

Control Unit Specification

| | |
|-------|--|
| | BATTERY POWERED GEARMOTORS |
| P.642 | Gearmotor Specifications and Electromagnetic Brake Specifications |
| P.644 | Gearmotors Characteristics and Specifications |
| P.649 | Dedicated Drive (Sold Separately) |
| P.653 | Control Unit Specification |
| P.654 | Wiring Diagrams |
| P.660 | Explanation of Terminals |
| P.661 | I/O Terminal Wiring |
| P.665 | Parameter List |
| P.670 | Safeguard Function List |
| P.671 | Connection Method and Installation |
| P.673 | Precautions for Installation |
| P.674 | Accessories |
| P.675 | Options |

Gearmotor Specifications and Electromagnetic Brake Specifications

Motor Specifications

| Series | V | | | | | | | | | | SD | |
|--------------------------------------|---|-----|-------------------------------|-----|-----|----------|-----|--------|-----|---------|---------------------------------|--|
| Power | 50 W | | 0.1 kW | | | 0.2 kW | | 0.4 kW | | 0.75 kW | | |
| Voltage (V) | 12 | 24 | 12 | 24 | 48 | 24 | 48 | 24 | 48 | 48 | | |
| Rated Current (A) | 5.9 | 2.7 | 12.4 | 5.8 | 2.7 | 9.8 | 5.1 | 20.1 | 9.9 | 19.5 | | |
| Time Rating | S1 (Continuous) | | | | | | | | | | S3 25 % | |
| Motor Lead Wire (mm ²) | 0.9(AWG18) | | 2(AWG14) | | | 2(AWG15) | | | | | | |
| Maximum Extension Length (m) | 5 | | | | | | | | | | 5 | |
| Frequency of Startup/Stop | 30 times/min (when using our drive) | | | | | | | | | | — | |
| Application Ambient Temperature (°C) | 0 °C to 40 °C | | | | | | | | | | 0 °C to 40 °C | |
| Application Ambient Humidity (%RH) | IP30 | | 85 % RH max (No Condensation) | | | | | | | | IP40/ IP44 | 85 % RH max (No Condensation) |
| | | | | | | | | | | | IP65 | 100 % RH max (No Condensation) |
| Storage Ambient Temperature (°C) | -10 °C to 60 °C (Not to freeze) | | | | | | | | | | -10 °C to 60 °C (Not to freeze) | |
| Storage Ambient Humidity (% RH) | 85 % RH max (No Condensation) | | | | | | | | | | IP40/ IP44 | 85 % RH max (No Condensation) |
| | | | | | | | | | | | IP65 | 100 % RH max (No Condensation) |
| Vibration Resistance | 0.5 G or less | | | | | | | | | | 0.2 G or less | |
| Altitude | 1,000 m max | | | | | | | | | | 1,000 m max | |
| Installation Environment | A place free from corrosive gas and/or explosive gas. Well ventilated place with no dust. | | | | | | | | | | IP40/ IP44 | A place free from corrosive gas, explosive gas, and/or vapor. Well ventilated place with no dust. |
| | | | | | | | | | | | IP65 | A place free from corrosive gas, explosive gas, and/or vapor. Not to be used underwater or in places where high water pressure is applied. |
| Installation Place | Indoors | | | | | | | | | | IP40/ IP44 | Indoors |
| | | | | | | | | | | | IP65 | Indoors/Outdoors |

Note: The rated current value shown in the table above is a reference value for a motor without a gearhead (motor alone). For gearmotors, refer to the load co-efficient current characteristics on pages 644 to 648.

Electromagnetic Brake Specifications

| Series | V | | | | | | | | | | SD |
|------------------------------------|--------------------------|------|--------|------|------|--------|------|--------|------|---------|-------------|
| Power | 50 W | | 0.1 kW | | | 0.2 kW | | 0.4 kW | | 0.75 kW | |
| Brake Type | Power-Off (Spring Close) | | | | | | | | | | |
| Holding Torque (N·m) (motor shaft) | 0.20 | | 0.57 | | | 0.95 | | 1.76 | | 3.0 | |
| Excitation Voltage (V) (±10 %) | 12 | 24 | 12 | 24 | 48 | 24 | 48 | 24 | 48 | 48 | |
| Current Consumption (A) (20 °C) | 0.44 | 0.25 | 0.65 | 0.36 | 0.17 | 0.58 | 0.28 | 0.58 | 0.31 | 0.21 | |
| Power Consumption (W) (20 °C) | 5.3 | 6.0 | 7.8 | 8.6 | 8.3 | 13.9 | 13.2 | 13.9 | 15.1 | 10.0 | |
| Lead Wire (mm ²) | 0.5 (AWG20) | | | | | | | | | | 0.3 (AWG22) |

Note: The electro-magnetic brake is for holding. It cannot be used for braking.

Note: Be sure to use a surge protector to protect the drive from surge generated by turning on/off the electro-magnetic brake.

Note: Use the varistor (82 V, 1 J or more) or a diode (100 V, 1 A or more) included in the package.

Note: Due to the structure of the brake, the disc produces friction noise during motor operation. However, this does not affect the performance of the brake.

VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VFS3-V/3E Type
Overhaul Right Angle Shaft
Deceleration Right Angle Shaft
FSS Type Right Angle Shaft

Control Unit Specification

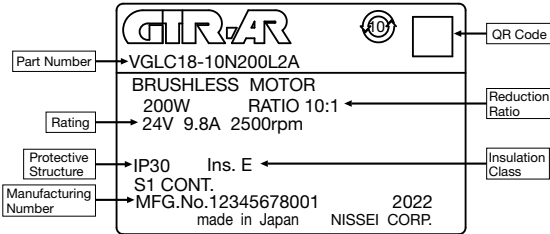
Technical Documentation

Option

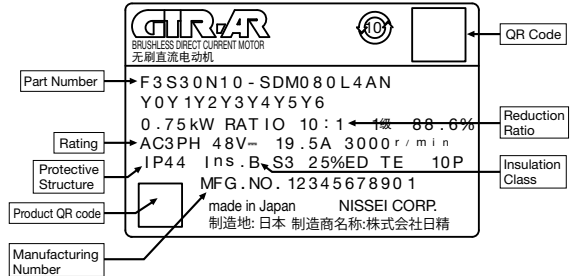
Gearmotor Specifications and Electromagnetic Brake Specifications

Nameplate

V Series



SD Series

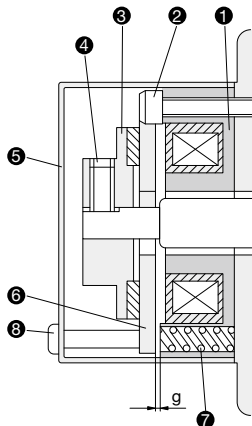


Electromagnetic Brake V Series

Structure

<50 W>

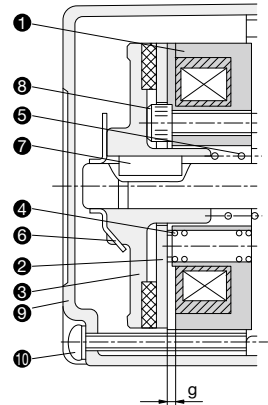
- ① Field
 - ② Hex Head Cap Screw
 - ③ Friction Disk Assembly
 - ④ Hexagon Socket Set Screw
 - ⑤ Brake Cover
 - ⑥ Armature
 - ⑦ Spring
 - ⑧ Brake Cover Fixing Screw
- g: Gap



Note: The brake is a holding brake. In normal use, the gap does not need to be adjusted. However, if the brake is repeatedly used for emergency stops, the friction disc may get worn and the gap may become wider. If the gap has become wider, it may prevent the brake from releasing. In this case, please adjust the gap.
Suitable gap $g = 0.2 \pm 0.1$

<0.1 kW, 0.2 kW, 0.4 kW>

- ① Field
 - ② Armature
 - ③ Outer Disk
 - ④ Spring 1
 - ⑤ Spring 2
 - ⑥ Shake-proof Washer Nut
 - ⑦ Key
 - ⑧ Hex Head Cap Screw
 - ⑨ Brake Cover
 - ⑩ Brake Cover Fixing Screw
- g: Gap



Note: The brake is a holding brake. In normal use, the gap does not need to be adjusted. However, if the brake is repeatedly used for emergency stops, the friction disc may get worn and the gap may become wider. If the gap has become wider, it may prevent the brake from releasing. In this case, please adjust the gap.
Suitable gap $g = 0.4 \pm 0.1$

VG/AG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Shaft
VF3 Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

Gearmotors Characteristics and Specifications

Gearmotors Characteristics

V Series

Note: These characteristics are representative of gearmotors. Customer can refer to this graph when using their own drives.

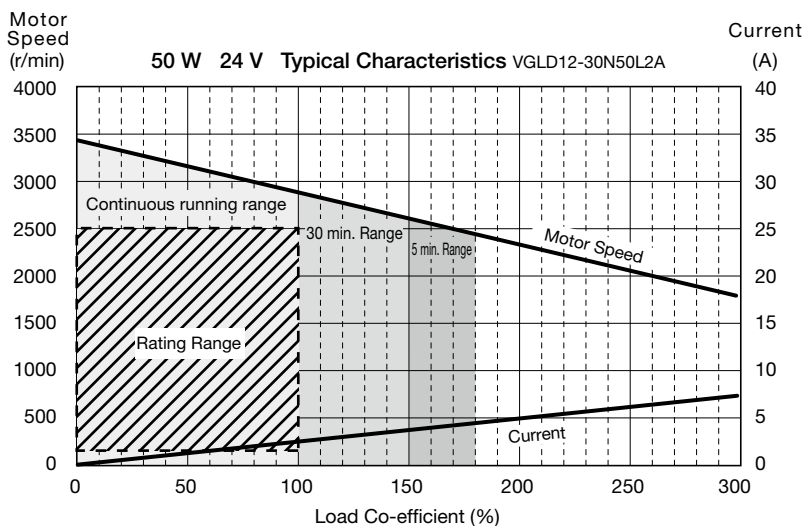
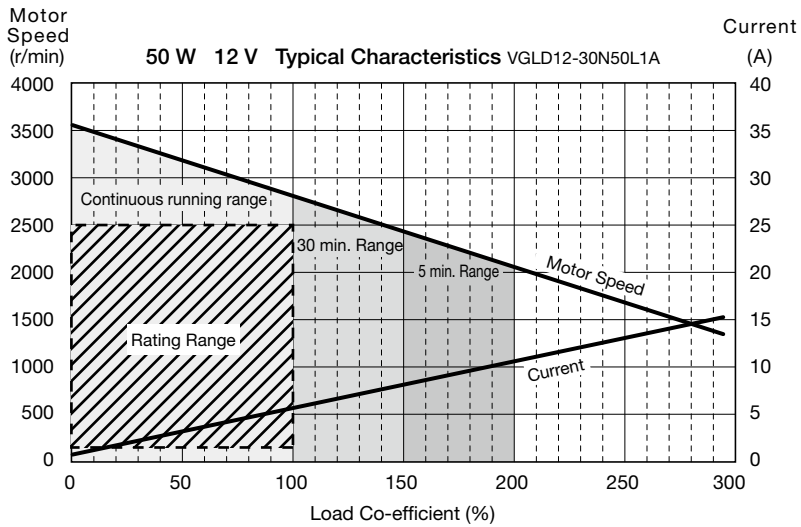
[Notes]

Below graphs explain relation between load co-efficient with rotational speed (motor shaft) as well of current.

The rating range defined by speed from 100 to 2500 r/min with 100 % load co-efficient.

Guidelines for use (with cold starts) at time ratings (5 minutes, 30 minutes) are also shown. However, please check the actual rating range with an actual unit.

1. The speed in the graphs below corresponds to the speed of the motor shaft. Consider the gear ratio when calculating the output shaft speed.
2. In the graphs below, 100 % corresponds to the allowable output shaft torque shown in the performance tables.
3. If a gearmotor is used outside the rating range, the life of the gearmotor may become shorter or problem may arise with the electro-magnetic brake. For details, please contact us.
4. Please make sure to maintain the surface temperature of the motor below 90 °C.



VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

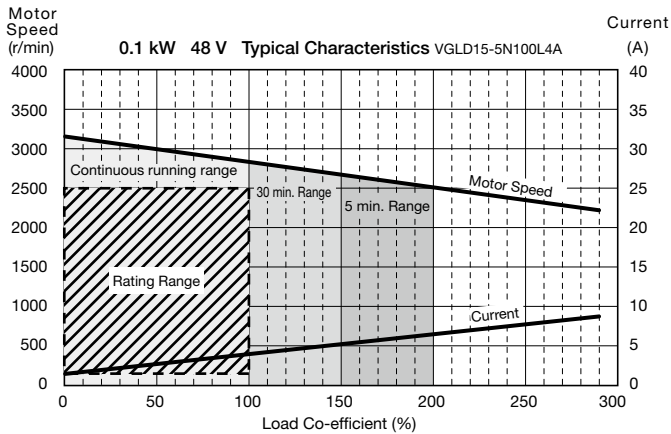
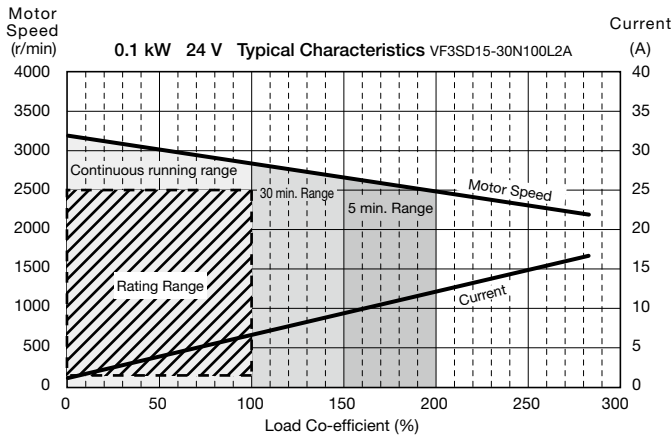
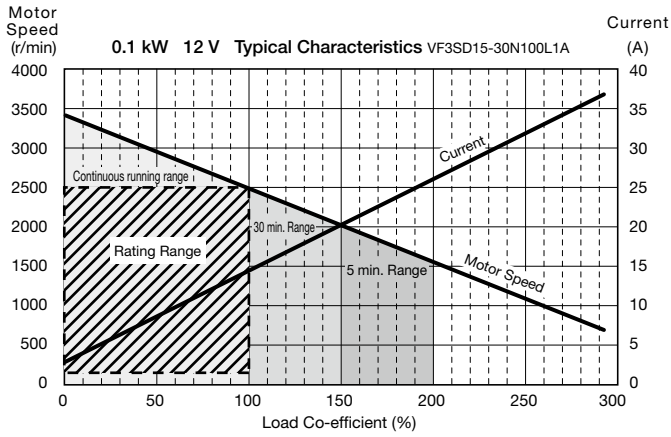
VF3S/VF3E Type
Concentric Right Angle Shaft
FSS Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

Gearmotors Characteristics and Specifications



VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

VG/APG Type
Parallel Shaft

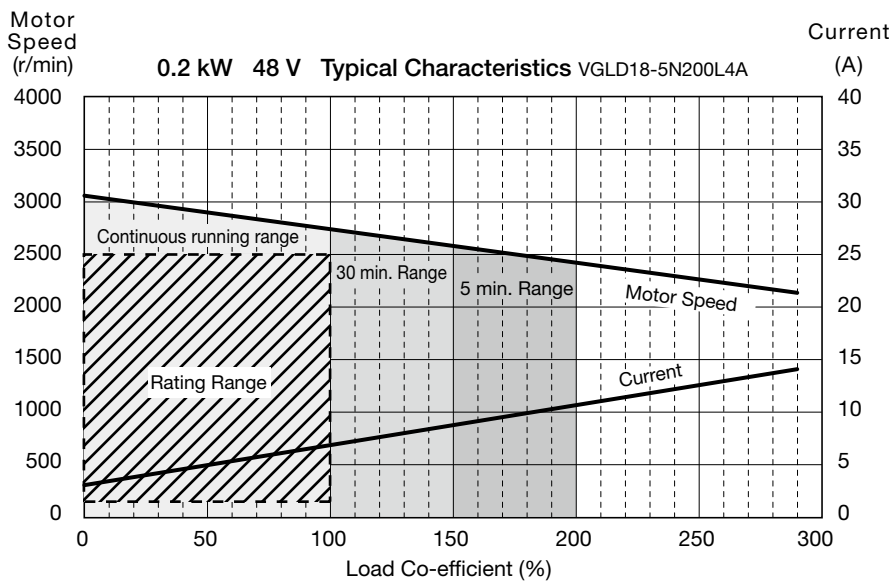
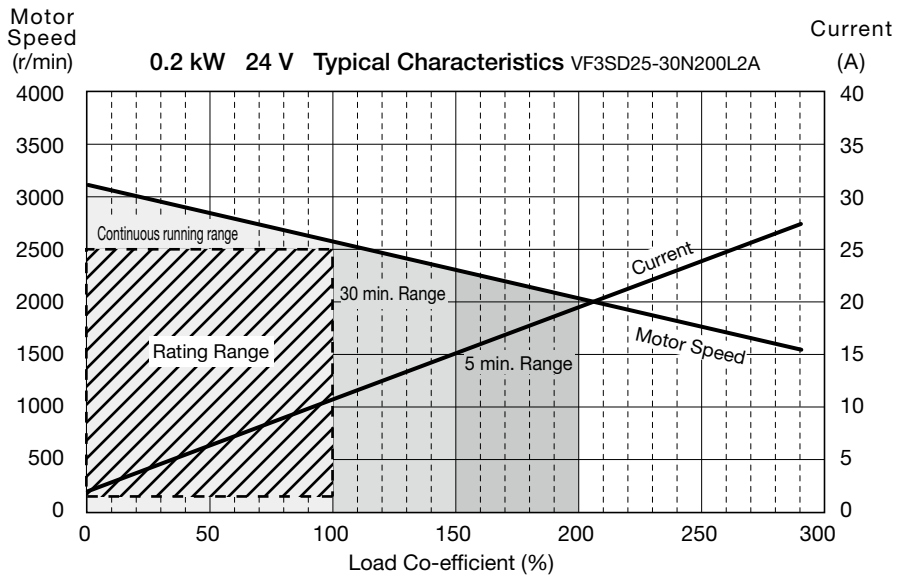
VH Type
Right Angle Shaft

VF3S/VF3E Type
Overhaul Right Angle Shaft
Overhaul Parallel Shaft

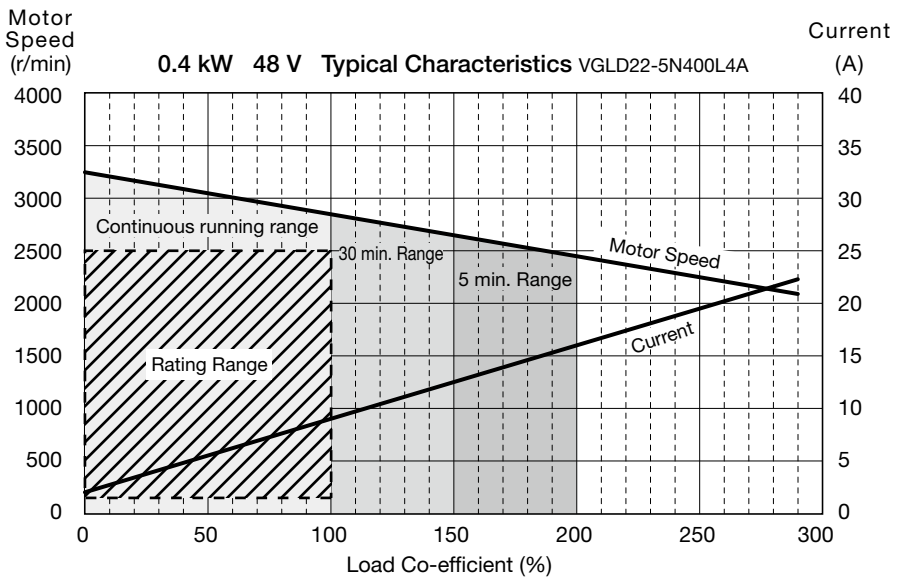
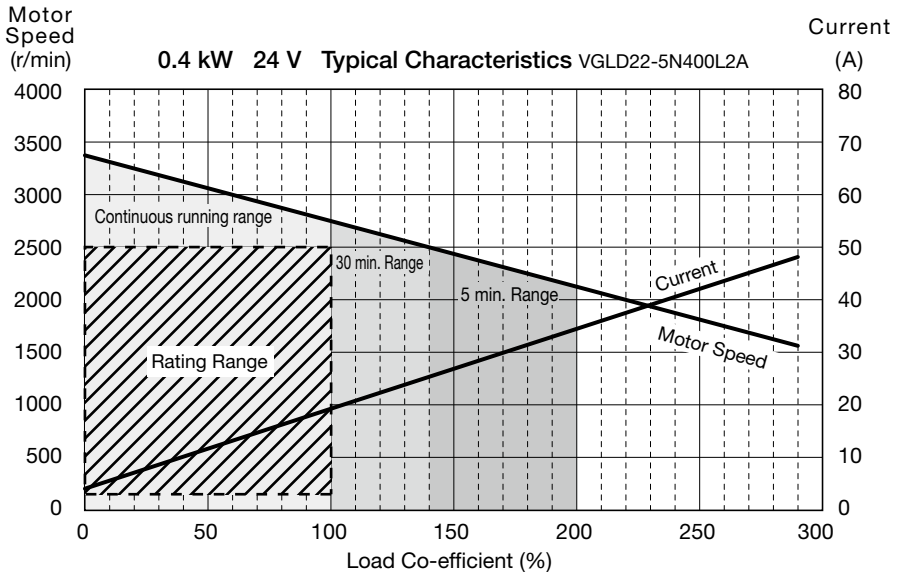
Control Unit Specification

Technical Documentation

Option



Gearmotors Characteristics and Specifications



VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

SD Series

Note: These characteristics are representative characteristics of gearmotors Refer to these graphs if the customer wishes to design a drive of their own.

[Notes]

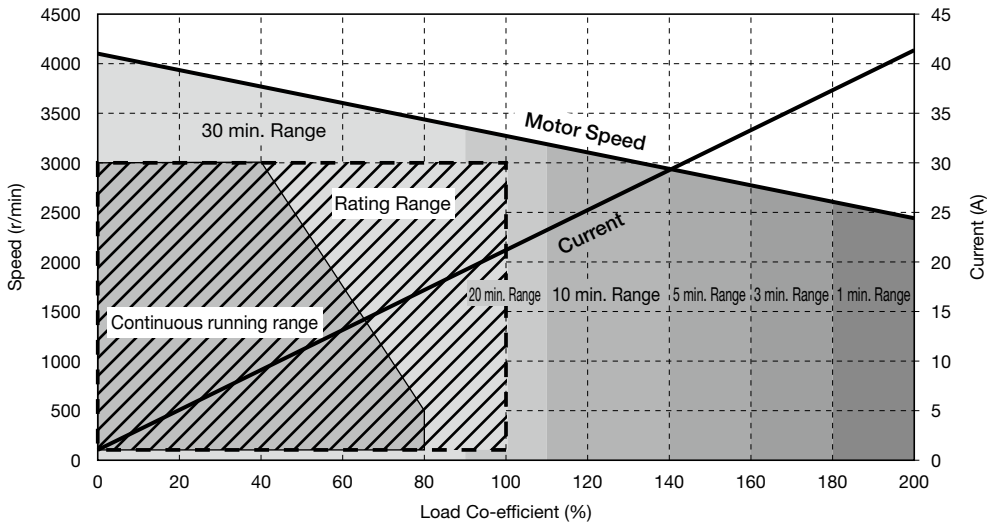
Below graphs explain relation between load co-efficient with rotational speed (motor shaft) as well of current.

The rating range defined by speed from 80 to 3000 r/min with 100 % load co-efficient.

Guidelines for use (with cold starts) at time ratings (5 minutes, 30 minutes) are also shown. However, please check the actual rating range with an actual unit.

1. The speed in the graphs below corresponds to the speed of the motor shaft. Consider the gear ratio when calculating the output shaft speed.
2. In the graphs below, 100 % corresponds to the allowable output shaft torque shown in the performance tables.
3. If a gearmotor is used outside the rating range, the life of the gearmotor may become shorter or problem may arise with the electro-magnetic brake. For details, please contact us.
4. Take care to keep the surface temperature of the motor below 90 °C.

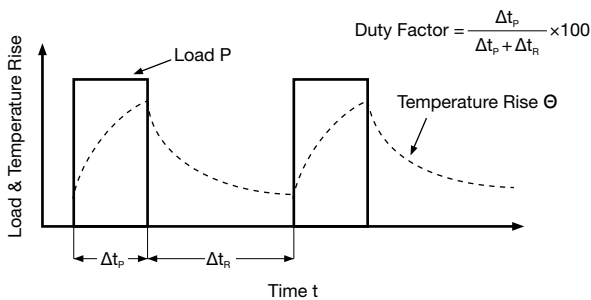
0.75 kW 48 V Typical Characteristics



The rating class of this product is the intermittent periodic rating (S3 25 %).

The intermittent periodic rating (S3) is the specification of repeating a cycle consisting of an operation period under a constant load and a deactivation period with no voltage applied.

The duty factor of this product is 25 %.



Dedicated Drives (Sold Separately)

Type Code

| Series | Motor Type | Brake Type | Power | Supply Voltage | Option |
|----------|------------|------------|------------|----------------|----------|
| A | BL | CD | 010 | L2 | X |
| A | SD | NB | 080 | L4 | X |
| ① | ② | ③ | ④ | ⑤ | ⑥ |

| | |
|------------------|---|
| ① Series | A :GTR-AR |
| ② Motor Type | BL : Brushless Motor V Series |
| | SD : Brushless Motor SD Series |
| ③ Brake Type | CD : V Series common to gearmotors with a brake and gearmotors without a brake |
| | NB : SD Series common to gearmotors with a brake and gearmotors without a brake |
| ④ Power | 005 : 50 W |
| | 010 : 0.1 kW |
| | 020 : 0.2 kW |
| | 040 : 0.4 kW |
| | 080 : 0.75 kW |
| ⑤ Supply Voltage | L1 : 12 V |
| | L2 : 24 V |
| | L4 : 48 V |
| ⑥ Option | Blank : Standard Specification |
| | X : Special Specification Code |


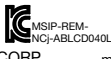


Model Lineup

The combinations of supply voltages and powers are as follows:





| Series | Power | Supply Voltage | | |
|--------|---------|----------------|-------------|-------------|
| | | 12 V | 24 V | 48 V |
| V | 50 W | A-BLCD005L1 | A-BLCD005L2 | — |
| | 0.1 kW | A-BLCD010L1 | A-BLCD010L2 | A-BLCD010L4 |
| | 0.2 kW | — | A-BLCD020L2 | A-BLCD020L4 |
| | 0.4 kW | — | A-BLCD040L2 | A-BLCD040L4 |
| SD | 0.75 kW | — | — | A-SDNB080L4 |

Nameplate

V Series

| | | |
|-----------------------|---|------------------|
| Part Number | MODEL : A- BLCD040L4 | |
| Input Specifications | INPUT : DC48V 10.6A | |
| Output Specifications | OUTPUT : AC3PH 0- 48V 0- 150Hz 10, 1A | Software Version |
| Serial Number | S/ N : 01705240123 0001 01 | Hardware Version |
| Global Standards |     | Product QR code |
| | NISSEI CORP. made in japan | |

SD Series

| | | |
|-----------------------|---|------------------|
| Part Number | MODEL : A- SDNB080L4 | |
| Input Specifications | INPUT : DC48V 19.6A | |
| Output Specifications | OUTPUT : AC3PH 0- 48V 0- 333Hz 19, 5A | Software Version |
| Serial Number | S/ N : 01911290123 0007 04 | Hardware Version |
| Global Standards |     | Product QR code |
| | NISSEI CORP. made in japan | |

VG/APG Type Parallel Shaft

VH Type Right Angle Shaft

VF3S/VF3F Type
Control Unit Specification
Control Unit Specification

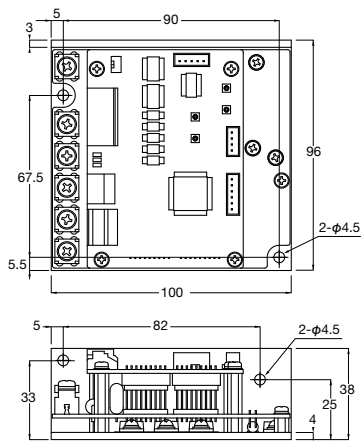
Control Unit Specification

Technical Documentation

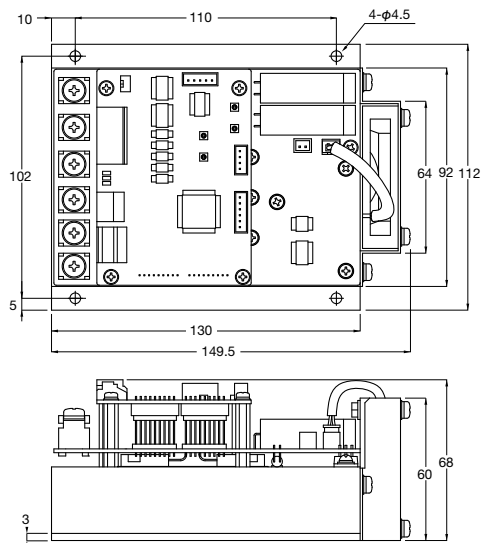
Option

Dimension Diagrams

<Figure 1>



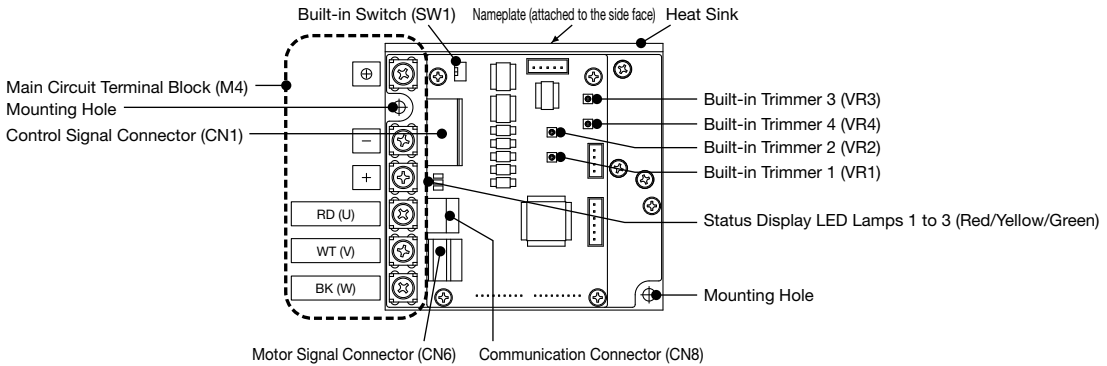
<Figure 2>



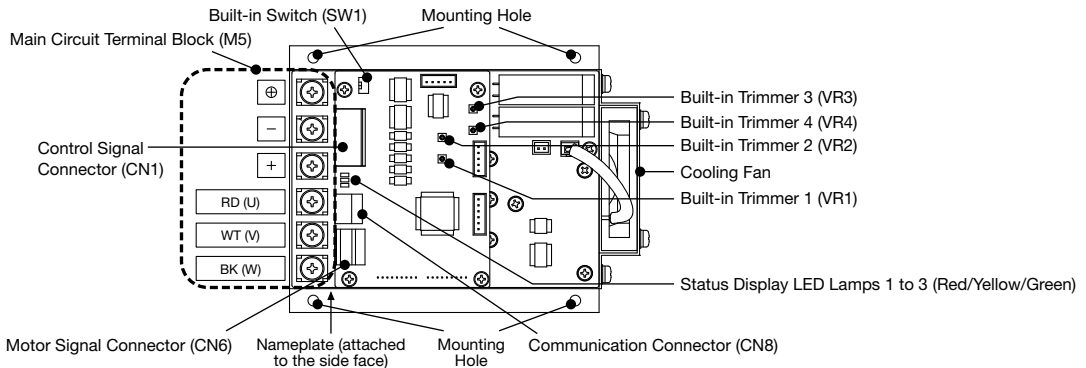
| Series | Power | Voltage | Part Number | Figure Number | Approx. Weight (kg) |
|--------|---------|---------|-------------|---------------|---------------------|
| V | 50 W | 12 VDC | A-BLCD005L1 | 1 | 0.29 |
| | | 24 VDC | A-BLCD005L2 | 1 | 0.29 |
| | 0.1 kW | 12 VDC | A-BLCD010L1 | 1 | 0.29 |
| | | 24 VDC | A-BLCD010L2 | 1 | 0.29 |
| | 0.2 kW | 48 VDC | A-BLCD010L4 | 1 | 0.29 |
| | | 24 VDC | A-BLCD020L2 | 1 | 0.29 |
| | 0.4 kW | 48 VDC | A-BLCD020L4 | 1 | 0.29 |
| | | 24 VDC | A-BLCD040L2 | 2 | 0.73 |
| SD | 0.75 kW | 48 VDC | A-BLCD040L4 | 1 | 0.29 |
| | | 48 VDC | A-SDNB080L4 | 2 | 0.73 |

Names of Parts

A-BLCD005L1 / A-BLCD005L2 / A-BLCD010L1 / A-BLCD010L2 / A-BLCD010L4 / A-BLCD020L2 / A-BLCD020L4 / A-BLCD040L4



A-BLCD040L2 / A-SDNB080L4



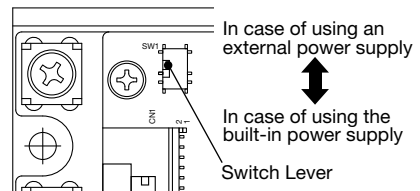
Built-in Switch

When inputting a control signal, choose to use the built-in power supply (+15 V) of the drive or an external power supply.

| Code | Setting | Description | |
|------|---|---|--|
| SW1 | In case of using an external power supply (Default) | The gearmotor will be disconnected from the built-in power supply of the drive. | |
| | In case of using the built-in power supply | V Series | IN-COM (CN1-1) will be shorted with GND inside the drive. A voltage of 15 V will be applied to each of the input terminals I1 to I8. |
| | | SD Series | A voltage of 15 V will be applied to each of the input terminals I1 to I8. |

Note: For the internal circuit, refer to page 661.

Built-in Switch Setting



VG/AGP Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Shaft
VF3S Type Right Angle Shaft

Control Unit Specification

Technical Documentation

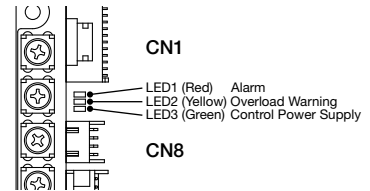
Option

Status Display LED Lamps

This function displays the status of the drive with LED lamps. The LED lamps light up according to the specifications described below.

| Code | Color | Specification |
|------|--------|---|
| LED1 | Red | This LED lamp lights up when an alarm occurs. |
| LED2 | Yellow | This LED lamp lights up during overload operation (operation above the rated current of the motor) and goes off when the overload state is cleared. In addition it goes off where as there is a overload alarm. |
| LED3 | Green | This LED lamp lights up when the control power supply is turned on. It also lights up or blinks when an alarm occurs. The number of blinks indicates the type of alarm. |

LED Lamp Layout



Built-in Trimmer

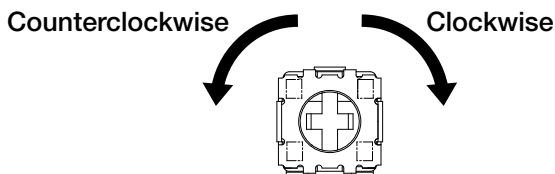
The drive is provided with four built-in trimmers. The following settings can be made by adjusting the trimmers.

| Code | Function Name | Description | Default |
|------|--|--|----------------------|
| VR1 | Built-in Trimmer 1 (Speed Setting Device) | The command speed increases by turning the trimmer clockwise. (Note 1) The setting ranges are as follows: V Series: 0 to 3000 r/min SD Series: 0 to 4000 r/min The maximum value of the speed setting by the trimmer can be changed with Pn040. (Note 2) | Clockwise MAX |
| VR2 | Built-in Trimmer 2 (Acceleration/Deceleration Time Setting Device) | The acceleration/deceleration time increases by turning the trimmer clockwise. Setting Range: 0.00 to 5.00 s The standard speed of the acceleration/deceleration time setting by the trimmer can be changed with Pn025. The default values of the standard speed are as follows: V Series: 2500 r/min SD Series: 3000 r/min | Counterclockwise MAX |
| VR3 | Built-in Trimmer 3 (Torque Limit Setting Device) | The torque limit value increases by turning the trimmer clockwise. Setting Range: 0 to 200 % | Clockwise MAX |
| VR4 | Built-in Trimmer 4 | Not used | — |

Note 1: The function of built-in trimmer 1 is disabled upon shipment. To enable built-in trimmer 1, change the user parameter (Pn000) to "4." The default setting is set to an external analog command.

Note 2: The speed can be set to up to 5000 r/min with the trimmer, but the speeds at which motors can rotate are as follows:
V Series: Up to 3000 r/min
SD Series: Up to 4000 r/min

Rotational Directions of Trimmers

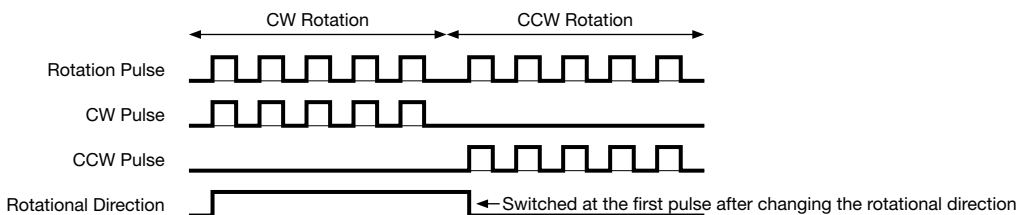


Control Unit Specification

| Series | | V | | | | SD | |
|--|---------------------------------|---|--|---------------|---------------|---------------|---|
| Applicable Motor Power | | 50 W | 0.1 kW | 0.2 kW | 0.4 kW | 0.75 kW | |
| Output Current (Rated/Maximum) | 12 V | 5.9 A/11.8 A | 12.4 A/24.8 A | — | — | — | |
| | 24 V | 2.7 A/5.4 A | 5.8 A/11.6 A | 9.8 A/19.6 A | 20.1 A/40.2 A | — | |
| | 48 V | — | 2.7 A/5.4 A | 5.1 A/10.2 A | 9.9 A/19.8 A | 19.5 A/39 A | |
| Input Supply Power (Rated Current/Maximum Current) | 12 V | 6.4 A/15.4 A | 13.1 A/31.4 A | — | — | — | |
| | 24 V | 3.4 A/8.2 A | 6.1 A/14.6 A | 10.9 A/26.2 A | 23.1 A/55.4 A | — | |
| | 48 V | — | 3.0 A/7.2 A | 5.4 A/13.0 A | 10.6 A/25.4 A | 19.6 A/52.3 A | |
| Main Circuit/Control Circuit Input Voltage Range | | For 12 V: 10 to 15 VDC For 24 V: 20 to 30 VDC For 48 V: 40 to 60 VDC | | | | | |
| Rated Speed | | 2500 r/min | | | | 3000 r/min | |
| Function | Control | Variable Speed Range | 100 to 3000 r/min | | | | 80 to 4000 r/min |
| | | Speed Command Method | External analog command, PWM speed command, pulse frequency speed command, built-in trimmer 1, speed commands 1 to 8 | | | | |
| | | Acceleration/Deceleration Time | Built-in trimmer 2, acceleration times 1 and 2, deceleration times 1 and 2 | | | | Built-in trimmer 2, acceleration times 1 and 2, deceleration times 1 and 2, external analog command |
| | | Torque Limit | External analog command, built-in trimmer 3, torque limit values 1 to 4 | | | | |
| | Input | Number of input points | Sequence Input: 8 points Analog Input: 1 point | | | | |
| | | Input Function | CW, CCW, speed command selection, acceleration/deceleration time selection, torque limit value selection, alarm reset/emergency stop, brake control signal forced ON command, DC lock, load inertia switch, PWM speed command, pulse frequency speed command | | | | |
| | Output | Number of output points | Sequence Output: 4 points Analog Output: 1 point | | | | |
| | | Output Function | Abnormality detection, operation, rotation pulse, CW rotation pulse, CCW rotation pulse, rotational direction, rotating, over rated torque, over designated torque, brake control signal, voltage drop warning (Note 2) | | | | |
| Safeguard Function | | Overload, over-voltage, voltage drop, drive overheat, over-speed, overcurrent, sensor error, system error | | | | | |
| Environment | Application Ambient Temperature | -10 °C to 50 °C | | | | | |
| | Storage Ambient Temperature | -25 °C to 70 °C | | | | | |
| | Application Ambient Humidity | 95 %RH max (No condensation) | | | | | |
| | Altitude | 1,000 m max | | | | | |
| | Vibration | 2.0 G or less | | | | | |
| Global Standards Conformance | | CE Marking (EMC Command), KC Mark | | | | | |
| Protective Structure | | IP00 | | | | | |
| RoHS Directive | | Conformance | | | | | |
| Motor-Drive Wiring Length | | Maximum Extension Length: 5 m | | | | | |

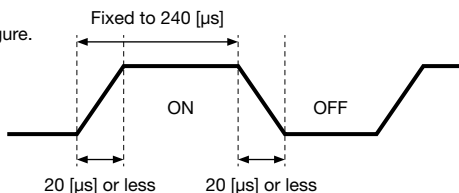
Note 1: Regenerative energy will be fed to the power supply unit through this drive.

Note 2: 18 pulses will be output for 50 W to 0.4 kW and 30 pulses will be output for 0.75 kW per motor rotation. The ON time is fixed to 240 [μs].



*About pulse waveform

The specification of the output pulse is as shown in the right figure. Select a counter according to the specification.



Note: The duty ratio differs depending on the frequency.

VG/AGP Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Current: High Precision Base Concentric High-Speed Shaft
FS Type High-Speed Shaft

Control Unit Specification

Technical Documentation

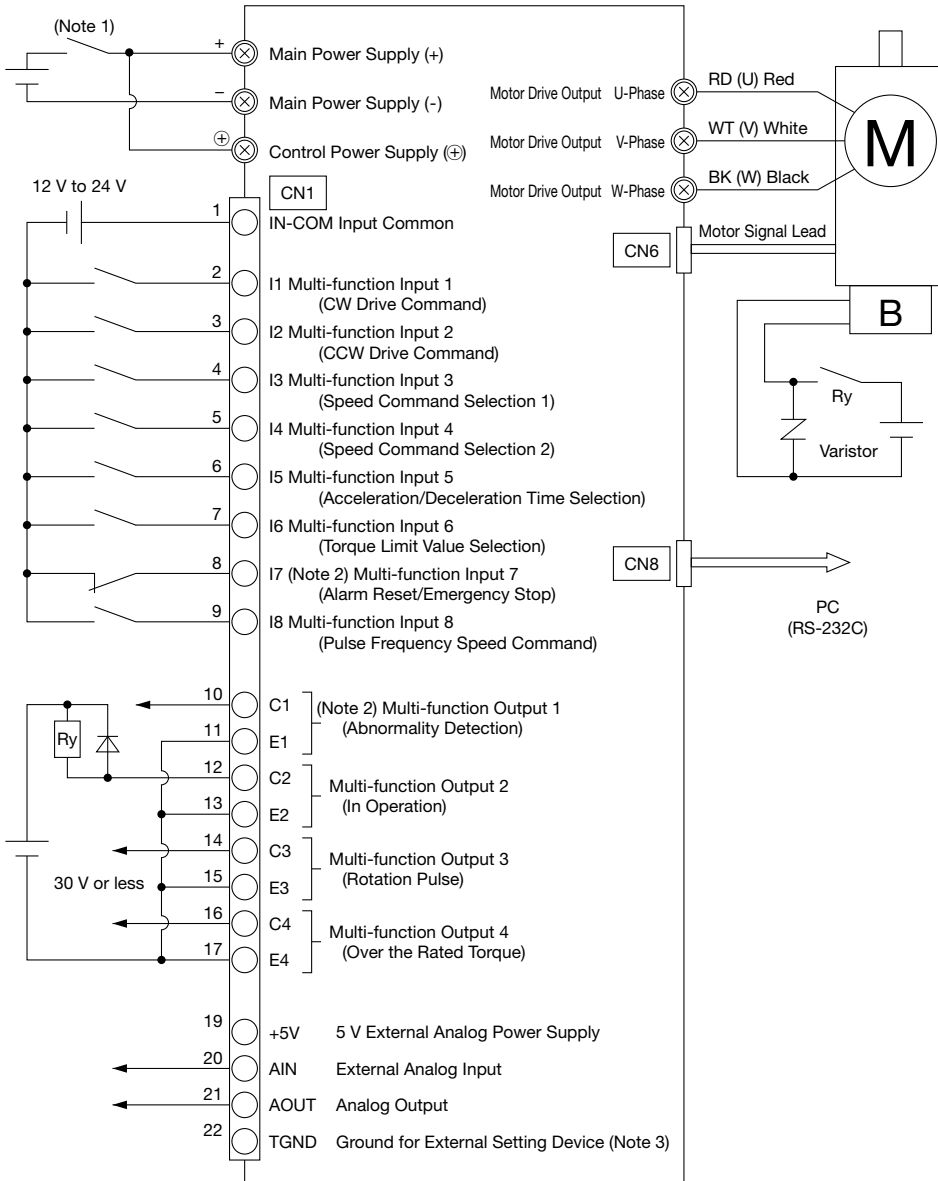
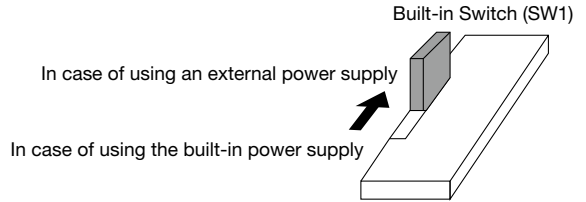
Option

Wiring Diagrams

V Series: 50 W to 0.4 kW

■ Sink Connection Example (When Using an External Power Supply)

When using an external power supply, set the built-in switch (SW1) of the drive as shown in the figure on the right.



Note 1: During regenerative operation, such as lifting operation or deceleration, do not disconnect the motor from the battery in a state where the main power supply (+) and the control power supply (⊕) are connected.

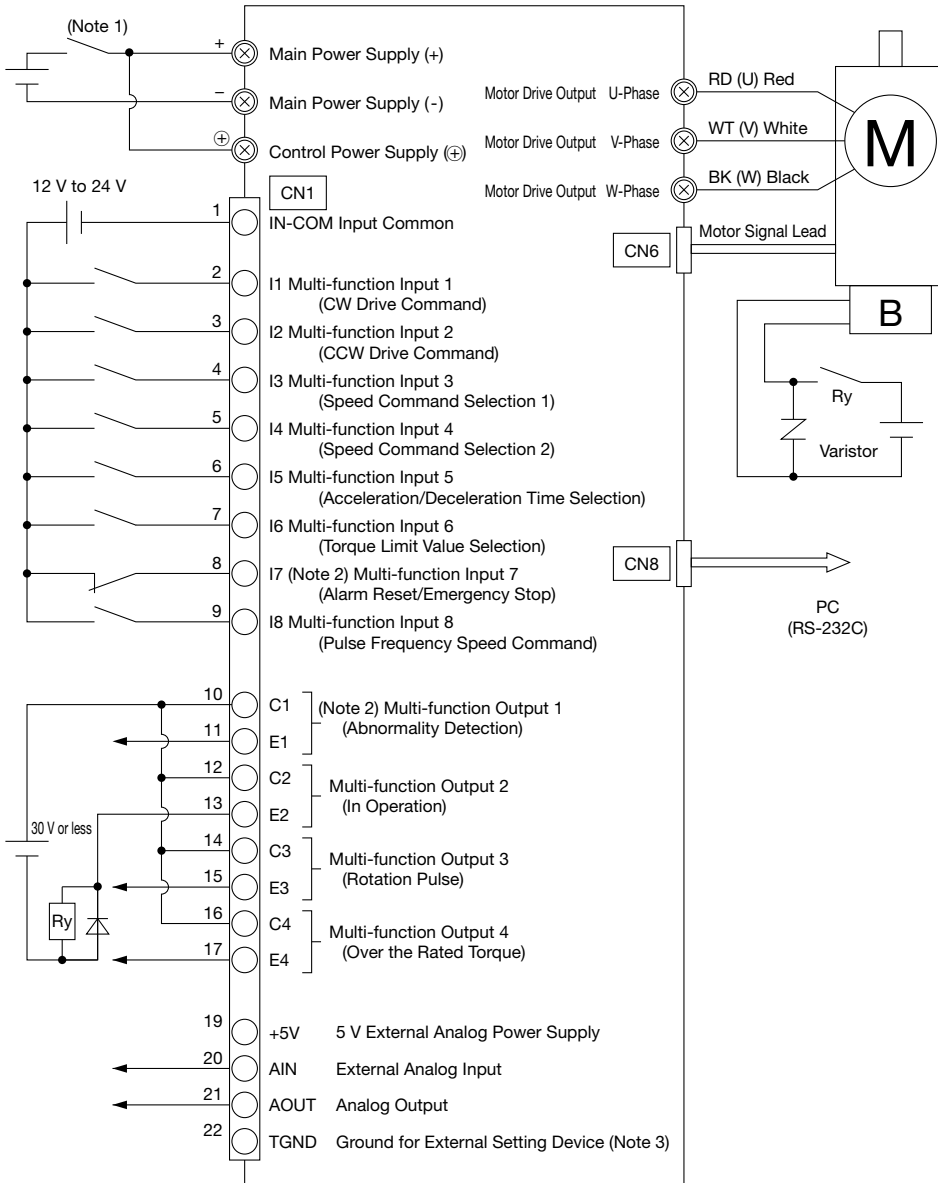
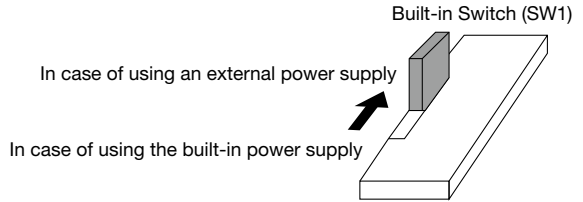
Note 2: For safety reasons, the polarity is reversed under the default settings.

Note 3: Draw the reference analog voltage from the main power supply (-) terminal.

V Series: 50 W to 0.4 kW

Source Connection Example (When Using an External Power Supply)

When using an external power supply, set the built-in switch (SW1) of the drive as shown in the figure on the right.



Note 1: During regenerative operation, such as lifting operation or deceleration, do not disconnect the motor from the battery in a state where the main power supply (+) and the control power supply (⊕) are connected.

Note 2: For safety reasons, the polarity is reversed under the default settings.

Note 3: Draw the reference analog voltage from the main power supply (-) terminal.

VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

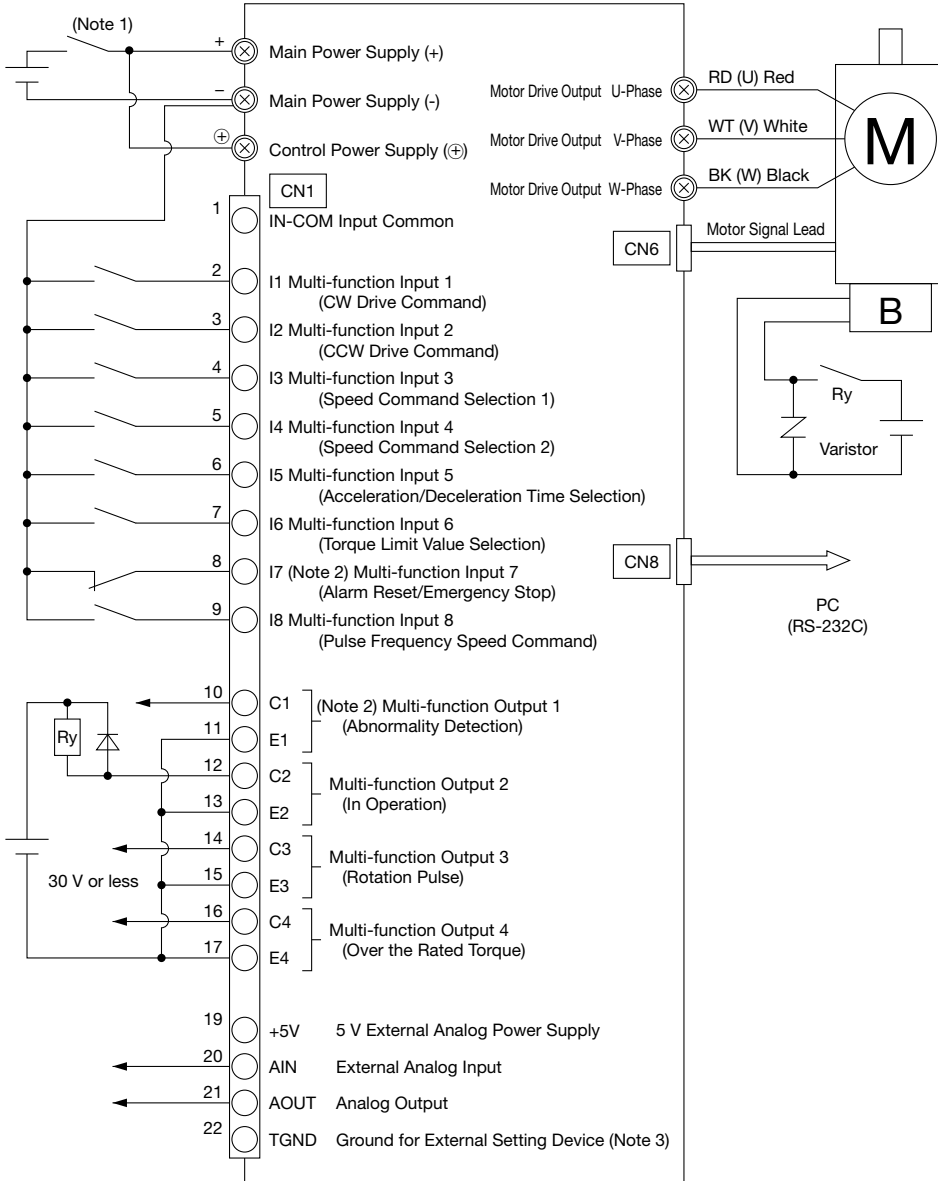
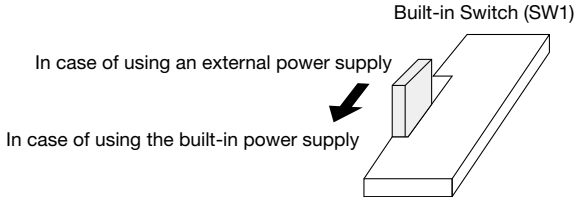
Technical Documentation

Option

V Series: 50 W to 0.4 kW

Sink Connection Example (When Using the Built-in Power Supply)

When using the built-in power supply, set the built-in switch (SW1) of the drive as shown in the figure on the right.



Note 1: During regenerative operation, such as lifting operation or deceleration, do not disconnect the motor from the battery in a state where the main power supply (+) and the control power supply (⊕) are connected.

Note 2: For safety reasons, the polarity is reversed under the default settings.

Note 3: Draw the reference analog voltage from the main power supply (-) terminal.

VG/APG Type Parallel Shaft

VH Type Right Angle Shaft

VF3S/VF3E Type Overhaul/Right Angle Shaft Deceleration Right Angle Shaft

Control Unit Specification

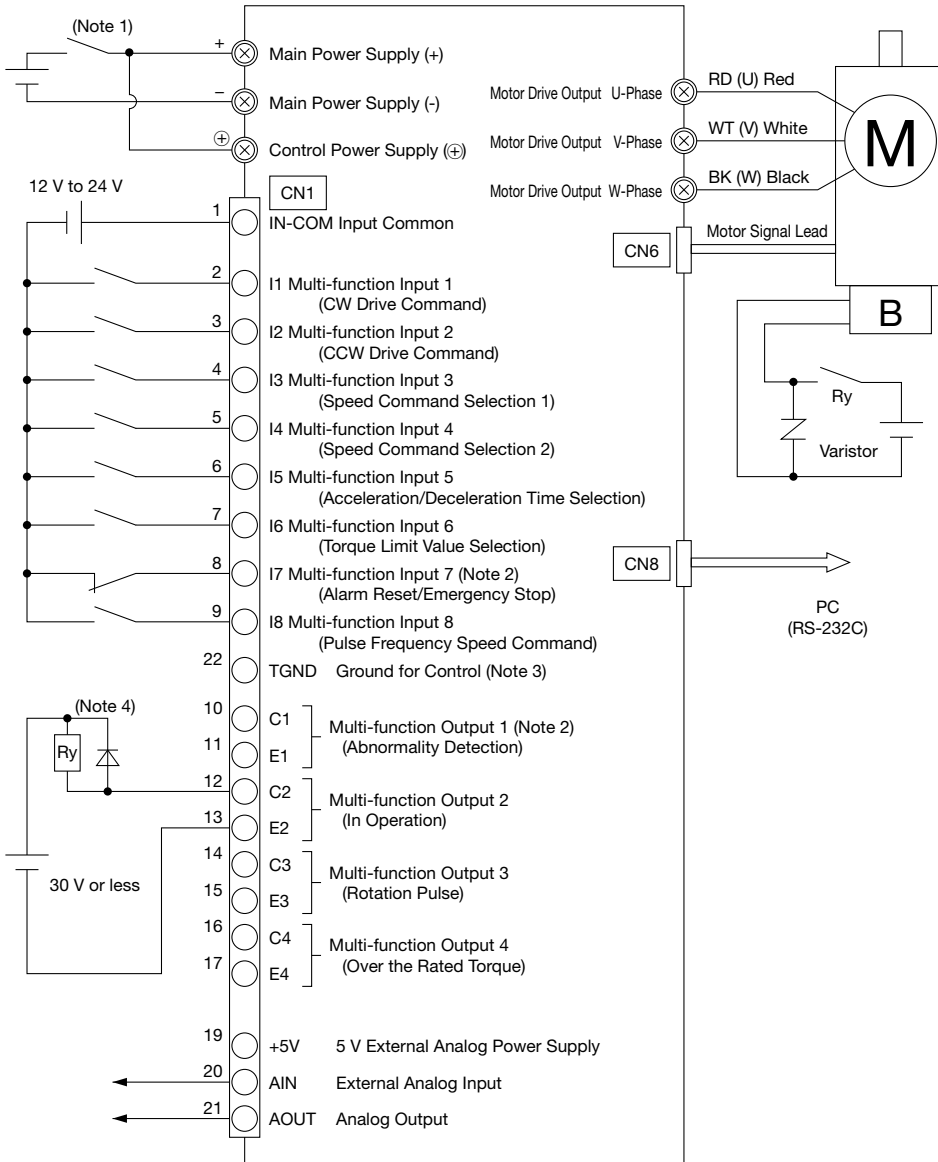
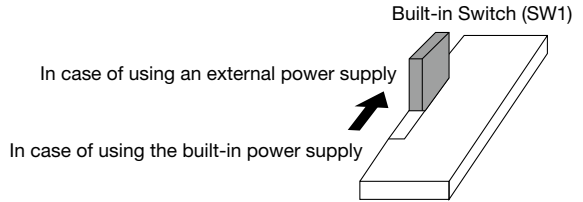
Technical Documentation

Option

SD Series 0.75 kW

Sink Connection Example (When Using an External Power Supply)

When using an external power supply, set the built-in switch (SW1) of the drive as shown in the figure on the right.



Note 1: During regenerative operation, such as lifting operation or deceleration, do not disconnect the motor from the battery in a state where the main power supply (+) and the control power supply (+) are connected.
 Note 2: For safety reasons, the polarity is reversed under the default settings.
 Note 3: Perform wiring by referring to "Precautions for wiring" on page 664.
 Note 4: This figure is a wiring example for using a brake.

VG/AGP Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Shaft
VF3S Type Right Angle Shaft

Control Unit Specification

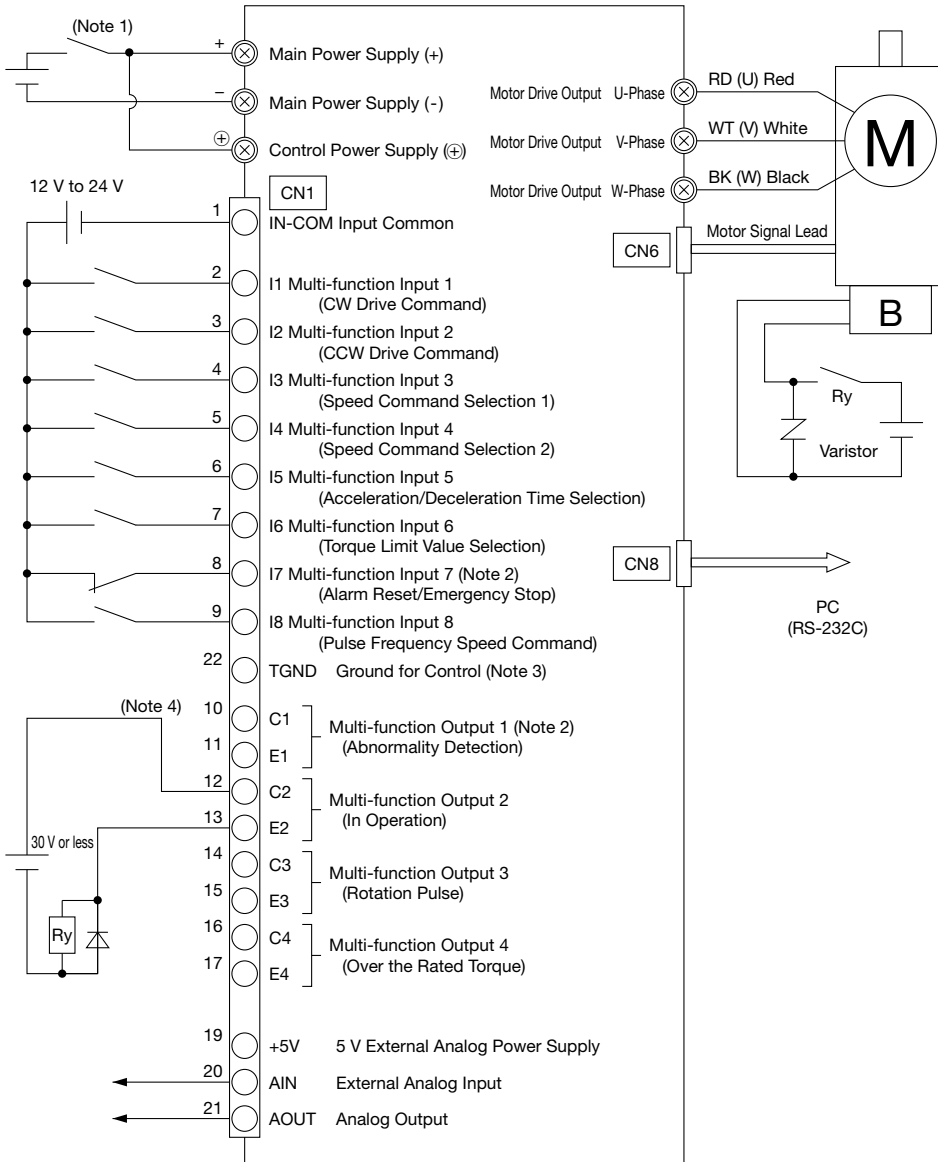
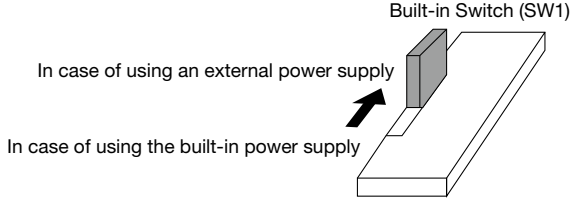
Technical Documentation

Option

SD Series 0.75 kW

Source Connection Example (When Using an External Power Supply)

When using an external power supply, set the built-in switch (SW1) of the drive as shown in the figure on the right.



Note 1: During regenerative operation, such as lifting operation or deceleration, do not disconnect the motor from the battery in a state where the main power supply (+) and the control power supply (+) are connected.

Note 2: For safety reasons, the polarity is reversed under the default settings.

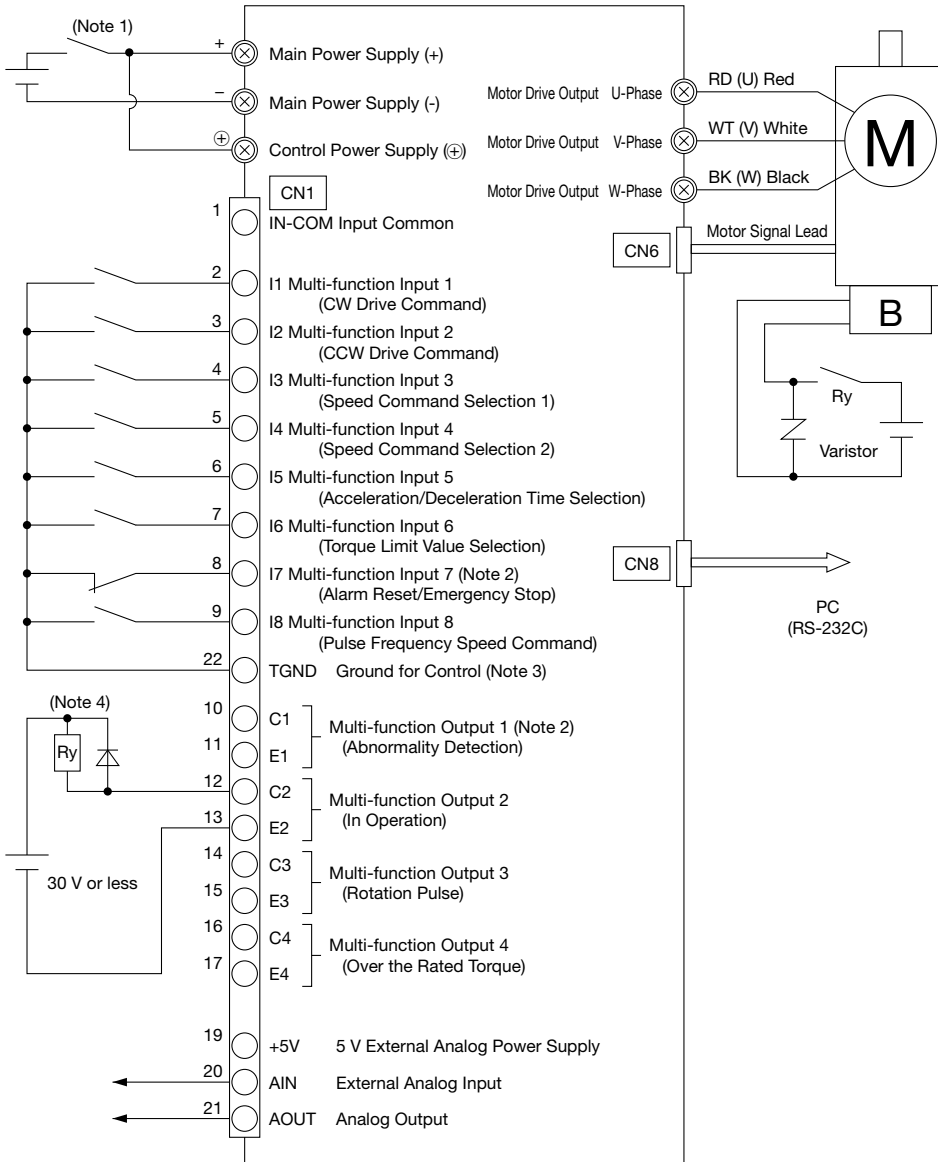
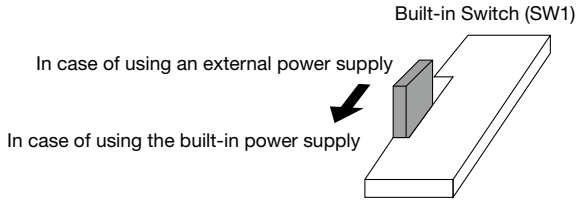
Note 3: Perform wiring by referring to "Precautions for wiring" on page 664.

Note 4: This figure is a wiring example for using a brake.

SD Series 0.75 kW

Sink Connection Example (When Using the Built-in Power Supply)

When using the built-in power supply, set the built-in switch (SW1) of the drive as shown in the figure on the right.



Note 1: During regenerative operation, such as lifting operation or deceleration, do not disconnect the motor from the battery in a state where the main power supply (+) and the control power supply (+) are connected.

Note 2: For safety reasons, the polarity is reversed under the default settings.

Note 3: Perform wiring by referring to "Precautions for wiring" on page 664.

Note 4: This figure is a wiring example for using a brake.

VG/AGP Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

Explanation of Terminals

Since the I/F is not isolated from the main power supply, perform wiring with care.

■ Connector Specifications

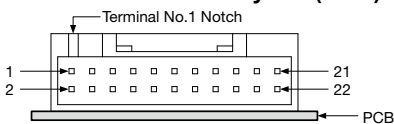
| Code | Manufacturer | Part Number | Remarks |
|---------------------------|--------------------|--------------|--|
| Terminal Block (TM1 to 6) | — | — | Tightening torque: 0.8 to 1.2 N·m (M4) Tightening torque: 1.6 to 2.0 N·m (M5) |
| CN1 | J.S.T.MFG.CO.,LTD. | S22B-PUDSS-1 | Compatible Housing: PUDP-22V-S Adaptable Terminal: SPUD-001T-P0.5 |
| CN6 | J.S.T.MFG.CO.,LTD. | S05B-XASK-1 | Compatible Housing: XAP-05V-1 Adaptable Terminal: SXA-001T-P0.6 |
| CN8 | J.S.T.MFG.CO.,LTD. | S4B-XH-A | Compatible Housing: XHP-4 Adaptable Terminal: SXH-001T-P0.6N |

■ Layout of Terminal Block

| Terminal Number | Function Name | Description |
|-----------------|----------------------------|---|
| ⊕ | Control Power Supply (+) | The positive side of the control power supply. |
| - | Main Power Supply (-) | V Series The negative side of the main power supply. This is also the negative side of the control power supply. |
| | | SD Series The negative side of the control power supply and the main power supply. |
| + | Main Power Supply (+) | The negative side of the main power supply. |
| RD(U) | Motor Drive Output U-Phase | Connect the terminal to the motor. (Note 1) |
| WT(W) | Motor Drive Output V-Phase | |
| BK(W) | Motor Drive Output W-Phase | |

Note 1: Pay attention to the connection of the motor drive output. If the connection is incorrect, the motor will not operate.

■ I/O Connector Layout (CN1)



| Terminal No. | Terminal Name | Function Name | Default |
|--------------|---------------|--|--|
| 1 | IN_COM | Input Common (Note 1) | — |
| 2 | I1 | Multi-function Input 1 | CW drive command |
| 3 | I2 | Multi-function Input 2 | CCW drive command |
| 4 | I3 | Multi-function Input 3 | Speed Command Selection 1 |
| 5 | I4 | Multi-function Input 4 | Speed Command Selection 2 |
| 6 | I5 | Multi-function Input 5 | Acceleration/Deceleration time selection |
| 7 | I6 | Multi-function Input 6 | Torque Limit Value Selection 1 |
| 8 | I7 | Multi-function Input 7 | Alarm Reset/Emergency Stop (Note 2) |
| 9 | I8 | Multi-function Input 8 | Pulse Frequency Speed Command |
| 10 | C1 | Multi-function Output 1 | Abnormality Detection (Note 2) |
| 11 | E1 | Multi-function Output 2 | In Operation |
| 12 | C2 | | |
| 14 | C3 | Multi-function Output 3 | Rotation Pulse |
| 15 | E3 | (Compatible with high-speed pulse output) (Note 3) | |
| 16 | C4 | Multi-function Output 4 | Over Rated Torque |
| 17 | E4 | (Compatible with high-speed pulse output) (Note 3) | |
| 18 | — | Not used | — |
| 19 | +5V | 5 V External Analog Power Supply (Note 4) | — |
| 20 | AIN | External Analog Input Terminal | Speed Command |
| 21 | AOUT | Analog Output Terminal | Speed (outputting actual speed of motor) |
| 22 | TGND | Ground for External Setting Device (Note 5) | — |

Note 1: When the built-in switch is set to use the built-in power supply, the terminal will be shorted with TGND inside.

Note 2: The I/O polarity is reversed by default.

Note 3: Multi-function outputs 3 and 4 are compatible with high-speed pulse output. When selecting rotation pulse, CW rotation pulse, or CCW rotation pulse among the output functions, assign the function to multi-function outputs 3 and 4.

Note 4: This is the power supply output terminal. Do not connect an external power supply.

Note 5: Connect the terminal only when using an external setting device. Do not connect it to another terminal when no external setting device is used.

■ Layout of Motor Signal Connector (CN6) (Note 1)

| Terminal No. | Terminal Name | Function Name |
|--------------|---------------|---------------------------|
| 1 | +15V | Power supply 15 V |
| 2 | HALL_U | Hall sensor input U-Phase |
| 3 | HALL_V | Hall sensor input V-Phase |
| 4 | HALL_W | Hall sensor input W-Phase |
| 5 | GND | Ground (Note 2) |

Note 1: The maximum extension length is 5 m.

Note 2: Do not connect the terminal to the main power supply (-).

■ Layout of Communication Connector (CN8)

| Terminal No. | Terminal Name | Function Name |
|--------------|---------------|-------------------|
| 1 | +5V | Power supply 5 V |
| 2 | TxD | Data transmission |
| 3 | RxD | Data receipt |
| 4 | GND | Ground (Note 1) |

Note 1: Do not connect the terminal to the main power supply (-).

VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VFSS/VFG Type
Overhaul/Right Angle Shaft
FSS Type/Right Angle Shaft

Control Unit Specification
Technical Documentation

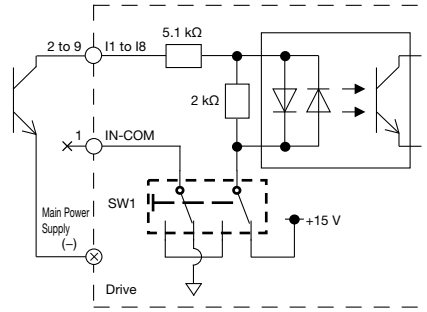
Option

I/O Terminal Wiring

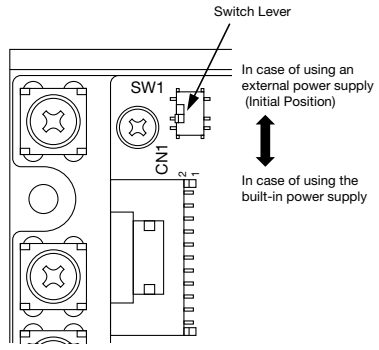
V Series: 50 W to 0.4 kW

Control Input

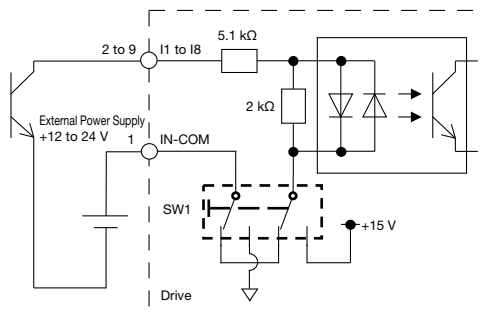
- When using the built-in power supply (Set SW1 to the CN1 side.)
<Sink Connection>



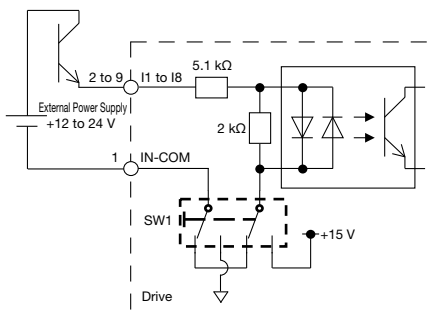
Note: Do not use CN1-1 (IN-COM) as shown in the figure above.



- When using an external power supply (Set SW1 to the opposite side of CN1.)
<Sink Connection>

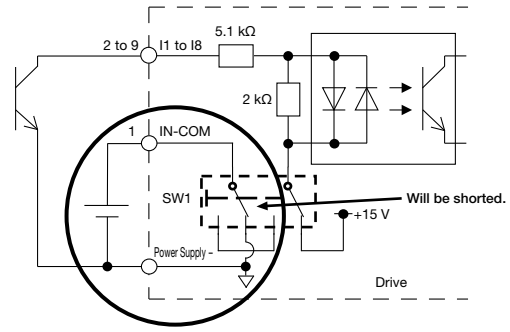


<Source Connection>



[Precautions for use of an external power supply]

If a sink connection is made using an external power supply with SW1 used as the built-in power supply and "-" of the input terminal power supply and "-" of the main and control power supplies are common, the power supplies may be shorted and the internal fuse may burn out. If the internal fuse is burned out, the drive needs to be replaced.

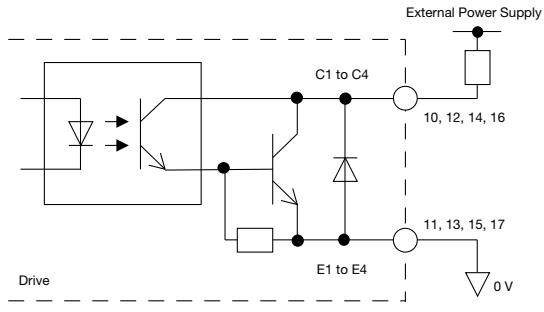


Control Output

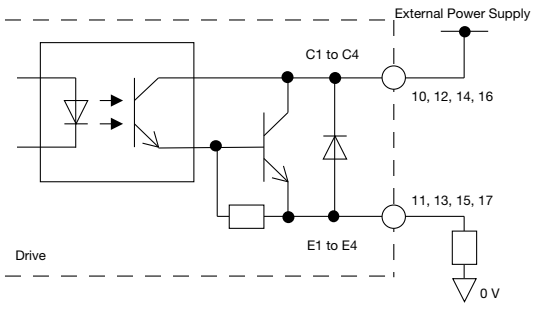
- Maximum rated value of control output

| | | |
|---------------------------------|--------------|--------|
| Maximum voltage between C and E | | 30 V |
| Maximum current | C1/E1, C2/E2 | 100 mA |
| | C3/E3, C4/E4 | 50 mA |

<Sink Connection>



<Source Connection>



VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

V Series: 50 W to 0.4 kW

External Analog Input

By inputting a DC voltage to the AIN terminal (external analog input terminal), a speed command value or torque limit value command can be enabled.

Note: The criterion for the DC voltage is different between the external speed setting device and the DC voltage control.

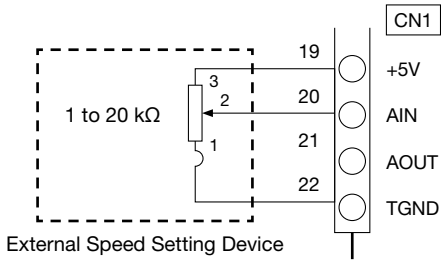
Connect the wires by referring to the following wiring examples:

● External speed setting device wiring example

An external speed setting device is available as an option.

If you prepare an external speed setting device from another vendor, select one within the range of 1 to 20 kΩ.

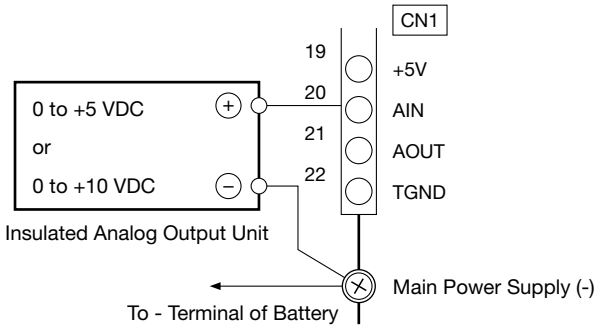
Do not connect TGND to any terminal other than terminal No. 1 of the external speed setting device.



● DC voltage control wiring example

If you intend to use an analog output unit or the like, one having an insulated output is recommended.

Connect the - output terminal of the analog output unit directly to the drive main power supply (-).



VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3E Type
Omni-Directional Drive
Right Angle Shaft

Control Unit Specification

Technical Documentation

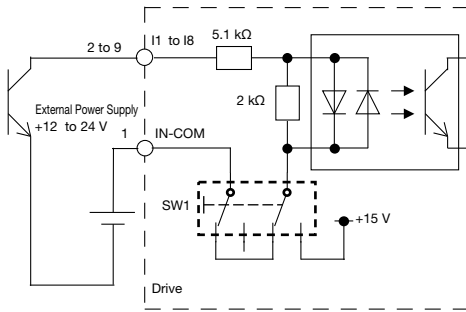
Option

SD Series 0.75 kW

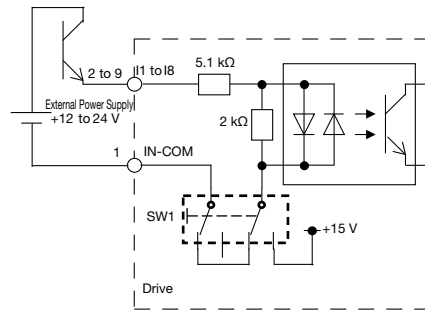
Control Input

- When using an external power supply (Set SW1 to the O side (default).)

<Sink Connection>

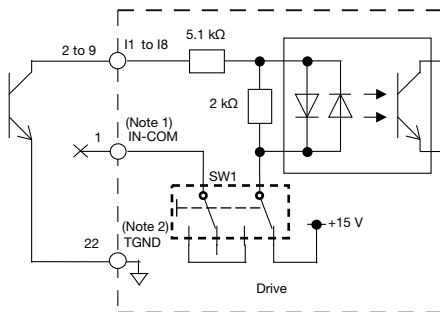


<Source Connection>

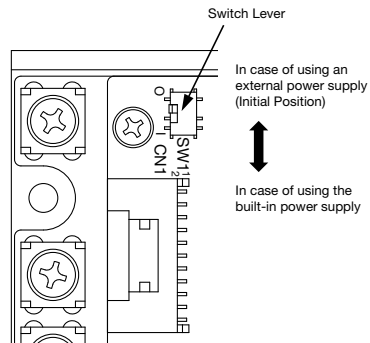


- When using the built-in power supply (Set SW1 to the I side.)

<Sink Connection>



Note 1: IN-COM will not be used when using the built-in power supply
 Note 2: Perform wiring by reference to Precautions for wiring on page 664.



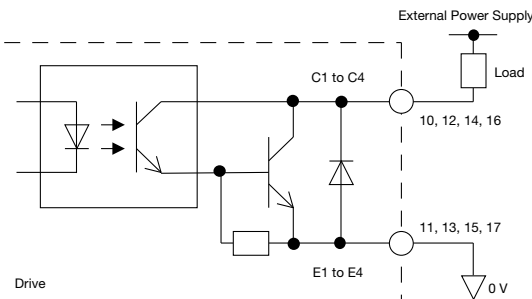
Switch Lever
 In case of using an external power supply (Initial Position)
 In case of using the built-in power supply

Control Output

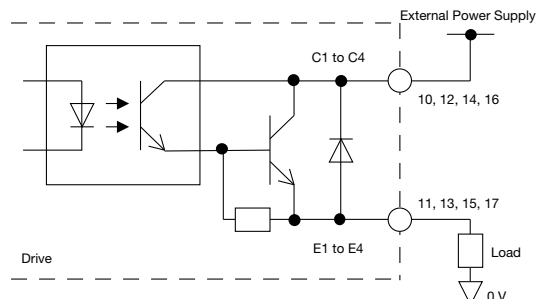
- Maximum rated value of control output

| Maximum voltage between C and E | | 30 V |
|---------------------------------|--------------|--------|
| Maximum current | C1/E1, C2/E2 | 100 mA |
| | C3/E3, C4/E4 | 50 mA |

<Sink Connection>



<Source Connection>



VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/MVF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
F3 Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

SD Series 0.75 kW

External Analog Input

By inputting a DC voltage to the AIN terminal (external analog input terminal), a speed command value or torque limit value command can be enabled.

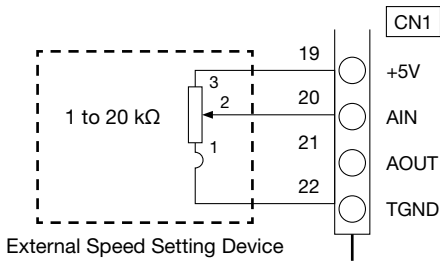
Note: The criterion for the DC voltage is different between the external speed setting device and the DC voltage control.

Connect the wires by referring to the following wiring examples:

External speed setting device wiring example

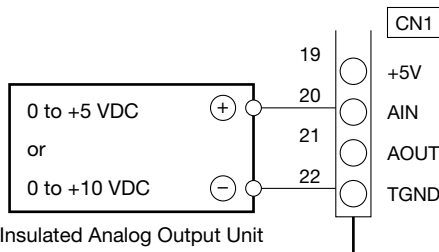
An external speed setting device is available as an option.

If you prepare an external speed setting device from another vendor, select one within the range of 1 to 20 kΩ.



DC voltage control wiring example

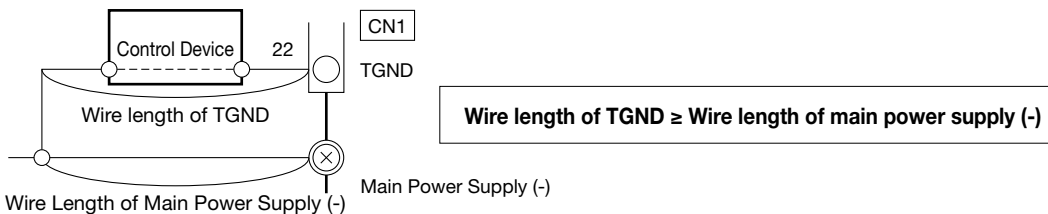
If you intend to use an analog output unit or the like, one having an insulated output is recommended.



Precautions for wiring

When TGND and the main power supply (-) are connected outside the drive, the current flowing through the main power supply (-) will be diverted to the TGND side. Each current value depends on the wiring resistance. If a current of 2 A or more flows to the TGND side, it may cause damage to the drive and control device. Perform wiring under the conditions shown below.

- Wire to be connected to TGND: 0.4 mm (AWG26) or less in diameter
- Wire to be Connected to main power supply (-): 1.6 mm (AWG14) or more in diameter



Parameter List

User Parameters

How to Set Parameters

User parameters can be changed using the software “ACD-PSTool” for computer (hereinafter referred to as PC).

Note: “ACD-PSTool” can be downloaded from our website for free.

Note: The communication cable between a PC (RS-232C) and the drive is an optional item (sold separately).

- The operation check of “ACD-PSTool” is performed by any of the following operating systems:
Windows7®, Windows8®, Windows8.1®, and Windows10®

Parameter List

Attributes

Each parameter has an attribute. Read the descriptions below.

| Attribute | Description |
|-----------|--|
| P | When the parameter is changed, the setting will become effective after rebooting The previous setting will remain effective until the power is rebooted. |
| S | When the parameter is changed, the setting will become effective after the motor stops or the power is rebooted. The previous setting will remain effective while the motor is operating. |
| D | As soon as the parameter is changed, the new setting will become effective. |

Command Parameters: Parameters Related to Command Settings

| No. | Name | Description | Unit | Setting Range | | Default Value | | Attribute |
|-------|---|---|-------|---------------|--------------|---------------|-----------|-----------|
| | | | | V Series | SD Series | V Series | SD Series | |
| Pn000 | Speed Command Source Selection | Used to select a speed command method. 1: External analog command 2: PWM speed command 3: Pulse frequency speed command 4: Built-in trimmer 1 5: Speed command 1 (Pn001) | — | 1 to 5 | 1 to 5 | 1 | 1 | S |
| Pn001 | Speed Command 1 | Used to set speed command 1. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn002 | Speed Command 2 | Used to set speed command 2. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn003 | Speed Command 3 | Used to set speed command 3. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn004 | Speed Command 4 | Used to set speed command 4. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn005 | Speed Command 5 | Used to set speed command 5. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn006 | Speed Command 6 | Used to set speed command 6. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn007 | Speed Command 7 | Used to set speed command 7. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn008 | Speed Command 8 | Used to set speed command 8. | r/min | 100 to 3000 | 80 to 4000 | 2500 | 3000 | D |
| Pn020 | Acceleration/Deceleration Time Command Source Selection | Used to select the command method for acceleration/deceleration time 1. 1: Built-in trimmer 2 2: Acceleration time 1, deceleration time 1 | — | 1 to 2 | 1 to 2 | 1 | 1 | S |
| Pn021 | Acceleration Time 1 | Used to set acceleration time 1 from 0 r/min to the acceleration/deceleration time standard speed (Pn025). | s | 0.00 to 5.00 | 0.00 to 5.00 | 0.1 | 0.1 | D |
| Pn022 | Deceleration Time 1 | Used to set deceleration time 1 from the acceleration/deceleration time standard speed (Pn025) to 0 r/min. | s | 0.00 to 5.00 | 0.00 to 5.00 | 0.1 | 0.1 | D |
| Pn023 | Acceleration Time 2 | Used to set acceleration time 2 from 0 r/min to the acceleration/deceleration time standard speed (Pn025). | s | 0.00 to 5.00 | 0.00 to 5.00 | 0.1 | 0.1 | D |
| Pn024 | Deceleration Time 2 | Used to set deceleration time 2 from the acceleration/deceleration time standard speed (Pn025) to 0 r/min. | s | 0.00 to 5.00 | 0.00 to 5.00 | 0.1 | 0.1 | D |
| Pn025 | Acceleration/Deceleration Time Standard Speed | Used to set the acceleration/deceleration time standard speed. Acceleration time: Time from 0 r/min to this parameter Deceleration time: Time from this parameter to 0 r/min | r/min | 1000 to 5000 | 1000 to 5000 | 2500 | 3000 | S |

Attribute S: The change will become applicable after the motor stops or the power is rebooted. D: The change will become applicable at any time.

VG/AGP Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Shaft
VF3 Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

| No. | Name | Description | Unit | Setting Range | Default Value | | Attribute |
|-------|--|---|-------------------|-----------------------|---------------|-----------|-----------|
| | | | | | V Series | SD Series | |
| Pn030 | Torque Limit Value Command Source Selection | Used to select the command method for torque limit value 1. 1: External analog command 2: Built-in trimmer 3 3: Torque Limit Value 1 | — | 1 to 3 | 2 | 2 | S |
| Pn031 | Torque Limit Value 1 | Used to set torque limit value 1. | % | 0 to 200 | 150 | 150 | D |
| Pn032 | Torque Limit Value 2 | Used to set torque limit value 2. | % | 0 to 200 | 150 | 150 | D |
| Pn033 | Torque Limit Value 3 | Used to set torque limit value 3. | % | 0 to 200 | 150 | 150 | D |
| Pn034 | Torque Limit Value 4 | Used to set torque limit value 4. | % | 0 to 200 | 150 | 150 | D |
| Pn040 | Built-in Trimmer 1/ PWM Speed Command Standard Speed | Used to set the standard speed of the built-in trimmer and the PWM speed command (Duty 100 %). | r/min | 100 to 5000 | 3000 | 4000 | S |
| Pn041 | Frequency Setting for Pulse Frequency Speed Command | Used to set the frequency of the pulse frequency speed command at the standard speed (Pn042). | ×10Hz | 1 to 9999 | 2500 | 3000 | S |
| Pn042 | Standard Speed for Pulse Frequency Speed Command | Used to set the standard speed of the pulse frequency speed command. | r/min | 1 to 5000 | 2500 | 3000 | S |
| Pn043 | PWM Speed Command Frequency | Used to set the frequency of PWM signal to be input. | Hz | 10 to 100000 (Note 1) | 1000 | 1000 | S |
| Pn050 | External Analog Input Level | Used to set the voltage level of the external analog input. 1: 0 to 10 V 2: 0 to 5 V | — | 1 to 2 | 2 | 2 | S |
| Pn051 | Analog Input Gain | Used to set the inclination of the external analog command. | (r/min) /V or %/V | -9.99 to 9.99 | 0.6 | 0.8 | S |
| Pn052 | Analog Input Offset | Used to set the offset of the external analog command. | r/min or V% | 0 to 9999 | 0 | 0 | S |
| Pn060 | Analog Output Selection | Used to set the function to be outputted in analog form. 1: Speed (The actual speed of the motor will be outputted.) 2: Load co-efficient (The load co-efficient of the motor will be outputted.) 3: Commanded speed (The commanded speed of the drive will be outputted.) | — | 1 to 3 | 1 | 1 | D |
| Pn061 | Analog Output Gain | Used to set the inclination of the analog output. | V/(r/min) or V/% | -99.99 to 99.99 | 1.00 | 1.00 | D |
| Pn062 | Analog Output Offset | Used to set the offset of the analog output. | V | 0.00 to 5.00 | 0.00 | 0.00 | D |

Attribute S: The change will become applicable after the motor stops or the power is rebooted. D: The change will become applicable at any time.
 Note 1: Frequencies of 10 to 1000 Hz can be set in increments of 1 Hz, and frequencies of 1000 to 100000 Hz can be set in increments of 10 Hz.

■ Pn030 Torque Limit Value Command Source Selection/Pn031 to Pn034 Torque Limit Value 1 to 4

These parameters are used to set motor output torque limit values.

Select a torque limit value using Multi-function Input: Torque Limit Value Selection 1 and 2.

The torque limit values corresponding to the combinations shown in the table below can be commanded by changing the ON/OFF state of the input terminals to which Torque Limit Value Selection 1 and 2 are assigned.

When both Torque Limit Value Selection 1 and 2 are set to OFF, change the setting of Torque Limit Value 1 Selection (Pn030) to select the command method for the torque limit value.

| Torque Limit Value Selection 1 | Torque Limit Value Selection 2 | Torque Command | |
|--------------------------------|--------------------------------|---|--|
| OFF | OFF | Torque Limit Value Command Source Selection (Pn030) | 1: External Analog Command 2: Built-in Trimmer 3 3: Torque Limit Value 1 (Pn031) |
| ON | OFF | Torque Limit Value 2 (Pn032) | |
| OFF | ON | Torque Limit Value 3 (Pn033) | |
| ON | ON | Torque Limit Value 4 (Pn034) | |

Command parameters: Parameters related to command settings

| No. | Name | Description | Unit | Setting Range | Default Value | Attribute |
|-------|---------------------------------|---|------|---------------|---------------|-----------|
| Pn100 | I1 Input Function Selection | Used to select the function of input terminal 1. | — | 1 to 12 | 1 | P |
| Pn101 | I2 Input Function Selection | Used to select the function of input terminal 2. | — | 1 to 12 | 2 | P |
| Pn102 | I3 Input Function Selection | Used to select the function of input terminal 3. | — | 1 to 12 | 3 | P |
| Pn103 | I4 Input Function Selection | Used to select the function of input terminal 4. | — | 1 to 12 | 4 | P |
| Pn104 | I5 Input Function Selection | Used to select the function of input terminal 5. | — | 1 to 12 | 6 | P |
| Pn105 | I6 Input Function Selection | Used to select the function of input terminal 6. | — | 1 to 12 | 7 | P |
| Pn106 | I7 Input Function Selection | Used to select the function of input terminal 7. | — | 1 to 12 | 9 | P |
| Pn107 | I8 Input Function Selection | Used to select the function of input terminal 8. | — | 1 to 14 | 14 | P |
| Pn110 | I1 Input Polarity Selection | Used to select the polarity of input terminal 1. | — | 0 to 1 | 0 | P |
| Pn111 | I2 Input Polarity Selection | Used to select the polarity of input terminal 2. | — | 0 to 1 | 0 | P |
| Pn112 | I3 Input Polarity Selection | Used to select the polarity of input terminal 3. | — | 0 to 1 | 0 | P |
| Pn113 | I4 Input Polarity Selection | Used to select the polarity of input terminal 4. | — | 0 to 1 | 0 | P |
| Pn114 | I5 Input Polarity Selection | Used to select the polarity of input terminal 5. | — | 0 to 1 | 0 | P |
| Pn115 | I6 Input Polarity Selection | Used to select the polarity of input terminal 6. | — | 0 to 1 | 0 | P |
| Pn116 | I7 Input Polarity Selection | Used to select the polarity of input terminal 7. | — | 0 to 1 | 1 | P |
| Pn117 | I8 Input Polarity Selection | Used to select the polarity of input terminal 8. | — | 0 to 1 | 0 | P |
| Pn120 | C1-E1 Output Function Selection | Used to select the function of output terminal 1. | — | 1 to 11 | 1 | P |
| Pn121 | C2-E2 Output Function Selection | Used to select the function of output terminal 2. | — | 1 to 11 | 2 | P |
| Pn122 | C3-E3 Output Function Selection | Used to select the function of output terminal 3. | — | 1 to 11 | 3 | P |
| Pn123 | C4-E4 Output Function Selection | Used to select the function of output terminal 4. | — | 1 to 11 | 8 | P |
| Pn125 | C1-E1 Output Polarity Selection | Used to select the polarity of output terminal 1. | — | 0 to 1 | 1 | P |
| Pn126 | C2-E2 Output Polarity Selection | Used to select the polarity of output terminal 2. | — | 0 to 1 | 0 | P |
| Pn127 | C3-E3 Output Polarity Selection | Used to select the polarity of output terminal 3. | — | 0 to 1 | 0 | P |
| Pn128 | C4-E4 Output Polarity Selection | Used to select the polarity of output terminal 4. | — | 0 to 1 | 0 | P |

P: The change will become applicable after the power is rebooted.

Input Terminal Function List

| Setting | Function |
|---------|--|
| 1 | CW drive command |
| 2 | CCW drive command |
| 3 | Speed Command Selection 1 |
| 4 | Speed Command Selection 2 |
| 5 | Speed Command Selection 3 |
| 6 | Acceleration/Deceleration time selection |
| 7 | Torque Limit Value Selection 1 |
| 8 | Torque Limit Value Selection 2 |
| 9 | Alarm reset/Emergency stop |
| 10 | Brake control signal forced ON command |
| 11 | Direct current lock |
| 12 | Load inertia switch |
| 13 | PWM speed command |
| 14 | Pulse Frequency Speed Command |

Output Terminal Function List

| Setting | Function |
|---------|-----------------------|
| 1 | Error detection |
| 2 | In Operation |
| 3 | Rotation Pulse |
| 4 | CW rotation pulse |
| 5 | CCW rotation pulse |
| 6 | Rotational Direction |
| 7 | Rotating |
| 8 | Over Rated Torque |
| 9 | Over specified torque |
| 10 | Brake control signal |
| 11 | Voltage drop warning |

Note 1: The brake control signal is available from software Ver. 0004. Do not use a drive of Ver. 0003 or older version.

VG/AG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/MF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

Comparison Parameters: Parameters Related to Comparisons of Output Functions

| No. | Name | Description | Unit | Setting Range | Default Value | Attribute |
|-------|--|---|------|---------------|---------------|-----------|
| Pn151 | Current Limit Value upon Direct Current Lock | Used to set the current value (rated current ratio) when the direct current lock is activated. | % | 0 to 100 | 30 | D |
| Pn160 | Torque Detection Level | Used to set the current value (rated current ratio) at which the output of over specified torque will be turned ON. | % | 0 to 200 | 80 | S |
| Pn161 | Torque Detection Hysteresis Width | Used to set the hysteresis width (rated current ratio) at which the output of over specified torque will be turned OFF. | % | 0 to 50 | 10 | S |
| Pn165 | Rated Torque Detection Hysteresis Width | Used to set the hysteresis width (rated current ratio) of the torque at which the output of over rated torque will be turned OFF. | % | 0 to 50 | 10 | S |

Mechanical Brake Parameters: Parameters Related to the Mechanical Brake

| No. | Name | Description | Unit | Setting Range | Default Value | | Attribute |
|-------|---|--|-------|----------------|---|-----------|-----------|
| | | | | | V Series | SD Series | |
| Pn170 | Mechanical Brake Release Speed Level | Used to set the internal commanded speed value at which the brake control signal will be turned ON. | r/min | 1 to 1000 | 20 | 20 | S |
| Pn171 | Mechanical Brake Operation Speed Level | Used to set the internal commanded speed at which the brake control signal will be turned OFF. | r/min | 0 to 1000 | 20 | 20 | S |
| Pn172 | Mechanical Brake Release Standby Time | Used to set the delay time until the signal is actually turned ON after the internal commanded speed reaches or exceeds the brake control signal ON speed. | s | 0.000 to 2.000 | 0.005 | 0.005 | S |
| Pn173 | Mechanical Brake Operation Standby Time | Used to set the delay time until the signal is actually turned OFF after the internal commanded speed reaches or exceeds the brake control signal OFF speed. | s | 0.000 to 2.000 | 0.005 | 0.005 | S |
| Pn175 | Input Voltage Drop Warning Voltage | Used to set the voltage that will issue an input voltage drop warning alarm. | V | 0.0 to 50.0 | 12 V:10.0 24 V:20.0 48 V:40.0 | 40.0 | D |
| Pn180 | Dynamic Brake Transition Speed | Used to set the speed of transition to the dynamic brake during a deceleration stop. | r/min | 30 to 5000 | 50 W:3000 100 W:3000 200 W:500 400 W:500 | 4000 | S |

Attribute S: The change will become applicable after the motor stops or the power is rebooted. D: The change will become applicable at any time.

VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3E Type
Overhaul/Right Angle Drive/Overhaul/Right Angle Set
FSS Type/Right Angle Set

Control Unit Specification

Technical Documentation

Option

Gain Parameters: Parameters Related to Gains

| No. | Name | Description | Unit | Setting Range | | Default Value | | Attribute |
|-------|---------------------------------|--|------|---------------|-------------|---------------|-----------|-----------|
| | | | | V Series | SD Series | V Series | SD Series | |
| Pn200 | Rigidity Table | Used to set a rigidity table. After the setting is completed, the following parameters will be changed to the set values in each table. - Speed Control Proportional Gain (Pn201) - Speed Control Integral Time (Pn202) - Torque Filter Time Constant (Pn203) | — | 1 to 5 | 1 to 5 | 3 | 3 | S |
| Pn201 | Speed Control Proportional Gain | Used to set the proportional gain of speed control. | — | 0 to 200 | 0 to 200 | 100 | 180 | D |
| Pn202 | Speed Control Integral Time | Used to set the integral time of speed control. Integral control will be disabled when "0" is set. | — | 0 to 1000 | 0 to 1000 | 80 | 80 | D |
| Pn203 | Torque Filter Time Constant | Used to set the time constant of the torque filter. | ms | 0.0 to 10.0 | 0.0 to 10.0 | 2.0 | 2.0 | D |
| Pn204 | Moment of Inertia Ratio 1 | Used to set the moment of inertia ratio of the connected load. Set the percentage of the moment inertia to the motor rotor inertia as the motor shaft equivalent. | % | 0 to 9999 | 0 to 9999 | 0 | 0 | D |
| Pn205 | Moment of Inertia Ratio 2 | Used to set the moment of inertia ratio of the connected load. Set the percentage of the moment inertia to the motor rotor inertia as the motor shaft equivalent. | % | 0 to 9999 | 0 to 9999 | 0 | 0 | D |
| Pn250 | Overload Selection | Used to select a method for detecting overload alarms. <V Series> 1: Detection based on the overload application time 2: Detection based on the electronic thermal. <SD Series> Cannot be changed. | — | 1 to 2 | 2 | 2 | 2 | S |
| Pn300 | User Parameter reset | When "5" is set, the user parameters will reset, and this parameter will become "0." | — | 0 to 5 | 0 to 5 | 0 | 0 | P |

P: The change will become applicable after the power is rebooted.
S: The change will become applicable after the motor stops or the power is rebooted.
D: The change will become applicable at any time.

■ Rigidity Table List

| Setting | Speed Control Proportional Gain | | Speed Control Integral Time | | Torque Filter Time Constant | |
|---------|---------------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|
| | V Series | SD Series | V Series | SD Series | V Series | SD Series |
| 1 | 60 | 160 | 120 | 100 | 3.0 | 3.0 |
| 2 | 80 | 170 | 100 | 90 | 2.5 | 2.5 |
| 3 | 100 | 180 | 80 | 80 | 2.0 | 2.0 |
| 4 | 120 | 190 | 60 | 70 | 1.5 | 1.5 |
| 5 | 140 | 200 | 40 | 60 | 1.0 | 1.0 |

VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

Safeguard Function List

When an error is detected, this drive will output an error detection signal and display the error state with an LED lamp. (LED1 (red) will light up, or LED3 (green) will light up or blink.)
 Moreover, in case of an error, the motor will enter the emergency stop state (free run state), regardless of the operating state. In such a case, the brake control signal will be turned OFF, and the brake control signal forced ON command will become disabled.

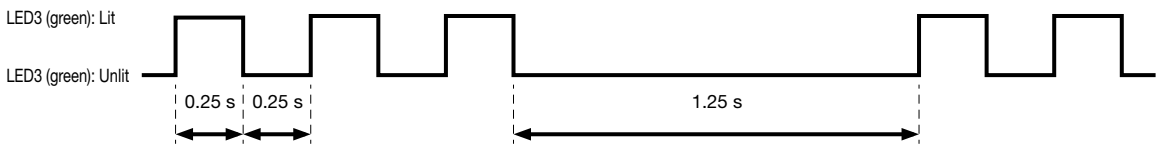
To resolve the error detection state, eliminate all factors that caused the alarm, and reset the alarm.

The PC software “ACD-PSTool” enables you to check the history of errors that occurred in the past. For details, refer to the instruction manual for “ACD-PSTool”.

Drives error list and display method

The following list shows the blinking patterns of LED3 (green) when errors are detected, and the conditions under which alarms will be issued.

| Number of blinks of LED 3 (green) | Alarm Name | Alarm Issuing Condition |
|-----------------------------------|----------------|--|
| 0 times (stays lit) | Overload | An alarm will be issued based on the operation time in overload operation. Two detection methods, detection based on the lapse of given time and detection by electronic thermal, are available. *Refer to the explanation of the user parameter Pn250 for details. |
| Once | Overvoltage | An alarm will be issued if the input voltage of the drive exceeds the maximum input voltage. |
| Twice | Voltage drop | An alarm will be issued if the input voltage of the drive drops below the minimum input voltage when the motor is in operation (including special lock). |
| Three times | Drive overheat | An alarm will be issued if the temperature of the drive heat sink exceeds 85 °C. |
| Four times | Overspeed | An alarm will be issued if the speed of the motor (including when the motor is rotated) exceeds 1.2 times the maximum speed. |
| Five times | Overcurrent | An alarm will be issued if a current 500 to 600 % or more of the rated current of the motor flows into the drive. |
| Six times | Sensor error | An alarm will be issued if the pattern of the hall signal pattern is HHH or LLL. |
| Ten times | System error | An alarm will be issued if there is an error inside the drive. |



VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VFS3/VFG Type
Overload Protection
Right Angle Shaft

Control Unit Specification

Technical Documentation

Option

Connection Method and Installation

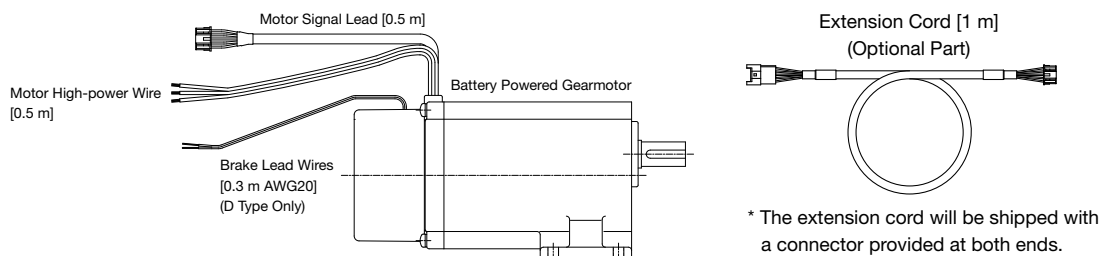
Connection Method

V Series: 50 W to 0.4 kW

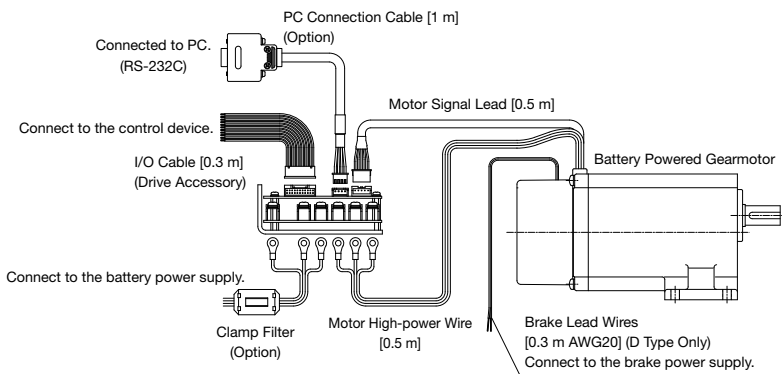
Connect devices as shown in the figure below.

- The length of the cords from the gearmotor is 0.5 m.
- Use the optional extension cord if you need to extend the motor signal lead.
- When extending a cord by connecting optional extension cords, the overall length must not exceed 4.5 m (up to four extension cords).
- Extension cords are not available for the motor's power wire and the brake lead wires.

Please use a cord with a wire diameter not smaller than the wire diameter specified on page 642, with length of 5 m or less. Minimize the length of the motor power wire. Otherwise the characteristics may be impaired



Example of Connection to Our Drives



Motor Signal Lead and Power Wire

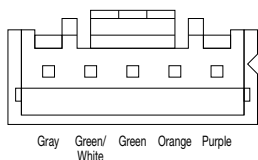
Signal Lead Colors and Signal Names

| Color of Lead Wire | Function |
|--------------------|---|
| Purple | Pole sensor power supply (15 V for our drive) |
| Orange | U-phase pole signal output (open collector) |
| Green | V-phase pole signal output (open collector) |
| Green/White | W-phase pole signal output (open collector) |
| Gray | GND |

Motor Power Wire Colors and Signal Names

| Color of Lead Wire | Description |
|--------------------|-------------|
| Red | U-Phase |
| White | V-Phase |
| Black | W-Phase |

Connector Pin Arrangement



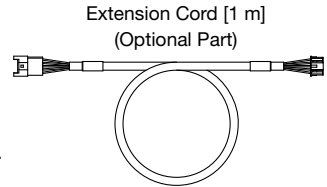
Brake Lead Wire Colors and Voltage Specifications

| Color of Lead Wire | Voltage |
|--------------------|--------------------|
| Yellow | 12 V specification |
| White | 24 V specification |
| Orange | 48 V specification |

SD Series 0.75 kW

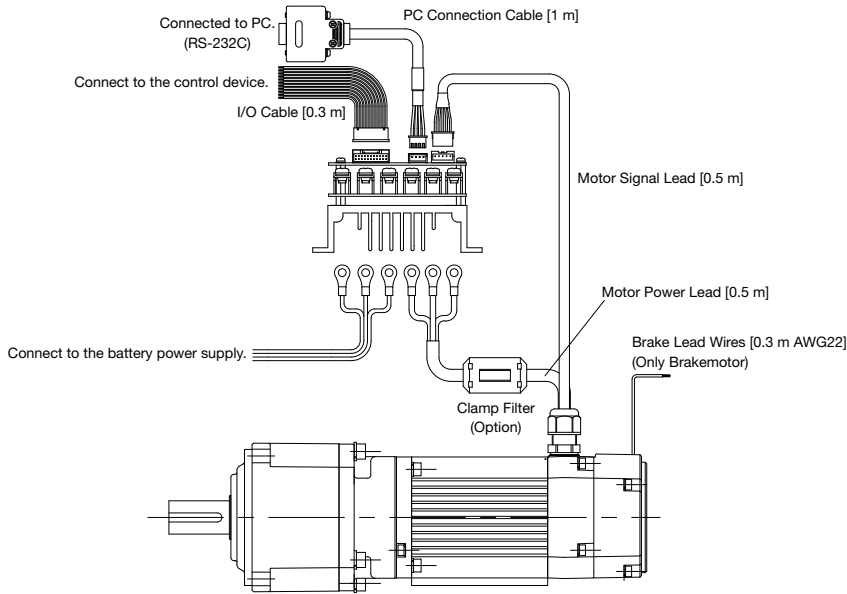
Connect devices as shown in the figure below.

- The length of the cords from the gearmotor is 0.5 m.
- Use the optional extension cord if you need to extend the motor signal lead.
- When extending a cord by connecting optional extension cords, the overall length must not exceed 4.5 m (up to four extension cords).
- Extension cords are not available for the motor power lead and the brake lead wires. Please use a cord with a wire diameter not smaller than the wire diameter specified on page 642, with length of 5 m or less. Minimize the length of the motor power lead. Otherwise the characteristics may be impaired



* The extension cord will be shipped with a connector provided at both ends.

Example of Connection to Our Drives



Motor Signal Lead and Power Lead

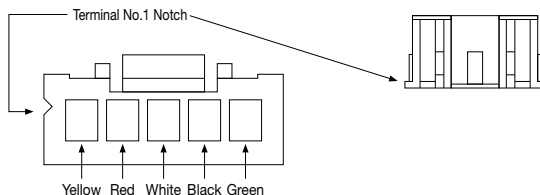
Signal Lead Colors and Signal Names

| Color of Lead Wire | Function |
|--------------------|---|
| Yellow | Pole sensor power supply (15 V for our drive) |
| 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 |

Motor Power Lead Colors and Signal Names

| Color of Lead Wire | Description |
|--------------------|-------------|
| Red | U-Phase |
| White | V-Phase |
| Black | W-Phase |

Connector Pin Arrangement



Brake Lead Wire Colors and Voltage Specifications

| Color of Lead Wire | Voltage |
|--------------------|--------------------|
| Brown | 48 V specification |

Precautions for Installation

When installing drives, keep the following precautions in mind:

■ Installation Environment

Ambient Temperature: -10 °C to 50 °C

Ambient Humidity: 95 % RH max (No condensation)

Altitude: 1000 m or lower

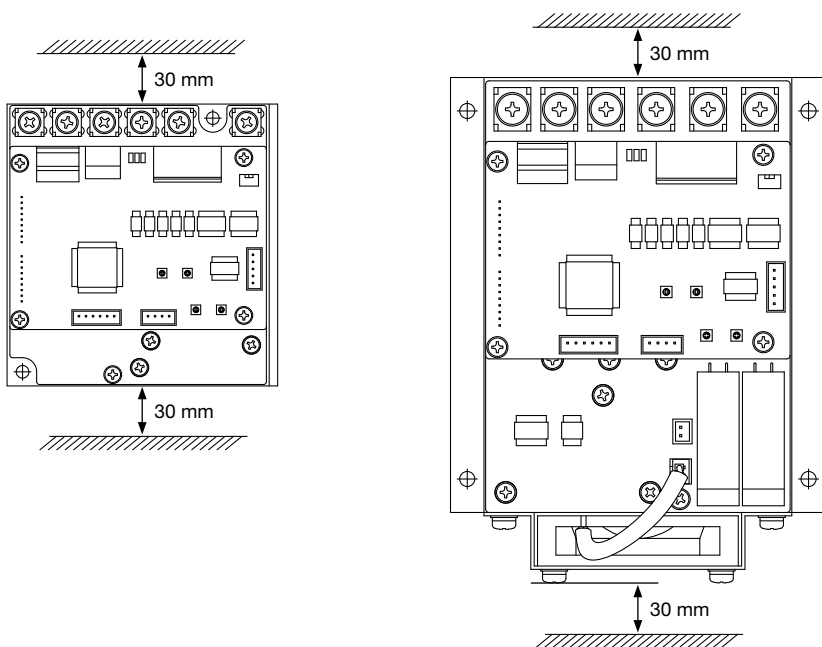
Environment: A place free from corrosive gas, explosive gas, and/or vapor. Well ventilated place with no dust.

Vibration: 2.0 G or less

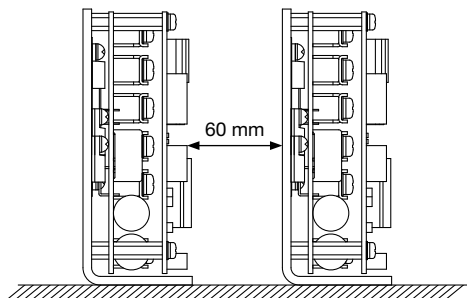
Installation Place: Indoors

* When installing a drive, place it in a switchboard or take other measures to prevent foreign substances from entering it.

* There is no restriction on the mounting posture of the drive, but keep a clearance of 30 mm or more above and below the drive.



When installing drives side by side, keep an interval of 60 mm or more between them.



VG/AG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3F Type
Concentric Right Angle Base Concentric Right Angle Shaft
FS Type Right Angle Shaft

Control Unit Specification

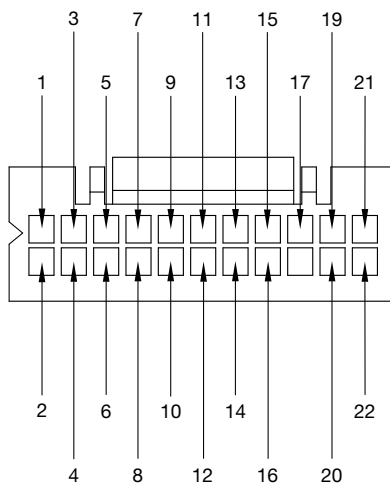
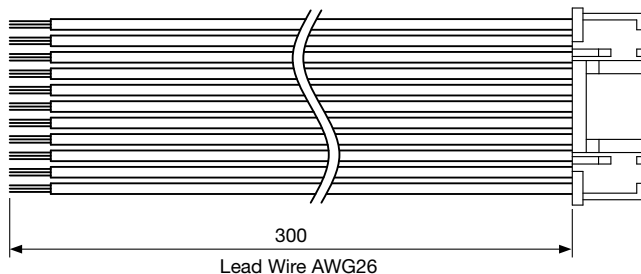
Technical Documentation

Option

Accessories

I/O Cable (to Be Connected to CN1)

| No. | Description | Color |
|-----|-------------|--------|
| 1 | IN-COM | Yellow |
| 2 | I1 | |
| 3 | I2 | |
| 4 | I3 | |
| 5 | I4 | |
| 6 | I5 | |
| 7 | I6 | |
| 8 | I7 | |
| 9 | I8 | Green |
| 10 | C1 | |
| 11 | E1 | |
| 12 | C2 | |
| 13 | E2 | |
| 14 | C3 | |
| 15 | E3 | |
| 16 | C4 | |
| 17 | E4 | Orange |
| 18 | — | |
| 19 | +5V | |
| 20 | AIN | |
| 21 | AOUT | |
| 22 | TGND | |



| Code | Manufacturer | Type on Board Side | Type on I/O Cable Side |
|------|--------------------|--------------------|------------------------------------|
| CN1 | J.S.T.MFG.CO.,LTD. | S22B-PUDSS-1 | Compatible Housing: PUDP-22V-S |
| | | | Adaptable Terminal: SPUD-001T-P0.5 |

VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

VF3S/VF3T Type
Omni-directional Gearmotor
Right Angle Shaft

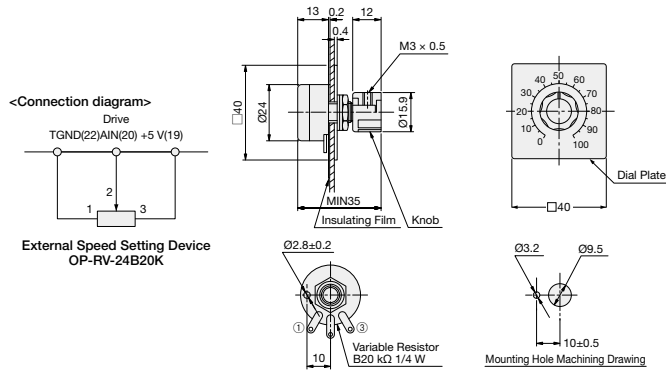
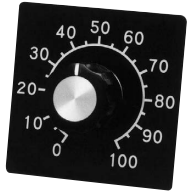
Control Unit Specification

Technical Documentation

Option

Options

External Speed Setting Device/OP-RV-24B20K

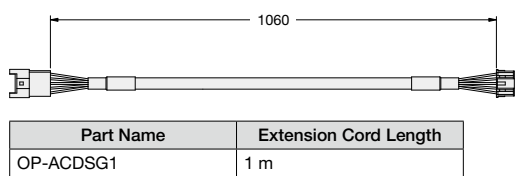


VG/APG Type
Parallel Shaft

VH Type
Right Angle Shaft

Extension Cord/OP-ACDSG1 (for Signal)

Use this extension cord as a signal lead between a drive and a gearmotor.

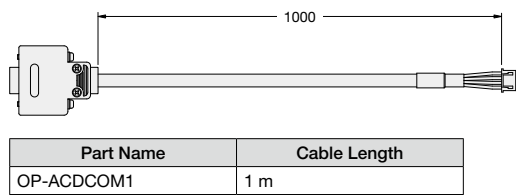


- The extension cord will be shipped with a connector provided at both ends.
- Only the signal lead from the motor can be extended.
- Extension cords are not available for the motor power wire and the brake lead wires. Please use a cord with a wire diameter not smaller than the wire diameter specified on the motor specification table on page 642, with length of 5 m or less.

VF3S/VF3F Type
Consult the Application Base Concerning Right-Angle Shaft
FS Type for Vgs Stat.

Communication Cable: OP-ACDCOM1 (for Communication)

This is a communication cable for PC connection. For connection to the USB port, prepare an RS-232C-USB conversion cable. Using dedicated software, you can set speed commands, acceleration/deceleration times, and torque limits with numerical values.

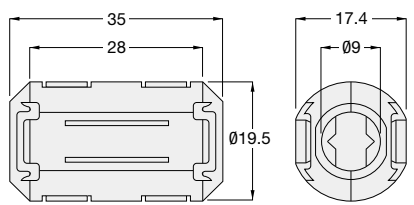


Control Unit Specification

Technical Documentation

Clamp Filter/OP-ZCAT

Manufacturer: TDK Model: ZCAT2035-0930A



Option

MEMO

| | | | | | |
|------------------------------|------------------------------|--|-----------------------------------|-------------------------|--------|
| VG/PG Type Parallel Shaft | VH Type Right Angle Shaft | VF3S/VF3E Type Cosmetic Right Angle Drive FSS Type Right Angle Shaft | Control Unit Specification | Technical Documentation | Option |
|------------------------------|------------------------------|--|-----------------------------------|-------------------------|--------|