



Operating and Assembly Instruction

Linear conveyor

PARU

Table of contents

1.	Safety Instrution	4
1.1.	General information	4
1.2.	Symbols and notes	4
1.3.	Intended use	4
2.	Product description	5
2.1.	General information	5
2.2.	Technical data	5
2.3.	Description of functions	7
3.	3. Mounting Instructions	8
3.1.	Transportation	8
3.2.	Assembly	8
3.3.	Bringing into service	8
4.	Operation Instructions	9
4.1.	Operation	9
4.2.	Tooling changeover	10
4.3.	Maintenance intervals and time limits	10
5.	Storage, Dismantling, Disposal	11
6.	Troubleshooting	11

Declaration of Incorporation

according to Machinery Directive 2006/42/EC

We,
Company

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

herewith declare under our sole responsibility that with regard to the following product:

Machine designation: (function)	Linear feeder
Type designation:	PARU (...)
Year:	2019
Serial number:	10865660 0001 – 2500000 0001

all relevant essential safety and health requirements of Directive 2006/42/EC have been fulfilled up to the battery limits.

The product to which this declaration refers is furthermore in conformity with following directives and standards or other regulations:

2006/42/EC	Machinery
2014/35/EU	Low Voltage
2014/30/EU	Electromagnetic Compatibility

EN 614-1	2006+A1:2009	EN ISO 13857	2008
EN 619	2002+A1:2010	EN ISO 14120	2015
EN 620	2002+A1:2010	EN 60204-1	2006
EN ISO	12100	2010	

The relevant technical documentation has been compiled in accordance with Annex VII B of the Machinery Directive and on request, such documentation will be transmitted to the competent authorities in hard copy.

Nico Altmeyer, Rhein-Nadel Automation GmbH, Reichsweg 19-23, 52068 Aachen

(Name and address of person authorised to compile the relevant technical documentation)

Notice: This machine must not be put into service until the complete system into which it will be incorporated has been declared to be in conformance with the provisions of the Directive.

Signatory information

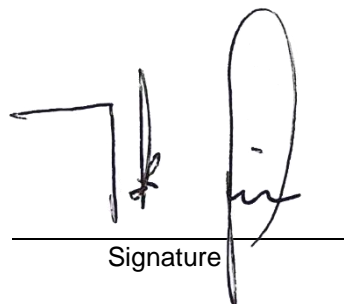
Name: Grevenstein

Given name: Jack

Function: Managing Director

Germany
Aachen,

Place and date



Signature

1. Safety Instruction

1.1. General information

These operating and assembly instructions contain all the information required for the safe use and operation of products in the PARU series, namely the models PARU S1 b, S1 u, S1 b wide, S1 u wide, PARU M1 b, M1 u, M1 b wide, M1 u wide, hereinafter referred to as PARU. This document, in particular the safety instructions, must be observed by all persons working on or with these products. In addition to the information in these operating and assembly instructions, the accident prevention rules and regulations applicable at the place of use must also be observed.

We recommend that the operating and assembly instructions be kept at the place of use of the PARU at all times. The risk assessment procedure used is taken from DIN EN ISO 12100:2011.

1.2. Symbols and notes

In these operating and assembly instructions there are four different signal words, three of them with a symbol. In order of decreasing importance, these are as follows:



Danger!

This symbol indicates an imminent danger to the life and health of persons. Failure to observe these instructions will result in severe adverse health effects, including life-threatening injuries.



Attention!

The symbol indicates possible damage to property and/or the environment.



Note!

This symbol indicates important facts and particularly useful information.

1.3. Intended use

The intended use of PARU is the drive of toolings from Rhein-Nadel Automation GmbH in automatic continuous operation and the interaction with a downstream process that picks up the conveyed goods. The toolings are buffer or sorting devices matched to the PARU and are used for the controlled feeding of bulk materials for automatic acceptance by a downstream process (e.g. handling device or separation). Any other use or structural modification of PARU is not considered to be in accordance with the intended use. Intended use also includes observance of these operating and assembly instructions.

PARU may only be used with coordinated toolings from Rhein-Nadel Automation GmbH or with toolings coordinated via the digital technologies of Rhein-Nadel Automation GmbH. Any other use is considered "not as intended". No modifications or conversions may be made to the PARU without prior consultation with the specialist personnel of Rhein-Nadel Automation GmbH and their approval.

The area of application of PARU within the scope of the intended use is in covered and enclosed industrial production and assembly facilities ("industrial area").



PARU may not be used:

1. outdoors
2. in wet or hazardous areas
3. under daylight
4. in areas with highly flammable media
5. in aggressive environments (e.g. saline atmosphere)
6. in production plants requiring clean room conditions
7. in private households

The limits of the PARU temperature range are set by the electromagnets installed. The ambient temperature should not exceed 40°C and its average value over a period of 24 hours should not exceed 35°C. The lower limit for the ambient temperature is -5°C. The altitude of the place of use shall not exceed 2000 m above sea level. The relative humidity of the ambient air should not exceed 50% at 40°C. At lower temperatures, higher humidity may be allowed, e.g. 90% at 20°C. The ambient air should not be significantly contaminated by dust, smoke, aggressive gases and vapors. Avoid direct sunlight or high UV radiation, as this can lead to embrittlement of some plastics that may be used in tooling and can make it difficult to read displays.

The following groups of persons ("users") are authorized to handle PARU:

1. instructed person: the instructed person has demonstrably been instructed by the operator about the tasks assigned to him/her on the PARU and possible dangers in the event of improper behavior on the PARU. Instruction is the basic prerequisite for working on the PARU. Reading the technical documentation of the PARU is part of the instruction.

Qualified personnel: Due to their technical training, knowledge and experience as well as knowledge of the relevant standards and regulations, qualified personnel are able to carry out the assigned work on the PARU and to independently recognize possible hazards when handling the PARU and to avoid hazards. A qualified electrician who, due to his technical training, knowledge and experience as well as knowledge of the relevant standards and regulations, is able to carry out work on the electrical components of the PARU and to recognize and avoid possible hazards independently. The qualified personnel also includes the electrician. 3.

Certain work, such as the replacement of electromagnets, leaf springs or other components of the PARU, may only be carried out by specialist personnel of Rhein-Nadel Automation GmbH or after prior consultation with specialist personnel of Rhein-Nadel Automation GmbH. To carry out this work, please contact our customer service: vertrieb@rna.de

2. Product description

2.1. General information

PARU is a standardized platform for the correct, individual supply of bulk materials in automated production or assembly. PARU is used in particular for buffering conveyed goods that have already been correctly oriented via ROTU. For this purpose, PARU is equipped with a material-specific tooling and integrated into the operator's production or assembly line, either on its own or as part of a feed system. PARU is thus an incomplete machine in the sense of the EC Machinery Directive 2006/42/EC.

With new toolings from Rhein-Nadel Automation GmbH, PARU can be converted at any time to feed new materials. The toolings are supplied by Rhein-Nadel Automation GmbH with information on the optimum amplitude, frequency and, if necessary, compressed air settings. No adaptation of the drive is necessary. PARU thus offers flexible feeding of conveyed goods at high conveying rates and short changeover times.

Note!



PARU is a precision machine. The functionality of the toolings depends on accuracy of the topology to the tenth of a millimeter. The settings on the control unit, the condition of the conveyed goods and the quality of the screw connections must also correspond to the condition of the specifications for target-oriented function.

2.2. Technical data

For all PARU applies:

Supply voltage [V]	0...230 V
Vibration frequency [Hz]	100 +- 10 Hz
Protection class IP	54
Temperature range operation [°C]	-5...+35
Noise emission: Continuous sound pressure level (without material conveyed)	< 70 dB (A)

Figure 1 on the left illustrates the dimensions of the PARU using the example of PARU S1, structure b. Figure 1 right illustrates the dimensions of PARU using the example of PARU S1, structure b wide. Figure 2 left illustrates the dimensions of the PARU using the example of PARU S1, structure u. Figure 2 right illustrates the dimensions of the PARU using the example of PARU S1, structure u wide. Structure b represents a PARU with flush useful and counter mass. Structure u represents a PARU with projecting effective mass.

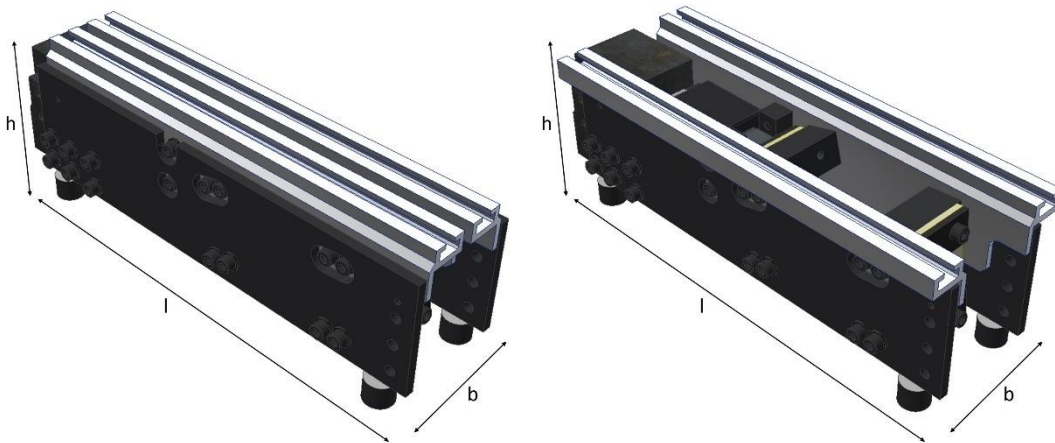


Figure 1: Dimensions of PARU, structure b (left) and structure b wide (right).

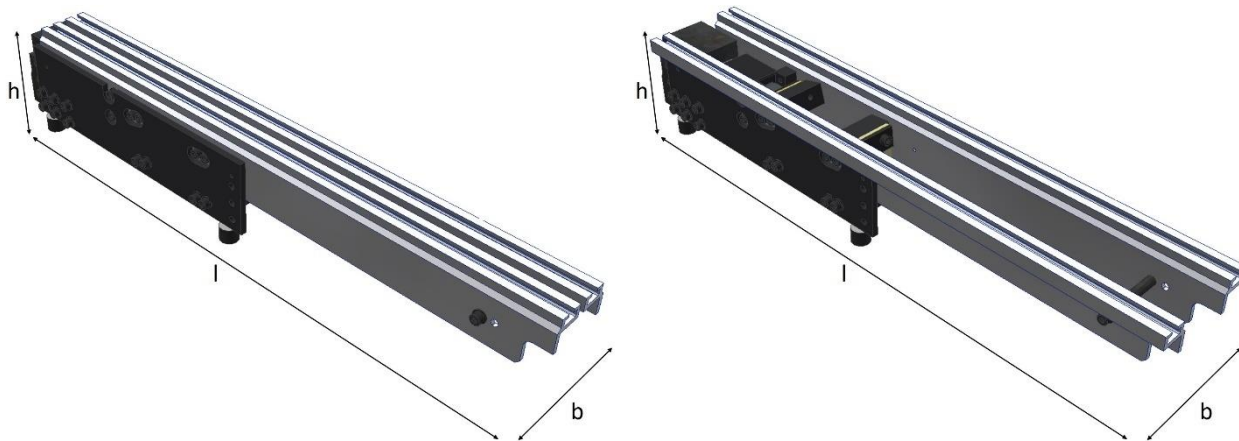


Figure 2: Dimensions of PARU, structure u (left) and structure u wide (right).

Other technical data of the superstructure:

	S1 b	S1 b wide	S1 u	S1 u wide
dimensions LxBxH [mm]	430 x 120 x 140	430 x 140 x 140	830 x 120 x 140	830 x 140 x 140
Mass without tooling [kg]	16,7	16,7	18,1	18,1
power [VA]	282	282	282	282
Leaf springs [mm]	5,5 5,5	5,5 5,5	5,5 5,5	5,5 5,5

	M1 b	M1 b wide	M1 u	M1 u wide
dimensions LxBxH [mm]	830 x 120 x 140	830 x 140 x 140	1230x120x140	1230x140x140
Mass without tooling [kg]	23	23	24,4	24,4
Power [VA]	282	282	282	282
Leaf springs [mm]	6,0 6,0	6,0 6,0	6,0 6,0	6,0 6,0



Note!

The noise emission depends on the material being conveyed and can therefore only be determined at the place of use under real conditions. If the sound pressure level exceeds the permissible level, suitable noise protection measures must be taken.

This results in the following spatial boundaries:

	Required footprint (lxbxh [mm])	Minimum load capacity of the footprint per sqm [kg]
S1 b, S1 b wide, S1 u, S1 u wide	380 x 130 x 180	50
M1 b, M1 b wide, M1 u, M1 u wide	780 x 130 x 180	80

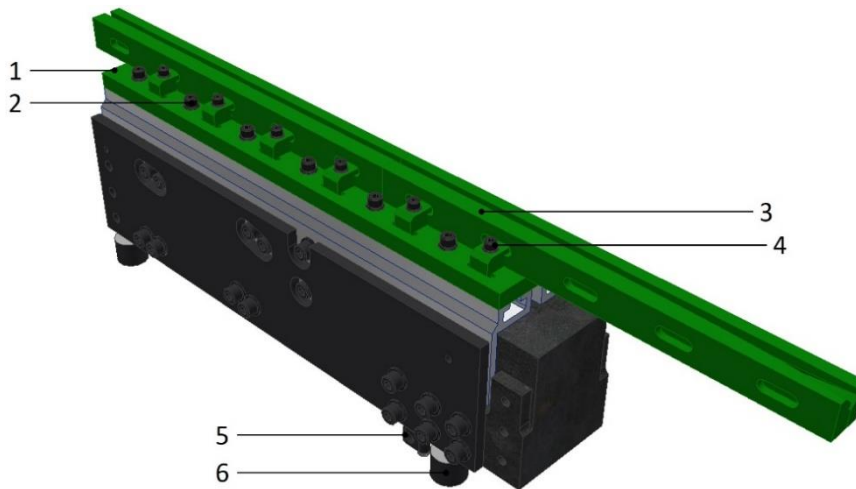
As a rule, the user only has to observe the screw tightening torque for the tooling fastening. For the sake of completeness and in case of possible maintenance, the screw tightening torques of the remaining screw connections of the PARU (all screws strength class 12.9) are shown in Table 2:

ISO 4762 M5 screws [Nm]	8
ISO 4762 M6 screws [Nm]	14
ISO 4762 M8 screws in steel [Nm]	25
ISO 4762 M8 screws for leaf spring [Nm]	30

2.3. Description of functions

PARU is a dual-mass oscillator. In PARU, the counter mass and the effective mass are connected to each other via obliquely set leaf springs with a fixed, non-adjustable angle. Vibrating magnets excite the system. This results in an oscillating movement of the working mass and the tooling. Due to this movement, the conveyed goods are accelerated in horizontal and vertical direction and move along the tooling. PARU oscillates in the range of 100Hz, the amplitude in vertical direction is up to 20µm, the amplitude in horizontal direction is up to 80µm.

Figures 1 and 2 show PARU without tooling. The tooling is fastened to the effective mass via the grooves of the effective mass by means of M6 nuts. Figure 4 shows a PARU S1, b with an exemplary tooling shown in green.



The conveyed goods are finally aligned and buffered, if necessary, via the tooling and the conveyed goods-specific arrangement elements. The tooling includes a carrier plate (1), which is fixed to the aluminum profile of the useful mass by means of screws (2) ISO 4762, M6x25, strength class 12.9 and sliding blocks. The sorting elements (3), in turn, are fixed to the carrier plate by means of clamping claws and screws (4) ISO 4762, M5x25, strength class 12.9. The strain relief for the cable of the electrical supply of the vibrating solenoid(s) (5) is located on the bottom side of the counterweight. PARU is screwed to the installation site via the threaded holes of the rubber feet (6).

3. Mounting Instructions

3.1. Transportation

PARU is packed for transport in a wooden crate suitable for the requirements or secured on a Euro pallet. You will need suitable lifting gear to transport PARU to its place of use. If the wooden crate/Europallet is badly damaged on delivery, please contact the carrier immediately. In order not to lose the right to claim settlement due to formal errors, please take into account the general terms and conditions of the forwarding agent.

PARU is fixed to the base plate of the wooden crate/Euro pallet. When unpacking and transporting, please observe any instruction leaflets supplied. We recommend that you keep the transport crate/Europallet and the packaging material for returning your PARU.

Unless otherwise agreed, the scope of delivery of the PARU includes:

1. transport crate/Europallet
2. PARU
3. operating and installation instructions
4. installation declaration
5. Tooling or tooling sets with setting recommendations, if applicable



Attention!

PARU must not be lifted or transported by the tooling. Before transporting, make sure that the lifting gear used has sufficient load-bearing capacity for the PARU. During transport, no persons may be under the PARU.

3.2. Assembly

PARU is delivered completely assembled, so that you only have to unpack PARU and assemble it at the destination. After removing the PARU from the wooden crate/Euro pallet, you should first check the visible surfaces of the PARU and, if necessary, clean them to remove any contamination that may have entered the PARU during transport. If necessary, please refer to the enclosed instructions for any adjustment and assembly work agreed individually with the customer.



Attention!

When placing the PARU on the target substructure, the temporary parking area or the target machine into which PARU is to be integrated, sufficient load-bearing capacity must be ensured. The target location must be dimensioned in such a way that no vibrations from the machine can be transmitted to the PARU or no vibrations from the PARU can be transmitted to the target machine.

PARU is screwed to the stand frame provided by the user or to a machine frame of the complete machine via the M6 threaded holes on the underside of the rubber feet. It is recommended that all rubber feet be bolted with ISO4762 M6 bolts of strength 8.8, Loctite threadlocker and a tightening torque of 10Nm.

Make sure that the components of the PARU that are subject to vibration cannot touch other devices during operation.

3.3. Bringing into service



Note!

The transfer of the workpiece provided via PARU tooling must be secured by the customer.

Before switching on for the first time:

Before switching on the PARU for the first time, check that

- The effective mass of the PARU can be moved freely without hitting the counter mass or components of the installation site.
- PARU is properly bolted to the target location and aligned using a spirit level
- The tooling is bolted down to the torque specified in the technical data.
- There are no objects or conveyed goods in the PARU.
- The available power supply (frequency, voltage, power) corresponds to the connection data of the control unit used.
- The control unit settings have been made in accordance with the specifications to match the tooling.
- The connection cable of the PARU is plugged into the respective control unit and the protective earth conductor is connected.
- If compressed air is used for sorting, the compressed air supply is connected.

**Attention!**

It must be ensured that the machine frame (stand, base frame, etc.) is connected to the protective earth conductor (PE). If necessary, a protective grounding must be carried out on site.

The electrical connection of the PARU and the components as well as the commissioning of the PARU may only be carried out by qualified personnel in accordance with the national provisions and regulations of the country in which the PARU is operated. When making changes to the electrical connection, be sure to observe the operating instructions for the control unit used.

Since PARU is a partly completed machine, the interaction between PARU and the user's acceptance station must be evaluated by the customer in a risk analysis. If measures are necessary as a result of this risk analysis, they must be implemented by the user. Emergency stop switches are not provided on the PARU. This function must be implemented by the manufacturer of the overall system/machine. Access to the circuit breakers must be free of obstacles at all times. The proper function of the off switches must be checked daily at the start of machine operation.

**Attention!**

PARU must not be put into operation until it has been completed with the complete machine and the safety requirements of the EC Machinery Directive for the complete machine have been met.

The first switch on:

After carrying out the previous steps, PARU is switched on without workpieces and at a low amplitude (start value e.g. 10%). The amplitude is now increased step by step to the target value for the tooling. The effective and counter masses of PARU must not strike anywhere.

If loud noises are noticeable on the PARU when it is switched on for the first time, please check whether

- All screw connections have been made in accordance with the technical data.
- The magnetic gap is correctly set at 3 mm or lower.
- The transition to the ROTU, to the separation or into the mold is correctly set.

If this is not the case, please contact Rhein-Nadel Automation GmbH.

**Note!**

The optimum conveying capacity of the PARU for one or more of the customer's conveyed goods has already been determined at the Rhein-Nadel Automation GmbH factory. We recommend not to deviate from the default values of amplitude and frequency for the corresponding tooling.

If PARU runs smoothly at the target frequency and amplitude associated with the tooling, the upstream process (feed system, e.g. ROTU) can be started with conveyed goods and the transition to PARU can be finally coordinated.

4. Operation Instructions

4.1. Operation

The following points must be observed when operating the PARU:

1. the feeder is switched on or off via the control unit as standard. The user is free to connect this control unit in turn to his higher-level machine control system.
- 2) A backlog of workpieces in the tooling of the upstream feed system, e.g. ROTU, must be avoided in any case, e.g. by shutting down the feed system or ROTU on the control unit side.

When using compressed air at the tooling, the operating pressure must be kept constant and must not be switched off during operation. When switching on or restarting, ensure that the operating pressure is safely present before PARU starts. 4.

The set air and sorting nozzles must not be changed. 5.

Accessibility to the PARU must be ensured for the operating personnel. 6.

6. jammed workpieces may only be removed from the PARU if it has been switched off completely beforehand. This procedure must be carried out without destroying the workpiece and the tooling! PARU is a precision machine; damage to the tooling in the range of tenths of a millimeter can already result in functional impairments. 7.

If the information in these operating and assembly instructions is observed, PARU is maintenance-free.

**Note!**

PARU may only be operated by trained specialist personnel. The information in these operating and assembly instructions must always be observed. The operating personnel of the operator of the PARU can be trained by Rhein-Nadel Automation GmbH. Please ask for the conditions for such a training measure if required.

**Note!**

Depending on the material being conveyed, the PARU can be very noisy. The use of ear protectors is therefore recommended for work on and in the vicinity of the PARU.

**Attention!**

It should not be assumed that the stopped PARU is a safe device. Spent energy from the leaf springs can be released unintentionally or through improper maintenance procedures. This applies in particular to procedures which can be dangerous if carried out contrary to the recommendations of these assembly instructions while the machine is in operation, e.g. removal of a jam.

4.2. Tooling changeover

The following points must be observed when changing the tooling of the PARU:

1. switch off the PARU, switch off the compressed air supply. 2.
2. loosen the tooling segments fastened with clamping claws. The carrier plate remains on the PARU. 3.
- If necessary, disconnect existing compressed air connections. 4.
4. store the old tooling at the designated storage location which meets the requirements of Chapter 5 of these Operating and Assembly Instructions.
5. carrying out the rapid emptying and the setup procedure of the upstream feed system, e.g. ROTU, for the complete removal of the old conveyed goods
6. assembly of the new tooling on the PARU. Make sure that the transition to the upstream and downstream process is adjusted accurately.
7. feeding of the conveyed goods into the upstream process. Operation of the PARU according to chapter 4.1 of these operating and assembly instructions

**Note!**

When changing the tooling, make sure that the upstream process (feed system or ROTU) supplies the correct materials to the new tooling of the PARU in order to avoid damage caused by incorrect materials.

4.3. Maintenance intervals and time limits

PARU is designed for automatic continuous operation. Information on the wear of the tooling cannot be given, as this varies depending on the PARU system - tooling - material conveyed. The recommended maintenance intervals are as follows:

1. daily: visual inspection of the PARU for jammed conveyed goods or damaged elements
2. weekly or as required: cleaning of PARU and tooling
3. semi-annually: basic cleaning of the PARU

The following agents are recommended for cleaning:

Part to be cleaned	Cleaning agent	Cleaning method
PARU counter ,ass (steel, bur-nished)	Soap suds or Isopropanol	Wipe off abrasion with damp cloth, allow to dry
PARU effective mass	Soap suds or Isopropanol	Wipe off abrasion with damp cloth, allow to dry
Tooling	Soap suds or Isopropanol	Wipe off abrasion with damp cloth, allow to dry, Anti-static spray if necessary

**Attention!**

The PARU must be disconnected from the mains for all maintenance work.

**Note!**

Maintenance intervention to remove jammed materials must only be carried out when the PARU is stationary!

5. Storage, Dismantling, Disposal

The PARU or the toolings must be stored in a dry place and protected from aggressive media or dirt. Strong temperature fluctuations must be avoided. After longer storage periods, cleaning must be carried out in accordance with section 4.3 of these operating and assembly instructions.

To dismantle the PARU from its destination, first disconnect the power and compressed air supply. Remove all conveyed goods from the system. Loosen the screws on the rubber buffers. Otherwise, follow the instructions in section 3.1 "Transport". For a return of the PARU to Rhein-Nadel Automation GmbH we recommend the use of the transport box.

The components of the PARU are made of steel and aluminum. Information on the material of the purchased parts can be found in the supplier documents. Devices that can no longer be used should not be dismantled and recycled as a whole unit, but rather in individual parts and according to the type of materials mentioned. Please contact Rhein-Nadel Automation GmbH if you wish to return the PARU.

6. Troubleshooting

Q "I have set up PARU according to the instructions in these operating and assembly instructions, but the PARU does not run".

A First check whether....

1. the settings on the control unit are correct (frequency, amplitude)
2. the tooling is installed in its original condition and correctly positioned without any masses removed or additionally attached by the user
3. the screw connections have been made in accordance with the technical data and PARU is cleanly fixed to an installation site with sufficient load-bearing capacity
4. the correct materials are present and are not jammed anywhere
5. the movement of the PARU is not impaired
6. the PARU is aligned horizontally
7. the magnetic gap is set to 3 mm
8. the leaf springs are damaged

If none of these measures help, try to make the PARU work by adjusting the excitation frequency. Contact Rhein-Nadel Automation GmbH for assistance.

Q "We have problems with different conveyor belt margins".

A Record the geometric deviations of the individual conveyor belt batches from the target material to be conveyed. Share these results with Rhein-Nadel Automation GmbH and request optimized tooling for these fluctuating conveyor belt batches.

Q "We have detected a defect on the PARU and need spare parts. How do we obtain them?"

A Basically, each part of the PARU can be reordered individually. Only the suspension struts are only available as a pre-assembled assembly. In case of replacement, please contact Rhein-Nadel Automation GmbH, www.rna.de directly.



Hauptniederlassung:
Rhein-Nadel Automation GmbH
Reichsweg 19-23
D-52068 Aachen
Tel.: +49 (0) 241-5109-0
Fax: +49 (0) 241-5109-219
E-Mail: vertrieb@RNA.de
www.RNA.de

Weitere Unternehmen der RNA-Gruppe:



PSA Zuführtechnik GmbH
Dr.-Jakob-Berlinger-Weg 1
D-74523 Schwäbisch Hall
Tel.: +49 (0) 791 9460098-0
Fax: +49 (0) 791 9460098-29
E-Mail: info@psa-zt.de
www.psa-zt.de



RNA Automation Ltd.
Unit C
Castle Bromwich Business Park
Tameside Drive
Birmingham B35 7AG
United Kingdom
Tel.: +44 (0) 121 749-2566
Fax: +44 (0) 121 749-6217
E-Mail: RNA@RNA-uk.com
www.rnaautomation.com



HSH Handling Systems AG
Wangenstr. 96
CH-3360 Herzogenbuchsee
Schweiz
Tel.: +41 (0) 62 956 10-00
Fax: +41 (0) 62 956 10-10
E-Mail: info@handling-systems.ch
www.handling-systems.ch



Pol. Ind. Famades c/Energia 23
E-08940 Cornellà de Llobregat (Barcelona)
Spanien
Tel: +34 (0)93 377-7300
Fax: +34 (0)93 377-6752
E-Mail: info@vibrant-RNA.com
www.vibrant-RNA.com
www.vibrant.es



RNA Digital Solutions in München
RNA Digital Solutions GmbH
Agnes-Pockels-Bogen 1
80992 München
Telefon: +49 (0) 1515 / 99 28 255
E-Mail: kontakt@rnadigital.de
www.designforfeeding.com
www.rnadigital.de

*Weitere Produktionsstandorte
der RNA-Gruppe:*

Werk Lüdenscheid

Rhein-Nadel Automation GmbH
Nottebohmstraße 57
D-58511 Lüdenscheid
Tel.: +49 (0) 2351 41744
Fax: +49 (0) 2351 45582
E-Mail: werk.luedenscheid@RNA.de

Werk Ergolding

Rhein-Nadel Automation GmbH
Ahornstraße 122
D-84030 Ergolding
Tel.: +49 (0) 871 72812
Fax: +49 (0) 871 77131
E-Mail: werk.ergolding@RNA.de

Werk Remchingen

Rhein-Nadel Automation GmbH
Im Hölderle 3
D-75196 Remchingen-Wilferdingen
Tel.: +49 (0) 7232 7355558
E-Mail: werk.remchingen@RNA.de