector into control unit</p> <p>Replace or re-adjust the sensor</p> <p>Check if sensor is plugged-in</p> <p>Replace fuse</p> <p>Close power switch</p>
<p>Vibratory Feeders vibrates only slightly</p> 	<p>Controller set at 0 % on control unit</p> <p>Wrong vibration frequency</p> <p>Attention If you operate a vibratory feeder designed for 100 vibrations per second without having inserted the jumper in the 5-pin connector, there is a risk of damage to the controller and magnet.</p>	<p>Set controller to 80 %</p> <p>Check that coding in plug connector of the controller is correct (see rating plate and 'Technical Data' (Section 1))</p>
The vibratory feeder no longer meets the requested feeding capacity after prolonged operation.	<p>Screws of one or more spring packs have come loose.</p> <p>Broken springs</p> <p>Misadjusted coil-to-armature gap</p> <p>Fixing screws of feeder bowl have come loose.</p>	<p>Tighten screws (for tightening torques see 'Technical Data' in Section 1).</p> <p>Replace broken springs</p> <p>Readjust the air gap (for gap size see 'Technical Data' in Section 1).</p> <p>Re-tighten the screws</p>
Vibratory feeder makes loud noises	<p>Fixing screws of enclosure have come loose.</p> <p>Bowl bottom is jammed</p> <p>Foreign matter in air gap (chips, or dust, parts handled)</p> <p><i>Only for SRHL 400 and SRC-N 800:</i></p> <p>Locking screw on armature plate has come loose</p>	<p>Re-tighten the screws</p> <p>Eliminate the jam</p> <p>Stop linear feeder and remove foreign matter. Then check the coil-to-armature gap.</p> <p>Re-tighten the screw</p>
Vibratory feeder cannot be tuned to a constant speed for longer periods of time.	The spring constant of the vibrating system has changed. The vibratory feeder operates close to the resonance point.	Re-tune the vibratory feeder. Remove springs. See Section 5: Tuning



RNA Group

Headquarters

Manufacturing and Sales

Rhein-Nadel Automation GmbH
Reichsweg 19-23
D-52068 Aachen

Phone: +49 (0) 241-5109-0

Fax: +49 (0) 241-5109-219

E-mail: vertrieb@RNA.dede

www.RNA.de

Further RNA group companies:



Manufacturing and Sales

Focus: Pharmaceutical Industry

PSA Zuführtechnik GmbH
Dr.-Jakob-Berlinger-Weg 1
D-74523 Schwäbisch Hall

Phone: +49 (0) 791 9460098-0

Fax: +49 (0) 791 9460098-29

E-mail: info@psa-zt.de

www.psa-zt.de



Manufacturing and Sales

RNA Automation Ltd.

Unit C

Castle Bromwich Business Park
Tameside Drive
Birmingham B35 7AG
United Kingdom

Phone: +44 (0) 121 749-2566

Fax: +44 (0) 121 749-6217

E-mail: RNA@RNA-uk.com

www.maaautomation.com



Manufacturing and Sales

HSH Handling Systems AG

Wangenstr. 96

CH-3360 Herzogenbuchsee

Switzerland

Phone: +41 (0) 62 956 10-00

Fax: +41 (0) 62 956 10-10

E-mail: info@handling-systems.ch

www.handling-systems.ch



Manufacturing and Sales

Pol. Ind. Famades c/Energia 23

E-08940 Cornellà de Llobregat (Barcelona)

Spain

Phone: +34 (0)93 377-7300

Fax +34 (0)93 377-6752

E-mail: info@vibrant-RNA.com

www.vibrant-RNA.com

www.vibrant.es

*Further manufacturing sites
of the RNA Group*

Manufacturing

Lüdenscheid branch

Rhein-Nadel Automation GmbH

Nottebohmstraße 57

D-58511 Lüdenscheid

Phone: +49 (0) 2351 41744

Fax: +49 (0) 2351 45582

E-mail: werk.luedenscheid@RNA.de

Manufacturing

Ergolding branch

Rhein-Nadel Automation GmbH

Ahornstraße 122

D-84030 Ergolding

Phone: +49 (0) 871 72812

Fax: +49 (0) 871 77131

E-mail: werk.ergolding@RNA.de