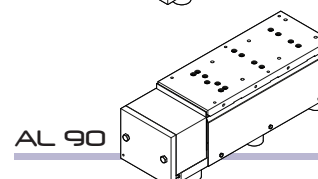
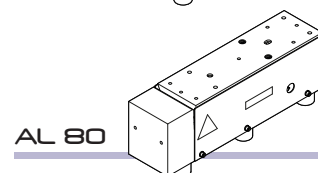
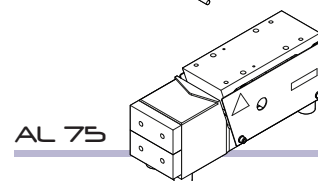
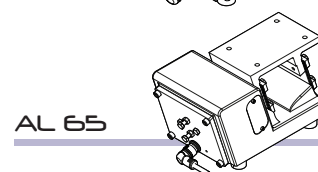
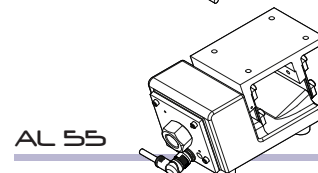
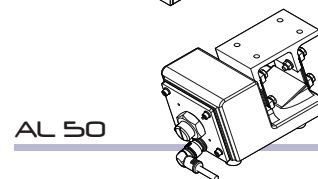
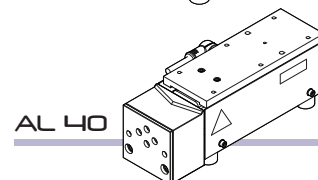
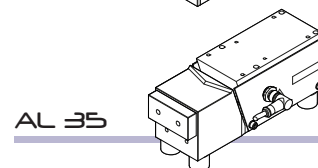
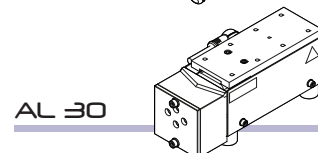
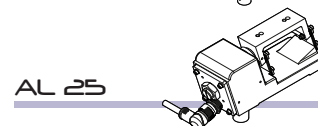

Brovind



Linear Vibrator

Use and Maintenance Instruction Manual

(translation of the basic instruction manual)

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SPARE PARTS

CHAPTER 8 SPARE PARTS



WARNING!

The Declaration of Conformity is attached to the manual but it is not included inside it.
This attached Declaration, and any others, must be kept and made available to anyone who requests it.

CHAPTER 1

OVERALL OPERATING FEATURES

1.1	GENERAL REMARKS _____	6/64-1
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1.1 General information

The assembly dealt with in this manual was designed, engineered and placed on the market to produce a movement that allows the feed of the material contained on the channel. This is specially designed, according to the type of material to be handled, but it is not part of the standard component. The channel is sold separately from the linear vibrator. An electromagnet generates a pulsating force which causes the leaf springs to bend momentarily. Between one pulse and another, the springs return to their original position. This last movement produces the feed of the material contained in the channel.



DANGER!

The assembly cannot be used for other types of product without the express authorization or any structural changes by the Manufacturer.

The assembly was conceived to ensure excellent results if used in compliance with operating and maintenance instructions as well as with the recommendations contained in this manual.

To achieve the best results the Manufacturer recommends that all the cleaning and maintenance operations be executed regularly to preserve the units making up the machine in their best working order.

It is especially important to train the staff in charge of the assembly about its use and maintenance, the control of operational procedures and safety rules described in this manual.

1.1.1 Revision of manual chapters

Revision

Chapter 01	00 - 26.08.2021	<i>First draft of the manual</i>
Chapter 02	00 - 26.08.2021	<i>First draft of the manual</i>
Chapter 03	00 - 26.08.2021	<i>First draft of the manual</i>
Chapter 04	00 - 26.08.2021	<i>First draft of the manual</i>
Chapter 05		<i>Chapter intentionally left blank</i>
Chapter 06	00 - 26.08.2021	<i>First draft of the manual</i>
Chapter 07	00 - 26.08.2021	<i>First draft of the manual</i>
Chapter 08	00 - 26.08.2021	<i>First draft of the manual</i>

1.2 How to consult the manual

The layout of this manual enables the reader to easily and rapidly find the necessary details for assembly operation and maintenance.

The operator must read it thoroughly and carefully and be sure to have understood all of the information within it.

The second function of this manual is to be used as reference and consulting documentation each time a special procedure or operation has to be performed.

Hence it has to be kept within the maintenance operators' reach so that it can be consulted at any moment.

The general table of contents makes manual consultation easier since it enables you to immediately find the topic concerned; moreover, each chapter index is repeated at the beginning of each chapter.

Some safety symbols have been introduced next to special paragraphs to stress their relevance and to facilitate the reader in finding their location.

Please pay special attention to these notes!

1.3 Testing, warranty and liability

Testing

The entire assembly is delivered to the customer prepared for installation, after successfully passing the tests and inspections required by the manufacturers, in accordance with the laws in force.

Warranty

The product warranty is 12 (twelve) months of operation and in any case no later than 12 months from the date of issue of the transport document, except in the case of specific agreements (which must be specified in the manufacturer's order confirmation).

Any warranty intervention is limited to the free replacement of parts found to be defective due to construction. Repairs, according to contractual agreements, can be carried out at our operational headquarters or they could be carried out at the customer's premises.

In case of shipment of the assembly, the shipping costs shall be borne by the customer.

The warranty shall be void in the event of late payment, unsuitable installation, misuse, poor or inadequate routine maintenance.

The warranty shall be void if modifications are made to the assembly without the prior consent of Brovind Vibratori, or if parts/components are replaced with spare parts not supplied by Brovind Vibratori.

Liability

In any case the Manufacturer shall not be held liable for operation anomalies or general failures deriving from a misuse of the assembly or by interventions and/or changes carried out by external staff without the Manufacturer's authorization.

1.4 Environmental conditions

Attention should be paid to the environmental conditions in which the assembly to be supplied must operate. The temperature of the environment shall never go below 10°C or exceed 40°C because this can cause a malfunction of the assembly.

Humidity should range between 10 ÷ 85% without condensate.

Lighting

The lighting of the installation environment must comply with the laws in force in the country where the assembly is installed and must still ensure good visibility at every point.



DANGER!

The assembly has no independent light sources, the assembler shall have to equip the work environment in compliance with the laws in force.

1.5 Terms used in the manual

Some technical terms were used while writing this manual, therefore a glossary was created to clarify them.

ASSEMBLY	Assembly of more parts or units of the assembly disassembled and tied together for transportation.
SLIDING BUSHINGS	Bushings with sliding rings located on two orthogonal planes.
SPACERS	Mechanical elements used to maintain two units separate.
FERRITIC STAINLESS STEEL	Chrome-plated stainless steel.
AUSTENITIC STAINLESS STEEL	Stainless steel containing such percentages of Ni and Cr that it keeps its austenitic structure even at room temperature.
EN	The European Norm identifies a European technical standard that is harmonised by the European Technical Commission and published in the OJEC.
IEC	International Electrotechnical Commission.
FORK LIFT	Forklift truck.

1.6 Symbols used in the manual

The manual contains a set of symbols used for important messages and warnings. The text written beside the symbol must be read more carefully:

**DANGER!**

This symbol indicates important warning messages, essential to the safety of the operator and the assembly. Thoroughly read the note on the side.

**CAUTION!**

This symbol indicates the obligation to do what the note to the side requests.

**WARNING!**

Information with value, useful to the user for its multiple purposes.

1.7 How to request interventions - technical assistance

All requests for interventions to the After Sales Service are to be sent to the following address:

After-Sales Service**BROVIND VIBRATORI S.p.a.,**

Via Valle Bormida, 5

12074 CORTEMILIA (CN)

Telephone number: +39.0173.820111

brovind@brovindvibratori.it

Specifying:

1. Serial number and year of installation;
2. defects detected;
3. exact address of the factory where the assembly is installed.

1.8 How to order spare parts

Any enquiry concerning spare parts should be sent to the following address:

After Sales Service

BROVIND VIBRATORI S.p.a.,
Via Valle Bormida, 5
12074 CORTEMILIA (CN)
Telephone number: +39.0173.820111
brovind@brovindvibratori.it

specifying:

1. Model of the assembly;
2. ID number engraved on the rating plate;
3. Code of the spare part to be ordered (refer to spare parts chapter);
4. Required quantity;
5. Shipping method;



WARNING!

Please also indicate if it is an executive order or a price request, the delivery date you require, the shipping address and the invoicing address as well as any shipping instruction.

Please also indicate the name, telephone number and email address of the contact person for the supply of spare parts.

After receiving your order we will send you our order confirmation with the indication of prices, delivery date and supply terms.

CHAPTER 2

SAFETY REGULATIONS

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2.1 General safety notes

Rules listed below have to be read carefully to become fundamental part of daily job for the machinery operation and maintenance in order to prevent accident to people and/or damages to property.



WARNING!

Do not try to operate the assembly until its operation has been completely understood. In case some doubts remain after the manual has been thoroughly and carefully read, please contact the Manufacturer's After-Sales Service.

Make sure that all safety requirements are known to all personnel involved in use, cleaning and maintenance.

Rating plates bearing the assembly manufacturing data must be compulsorily kept in good condition. Should they be damaged, apply to our [After-Sales Service](#).

Replace damaged parts with original spare parts guaranteed by the manufacturer.

Never attempt risky solutions!

Always comply with the safety regulations: in case of doubt please read this manual again before any intervention.

It is forbidden to inspect the assembly when it is connected to the mains electricity as it is subject to automatic starts.

It is forbidden to sit down and/or lean against the assembly while it is operating.

It is forbidden to modify the assembly parts.

Clean the components of the assembly with soft, dry cloths (consult the maintenance sheets).

Solvents - such as alcohol or gasoline or diluents - are forbidden. to clean all the surfaces.

Any intervention on the assembly by a staff member with different skills to those requested in the table in the [STAFF SELECTION AND QUALIFICATION](#) " is forbidden.

Keep your hands, arms or any part of the body away from moving machine parts.

To search for or remove any cause of failure or problem, follow all of the safety precautions described in this manual to prevent any harm to people and/or pets and/or damage to property.

Before starting any operation focus all of your attention on the machinery.

It is necessary to be always extremely careful and watchful and to have quickness of reflexes; these are the basic conditions for the operator.

Do not start the assembly while under the influence of alcohol, drugs or psychotropic substances.

Under 18s and handicapped people are forbidden to operate this machinery.

The assembly shall be used only for the purposes it has been designed for and according to what is set out by the contract entered into with the Manufacturer.



CAUTION!

Do not use the assembly for uses other than those listed in the manual.

Any misuse of the assembly can endanger the personnel in charge of its operation and damage the unit.

Before trying to use the machine for other purposes than those it has been designed for, please contact the Manufacturer for the authorisation.

For any problem that may arise during the operational life of the assembly and in any case not covered by this technical documentation, our [After-Sales Service Department](#) must be contacted in order to resolve the problem as quickly as possible.

2.2 Definition of safety terms

The following terms are used in this manual in relation to safety:

Operator	The person(s) responsible for installing, operating, adjusting, cleaning, repairing, moving and carrying out maintenance on the assembly.
Commissioning	The first use, for its intended purpose within the Community, of an assembly covered by this Directive.
Hazard	A potential source of injury or damage to health.
Risk	Combination of the probability and severity of an injury or harm to health that can arise in a hazardous situation.
Guard	The assembly component specifically used to provide protection with a physical barrier.
Intended use	Use of the assembly in compliance with the information provided in the instructions for use.
Reasonably foreseeable misuse	Use the assembly in a way other than that provided in the instructions for use, but that can result from an easily foreseeable human behaviour.
Residual risks	Risks that remain, despite the protective measures incorporated into the design of the assembly and despite the guards and the additional protective measures used.

2.3 Safety symbols and pictograms

Safety pictograms may be present on the machine in order to:

- Highlight the presence of risks and hazards,
- Report the obligation to perform certain procedures,
- Report a ban on other potentially hazardous ones.

These pictograms should not be removed and should be replaced when unreadable or missing.

Symbols	Description
	Indicates the electrocution hazard. When this signal is present, the operator must get close to assembly only when it is disconnected from power supply. In any case, always wear dielectric gloves when approaching.
	This symbol indicates an obligation. When this signal is present, the operator must carefully read the instructions in the relevant section of the instruction manual.
	This symbol indicates the prohibition of sitting. When this signal is present, the operator must not sit onto the assembly.
	This symbol indicates the prohibition of climbing up. When this signal is present, the operator must not climb onto the assembly.
	This symbol forbids people from removing guards on the assembly. Removing guards can pose serious hazards to people. When this signal is present, the operator shall keep casings always assembled.



2.4 Correct use of the assembly

The assembly dealt with in this manual was designed, engineered and placed on the market to produce a movement that allows the feed of the material contained on the channel. This is specially designed, according to the type of material to be handled, but it is not part of the standard component. The channel is sold separately from the linear vibrator. An electromagnet generates a pulsating force which causes the leaf springs to bend momentarily. Between one pulse and another, the springs return to their original position. This last movement produces the feed of the material contained in the channel.

2.5 User's duties






The assembly user shall make sure that:

the assembly is intended solely for the uses set out and agreed in the contract. Service instructions are available to the staff, who must be properly trained on use of the assembly and who must comply with all safety and accident-prevention rules.

2.6 Service staff

2.6.1 Staff selection and qualification

Operators are classified as follows:

	UNSKILLED OPERATOR	Person trained and informed on the normal use the assembly. The operator can do a routine cleaning of the assembly without removing any guards and/or safety devices and without altering in any way operation of the devices included by the manufacturer to prevent accidents.
	HIGHLY SKILLED MAINTENANCE TECHNICIAN	Person in possession of specific training in the field of conveyors with vibrating means; person who has attended specialisation courses at BROVIND VIBRATORI S.p.A. able to modify, repair, replace components restoring the level of reliability and safety envisaged in the design phase. They can also install, start and dispose of the assembly at the end of its service life. They can change any operational parameter of the assembly.
	MECHANICAL MAINTENANCE TECHNICIAN	Person trained and instructed on mechanical hazards on the assembly and with adequate education on laws and regulations covering accident-prevention. They can remove the assembly guards and carry out repairs and/or routine and extraordinary maintenance operations without power supply.
	ELECTRICAL MAINTENANCE TECHNICIAN	Person trained and instructed on electrical hazards on the assembly and with adequate education on laws and regulations covering accident-prevention. They can remove the assembly guards and carry out repairs and/or routine and extraordinary maintenance operations with power supply on.
	MANUFACTURER'S TECHNICIAN	Person trained by the Manufacturer able to modify, repair, replace components restoring the level of reliability and safety foreseen in the design phase. They can also install, start and dispose of the assembly at the end of its service life. They can change any operational parameter of the assembly.

2.6.2 Staff training

The user company can only employ competent, authorised and qualified personnel.

The staff must have been informed in detail about the likely risks and hazards.

Repair and maintenance operations on the electric drive device and/or the electric controls can only be carried out by authorised personnel. In order to operate it is necessary to have a specialised qualification (mechanical and/or electrical) and 2 years of professional experience or, alternatively, 6 years of professional experience in the field.

2.7 Personal Protective Equipment



DANGER!

The use of PPE is mandatory!
Operating on the assembly without the required PPE can harm people.

The employee shall have to inform the staff about the following topics related to a safe use of the assembly:

1. Accident risks;
2. Devices intended for operator safety;
3. General accident-prevention rules laid down by International directives and by the legislation in the destination country of the machine.





Before starting work the operator must know the assembly features, and must have fully read this manual and any attached manuals.

The operator must always





1. Pay the utmost attention to all warning signs.
2. Use gloves for maintenance operations on the assembly.

Apply and enforce the safety regulations. In case of doubts, read this manual again before intervening.

The personal protective equipment that the operators assigned to the use of the assembly must have at their disposal must comply with the legislation in force, and, in relation to the action they must perform, it must be the following:

PPE for operator / shift supervisor / maintenance technician	
	<p>Clothes Operator's clothes shall be suitable to stand the product to be handled, and shall also allow perfect freedom of movement.</p>
	<p>Footwear (foot protection) They must have anatomic anti-stress soles for foot comfort, and the upper part must be impenetrable on contact with the product being handled. They must completely cover the ankle by overlapping trousers. They must also allow the foot to transpire properly.</p>
	<p>Light gloves (hand protection) They must fit the operator's hand and be long enough to cover the elasticated clothing reaching the wrist of the operator. They must guarantee a safe and firm grip while providing high resistance to the product being handled. They must provide protection and comfort against high and low temperatures, as well as satisfactory absorption of perspiration. For electrical maintenance interventions, gloves must be dielectric.</p>
	<p>Earmuffs (eardrum protection) They must be suitable and adequate for the sound level of the work environment. Starting from 80 dB, it is mandatory to provide acoustic protection. Starting from 85 dB, the worker must use a protection device. When choosing the device, pay attention to overprotection, this phenomenon leads the operator to be too protected against the sounds in his environment, the perceived level under the protection must never be below 70 dB. <i>Example 1: you work in an environment where the sound level is 90 dB. Choose an acoustic protection of at least 15 dB. The latter will bring the noise back to a level of 75 dB, which is not harmful to hearing.</i> <i>Example 2: you are at a music festival with a sound level of 120 dB. Choose earplugs with a protection of at least 40 dB. The latter will bring the noise back to a level of 80 dB.</i></p>

For each stage there are risks that require the use of specific PPE. The following table identifies the required equipment:

				
Handling	●	●	●	
Unpacking	●	●	●	
Assembly	●	●	●	
Ordinary use	●	●		●
Adjustments	●	●	●	
Cleaning	●	●	●	
Maintenance	●	●	●	
Disassembly	●	●	●	
Dismantling	●	●	●	

● For electrical interventions, gloves must be dielectric.

● If the assembly is placed in a reverberant environment or in the presence of other sources of noise

2.8 Workstation

During the normal production cycle the assembly is automatic, and it does not require the constant presence of an operator.

2.9 Notes on use of the assembly

2.9.1 Intended use

This assembly has been designed, engineered and sold to be used as described in paragraph 2.4 "Correct use of the assembly".



IT IS STRICTLY FORBIDDEN TO

1. replace or modify the speed of the assembly components;
2. replace components with non-original spare parts;
3. remove or alter the protective casings;
4. use the assembly in environments with explosive atmosphere.

Before any modifications, it is compulsory to contact the Manufacturer for the relevant approval.

2.9.2 Authorised use

The assembly is engineered to produce a movement that allows the feed of the material contained in the channel installed on it. This is specially designed, according to the type of material to be handled, but it is not part of the standard component. The channel is sold separately from the linear vibrator.

The components handled are strictly linked to the development of industrial processes.

2.9.3 Unauthorised use

Improper uses are all those uses other than the ones described in the "Intended use" and "Authorised use" paragraphs.

The unauthorised use of the assembly shall immediately void the warranty.

2.9.4 Reasonably foreseeable misuse

In normal use of the assembly there are no misuses. It may be powered with components that no longer comply with the contractual characteristics.

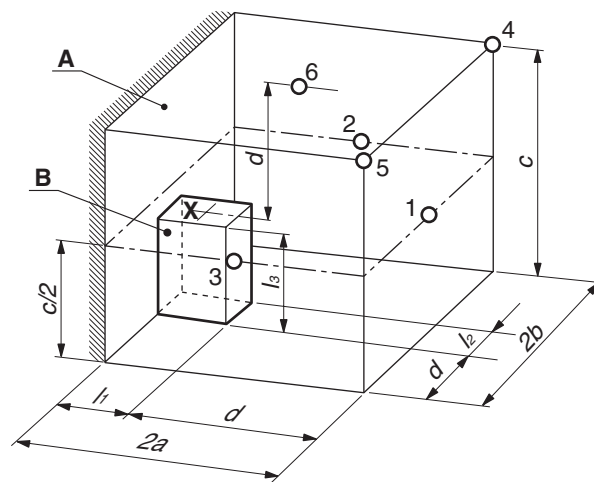
2.10 Noise level

The assembly is engineered and built to minimise noise level at the source.

Measurements carried out in the operator station during normal operation led to the determination of values in compliance with the current standard.

The measurement of the level of acoustic pressure equivalent weighted A results in conformity with the standard EN ISO 3744.

As provided by this standard, the assembly is positioned with its centre in correspondence to the centre of the fictitious reference parallelepiped, the direct longitudinal axis the same as the x axis and the rear part facing point 1 (see following figure).



DANGER!

If the assembly is placed in a reverberating environment or where there are other sources of noise and the daily exposure is higher than 85 dB(A), these imply conditions of hazard; therefore, in this case the employer must provide personal protective equipment for the workers (earmuffs, earplugs).



The test documents and certificates of the instruments are filed with the company BROVIND VIBRATORI S.p.A. available to the supervising authorities.

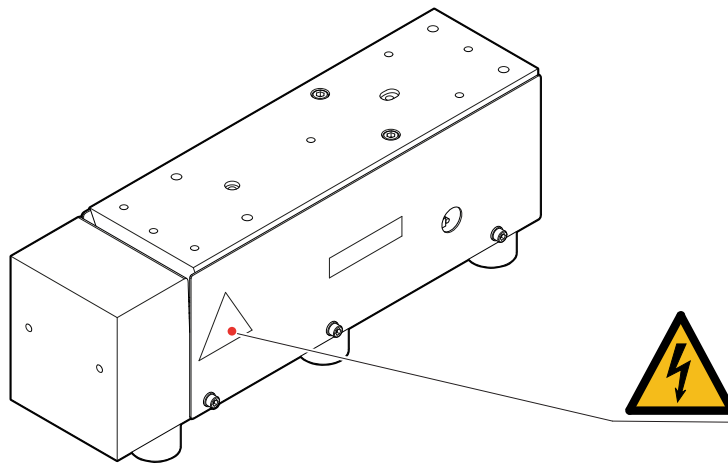
2.11 Residual risks

The protective measures integrated into the design of the assembly and the complementary measures adopted make it possible to declare that the assembly does not pose any hazards to the operator during its operating cycle. During maintenance or adjustment activities some risks arise. They cannot be completely eliminated or immediately dissipated. The presence of such residual risks is recalled by application of safety pictograms on the assembly and as shown in the following map.



WARNING!

In order to understand the meaning of each pictogram, refer to the paragraph [“Safety symbols and pictograms”](#)



Measurements made on an assembly belonging to the same series have led to determining that there are no magnetic fields and therefore the presence of harmful interference for the operator. The test certificates are filed with the company BROVIND VIBRATORI S.p.A. available to the supervising authorities.

2.12 Safety devices

Fixed guards

Fastening the fixed guards to the assembly must be performed by means of systems requiring the use of tools for their opening or disassembly. Fastening systems remain integral with the guard or assembly when the guard is removed. Normally fixed guards cannot remain in place in the absence of their fasteners.



DANGER!

The removal of a fixed guard can only occur when the assembly is disconnected from its energy sources.

It is mandatory to check its correct repositioning after carrying out maintenance activities.

CHAPTER 3

HANDLING, INSTALLATION AND TECHNICAL FEATURES

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3.1 Safety warnings



DANGER!

This chapter is intended for skilled and suitably trained staff.

Load and unload interventions imply a high risk for people!

Handling operations described in this paragraph must be executed by staff qualified for said operations: staff expressly trained to load, unload and handle packages by lifting equipment such as fork lifts.

Staff in charge of handling must be familiar with accident prevention rules.

Before every handling operation make sure the lifting mean is suitable to lift the load to be handled.

Make sure the load stability cannot cause hazards and/or accidents.

Make sure vehicles and logistic structures used are in perfect operating conditions.

Do not stay close to suspended loads.

During handling operations, operators must wear the appropriate personal protective equipment such as: gloves and non-slip shoes.

3.2 Shipping

The Manufacturer uses packages suitable to guarantee the products remain intact and keep during transportation according to the modes of transport and kind of products to be shipped.

Dimensions (length, width, height) and weight of each assembly are written in the delivery note (machines shipped within Italy) or in the packing list (machines shipped abroad).

WARNING!

Upon receipt of the assembly, check with the carrier if the packaging is intact and has not been damaged during transport or has been opened on purpose to remove parts from inside. Check that the supply corresponds to the purchase order specifications and make sure the delivery is complete by referring to shipping papers.







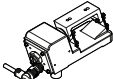
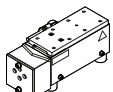
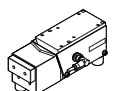
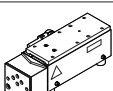



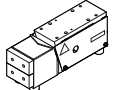
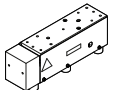
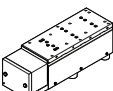


In case the packing is damaged outside, open it in the presence of the hauler and check that the assembly has not been damaged. Describe any damages found in the shipping documents and immediately notify the Manufacturer's shipping department.

If the packing does not show any anomalies, check the outside of the assembly within 24 hours after delivery. In case of visible damages due to transport, immediately notify the hauler, the insurance company as well as the manufacturing company.

3.3 Transport, handling, unpacking

Both transport and handling of the assembly requires specific training. In some cases, some models do not require the use of certified lifting devices as their weight does not exceed the thresholds dictated by the standard, in other cases it is necessary to use lifting devices. For better clarity, a summary table of the models with their respective weight has been created. According to the weight, the possible handling systems are indicated.

Model	Weight in Kg					
 AL 15	2	●	●			
 AL 25	5	●	●			
 AL 30	5	●	●			
 AL 35	6	●	●			
 AL 40	7	●	●			
 AL 50	15	●	●			
 AL 55	20	●			●	
 AL 65	35			●	●	
 AL 75	16	●	●			
 AL 80	30			●	●	
 AL 90	91					●



DANGER!

The use of makeshift means, worn or unsuitable lift accessories, the use of untrained personnel can cause damage to people and property.



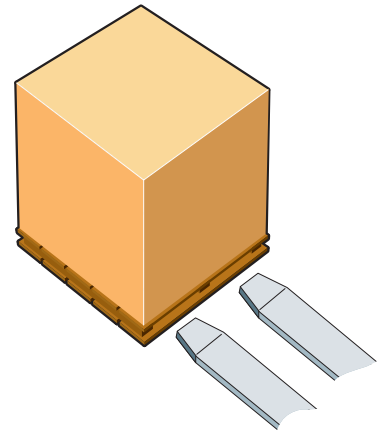
CAUTION!

In some cases lifting equipment requires the possession of specific licenses to be driven or used. The customer has the duty to verify the presence of those regulatory requirements.

The unpacking phases pose considerable hazards as in the realisation of the packaging itself, for instance, spiked wooden planks, sheets of plastic materials that are easily flammable can be used. These materials must be disposed of as special waste in accordance with local legislation.

3.3.1 Types of packaging

Transport by means of transpallets by fitting forks into their suitable housings on pallet. Use transpallets with an adequate carrying capacity (<150 Kg). Upon assembly delivery, the personnel must check that during transport such damage as to impair the correct operation of the assembly has not been caused, besides visible damage.



CAUTION!

Upon receipt of the goods, protective systems such as films or barrier bags - if they have been used - must be opened in order to prevent condensate from forming: in fact, it may damage the electrical components in case of immediate start-up.

3.3.2 Unpacking and lifting

Carefully follow the general instructions below to safely handle the assembly:

1. transport the assembly still packaged as close as possible to the installation site, then unpack it.
2. Remove the cover and carefully free all the material used to pack the assembly.



CAUTION!

In case of lifting with a forklift, proceed step by step in order to check the weight balance.

The above described transfer operations shall be carried out by skilled staff, that shall be prepared to carry out under safety conditions load, unload and packaging handling and that shall be acquainted with the use of lifting tools and informed of the safety regulations in force.

- Check that the lifting and transportation equipment capacity is suitable to the weight of the components making up the assembly.
- Slowly lift and check that the weight is properly balanced.
- Use lifting equipments with suitable capacity and EC conformity marking.

A forklift rated capacity does never match the actual capacity, which changes according to the height the operation takes place and the load centre of gravity to the fork back.

3.4 Storage

The storage area of the assembly must be cordoned off in order to reduce the risk of damage and/or injury resulting from the movement of vehicles and people; it must take place in a covered place and with adequate ventilation to avoid temperature changes that would promote condensate formation within the machine, affecting the proper operation of the electronic components. Temperatures that are too high or too low can damage the assembly.

The assembly exposure to rain and snow should be avoided.

During long downtimes it is necessary to periodically check that the packaging is undamaged and that vermins such as insects, rodents and birds are missing. Each of these categories deserves attention and the monitoring and control techniques implemented must be specific to each vermin.



	°C	°F
T(max)	40	104
T(min)	-15	5



WARNING!

Improper assembly storage can result in damage to internal components and the formation of potentially hazardous grime deposits in the food industry. Under no circumstances shall Brovind Vibratori S.p.A. be held liable for damages arising from non-compliance with the requirements in this paragraph.

3.5 Assembly

The regulations in force at the installation site of the assembly (both regarding accident prevention and technical/environmental matters) should be properly considered during the assembly of the unit. During these phases there are many risks and hazards. The manual provides the necessary guidance to mitigate these risks.

The assembly can be used only after having carefully read and understood the content of the manual.

The staff assigned to use the assembly must, in any case, comply with the accident prevention regulations in force in the Country of installation of the assembly.

The normal assembly use entails some residual risks that could not be eliminated during the design phase. The manual provides the necessary guidance to mitigate these risks.



DANGER!

The use of the faulty assembly is expressly prohibited. Any use of the assembly for purposes other than those described in the manual can pose hazards to people and to the assembly intactness, and it is expressly prohibited.



CAUTION!

The assembly must be installed and used only in environments with the characteristics listed in the Use and Maintenance Manual.

Any anomaly or failure of must be promptly reported and repaired by the staff in charge.

Layout for assembly positioning

A correct, precise positioning of the assembly guarantees its optimal operation.

For further explanations and specifications consult the Internet website <https://www.brovindvibratori.it/> r After-Sales Department.

3.6 Dismantling and disposal

At the end of the real lifespan, the user company should proceed to the dismantling of the assembly in compliance with the regulations in force first by providing with the overall cleanliness of the various elements and the separation of the pieces that make up the assembly.

After disassembling the unit, it is necessary to separate the different materials in compliance with the legislation of the Country in which the assembly must be disposed of. The assembly does not contain components or hazardous substances which require special removal procedures.

3.6.1 Materials making up the assembly

With regard to its disposal, it must be borne in mind that the materials which the assembly is made of are not hazardous, and they mainly consist of:

1. laminated or galvanised ferrite steel;
2. polythene plastic material, either loaded or not, or adiprene;
3. elastomers;
4. aluminium;
5. carbon (if any).

**WARNING!**

During disposal comply with the rules in force in the Country in question.

3.7 Marking

The identification plate is placed on the assembly.

All the assembly identification data are engraved on the plate. Those data shall always appear in every document exchanged between the user and manufacturing company, e.g. in every request for assistance or spare parts request, etc.

**CAUTION!**

It is absolutely prohibited to remove or tamper with the identification plates.

3.8 Space required by the operator

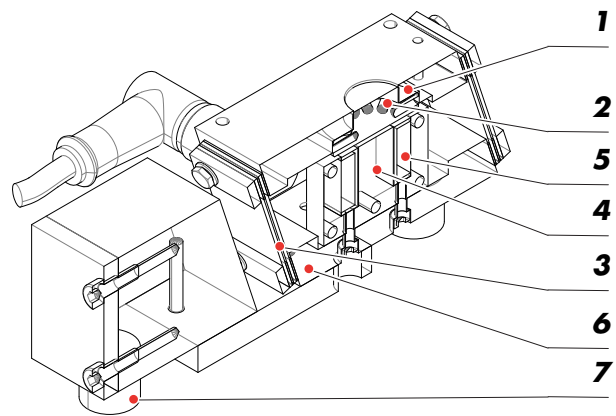
The space required for maintenance workers must be strictly at least 80/100 cm. This space must be left along the whole perimeter of the assembly. It must also be considered that, should the physical characteristics and/or the handling requirements to properly and safely carry out the above-mentioned operations, or should the operators ask for it, this free space must be wider than that indicated above.

3.9 Description of units, dimensions and weights

The assembly consists of the following units:

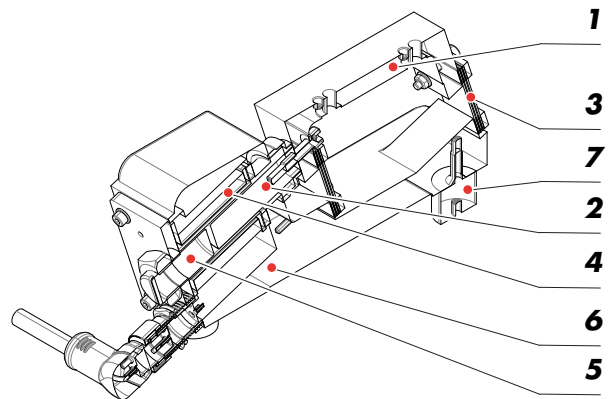
AL 15

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



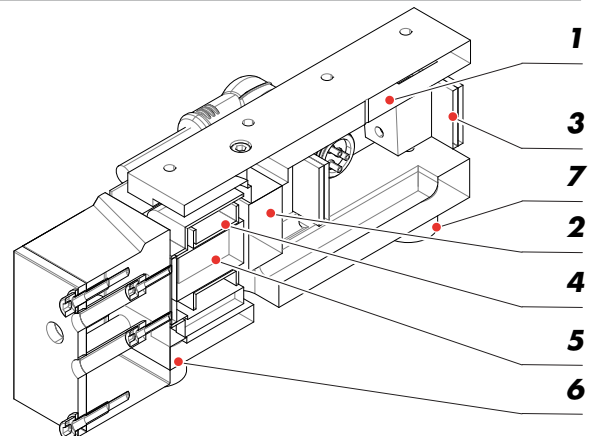
AL 25

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



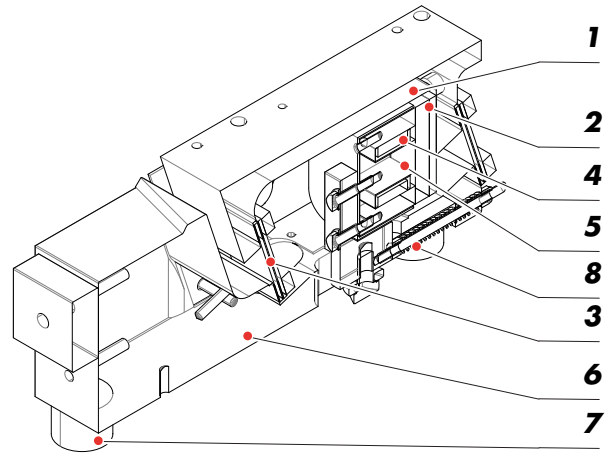
AL 30

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



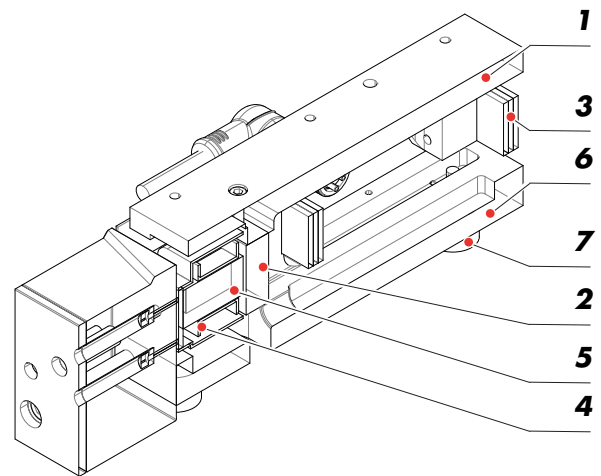
AL 35

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices
- 8. Spring



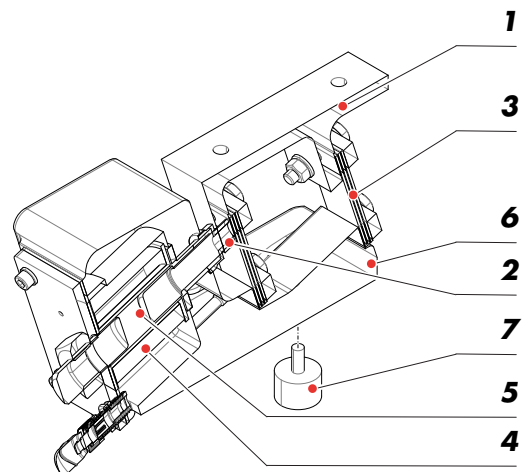
AL 40

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



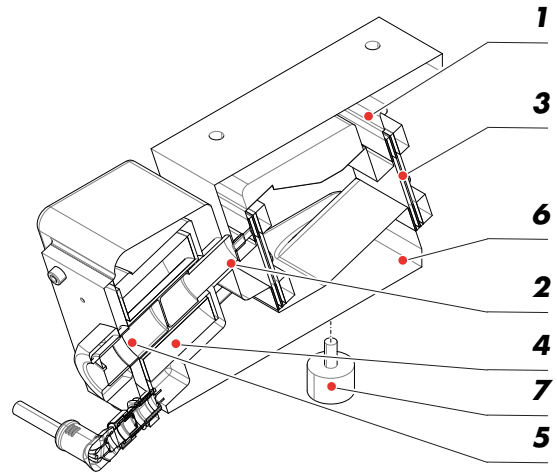
AL 50

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



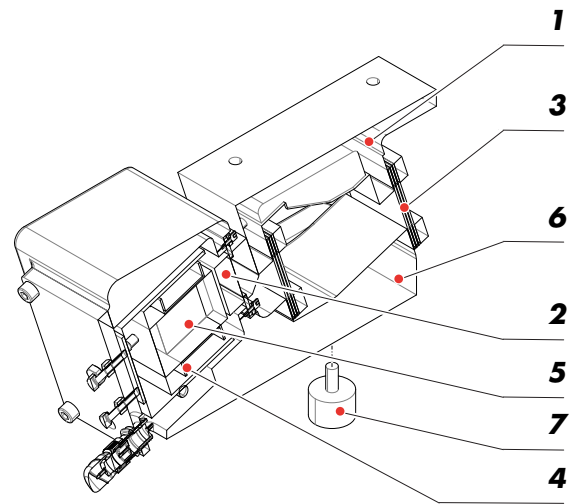
AL 55

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



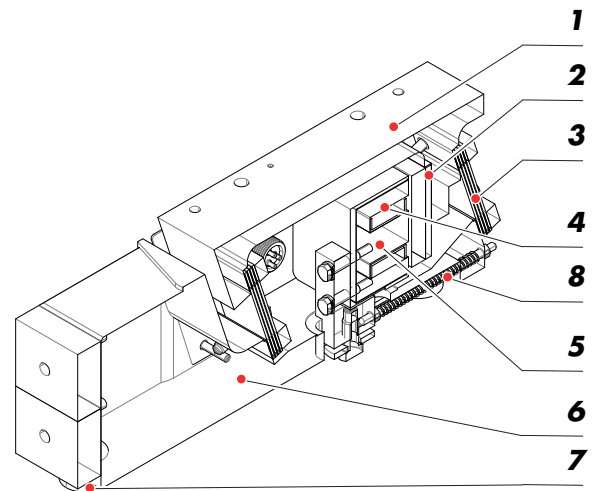
AL 65

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



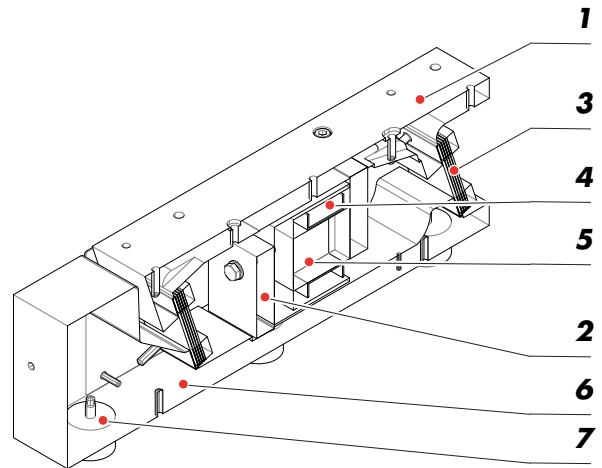
AL 75

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



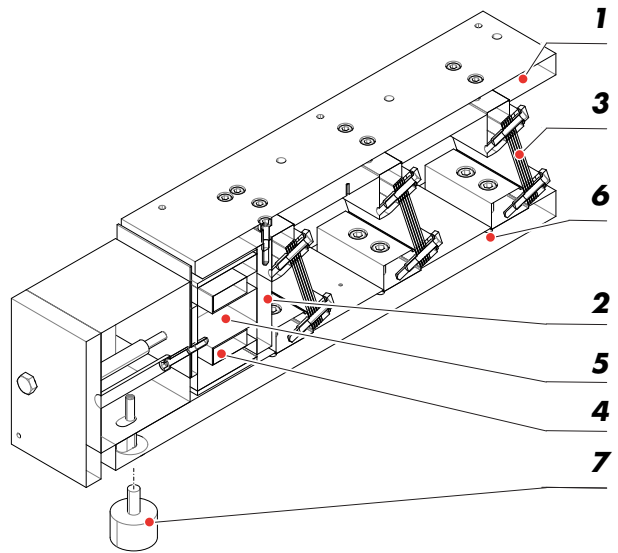
AL 80

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



AL 90

- 1. Rack
- 2. Armature
- 3. Leaf springs
- 4. Coil
- 5. Core
- 6. Base
- 7. Vibration-damping devices



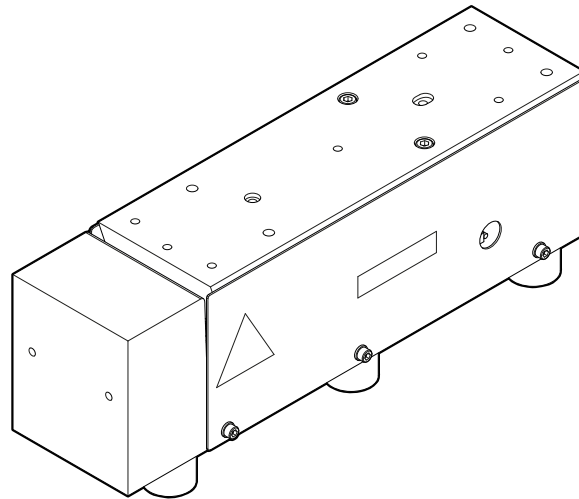
The overall dimensions, weights and consumption of each individual model are detailed on the official website of Brovind Vibratori S.p.A..

CHAPTER 4
OPERATING PRINCIPLE

4.1 OPERATION CYCLE _____ 34/64-4

4.1 Operating cycle

Assembly operation is subject to the general safety rules implemented in industrial machines. For simplicity, a specific model is taken as an example, however the customer is advised that the operating process is the same for all the models in the manual.



The linear vibrator must be installed under a sliding channel (optional supply) suitably designed for the transport of the product. Its sliding is allowed by the vibration of the vibrating masses supplied with the linear vibrator. An electromagnet generates a pulsating force which causes the leaf springs to bend momentarily. Between one pulse and another, the springs return to their original position. This last movement produces the feed of the material contained in the channel.

The unit can be sold combined with a Brovind control system capable of constantly reading the mains voltage that powers the vibrators, or the acceleration value by means of a specific probe. Consequently, as the mains voltage or the vibrating drive unit load varies, the power delivered to the vibrating drive unit is varied (increased or decreased) in order to keep the flow of the conveyed material constant.

CHAPTER 6

MAINTENANCE AND INSPECTIONS

6.1	GENERAL NOTES ON SAFETY REGULATIONS _____	36/64-6
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6.1 General remarks on safety rules



WARNING!

This chapter is for skilled staff only.

- a) The maintenance operations on equipment require no. 1 operator, with the following qualifications:
 - 1 Mechanical maintenance operator.
 - 1 Electrician (maintenance) technician
- b) **DO NOT ALTER** any parts of the assembly to fit in additional or different devices, without prior authorisation from the Manufacturer; the Manufacturer shall not be held liable for any unauthorised alterations.
- c) Activities described in this chapter must be **EXCLUSIVELY PERFORMED** by qualified staff, notably by:
 - TRAINED TECHNICIANS WHO HAVE FOLLOWED** specialising and training courses, and have experience in installing, starting and maintain the assembly.
 - They must be familiar with the regulations and rules on accident prevention.
- d) Should some defects jeopardise the operation safety, **THE ASSEMBLY MUST BE STOPPED IMMEDIATELY**.

6.2 General procedure

Follow the general procedure below before carrying out any maintenance operation:

- a) Disconnect the power supply
- b) Padlock the main switch located on the power panel in the closed position, the key must be kept by the head of maintenance, who shall not give it to anyone;
- c) Position the different mobile elements of the assembly as comfortably as possible for the planned maintenance. Perform maintenance or repair operations in accordance with the specifications in the respective description of this manual;
- d) Once all the operations have been completed, before putting the unit back into operation, make sure that:
 - 1. all work tools have been put away
 - 2. all movable parts have been secured;

6.3 Maintenance inspections and interventions

6.3.1 Type and frequency of maintenance checks and operations

A more frequent systematic verification of the operation and cleanliness of certain parts of the assembly among those most stressed, more subject to wear or dirt can prevent future operation faults and help keep the assembly at its highest level of output, thereby ensuring constant operation over time.

6.3.2 Maintenance

Maintenance is the series of scheduled operations to be executed regularly and periodically on assembly parts.

The **routine maintenance** consists in checking the operation and cleanliness of the various parts;

The **extraordinary maintenance** consists in fully replacing assembly parts or gears whose average lifespan is over in order to prevent breakdowns resulting in the assembly stoppage.

The following information is reported for every intervention of routine or extraordinary maintenance:

- the frequency calculated in operation hours;
- the operator authorised to perform the operation;
- the time averagely required and a detailed description of the intervention procedure.

The frequency reported for every intervention and the time required to execute it are merely informative, so that the maintenance interventions can be properly scheduled. Only after continuous maintenance service and its critical analysis can the real needs be determined in accordance with the main requirements of the company.

6.3.3 Cleaning the assembly

Periodical schedules cannot be given, since cleaning depends on how often the assembly is used, the conditions of processed product and accidental events.

6.3.3.1 External cleaning

The qualification required for the cleaning of the mere **external** parts of the assembly is the following: O1 (operator). For the cleaning of external parts a higher qualification is required.



CAUTION!

- Do not use solvents, such as alcohol, petrol, etc...
- Only use dry cloths or air solid streams.

6.3.4 Summary tables of routine maintenance

A regular maintenance, completed by an accurate cleaning and a daily inspection of the assembly, guarantees a safe, cost-effective use of it.

The following tables indicate the frequency at which it is appropriate to carry out control and maintenance; the values reported are indicative and referred to the following working conditions:

- 5 working days / week
- 8 hours / day
- Environment temperature: 20°C - U.R. 50%

Conditions that are different from these implicate the necessity to reconsider, consequently, the maintenance intervals.



Electrical maintenance engineer



Mechanical maintenance technician



Highly skilled maintenance technician



Unskilled operator



Visual check: check any damage, the conditions of high wear.



Hearing check: check for unusual noises.

Air gap: check the procedure on the sheet number MAN04



Tightening: check nuts and/or screws clamping, which retain the components.











Air gap: act through the adjustment screw/s to increase or decrease the distance between the core and the armature.



Adjusting: check the position of the component and restore the position if necessary; in case of air gap adjustment use a thickness gauge.



Cleaning: check the cleaning conditions of the components.

Action		1000 hours	3000 hours	6000 hours	In case of breakdown/wear when needed	Operator	Maintenance sheet
CLEANING							
External cleaning of the assembly	Clean if need be	X					
Internal cleaning the assembly	Clean if need be				X		PUL01
CHECKS							
Check tightenings	Visual inspection				X		CON01
REPLACEMENTS AND ADJUSTMENTS							
Replacing leaf springs	Breakage			X			MAN03
Adjusting air gap coil	To be performed after replacing the coil			X			MAN04
Calibrating vibrating base	Breakage			X			MAN05
Calibrating vibrating base <i>Models AL25, AL50, AL55</i>	Breakage			X			MAN05a
Replacing coil <i>Models AL25, AL50, AL55, AL65</i>	Breakage			X			MAN06
Replacing coil <i>Models AL15, AL30, AL35, AL 40, AL75, AL80, AL90</i>	Breakage			X			MAN06a
Wiring up the new coil	Breakage			X			MAN07

INTERNAL CLEANING THE ASSEMBLY

PULO1

FREQUENCY:	-	REQUIRED TIME:	30 minutes
QUALIFIED OPERATOR:		ACTIONS: <i>Visual inspection and cleaning through suitable equipment</i>	 

It is essential to periodically check the cleanliness of the assembly.

The external cleaning of the partly completed machine is intended to remove deposits of soil that usually form on surfaces.

The frequency of these checks/inspections depends on the use of the assembly, on the conditions of the processed product and on accidental events. It is therefore necessarily referred to for the evaluation of the end user.



CAUTION!

- Do not use solvents such as alcohol, petrol, etc.
- Only use dry cloths or solid streams of air at low pressure.

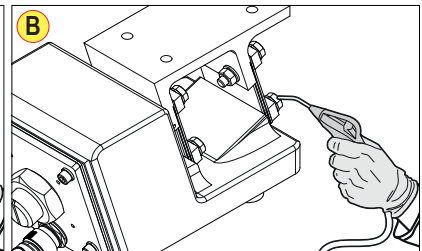
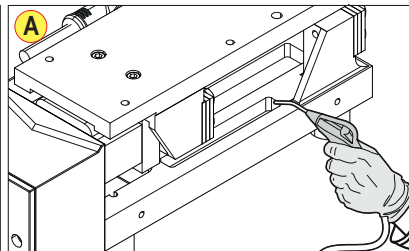
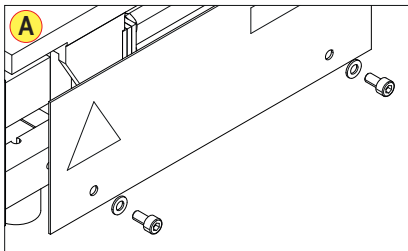


DANGER!

The use of pressures higher than 4 BAR is expressly prohibited as it can cause damage to internal components.

Depending on the model of vibrator supplied, it may be necessary to disassemble the protective casing using the fixing screws.

- vibrator model with side casing
- vibrator model without side casing



CAUTION!

In linear vibrator models equipped with side casing, the maintenance technician is required to reposition the side casing after cleaning.



CHECK TIGHTENINGS

CON01

FREQUENCY: - REQUIRED TIME: 30 minutes

QUALIFIED OPERATOR:



ACTIONS:
*Auditory check and parts
tightening*



If anomalous vibrations occur accompanied by metallic noise, it is necessary to stop the unit and check all the tightening of the various components.

Threading	Ø (mm)	Pitch (mm)	Friction coefficient	Torque (Nm)	
				Class 8.8	Class 10.9
M4	4	0.7	0100	2.5	3.5
			0125	2.9	4.0
			0140	3.1	4.3
M5	5	0.8	0100	4.9	6.9
			0125	5.6	8.0
			0140	6.0	8.5
M6	6	1.00	0100	8.5	11.9
			0125	9.8	13.8
			0140	10.4	14.6
M8	8	1.25	0100	20.4	28.7
			0125	23.6	33.5
			0140	52.1	35.3
M10	10	1.50	0100	40.2	56.6
			0125	46.5	65.0
			0140	49.5	69.6
M12	12	1.75	0100	68.9	96.8
			0125	79.5	112.0
			0140	84.5	119.3

REPLACING LEAF SPRINGS

MAN03

FREQUENCY:

-

REQUIRED TIME:

30 minutes

QUALIFIED OPERATOR:



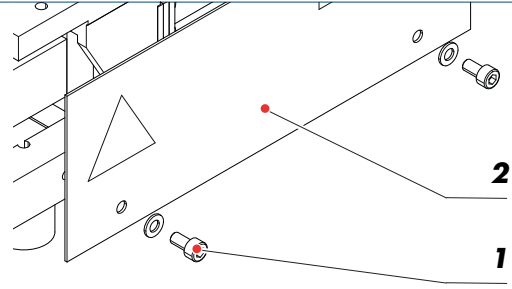
ACTIONS:

Visual inspection and replacement owing to breakage.
Disconnect the power before carrying out the maintenance action.



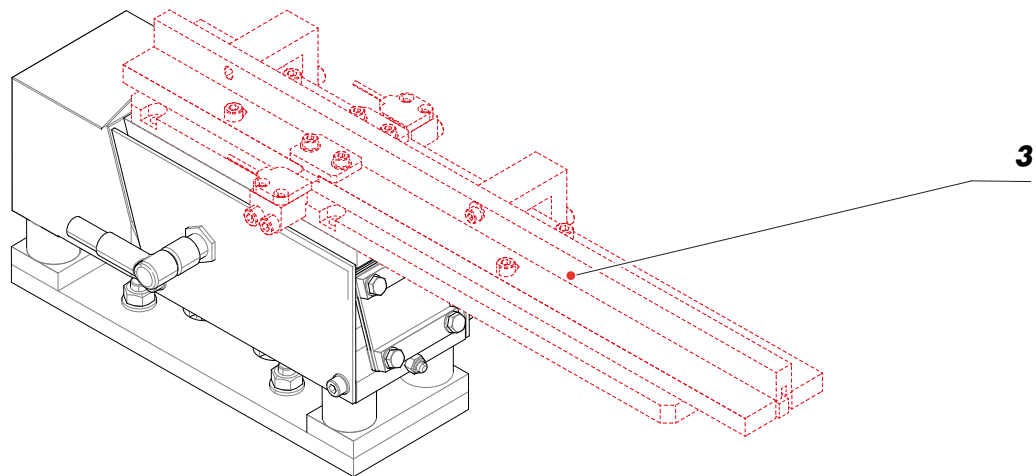
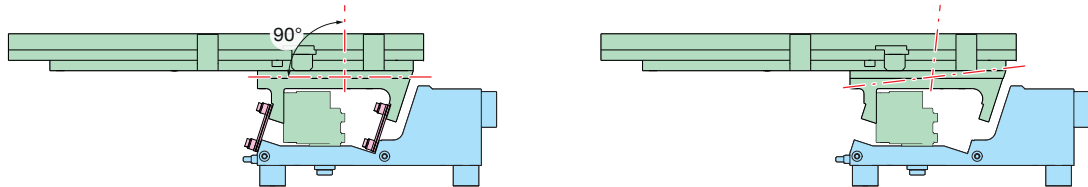
CAUTION!

In order to remove the springs it is necessary to remove the side casing in some models of linear vibrators. Remove the fixing screws (1) using a hexagonal or Allen key and remove the protective casing (2). After replacing the leaf springs, the maintenance technician must reposition the side casing.

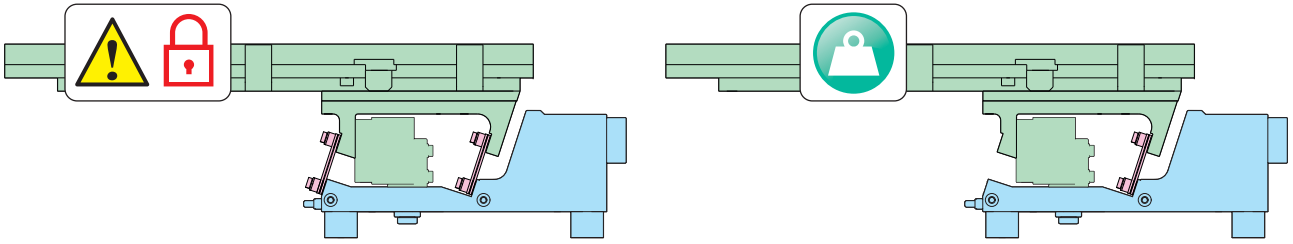


CAUTION!

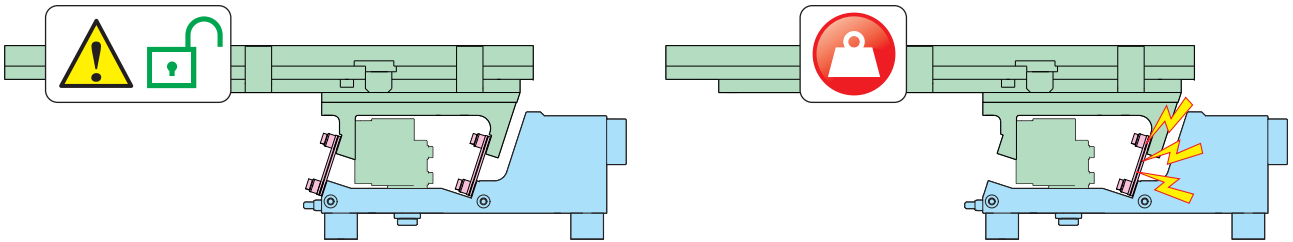
In order not to compromise the correct alignment of the vibrating unit, it is forbidden to replace both springs at the same time. Always proceed with the replacement and tightening of one assembly and then the other.



Before proceeding with the replacement of the springs it is necessary to lock the rack of the vibrating unit. In order to facilitate this activity, we recommend that the channel (3) installed above it be used.

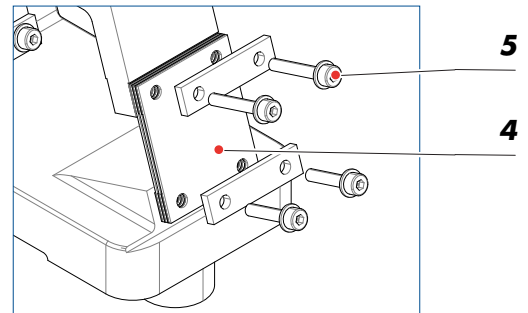


The locking allows to lighten the weight that weighs on the spring pack, and therefore to allow its replacement.



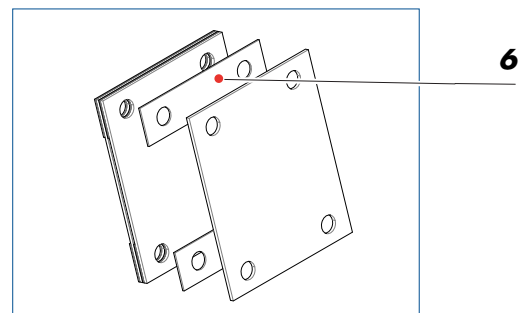
Leaving the channel and consequently the rack free, during the replacement of the spring assembly the weight will weigh on the springs still installed, also causing them to break.

To replace the springs (4) it is necessary to loosen the fixing screws (5) using a hexagonal or "Allen" key and replace them with original spare parts.



CAUTION!

When assembling the new reed valve package, the metal shim (6) must be inserted between each spring. This is not present in the spare kit, but it is necessary to recover it from the previously disassembled.



ADJUSTING AIR GAP COIL

MAN04

FREQUENCY:

-

REQUIRED TIME:

60 minutes

QUALIFIED OPERATOR:

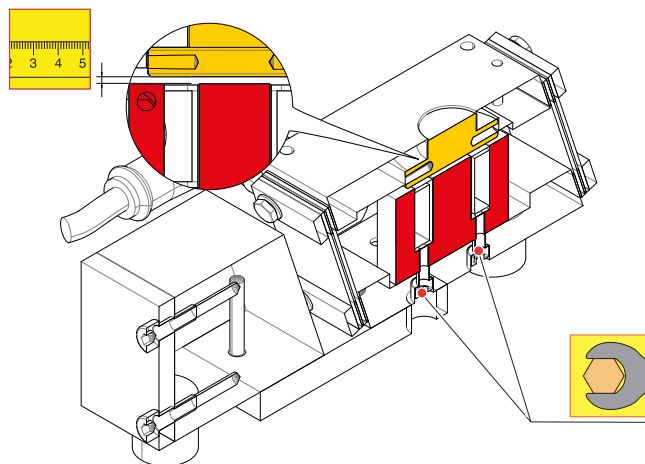


ACTIONS:

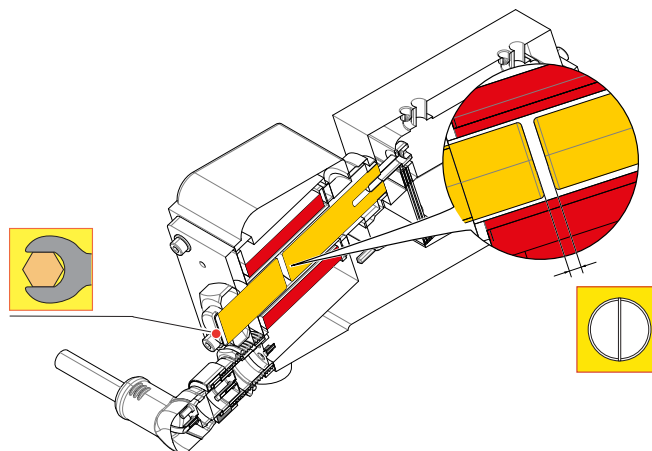
Visual and auditory control.
Disconnect the power before carrying out the maintenance action.



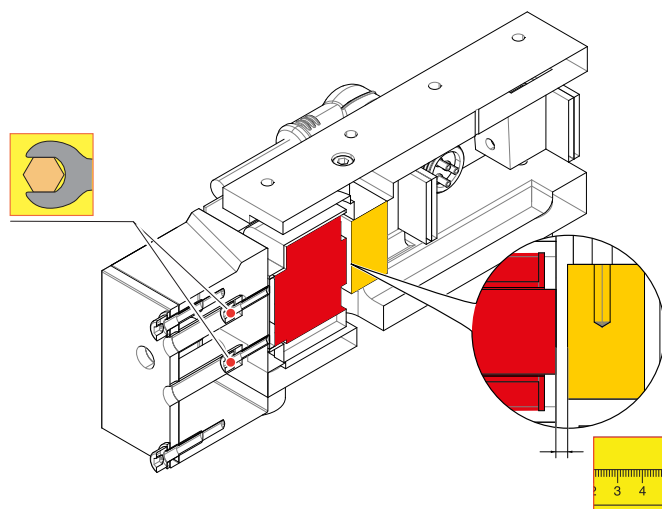
AL 15



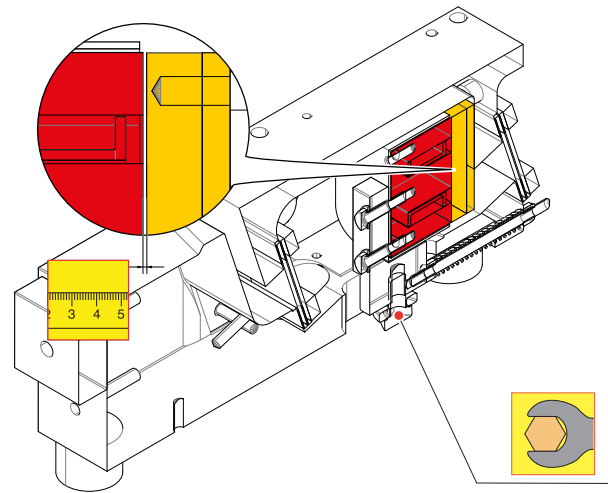
AL 25



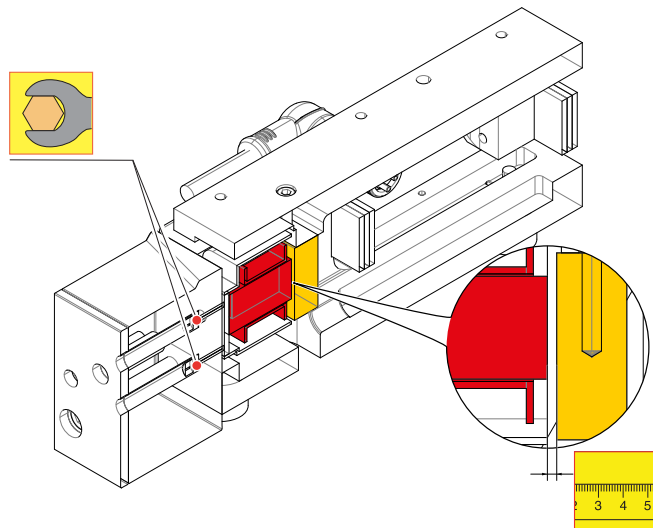
AL 30



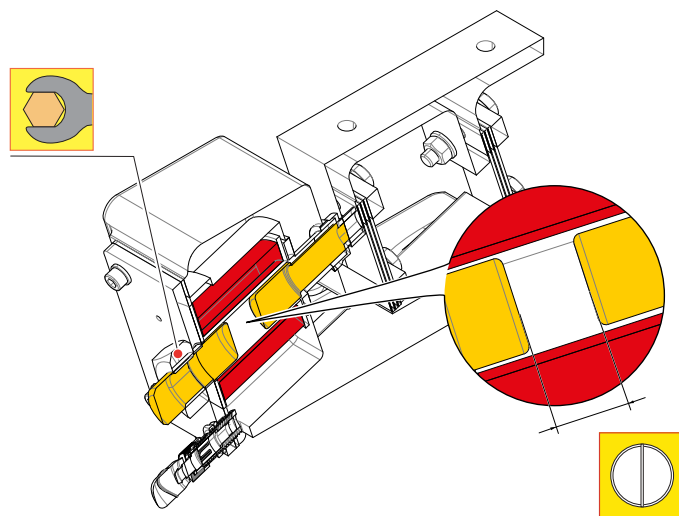
AL 35



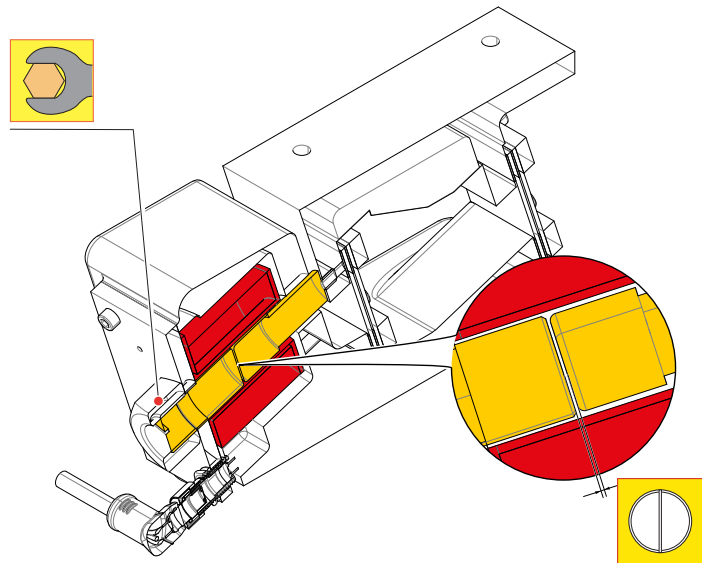
AL 40



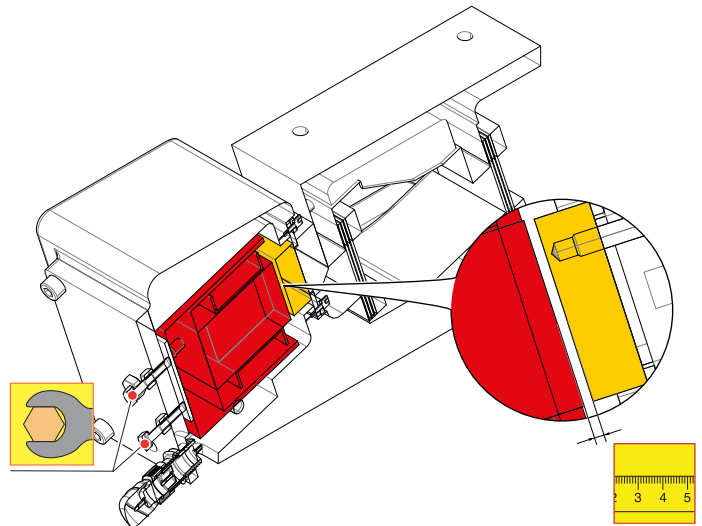
AL 50



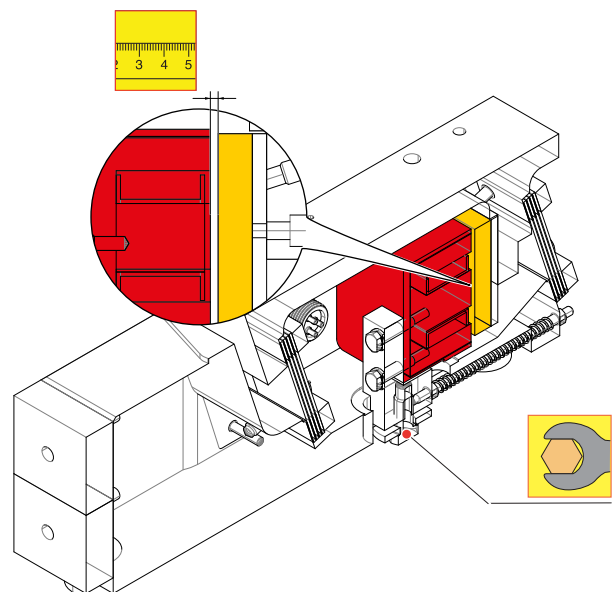
AL 55



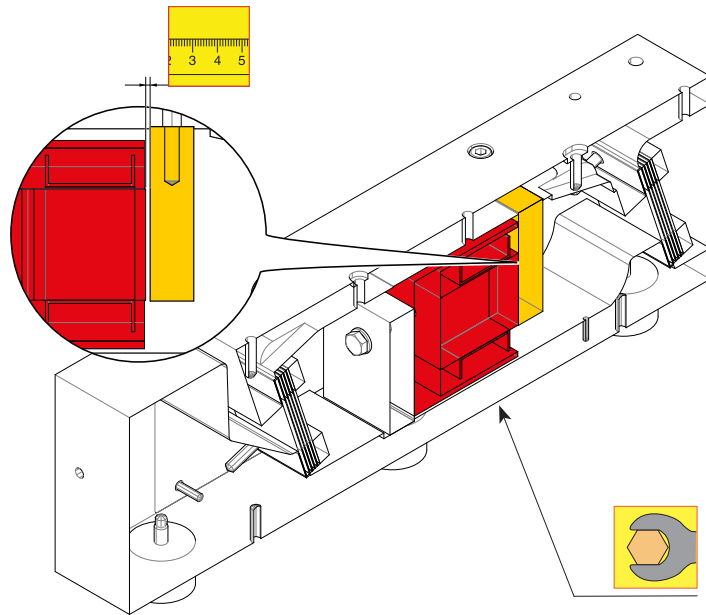
AL 65



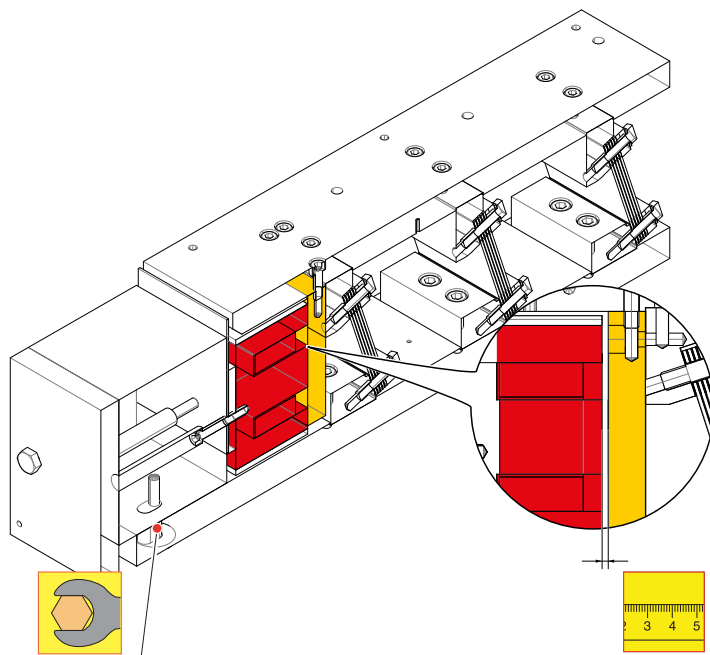
AL 75







AL 80



AL 90



By reducing the air gap you get the maximum performance of the appliance and the lowest consumption. If a loud metallic noise occurs with the potentiometer at maximum, it is necessary to increase the measurement of the air gap, until the noise stops.

FREQUENCY:	-	REQUIRED TIME:	30 minutes
QUALIFIED OPERATOR:		ACTIONS: <i>Visual and auditory inspection and replacement owing to breakage. Disconnect the power before carrying out the maintenance action.</i>	  

Our devices are carefully calibrated upon testing.

If it is still necessary to adjust the air gap or change the number of leaf springs, proceed as indicated below.

Air gap measurement variation

Refer to maintenance sheet no. MAN04

In order to change the size of the air gap, it is necessary to act on the adjustment screws of the core or armature.

By reducing the air gap you get the maximum performance of the appliance and the lowest consumption.

If a loud metallic noise occurs with the potentiometer at maximum, it is necessary to increase the measurement of the air gap, until the noise stops.

Calibrating springs

In order to establish the correct calibration of the leaf springs, the following procedure must be followed:





1. remove the casing;
2. activate the vibrator and calibrate the potentiometer in order to have an average "working speed";
3. slowly unscrew, by about half a turn, the lower fixing screw of a pack of springs and observe the progress of the pieces.

- a) If the speed of the material increases slightly, the vibrating base turns out to be calibrated.
- b) If the speed of the material increases significantly, a spring must be removed or the thickness of one of them reduced until condition "a)" is reached.
- c) If the speed decreases, or in any case no variation occurs, a spring must be added, or replaced with another one of greater thickness until condition "a)" is reached.

CALIBRATING VIBRATING BASE

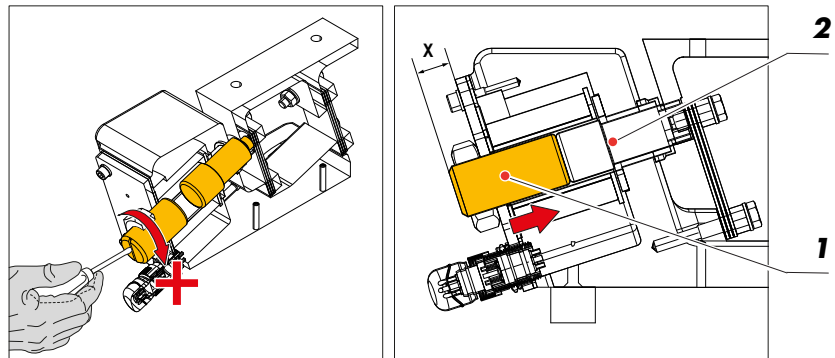
MAN05A

Only for models

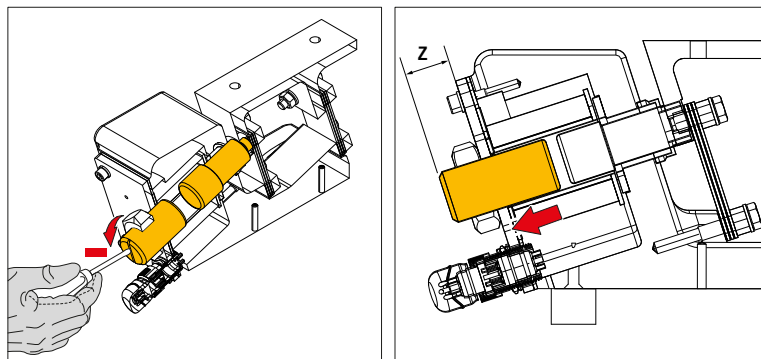
AL25	AL50	AL55
FREQUENCY:	-	REQUIRED TIME: 30 minutes
QUALIFIED OPERATOR:		ACTIONS: Visual and auditory inspection and replacement owing to breakage. Disconnect the power before carrying out the maintenance action.   

Our devices are carefully calibrated upon testing.
If it is still necessary to adjust the air gap, proceed as indicated below.

In order to adjust the size of the air gap, it is necessary to act on the core adjustment screw (1) by rotating clockwise until it touches the armature (2).



Using a gauge, measure the "x" dimension, and rotate counter-clockwise, moving the core away from the armature;



the "z" dimension, which must be obtained, must comply with the following table based on the model purchased.

AL25	X + 1.6 mm = Z
AL50	X + 2.5 mm = Z
AL55	X + 1.6 mm = Z

Through this action, a reduction of the air gap is obtained, obtaining the maximum efficiency of the appliance and the lowest consumption.

If a loud metallic noise occurs with the potentiometer at maximum, it is necessary to increase the measurement of the air gap, until the noise stops; make counterclockwise rotations one quarter turn at a time.

REPLACING COIL

MAN06

Only for models

AL25

AL50

AL55

AL65

FREQUENCY:

-

REQUIRED TIME:

30 minutes

QUALIFIED OPERATOR:

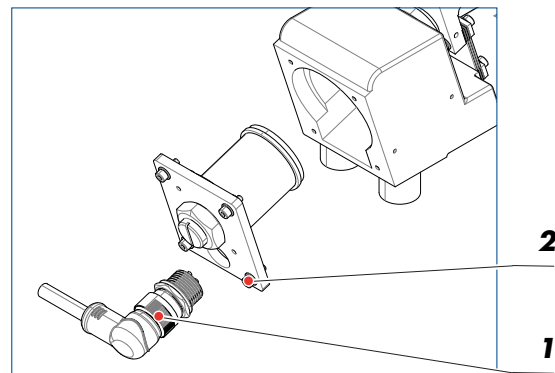


ACTIONS:

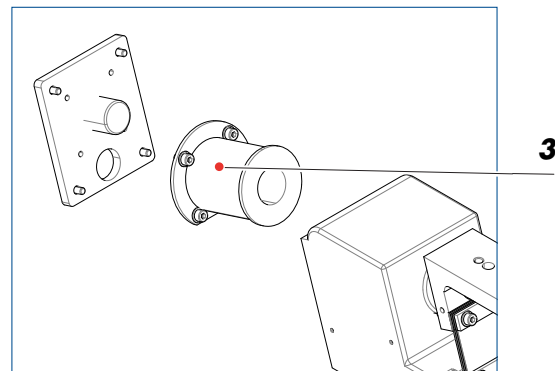
Visual inspection and replacement owing to breakage.
Disconnect the power before carrying out the maintenance action.



Disconnect the electric connector (1) and unscrew the fixing screws (2) of the casing.



Unscrew the coil fixing screws (3) and replace it.



CAUTION!

For the wiring of the new coil it is necessary to consult the MAN07 maintenance sheet

REPLACING COIL

MAN06a

Only for models

AL15

AL30

AL35

AL40

AL75

AL80

AL90

FREQUENCY:

-

REQUIRED TIME:

30 minutes

QUALIFIED OPERATOR:

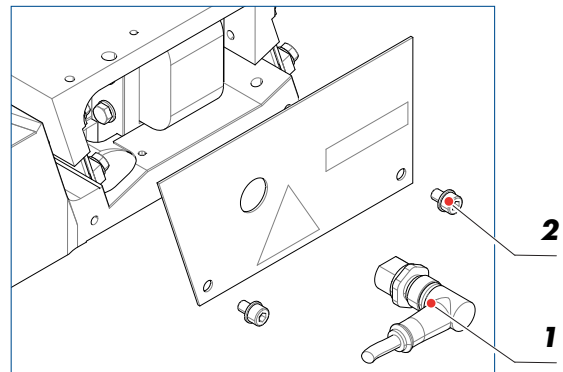


ACTIONS:

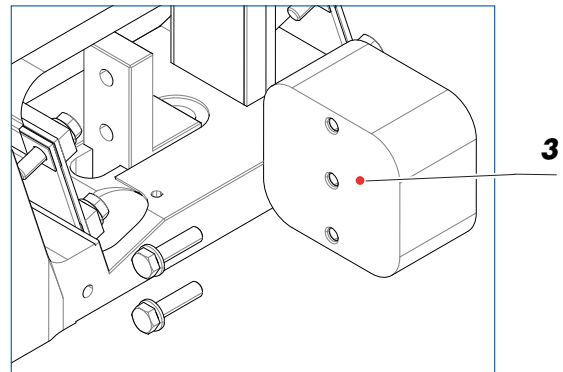
Visual inspection and replacement owing to breakage. Disconnect the power before carrying out the maintenance action.



Disconnect the electric connector (1) and unscrew the fixing screws (2) of the casing.



Unscrew the coil fixing screws (3) and replace it.



CAUTION!

For the wiring of the new coil it is necessary to consult the MAN07 maintenance sheet

WIRING UP THE NEW COIL

MAN07

FREQUENCY:

-

REQUIRED TIME:

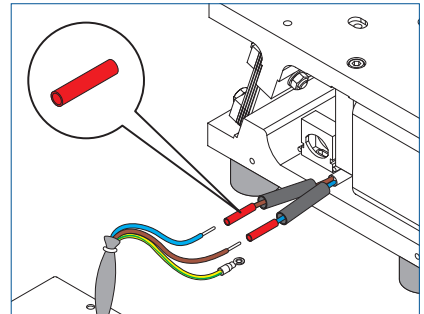
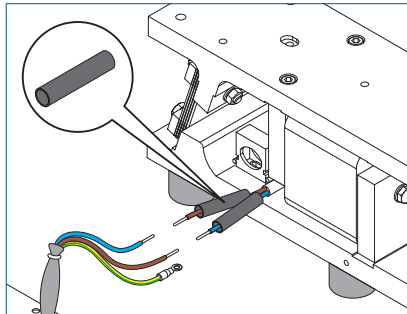
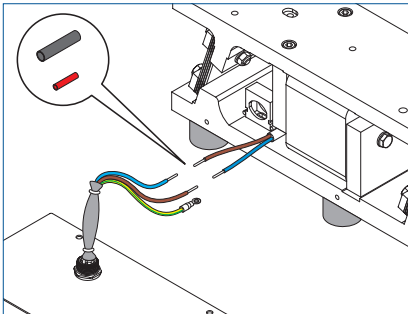
60 minutes

QUALIFIED OPERATOR:

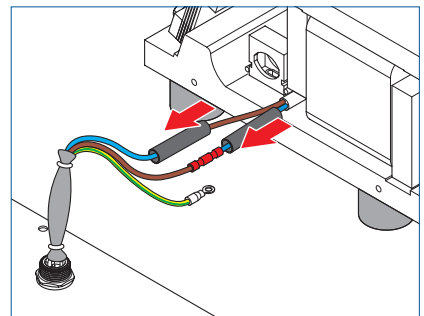
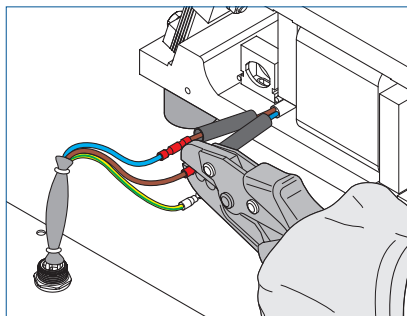
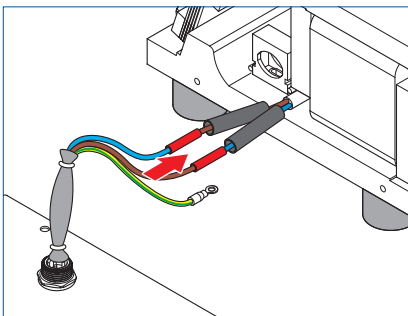


ACTIONS:

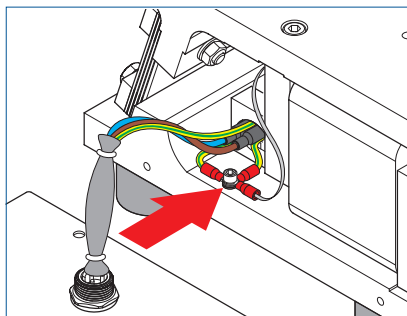
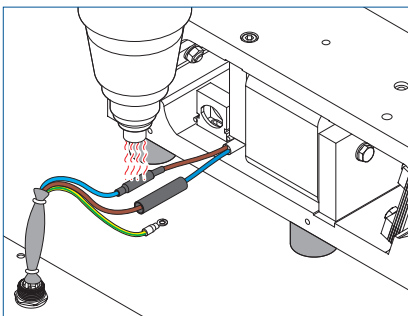
Replacement owing to break-age. Disconnect the power before carrying out the maintenance action.



Eliminate the external covering of the voltage cables, use a sheath of adequate size and insert it into the voltage cables; use a crimp coupling and insert the cables into the two ends of the coupling.



Crimp the coupling and make sure that the cables are tight, cover the wiring with the sheath and weld it.



Secure the two earth masses and lay the cables inside the cable tie, close the guard.



CAUTION!

In some models of linear vibrators, it is necessary to remove the side guard in order to replace the coil. At the end of the maintenance activity, the repositioning of the side guard is mandatory.



CHAPTER 7 REPAIRS AND DIAGNOSTICS

7.1	DIAGNOSTICS	54/64-4
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7.1 Diagnostics



WARNING!
THIS CHAPTER IS FOR SKILLED STAFF ONLY.

Unskilled operator: he/she carries out a troubleshooting intervention and, in case he/she is authorised, he/she eliminates the anomaly cause and resets the assembly correct operation. The electrical or mechanical maintenance technician: he/she intervenes at a later time, if the operator is unable to identify the cause of the problem or the restoration of correct operation involves the execution of operations for which he/she is not authorised.

We report below a general method of intervention, this is a guide to face in an organic and systematic way the anomalies and malfunctions that may occur during the operation of the assembly. As a matter of fact, a correct troubleshooting procedure improves the possibility of identifying the causes and reducing intervention delays.

It is very important for proper operation to use the assembly in accordance with what was agreed in the supply contract at the time of purchase.

Failure to comply with this requirement is the cause of most malfunctions.

In any case, if, after carrying out the steps indicated, it is not possible to restore correct operation of the unit, contact the After-Sales Service BROVIND VIBRATORI S.p.A.

If the vibrating linear drive cannot ensure the feed of pieces, check:

1. The presence of vibration

If there is no vibration, the fault is of an electrical nature and can be attributed to:

- | | |
|---------------------------------|--|
| a) Power outage | It is necessary to search for the interruption (cable cut, disconnected, etc.) and reset the circuit. |
| b) Coil burnt out | The burnt part must be replaced by requesting the original spare part to Brovind Vibratori S.p.A.. |
| c) Electronic controller faulty | Check the fuse inside the controller and replace it if need be. Otherwise replace the controller itself. |

2. The speed and uniformity of feed

If they are not adequate or constant, the fault can be of an electrical or mechanical nature and attributable to:

1. Breakage or loosening of a locking screw (fixing the vessel or springs).
2. Breakage of one or more leaf springs.

In both cases the appliance has a large area where the pieces move forward with difficulty or they even remain stationary.

It is necessary to replace the leaf spring (s) or broken screw with others that are perfectly identical.

Another cause of malfunction may be due to a slight yield strength of springs. In this case, as well as after replacing the coil or one or more broken springs, it is necessary to re-calibrate the vibrating base. In all these cases the parts must be replaced with original spare parts.

Brovind Vibratori S.p.A. shall not be held liable for damage to things or people caused by replacements not approved by the same.

3. The presence of a component stuck between the guides or the selective organs.

In that case the operator must:

1. switch off the appliance
2. Clear the affected area from the other components
3. Remove the jammed component taking care not to damage the guides or the selective organs.



Check if the jam is caused by the presence of a foreign body or by the loosening of the fasteners of a guide, a cover or a selector switch. In this case, secure it correctly.

4. The vibrator temperature exceeds the thresholds defined by the standard.

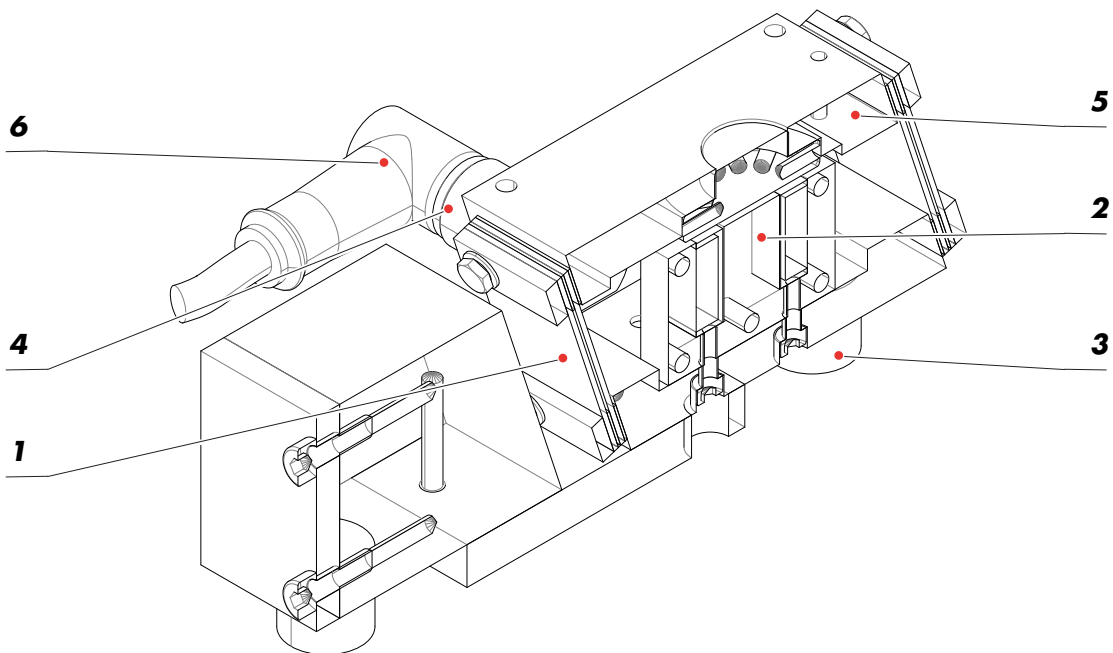
In that case the operator must:

1. Switch off the appliance
2. Check the power supply voltage, this must correspond to the rating plate data.
3. IT is necessary to calibrate the vibrator, refer to the maintenance sheets contained in the manual.

CHAPTER 8
SPARE PARTS

DESCRIPTION

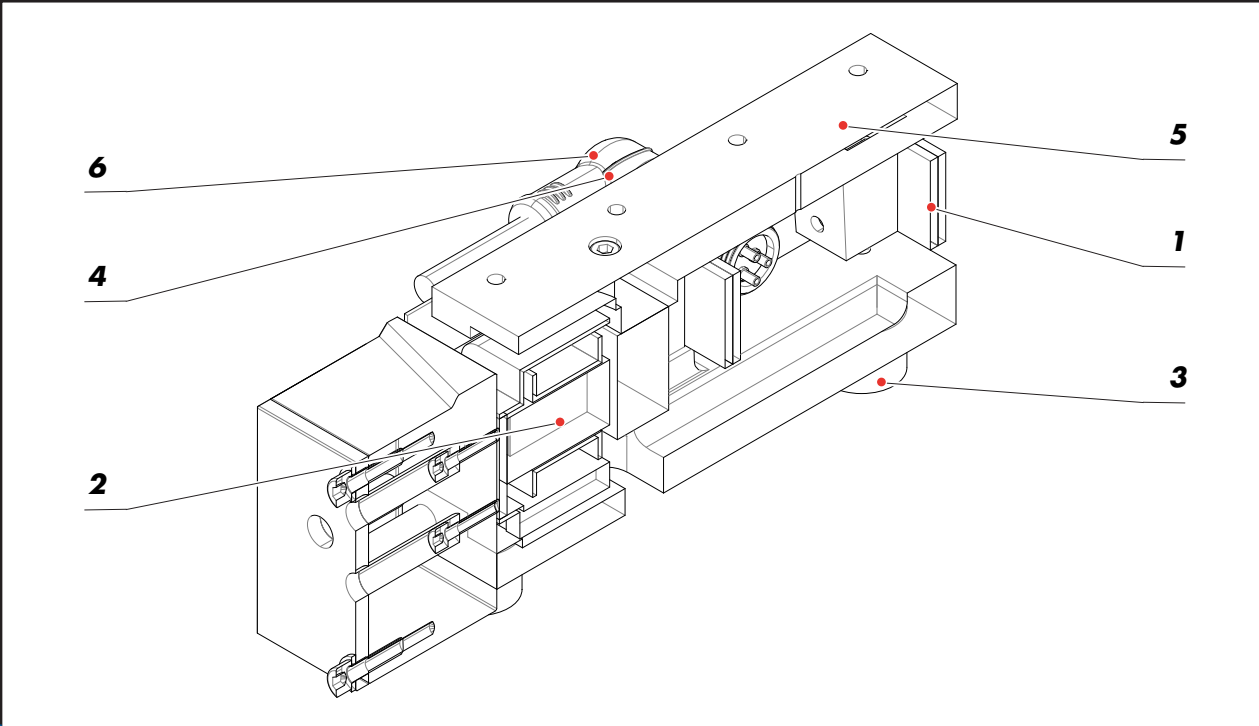
Linear vibrating drive AL 15



Pos.	Description
1	Leaf springs
2	Coil
3	Vibration-damping devices
4	Male connector
5	Rack
6	Female connector

DESCRIPTION

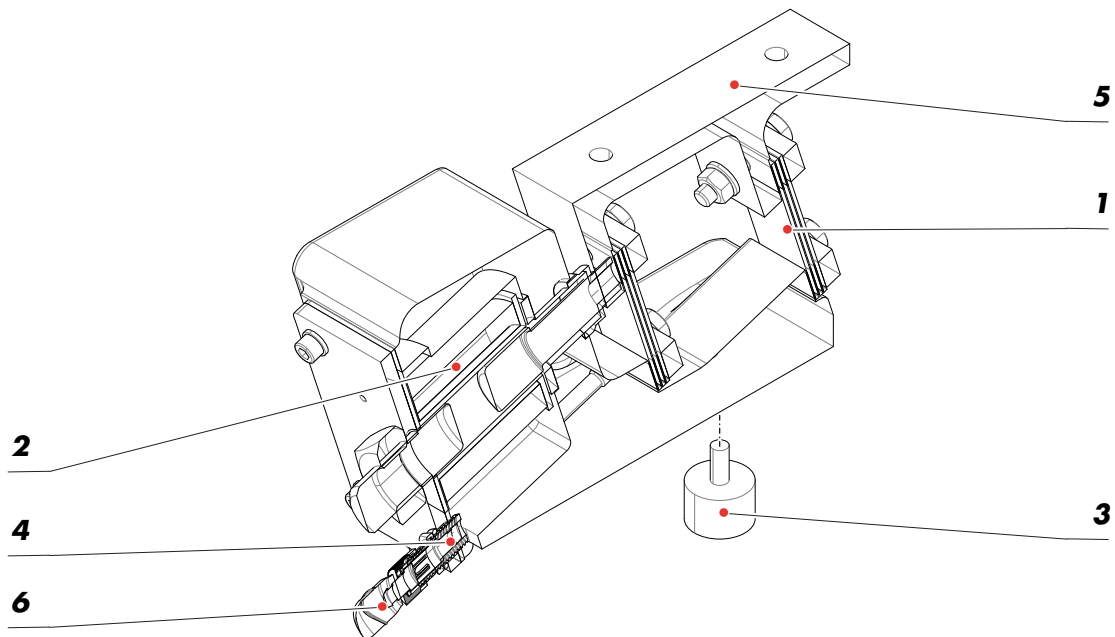
Linear vibrating drive AL 30 and AL 40



Pos.	Description
1	Leaf springs
2	Coil
3	Vibration-damping devices
4	Male connector
5	Bracket
6	Female connector

DESCRIPTION

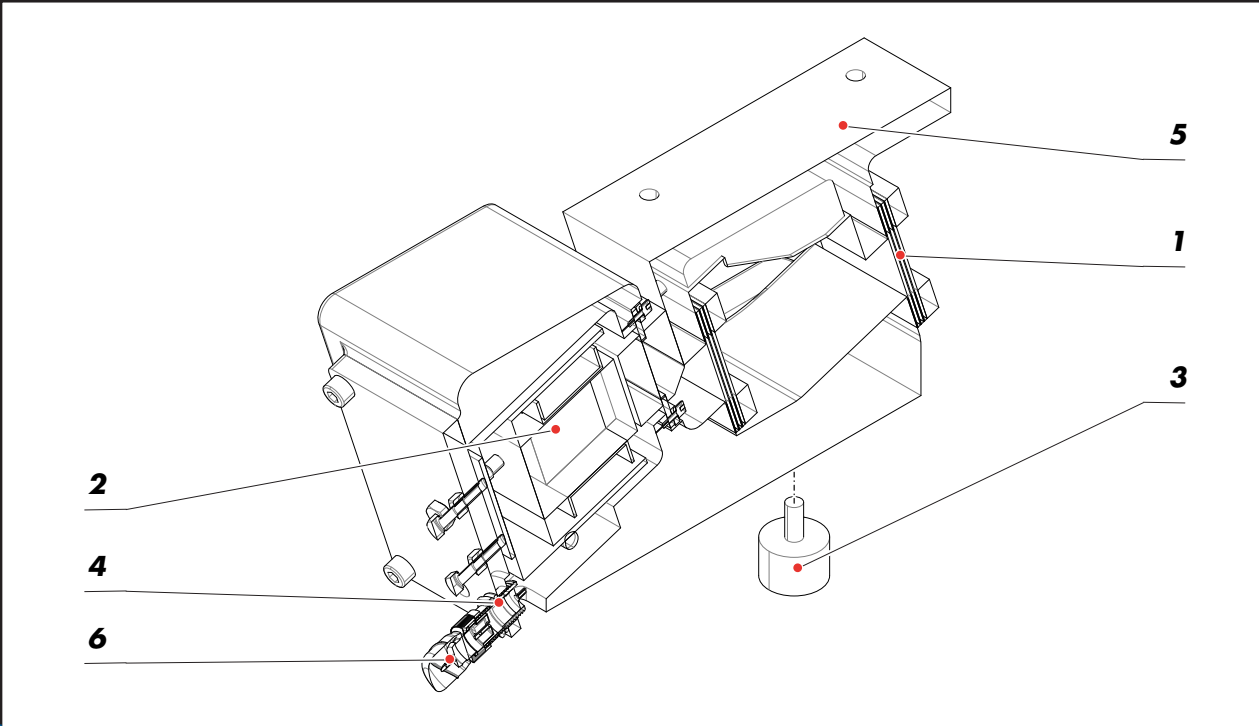
Linear vibrating drive AL 25, AL 50 and AL 55



Pos.	Description
1	Leaf springs
2	Coil
3	Vibration-damping devices
4	Male connector
5	Bracket
6	Female connector

DESCRIPTION

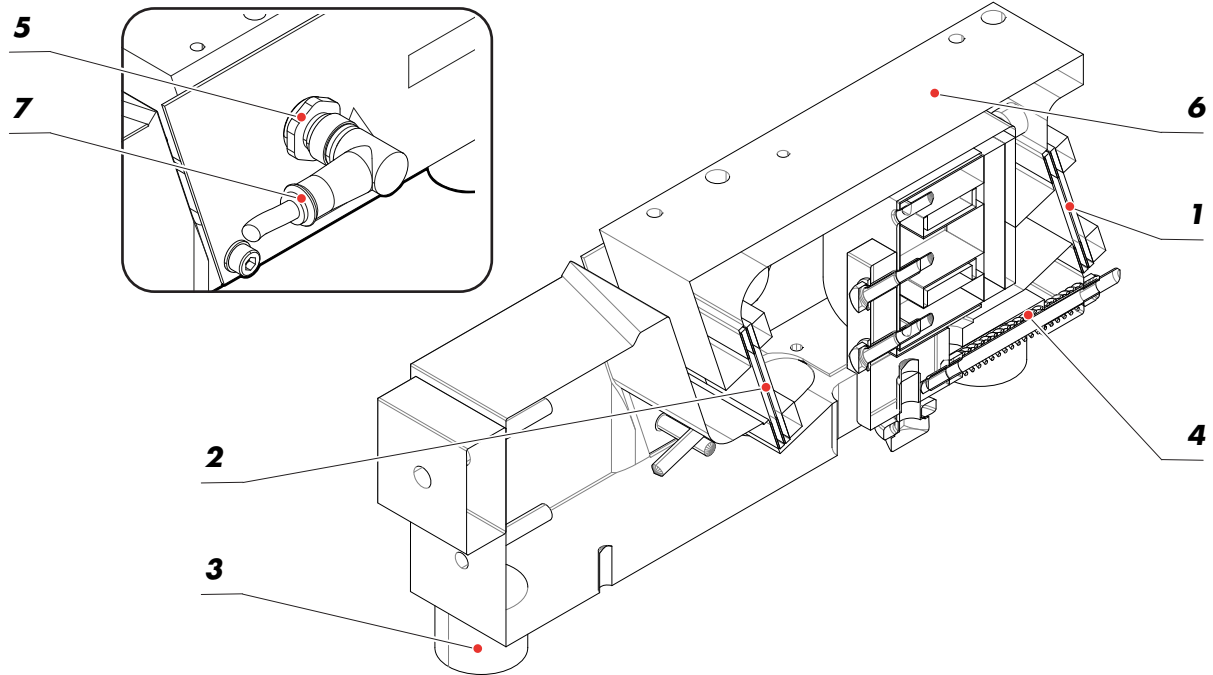
Linear vibrating drive AL 65



Pos.	Description
1	Leaf springs
2	Coil
3	Vibration-damping devices
4	Male connector
5	Bracket
6	Female connector

DESCRIPTION

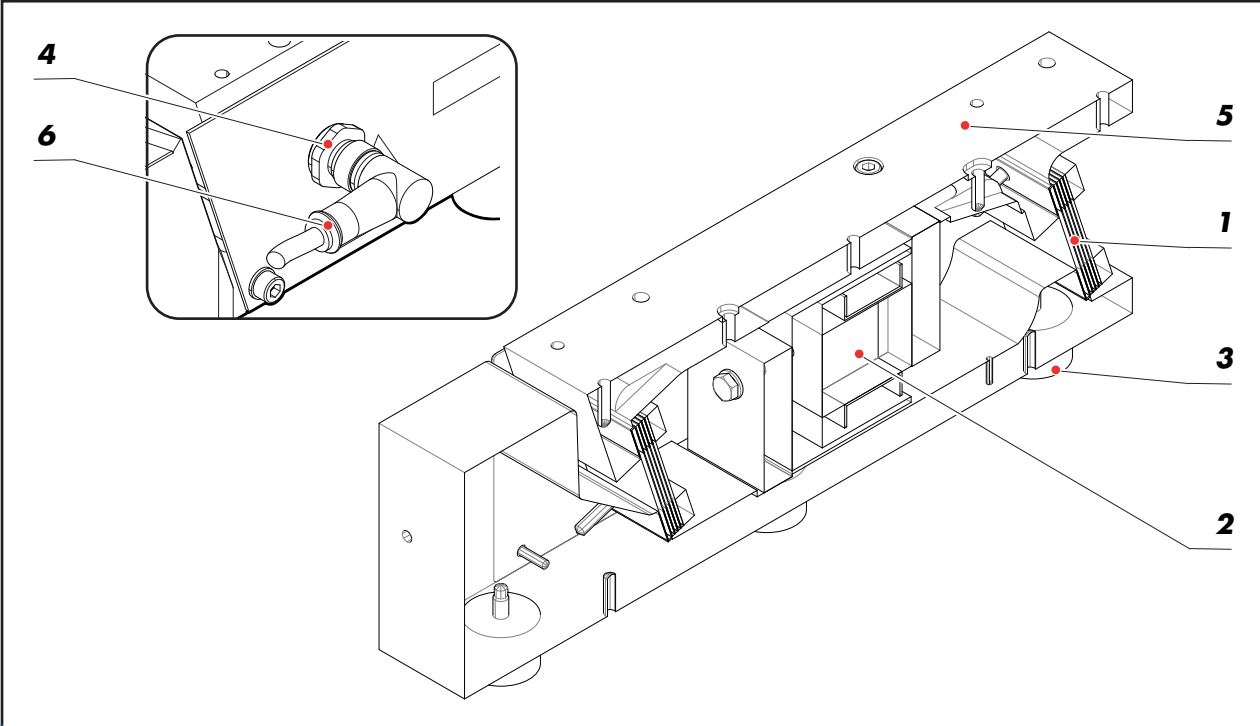
Linear vibrating drive AL 35, AL 75



Pos.	Description
1	Leaf springs
2	Coil
3	Vibration-damping devices
4	Spring
5	Male connector
6	Bracket
7	Female connector

DESCRIPTION

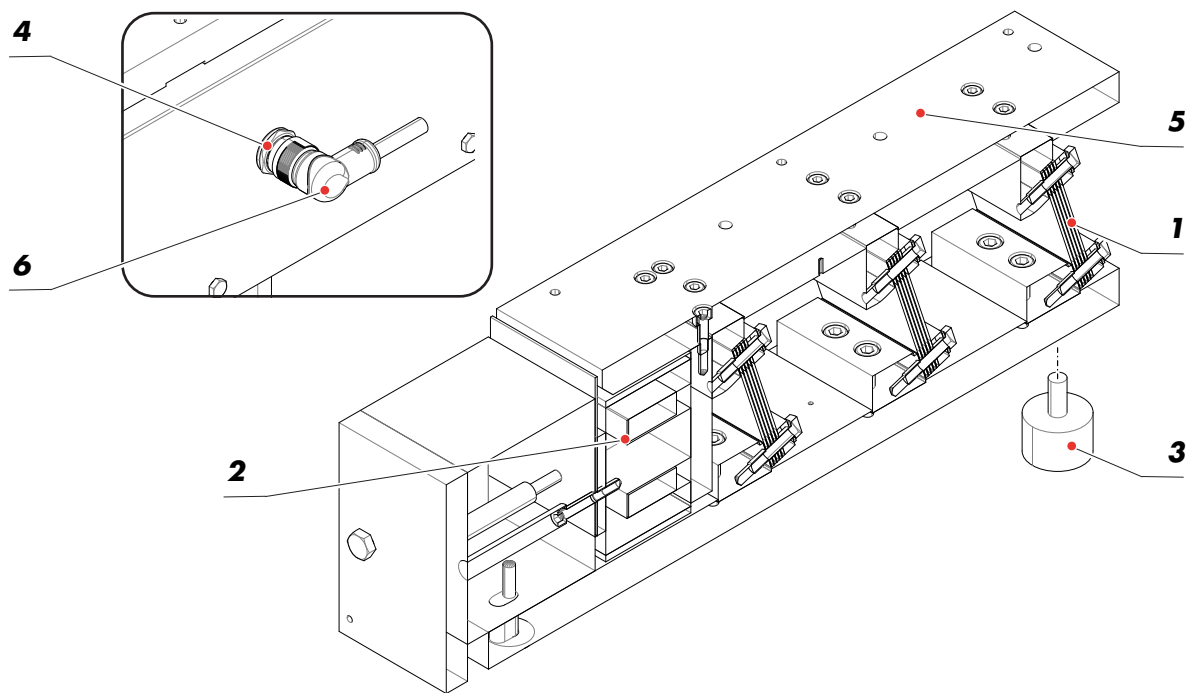
Linear vibrating drive AL 80



Pos.	Description
1	Leaf springs
2	Coil
3	Vibration-damping devices
4	Male connector
5	Bracket
6	Female connector

DESCRIPTION

Linear vibrating drive AL 90



Pos.	Description
1	Leaf springs
2	Coil
3	Vibration-damping devices
4	Male connector
5	Bracket
6	Female connector