

# **NLD CORELESS LINEAR MOTOR**

# **Manual**

Ver. 1.2

**Nikki Denso Co., Ltd.**

Document number: TIE-13550B

## Preface

We would like to thank you for adopting  $\tau$  linear servo motor <NLD coreless linear motor series>.

### [Confirmation items]

#### 1. Inspection at delivery

Check the following items when receiving our motor:

- (1) Is the motor what you ordered? (Check the model number, rated output, combined driver, accessories, etc.)
- (2) Is no portion damaged during transportation? (Is packing free from breakage? Is the motor free from abnormalities in appearance?)
- (3) Does the motor come with accessories?

\* If you find a packing material such as a cardboard box being broken, contact our sales representative without unpacking the motor.

If you find any abnormality listed above, contact our sales representative immediately.

#### 2. Precautions before installation (during transportation)

\* When transporting the motor, handle it with care so as not to damage it.

##### \* Precautions

Do not stack motors or put anything on the motor.

Do not apply any shock to the motor.

Do not handle the motor cable to transport the motor. → This action may cause cable disconnection.

#### 3. Precautions in storage

Store our motor in an environment in which the following conditions are satisfied if not used for some time after delivery to prevent insulation deterioration and rusting. Immediately after delivery, unpack the motor and be sure to confirm that there is no abnormality caused during transportation including damage on the motor.

Item		Description
Ambient conditions	Temperature	-10°C to +60°C
	Humidity	85% or less (no condensation allowed)
	Storage place	Store the motor at a clean and dust-free place. Do not store the motor in any harmful atmosphere such as corrosive gas, cutting oil, metal dust, or oil.
Vibration		Store the motor in a place where there is no vibration.
Others		The period during which rust prevention treatment is effective is within three months after the shipment from our factory under the above ambient conditions. If you want to store the motor longer, perform rust prevention treatment and periodic inspection.

Motor storage conditions

#### 4. Preventions in transportation

If you want to transport our motor after delivery, transport it under the following conditions.

Item		Description
Ambient conditions	Temperature	-10°C to +60°C
	Humidity	85% or less (no condensation allowed)
	Storage area	Do not transport the motor in any harmful atmosphere such as corrosive gas, cutting oil, metal dust, or oil.
Vibration		0.5 G or less

Motor transportation conditions

### **Caution**

Storage and transportation at a humidity of 65%RH or less is recommended.  
If the humidity is higher than 65%RH, contact our sales representative.

#### **[About this manual]**

This manual describes the specifications, driving directions, installation, precautions for use, and others of the NLD linear motors.

To use the motor properly, understand the contents of this manual completely.

When performing installation, operation, and other work, follow the conditions and procedures described in this manual.

When using a pole sensor, read "τ Linear Servo Motor Option Manual" in addition to this manual.

When using a customized motor, read the specifications for the customized motor in addition to this manual.

If the description of an item differs between the specifications and this manual, follow the description in the specifications.

#### **[About the warranty period]**

The warranty period for our product is one year from the date of shipment.

However, note that failures and abnormalities resulting from the following causes are not covered by this warranty:

- ① Modifications by the customer
- ② Improper use different from the description in this manual
- ③ Natural disasters
- ④ Improper connection with any manufacturer's product not approved by Nikki Denso

If you find a failure or abnormality during or not during the warranty period, contact our sales representative.

**\* Nikki Denso Co., Ltd. reserves the right to revise this manual at any time. Information in this manual is subject to change without notice.**

**Although the information from Nikki Denso is correct and reliable, Nikki Denso assumes no responsibility for the use of the information unless specially guaranteed by Nikki Denso.**

# Safety precautions

Before performing installation, wiring, operation, maintenance, and inspection, diagnosing abnormalities, and taking action against them, be sure to read this manual and other related instruction manuals thoroughly and use the motor properly.

After getting the proper and adequate knowledge of the motor and understanding the safety information and precautions, use the motor.

In this manual, safety precautions are ranked in the following two categories: "Danger" and "Caution".

And, handling precautions are classified in "Prohibition" and "Compulsion". "Action not to be done" is defined as "Prohibition" and "action to be done" is defined as "Compulsion".

 **Danger** : Mishandling may cause a dangerous situation, which could lead to user's death or serious injury.

 **Caution** : Mishandling may cause a dangerous situation, which could lead to user's medium or light injury or property damage.

An item marked with  **Caution** could also lead to serious results depending on the actual situation. Be sure to follow any item marked with Danger or Caution since it describes an important precaution.

 **Prohibition** : **Action not to be done**  
If this precaution is ignored, the motor does not operate normally.

 **Compulsion** : **Action to be done**  
If this precaution is ignored, the motor does not operate normally.

[Cautions for using the motor]



## Danger

★ To avoid the danger of electric shock and injury, be sure to follow the instructions below.

- ① Make sure to ground the ground terminal or ground wire of the motor.  
Use a ground wire with at least the thickness specified in this manual and apply at least class 3 grounding.  
**"Electric shock may occur".**
- ② Do not damage the cable, pull it forcibly, apply excessive force to it, put any heavy thing on it, or let it get caught in something.  
**"Electric shock may occur".**
- ③ Never touch the motor while it is running.  
**"Injury may occur".**
- ④ Do not touch the terminal for five minutes after a withstand voltage test or insulation resistance test.  
**"Electric shock may occur".**



## Caution

- ① Use the motor in combination with the specified driver and controller.  
**"Fire or failure may occur".**
- ② Never use the motor in a place where it will get water, in a corrosive or flammable gas atmosphere, or near a combustible material.  
**"Fire or failure may occur".**
- ③ The motor, driver, controller, and peripheral devices are very hot during operation. Do not touch them.  
**"Burn injury may occur".**
- ④ The motor could be very hot while the power is being supplied and for a while after the power is turned off. Do not touch it.  
**"Burn injury may occur".**

[Receiving and checking the motor]



## Caution

- ① When you receive the motor, if it is not what you ordered or the quantity of any item is not correct, contact our sales representative without using the motor.  
**"Electric shock, injury, damage, fire, or failure may occur".**
- ② If you find a packing material being broken, notify our sales representative of the fact without unpacking the motor.  
**"Electric shock, injury, damage, fire, or failure may occur".**

**[Storage]**

 **Prohibition**

Do not store the motor in a place exposed to rain, water, or poisonous gas or liquid.  
**"Failure may occur".**

**[Storage]**

 **Compulsion**

- ① Store the motor in a place free from direct sunlight at a temperature and humidity within the ranges specified in this manual.  
**"Failure may occur".**
- ② When the motor is stored for more than three years after purchased, be sure to contact our sales representative.  
**"Failure may occur".**

**[Transportation]**

 **Caution**

When transporting the motor, do not hold the cable or motor shaft.  
**"Injury or failure may occur".**

 **Compulsion**

Overloading products may cause load to drop. Follow the instructions.  
**"Injury or failure may occur".**

**[Installation]**

 **Caution**

- ① Do not climb on the motor or put any heavy thing on it.  
**"Injury or failure may occur".**
- ② Prevent foreign matters from getting into the motor.  
**"Fire may occur".**
- ③ Make sure to install the motor in the specified orientation.  
**"Fire or failure may occur".**
- ④ Do not apply strong impact to the motor.  
**"The motor may be damaged".**
- ⑤ Install the motor appropriately according to the output or weight of the main unit.  
**"The motor may be damaged".**
- ⑥ Install the motor on an incombustible material such as metal.  
**"Fire may occur".**
- ⑦ Use the motor in an environment free from dust.
- ⑧ Firmly fix the motor on a mounting surface with enough rigidity.  
Protect the installed motor so that it does not get hit by articles such as dropping items.

[Wiring]

 **Caution**

- ① Make sure to conduct correct wiring.  
**"Motor runaway or burning, injury, or fire may occur".**
- ② To avoid the effect of noise, use cables having lengths and following specifications (shielded, twisted, and/or other treatment applied) that are specified in the driver and controller manuals.  
**"Motor runaway, injury, or damage to the machine may occur".**
- ③ To prevent electric shock and avoid the effect of noise, make sure to perform proper grounding.  
**"Motor runaway, electric shock, injury, or damage to the machine may occur".**

[Operation]

 **Caution**

- ① The motor has no protective device. Use an overcurrent protection device, ground-fault circuit interrupter, thermal overtemperature control device, and emergency stop device for protection.  
**"Injury or fire may occur".**
- ② Make sure that the combination of the motor, driver, and controller is correct.  
**"Injury, fire, or damage to the machine may occur".**
- ③ Before performing trial operation, fix the motor, separate the motor from the load system, and confirm the operation. Then, mount the load system.  
**"Injury or damage to the machine may occur".**
- ④ Extreme adjustment or change may make operation unstable. Be careful when making such adjustment or change.  
**"Injury or damage to the machine may occur".**
- ⑤ When an alarm occurs, reset the alarm. Make sure to remove the cause before restarting the motor.  
**"Injury or damage to the machine may occur".**
- ⑥ At the recovery from an instantaneous interruption, the machine may restart suddenly. In this case, keep away from the machine.  
(Design the machine so that the safety of workers is ensured at the restart of the machine.)  
**"Injury may occur".**
- ⑦ If any hazardous situation is assumed when the motor stops or fails, install an external braking mechanism to avoid accident.  
**"Injury or damage to the machine may occur".**

 **Prohibition**

Do not turn the power on in the motor driven or vibrated status.  
**"Motor runaway, injury, or damage to the machine may occur".**

 **Compulsion**

Configure an external emergency stop circuit to stop operation and shut down the power immediately.  
**"Injury or damage to the machine may occur".**

[Maintenance and inspection]

 **Prohibition**

The motor shall be overhauled only by Nikki Denso or by a company specified by Nikki Denso.  
**"A failure may be caused".**

# Contents

Chapter 1 Outline.....	1-1
1-1 Features.....	1-1
1-1-1 Coreless linear motor .....	1-1
1-1-2 NLD series .....	1-1
1-2 System configuration .....	1-1
Chapter 2 Specifications .....	2-1
2-1 Model number .....	2-1
2-1-1 Motor model number .....	2-1
2-1-2 Magnet base (called MG base below) model number .....	2-1
2-1-3 Coil unit (called CL unit below) model number .....	2-2
2-2 General specifications.....	2-2
2-3 Rated specifications .....	2-3
2-3-1 Rated specifications of the standard type.....	2-3
2-3-2 Rated specifications of the large-thrust type .....	2-4
2-4 Wiring specifications .....	2-6
Chapter 3 Driving direction .....	3-1
3-1 Standard/large-thrust types .....	3-1
Chapter 4 Installation.....	4-1
4-1 Mounting the MG base and CL unit.....	4-1
4-1-1 Standard type .....	4-1
4-1-2 Large-thrust type .....	4-2
4-2 Corner shape .....	4-3
4-2-1 Standard/large-thrust types .....	4-3
4-3 Connecting MG bases.....	4-4
4-3-1 Standard/large-thrust types .....	4-4
Chapter 5 Notes on use.....	5-1
5-1 Preparations.....	5-1
5-2 Operation .....	5-1
Chapter 6 Notes on using multiple axes .....	6-1
Chapter 7 Maintenance .....	7-3
7-1 Daily inspection.....	7-3
7-2 Periodic inspection.....	7-3
7-3 Warranty period.....	7-4

# Chapter 1 Outline

## 1-1 Features

### 1-1-1 Coreless linear motor

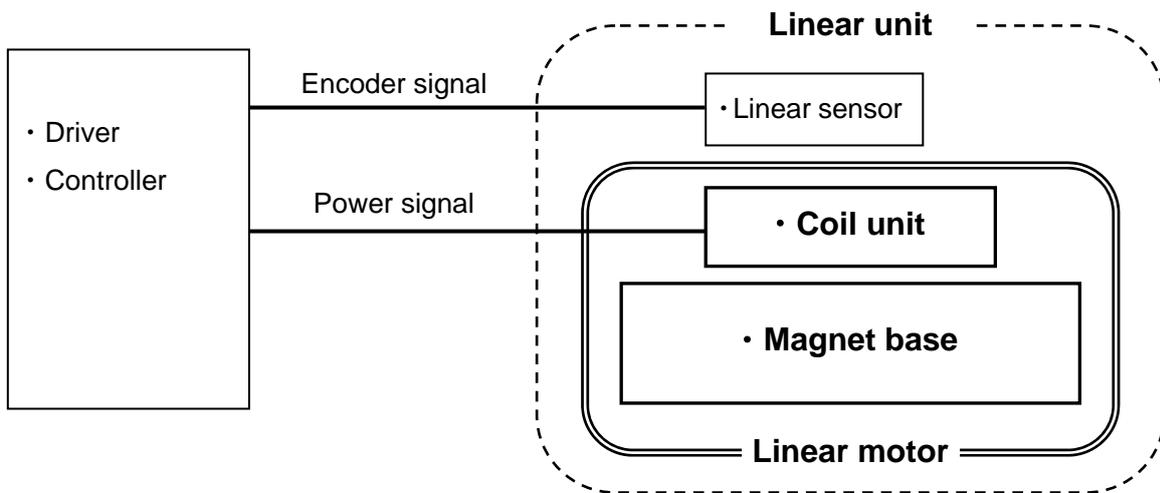
A coreless linear motor can make smooth movement possible since its coil unit does not have magnetic materials, so no attraction is generated and the speed ripple and cogging can be suppressed.

### 1-1-2 NLD series

The NLD series has the advantages of coreless linear motors and magnetic characteristics have been improved to greatly improve cost performance while keeping high accuracy positioning characteristics.

## 1-2 System configuration

The system configuration of a linear motor is shown below.



## Chapter 2 Specifications

### 2-1 Model number

#### 2-1-1 Motor model number

A model number of the NLD linear motor series is shown below.

N L D — ① ② ③ ④ ⑤ ⑥ ⑦ — ⑧

Example) N L D — A M 1 0 S A 2 A

① Motor type		② Magnet type		③ Nominal coil unit length		④ Subtype		⑤ Voltage specification		⑥ Design order		⑦ Used connector		⑧ Customized model	
A	Standard	M	—	10	100mm	Standard/large-thrust type		A1	AC 100	A	1st version	None	Plastic connector	None	Standard model
				20	200mm	S	Mounted on a side	A2	AC 200	B	2nd version	M	Metal connector	S01	Customized model
F	Large-thrust	L	—	30	280 to 310 mm						(serial number)			S02	model (serial number)
				40	390 to 430 mm									•	
				60	570 to 600 mm									•	
				70	700 to 710 mm										
				85	850mm										

#### 2-1-2 Magnet base (called MG base below) model number

A model number of an MG base is shown below.

M B D — ① ② ③ ④ ⑤ — ⑥

Example) M B D — A M 1 2 S A

① Motor type		② Magnet type		③ Nominal magnet base length		④ Subtype		⑤ Design order		⑥ Customized model	
A	Standard	M	—	12	120mm	Standard/large-thrust type		A	1st version	None	Standard model
				24	240mm	S	Mounted on a side	B	2nd version	S01	Customized model
F	Large-thrust	L	—	11	112mm				(serial number)	•	(serial number)
				33	336mm					•	

### 2-1-3 Coil unit (called CL unit below) model number

A model number of a CL unit is shown below.

CLD — ① ② ③ ④ ⑤ ⑥ ⑦ — ⑧

Example) CLD — A M 1 0 S A 2 A

① Motor type		② Magnet type		③ Nominal coil unit length		④ Subtype		⑤ Voltage specification		⑥ Design order		⑦ Used connector		⑧ Customized model	
A	Standard	M	—	10	100mm	Standard/large-thrust type		A1	AC 100	A	1st version	None	Plastic connector	None	Standard model
				20	200mm	S	Mounted on a side	A2	AC 200	B	2nd version	M	Metal connector	S01	Customized model
F	Large-thrust	L	—	30	280 to 310 mm						(serial number)			·	(serial number)
				40	390 to 430 mm									·	
				60	570 to 600 mm										
				70	700 to 710 mm										
				85	850mm										

### 2-2 General specifications

The following table lists general specifications.

**Table 1 General specifications**

Item		Description
Ambient conditions	Temperature	0°C to 40°C
	Humidity	85% or less (No condensation allowed)
	Installation place	Do not install the motor in any harmful atmosphere such as corrosive gas, cutting oil, metal dust, or oil.
Installation orientation		Horizontal, vertical
Driving direction		Both directions
Cooling method		Natural cooling
Finished color		Magnet base: White, Coil block: White, Coil: Black
Insulation class		Class F
Dielectric strength voltage		1500 V (for 1 minute)
Vibration resistance		1 G (for 2 hours in each of three directions)
Impact resistance		10 G (three times for each of three directions)
Protection class		IP40 * For the coil unit only

## 2-3 Rated specifications

### 2-3-1 Rated specifications of the standard type

**Table 2 Rated specifications of the standard type**

Motor model	NLD-AM	10SA2A	20SA2A	30SA2A	40SA2A
Rated thrust	N	50	95	150	200
Maximum thrust	N	150	275	450	500
Rated output	W	150	285	450	600
Rated current	A	1.8	3.4	5.2	6.8
Maximum speed	m/s	3.5			
Rated speed	m/s	3.0			
Sensor resolution	μm	1.0, 0.1			
Power supply	ACV	180 to 240 VAC, three phase, 50/60 Hz			
CL unit model	CLD-AM	10SA2A	20SA2A	30SA2A	40SA2A
MG base model	MBD-AM	12SA, 24SA			
VC driver	NCR-DD	A0A2□201D	A0A2□401D	A0A2□801D	A0A2□801D
VC controller	NCR-CD	A1A2□201D	A1A2□401D	A1A2□801D	A1A2□801D

The specification values listed above are measured at an ambient temperature of 25°C when the motor mounted on the following heatsink (aluminum plate) operates:

Heatsink size

250 × 250 × 15 mm

450 × 450 × 15 mm

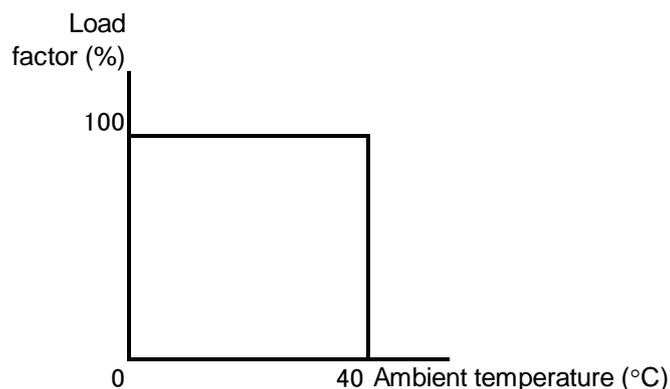
Applicable CL units

CLD-AM10SA2A, AM20SA2A

CLD-AM30SA2A, AM40SA2A

#### Load factor-ambient temperature characteristics

The following figure shows standard type characteristics for ambient temperatures.



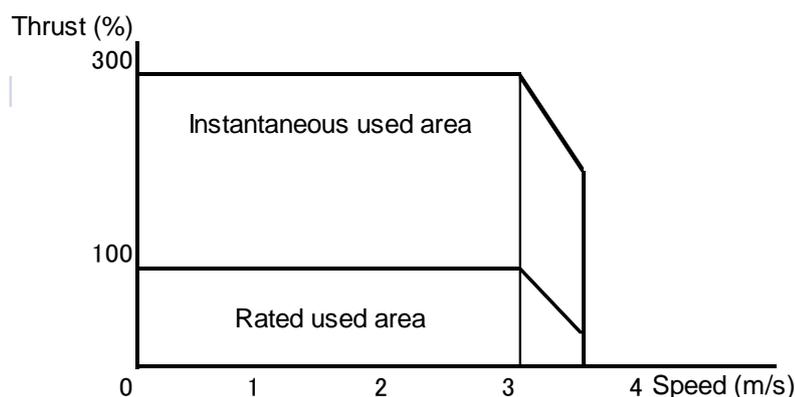
(For details including setting in the derating mode, see "5-2. Operation".)

#### Load factor-operation characteristics

Derating may be applied depending on the operation condition. For the condition and setting, see "5-2. Operation".

## Thrust-speed characteristics

The following figure shows standard type characteristics for speeds.



## 2-3-2 Rated specifications of the large-thrust type

**Table 3 Rated specifications of the large-thrust type**

Motor model	NLD-FL	30SA2A	40SA2A	60SA2A	70SA2A	85SA2A
Rated thrust	N	320	480	640	800	1000
Maximum thrust	N	960	1440*1	1920	2400	3000
Rated output	W	960	1440	1920	2400	3000
Rated current	A	4.6	6.8	9.2	11.5	14.7
Maximum speed	m/s	3.5				
Rated speed	m/s	3.0				
Sensor resolution	μm	1.0, 0.1				
Power supply	ACV	180 to 242 VAC, three phase, 50/60 Hz				
CL unit model	CLD-FL	30SA2A	40SA2A	60SA2A	70SA2A	85SA2A
MG base model	MBD-FL	11SA, 33SA				
VC driver	NCR-DD	A0A2□801D	A0A2□801D*1 A0A2□152D	A0A2□152D	A0A2□222D	A0A2□222D
VC controller	NCR-CD	A1A2□801D	A1A2□801D*1 A1A2□152D	A1A2□152D	A1A2□222D	A1A2□222D

\*1 The maximum thrust is 1200 N when this model is used in combination with a 800-W driver and controller.

The specification values listed above are measured at an ambient temperature of 25°C when the motor mounted on the following heatsink (steel plate) operates:

Heatsink size

700 × 450 × 40 mm

900 × 450 × 40 mm

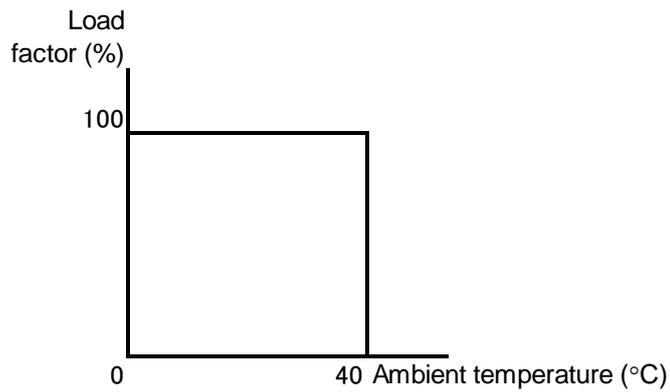
Applicable CL units

CLD-FL30SA2A, FL40SA2A, FL60SA2A

CLD-FL70SA2A, FL85SA2A

### Load factor-ambient temperature characteristics

The following figure shows high-thrust type characteristics for ambient temperatures.



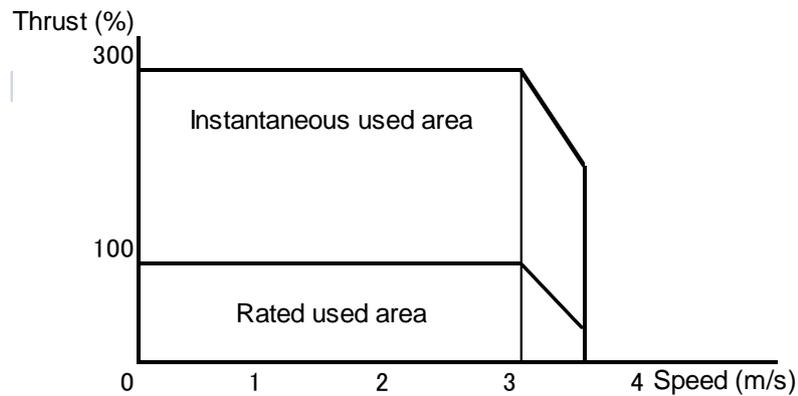
(For details including setting in the derating mode, see "5-2. Operation".)

### Load factor-operation characteristics

Derating may be applied depending on the operation condition. For the condition and setting, see "5-2. Operation".

### Thrust-speed characteristics

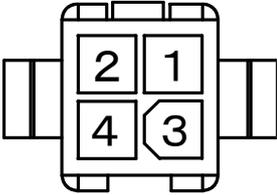
The following figure shows large-thrust type characteristics for speeds.



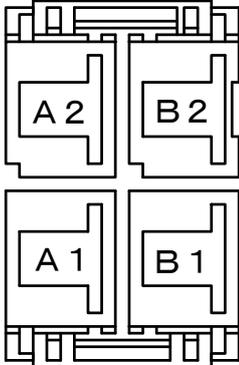
## 2-4 Wiring specifications

MATE-N-LOK connectors are used for connecting terminals (U, V, W, and E). Prepare wiring cable side connectors by yourself or use our options. The following tables list connector and contact model numbers, used wire, and pin configuration.

**Table 4 Wiring specifications (standard type)**

Used connectors	AMP mini-universal MATE-N-LOK connectors (4-pin) of AMP											
	Motor side connector	Wiring cable side connector										
Connector main unit	Plug housing 172167-1	Cap housing 172159-1										
Contact	Pin 170360-1 or 170364-1	Socket 170362-1 or 170366-1										
Used wire	U,V,W,E: 0.75 mm <sup>2</sup>	U,V,W,E: At least 0.75 mm <sup>2</sup>										
Wiring cable side pin configuration	 <table border="1" data-bbox="858 860 1295 1032"> <thead> <tr> <th>Pin No.</th> <th>Signal name</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>U</td> </tr> <tr> <td>2</td> <td>V</td> </tr> <tr> <td>3</td> <td>W</td> </tr> <tr> <td>4</td> <td>E</td> </tr> </tbody> </table>		Pin No.	Signal name	1	U	2	V	3	W	4	E
	Pin No.	Signal name										
1	U											
2	V											
3	W											
4	E											
View from the connection side												

**Table 5 Wiring specifications (large-thrust type)**

Used connectors	D5200 series connectors (4-pin) of AMP											
	Motor side connector	Wiring cable side connector										
Connector main unit	Tab housing 1-917808-2	Receptacle housing 1-917807-2										
Contact	Tab contact 917804-2	Receptacle contact 316040-2										
Used wire	U,V,W,E: 1.25 mm <sup>2</sup>	U,V,W,E: At least 1.25 mm <sup>2</sup>										
Wiring cable side pin configuration	 <table border="1" data-bbox="858 1585 1295 1758"> <thead> <tr> <th>Pin No.</th> <th>Signal name</th> </tr> </thead> <tbody> <tr> <td>B1</td> <td>U</td> </tr> <tr> <td>B2</td> <td>V</td> </tr> <tr> <td>A1</td> <td>W</td> </tr> <tr> <td>A2</td> <td>E</td> </tr> </tbody> </table>		Pin No.	Signal name	B1	U	B2	V	A1	W	A2	E
	Pin No.	Signal name										
B1	U											
B2	V											
A1	W											
A2	E											
View from the connection side												

## Chapter 3 Driving direction

When the MG base is fixed and CL unit is movable, for the driving direction of the CL unit, the cable side direction is determined to be the forward direction (FD). (This is independent of the orientation of the MG base.)

\* Install the linear motor so that the forward direction of the linear motor and that of the linear sensor are the same. (Refer to the sensor specifications to check the driving direction of the linear sensor.)

### 3-1 Standard/large-thrust types

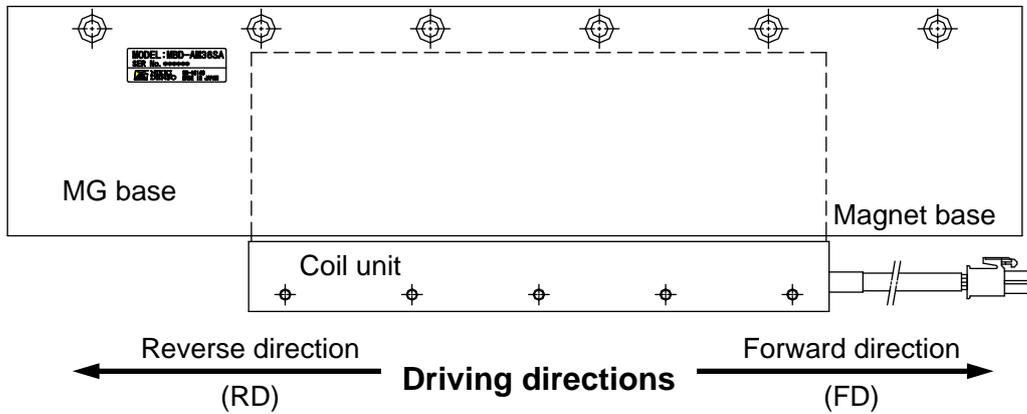


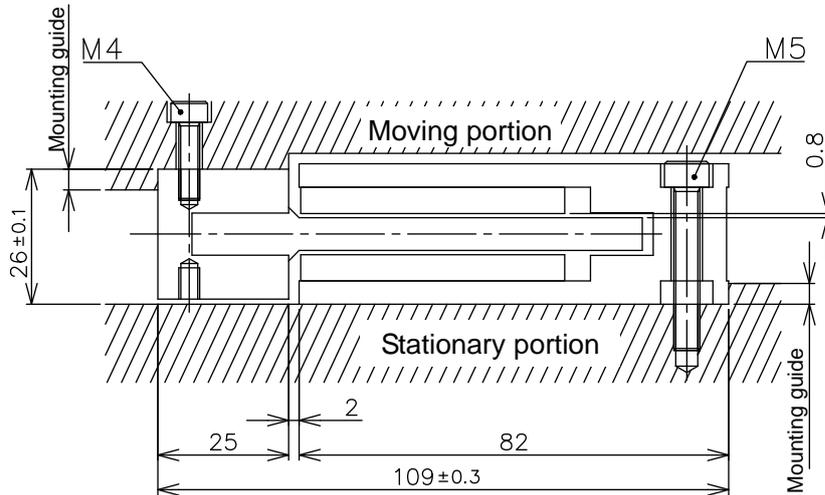
Figure 1. Driving directions of the standard/large-thrust types

## Chapter 4 Installation

### 4-1 Mounting the MG base and CL unit

#### 4-1-1 Standard type

The following figures show mounting dimensions of the standard type (side installation) and recommended surface accuracy.



Use a mounting guide (such as level differences or dowel pins) to mount the MG base and CL unit so that the dimensional tolerances shown in the left figure are satisfied.

Figure 2a. Mounting dimensions of the standard type

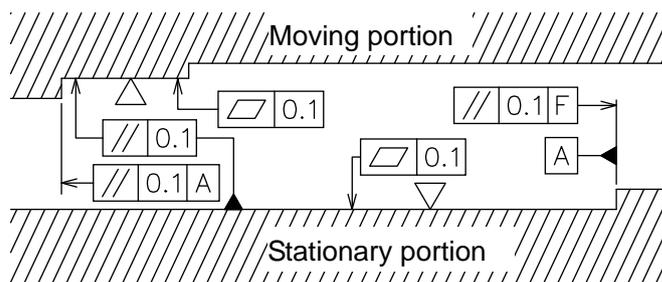


Figure 2b. Recommended surface accuracy

\* Remove foreign matters including burrs and remaining coating materials completely from the motor installation surfaces so that the surfaces are free from gaps and differences in level.

▽: Ry 50S (Rmax 50S)

F: Linear system  
(such as an LM guide)

### 4-1-2 Large-thrust type

The following figures show mounting dimensions of the large-thrust type (side installation) and recommended surface accuracy.

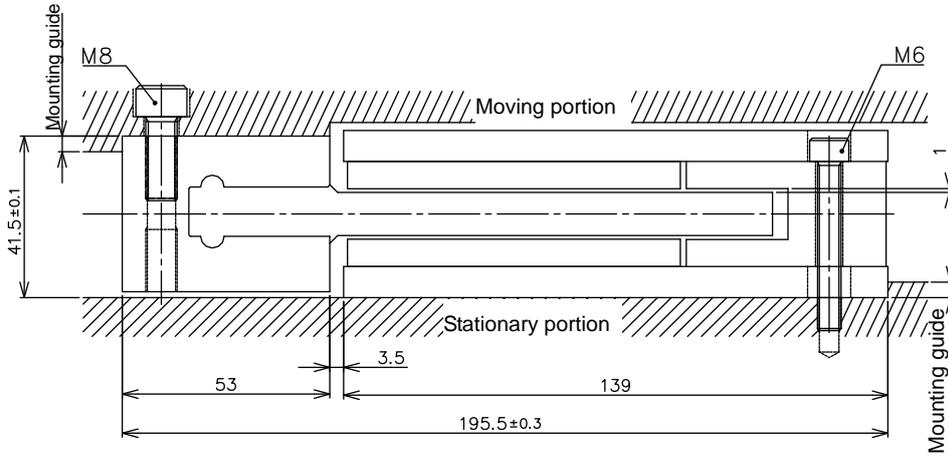


Figure 3a. Mounting dimensions of the large-thrust type

Use a mounting guide (such as level differences or dowel pins) to mount the MG base and CL unit so that the dimensional tolerances shown in the left figure are satisfied.

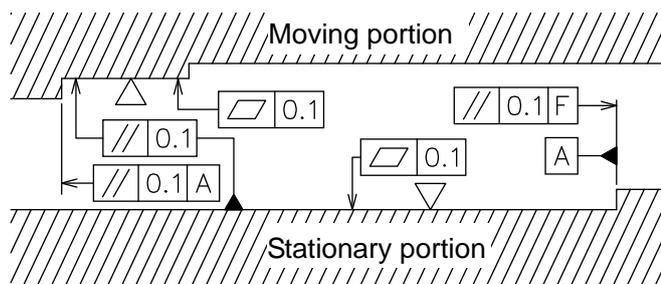


Figure 3b. Recommended surface accuracy

\* Remove foreign matters including burrs and remaining coating materials completely from the motor installation surfaces so that the surfaces are free from gaps and differences in level.

▽: Ry 50S (Rmax 50S)

F: Linear system (such as an LM guide)

## 4-2 Corner shape

The following section describes the "corner shape" of the standard type. Be careful about the "corner shape" when designing the target machine so that precise butting is made.

### 4-2-1 Standard/large-thrust types

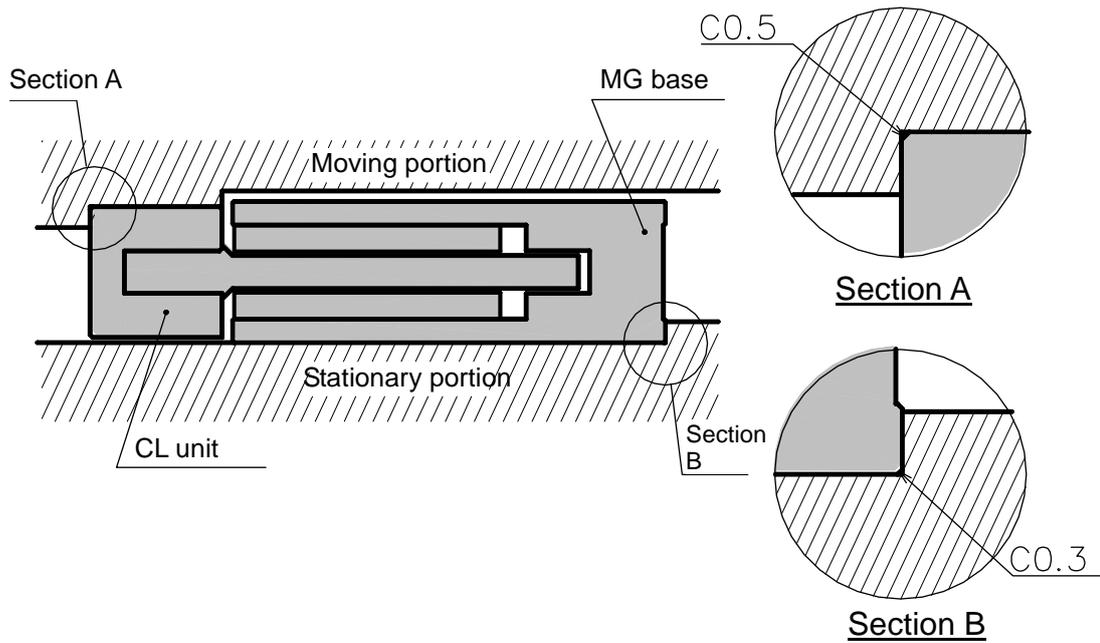


Figure 4. Corner shape (standard/large-thrust types)

## 4-3 Connecting MG bases

### 4-3-1 Standard/large-thrust types

Connect MG bases from the left in the descending order of size by following the procedure below.

- 1) Fix the first MG base.

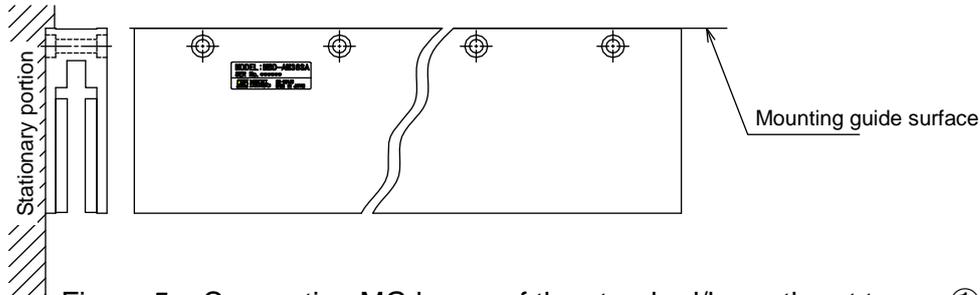


Figure 5a. Connecting MG bases of the standard/large-thrust types ①

Align the first MG base with the mounting guide surface as shown in the figure above (be careful about the orientation) and fix it.

- 2) Make the second MG base ready on the right.

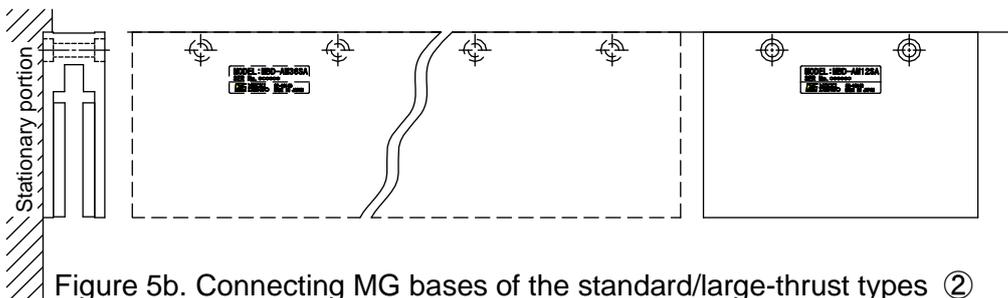


Figure 5b. Connecting MG bases of the standard/large-thrust types ②

Place the second MG base to the right of the first MG base (nameplate side), but keep them away, and align it with the mounting guide surface. **(\* Make sure to place the second MG base in the same orientation as for the first MG base.)**

- 3) Butt the second MG base to the first MG base and fix it.

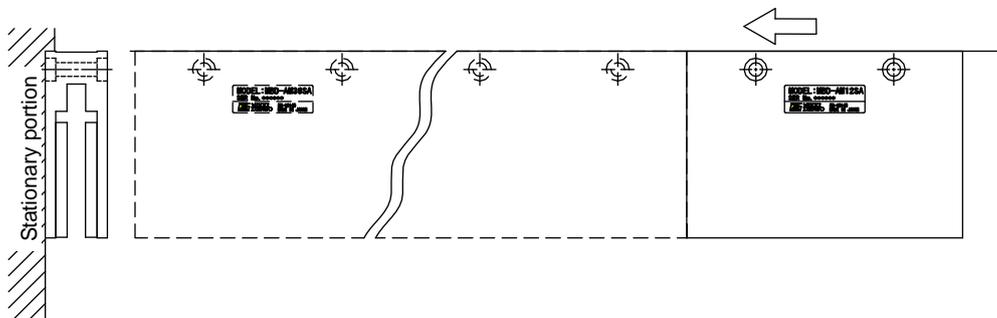


Figure 5c. Connecting MG bases of the standard/large-thrust types ③

Slide the second MG base along the mounting guide surface, butt it to the first MG base slowly, and fix it with bolts.



## Caution

- ① The MG bases attract each other. Be careful not to catch your finger between them.
- ② Things made of magnetic materials, such as a wrench, are strongly attracted to the magnet.  
Be careful about them.

## Chapter 5 Notes on use

When using and operating the motor, follow the precautions below and handle the motor paying due attention to the safety.

### 5-1 Preparations

- Make sure to properly connect the power lines (including ground wire) and signal cables to the driver.
- Before wiring work, make sure to turn the power to the used driver off.
- Carefully conduct wiring so that external noise does not affect the motor or encoder.
- Fix the wires from the motor and encoder appropriately so that they are not moved or no force is applied to them.
- Before running the motor by supplying the power, move the motor moving portion at very low speed manually and confirm that there is no abnormal sound from the motor and the motor does not interfere with any peripheral device.
- Before turning the power on, confirm that nobody is within the machine operation range.

### 5-2 Operation

- Specify the motor number of the motor to be used for driver parameter "P000: Motor type" correctly. (The motor number is listed in "Applicable motors" in the driver manual.)
- Parameter "P144: Electronic thermal detection selection" is factory-set to "STD: Standard" to prevent the CL unit from being damaged by heat concentrating on one phase. When using the motor under any of the following conditions, set this parameter to "O.L.70%":
  - 1) Synchronous speed and torque control with which each axis cannot be controlled individually are performed with a two-axis specification in which both axes are mechanically connected and interfere with each other. (Example: Gantry control)
  - 2)-1. Repetitive positioning operation within a stroke of 40 mm is performed (for a type other than the large-thrust type).
  - 2)-2. Repetitive positioning operation within a stroke of 56 mm is performed (for the large-thrust type).
  - 3) Torque control is performed for pushing motion against the motor direction in the zero speed state.  
(Set the above value if the above condition is satisfied also when the master controller performs torque control over a Nikki Denso motor.)
  - 4) The motor is run at a low speed slower than 24 mm/s.
- Conduct a test run by supplying power and mounting neither load nor workpiece, that is, in the no load state.

\* For details of parameter setting and operation procedure, thoroughly read the manual of the driver you use to perform them properly.

## Chapter 6 Notes on using multiple axes

When mounting CL units for parallel use on multiple axes on the same machine surface and driving them using one driver, install the motor according to the instructions below. (Common to each type)

- Use a driver and controller whose capacity is greater than the total capacity of the CL units and connect them via a terminal block in parallel. (See Figure 5.)
- Be sure to make the cables of the CL units face in the same direction and align the direction with the linear sensor as described in "3. Driving direction".
- Place the MG base and CL unit for each axis so that the relative position relationship is within  $\pm 0.25$  mm.
- Arrange the MG bases and CL units so that the relationships between the MG base side on which the nameplate is attached and the side of the relevant CL unit are the same.
- When you want to use a pole sensor, mount it only on either CL unit.

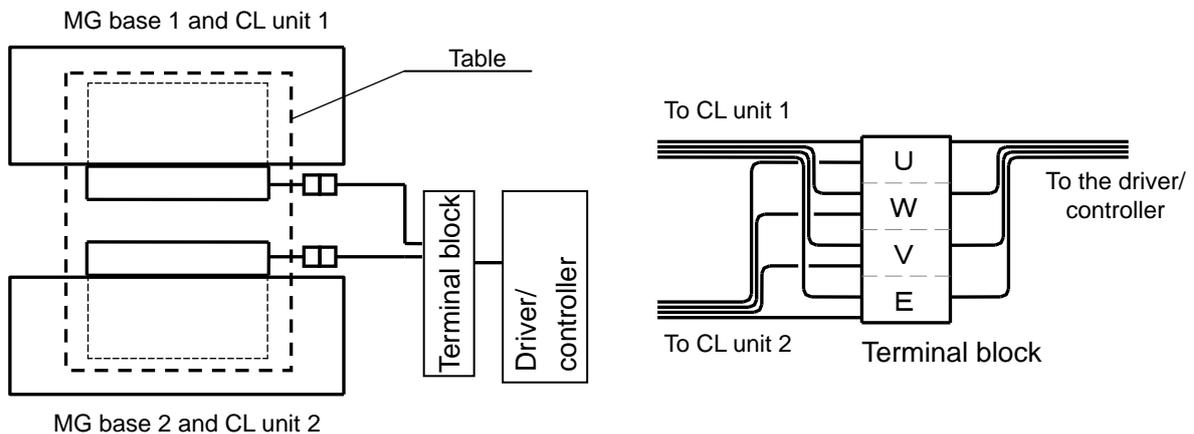


Figure 6. Outline configuration diagram and terminal block wiring specifications

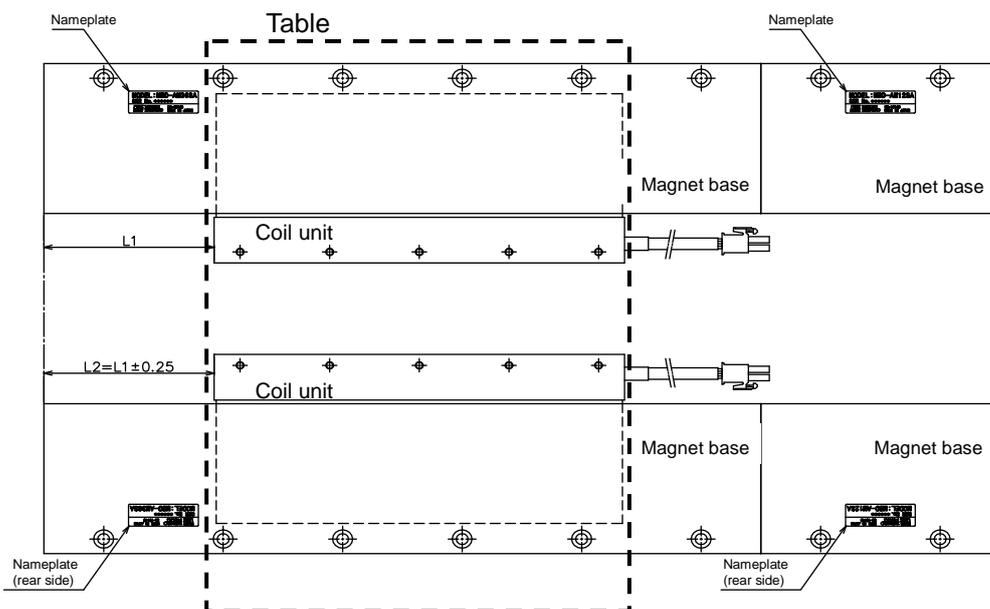


Figure 7. Correct arrangement

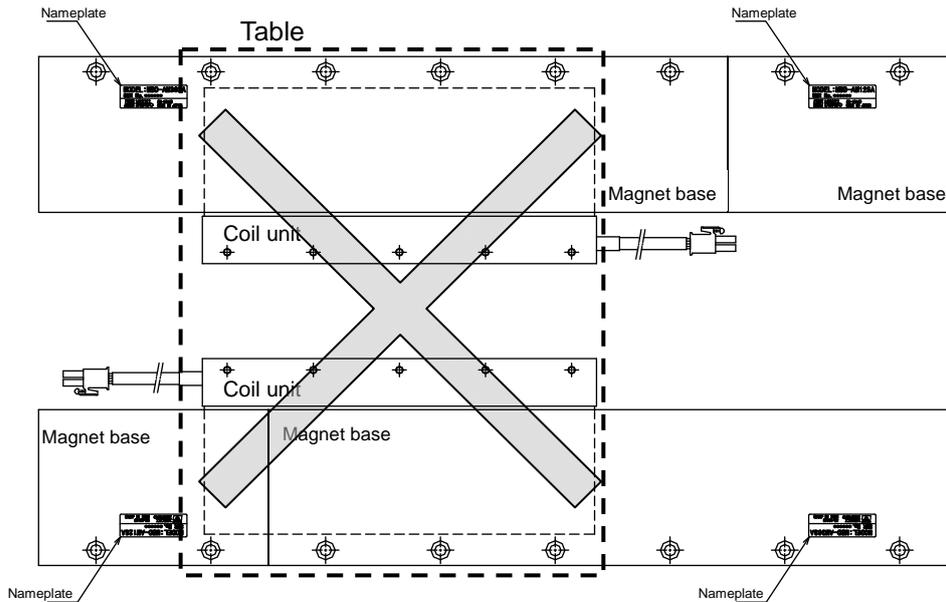


Figure 8a. Incorrect arrangement: Example 1

The cable directions (driving directions) from the coil units are not the same. The relationships between the MG base side on which the nameplate is attached and the side of the relevant CL unit are not also the same.

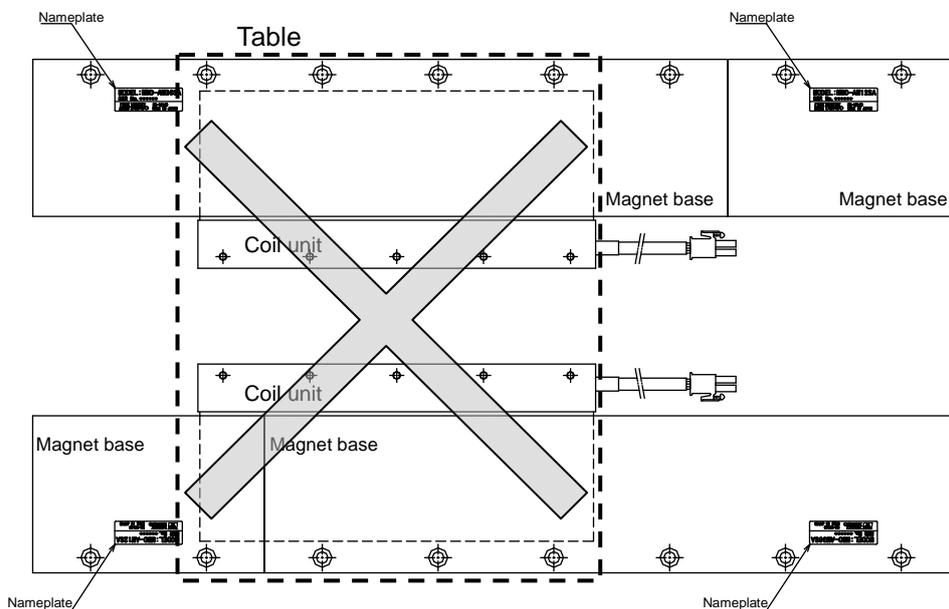


Figure 8b. Incorrect arrangement: Example 2

The cable directions from the coil units are the same, but the relationships between the MG base side on which the nameplate is attached and the side of the relevant CL unit are not the same.

## **Chapter 7 Maintenance**

The motor is maintenance-free; however, to prevent a failure due to a change in the use environment, periodically inspect it according to the following instructions.

- Before inspecting the motor, be sure to turn the power to the used driver off.
- The worker who inspects the motor should check the on and off states of the used driver.
- Inspect the motor according to the precautions for maintaining the driver that are described in the manual of the used driver.
- Before measuring the insulation of the motor, completely disconnect the wires between the motor and driver (U, V, and W).

### **7-1 Daily inspection**

Inspect the following items as daily inspection.

- Whether the motor runs normally
- Whether there is any abnormality in the installation environment (check the power supply, temperature, humidity, dust, and other items.)
- Whether there is any abnormality in the cooling system (such as whether anything blocks airflow)
- Whether any terminal or connector is loose
- Whether there is any abnormal sound or vibration
- Whether there is abnormal heat or discoloration

### **7-2 Periodic inspection**

Inspect the following items at intervals of the specified operating time or period (for such as once half a year or once a year) as periodic inspection.

- Whether the section connecting to the load is loose
- Whether there is any abnormality in the installation environment (check the power supply, temperature, humidity, dust, and other items.)
- Whether there is any abnormality in the cooling system (such as whether anything blocks airflow)
- Whether any terminal or connector is loose
- Whether there is any abnormal sound or vibration
- Whether there is abnormal heat or discoloration
- Whether there is any scratch or wear on any cable

### 7-3 Warranty period

The warranty period for the motor is one year from the date of shipment. However, note that failures and abnormalities resulting from the following causes are not covered by this warranty.

- Modifications by the customer
- Improper use different from the description in this manual
- Natural disasters
- Improper connection with any manufacturer's product not approved by Nikki Denso

This warranty shall cover only repair of the driver and motor main units. Any damage and loss of chance at your side, which will be induced by a failure of the delivered product, is excluded from the warranty.



## Caution

Our products have been designed and manufactured for general-purpose applications in the general industry and are not intended to be used in any equipment or system that may be involved with human life.

For this reason, Nikki Denso assumes no responsibility if our product is used for any other application than we intend.

(Examples: Applications in equipment and systems for atomic, aerospace, medical, and passenger vehicles that may greatly be involved with human-life and assets)