GTR-AR

Battery Powered Gearmotor SD type
Detailed Instruction Manual

<Read this Manual before using the product.>

APG（Inline Shaft）

AFC（Right Angle Hollow Bore）

NISSEI CORPORATION

Introduction

Thank you very much for purchasing our product.

Safety Precautions

・Be sure to carefully read the contents described in this instruction manual and to understand how to use product correctly before using it.
・The extent of hazard/damage expected to occur in the case of improper handling are classified and indicated in ranks of “DANGER”, ”WARNING”, and ”CAUTION.” The definitions and indications are as follows.

■ Description of the symbol

Danger	Cases where it is expected that a degree of danger is extremely high such that improper handling possibly causes a dangerous situation to occur, which may lead to death or serious injury.
Warning	Cases where improper handling possibly causes a dangerous situation to occur, which may lead to death or serious injury.
Caution	Cases where improper handling possibly causes a dangerous situation to occur, from which a minor or medium degree of injury may be incurred.

Even items described in “CAUTION” may lead to a serious results depending on the situation.
Be sure to observe every instruction which deals with important contents.

■ The types of contents to be observed are explained with classification by graphical symbols below.

	Indicates "What You Must Pay Attention To."		Indicates "What You Must Not Do."
	Indicates "Burn Hazard."		Indicates "Do Not Disassemble."
	Indicates "Electric Shock Hazard."		Indicates "What You Must Do."
	Indicates "Fire Hazard."		Indicates "Ground Connection."

Danger	
■ General	
	If the product is used in an application such as a personnel transport device, make sure to install a protective device for safety purposes. Failure to implement safety measures may result in personal injury, death, and/or damage to the application.
	If the product is used in an elevator, install a safety device on the application to prevent it from falling. Failure to implement safety measures may result in personal injury, death, and/or damage to the application due to the falling of the elevator.
	Do not use the product under the explosive atmosphere. Failure to follow this precaution may result in explosions, ignition of fire, fire, electric shock, injury, and/or damage to the application.
■ Wiring	
	Do not change the wiring while the product is energized. Failure to follow this precaution may result in fire, electric shock, and/or damage to the application.

⚠ Warning

■ General	
	The operators in charge of installation, piping, wiring, operation, handling, maintenance, and inspection should have enough knowledge and technical skill related to the product. Failure to follow this precaution may result in fire, electric shock, injury, and/or damage to the application.
	Do not repair, disassemble or remodel the product. Failure to observe this precaution may result in injury, fire, electric shock, and/or burns.
	When replacing the product equipped with holding brake, make sure to secure the application side. Failure to follow this precaution may result in injury and/or damage to the application due to the falling of the device.
	Be sure not to get water or oil/grease into the brake unit. Failure to follow this precaution may result in falling or out-of-control accident due to the decreased brake torque.
■ Installation	
	Do not operate the product where it is exposed to water (except IP65), corrosive atmosphere, flammable gas atmosphere, and near the combustible material. Failure to follow this precaution may result in fire and/or accident.
■ Operation	
	When the operation has stopped due to the occurrence of error or activated safeguards, do not re-start the operation until the causes of error are determined and countermeasures are taken. Failure to follow this precaution may result in damage to the application, injury, fire, electric shock, and/or burns.
	Be sure not to approach to the application after a power failure. Otherwise, sudden power recovery may cause injury.
	When performing trial operation, fix the product in place and disconnect it from the application. Failure to follow this precaution may result in injury.

⚠ Caution

■ General	
	Never perform operations with wet hands. Failure to follow this precaution may result in electric shock.
	When operating the gearmotor with the specialized driver, use it under the specified combination. Failure to follow this precaution may result in damage to the application and/or fire.
	Operate the product under the conditions specified in this instruction manual. Failure to follow this precaution may result in damage to the application and/or injury.
	Do not expose the product to strong impacts/shocks. Failure to observe this precaution may result in failure of the product and/or injury.
	If a dangerous situation is expected due to the movement by external force (gravity, etc.) when the power is shut off or stopped abnormally, safety cannot be ensured with the holding brake of the gearmotor . In this case, be sure to provide an external brake structure to ensure safety. Failure to follow this precaution may result in damage of the product and/or injury.
	When reversing the rotation, be sure to stop the motor completely before starting the reverse rotation. Otherwise, the application may be damaged.
	Do not perform withstand voltage test witch applies 12V or more to the sensor circuit built in the motor. Failure to follow this precaution may result in damage of the product and/or injury.
	Make sure the temperature of motor surface should not exceed 90℃.Failure to follow this precaution may result in damage of the product and/or burn injury.
	Do not remove the nameplate.

⚠ Caution

■ Transportation	
	The product must be transported correctly in accordance with its weight. Failure to follow this precaution may result in injury and/or malfunction.
	Do not transport the gearmotor by holding the cable or the output shaft. Failure to follow this precaution may result in damage to the application and/or injury.
	Do not overload/over stack the products. Failure to follow this precaution may result in injury and/or malfunction.
■ Installation	
	When handling the gearmotor, be careful with the sharp edges/points of the application. Failure to follow this precaution may result in injury.
	Fix the gearmotor firmly in place. Failure to follow this precaution may result in damage to the application and/or injury.
	Do not put any combustible material near the product. Failure to follow this precaution may result in fire.
	Do not put any object that may prevent air from being circulated around the product. Failure to follow this precaution may cause burns due to abnormal overheating, and/or fire.
	Do not stand on or place any heavy object on the product. Failure to follow this precaution may result in injury.
	Install an oil pan for a food machinery and other applications in which leakage cannot be present and may occur in the event of a failure, service life, etc. Otherwise, products may be defective due to oil leakage.
■ Wiring	
	Be careful not to cause damage to the cable nor pull it strongly. Failure to follow this precaution may result in injury, fire, and/or electric shock.
	Make sure that the gearmotor is correctly wired. Failure to follow this precaution may result in injury due to damaged equipment.
■ Operation	
	Immediately stop the operation if there is any abnormality. Failure to follow this precaution may result in electric shock, injury, and/or fire.
	Do not touch the gearmotor when the power is on or immediately after turning off the power, as their surfaces may be hot for a while. Failure to follow this precaution may cause burns.
	Do not touch the rotating part of the gearmotor. Failure to follow this precaution may result in injury.

Important

When disposing of the product, dispose of it as a general industrial waste. Please follow local laws and regulations if any apply and take care of the waste accordingly.

Notice

We shall assume no responsibility or liability for any troubles caused by use that violates the cautions above.

The contents of this manual are subject to change without notice.

We have made every possible effort to make the contents of this manual easy to understand. If there is anything that is unclear or hard to understand, please feel free to contact us.

■ CCC Certification

Brushless DC Gearmotors are not subject to CCC certification.

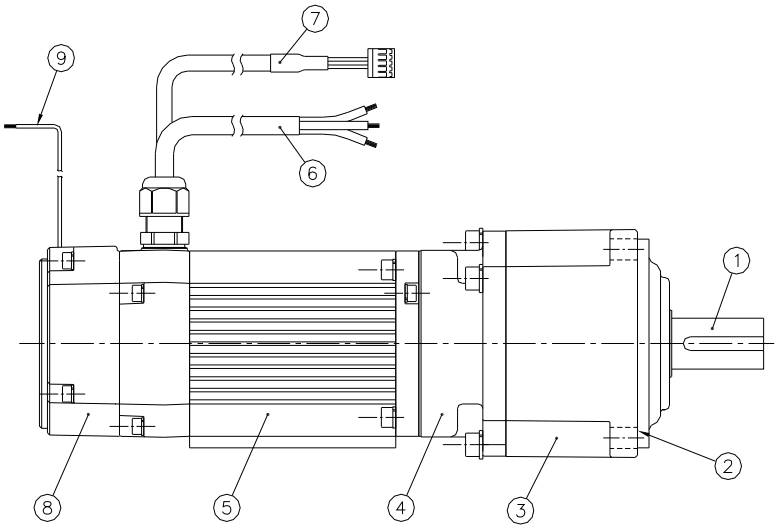
Brushless DC Gearmotors need to control by motor control Drive Unit.
Therefor applicable models are not subject to CCC certification.

Table of contents

1. Before Using This Product

1-1 Names of Part

■ Gearmotor



*Its appearance differs according to classification by mount form.

No.	Name	No.	Name
1	Output shaft	6	Motor power line
2	Assembling Flange	7	Motor signal line
3	Gearhead	8	Brake
4	Bracket	9	Brake lead wire
5	Motor		

1-2 Inspection upon Unpacking

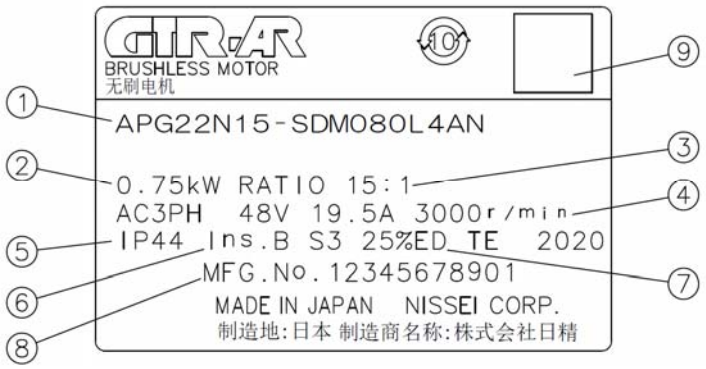
■ Checking Package Contents

Check for the following items when unpacking the package.
Contact the dealer from where you purchased the product or your nearest service office if you have any questions or if there are any defects.

1. Is the information on the nameplate consistent with your order?
   (Gearmotor Model, Reduction Ratio, Motor Power, Voltage, etc.)
2. Were any parts damaged during transportation?
3. Are there any loose screws, bolts, or nuts?
4. Do the accessories included in the package match the contents of the accessory list?
   (The accessory list is not included if there are no accessories.)

1-3 Information provided on Nameplate

The following is a typical nameplate.



No.	Description
1	Gearmotor Model
2	Motor Power
3	Reduction ratio
4	Rated Voltage
5	IP Rating
6	Insulation class
7	Rating
8	Manufacturing No.(MFG NO.)
9	QR code

- Check the following chart for Gearmotor Model.
- In case of inquiry, inform us the Gearmotor Model and MFG NO.

1-4 Gearmotor Model

The contents of Gearmotor Model's codes are as follows.
Make sure the Gearmotor Model on nameplate is consistent with your order.

Gearhead Type				
[1]	[2]	[3]	[4]	
Mount Form	Frame Number	Shaft Arrangemnet	Reduction ratio	–
APG	22	N	15	–

Motor Model						option
[5]	[6]	[7]	[8]	[9]	[10]	[11]
Motor Classification	Motor Specification	Motor Power	Power supply voltage	Standards	Brake	Auxiliary Code
SD	M	80	L4	A	N	X

Gearhead Type	[1]	Mount Form	APG	Inline Shaft	
			AFC	Right Angle Hollow Bore	
	[2]	Frame Number	＊＊	Output Shaft Diameter	
	[3]	Shaft Arrangement	N	Inline Shaft	
			S	Right Angle Hollow Bore	
	[4]	Reduction ratio	15～60	15:1/15 20:1/20 25:1/25 30:1/30 40:1/40 50:1/50 60:1/60	
Motor Model	[5]	Motor Classification	SD	Brushless Motor SD type	
	[6]	Motor Specification	Inline Shaft(APG)		Right Angle Hollow Bore(AFC)
			M	IP44	M / IP40
			W	IP65	
	[7]	Motor Power	080	0.75kW	
	[8]	Power supply voltage	L4	DC48V	
	[9]	Standards	A	No Standard	
	[10]	Brake	N	No Brake	
			B	With Brake	
option	[11]	Auxiliary Code	Blank	Standard Specification	
			X	Designates a special option	

- [2] Frame Number is changed by Mount Form.

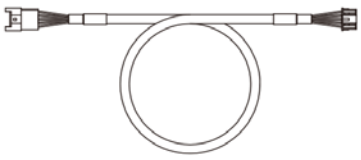
2. Connection method and Installation

2-1 Connection method

Connect each device as shown in the following figure.

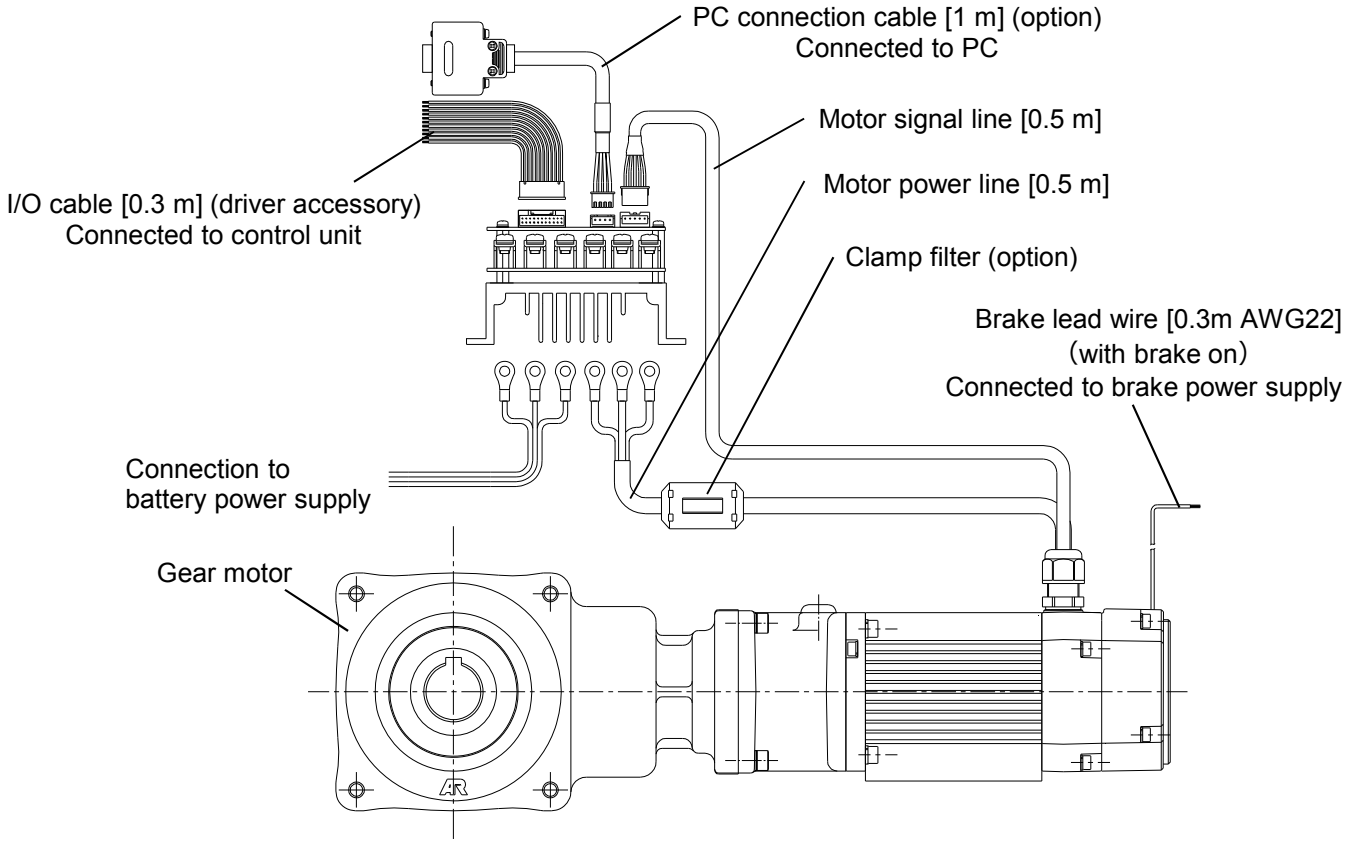
- The length of the cords from the gearmotor is 0.5 m.
- Please use the extension cord (Option) if you need to extend the motor signal line.
  If it is extended by connecting optional extension cords, its overall length must be 4.5 m or less
  (i.e. up to four extension cords can be used).
- Extension cords are not available for the motor power line and Extend it to 5 m or less using cords with a diameter not smaller than the specified wire diameter (P12 ■Motor Specification).
  Make the motor power line as short as possible in order to avoid deterioration of motor characteristics.
  brake lead wire.

■Extension cord [1 m]
(optional part: OP-ACDSG1)



* Shipped with the extension cord having a connector on both ends.

■Example of connecting to Nissei Driver



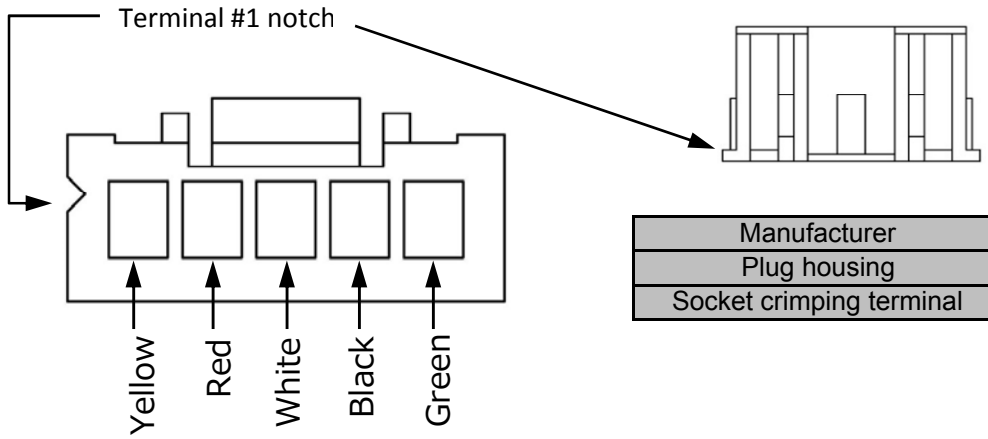
Note: 1. The maximum extension length for the motor signal line, motor power line, and brake lead wire is 5 m.
If the motor signal line is extended by connecting optional extension cords, its overall length must be 4.5 m or less (i.e., up to four extension cords can be used).
2. The motor power line is not equipped with a round terminal.
Such terminal must be prepared by the user.
3. The connector is not waterproof specification.

2-2 Motor signal line and power line

■ Signal line colors and functions

Line color	Function
Yellow	Pole sensor power supply (15 V for Nissei driver)
Red	U-phase pole signal output (open collector)
White	V-phase pole signal output (open collector)
Black	W-phase pole signal output (open collector)
Green	GND

■ Connector pin configuration



Manufacturer	J.S.T. MFG.
Plug housing	XAP-05V-1
Socket crimping terminal	SXA-001T-P0.6

■ Motor power line colors and descriptions

Line color	Description
Red	U-phase
White	V-phase
Black	W-phase

■ Brake lead wire colors and voltage specifications

Wire color	Voltage specification
Brown	48V specification

2-3 Installation

■ Installation Environment

IP Rating	IP40 / IP44	IP65
Ambient Temperature	0℃～40℃	0℃～40℃
Ambient Humidity	85%RH or lower (no condensation)	100%RH or lower (no condensation)
Altitude	1000m or lower	1000m or lower
Atmosphere	A place with no corrosive/explosive gas, vapor, etc. A well-ventilated place without any dust.	A place with no corrosive/explosive gas, vapor, etc. Not to be used underwater or in places where high water pressure is applied.
Installation Place	Indoors	Indoors / Outdoors

■ Installation Orientation

No restriction on installation orientation. (Since it uses a grease lubrication system)

■ Installation Procedure

Secure the gearmotor with four bolts on a vibration-free and flat machine-processed surface.
If the foundation is bad or the mounting surface is not flat enough, vibration may occur during operation and the service life of the gearmotor may be shortened.
Make sure the flatness of the mounting surface is 0.1mm or less.

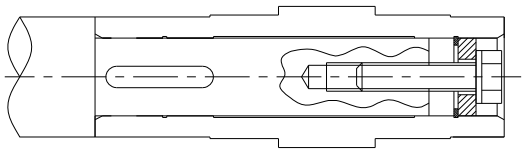
Tightening torque for installation bolts (reference value)

Mounting Hole (mm)	Bolt Size	Tightening Torque	
		(N・m)	{(kgf・m)}
9	M8	13	{1.3}
11	M10	25	{2.6}

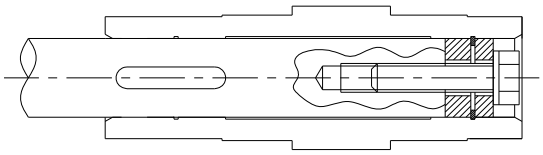
■ Method of Fixing/Installing and removing the Drive Shaft for Right Angle Hollow Bore(AFC)

● Method of Fixing

1.When there are steps on the drive shaft

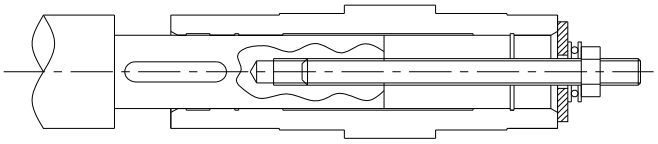


2.When there are no steps on the drive shaft

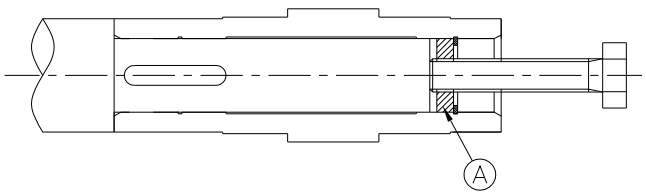


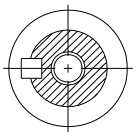
● Installing and removing the Drive Shaft
It's easy to install and remove the Drive Shaft as follows.

1.Installing



2.Removing

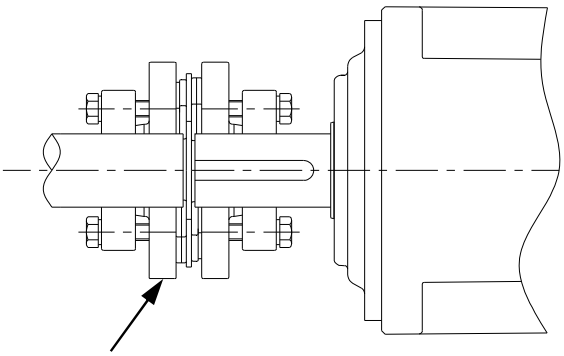




cross-section "A"

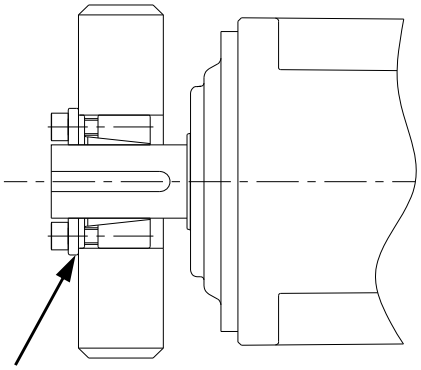
■ Connecting with Inline Shaft(APG)

● Against solid shaft
(Tightening with ball screw, etc.)



Commercial
flexible coupling

● Against hollow Bore
(Tightening with pulley, etc.)



Commercial
tightening device

■ Connecting with other equipment

For connecting the reducer to the other equipment, be sure to observe following points.

● "H7" fit is recommended for the couplings, sprockets, pulleys, gears, etc.
when attaching to the reducer shaft.

1.When directly connected
Connect the reducer to the other equipment precisely, so that the center of the shaft of both machines will be fully aligned.

2.Attaching Chains, V-Belts, Gears, etc.
・In any connection, the shaft center of the reducer and the shaft center of the other equipment must be set parallel to each other.
Also, be sure that the centerline of the sprockets and pulleys are perpendicular to the shaft.
・In case excessive load is applied to the end of the output shaft, unexpected force could arise, which may result in crack of the case.
Therefore, insert the sprockets, pulley, gear,etc. to the shoulder of the shaft, so that the load point could be as close to the reducer as possible.
・When operating by using belt, be sure not to give too much tension in order to avoid slipping.
Excessive tensioning may result in damage to the bearings of the shaft.
・When operating by using chain, if the chain is installed loosely, shock load will occur when the drive shaft starts rotation, and this can result in damage to the reducer and the other equipment.
Therefore, care should be given to the tension of the chain.

3. Specifications and Performance

3-1 Motor and Electromagnetic Brake Specifications

■ Motor Specifications

Motor	Battery Powered Brushless Motor	
Motor Power	0.75 kW	
Voltage	DC 48V	
Rated Current	19.5 A	
Rating	S3 25%	
Motor Lead Wire Size	2 mm^2 (AWG14)	
Maximum Extended Length	5 m	
Ambient Temperature	0～40 ℃	
Ambient Humidity	IP40/IP44	85%RH or lower (no condensation)
	IP65	100%RH or lower (no condensation)
Ambient Storage Temperature	-10～60 ℃ (no freezing)	
Ambient Storage Humidity	IP40/IP44	85%RH or lower (no condensation)
	IP65	100%RH or lower (no condensation)
Vibration	0.5G or lower	
Altitude	1,000m or lower	
Atmosphere	IP40/IP44	A place with no corrosive/explosive gas, vapor, etc. A well-ventilated place without any dust.
	IP65	A place with no corrosive/explosive gas, vapor, etc. Not to be used underwater or in places where high water pressure is applied.
Installation Place	IP40/IP44	Indoors
	IP65	Indoors/Outdoors

* Rated current value is a reference value for motor only.(without the gearhead)
About Gearmotor, plase refer the Gearmotor Characteristics(P.13).

■ Electromagnetic Brake Specifications

Item \ Motor Power	0.75 kW
Brake Type	Power-Off (Spring Close)
Static Torque (motor shaft)	3.0 N·m
Excitation Voltage	DC 48V ±10%
Current Draw (at20℃)	0.21 A
Power Draw (at20℃)	10.0 W
Brake Lead Wire Size	0.3 mm^2 (AWG22)

* Electromagnetic Brake is meant for holding and should not be used for braking.

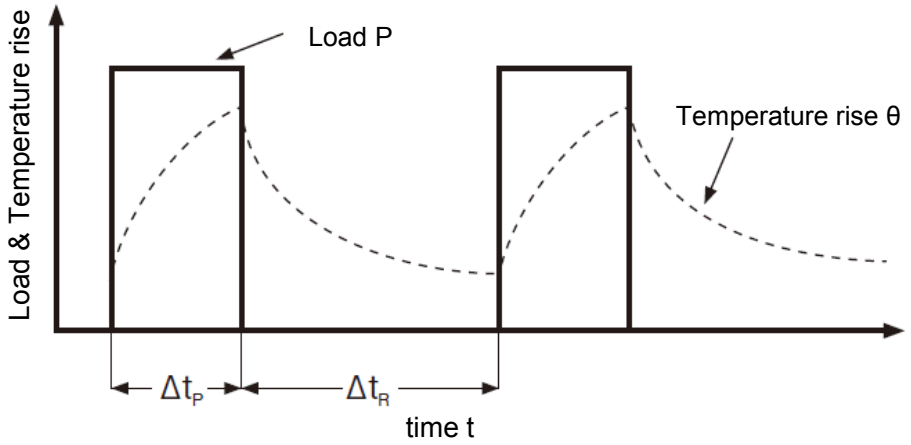
Be sure to insert a surge protector to protect the driver from surge generated by turning on/off the electromagnetic brake.
Use the varistor (82V, 1J or higher) included in the package or a diode (100V, 1A or higher).

3-2 Range of use of Gearmotor

■ Rating

Rating class of this product is Intermittent Rating(S3 25%).
Intermittent Rating(S3) is repeating the cycle which is operation period with constant load and suspension period without apply voltage,
Duty Factor of this product is 25%.

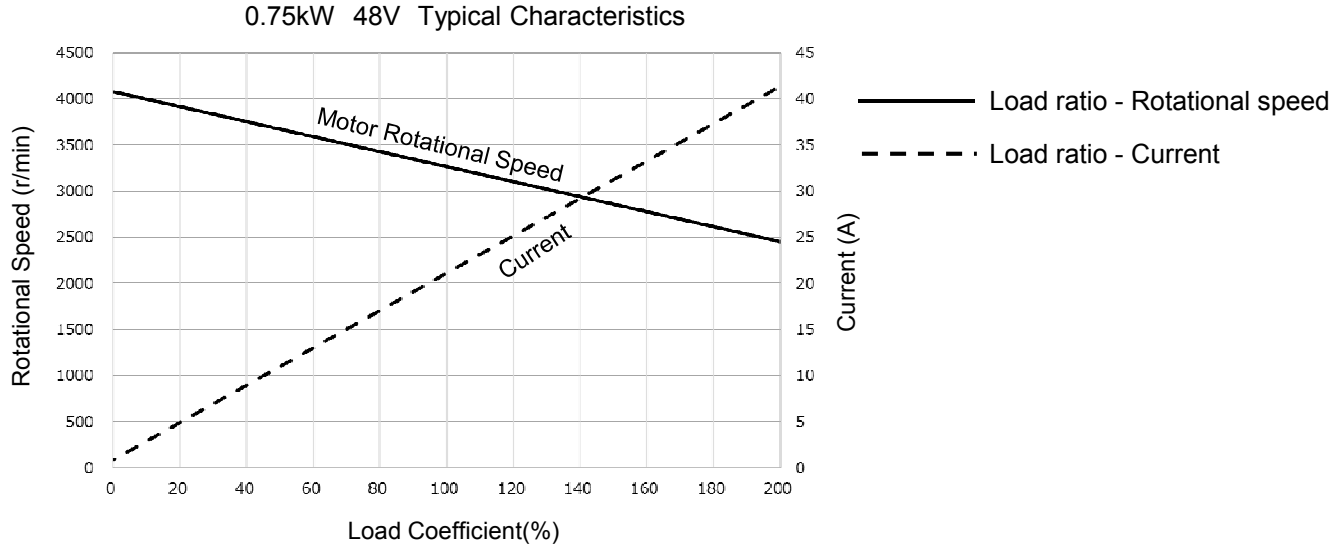
$$\text{Duty Factor} = \frac{\Delta t_P}{\Delta t_P + \Delta t_R} \times 100$$



■Gearmotor Characteristics

The coefficient of rotation speed to load and the coefficient of current draw to load for gearmotor units are shown in these graphs.
These characteristics are gearmotor unit characterisrics.
Customers may refer to these graphs when creating drivers.

* The rotational speed in the graphs below corresponds to the motor shaft.
  Use the gear ratio to calculate the output rotational speed.
* In the graphs below, 100% corresponds to output allowable torque in the performance tables.



When using a Nissei Driver
Used within the rated speed range (80 to 3000 r/min) at 100% load factor.

3-3 When making a driver

■ Type and specifications of Hall IC

Manufacturer	Asahi Kasei Micro devices
Model	EW-710B
Power Supply Voltage	18V
Output Current	15mA
Operating Temperature	-20～115℃

■ Excitation pattern

・It rotates in the forward direction as illustrated below.
・Excitation current flows in the reverse direction through the power lines when rotating in the reverse direction.

■ Specifications of Motor and Electromagnetic Brake

・Electromotive force constant and torque constant of a single motor are described below.

Motor Characteristics	0.75kW
	48V
Electromotive Force Constant (V/kr/min)	8.2
Torque Constant (Nm/A)	0.12
Line Resistance (Ω)at 20ºC	0.061

・The resistance values of the electromagnetic brake are described below.

Electromagnetic Brake Characteristics	0.75kW
	48V
Coil Resistance (Ω) at 20ºC	230

4. Maintenance, Service Life, and Inspection

4-1 Maintenance and Service Life

■Gearmotor

- All the models that we offer utilize grease for lubrication so replacement and replenishment of the grease is not required.
  The gearmotor is designed for 10,000 hour mark.
- The service life of the oil seal may differ depending on the environment and usage.
  Oil seals may need to replaced before the 10,000 hour mark.

4-2 Periodic Inspection

Gearmotor inspection items are described in the table below.
Based on the inspection guideline, determine the best inspection time by judging the usage and environme

Inspection items	Inspection frequency	Inspection and maintenance procedure	Remarks
Checking of connection between gearmotor and machine	Before the start of operations	・Make sure that the gearmotor-machine mounting screws are tight enough. ・Make sure that the gearmotor is firmly connected to the load. ・Check for misalignment.	—
Vibrational and acoustic check	Everyday	・Check by touch and hearing.	No increase from the normal level
Appearance check	Whenever required	・Perform cleaning with a cloth, compressed air, etc.	—
Checking for grease leakage	Every 2 to 3 days	・Make sure that the connections of the gearmotor case, oil seal, bracket, etc. are free from leakage.	—

5. Storage

1.Storage location

(1) When the product is stored, it shall be stored in a dry place indoors, with good ventilation, without direct sunlight, extreme temperature change, humidity, dust, and/or corrosive gas.
(2) Do not directly place the product on the ground when it is stored.
(3) If there is a micro vibration the bearing may be damaged by fretting corrosion even when the product is stored. Please store the product in a place without vibration.

2.Operation during storage

(1) To prevent the bearings from getting rusty, operate the motor every six months to check if the motor rotates smoothly and there is no abnormal sound.
(2) Apply rust prevention to the output shaft and the flange side and other uncoated processed surfaces every six months.

3.Usage after storage

(1) Check that there is no abnormal sound, vibration, heat generation and other abnormalities during the initial operation.
(2) For gearmotors with a brake, check that the brake operates properly.
If any abnormality is found, please immediately contact our nearest service office.

6. Warranty

1.Warranty period

Whichever is shorter of 18 months from the date of delivery or 12 months after start of use.

2.Warranty coverage

(1) The warranty coverage is limited to our production range.
(2) If a failure that prevents function of the delivered product occurs under the conditions with normal installation/connection and handling (inspection/maintenance) described in this instruction manual during the warranty period, the product will be repaired without any additional cost.
However, if it falls under the following warranty exclusions, they shall not be covered by the warranty.

3.Warranty exclusions

(1) Repair, parts replacement or delivery of alternative products caused due to product wear of disassembling and remodeling by customers.
(2) When the product is operated under conditions that are outside of the rated data described in our catalog/instruction manual or specifications mutually agreed.
(3) When there is a defect(centering of coupling etc.) in the power transmission part with the customer's device.
(4) When inevitable accidents such as extraordinary natural disaster (Example: Earthquake, lightning, fire, and flooding) or artificial malfunction is a cause of a failure.
(5) Secondary failure caused by defects of customer's equipment.
(6) Failure due to a part supplied by the customer or designated parts, drive units (Example: motor, servo motor, hydraulic unit, etc)
(7) When storage, maintenance management of the delivered product is not performed properly and handling is not carried out correctly.(For storage, see “5.Storage”.)
(8) Failure due to items that cannot be attributed to our manufacturing responsibility other than the above.
(9) We do not take any responsibilities for the loss of opportunity due to operation failure etc. and damage to other than our products.

4. Governing Law

These items related to the product and this operation manual shall be governed by and construed in accordance with the laws of Japan.

Contact Us

■Inquiries about quote, purchase, repair, and inspection

Overseas Sales	
Address	1-1 Inoue, Izumi-cho, Anjo, Aichi 444-1297, Japan
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■ Related instruction manual and software

Name	Battery Powered Gearmotor SD type Detailed Instruction Manual (this manual)
Description	Detailed instruction manual with wiring method of the gearmotor, notes, etc.
URL	https://www.nissei-gtr.co.jp/pdf/data/gtr/manual/sd/battery-msd-e.pdf

Name	Battery Powered Driver SD type Detailed Instruction Manual
Description	Deatiled Instruction Manual for the Specialized Driver including details of Parameters, etc.
URL	https://www.nissei-gtr.co.jp/pdf/data/gtr/manual/sd/battery-dsd-e.pdf

Name	Parameter Setting Software for the Battery Powered Type Driver (ACD-PSTool)
Description	Parameter Setting Software for this Driver.
URL	https://english.nissei-gtr.co.jp/gtr/download/agreement-e/

Name	Parameter Setting Software for the Battery Powered Type Driver (ACD-PSTool) Instruction Manual
Description	Instruction Manual for Driver Parameter Setting Tool including Connection Method, etc.
URL	https://www.nissei-gtr.co.jp/pdf/data/gtr/manual/gtr2-cd/acd-pc-e.pdf

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