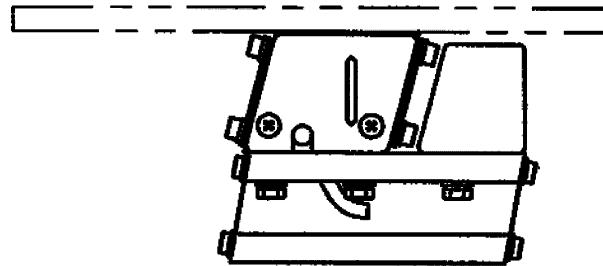


# NTN Instruction Manual

Read the Instruction Manual to the last before use, and operate the machine correctly.

## NTN Small Linear Feeder Type S05/S08



### Introduction

Thank you for your purchase of the NTN Linear Feeder.

For correct operation of the machine, read the Instruction Manual carefully before use, and ensure execution of safe work through correct operation.

Be sure to deliver this Instruction Manual to the end user. The end user is further requested to store the Instruction Manual carefully in a ready-to-take-out place to facilitate reference at any time after reading.

### 1. Before Use












- Upon receipt of the machine, check it for break and missing parts caused during transportation. If any problem is found, contact your local distributor.
- Be sure to remove packages of the machine and the transportation fixtures, if attached to the main body, before use.
- Be sure to use an NTN controller for the machine.  
If other controllers should be used, specified performances of the machine may not be exhibited.

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## 2. Precautions for Safety

This machine is designed and manufactured as a parts feeder based on the concept of trouble-freeness and labor saving. However, you are also highly responsible for safety as a user. Be sure to fully read this Instruction Manual before starting to operate the machine and strictly observe the safety precautions given below. Further, don't fail to comply with the instructions on the warning and cautions labels adhered to the main body of the machine.

 <b>WARNING</b>	<p>Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.</p>
 <b>CAUTION</b>	<p>Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury or property damage only.</p>
 <b>WARNING</b>	
	<p>The most hazardous points of the machine are electrical equipment. Be sure to connect grounding cables to them. Otherwise, electric shock may be caused.</p>
	<p>Never use the machine in atmosphere of explosive or flammable gas or where such gas leaks. Explosion or fire hazard may be caused.</p>
 <b>CAUTION</b>	
	<p>Do not use the machine at a place exposed to splash of water, outdoors, or place of extremely lower temperature or high temperature and high humidity. (For the operating environmental conditions, refer to the next page.)</p>
	<ul style="list-style-type: none"> <li>• This machine is heavy (for the mass, see specifications on in Paragraph 10). Transport the machine carefully with care to prevent drop after wearing safety shoes.</li> <li>• Fix the machine securely after installation.</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not conduct the installation and assembly work with bare hands.</li> <li>• Do not touch a chute provided with alignment mechanism with bare hands with attention paid to sharp edges. <u>Be sure to wear gloves.</u></li> </ul>
	<p>Do not use the machine on a base lacking in strength or at an unstable place. Otherwise, specified performances cannot be exhibited.</p>
	<p>Do not install the main body in inclination. Otherwise, specified performances cannot be exhibited.</p>
	<p>Please do not scratch, pull or forcibly bend the wiring. Moreover, when a heavy thing is put on it, or it is pinched, the wiring will damage. It causes a fire or an electric shock.</p>
	<p>When welding is intended to a chute, be sure to connect the grounding clip of the welding machine to the chute securely. Incomplete grounding for welding may cause the grounding cable connected from the main body to the controller to burn, leading to electric shock or current leak.</p>

## □ For correct use

- [1] The NTN linear feeder is a vibrating machine to linearly feed parts to a specified place by means of a chute manufactured to the shape of specified parts. Do not use the machine for other purposes of material testing and sieving.
- [2] Operate the NTN linear feeder in conformance with instructions in this Instruction Manual and manuals enclosed in the package. For technical specifications, refer to specifications in Paragraph 10.
- [3] Be sure to use NTN controller for NTN linear feeder. Also, use a controller and power supply compatible with this machine.
- [4] The noise level varies with the specifications of the machine and materials of parts to be fed. If the noise level should exceed the allowable limit value, take measures to reduce the noise level by fitting a sound insulating cover.

**(Note 1)** Do not use the machine when it is in incomplete state (such as unusual noise, abnormal vibration and missing parts).

**(Note 2)** Parts other than specified parts cannot be fed when the chute is provided with the feed mechanism to feed the specified parts.

**(Note 3)** Operating environmental conditions

Operating ambient temperature	0 to 40°C
Operating ambient humidity	30 to 90% (No dew condensation is allowed.)
Operating altitude	1000 m max.
Transportation shelf temperature	-10 to 50°C
Atmosphere of operating place	No splash of water and chemicals are allowed. No combustible gas and corrosive gas are permitted. To be used indoors.

## □ User observance items

- [1] Conduct all works including operation, maintenance and repair in accordance with the instructions in this Instruction Manual and other manuals.
- [2] Avoid use of the NTN linear feeder in such a manner as to spoil safety of the machine. If any sign of change likely to spoil safety, inform NTN of the details of the sign.

**(Note)** Have the NTN linear feeder installed, operated, maintained and repaired by professional engineers.  
Further, make it a rule not to allow persons other than related persons to operate the machine.

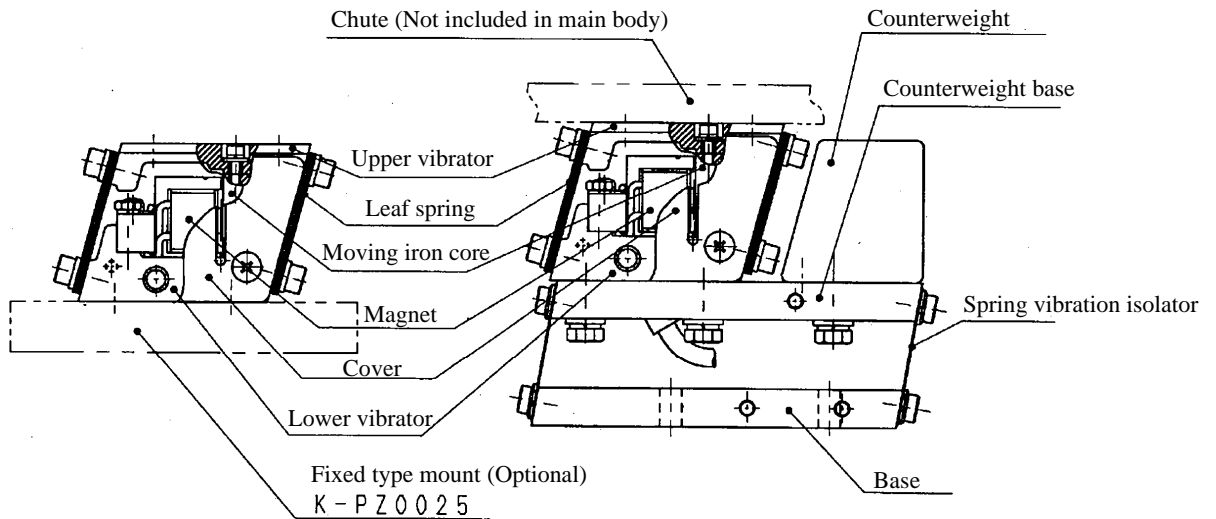
### 3. Operating Principle

The chute installed on the upper vibrator is connected to the lower vibrator by means of the leaf spring provided at a certain angle, and they are vibrated with a magnet, so that works on the chute are thrown upward aslant, resulting in little-by-little advancement of the works.

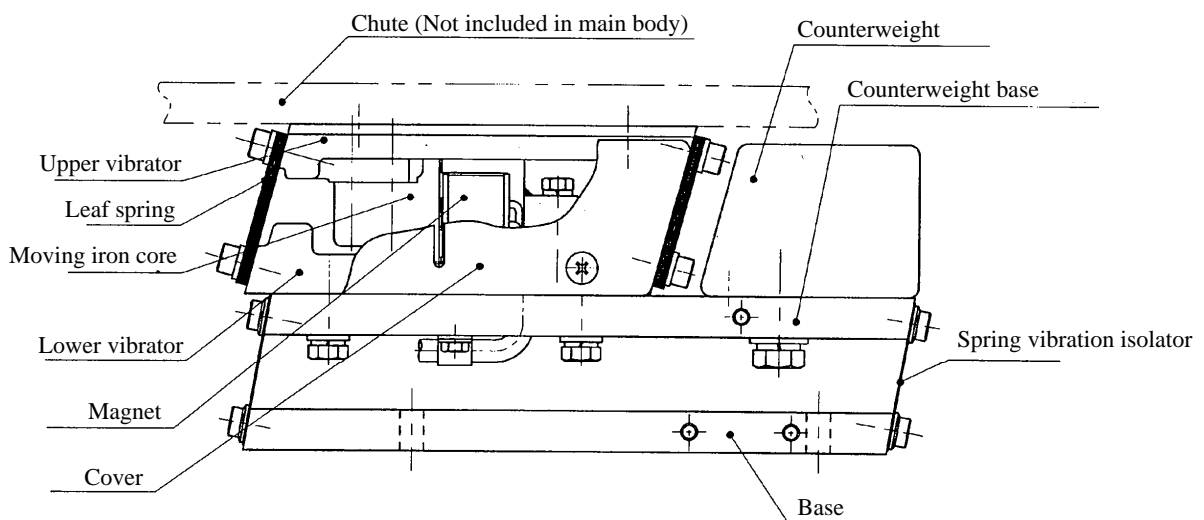
Large vibration can be generated with small oscillating force, since resonance is made to the suction frequency of the magnet with strength of the leaf spring set properly to the mass of the chute.

### 4. Names of Main Component Parts

S05



S08



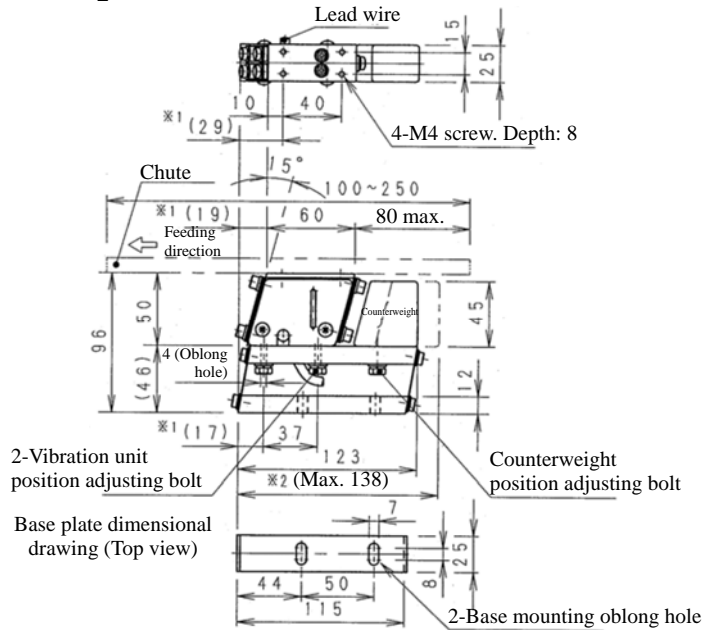
## 5. Dimensional Drawing



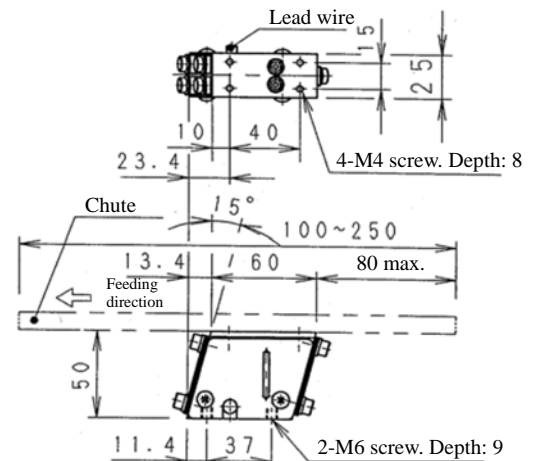
### CAUTION

In mounting a chute, be careful of the bolt length. Ensure that the threaded area length protruding from the chute bottom face does not exceed the depth of the screw for chute mounting shown below. If bolts longer than specified should be used, the drive unit will be damaged, so that the machine is put in condition not to fully fulfill its functions.

### K-S051<sub>2</sub><sup>1</sup> (Vibration-proof type)



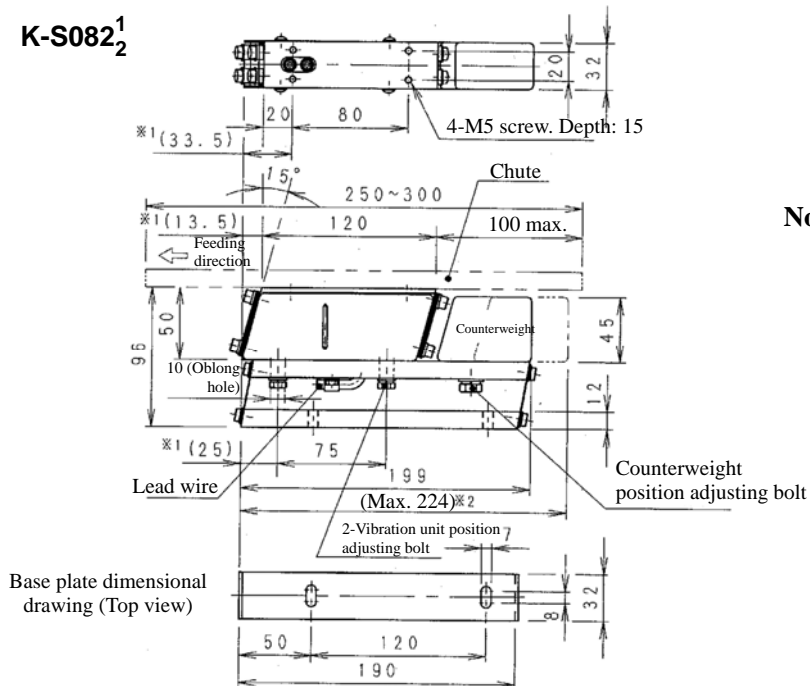
### K-S051A<sub>2</sub><sup>1</sup> (Fixed type)



\*1: Dimensions marked with \*1 can be adjusted forward/backward by approx.  $\pm 2$  mm with "2-Vibration unit position adjusting bolt".

\*2: Dimension marked with \*2 can be adjusted with "Counterweight position adjusting bolt".

### K-S082<sub>2</sub><sup>1</sup>



**Note)** At the occasion of manufacture of the chute, strictly observe the allowable dimensions specified above and the mass specified in Paragraph 10 "Specifications". In addition, make the chute as light as possible within the range not to reduce the rigidity of the chute.

\*1: Dimensions marked with \*1 can be adjusted forward/backward by approx.  $\pm 2$  mm with "2-Vibration unit position adjusting bolt".

\*2: Dimension marked with \*2 can be adjusted with "Counterweight position adjusting bolt".

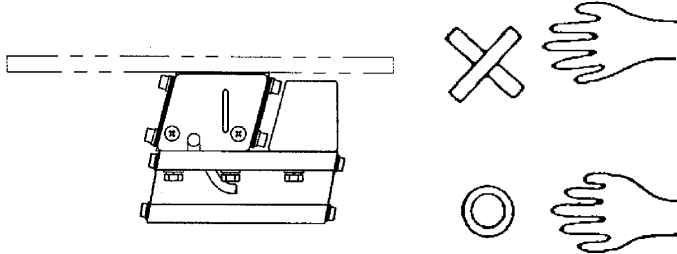
## 6. Transportation and Installation



### CAUTION

The machine is heavy. Transport the machine carefully with care not to cause drop.

### (1) Transportation



If the machine is transported while holding the chute, the chute or leaf spring may be deformed. Be sure to hold the base or the main body.

### □ Precautions for transportation

The machine is heavy. When transporting it, conduct the work carefully with care not to allow drop. For the mass of the main body (adding the mass of chute if attached), refer to Paragraph 10 "Specifications".

### (2) Installation

Fix the base with bolts securely. In the case of the fixed type of S05, mount the base on an iron plate of at least 10 mm in thickness, since vibration-proofing function is not provided.

An advisable mounting method is that vibrations are hardly felt when you touch the base during operation.

**Note)** Do not allow the base to lose hold as a result of use of undersize bolts. Do not mount the base on a thin iron plate of less than 10 mm. Do not mount it at an extremely high position.

### □ Precautions for installation

- [1] Assemble and set the machine with sufficient care not to cause deformation of the chute and the spring vibration isolator.
- [2] Wear safety gloves so that you may not touch sharp edges of the chute with naked hands.
- [3] Do not use the machine on a base lacking in strength or at an unstable place.
- [4] Do not fix the machine with the vibrating portion (other than the base) of the machine coming into contact with anything else.
- [5] If the machine should be installed in inclination, specified performance cannot be exhibited. Be sure to check the level of the installed machine.
- [6] When execution of welding work or grinding work is intended in the vicinity of the linear feeder, fit a protective cover to the entire linear feeder. Otherwise, iron powder and others may infiltrate to spoil performance of the machine.

## 7. Wiring and Operating Methods



### WARNING

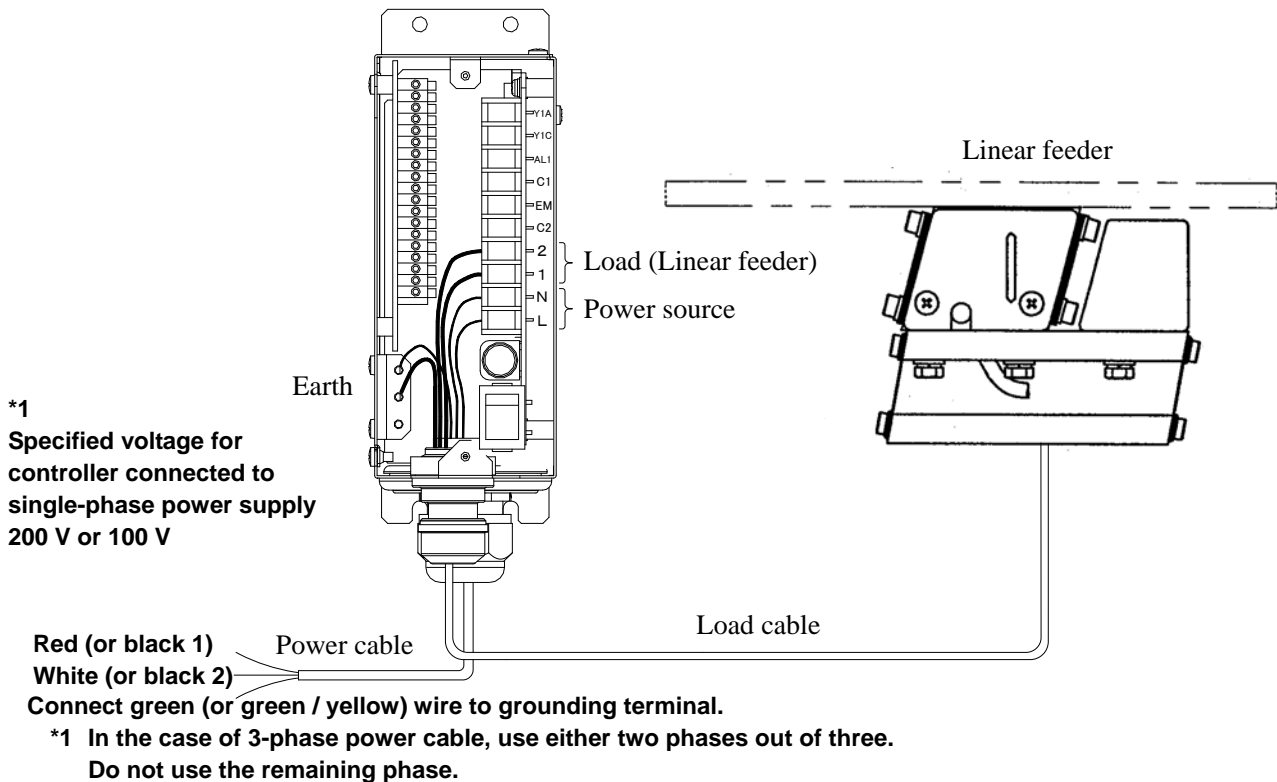
Ensure that the supply voltage is as specified on the machine nameplate (seal bearing the type, power supply and manufacturer's serial No.) attached to the vibrator body.



### CAUTION

As to settings for controllers such as controllers with selector switches (full wave/half wave, 50/60 Hz, 100 V/200 V, etc.) and frequency variable controllers with F-V curve setting function, adjust the settings to specifications of the main body and power conditions. Wrong settings may cause troubles such as burning of the magnet. For settings of the selector switches, F-V curve and others, refer to the Instruction Manual of the controller.

Controller (Example: K-ECF25)



- (1) Remove the transportation fixture fixing the chute and the linear feeder, if any.
- (2) Connect the power supply. (For detailed wiring connection method, refer to the Instruction Manual of the controller.)
- (3) Turn the speed adjusting knob on the controller counterclockwise to adjust the pointer position to the scale of "0".  
(Check that the linear feeder is not in touch with anything located in its vicinity but in free state.)
- (4) Turn ON the POWER switch of the controller. (Confirm lighting of LED on the operation panel.)
- (5) Slowly turn the speed adjusting knob clockwise to set the pointer position to the scale of the speed corresponding to the feeding capacity. Operate the machine at amplitude lower than the maximum allowable amplitude of leaf spring specified in Paragraph 8 to prevent break of the leaf spring.

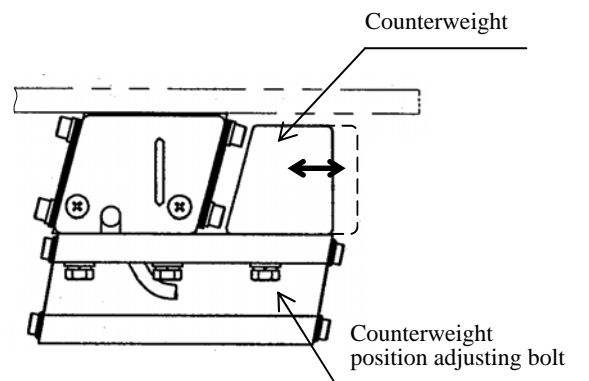
- (Note 1)** When it is intended to assemble the machine with other device, do not turn ON/OFF the linear feeder on the primary side of the controller but use an external control input terminal.
- (Note 2)** The power connection work shall be executed by persons in charge of electrical engineering. Where modification or change of wiring connections is intended, conduct the work while referring to the Instruction Manual of the controller.
- (Note 3)** When a chute that matches with the shape of specified parts is installed, and indication mark is found around the controller speed adjusting knob, set the adjusting knob at corresponding position in use.
- (Note 4)** When it is intended to extend the load cable of the machine by your company, use a cable of 2.5 mm<sup>2</sup> min. in diameter and 10 m max. in length. Further, conduct a protective continuity test to make sure that the machine is grounded appropriately.
- (Note 5)** For detailed operation of the controller to be used, refer to the Instruction Manual of the controller.

## 8. Inspection and Adjustment

### (1) Adjustment of counterweight

If the parts feeding speed is uneven on the front and back on the chute, move the counterweight back and forth for adjusting.

(Note) Tighten the counterweight position adjusting bolt securely. Also make sure that the sphere of movement of the counterweight is shown in item 5 Dimension Drawing on page 5.



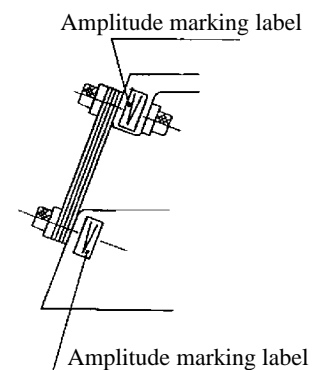
### (2) Inspection and adjustment of leaf spring

#### [1] Maximum allowable amplitude of leaf spring

Operate the machine at amplitude lower than the value shown in the following table to prevent break of the leaf spring.

If the machine should be operated at higher amplitude, the leaf spring may break at an early date. For measurement of amplitude, attach the amplitude marking labels provided as shown below, and be sure to total the readings of the upper and lower amplitude marking sheets.

Type/size	Leaf spring Part No.	Amplitude <<Upper + Lower>>
S05	K-PLS2-35×5	0.7 mm
S08	K-PLS2-35×5	0.7 mm



**(Note)** When NTN specifies a recommended speed, set the speed adjusting knob of controller at a corresponding recommended graduation.



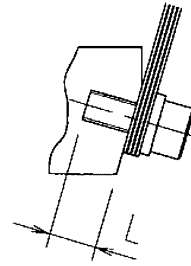
**[2] Precautions for attachment/detachment of leaf spring**

When attaching/detaching the leaf spring, be sure to attach/detach the leaf spring in one leaf spring unit and then proceed to the next unit. Do not loosen all units at one time.

- a) The required bolt bite depth (Dimension L includes bite depth on the upper vibrator side) shall be 1.5 to 2.1 times as much as the screw diameter (As to S05 and S08, the bolt bite depth shall be 7.5 to 10.5 mm, since M5 screws are used). Change the bolt length according to increase or decrease in the number of leaf springs. Tighten the bolts to the torque specified in the following table.

**(Note)** As to S05, strictly observe the bolt bite depth specified above, since interference may take place with the moving iron core or the magnet when the bolt bite depth is 11 mm min.

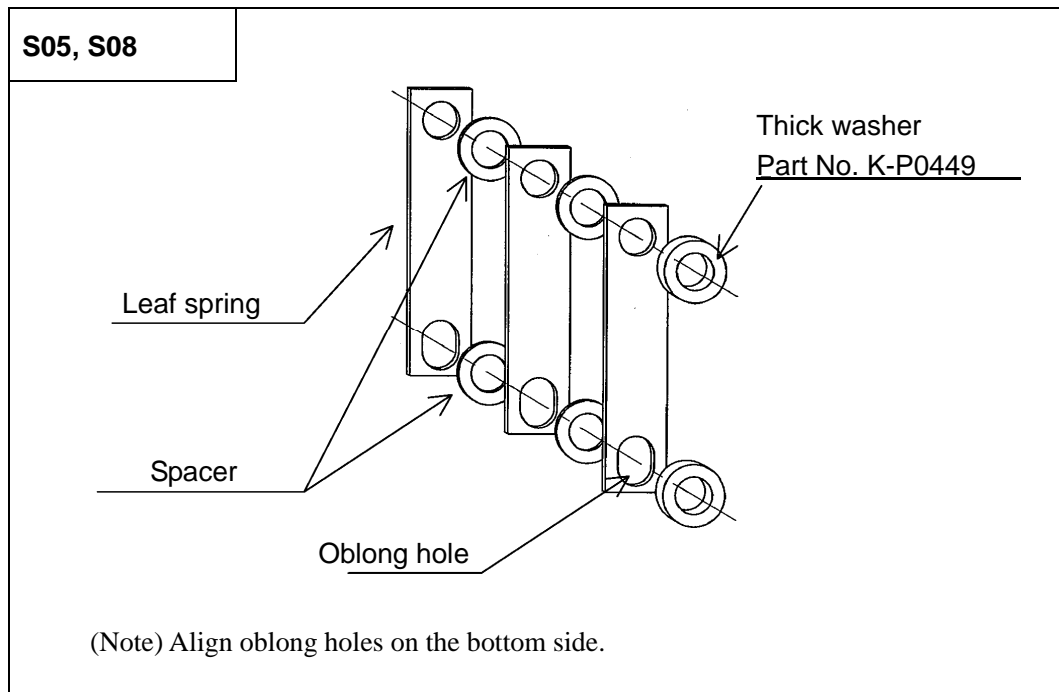
Type/size	Bolt used	Tightening torque
S05	Hexagon socket head cap screw M5 (Strength division: 10.9 or higher)	Approx. 8.8 N·m (90 kgf·cm)
S08	Hexagon socket head cap screw M5 (Strength division: 10.9 or higher)	Approx. 8.8 N·m (90 kgf·cm)



- b) Assemble leaf springs after applying grease or rust preventive oil to the areas between leaf springs (between leaf spring and spacer).

**(Note 1)** Do not allow dust, chips and others to be caught between leaf springs.

**(Note 2)** Assemble leaf springs with the end faces aligned as shown below.



### [3] Retightening

Check the leaf spring mounting bolts to retighten them after actual operating time of 40 hours.

When the bolts are tightened normally, there hardly is the additional tightening allowance. But, consider this requirement as retightening to cope with comfortable fitting of the leaf springs.

### [4] Correction of set in fatigue

When the machine comes to be operated with the speed adjusting knob set to the MAX. position at all times, add 1 or 2 pieces of leaf springs to a leaf spring unit located at any one place.

Even if leaf spring mounting bolts are tightened normally, the amplitude may reduce slightly after operation of the machine for 40 to 100 hours due to reduction of the spring constant of the leaf spring itself resulting from repetitive stress caused by vibrations.

### [5] Change of leaf spring

A 100% change of leaf springs is recommended with the guideline of 1-year operation on the basis of operations of 8 hours a day.

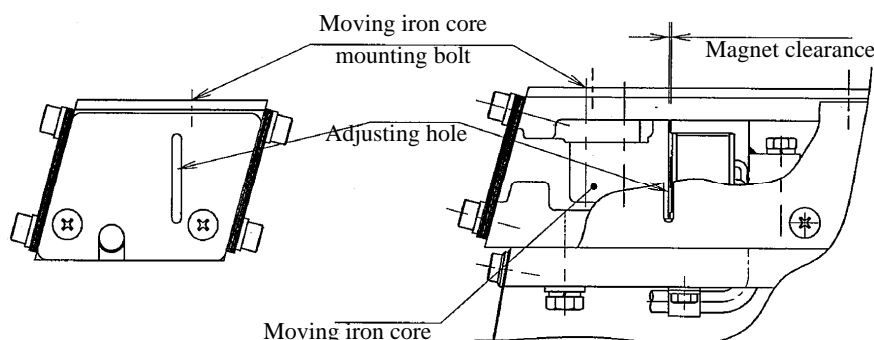
If normal amplitude cannot be recovered after correction of the set in fatigue as described in [4] above, we recommend that you change all leaf springs, considering that the end of the life of the leaf spring has been reached.

**(Note)** When new leaf springs are required, purchase them after referring to the leaf spring part No. shown in Paragraph 10 "Specifications".

### (3) Check and Adjustment of magnet clearance

The clearance between the magnet and the moving iron core is duly set as shown below before shipping of the main body from NTN. But, it is advisable to narrow the clearance as much as possible within the range not to cause touch of the magnet with the moving iron core during operation of the machine at the maximum amplitude. Thus, check the magnet clearance from time to time to keep an appropriate value. In operations under the atmosphere of much powder and others, such foreign matter may stick solidly on the magnet and the moving iron core to narrow the clearance, resulting in generation of unusual noise. Conduct periodic check to remove such foreign matter.

Type	Magnet clearance (mm)	
	Default	Max.
S05	0.5	
S08	0.5	



### <Adjusting method>

- [1] Loosen the moving iron core mounting bolts (2 places on the top of the upper vibrator).
- [2] Insert a clearance gauge of 0.5 mm into the magnet clearance through the adjusting hole in the cover.  
Push the moving iron core toward the magnet side, and fix the moving iron core temporarily.
- [3] Tighten the moving iron core mounting bolts. At that time, take care so that the position set in [2] may not deviate.
- [4] Pull out the clearance gauge. (Check that the magnet clearance value is not deviated.)



### CAUTION

**When the machine is operated at the magnet clearance of at least 120% of the maximum value specified above, the magnet may burn. Check the magnet clearance from time to time to keep an appropriate value.**

### (4) Change of power frequency

NTN linear feeder is adjusted in conformance with the power frequency applicable to the district where it is to be used or the set frequency on the controller. Accordingly, normal vibrations cannot be attained, if the power frequency being the driving output frequency or the frequency set on the controller is different. To change the power frequency, follow the procedure specified below.

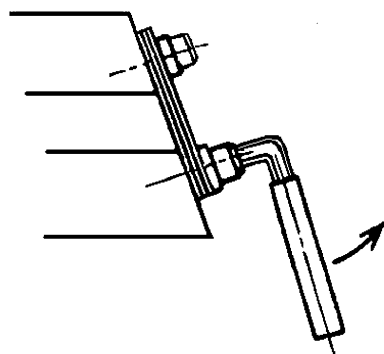
**(Note)** Where the driving output frequency is set on a frequency variable controller, change of the setting is not required, even after the power frequency (50 Hz $\leftrightarrow$ 60 Hz) is changed.

#### [1] Change of the number of leaf springs

50 Hz  $\rightarrow$  60 Hz: Increase the number of leaf springs by approx. 40%.

60 Hz  $\rightarrow$  50 Hz: Decrease the number of leaf springs by approx. 30%.

#### <For information: How to check excess or deficiency of the number of leaf springs>



Check according to the following method if the number of leaf springs currently mounted is too large or too small.

Loosen the leaf spring locking bolt at one place only while allowing vibrations so as to check the amplitude.

- Amplitude increased  $\rightarrow$  No. of leaf springs is too large.
- Amplitude decreased  $\rightarrow$  No. of leaf springs is too small or adequate.

Optimum state is that sufficient amplitude is attained and that the amplitude decreases when the bolt is loosened.

## [2] Switching of frequency in controller

Conduct setting as described in the following table. For details, refer to the Instruction Manual of the controller.

power source frequency	In the case of 50Hz		In the case of 60Hz	
Setting of DIP switch by K-EGA57.	SW2	ON	SW2	OFF
	SW3	OFF	SW3	ON

## 9. Troubleshooting

If a trouble should take place, check the following points.

### (1) No vibration at all

In this case, locate the cause with the trouble contents divided into the mechanical system and the electrical system.

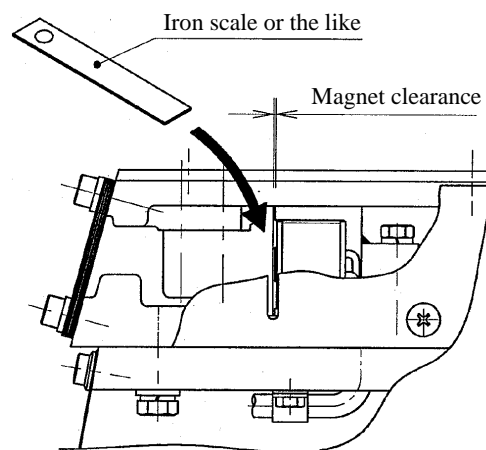
Insert an iron piece in the magnet clearance as shown below with the POWER switch turned ON.

#### [1] Strong suction in vibration

The electrical system is normal. The cause lies in either wrong setting of bowl feeder leaf springs or wrong designation of the frequency.

#### [2] No suction at all

The electrical system including the controller and the magnet is problematic. But, in the case of a controller with sensor, it is possible that the detection head is in detection of a work. This is not a trouble. Conduct adjustment of the optical axis or check the near-by distance and others again.



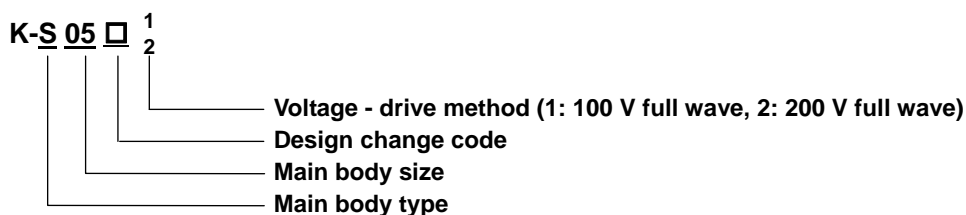
As to the electrical system, check the following items as well for the sake of confirmation.

- Correct connection of power (Refer to Paragraph 7 "Wiring and Operating Methods").
- Fusion of controller fuse and working of overcurrent protective function
- External control input terminal of controller is shorted by short-circuit fitting, or is closed by external control. (See the controller operation manual.)
- Magnet coil is not broken.

- |  |  |
|--|--|
| <b>(2) Vibrating but amplitude is insufficient</b> | <ul style="list-style-type: none"> <li>[1] Improper power (such as connection of 100 V against specifications of 200 V)</li> <li>[2] Loosening of mounting bolts of leaf springs</li> <li>[3] Loosening of locking bolts of chute and others</li> <li>[4] Excessively wide magnet clearance</li> <li>[5] Non-removal of transportation fixtures</li> <li>[6] Too heavy chute mass</li> <li>[7] Improper number of leaf springs to the mass of the chute</li> </ul> |
| <b>(3) Decreased amplitude during use</b>          | <ul style="list-style-type: none"> <li>[1] Set in fatigue of leaf springs</li> <li>[2] Loosening of mounting bolts of leaf springs</li> <li>[3] Break or rusting of leaf springs</li> <li>[4] Inclusion of foreign matter in magnet clearance</li> <li>[5] Loosening of chute locking bolts</li> </ul>   |
| <b>(4) Unusual metallic noise</b>                  | <ul style="list-style-type: none"> <li>[1] Contact of magnet with moving iron core due to narrow magnet clearance or inclusion of foreign matter in magnet clearance</li> <li>[2] Over-amplitude</li> <li>[3] Interference of cover with vibrator</li> <li>[4] Non-removal of transportation fixtures</li> </ul>   |

When the cause cannot be located, inform NTN of the symptom as in detail as possible while referring to those described above to enable quick establishment of countermeasures.

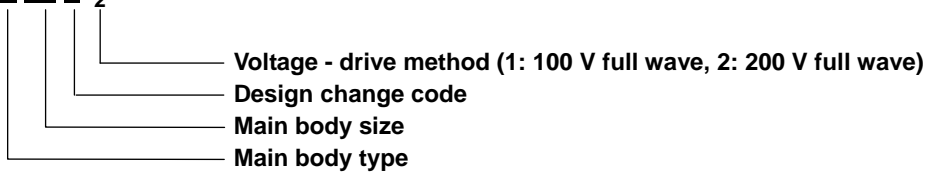
## 10. Specifications



Product No.	K-S0511	K-S0512	K-S05A1	K-S05A2
Supply voltage (V)	100	200	100	200
Dissipation current (A)	0.10	0.05	0.10	0.05
Power consumption (VA)	10			
Drive method	Full wave			
No. of vibrations (times/min)	6000 (50 Hz), 7200 (60 Hz)			
Spring angle (θ)	15°			
Max. loadage (kg) (Work + chute masses)	0.4			
Chute length (mm)	100 to 250			
Magnet part No. (No. of magnet used)	K-PMG-011-5 (1 piece)	K-PMG-021-2 (1 piece)	K-PMG-011-5 (1 piece)	K-PMG-021-2 (1 piece)
Cable size x length (from center position)	1.0 mm <sup>2</sup> × 1.0 m			
Fitting of leaf spring (No. of places)	3			
Standard No. of leaf springs set	5 pieces × 3 places = 15 pieces			
Leaf spring part No. (Material)	K-PLS2-35 × 5 (Steel)			
Leaf spring dim. (mm) Length (Hole pitch) × Width × Thickness	46 (35) × 10 × 0.5			
Strength division of leaf spring locking bolt	12.9			
Leaf spring tightening torque	8.8 N·m (90 kgf·cm)			
Spring vibration isolator part No.	K-PLS4-32 × 3.5 (Steel)			
External color	Black/silver			
Mass (kg)	1.3		0.4	
Remarks	Vibration-proof type		Fixed type (Fixed type mount K-PZ0025: Optional)	

(Note) For controllers applicable to this machine, refer to the catalog and the Instruction Manuals of controllers.

K-S 08 2<sup>1</sup><sub>2</sub>



Product No.	K-S0821	K-S0822
Supply voltage (V)	100	200
Dissipation current (A)	0.2	0.1
Power consumption (VA)	20	
Drive method	Full wave	
No. of vibrations (times/min)	6000 (50 Hz), 7200 (60 Hz)	
Spring angle (θ)	15°	
Max. loadage (kg) (Work + chute masses)	1.2	
Chute length (mm)	250 to 300	
Magnet part No. (No. of magnet used)	K-PMG-017-3 (1 piece)	K-PMG-027 (1 piece)
Cable size x length (from center position)	1.0 mm <sup>2</sup> × 1.25 m	
Fitting of leaf spring (No. of places)	4	
Standard No. of leaf springs set	6 pieces × 4 places = 24 pieces	
Leaf spring part No. (Material)	K-PLS2-35 × 5 (Steel)	
Leaf spring dim. (mm) Length (Hole pitch) × Width × Thickness	46 (35) × 10 × 0.5	
Strength division of leaf spring locking bolt	12.9	
Leaf spring tightening torque	8.8 N·m (90 kgf·cm)	
Spring vibration isolator part No.	K-PLS4-32 × 3.5 (Steel)	
External color	Black/silver/aluminum ground	
Mass (kg)	2.4	
Remarks	Vibration-proof type	

(Note) For controllers applicable to this machine, refer to the catalog and the Instruction Manuals of controllers.

## **About NTN Parts Feeder Shipping Warranty Card**

A shipping warranty card is attached to this product. Be sure to receive the card at the occasion of your purchase of the product.

The warranty card assures free repair of the product in accordance with conditions specified in the card. You are requested to keep the card after reading the descriptions given therein carefully.

- The contents of this Instruction Manual are subject to change for functional improvement and others without prior notice.

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Revised: May 7, 2014

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