

## Installation and Operating Instructions

PARU-Mini-S  
PARU-Mini-XS

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## 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 of manufacture	2021
Serial number	11080000 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	618	2002+A1:2010	EN ISO	14120	2015	
EN	ISO	12100	2010	EN	60204-1	2006

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

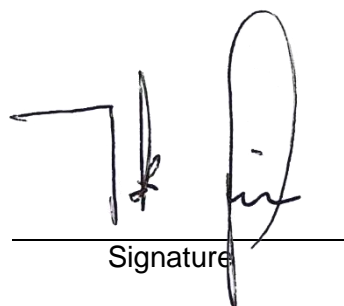
Given name: Jack

Function: Managing Director

Germany

Aachen, 30.05.2022

Place and date



Signature

# 1. Safety information

## 1.1. General

This operating and installation instruction manual comprises all required information for the safe use and operation of products from our PARU Mini series, namely the models PARU Mini XS and PARU Mini S. This document, in particular the safety directives, must be observed by all persons who work on or with these products. Apart from the safety directives in these installation and operating instructions, the accident prevention rules and regulations that apply at the place of use must be observed.

We recommend to always keep the installation and operating instruction manual handy, near the PARU Mini. The applied procedure for risk assessment can be found in DIN EN ISO 12100:2011.

## 1.2. Symbols and notices

In the present installation and operating instructions you will find four different signal words, three of them with an associated symbol. These are the following, sorted from the most to the least important:



### **Danger**

Indicates imminent danger.

Failure to observe this information will result in death or serious injury (invalidity).



### **Warning**

Indicates a potentially hazardous situation.

Failure to observe this information will result in death or serious injury (invalidity).



### **Caution**

Indicates a potentially hazardous situation.

Failure to observe this information will result in material damage and minor or moderate injury.



### **Notice**

Indicates general information, useful tips and recommendations which have no influence on the health and safety of PARU users.

## 1.3. Intended use

The intended use of PARU Mini is to drive tooling units supplied by Rhein-Nadel Automation GmbH (RNA) or tooling units selected in consultation with RNA. These tooling units are buffering or sorting devices matched to the PARU Mini and which serve for the orderly feeding of bulk parts for automatic pick-up by a downstream process (for example a handling device or escapement). These tooling units operate in continuous automatic mode. Any other use beyond the above or any modifications to the SRA-Z drive shall be deemed inconsistent with the machine's intended use. The intended use also includes the observance of these installation and operating instructions.

PARU Mini must be used exclusively with the matched tooling units as specified by Rhein-Nadel Automation GmbH (see centre of gravity and rail length under Technical Data). Any other application shall be deemed 'inconsistent with the machine's intended use'. Without prior consultation of qualified personnel of Rhein-Nadel Automation GmbH and their approval, no changes or modifications must be made to the PARU Mini. PARU Mini is to be operated in roofed and closed industrial production and assembly facilities ('industrial area') in accordance with its intended use.

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**The use of PARU Mini drives is not allowed:**

1. Outdoors
  2. In areas subject to explosion hazards or in wet areas
  3. Underground
  4. In areas with highly inflammable substances
  5. In aggressive environments (i.e. saline atmosphere)
  6. In production plants requiring cleanroom conditions
  7. In private households
- 

The temperature ranges of PARU Mini are limited by the installed electromagnets. The ambient temperature must not exceed 40°C and its mean value over a period of 24 hours must not exceed 35°C. The lower limit for the ambient temperature is -5°C. The altitude of its place of use must not exceed more than 2000 m above sea level. The relative humidity of ambient air must not exceed 50% at 40°C. A higher humidity may be acceptable at lower temperatures, i.e. 90% at 20°C. The ambient air must not be significantly contaminated by dust, smoke, aggressive gases and vapours. Avoid direct sunlight or high UV radiation as this may cause embrittlement of some plastic components possibly installed in the tooling unit, and adversely affects the readability of controller displays.

The following groups of persons ('users') are authorized to use and handle the PARU Mini:

#### 1.4. Personnel

The following groups of persons ('users') are authorized to use and handle the PARU drive:

1. Instructed person: Instructed persons have demonstrably been briefed by the equipment user on their assigned tasks on the PARU and the potential dangers hazards in case of improper behaviour. An instruction session is a fundamental prerequisite for working on the PARU. Reading of the technical documents related to the PARU drive is part of this instruction session.
2. Qualified personnel: Qualified personnel are able to independently execute their assigned work on the PARU-Mini and recognize potential dangers in handling the PARU-Mini and avoid hazards based on their professional training, skills and experience and knowledge of the respective standards and regulations. Any trained electrician who has professional training, skills and experience as well as knowledge of the respective standards and regulations is able to work on the electric components of the PARU-Mini and independently recognize and avoid potential dangers. Qualified personnel includes trained electricians.
3. Certain work such as replacing electromagnets, leaf springs or other components of the PARU-Mini must only be done by qualified personnel of Rhein-Nadel Automation GmbH or after previous consultation with qualified personnel of the Rhein-Nadel Automation GmbH. For carrying out such work, please contact our customer service: [vertrieb@rna.de](mailto:vertrieb@rna.de)

#### 1.5. Residual hazards

**Danger!**

The PARU-Mini is intended to complete / to be incorporated into a complete system. Do not operate the machine before safe completion/incorporation by the user.

---

**Notice!**

The PARU-Mini was delivered as an incomplete machine with a Declaration of Incorporation according to Machinery Directive 2006/42/EC and is intended to be incorporated into a complete system. Incorporation means that the PARU-Mini drive must be connected to a disconnecter (main disconnect switch) which can be locked out in order to prevent inadvertent starting during works.

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## 2. Product description

### 2.1. General

PARU Mini is a standardized platform for presenting bulk parts in properly oriented and singulated manner in automated production or assembly lines. For this purpose, PARU Mini is associated to product-specific tooling (rail) and integrated - on its own or as part of a feeding system - into a production or assembly line at the user's. PARU Mini requires no manipulations. The complete tuning/ matching of the system is done in RNA's factory by means of simulation-based system engineering in accordance with user's requirements. PARU Mini is an incomplete machine as defined by the Machinery Directive 2006/42/EC.

PARU Mini can be retooled at any time in order to feed other parts. The tooling units adapted via simulation tools offer a Plug&Feed capability, meaning that production can start right after mounting the adapted tooling on the PARU Mini, without any adjustments to the drive. PARU Mini thus provides for flexible feeding of parts at high rates and with short retooling times.



PARU Mini is a precision machine. To fully exploit its functionality it is imperative that you use this product in conformity with this operating and installation instruction manual. Beside the configuration of the tooling, the controller settings and the condition of the parts handled must comply with the specification document and the parameters set up during the simulation-based matching phase if the desired function is to be achieved.

### 2.2. Technical data

The following applies for all PARU Mini (EU | USA):

Power supply [V/Hz]	230/50   110/60
Operating voltage [V]	0...210   0...100
Vibration frequency [Hz]	100   120 +/- 5 Hz
Degree of protection IP	54
Operating temperature range [°C]	-5...+35
Noise emission: Constant sound pressure level (without parts)	< 70 dB (A)
Length of connecting cable [mm]	1500

The PARU Mini series comprises the models PARU Mini XS and PARU Mini S as shown in Fig. 1.

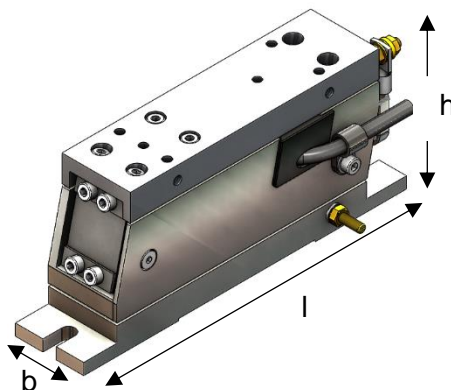


Fig. 1: Dimensions of PARU Mini



#### Notice!

Noise emission: constant sound pressure level (without parts) < 70 dB (A)  
Noise emission depends on the parts to be fed and can therefore be measured only at the site of installation, under real-world conditions. If the sound pressure level exceeds the acceptable limit, suitable noise reduction measures need to be taken.



**Notice!**

PARU-Mini is a precision machine. The function of the drive depends on the accuracy of the design of the tooling and its coating. For correct function of the equipment, the controller settings as well as the filling rate, state of the parts to be fed and qualities of threaded assemblies must also be in line with the specifications in these operating and installation instructions.

Following applies to the different variants of PARU Mini:

Linear Feeder Type	PARU Mini XS	PARU Mini S
Dimensions L x W x H (mm)	170 x 36 x 73	200 x 42 x 80
Mass excl. tooling [kg]	1.8	3.0
Power input [VA]	15	19
Current input [A] at 230V	0.07	0.08
Current input [A] at 110V	0.16	0.17
Magnet article code for 230V	39930322	39930334
Magnet article code for 110V	39930323	39930335

This translates to following space requirements:

	Floor space requirement (L x W [mm])	Minimum loading capacity of floor per sqm [kg]
PARU Mini XS	170x50	30
PARU Mini S	200x60	50

Tooling units are attached to the useful mass with M5 or M6 (Mini M) fastening screws. Fig. 2 shows the mounting hole pattern of the PARU Mini series on the example of a PARU Mini S.

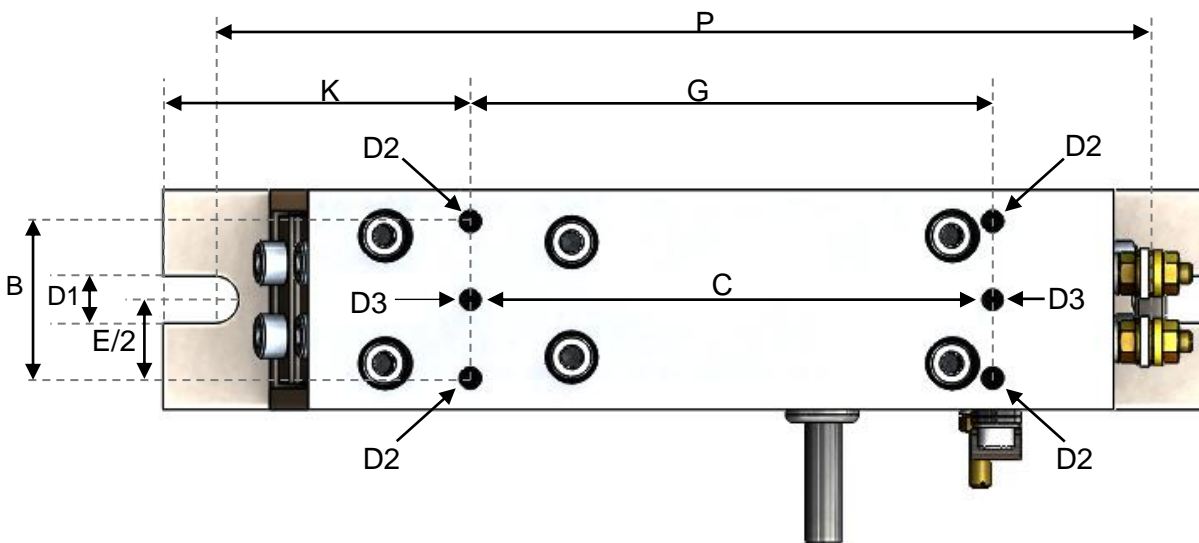


Fig. 2: Mounting dimensions of PARU Mini

Linear Feeder Type	PARU Mini XS	PARU Mini S
P [mm]	150	180
G [mm]	80	100
K [mm]	49.5	58.9
C [mm]	60	=G
E/2 [mm]	18	21
B [mm]	25	30
D1 [mm]	7	9
D2 [mm]	M5	M5
D3 [mm]	4H7	4H7

PARU Mini is tuned ex works for a series of standard tooling units. The relevant physical parameters of these add-on tools (mass, dimensions, position) are listed below.

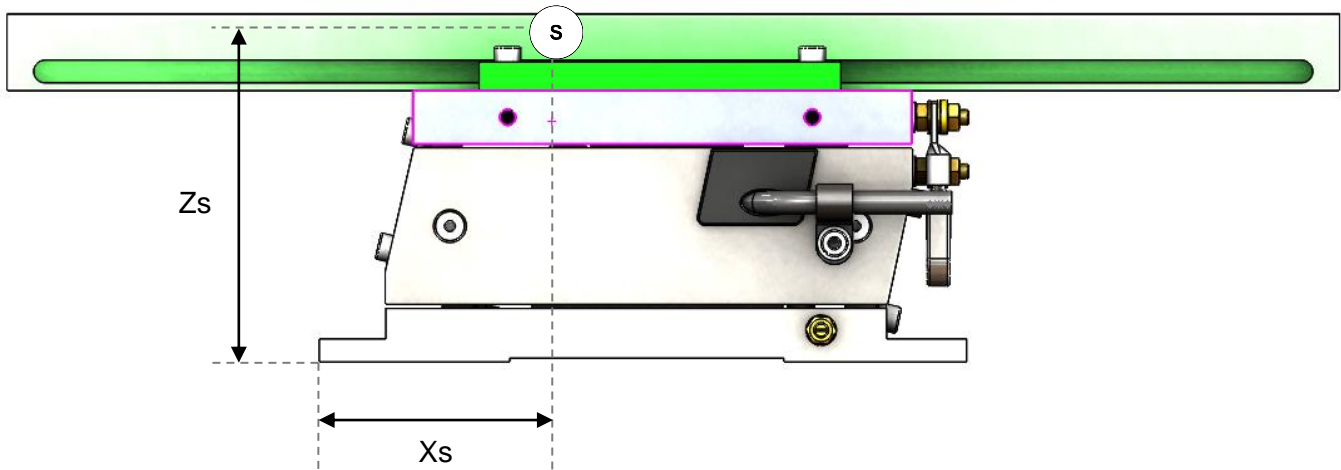


Fig. 3: Centre of gravity coordinates of tooling for PARU Mini

Linear Feeder Type	PARU Mini XS	PARU Mini S
Ideal weight of tooling [kg]	0.7 ± 0.025	1.1 ± 0.05
Max. weight of tooling [kg]	0,9	1,4
Recommended max. length of tooling [mm]	300	500
Centre of gravity of rail Xs [mm]	90 ± 10	97 ± 10
Centre of gravity of rail Zs [mm]	81 ± 10	100 ± 15
Centre of gravity of rail Ys [mm]	0 ± 9	0 ± 5

Due to the PARU Mini's design with individual spring legs it can be adapted to a wide range of tooling units in addition to the ones specified above. This must be done in consultation with RNA however. As a rule the equipment user only needs to observe the tightening torque for the tooling fasteners. For the sake of completeness and in anticipation of potential maintenance work find below the tightening torques for all relevant threaded assemblies of PARU Mini (all screws have property class 10.9 or better):

ISO 4762 M4 screws of leaf spring [Nm]	4.5
ISO 4762 M5 screws of leaf spring [Nm]	6.5
ISO 4762 M6 screws of leaf spring [Nm]	9
ISO 4762 M4 screws of spring leg domes [Nm]	4
ISO 4762 M5 screws of spring leg domes [Nm]	6
ISO 4762 M6 screws of spring leg domes [Nm]	8

To avoid overheating of the electromagnetic coil and ensure energy-efficient operation it is imperative that the air gap is properly set in accordance with following table:

	Air gap EU	Air gap USA
PARU Mini XS [mm]	1.0 ± 0.05 mm	1.0 ± 0.05 mm
PARU Mini S [mm]	1.2 ± 0.05 mm	1.2 ± 0.05 mm

To ensure constant feed rates even in production facilities with powerful consumers and fluctuating mains voltages we recommend the use of optimized controllers supplied by Rhein-Nadel Automation GmbH. If you wish to operate a PARU Mini with a third-party controller please contact Rhein-Nadel Automation.



**Notice**

For smooth operation some minimum requirements must be fulfilled at the site of installation. The base must be as rigid and stable a structure as possible. We recommend a minimum mass of 20kg for PARU Mini XS and 30kg for PARU Mini S.



### 2.3. Automatic mode change / pin assignment

PARU Mini drives do not require the operator to take care of selecting the right operating mode. The operating mode is determined by a code in the RNA vibrating drive connector. A wire jumper from pin 3 to 4 in 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 drive systems come with the right code in the connector.

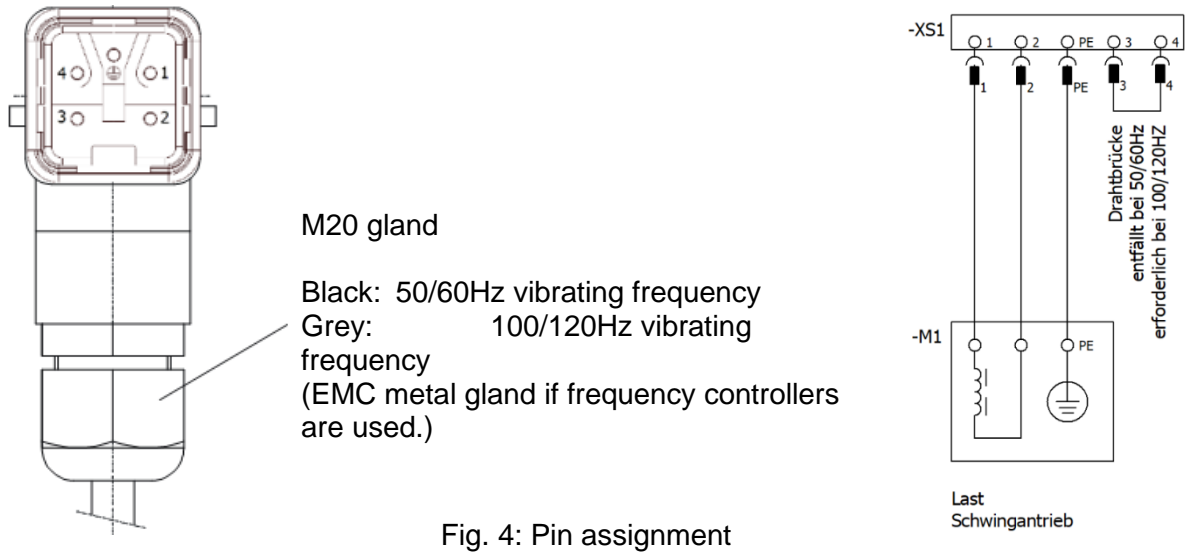


Fig. 4: Pin assignment



#### Notice

Where frequency controllers with selectable output frequency are used, an EMC metal gland and a shielded cable are provided.

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 available choice of controllers is shown in the following table:

	SCU 1000 /2000	ESG 2000	ESK 200X	ESR 2000	ESR 2500
PARU-Mini S & XS	√	√	√	√	√



#### Notice

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

## 2.4. Functional description

PARU Mini is a two-mass system. With PARU Mini, exciter mass and useful mass are connected to each other by spring leaves inclined at a fixed angle. The usable mass also includes the tooling. The vibratory system is excited by magnets. This results in an oscillating motion of the usable mass. This motion accelerates the parts in horizontal and vertical direction, causing them to move along the tooling. PARU Mini oscillates in the range of 100Hz (EU) resp. 120Hz (USA). The vertical amplitude is up to 30µm, the horizontal amplitude is up to 150 µm.

Fig. 4 illustrates a PARU Mini XS unit with a typical tooling (4) shown green.

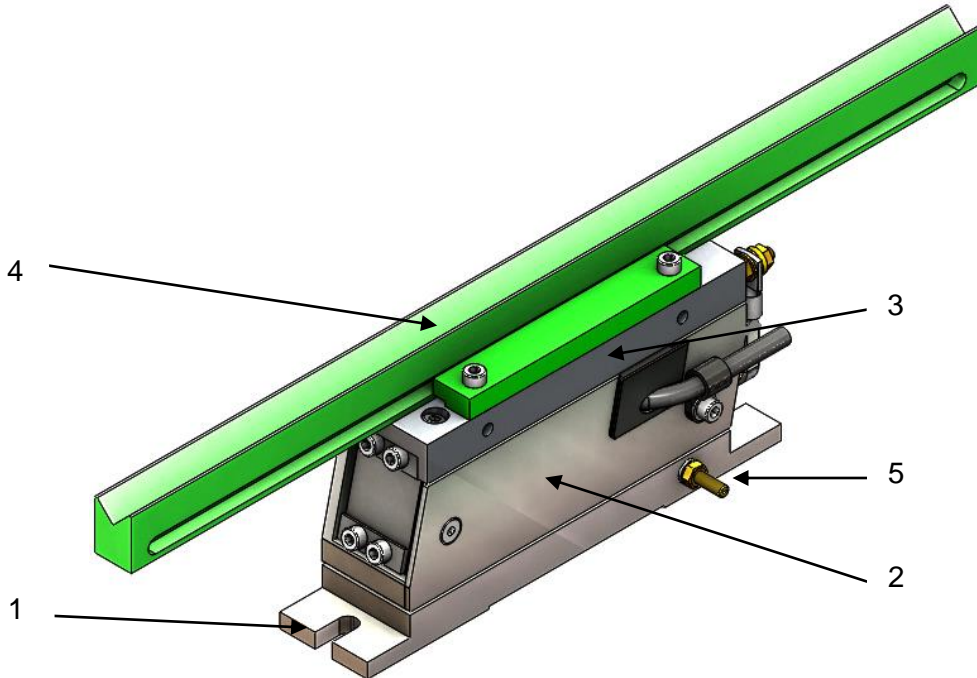


Fig. 4: PARU Mini XS with tooling (shown green)

The parts handled are finally oriented and buffered by means of the tooling (4) and the part-specific sorting elements. Two M6 or M8 screws are used to fasten the PARU Mini to its mount via the stationary baseplate (1). The exciter mass (2) and useful mass (3 and 4) are the vibrating components. The tooling is part of the useful mass and is fastened to the useful mass plate (3) by means of clamps, for example. The connection for user's earth (5) is located on the baseplate.

## 2.5. Tooling development

We recommend you to observe following general conditions when designing tooling units for PARU Mini. The tooling must be a rigid body in order to transmit the motion of the useful mass in the best possible way. We recommend a feed rail height-to-width ratio of 2:1 or higher. We recommend the use of threaded assemblies suitable for rigid bodies.

To ensure stability of the PARU Mini with minimum transmission of bearing forces to its mount, the rail should not exceed the maximum weight stated in chapter 2.2.

The tooling centre of gravity should be located in the middle of the PARU Mini, and the centrifugal moment about the feeding axis of PARU Mini should be close to 0.

For virtual validation of the feeding behaviour and system tuning/matching we recommend to design the tooling using the CAD dummy for PARU Mini and the simulation tool of Rhein-Nadel Automation GmbH.

## 3. Installation Instructions

### 3.1. Shipping and handling

PARU Mini is packed for shipment in a suitable cardboard box. If the cardboard box is severely damaged on delivery, please contact the forwarding agent without delay. Please observe the forwarding agent's Terms and Conditions so as not to forfeit your right to claim damages due to errors in form. For unpacking and internal transport please observe the instruction sheets attached, if any. We recommend that you keep the cardboard box and packing materials if you ever need to return the PARU Mini. Unless otherwise agreed, the scope of delivery of PARU MINI comprises:

- Cardboard box for shipping
- PARU Mini
- Operating and installation instructions
- Declaration of Incorporation
- Tooling or tooling sets with recommended settings



Do not sling or handle PARU Mini at or on the orienting device. Make sure that nobody is under the suspended PARU Mini during handling operations.

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Due to the risk of damaging any provided sensitive sorting features avoid lifting the PARU Mini at its tooling.

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### 3.2. Installation

PARU Mini is delivered completely assembled so that you will only need to unpack and install it at the intended site. After removing PARU Mini from its packing you should first make a visual inspection of all visible surfaces and clean the unit as necessary to remove any soiling, e.g. cardboard material that may have entered it during transit. For installation work individually agreed between buyer and seller, please refer to the instructions attached.

PARU Mini is fastened to the mounting structure provided by user or to the structure of the complete machine by means of two M6 respectively M8 screws. We recommend to use ISO4762-compliant screws of strength class 8.8 and to lock them with Loctite.



#### Notice

As for the machine frame or complete machine be sure to observe the requirements from chapter 2.2 with regard to stability and mass.

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For positioning the SRA-Z on its intended substructure, temporary storage deposit or the target machine in which the drive is to be integrated, make sure that the load bearing capacity is sufficient. The mount must be dimensioned such that no vibrations are transmitted from the machine to the PARU Mini, and vice versa.

---

Make sure that vibrating components of the PARU Mini cannot touch any other equipment during operation.

### 3.3. Commissioning



Reception by user of the parts presented by a tooling of the PARU Mini must be ensured.

Check following items before starting the feeding system:

#### **Danger! Attention!**

- All shipping braces are removed and all screws and bolts tightened firmly.
- The drive is properly aligned and fastened in place without any strains or stresses exerted on the base plate and/or substructure. After that check smooth carryover of the parts on the feeder transition points.
- The transitions to downstream equipment are perfectly aligned with no interferences.
- The vibrating motors are standing free without contact to any solid body.
- The compressed-air supply (if required) is available and stable. The required operating pressure is shown in the table. The cross-sectional areas at the connections are to be adapted to the connection union or coupling (if provided).
- All guards and safety devices are in perfect working condition.
- No objects and (bulk) parts are inside the machine.
- The motor connecting cables are plugged into the requisite control unit.
- The available electricity supply (frequency, voltage, power) corresponds to the connection data of the control system.
- The control units have been set up as specified.



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.

Electrical connection of the PARU Mini and its components as well as commissioning of the system must only be carried out by professionals in accordance with the rules and regulations of the country where the PARU Mini is operated! When making any change to the electrical connection be sure to observe the operating instructions for the control unit used.

As PARU Mini is incomplete machinery, the interaction between PARU Mini and user's receiving station is to undergo a risk analysis to be conducted by user. Should this risk analysis reveal that any measures are required, these measures are to be implemented by user. Emergency Off switches are not provided on PARU Mini. This function has to be implemented by the manufacturer of the complete system/machine. Maintain unobstructed access to Emergency Off switches at all times. Check proper operation of the Emergency Off switches every day at the beginning of the machine operation.



Do not put the PARU Mini into operation until it has been incorporated into or assembled with the entire system and the safety requirements of the EC Machinery Directive for the entire system are met.

#### **First power up:**

Once the previous steps have been carried out switch the PARU Mini on without parts and at a low amplitude (using a starting value of 10%, for example). Now increase the amplitude step by step until you reach the target value defined for the tooling. Make sure that the useful mass and the exciter mass of the PARU Mini do not knock into anything.

If the first start-up of the PARU Mini is accompanied by loud noises, please check that: All threaded fasteners have been selected and tightened in accordance with the Technical Data.

- 
- The air gap is correctly set in accordance with the table.
- The transitions from the upstream feeding system, to the escapement or into the tooling are correctly set up.

Otherwise please contact Rhein-Nadel Automation GmbH.



The optimum feed rate of PARU Mini for one or several parts of Buyer has already been determined in RNA Digital Solutions GmbH's factory. We strongly recommend that you not deviate from the amplitude and frequency defined for the respective tooling.

If PARU Mini runs smoothly at the target frequency and amplitude associated to the tooling, the upstream process (feeding system) can be started with parts for final adjustment of their transition to the PARU Mini.

## 4. Operating Instructions

### 4.1. Operation

#### **For operation of the PARU Mini observe the following items:**

In standard configuration the feeding system is switched on and off via the controller. Equipment users have the possibility of interfacing this controller with their higher-level machine controllers.

Take great care to prevent parts from backing up into the tooling of the upstream feeding system, for example by stopping the feeding system via the controller.

If compressed air is used at the tooling be sure to keep a constant operating pressure and be advised that the air supply must not be switched off during operation. On start-up or re-starting make sure that the operating pressure is reliably available before the PARU Mini starts.

The set air and sorting nozzle positions must not be changed.

Operators must have free access to the PARU Mini at all times.

NEVER remove jammed parts from the PARU Mini unless it has been shut down completely. Proceed without damaging the product or the tooling! Be advised that PARU Mini is a precision machine where tooling defects as small as a tenth of a millimetre may already impair the function.

If you observe all operation and installation instructions in this manual the PARU Mini will require no maintenance.



PARU Mini must be operated by trained professionals only. Observe the installation and operating instructions at all times. Operation of PARU Mini is permitted only if the enclosure is installed and user's safety circuitry is functional. Operators assigned by the equipment user can be trained on the PARU Mini by Rhein-Nadel Automation GmbH. Please ask for the terms and conditions of such training if required.



Depending on the parts handled the PARU Mini may emit a high noise level. Therefore we recommend that you wear ear protection for any working on and around the PARU Mini.



Even when stopped the PARU Mini should not be assumed to be in a safe state. Stored energy, for example from the leaf springs, may be released unintentionally or through maintenance procedures not in accordance with instructions. This applies in particular to procedures that may be dangerous if carried out whilst the machine is in operation, e.g. the clearing of a jam, which is against the recommendations of this instruction manual.

### 4.2. Tooling change

#### **For tooling changes of the PARU Mini observe the following items:**

1. Switch off PARU Mini,
2. Switch off the compressed air supply (if provided)
3. Unscrew the tooling segments.
4. Disconnect compressed air lines (if provided).
5. Store the dismantled tooling at an appropriate location that satisfies the requirements specified in chapter 5 of this operating and installation instruction manual.
6. Perform the quick-emptying and changeover procedure for the upstream feeder system to completely remove all previous parts.
  
7. Mount the new tooling on the PARU Mini. Take care that the transfers from / to the upstream / downstream processes are adjusted with utmost precision.
8. Feed the parts to the upstream process. Operate the PARU Mini in accordance with chapter 4.1 of this operating and installation instruction manual.



For tooling changes make sure that the upstream process (feeding system) supplies the correct parts matching the new tooling of the PARU Mini. Otherwise it may be damaged by handling of the wrong parts.

### 4.3. Maintenance items and intervals

PARU Mini is designed for continuous automatic operation. Information on wear cannot be provided as such wear varies depending on the system (PARU Mini - tooling - parts handled) on hand. Recommended maintenance intervals are as follows:



**Notice!**

Clean the drive with a clean non-linting cloth and isopropyl alcohol, soap suds or cleaning solvent.



**Notice!**

The drive units basically require no maintenance. They require cleaning only when soiled or after coming into contact with liquids.

Maintenance plan				
Action		Interval		
P = check E = adjust R = clean		N = re-tighten S = lubricate A = replace		t = daily w = weekly m = monthly
				h = half-yearly j = yearly
Component	Check	Action	Interval	Note
General machine condition	Visual inspection	P	t	Pay attention to corrosion, damage and defects
Electrical equipment	Make functional test	P	h	Tighten loose connections, remove charred cables/components
Couplings / connections		P / N	h	Observe tightening torques
SRA-Z drive	Clean from dirt	R	w	Pay attention to corrosion, damage and defects
Hoses and pipes	Visually check for leaks and damage	P	w	



Wear following personal protective equipment:



- Foot protectors (safety footwear)
- Hand protectors (safety gloves), if necessary



Before starting any maintenance work, switch off the machine using the main switch (supply circuit disconnecter) and lock it off with a padlock to prevent inadvertent starting. If appropriate, affix the 'Do not switch' sign in a conspicuous place at the disconnectors.



**Notice!**

Be careful when working on and with motors/electromagnets! They can get hot during operation. Therefore let motors cool down before working on them. If this is not possible, take suitable protective measures such as the use of gloves.



**Danger!**

Maintenance work must be performed by professionals only.

Gefahr

- Inspect/check the electrical equipment of the drives at regular intervals of time. Remedy defects like loose connections or charred cables without any delay.

**Danger!**

Before connecting or disconnecting cables, verify absence of voltage. Non-observance may lead to electric shock or machine malfunctions.

- Use only original fuses with the specified amperage! In the event of faults in power supply switch off the machine at once!
- Observe the respective product safety instructions when handling oils, greases and other chemical substances!
- Replace damaged spare parts and safety-relevant parts without any delay.

**Notice!**

Periodical maintenance and inspection of the machine is very important. This avoids malfunctions and improves safety and reliability in operation.

## 5. Storage, dismantling, disposal

PARU Mini units or tooling units must be stored in a dry place protected from aggressive media or soiling. Strong temperature variations must be avoided. After prolonged storage the unit must be cleaned in accordance with chapter 4.3 of this installation and operating instruction manual.

Disconnect power and compressed air before dismantling the PARU Mini from its target system. Remove all parts from the system. Loosen the M8 fastening screws. For the rest observe the instructions in chapter 3.1 "Shipping and Handling". We recommend that you keep the cardboard box in which the PARU Mini unit was delivered in case you should need to return the PARU Mini to Rhein-Nadel Automation GmbH.

The components of the PARU Mini unit are mainly steel and aluminium. Units which are no longer in use should not be disposed of as complete units but dismantled and the component parts recycled according to their materials. Please contact Rhein-Nadel Automation GmbH if you want to return the PARU Mini unit.

## 6. Accessories / spare parts / customer service

Spare parts must satisfy the technical requirements specified by us. This is always ensured if genuine spare parts are used. We assume warranty only for the genuine spare parts supplied by us. The installation and/or use of spare parts not supplied by us may have a negative effect on design characteristics and thus impair active and/or passive safety. We do not assume any liability or warranty for damage due to the use of other than genuine spare parts or accessories.

Please address your spare parts orders to our customer service department.

For a smooth and swift execution of your spare parts order we need following information:

1. Name of customer:
2. Machine identification
3. Designation of spare part required
4. Required quantity
5. Requested mode of shipment

## 7. Troubleshooting

Q	'I have installed the PARU Mini unit in accordance with these installation and operating instructions but it won't run.'
A	<p>First, check that:</p> <p>The controller settings are correct (frequency, amplitude).</p> <p>The tooling is installed in its original condition and positioned correctly, i.e. no masses have been removed or added by user.</p> <p>All threaded fasteners have been selected and tightened in accordance with the Technical Data and the PARU Mini is fastened properly on a mount of sufficient load bearing capacity.</p> <p>The correct parts to be conveyed are present and not jammed anywhere.</p> <p>Movements of the PARU Mini, in particular its useful mass and exciter mass, are not impaired.</p> <p>The PARU Mini is in horizontal alignment.</p>

	<p>The air gap is set to the nominal width.  Check the leaf springs for damage.  If none of these measures are successful, try to start the PARU Mini by adjusting the excitation frequency. Please contact Rhein-Nadel Automation GmbH.</p>
Q	<p>'We have trouble with batches of different parts to be handled.'</p>
A	<p>Determine the geometric deviations of the individual batches from the setpoint parts. Send the results to Rhein-Nadel Automation GmbH and request a quotation for a tooling that is optimized for these varying part batches with the help of simulation.</p>
Q	<p>'We have noticed a defect on the PARU Mini and need spare parts. How do we get them?'</p>
A	<p>In principle, each component of the PARU Mini can be ordered individually, except for the spring legs which are available only as pre-assembled units. Please contact Rhein-Nadel Automation GmbH (<a href="http://www.rna.de">www.rna.de</a>) for your spare part requirements.</p>





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