GTR-AR

Brushless Gearmotor
Battery Power Type
(CD Type)

Gearmotor Instruction Manual

G (Parallel Shaft)

H (Right Angle Shaft)

F2 (Hollow Shaft)

FOREWORD

Thank you for your purchasing of the GTR-AR Series storage battery operated Type.
Please be sure to read this lnstruction Manual before using the products, as it provides you with information for proper usage of this driver.

- All information contained in this manual is subject to change without notice due to revision or modification.
- Though we elaborated the contents, please advise us if any error is found in this manual.

For Safe Operation

- The contents of this Instruction Manual should be carefully read and understood before operating this product.
  The user of this product shall be responsible for any damage or loss incurred due to the user's negligence of appropriate usages and warnings described in this manual.
- This Instruction Manual should be deliverd to a person who actually operates this product.
- This Instruction Manual should carefully be kept in a convenient place for the operator's easy reference.
- In this Manual, injuries and damages anticipated in case of mishandling of the equipment, are classified into two categories, “Danger”and “Caution”. The definition of the classification are given below with the corresponding graphic symbols.

 **Danger**	The case that mishandling of the equipment may result in dangerous situation and may lead to serious of fatal injury to personnel.
 **Caution**	The case that mishandling of the equipment may result in dangerous situation and may lead to midium to light injury, or the case that may result in damage to the equipment.

Please be aware that even items marked with “CAUTlON” may cause fatal accidents. Therefore, be sure to follow the instruction, for every item described is very important.

⚠ Danger

(General)

- Do not use the product in explosiveness atmosphere Failure to observe this warning may cause explosion, spark, fire, electfic shock, physical injury, and/or damage to the equipment.
- The operators in charge of transportaton, installation, wiring, operation, maintenance, and inspection of the equipment should have enough knowledge and technical skill for the product. Failure to observe this warning may cause explosion, spark, fire, electric shock, physical injury, and/or damage to the equipment.
- If the product is to be used in a system for transportation, be sure to furnish it with a protective device for safety. Failure to observe this warning may cause physical injury and/or damage to the equipment by accidental falling.
- If the equipment is to be used with an elevator, be sure to furnish with a safety device to prevent the elevator from accidentaI falling. Failure to observe this warning may cause physical injury and/or damage to the equipment.
- Be sure not to get water or oil/grease into the brake unit. Failure to observe this warning may cause accidental falling and/or runaway accident by the decreased brake torque.
- Be sure not to splash the water to the driver. Failure to observe this warning may cause malfunction.

(Transportation)

- When a product is lifted up for transportation, be sure not to enter underneath of the lifted product. Falling of product may cause serious injury.

(Wiring)

- When connecting the product to the power cable, be sure to follow the Instruction Manual. Failure to observe this warning may cause electric shock, fire and/or malfunction.
- Be sure to cut off the power supply before wiring. Failure to observe this warning may cause electric shock and/or fire.
- Be sure to use the appropriate power supply specified in the nameplate. Failure to obseve this warning may cause burnout of the motor and/or fire.
- Do not bend, pull or tuck down power cables or motor lead wires forcibly. Failure to observe this warning may cause electric shock.
- lnstall an external circuit breaker, fuse or other safety devices on the power supply side for quick cutoff and stopping operation in case of abnormal overcurrent. Refer to page 45 for recommended fuse. Failure to observe this warning may cause malfunction and/or physical injury.
- Power-on with the operation signal ON induces a sudden movement of motor. Be sure to check if the operation signal is OFF before supplying power. Failure to observe this warning may cause physical injury.

(Operation)

- Do not approach or touch rotating parts such as a shaft while the machine is running. Failure to observe this warning may cause wind-in and physica1 injury.

(Daily lnspection, Maintenance)

- When inspecting and/or adjusting the machine while it is in operation, do not touch rotating parts such as a shaft. Failure to observe this warning may cause wind-in and physical injury.

- Do not operate the equipment with the safe guard off for inspection. Failure to observe this warning may cause wind-in and physical injury.

(Inspection and Maintenance of Brake Part)

- Before actual operation of the equipment, make sure the brake is functioning properly by turning the switch on and off. Failure to observe this warning may cause accidental falling and run out of control.
- Do not operate the equipment without brake cover after inspection and adjustment of brake gap. Failure to observe this warning may cause wind-in and physical injury.
- Do not release the brake while the equipment is being loaded in the application such as lift. Failure to observe this warning may cause accidental falling.

⚠ Causion

(General)

- Do not use a gearmotor under conditions other than specified in the nameplate or the product specifications. Failure to observe this warning may cause electric shock, physical injury and/or damage to the equipment.
- Do not insert your fingers or any other object into the aperture of the gearmotor. Failure to observe this warning may result in electric shock, physical injury, fire and/or damage to the equipment.
- Do not use the damaged geamotor. Failure to observe this warning may result in physical injury and/or fire.
- Never touch the inside of the driver. Failure to observe this warning may cause electric shock.
- Use a motor and driver only in the specified combination. An incorrect combination may cause damage to the equipment and/or fire.
- Do not touch the motor or driver during operation nor immediately after stopping. The surfaces are hot and this may cause a burn.
- Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. Failure to observe this warning may cause fire and/or physical injury.
- If the equipment is found abnormal, stop running immediately. Failure to observe this warning may cause physical injury and/or fire.
- Do not tear off the nameplate.
- NISSEI CORPORATION shall not be responsible for, and also shall not warrant any trouble derived from any modification and/or repair by the user.

(Check when unpacking)

- Check if the product is the same product as ordered. lnstalling a wrong product may cause physical injury and/or damage to the equipment.

(Transportation)

- Be careful when transporting products to avoid falling down.

(Installation)

- Do not place any inflammable object near the equipment. Failure to observe this warning may cause fire.
- Be sure to operate the product under the condition specified in this manual. Failure to observe this warning may cause malfunction.
- Do not place any object around this product so that it may not block circulation of air. Failure to observe this warning may result in abnormal overheating, due to the blocking of the air-ventilation, which may cause burn injury and/or fire.
- Do not step on nor place any heavy object on this product. Failure to observe this warning may cause physical injury.
- Do not step on a gearmotor or hang to it. Failure to observe this warning may cause physical injury.
- Do not touch the edge of the shaft of gearmotor or key groove in the bore with bare hands. Failure to observe this warning may cause physical injury.
- Do not give any strong impact nor shock to this product. Failure to observe this waming may cause malfunction.
- In equipments like food machines, which must avoid oil or grease, furnish with protective devices like oil pan, in order to protect from the oil leakage caused by failure or life of the manufactured products. Leaking oil may cause defective products.

(Connecting with other equipmcnt)

- When connecting the gearmotor with a load, make sure of the alignment of shaft, the tension of the belt and parallelism of pulleys. In direct coupling, be sure to check whether the alignment of shaft is extremely precise. If a belt is to be used, be sure to adjust its tension properly. Also, before operation, inspect whether the setting bolts for pulleys and coupling are securely tightened. Failure to observe this warning may cause serious injury and/or damage to the equipment due to broken parts.
- Safe guards should be furnished around rotating parts to avoid danger to persons.
- Before coupling with the other machine, be sure to check the direction of rotation. Unexpected operation in wrong direction may cause serious injury and/or damage to the equipment.

(Wiring)

- Be sure to connect wires properly and securely to the driver, motor and power supply. Failure to observe this warning may cause malfunction.
- Do not measure the insulation resistance. Failure to observe this warning may cause malfunction.
- Wiring should be properly made under the specified electrical equipment engineering standard or the safety code. Failure to observe this warning may cause elcctric shock, fire or physica1 injury.
- When rotating gearmotor alone, take off the key attached temporarily to the output shaft. Failure to observe this warning may cause physical injury.
- Check up the direction of rotation before connecting with the other machine. Rotation in wrong direction may cause physical injury and/or damage to the equipment.
- The length of the motor power cable and brake cable should be 3m or less, by recommended cable size. Excessive length of wiring may cause steep voltage drop and this makes the motor disable to start up.
- When reversing a gearmotor is required in operation, be sure to stop rotating and then start reversing. Reversing without complete rest may cause damage to the equipment.

(Operation)

- Do not touch the rotating part of motor during operation. Failure to observe this warning may cause physical injury.
- Do not get closer to the machine immediately after recovering from occurrence of instantaneous interruption of power supply. The machine may restart unexpectedly. Failure to observe this warning may cause physica1 injury.
- Do not restart operations just after the machine stop by abnormal hazard and/or protective function unless the cause is ldentified and any corrective action is taken.
- The gearmotor becomes rather hot during operation, so do not touch it with bare hands. Failure to observe this warning may cause burn injury.
- When a gearmotor is found abnormal, stop running immediately. Failure to observe this warning may cause electric shock, physical injury or fire.
- Do not supply the commercial power source directly to the motor. Failure to observe this warning may cause burnout of the motor.
- Be sure to secure the motor to the equipment. Failure to observe this warning may cause physical injury by unexpected movement when it starts/stops rotating.

(Daily lnspection, Maintenance)

- Surface of a gearmotor becomes very hot. Therefore, do not touch it with bare hands. Failure to observe this warning may cause burn injury.
- When operation being found abnormal, diagnose the fault according to the instruction manual. Do not operate the machine until the causes of fault are found and proper measures are taken.

(Disassemble and Assemble)

- Be sure to ask our branch office or factory for repairing, disassembling and assembling equipment. Failure to observe this warning may cause physical injury or fire.
- Before servicing, disconnect all power to the motor, confirm the motor is stopped, then wait at least three minutes. Failure to observe this warning may cause electric shock.
- Do not inspect the continuity of the wiring while the power is ON. Failure to observe this warning may cause electric shock.

(Disposal)

- When disposing our products, treat them properly as general industrial waste.

Contents

Installation

■ Proper location for installation

Ambient Temperature: 0℃ to 40℃
Ambient Humidity: Less than 85%
Altitude: Less than 1,000m
Environment: Well ventilated place free from dust. In case of dangerous atmosphere such as explosive gas or vapor exist, be sure to use an explosion-proof motor.
Installation Location: lndoors

■ Installation

Install the product with the four bolts on a flat and machined surface free from vibration.
Roughness of the surface should be less than 0.3mm.

■ Mounting Position

This product can be installed in any direction due to a grease lubrication system.

■ Connecting with Other Equipment

①H7 fit is recommended for the couplings, sprockets, pulleys, gears, etc. when attaching to the gearmotor.
②In case of direct connection, connect the machine to the other equipment precisely, so that the center of the shaft of both machines will be fully aligned.
③In case of attaching chains of belt, connect the units precisely, so that the center of the shafts of the gearmotor and that of the other equipment are parallel. Also, be sure that the centerline of the sprockets and pulleys must be perpendicular to the shaft.
④When installing the coupling of other machine to the output shaft, do not give any strong impact onto the output shaft and coupling. It may cause damage to the bearing, there by leading to noise, vibration or failure.

■ Cautions for Operation

①Load torque, moment of inertia J and OHL should all be kept lower than the allowable values in operation.
②Never start reversing before the motor is completely stopped. Plugging can cause serious damage to gearmotors and other machine components.
③Do not perform the withstand voltage test of the signal line of the motor. It may cause damage to the electronic device in the motor.
④The surface temperature of the driver should not exceed100℃ (12V·24V/50W～200W), 120℃ (48V/100w～400w) or 80℃ (24V/400w)
⑤The surface temperature of the motor should not excced 90℃.

Gearmotor specifications

■Motor specificattions

Item \ Motor capacity(W)	50W		100W			200W		400W	
Motor type	Brushless DC moter for battery power supply								
Voltage (V)	12	24	12	24	48	24	48	24	48
Ambient temperature (℃)	0 ～40℃								
Rated current(A)*1	6.3	3.1	13.6	6.6	3.2	11.1	6	21.7	10.6
Motor lead wire (mm^2)	0.9 (AWG18)		2 (AWG14)						
Max extension Length (m)	3								

*1 Rated current in above is a reference value with the motor unit only (without reducer).
Pleasc refer to the gearmotor peroformance at next page.

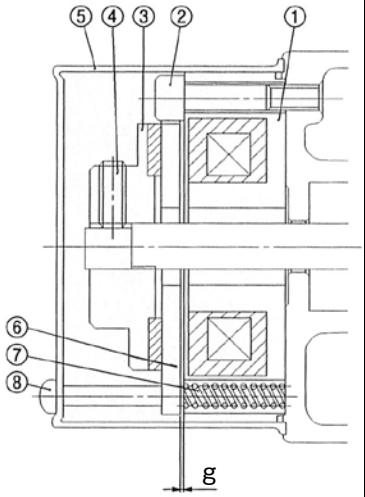
■Electromagnetic brake specifioations

Item \ Motor capacity(W)	50W		100W			200W		400W	
Brake type	Spring close (“Power-off, Brake-on”) type								
Friction torque(N･m) (converted into motor shaft)	0.20		0.57			0.95		1.76	
Excitation voltage(±10%)(V)	12	24	12	24	48	24	48	24	48
Current (at 20℃) (A)	0.44	0.25	0.65	0.36	0.17	0.58	0.28	0.58	0.31
Power (at 20℃) (W)	5.3	6	7.8	8.6	8.3	13.9	13.2	13.9	15.1
Brake lead wire (mm^2)	0.5 (AWG20)								

■Electromagnetic brake structure

After operation for an extended period of time, the friction disk of brake becomes abraded and the gap (g) increases. When the gap clearance becomes greater than the limit of gap to inhale, armature inhaling becomes difficult by magnet, making it impossible to release the brake. In order to operate this machine safely, it is recommended to check or adjust the brake gap periodically.

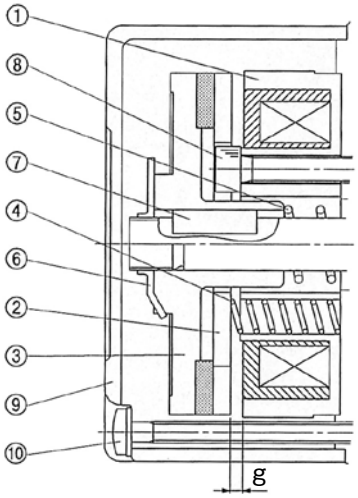
50W



①Field
②Hex Socket Head Cap bolt
③Friction disk assembly
④Setscrew
⑤Brake cover
⑥Armature
⑦Spring
⑧Brake cover setting screw
g : Gap

Inhalablc Gap g = 0.5mm and less
Proper gap g = 0.2mm ± 0.1

100W･200W･400W



①Field
②Armature
③Friction disk
④Spring l
⑤Spring 2
⑥Castellated Nut
⑦Key
⑧Hex Socket Head Cap bolt
⑨Brake cover
⑩Brake cover setting screw
g : Gap

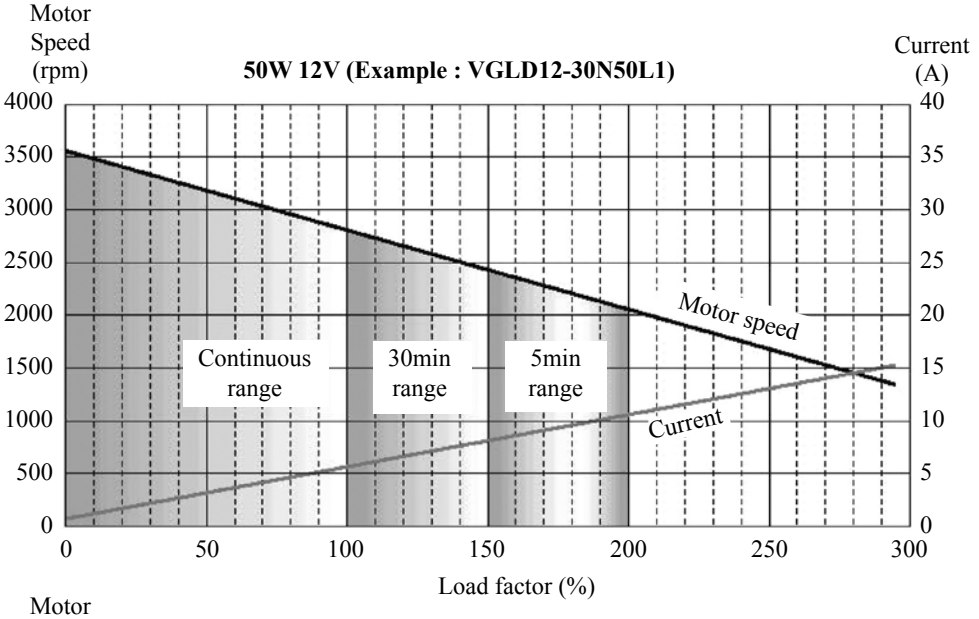
Inhalale Gap g = 0.7mm and less
Proper gap g = 0.4mm ± 0.1

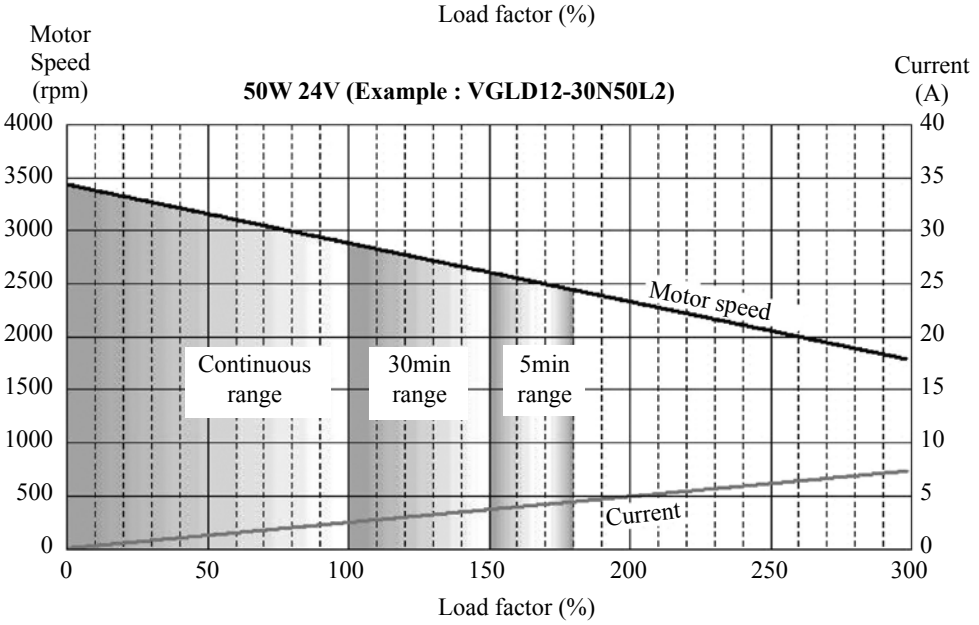
■ Gear motor performance

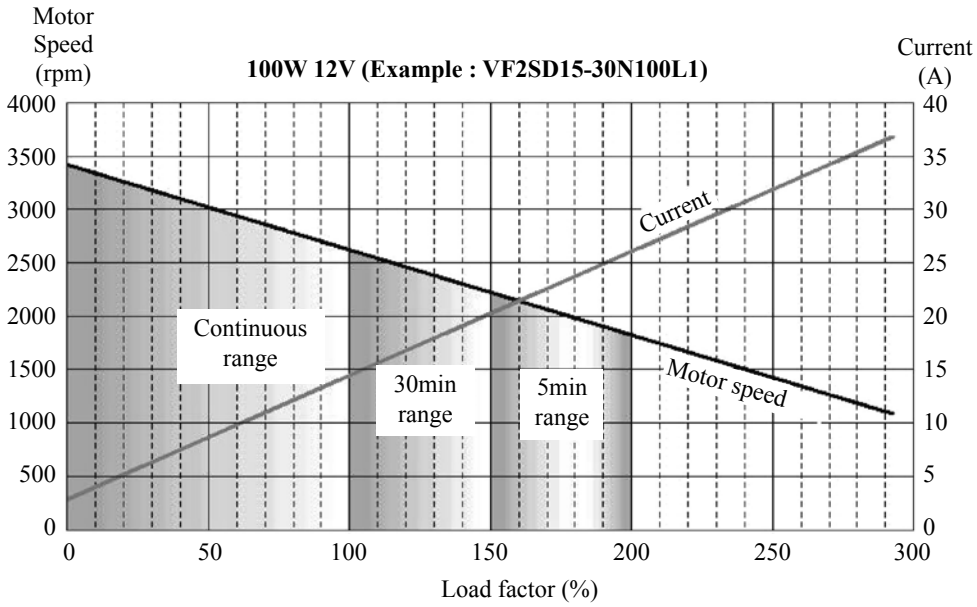
The example of load factor - motor speed perfomance and load factor - current performance of the gearmotor is below. This perfomance is in the state only of the gearmotor. Please refer when the driver is produced by the customer. It shows the range that use it at the short time rating (5min and 30min), however, please confirm it with end use application.

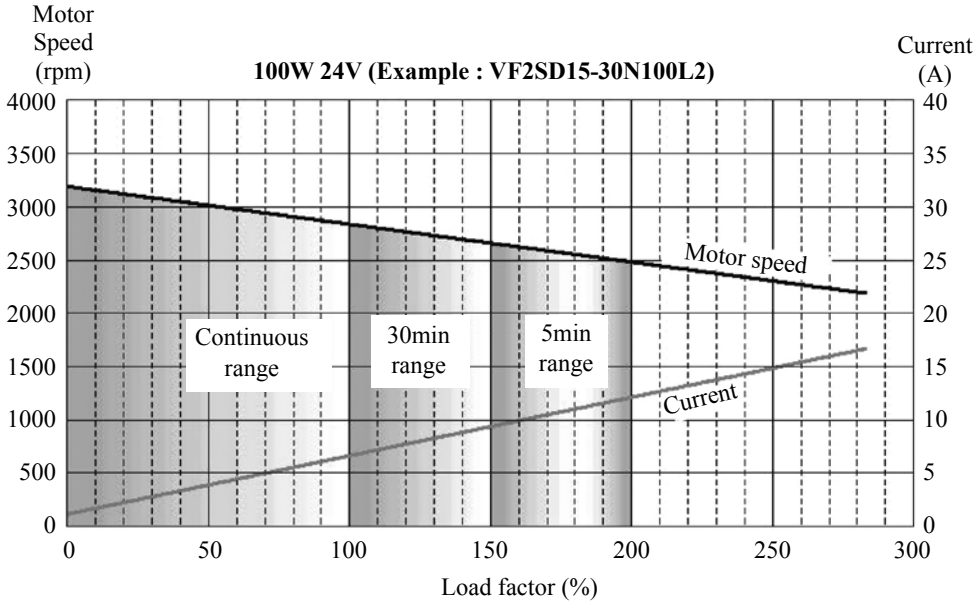
When our driver is used, the motor can use within motor speed 500rpm~2500rpm and the load factor 100% as a rated range.

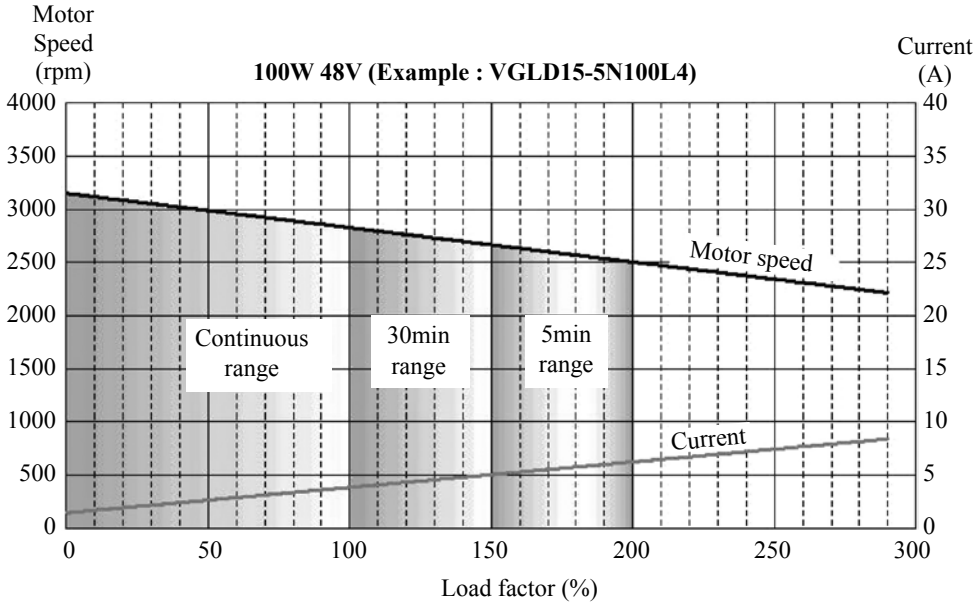
※The motor speed of the graph below is a value converted into the motor shaft. Please consider the gear ratio in the rotational speed of the output shaft.
※100% of the graph below is equal to the allowable torque of output shaft.
※When the motor is used within the range of the short-time rating, the lifetime of the reducer might become shorter, or braking torque might be insufficient. Please contact our sales office for details.

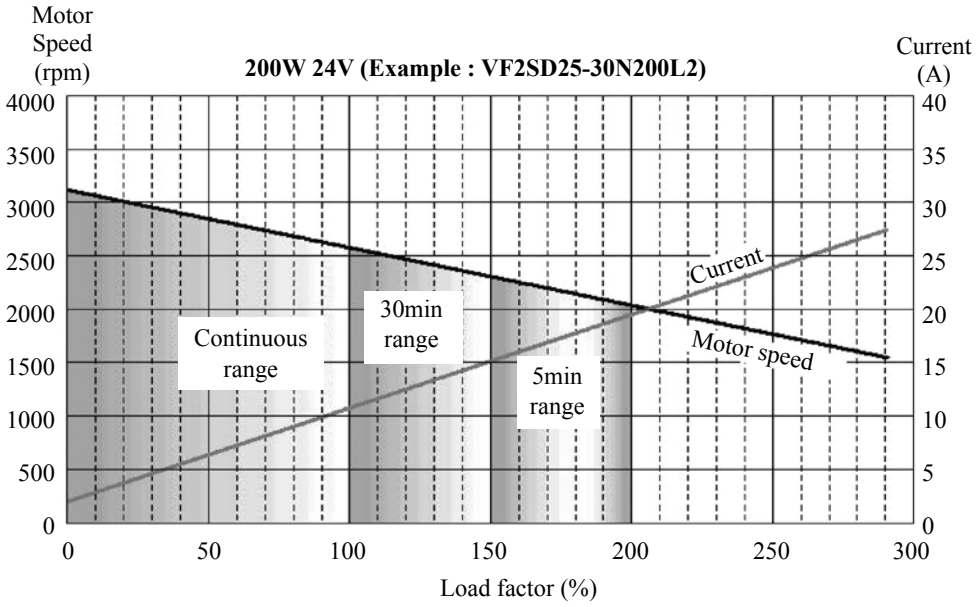


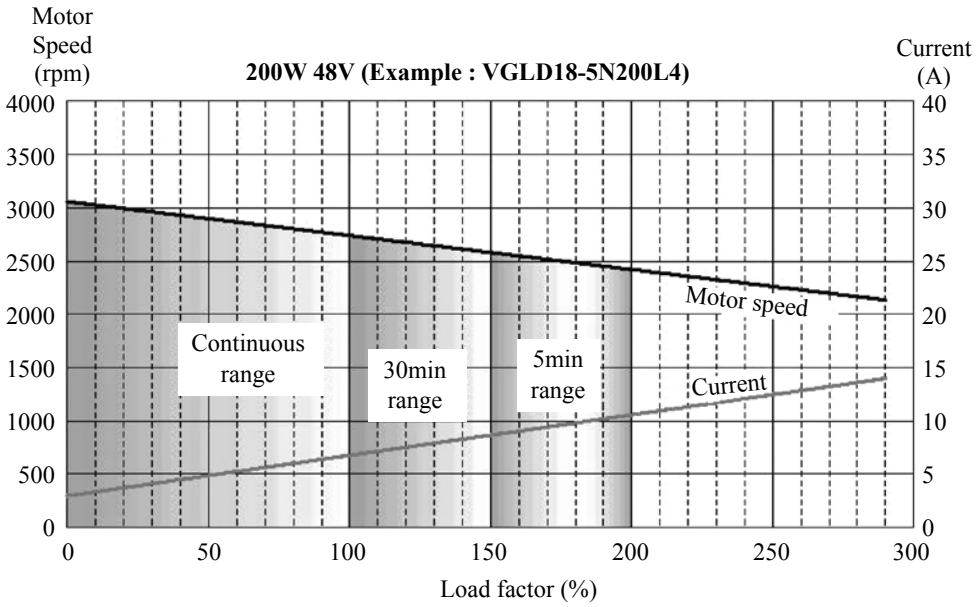


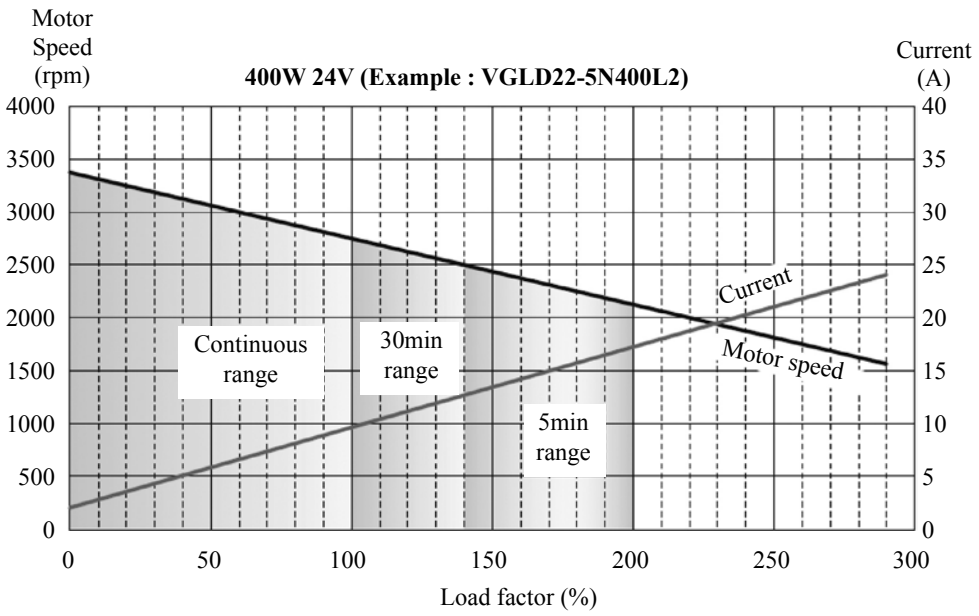

Motor Speed (rpm)
100W 12V (Example : VF2SD15-30N100L1)
Current (A)
4000
3500
3000
2500
2000
1500
1000
500
0
40
35
30
25
20
15
10
5
0
Current
Motor speed
Continuous range
30min range
5min range
0
50
100
150
200
250
300
Load factor (%)

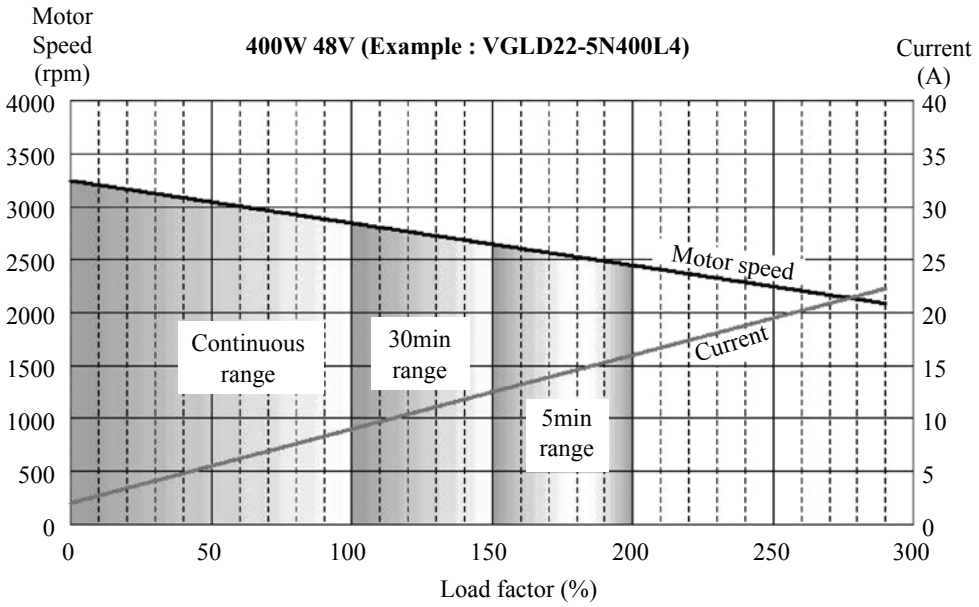

Motor Speed (rpm)
100W 24V (Example : VF2SD15-30N100L2)
Current (A)
4000
3500
3000
2500
2000
1500
1000
500
0
40
35
30
25
20
15
10
5
0
Motor speed
Continuous range
30min range
5min range
Current
0
50
100
150
200
250
300
Load factor (%)


Motor Speed (rpm)
100W 48V (Example : VGLD15-5N100L4)
Current (A)
4000
3500
3000
2500
2000
1500
1000
500
0
40
35
30
25
20
15
10
5
0
Motor speed
Continuous range
30min range
5min range
Current
0
50
100
150
200
250
300
Load factor (%)


Motor Speed (rpm)
200W 24V (Example : VF2SD25-30N200L2)
Current (A)
4000
3500
3000
2500
2000
1500
1000
500
0
40
35
30
25
20
15
10
5
0
Current
Motor speed
Continuous range
30min range
5min range
0
50
100
150
200
250
300
Load factor (%)

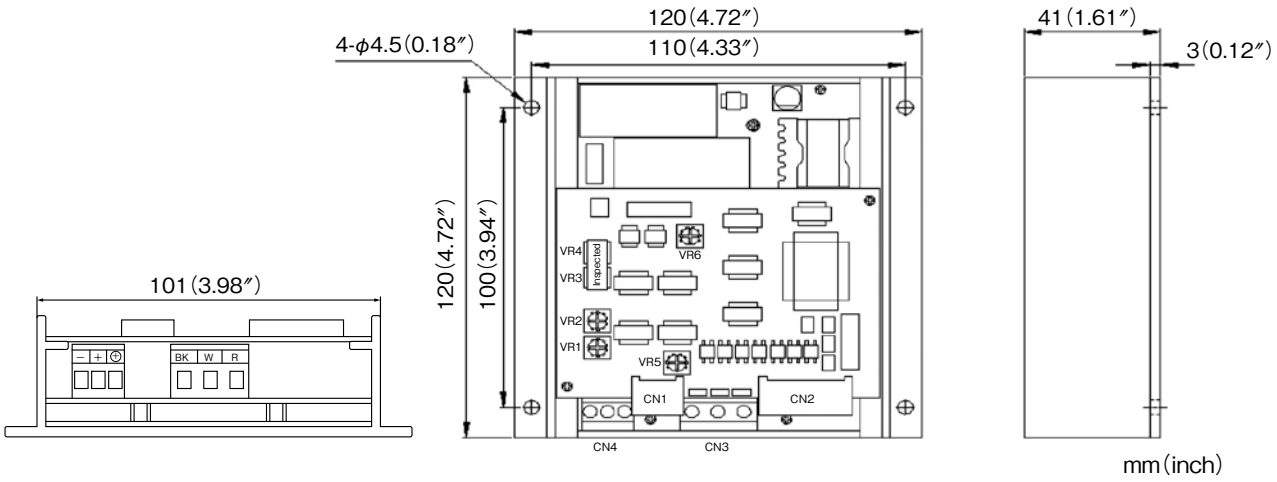

Motor Speed (rpm)
200W 48V (Example : VGLD18-5N200L4)
Current (A)
4000
3500
3000
2500
2000
1500
1000
500
0
40
35
30
25
20
15
10
5
0
Motor speed
Current
Continuous range
30min range
5min range
0
50
100
150
200
250
300
Load factor (%)


Motor Speed (rpm)
400W 24V (Example : VGLD22-5N400L2)
Current (A)
4000
3500
3000
2500
2000
1500
1000
500
0
40
35
30
25
20
15
10
5
0
Continuous range
30min range
5min range
Current
Motor speed
0
50
100
150
200
250
300
Load factor (%)

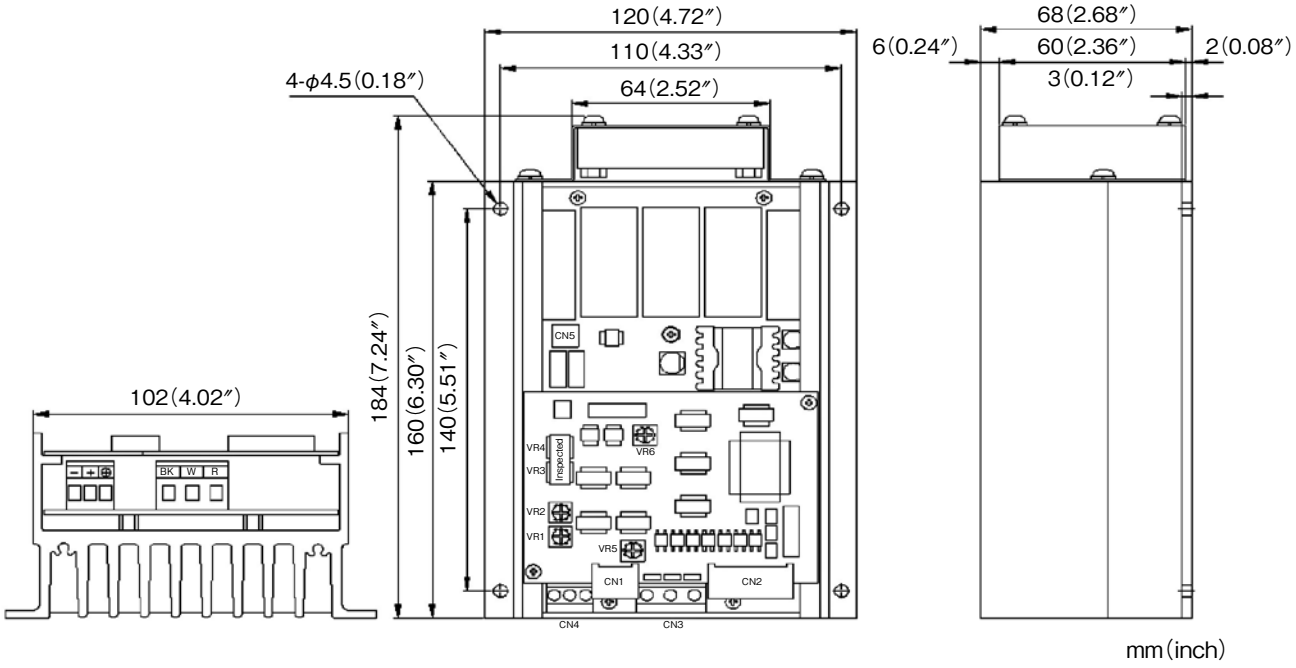

Motor Speed (rpm)
400W 48V (Example : VGLD22-5N400L4)
Current (A)
4000
3500
3000
2500
2000
1500
1000
500
0
40
35
30
25
20
15
10
5
0
Continuous range
30min range
5min range
Motor speed
Current
0
50
100
150
200
250
300
Load factor (%)

Driver dimensions

■50W～200W type (12V/24V) weight 0.41kg

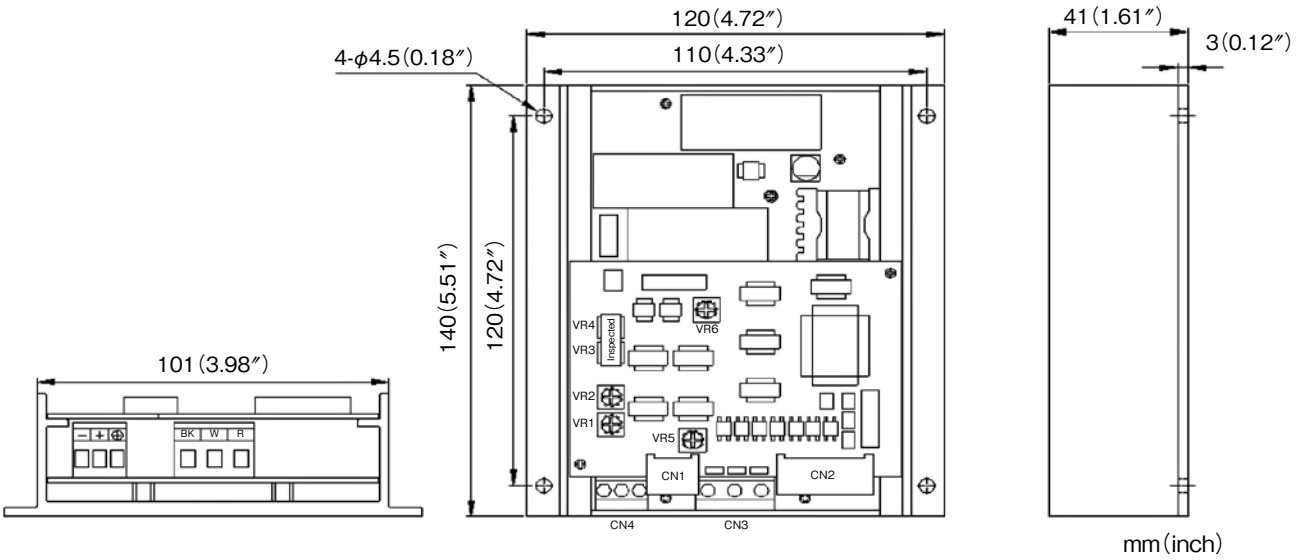


■400W type (24V) weight 1.14kg



Driver dimensions

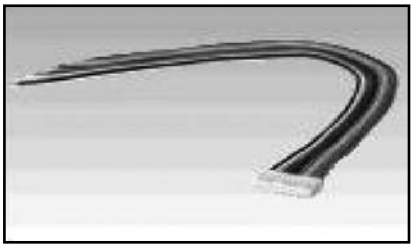
■400W type (48V) weight 0.48kg

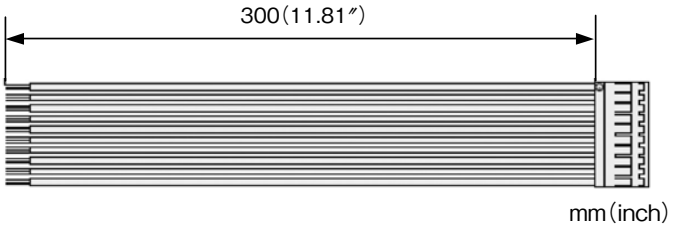


■I/O cable

I/O cable is attached to the driver.

It is used as the signal line between the driver and the control device.





Driver Specifications

■ Driver Specifications

Item \ Motor capacity(W)		50W	100W	200W	400W
Supply Voltage Range(V) (Rated/Max)		DC12V±10% DC24V±10%	DC12V±10% DC24V±10% DC48V±10%	DC24V±10% DC48V±10%	DC24V±10% DC48V±10%
Motor Type		2 Input Power Supply: Power Supply for motor operation and Power Supply for control			
Input Current	12V(A)	7/10	15/22	-	-
	24V(A)	3/4.5	5.5/9	12/18	23/34
	48V(A)	-	3/4.5	6/9	11/16.5
Variable Speed Range (rpm)		150~2500			
Acceleration and Deceleration Range (sec)		0.1~4 (0 → 2500rpm)			
Input Specification		Photocoupler input (no insulation) internal supply 15V CW start, CCW start, reset, speed command voltage input (0~5V) Torque limit function:on/off			
Output Specification		Open collector output (30V,100mA) Alarm (overload, driver abnormal temperature) Rotation speed output (18 pulse/rev, pulse width 0.8ms) Output during rotation (electromagnetic brake control)			
Speed Setting		Installed VR1, External volume setting Or DC voltage command (0~5V)			
Acceleration and Deceleration Setting		1 pattern (set with installed VR2 : 0.l~4sec)			
Speed Gain Control		Installed VR6			
Torque Limit Setting		Set with installed VR5 (0~100%) Torque limit function : on/off			
Protective Function		Overload (10sec), Driver abnormal temperature *1 Input voltage reduction (no operation) *2 Current limit (rated ×150%)			
Other		Speed feedback circuit disconnection Overload alarm circuit disconnection Max distance between motor and driver : 3 m			
Environment	Temperature	In use : 0~40℃/Conservation : -10~60℃			
	Humidity	Below 85%RH Free from vapor			
	Vibration	Below 0.5G			
	Atmosphere	Free from corrosive gas, dust (lndoor)			
Weight	12V, 24V(50W~200W)	120×120×41 (W×L×H) Open Frame 0.41kg			
	24V(400W)	120×184×68 (W×L×H) Open Frame with cooling fan 1.14kg			
	48V	120×l40×41 (W×L×H) Open Frame 0.48kg			
Attachment		I/O cable (300mm)			

*1. The temperature sensor works at 100℃ (12V･24V/50W～200W), 120℃ (48V/100W～400W) or 80℃ (24V/400W).

*2. This is a function to assure the movement of the controlling circuit; It is not for detection of low battery.

Note: This driver cannot dispose the regenerative energy. The terminal voltage of the battery need to be observed if you operate the driver with load generate regenerative energy.

■ Connection and Installation

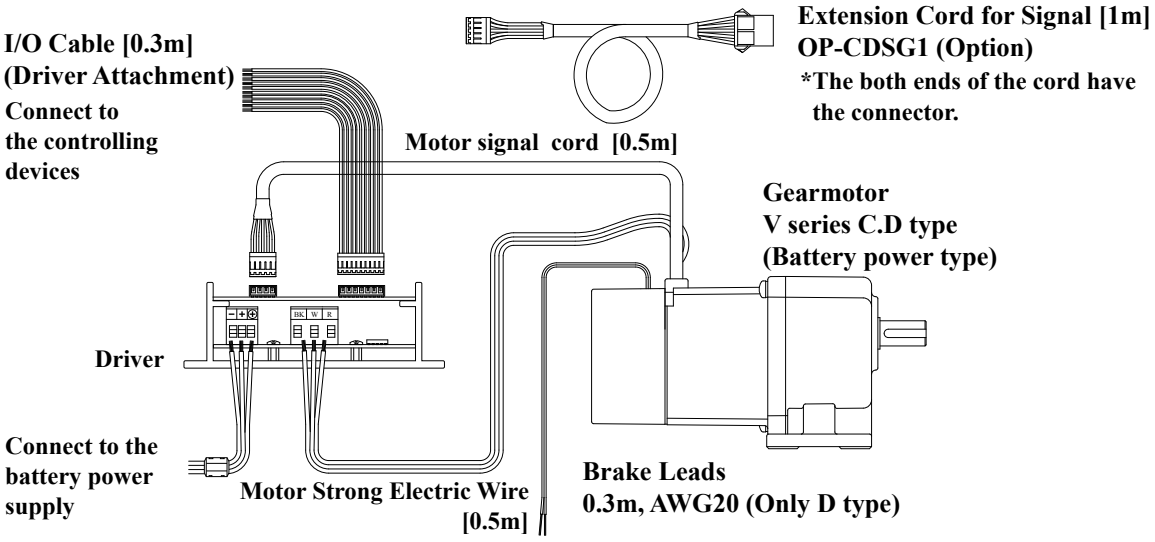
Connect each devices as below.

*The length of the cords from the gearmotor is 500mm.

*PIease use the extension cord (Option) if you need to extend the motor signal cord.

*Extension cords for motor strong electric wire and brake leads are not for sale, please refer to the motor specification and extend the cord within 3m.

*Please refer to the related page for details of wirings or specifications.



■ Caution of wiring

1 Please use the driver input terminal to start and stop the motor. Please avoid starting and stopping the motor by ON/OFF on 1st. power supply(input to the driver) line.

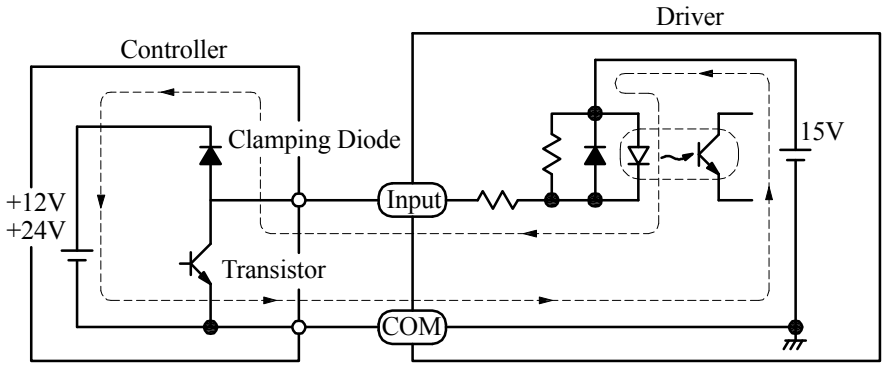
2 Don't connect the commercial power supply directly to the motor.

3 Be sure not to shut off the power supply (-) and wiring during motor operation. They may cause to brake the driver and peripheral devices by current flows through CN2-10 input common ground.

4 The driver cannot control the brake on/off. Please prepare the controlling circuit for the electromagnetic brake. (Please refer to the example of the motor wiring.)

5 Be sure to insert the surge suppressor to protect the driver from surge generated from switching on/off the electromagnetic brake. Please use varistor (82V, over 1J) or diode (100V, over lA). (Please refer to the example of the motor wiring)

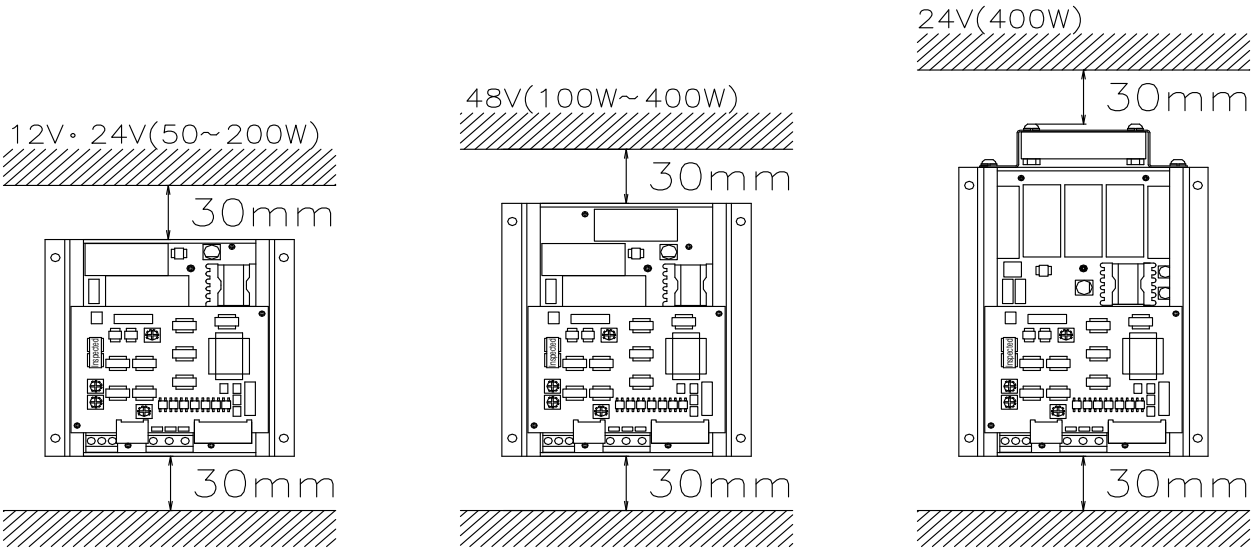
6 When you use the controller installed clamping diode, and wire as a figure shown as below, current may flows as allowed lines in a figure below and motor may start running if you switch the driver on before the controller power supply, or switch the controller power supply off when the driver power supply is on. Also, the motor may start running if the capacity of the power supply is differ. Therefore, be sure to switch on the controller first when you start, and switch off the driver first when you make it stop.



Power ON : Controller ON (Driver ON)
Power OFF : Driver OFF (Controller OFF)

■ Installation of the driver

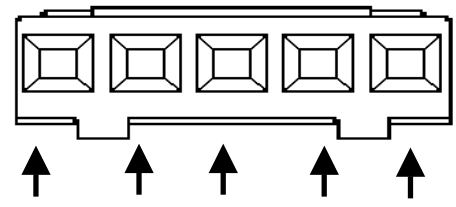
*Please install the driver as a figure below. Direction of installation is out of consideration. But, please be sure to have the space of more than 30mm from the roof and ground of the driver.



■ CNl Connect the motor signal wire (connector). Each signal wires are used as below.

1	Purple	Supply for pole sensor
2	Orange	U ph. Pole signal output (open collector)
3	Green	V ph. Pole signal output (open collector)
4	Green/White	W ph. Pole signal output (open collector)
5	Gray	GND

■ Position for Connector Pins



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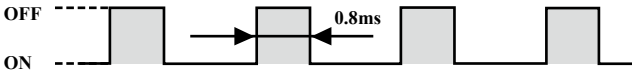
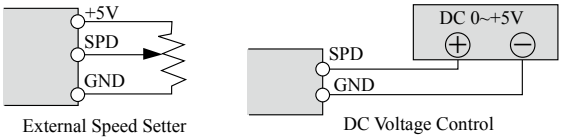
■CN2 Connect the regulation signal wire

Terminal		Name	Function		In connecting with GND
Input Terminal	1(Brown)	CW	Rotate the motor to CW direction. Please avoid operating with CCW direction; it causes to stop the motor.	In case of 400W/24V, the cooling fan synchronizes with the start command.	Motor rotates
	2(Red)	CCW	Rotate the motor to CCW direction. Please avoid operating with CW direction; it causes to stop the motor.		Motor rotates
	3(Orange)	Torque Limit	Output torque limit function:on/off When connected with GND, it can regulate the output torque by VR5		Torque Limit on
	4(Yellow)	Reset	Alarm is to be reset. It stops the power feeding to the motor when disconnected with GND.		Operatable
Output Terminal	5(Green)	In operation	It is on when the motor is rotating (torque output) and open collector is slowing down. It is off when the alarm is on. It can be used for measuring on/off of the electromagnetic brake.		
	6(Blue)	Alarm	Alarm is to be off when protective circuit is on. Driver temperature is to be abnormal when open collector output is overload.		
	7(Purple)	FBP	Output the pulse responding to motor rotation (Pulse width:0.8ms) It is used for monitoring the motor rotation. (1 motor rotation per 18 pulses) Fixed pulse width, duty ratio will change as rotation speed. 		
	8(Gray)	+5V	Speed command input terminal; it is to be used when you set speed with DC voltage or external speed setter.		
	9(White)	SPD	External speed setter is available as an option. If you prepare the external speed setter by yourself, please select the range of 1 k~20kΩ. Please be sure to connect 8 (gray) and 9 (white), if you use only installed speed setter. 		
	10(Black)	GND	Input/Output common ground (CN4-1; internally connected with power supply(-)side.)		

■CN3 Connect the Motor Power Line

1	Black	Wph.	Connect the motor leads with the same color.
2	White	Vph.	
3	Red	Uph.	

■CN4 Connect the Power Supply

1	−	Power Supply (-)	DCI2V±10% (-), DC24V±10% (-), DC48V±10% (-), these are all common for main power supply and controls. Standby electricity can be minimized by switching off the power supply for control (+).
2	+	Main power supply (+)	
3	⊕	Power Supply for Regulation(+)	

■LED Indicator

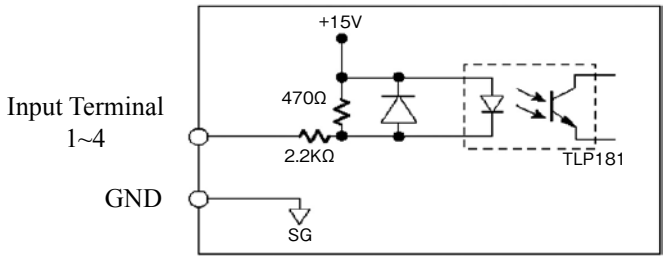
Green	Power Supply	Power Supply lndicator lights when power supply for control is on.
Yellow	Overload	Overload Indicator blinks when exceed the rated load.
Red	Alarm	Alarm Indicator lights when the protective function worked and the motor stopped.

■Trimmer Setter

No.	Name	Explanation	Turn to the right…
VR1	Installed speed setter	Trimmer for speed setting.	High Speed
VR2	Slow up/down setter	Trimmer for slow up/down time setting. 0.1sec~4sec	Longer time
VR3	CW max speed control	Trimmer for speed setting at shipment.	High Speed
VR4	CCW max speed control	Do not adjust in a normal operation.	High Speed
VR5	Torque limit setter	Torque limit will be effective when the torque limit signal [3-orange] is connected with GND.	High Torque
VR6	Speed gain setter	Trimmer for speed gain setting. Do not adjust in a normal operation. When the speed gain setter reduced, the rotation become smooth, but the speed follow-up performance become worsens.	Low gain

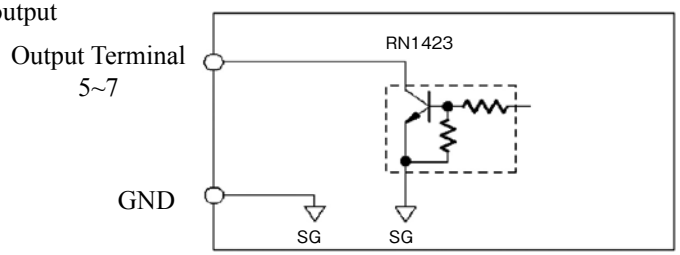
■Framework of input circuit

● photocoupler input　　Leakage current when it turned off should be 2mA of less.



■Framework of outqut circuit

● Open collector output



Max load voltage：30V
Max load current：100mA

■Processing Glitches

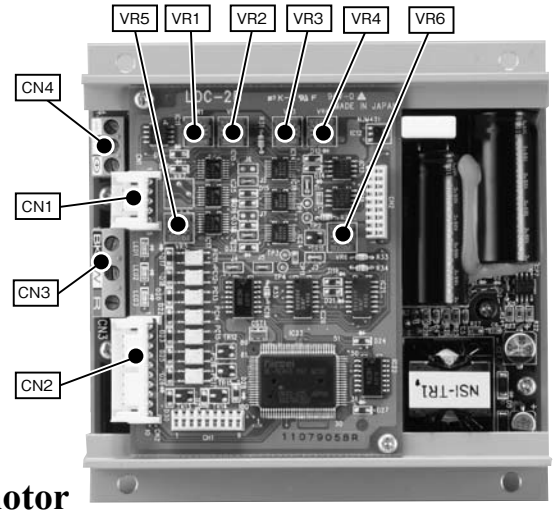
	Name	Contents	Reaction
1	Overload	The motor ran more than the rating torque for ten seconds or more.	Alarm
2	Abnormal temperature rise	The radiator of driver is overheated. ※1	Alarm
3	Lack of input voltage	The power supply voltage decreased to less than 8.4V (20V for 48V type)	Motor stops※2

※1　The temperature sensor works at 100℃ (12V･24V/50W~200W), 120℃(48V/100W～400W) or 80℃ (24V/400W).

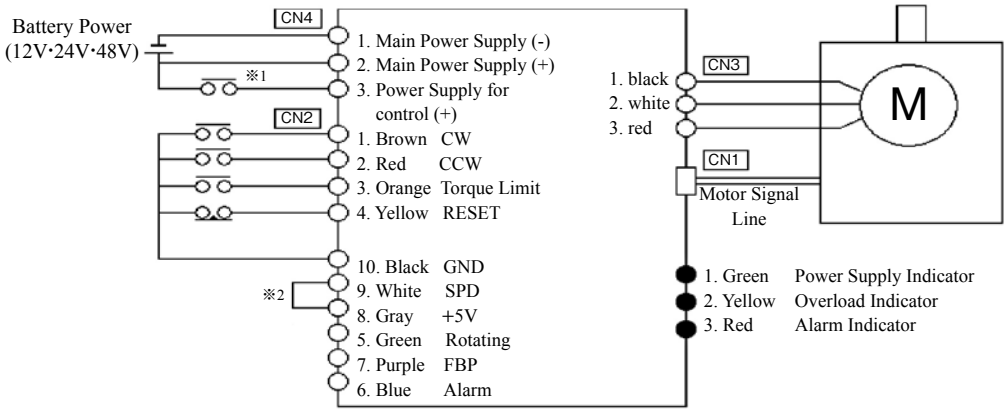
※2　Motor starts rotating when the voltage returns.The signal [5-green] continues to be on.

Cautions for Wiring

■Driver Appearance



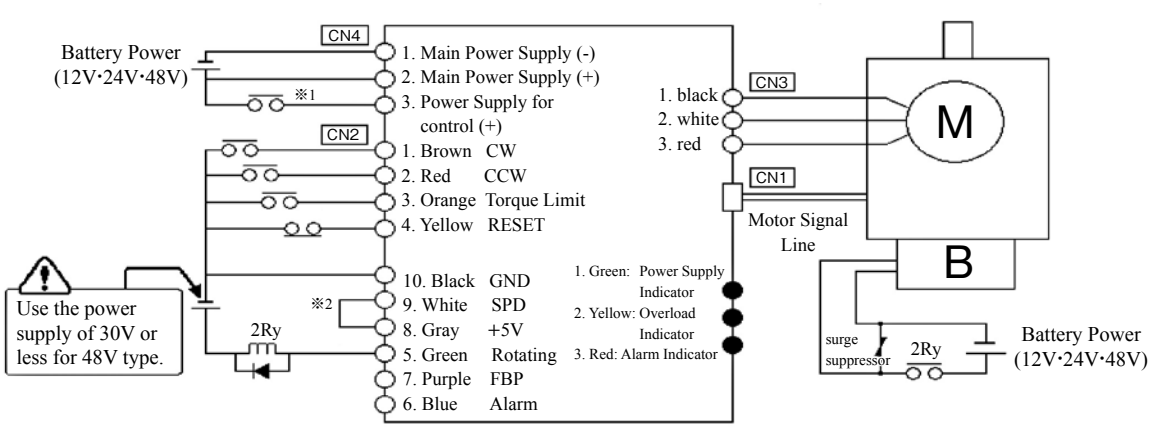
■Example of wiring the motor



※1 This connecting point can decrease the standby electricity of the driver.
※2 Please connect when you set the rotation speed with installed VR1.

■Example of wiring the Electromagnetic brake motor

1. The driver cannot control the brake on/off. Please prepare the controlling circuit to the outside for the brake (figure below).
2. Be sure to insert the surge suppressor (※l) to protect the driver from surge generated from switching on/off the electromagnetic brake. Please use varistor (82V, over 1J) or diode (100V, over 1A).



※1 This connecting point can decrease the standby electricity of the driver.
※2 Please connect when you set the rotation speed with installed VR1.

Troubleshooting for Gearmotor

Trouble	Cause	Troubleshooting
The motor does not run even in the unloaded condition.	Disconnection of motor power line.	Check the wiring.
	Disconnection of motor signal line.	Check the wiring or connection.
	Broken gear, shaft or bearing.	Repair at authorized factory.
The motor does not run in the loaded condition.	Lack of battery residual quantity.	Charge the battery.
	The motor power line is too long.	Check the length of wire.
	Worn out gear.	Repair at authorized factory.
	Overload operation.	Reduce the load.
Abnormal rise in temperature.	Overload operation.	Reduce the load.
	High frequency of start and stop.	Reduce the frequency.
	Damage to bearings.	Repair at authorized factory.
Abnormal noise.	Continued noise − defective bearing or worn out gear.	Repair at authorized factory.
	Intermittent noise − damaged gear or foreign substances inside the motor.	Repair at authorized factory.
Excessive vibration.	Worn out gear or bearing.	Repair at authorized factory.
	Improper installation or slacked bolts.	Tighten the bolts.
Brake does not work.	Damaged switch.	Replace or repair the switch.
Brake function is not enough. Long braking time.	Foreign substances or oil are adhered to the friction disk.	Remove foreign substances or oil, or repair at authorized factory.
	Life of the friction disk.	Replace the friction disk or repair at authorized factory.
	Excessive moment of load inertia.	Reduce the load.
Motor does not run. (Rotating speed does not increase.) Overheated motor. Abnormal noise in braking.	Larger brake gap.	Adjust the brake gap.
	Disconnection or short circuit of brake coil.	Replace the brake coil or repair at authorized factory.
	Poor contact of switch.	Repair or replace the switch.

Troubleshooting for Driver

Trouble	Cause	Investigating point	Troubleshooting
The motor does not run. (The green LED turned off.)	Lack of power supply voltage.	The power supply voltage for the control of CN4 is not enough. (less than l0V)	Charge the battery.
The motor does not run. (The green LED turned on.)	The reset signal is not instructed.	[4-yellow] of CN2 is opened.	Short circuit [4-yellow] and [10-black].
	The speed instruction is 0.	The speed instruction is not input to [9-white] of CN2.	Short circuit [9-white] and [8-gray], or use an external volume.
	The start instruction is defective.	Both CW and CCW of CN2 are short circuited with GND.	Short circuit either one of [1-brown] or [2-red].
	The torque is limited.	[3-orange] of CN2 and GND are short circuited.	Open [3-orange].
	Lack of power supply voltage.	The power supply voltage for the control of CN4 is not enough. (12･24V type: less than 8.4V) (48V type: less than 20V)	Charge the battery.
	The motor signal line is not connected.	The motor signal line is not securely connected with CN1.	Connect the motor signal line with CN1.
The alarm light is turned on.	Overload operation.	The yellow LED blinked for ten seconds, then the red LED turned on.	Reexamine the capacity of motor and reduction gear ratio.
	Overload operation caused by brake defective.	Whether the brake operates or not.	Refer to the troubleshooting of the gearmotor.
	Abnormal temperature rise of the driver.※	The red LED turned on without the yellow LED blinking.	Improve the driver's heat radiation.
Motor irregularly runs and stops.	The motor power line is connected incorrectly.	The motor power line (red, black or white) is connected inconrrectly to CN3 of the driver.	Connect the wire correctly.

※ The temperature sensor works at 100℃ (12V･24V/50W～200W), 120℃ (48V/100W～400W) or 80℃ (24V/400W).

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