

## OPERATING MANUAL

Tuning-free AC servo motor unit  
**NX Series Motor**



## Introduction

### ■ Before use

Only qualified personnel should work with the product. Use the product correctly after thoroughly reading the section "Safety precautions." The product described in this manual has been designed and manufactured to be incorporated in general industrial equipment. Do not use for any purpose. Oriental Motor Co., Ltd. is not responsible for any damage caused through failure to observe this warning.

### ■ Structure of the manual

Operating manuals for the **NX Series** are listed below. Always keep the manual where it is readily available.

#### ● NX Series OPERATING MANUAL Motor (this document)

This manual explains the names and functions of motor components as well as the installation method.

#### ● NX Series OPERATING MANUAL Driver (supplied with driver)

This manual explains the names and functions of driver components as well as the installation method.

#### ● NX Series USER MANUAL

This manual explains the driver function as well as how to install/connect and operate the product, among others. The "USER MANUAL" does not come with the product. For details, contact your nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.

## Regulations and standards

### ■ UL Standards and CSA Standards

This product is recognized by UL under the UL and CSA Standards.

#### Applicable Standards

Applicable Standards	Certification Body	File No.
UL 1004-1, UL 1004-6 CSA C22.2 No.100	UL	E336472

### ■ CE Marking

This product is affixed the CE Marking under the Low Voltage Directive and EMC Directive.

#### ● Low Voltage Directive

The motors are certified by TÜV Rheinland under the EN 60034-1. (NXM620, NXM810 and NXM920 only)

#### Applicable Standards

EN 60034-1, EN 60034-5, EN 60664-1

Thank you for purchasing an Oriental Motor product.

This Operating Manual describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

### ● Installation conditions

To be incorporated in equipment.

Overvoltage category: II

Pollution degree: 3

Protection against electric shock: Class I

Connect the lead wire for Protective Earth Terminal of the "cable for motor", to the Protective Earth Terminal on the driver.

### ■ Hazardous substances

The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).

## Safety precautions

The precautions described below are intended to prevent danger or injury to the user and other personnel through safe, correct use of the product. Fully understand the meaning of each item before using the product.



Handling the product without observing the instructions that accompany a "Warning" symbol may result in serious injury or death.

### General

- Do not use the product in explosive or corrosive environments, in the presence of flammable gases or near combustibles. Doing so may result in fire, electric shock or injury.
- Assign qualified personnel the task of installing, wiring, operating/controlling, inspecting and troubleshooting the product. Failure to do so may result in fire, electric shock, injury or damage to equipment.
- Do not transport, install the product, perform connections or inspections when the power is on. Always turn the power off before carrying out these operations. Failure to do so may result in electric shock.
- Provide a means to hold the moving parts in place for applications involving vertical travel. In the position control mode, the motor will lose its holding torque when the power is turned off. In all other modes, the holding torque will be lost when the motor stops. Loss of holding torque may cause the moving part to drop, resulting in injury or damage to the equipment.

### Installation

- To prevent the risk of electric shock, use the motor for class I equipment only.
- Install the motor so as to avoid contact with hands, or ground them to prevent the risk of electric shock.

### Connection

- Connect the motor securely according to the motor connection method explained in the OPERATING MANUAL Driver or USER MANUAL. Failure to do so may result in fire or electric shock.
- Do not forcibly bend, pull or pinch the cables. Doing so may result in fire or electric shock.

### Repair, disassembly and modification

- Do not disassemble or modify the motor. This may cause electric shock or injury. Refer all such internal inspections and repairs to the branch or sales office from which you purchased the product.

## ⚠ Caution

Handling the product without observing the instructions that accompany a "Caution" symbol may result in injury or property damage.

### General

- Do not use the motor beyond its specifications, or electric shock, injury or damage to equipment may result.
- Do not touch the motor during operation or immediately after stopping. The surface is hot and may cause a skin burn(s).

### Transportation

- Do not hold the motor output shaft or motor cable. This may cause injury.

### Installation

- Provide a cover over the rotating parts (output shaft) of the motor to prevent injury.

### Operation

- Do not touch the rotating parts (output shaft) of the motor during operation. This may cause injury.
- Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
- The motor's surface temperature may exceed 70 °C (158 °F), even under normal operating conditions. If a motor is accessible during operation, post a warning label shown in the figure in a conspicuous position to prevent the risk of skin burn(s).
- For the power supply input to the electromagnetic brake, use a DC power supply with reinforced insulation on the primary side.



Warning label

### Maintenance and inspection

- To prevent the risk of electric shock, do not touch the terminals while measuring the insulation resistance or conducting a voltage-resistance test.

### Disposal

- To dispose of the motor, disassemble it into parts and components as much as possible and dispose of individual parts/components as industrial waste.

## Precautions for use

This section covers limitations and requirements the user should consider when using the product.

- **Always use the cable (supplied or accessory) to connect the motor and driver.**

Be sure to use the cable (supplied or accessory) to connect the motor and driver. In the following condition, an appropriate accessory cable must be purchased separately.

- If a flexible cable is to be used.
- If a cable of 3 m (9.8 ft.) or longer is to be used.

- **Conduct the insulation resistance measurement or withstand voltage test separately on the motor and the driver.**

Conducting the insulation resistance measurement or withstand voltage test with the motor and driver connected may result in injury or damage to equipment.

- **Do not apply a radial load and axial load in excess of the specified permissible limit.**

Operating the motor under an excessive radial load and axial load may damage the motor bearings (ball bearings). Be sure to operate the motor within the specified permissible limit of radial load and axial load. See [USER MANUAL](#) for details.

- **Do not use the electromagnetic brake to reduce speed or as a safety brake.**

The electromagnetic brake is of non-excitation type. Although it helps maintain the position of the load in the event of power outage, etc., this brake cannot securely hold the load in place. Always stop the motor first, and then use the electromagnetic brake to maintain the position of the load.

### • Preventing electrical noise

See [USER MANUAL](#) for measures with regard to noise.

### • About grease of geared motor

On rare occasions, a small amount of grease may ooze out from the geared motor. If there is concern over possible environmental damage resulting from the leakage of grease, check for grease stains during regular inspections. Alternatively, install an oil pan or other device to prevent leakage from causing further damage. Oil leakage may lead to problems in the customer's equipment or products.

### • Make sure not to hit or apply a strong impact on the motor output shaft or the encoder.

Applying a strong impact on the motor output shaft or the encoder may cause encoder damage or motor malfunction. The warning label shown in the right is attached on the motor.



Warning label

### • Make sure to provide measures so that the key is not flown off when operating the motor with key in a state where a load is not installed.

Flying off the key may result in injury or damage to equipment.

## Preparation

### ■ Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the branch or sales office from which you purchased the product.

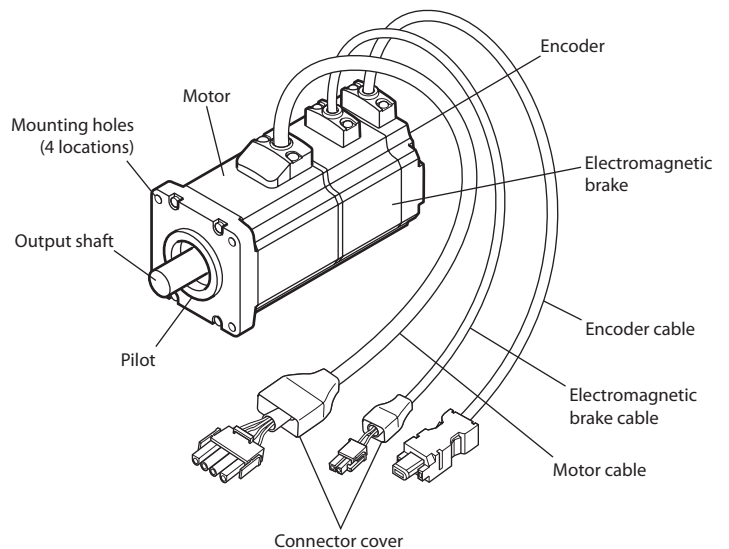
- Motor .....1 unit
- [OPERATING MANUAL Motor](#).....1 copy (this document)
- Parallel key .....1 pc. (supplied with geared types)
- Cable for motor .....1 pc. \*1
- Cable for encoder .....1 pc. \*1
- Cable for electromagnetic brake ....1 pc. \*1\*2

\*1 Included in a motor and driver package product.

\*2 Supplied with electromagnetic brake motor.

### ■ Names of parts

This figure shows the NXM620M.



# Installation

## Location for installation

The motor is designed and manufactured to be incorporated in equipment. Install it in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature 0 to +40 °C (+32 to +104 °F) (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area not subject to splashing oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- 1000 m (3300 ft.) or lower above sea level

## Installation direction

The motor can be installed in any direction. There is an exception, however, in humid places, areas subject to mist and other environments where water accumulates easily. In such environments, the motor should be installed in the direction whereby the motor cable extends downward.

## Installation method

To allow for prevent vibration, install the motor on a metal surface of sufficient strength. Install the motor in a location where heat dissipation capacity equivalent to a level achieved with a heat sink (made of aluminum) is ensured. Refer to the table below for the heat sink.

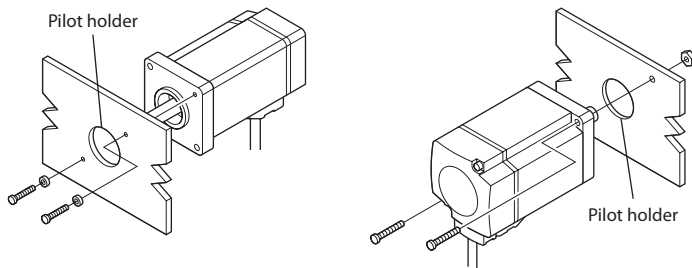
Motor model *	Heat sink size [mm (in.)]
NXM45, NXM410, NXM620, NXM65-PS□, NXM610-PS□, NXM920-PS□, NXM810-J□, NXM820-J□	250×250×6 (9.84×9.84×0.24)
NXM640, NXM940-PS□, NXM1040-J□	300×300×10 (11.81×11.81×0.39)
NXM975, NXM1075-J□	350×350×10 (13.78×13.78×0.39)

\* □ within the model name represents the gear ratio.

## Motor frame size: 42 mm (1.65 in.)

Secure at the two mounting holes according to the installation method appropriate for your specific method of use.

- Installation method A
- Installation method B



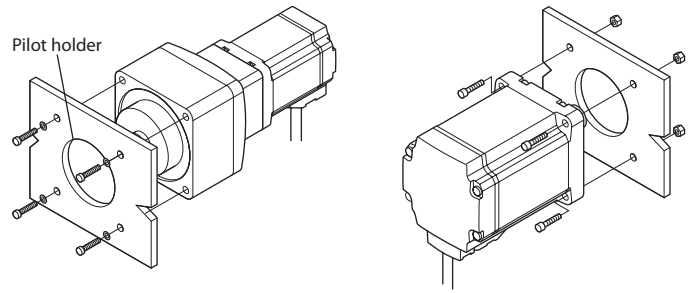
### Standard type

Frame size [mm (in.)]	Bolt size	Tightening torque [N-m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
42 (1.65)	M3	1 (142)	6 (0.24)	A
			—	B

## Motor frame size: 60 to 104 mm (2.36 to 4.09 in.)

Secure at the four mounting holes according to the installation method appropriate for your specific method of use.

- Installation method C
- Installation method D



### Standard type

Frame size [mm (in.)]	Bolt size	Tightening torque [N-m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
60 (2.36)	M4	2 (280)	—	D
85 (3.35)	M6	3 (420)		

### PS geared type

Frame size [mm (in.)]	Bolt size	Tightening torque [N-m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
60 (2.36)	M5	2.5 (350)	10 (0.39)	C
90 (3.54)	M8	4 (560)	15 (0.59)	

### PJ geared

Frame size [mm (in.)]	Bolt size	Tightening torque [N-m (oz-in)]	Effective depth of bolt [mm (in.)]	Installation method
80 (3.15)	M6	9 (1270)	—	D
104 (4.09)	M8	15 (2100)		



Since the tightening torque of the PJ geared type is large, using a mechanically weak mounting plate or screws may cause damage. Satisfy the following conditions for the mounting plate and screws. Also, be sure to tighten with the specified torque.  
Material of mounting plate: Steel  
Mounting screw: Use a Bolt which tensile strength rank is 12.9 or higher

## Note for when the installation method B or D is used

If washers are used with the installation method B or D, make sure the washer type and size are correct. The washers may come into contact with the motor flange, causing improper installation. Refer to the table below, and use suitable washers in which the bolts are completely seated.

Frame size [mm (in.)]	Bolt size	Outer diameter of washer [mm (in.)]
42 (1.65)	M3	Ø5.9 (0.23) or less
60 (2.36)	M4	Ø8.6 (0.34) or less
85 (3.35)	M6	Ø12 (0.47) or less

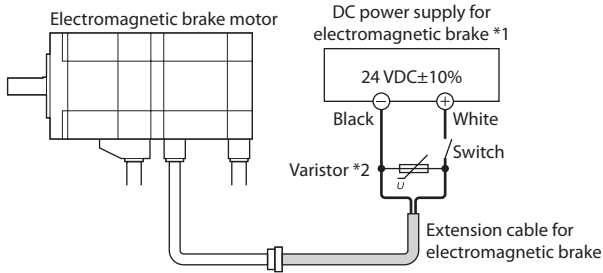
## ■ Installing a load

When connecting a load to the motor, align the centers of the motor's output shaft and load shaft. Be careful not to damage the output shaft or the bearings (ball bearings) when installing a coupling or pulley to the motor's output shaft.

## ● Electromagnetic brake motor

To release the electromagnetic brake and install the load, a DC power supply is needed to power the electromagnetic brake. Use an extension cable for electromagnetic brake to connect a DC power supply of 24 VDC±10% to the motor.

Unit models come with an extension cable for electromagnetic brake.



\*1 The power supply current capacities are as follows.

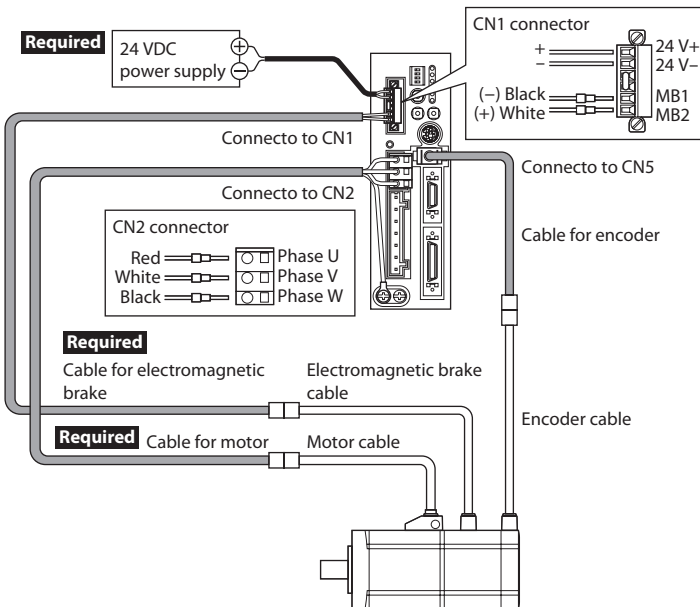
**NX975, NX1040, NX1075:** 0.8 A or more  
 Motor other than the above: 0.7 A or more

\*2 To protect the switch contacts and prevent noise, the customer is advised to provide a varistor [recommended varistor: Z15D121 (SEMITEC Corporation)].

## Connection

### ■ Connecting to the driver

Refer to the **OPERATING MANUAL Driver** or **USER MANUAL** for the connection method. After the cables have been interconnected, cover each connector with the connector cover.



### ■ Grounding the motor

Connect the lead wire for Protective Earth Terminal of the "cable for motor", to the Protective Earth Terminal on the driver.

Tightening torque: 1.2 N·m (170 oz-in)

## General specifications

Degree of protection		IP65 *
Operation environment	Ambient temperature	0 to +40 °C (+32 to +104 °F) (non-freezing)
	Humidity	85% or less (non-condensing)
	Altitude	Up to 1000 m (3300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, liquids, or oil (oil droplets)
Storage environment	Ambient temperature	-20 to +60 °C (-4 to +140 °F) (non-freezing)
	Humidity	85% or less (non-condensing)
	Altitude	Up to 3000 m (10000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, liquids, or oil (oil droplets)
Shipping environment	Ambient temperature	-20 to +60 °C (-4 to +140 °F) (non-freezing)
	Humidity	85% or less (non-condensing)
	Altitude	Up to 3000 m (10000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, liquids, or oil (oil droplets)

\* With the standard type, excluding the through part of the shaft and connectors.  
 With the geared type, excluding the connectors.

## Inspection

It is recommended that periodic inspections be conducted for the items listed below after each operation of the motor. If an abnormal condition is noted, discontinue any use and contact your nearest office.

### ● During inspection

- Are any of the motor mounting screws loose?
- Check for any unusual noises in the motor's bearings (ball bearings) or other moving parts.
- Are the motor's output shaft and load shaft out of alignment?
- Are there any scratches, signs of stress or loose driver connections in the motor cable?

## Options

### ● Connection cable set, flexible connection cable set

Motor cable set is needed to connect the motor and driver. Each set includes two cables, one for motor and the other for encoder.

The connection cable set for electromagnetic brake includes three cables, one each for motor, encoder and electromagnetic brake.

#### ● For standard motor

Model *	Length [m (ft.)]
CC010VN□	1 (3.3)
CC020VN□	2 (6.6)
CC030VN□	3 (9.8)
CC050VN□	5 (16.4)
CC070VN□	7 (23)
CC100VN□	10 (32.8)
CC150VN□	15 (49.2)
CC200VN□	20 (65.6)

#### ● For electromagnetic brake

Model *	Length [m (ft.)]
CC010VN□B	1 (3.3)
CC020VN□B	2 (6.6)
CC030VN□B	3 (9.8)
CC050VN□B	5 (16.4)
CC070VN□B	7 (23)
CC100VN□B	10 (32.8)
CC150VN□B	15 (49.2)
CC200VN□B	20 (65.6)

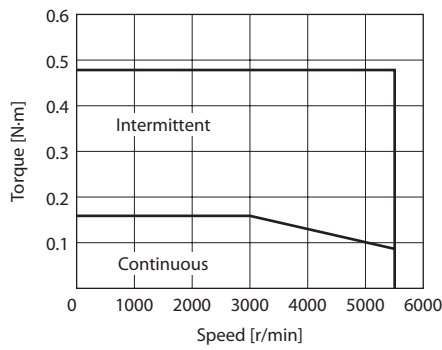
\* □ indicates **F** (connection cable set) or **R** (flexible connection cable set).

# Speed-Torque characteristics

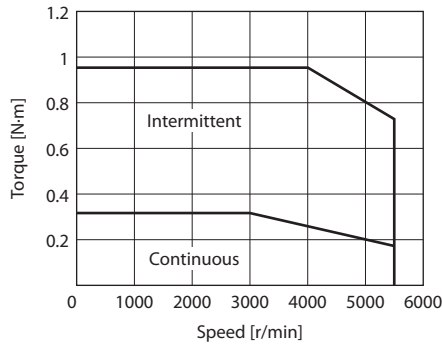
## Standard type

Motor model	Continuous stall current [A]	Heat sink size [mm (in.)]	Maximum speed [r/min]
NXM45A NXM45M	0.91	250×250×6 (9.84×9.84×0.24)	5500
NXM410A NXM410M	1.12		
NXM620A NXM620M	1.8		
NXM640A NXM640M	3.2	300×300×10 (11.81×11.81×0.39)	
NXM975A NXM975M	5.9	350×350×10 (13.78×13.78×0.39)	

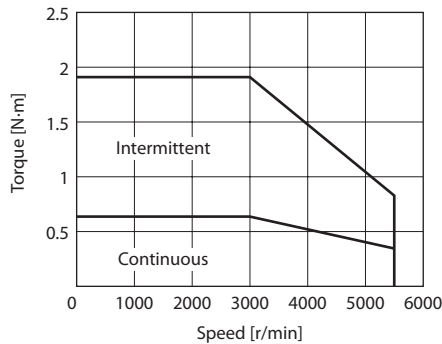
### • NXM45A, NXM45M



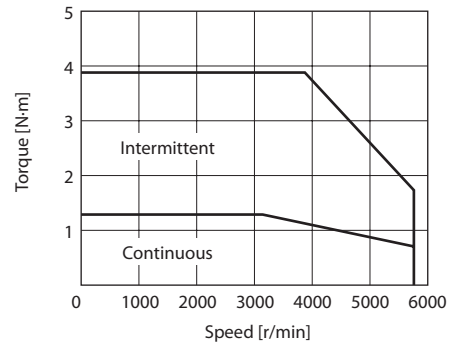
### • NXM410A, NXM410M



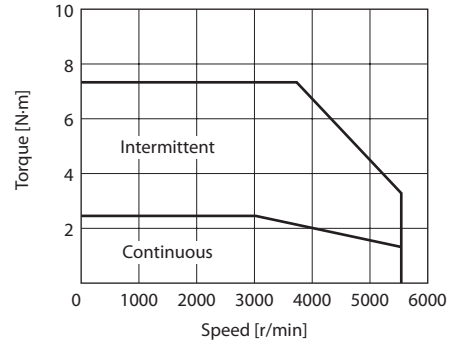
### • NXM620A, NXM620M



### • NXM640A, NXM640M



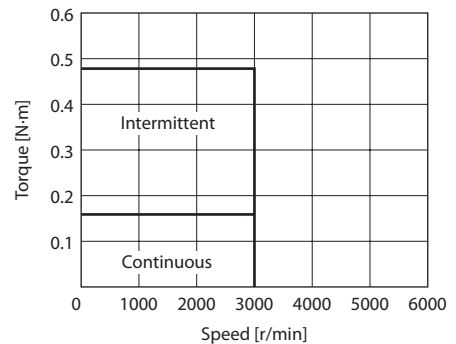
### • NXM975A, NXM975M



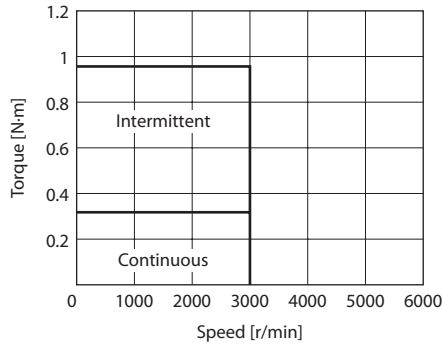
## Geared type

Motor model	Continuous stall current [A]	Heat sink size [mm (in.)]	Maximum speed [r/min]
NXM45A NXM45M	0.91	250×250×6 (9.84×9.84×0.24)	3000
NXM410A NXM410M	1.12		
NXM610A-J NXM610M-J	1.1		
NXM620A-J NXM620M-J NXM620A NXM620M	1.8	300×300×10 (11.81×11.81×0.39)	
NXM640A NXM640M	3.2		
NXM940A-J NXM940M-J	5.1	350×350×10 (13.78×13.78×0.39)	
NXM975A-J NXM975M-J	5.9		

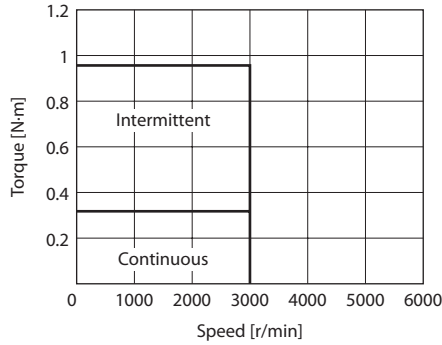
### • NXM45A, NXM45M



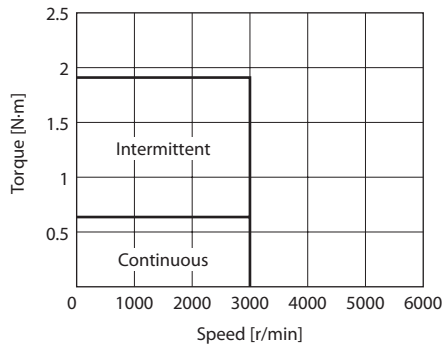
• NXM410A, NXM410M



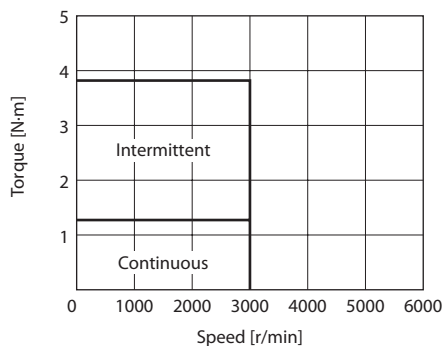
• NXM610A-J, NXM610M-J



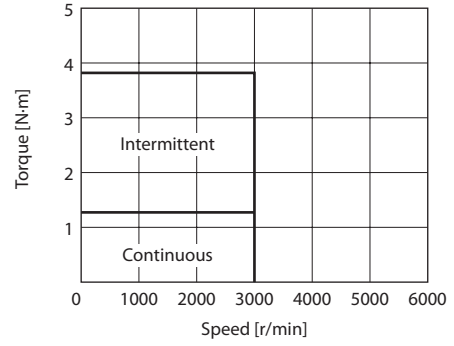
• NXM620A-J, NXM620M-J, NXM620A, NXM620M



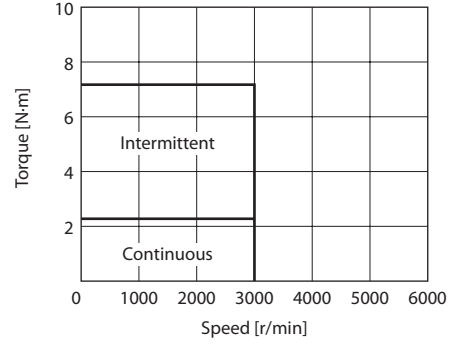
• NXM640A, NXM640M



• NXM940A-J, NXM940M-J



• NXM975A-J, NXM975M-J



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