

G3J-T

Refer to *Safety Precautions for All Solid State Relays*.

Soft-start/stop Function Starts and Stops Three-phase Motors Smoothly and Economically

- Function like an inverter by holding down the starting current.
- Harmonized protection with thermal overload relays complying with IEC 947-4-1 (Class 10A/10); can be used like a standard contactor.
- Comply with UL, CSA, IEC (400-V models only), and JEM requirements.
- Mount with screws or to DIN tracks.
- Compact monoblock construction for the G3J-T217BL (W: 100 × H: 100 × D: 110 mm) with a heat sink.
- Snubber circuit and varistor are built-in.
- Operation indicator.



Model Number Structure

Model Number Legend

G3J-□□□□□□□
1 2 3 4 5 6 7

1. Basic Model Name

G3J: Solid State Contactor

2. Load Power Supply

Blank: AC output

3. Functions

T: Soft-start/stop function

4. Rated Load Power Supply Voltage

2: 200 VAC

4: 400 VAC

5. Rated Load Current

17: 17.4 A (200-V models)

11: 11.1 A (200-V models)

05: 4.8 A (200-V models), 5.5 A (400-V models)

03: 2.4 A (400-V) models

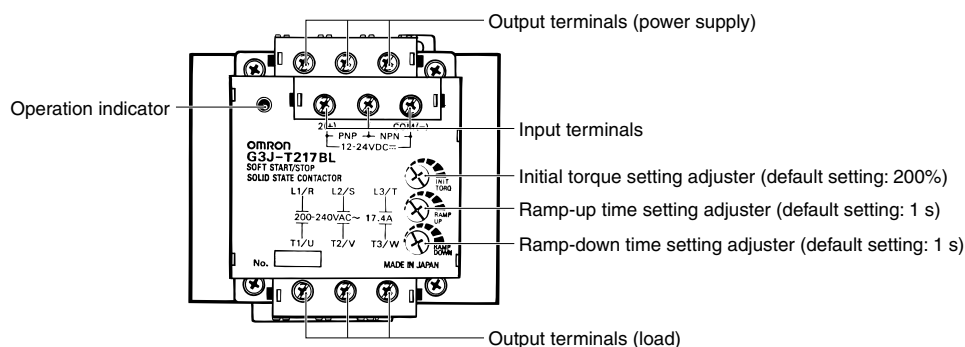
6. Terminal Type

B: Screw terminals

7. Zero Cross Function

L: Not equipped with zero cross function

Appearance



Ordering Information

List of Models

| Number of elements | Insulation method | Rated supply voltage | Input method | Applicable motor | | Model |
|--------------------|-------------------|----------------------|---|------------------|----------------|------------|
| 3 | Phototriac | 12 to 24 VDC | No-voltage input (open and short-circuit input) | 2.2 kW (5.5 A) | 380 to 400 VAC | G3J-T405BL |
| | | | | 0.75 kW (2.4 A) | | G3J-T403BL |
| | | | | 3.7 kW (17.4 A) | 200 to 220 VAC | G3J-T217BL |
| | | | | 2.2 kW (11.1 A) | | G3J-T211BL |
| | | | | 0.75 kW (4.8 A) | | G3J-T205BL |

Note: When ordering, specify the rated supply voltage.

Specifications

Ratings (at an Ambient Temperature of 25°C)

Power Supply

| | |
|-------------------------|------------------------------|
| Rated supply voltage | 12 to 24 VDC |
| Operating voltage range | 10.2 to 26.4 VDC |
| Current consumption | 50 mA max. (at 12 to 24 VDC) |

Operation Circuit

| | |
|--|---|
| Input current | 10 mA max. (at 12 to 24 VDC) |
| Input method No-voltage input (short-circuiting and opening inputs) (See note.) | Short-circuiting or opening terminals 1 and COM or 2 (+) and 1 SSR input turned ON:A maximum residual voltage of 2 V between short-circuited terminals SSR input turned OFF:A maximum leakage current of 0.15 mA Relay input: For minute signals |

Note: Refer to *Safety Precautions for All Solid State Relays*.

Main Circuit

| Item | | G3J-T405BL | G3J-T403BL | G3J-T217BL | G3J-T211BL | G3J-T205BL |
|------------------------------------|--|--|-------------------------|---------------------------|--------------------------|--------------------------|
| Rated load voltage | | 200 to 400 VAC (50/60 Hz) | | 200 to 240 VAC (50/60 Hz) | | |
| Load voltage range | | 180 to 440 VAC (50/60 Hz) | | 180 to 264 VAC (50/60 Hz) | | |
| Rated carry current | | 5.5 A (Ta = 40°C) | 2.4 A (Ta = 40°C) | 17.4 A (Ta = 40°C) | 11.1 A (Ta = 40°C) | 4.8 A (Ta = 40°C) |
| Min. load current | | 0.5 A | | | | |
| Peak-value current resistivity | | 220 A, 60 Hz, 1 cycle | 96 A, 60 Hz, 1 cycle | 500 A, 60 Hz, 1 cycle | 350 A, 60 Hz, 1 cycle | 150 A, 60 Hz, 1 cycle |
| Overload resistance | | Refer to <i>Information Common to the G3J, G3J-T, and G3J-S</i> . | | | | |
| Closed current (effective value) | AC3 | 55 A | 24 A | 174 A | 111 A | 48 A |
| | AC4 | 66 A | 28.8 A | 208.8 A | 133.2 A | 57.6 A |
| Breaking current (effective value) | AC3 | 44 A | 19.2 A | 139.2 A | 88.8 A | 38.4 A |
| | AC4 | 55 A | 24 A | 174 A | 111 A | 48 A |
| Applicable load | 3-phase inductive motor (AC3 AC4 AC53-a) | 380 to 400 VAC, 2.2 kW, 5.5 A 380 to 400 VAC, 0.75 kW, 2.4 A 200 to 220 VAC, 3.7 kW, 17.4 A 200 to 220 VAC, 2.2 kW, 11.1 A 200 to 220 VAC, 0.75 kW, 4.8 A Motors passing the AC3-class, AC4-class, and AC53-a-class switching frequency test (Ta = 40°C) under conditions specified by OMRON. Refer to <i>Information Common to the G3J, G3J-T, and G3J-S</i> . | | | | |
| | Resistive load (AC1) (See note.) | 200 to 400 VAC, 5.5 A | 200 to 400 VAC, 2.4 A | 200 to 240 VAC, 17.4 A | 200 to 240 VAC, 11.1 A | 200 to 240 VAC, 4.8 A |

Note: No single-phase load can be connected.

■ Characteristics

| Item | G3J-T405BL | G3J-T403BL | G3J-T217BL | G3J-T211BL | G3J-T205BL |
|------------------------|--|------------|---------------------------|------------|------------|
| Ramp-up time | Set within a range from 1 to 25 s. | | | | |
| Ramp-down time | Set within a range from 1 to 25 s. | | | | |
| Starting torque | Set within a range from 200% to 450% In. | | | | |
| Output ON-voltage drop | 1.8 V _{RMS} max. | | 1.6 V _{RMS} max. | | |
| Leakage current | 20 mA max. (at 400 VAC) | | 10 mA max. (at 200 VAC) | | |
| Insulation resistance | 100 MΩ min. (at 500 VDC) | | | | |
| Dielectric strength | 2,500 VAC, 50/60 Hz for 1 min | | | | |
| Vibration resistance | Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude | | | | |
| Shock resistance | Destruction: 294 m/s ² | | | | |
| Ambient temperature | Operating: -20°C to 60°C (with no icing or condensation) Storage: -30°C to 70°C (with no icing or condensation) | | | | |
| Ambient humidity | Operating: 45% to 85% | | | | |
| Weight | 730 g max. | | 800 g max. | 730 g max. | |
| Standards | UL508 File No. E64562 CSA22.2 No. 14 File No. LR35535 | | | | |

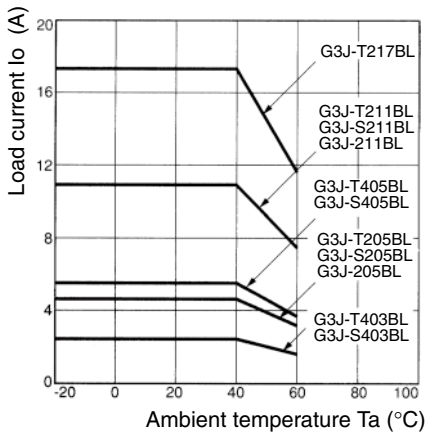
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

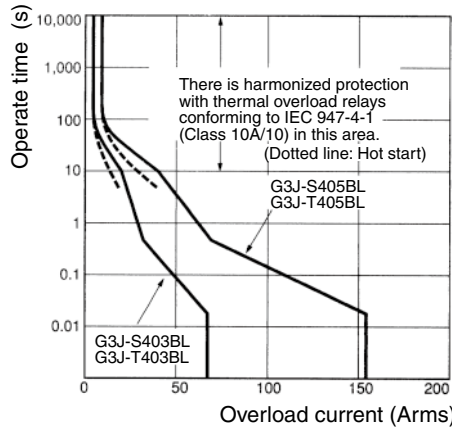
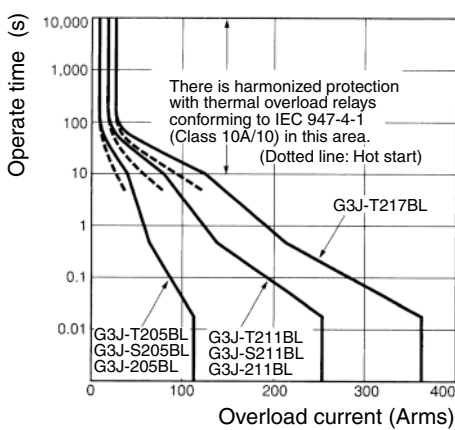
Engineering Data

Load Current vs. Ambient Temperature



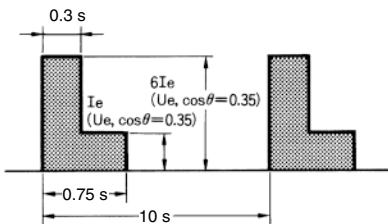
Overload Current Resistivity

Conditions: 60 Hz, Ta of 25°C, non-repetitive (1/2 for repetitive)



Switching Frequency Test Conditions (AC3/AC4/AC53-a)

AC3 Class (Immediate Start)



Ie: Rated carry current
Ue: Rated load voltage (200/400 V)

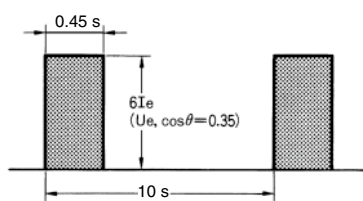
The following Soft-start conditions apply.

Ramp-up time: 1 s
Starting torque: 450% In

The following Soft-start/stop conditions apply:

Ramp-up time: 1 s
Ramp-down time: 1 s
Starting torque: 450% In

AC4 Class (Inching)



Ie: Rated carry current
Ue: Rated load voltage (200/400 V)

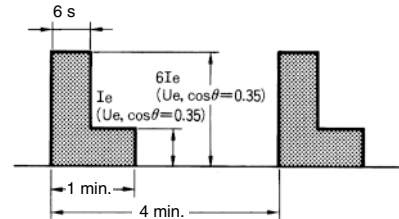
The following Soft-start conditions apply.

Ramp-up time: 1 s
Starting torque: 450% In

The following Soft-start/stop conditions apply:

Ramp-up time: 1 s
Ramp-down time: 1 s
Starting torque: 450% In

AC53-a: 6-6: 25-15



Ie: Rated carry current
Ue: Rated load voltage (200/400 V)

The following Soft-start conditions apply.

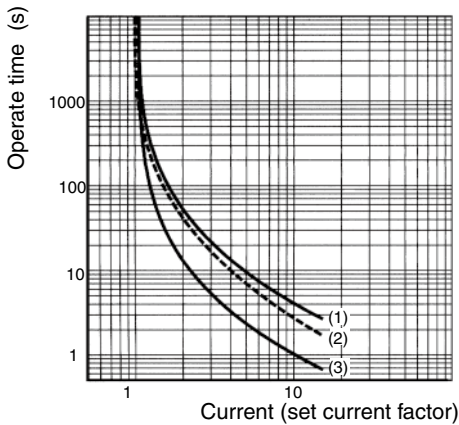
Ramp-up time: 1 s
Starting torque: 450% In

The following Soft-start/stop conditions apply:

Ramp-up time: 1 s
Ramp-down time: 1 s
Starting torque: 450% In

Recommended Thermal Overload Performance

Overload Characteristics



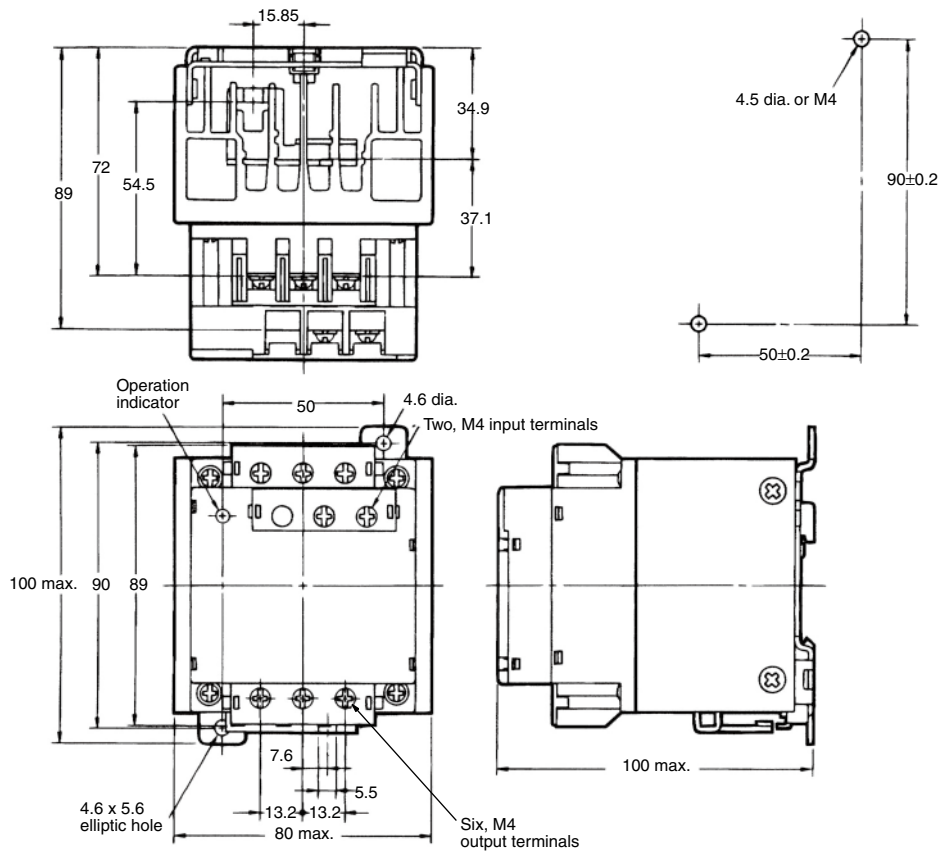
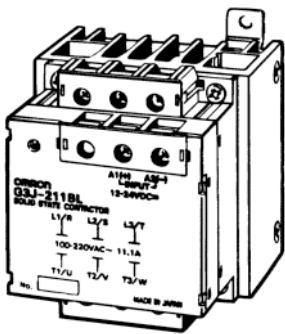
- (1): Balanced operation, 3-phase, from cold state
- (2): Balanced operation, 2-phase, from cold state
- (3): Balanced operation, 3-phase, after a long period of set current flow (hot state).

Dimensions

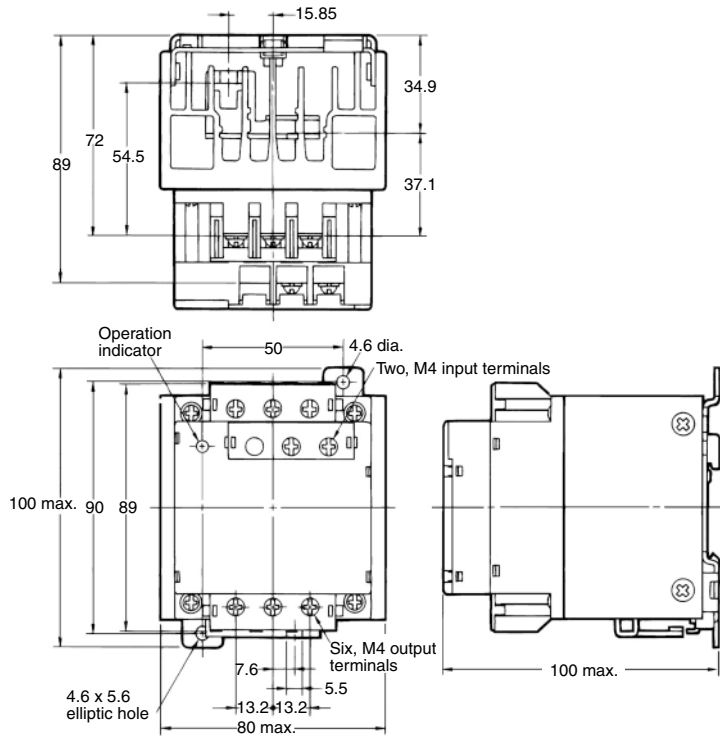
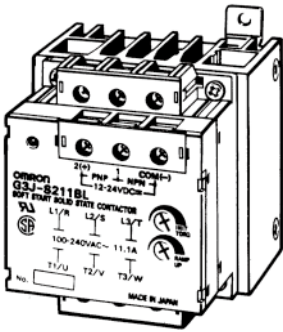
Note: All units are in millimeters unless otherwise indicated.

Solid State Contactors

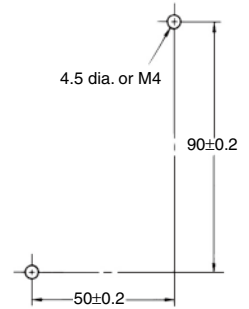
- G3J-211BL
- G3J-205BL
- G3J-211BL-2
- G3J-205BL-2



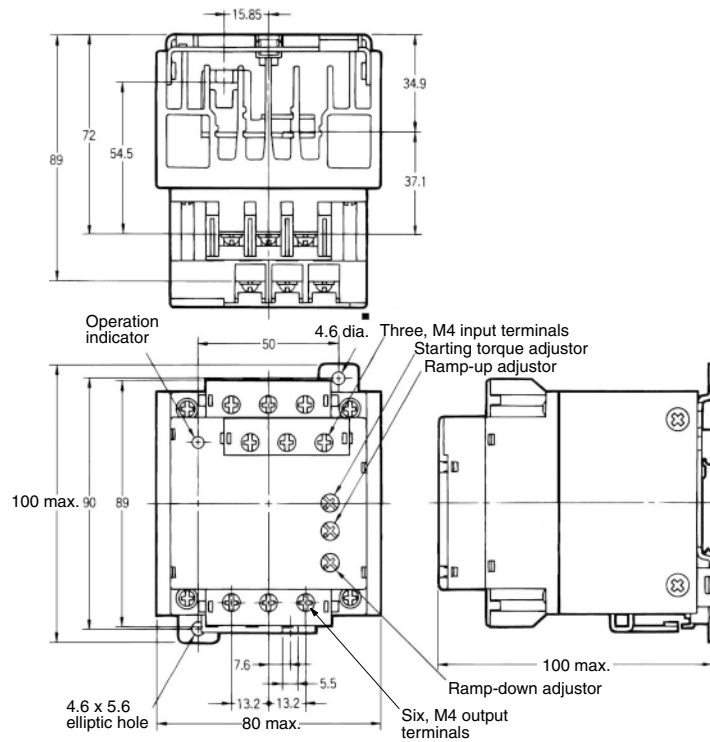
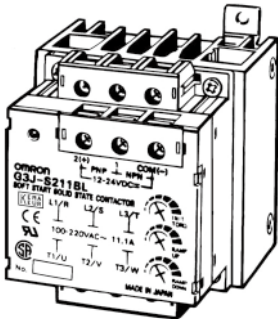
G3J-T211BL
G3J-T205BL
G3J-T405BL
G3J-T403BL



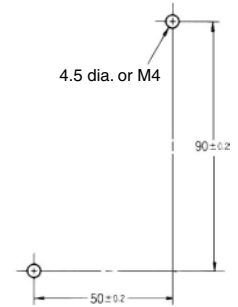
Mounting Holes



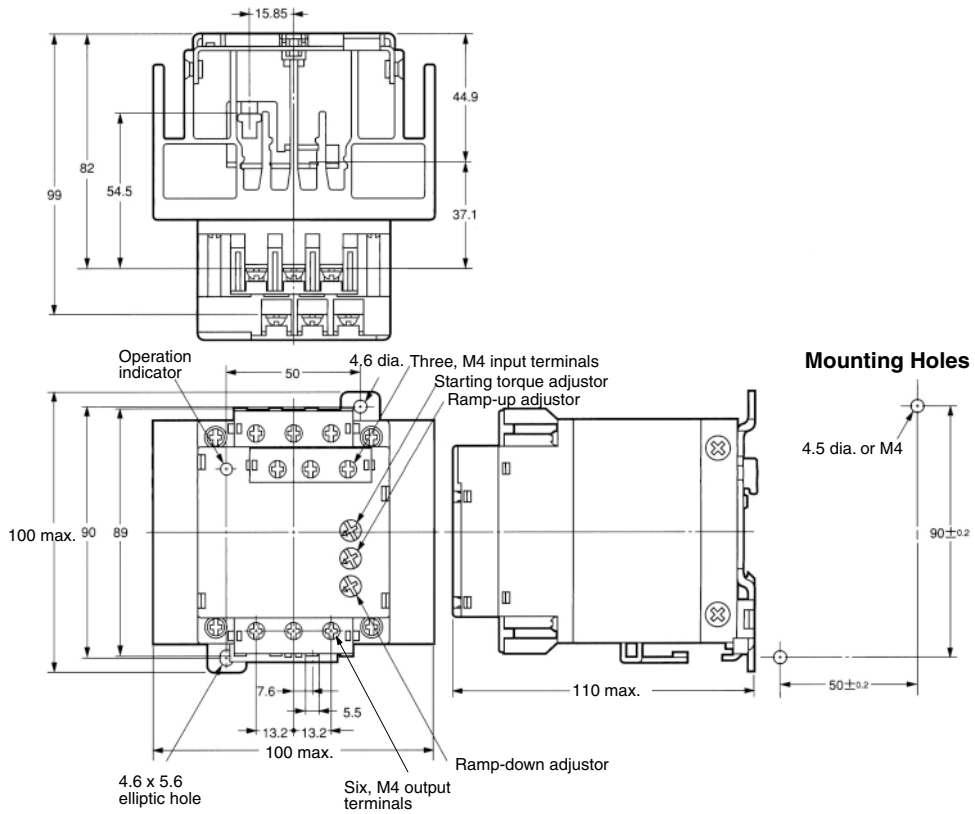
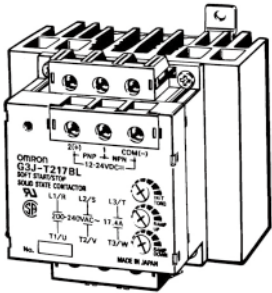
G3J-S211BL
G3J-S205BL
G3J-S405BL
G3J-S403BL



Mounting Holes



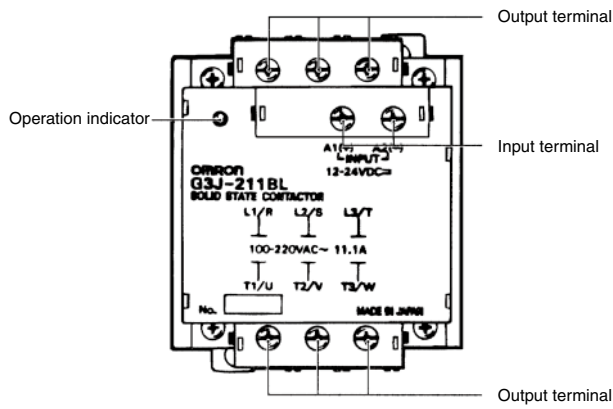
G3J-T217BL



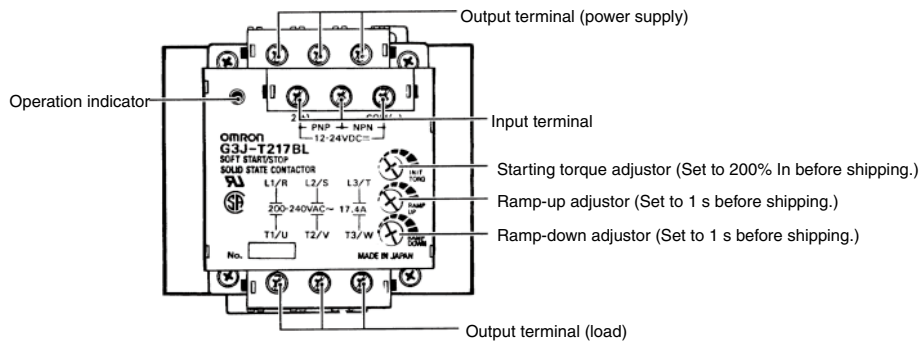
Installation

■ Nomenclature

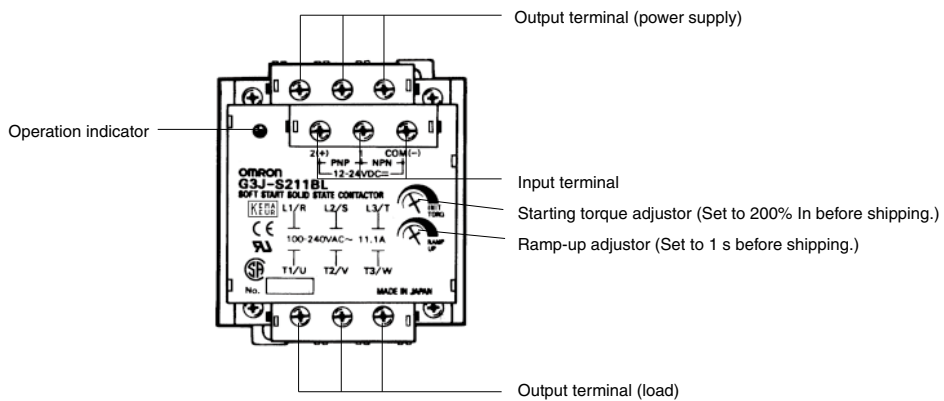
G3J



G3J-T

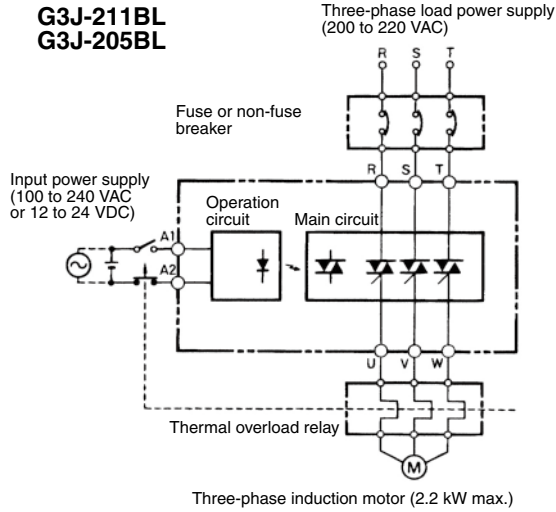


G3J-S

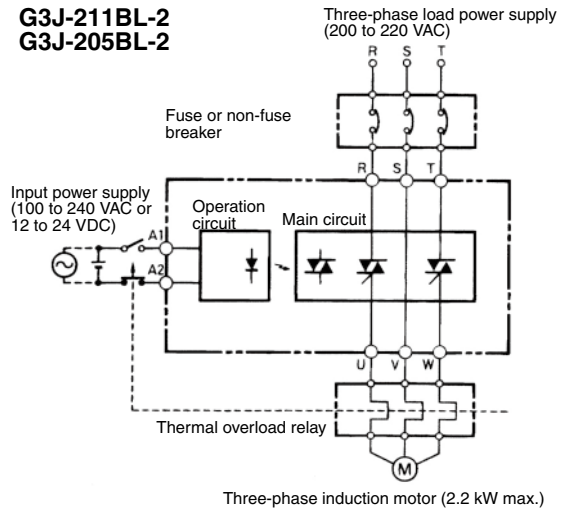


Internal Connections

Simple 3-element Models

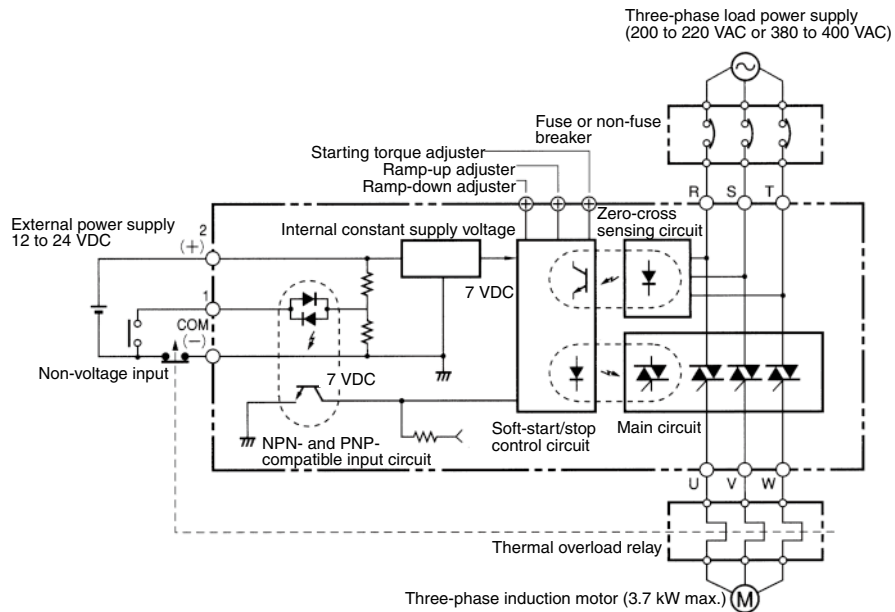


Simple 2-element Models



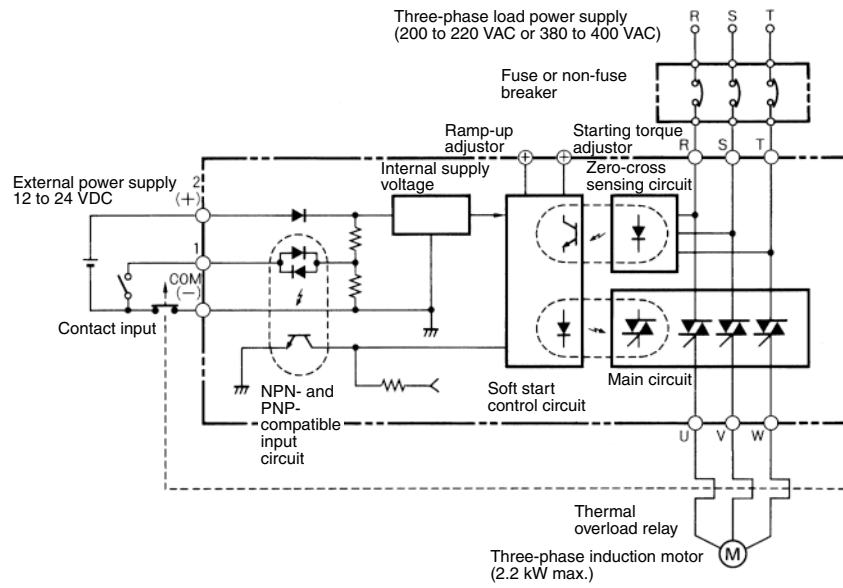
Soft-start/stop Models

G3J-T217BL
G3J-T211BL
G3J-T205BL
G3J-T405BL
G3J-T403BL



Soft-start Models

G3J-S211BL
 G3J-S205BL
 G3J-S405BL
 G3J-S403BL

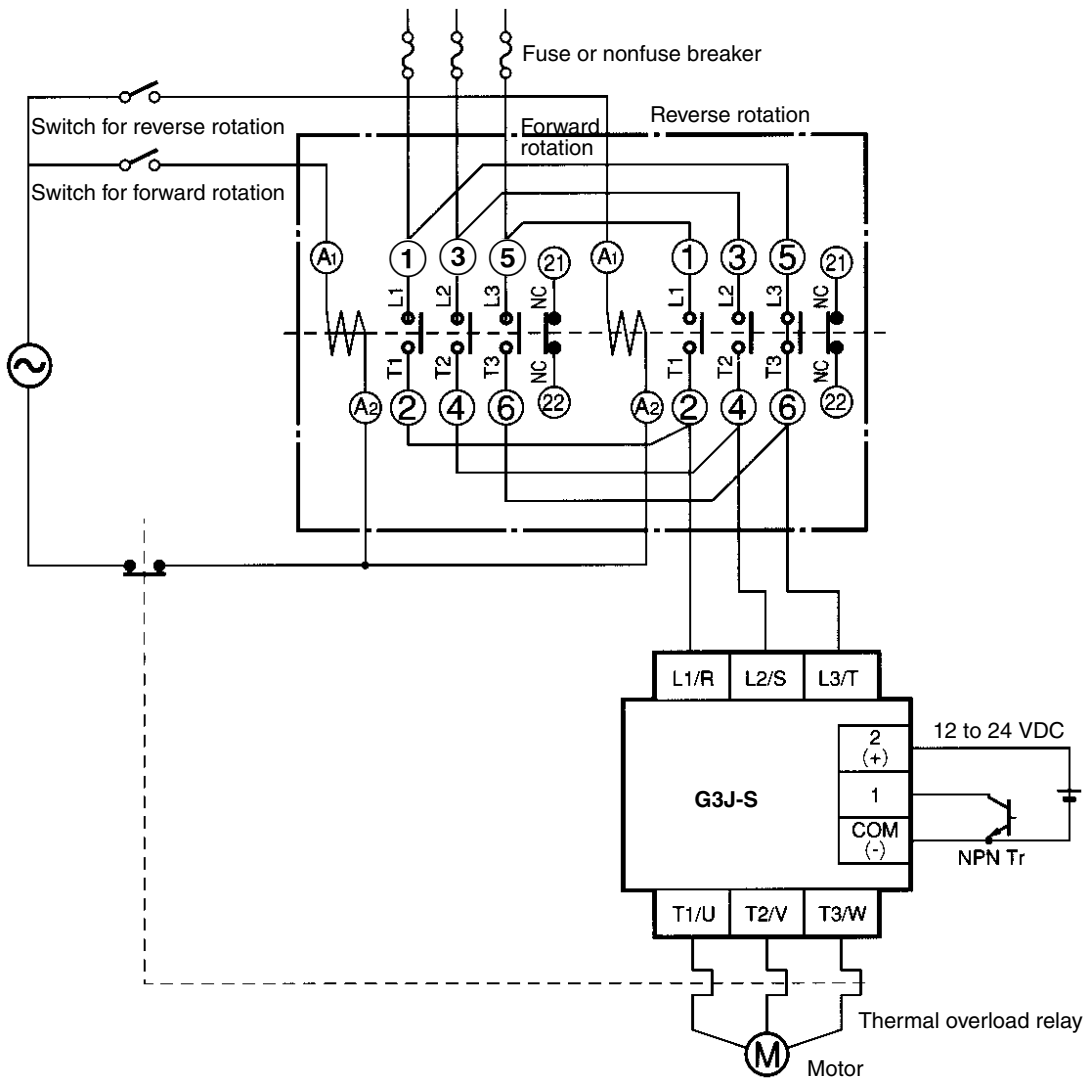


Forward/Reverse Rotation

G3J-S or G3J-T with a Reversible Contactor with Built-in Mechanical Interlock Function

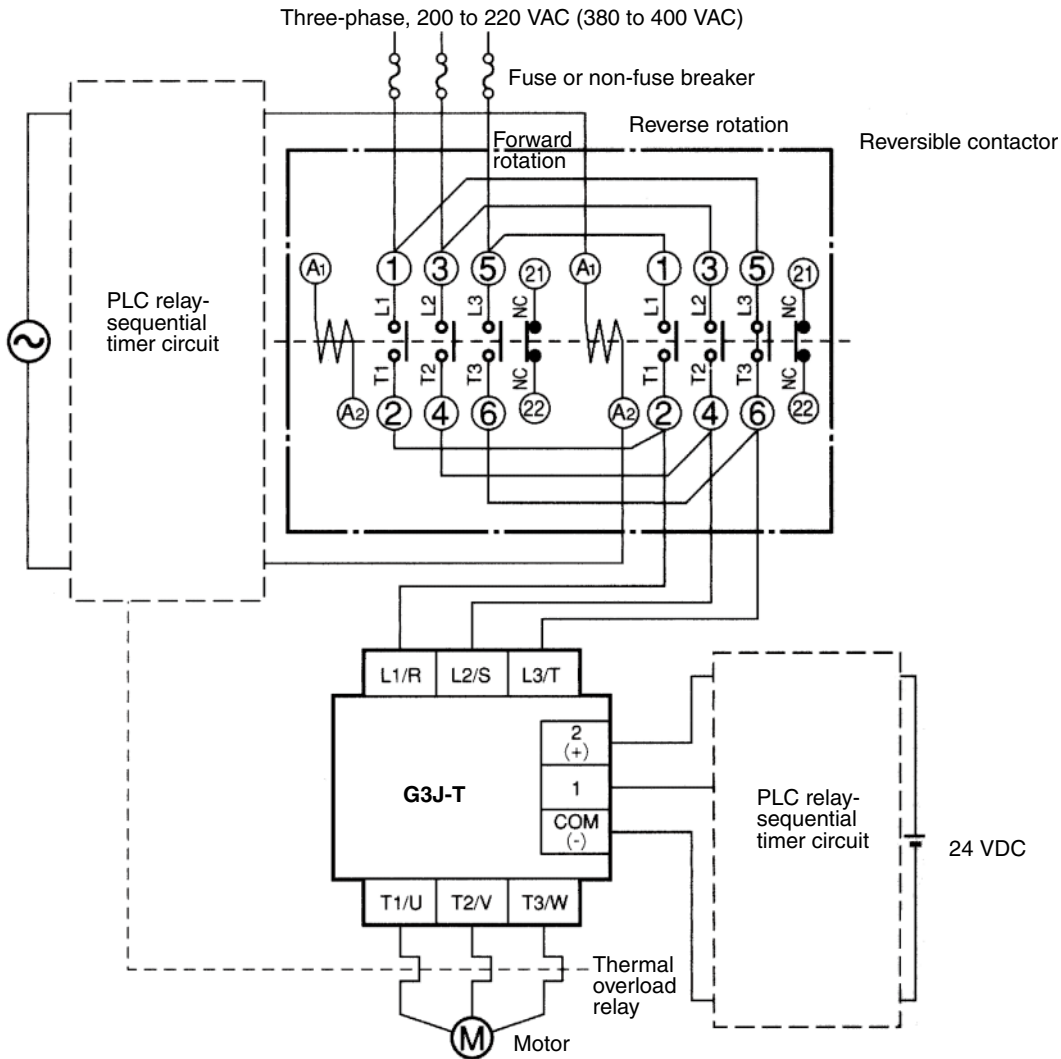
G3J-S□BL or G3J-T□BL

Three-phase, 200 to 220 VAC (380 to 400 VAC)

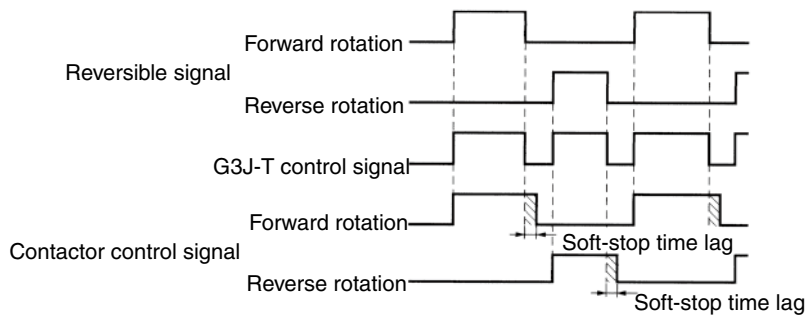


- Note:**
1. Be sure to use a fuse or non-fuse breaker to protect the G3J.
 2. Make sure that the interval between forward and reverse operations is at least 100 ms.
 3. Be sure to apply the input signal of the G3F-S after the reversible contactor starts operating. If the input signal is applied before the contactor starts operating, the soft-start function may not operate.

G3J-S or G3J-T



For soft-stop control, the G3J-T has enough load current to continue rotating the motor during ramp-down time setting even after the control signal of the G3J-T is tuned OFF. Therefore, a time lag is required between the time when the G3J-T stops operating up to the time when the reversible contactor is turned OFF. The ramp-down time of the G3J-T is adjustable up to approximately 25 s max. Therefore, set the time lag to 25 s in the initial sequence during the adjustment stage. Adjust the time lag of the sequential circuit according to the application.



Note: Make sure that the interval between forward and reverse operations is at least 100 ms. If the G3J is turned ON by noise input, short-circuiting between phases will result. In order to prevent this, insert a protective resistor.

⚠ WARNING
Do not use two G3J-S or G3J-T Units together in reversible operation.

Connections Example

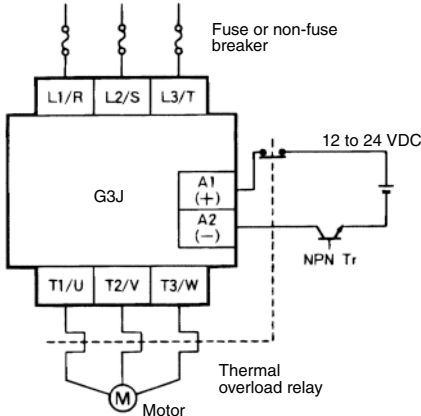
Harmonized protection is ensured for motor overcurrents.

Be sure to supply power to the G3J through a fuse or non-fuse breaker to protect the G3J from damage due to short-circuiting.

Simple DC-input Models

G3J-□BL, G3J-□BL-2

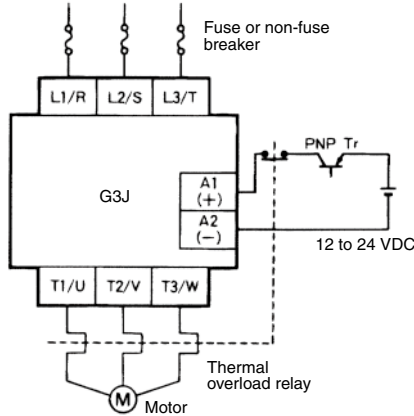
Three-phase, 200 to 220 VAC



Simple DC-input Models

G3J-□BL, G3J-□BL-2

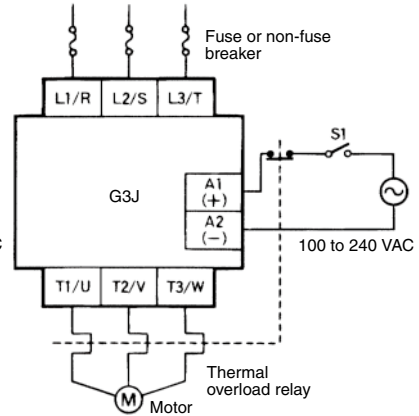
Three-phase, 200 to 220 VAC



Simple AC-input Models

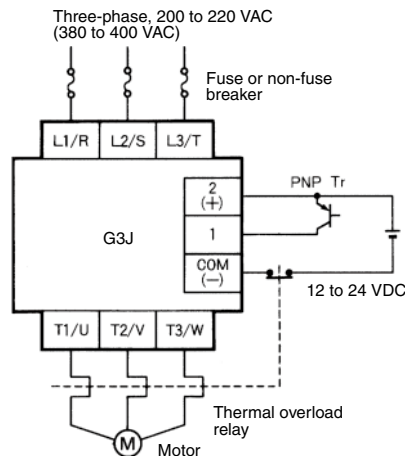
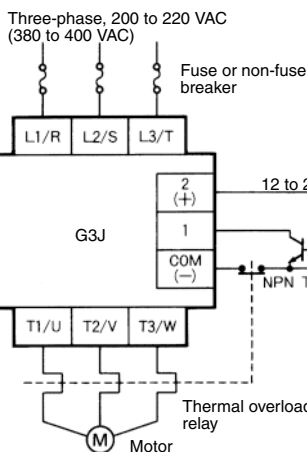
G3J-□BL, G3J-□BL-2

Three-phase, 200 to 220 VAC



Soft-start/Soft-start/stop Models

G3J-S□BL, G3J-T□BL

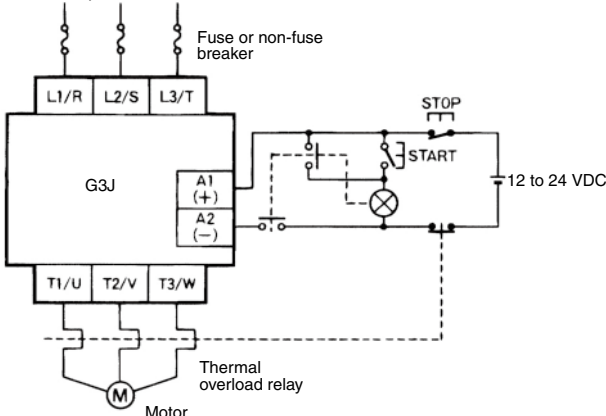


- Note:**
1. When the minimum applicable load of the thermal relay auxiliary contacts becomes smaller than the input current of the G3J, insert a bleeder resistance.
 2. Connect the thermal relay NC contact to the 2 (+) or COM (-) line. Connecting the thermal relay NC contact to the 1 input will cause contact failure.

Self-hold Circuits

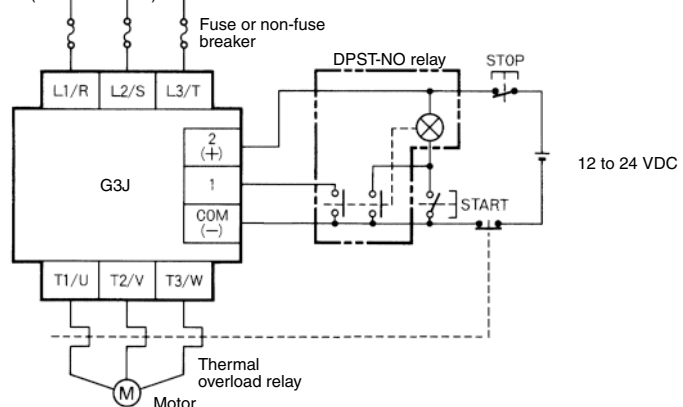
G3J-□BL, G3J-□BL-2

Three-phase, 200 to 220 VAC



G3J-S□BL, G3J-T□BL

Three-phase, 200 to 220 VAC (380 to 400 VAC)



Note: Be sure to use a fuse or non-fuse breaker to protect the G3J.

■ Fuse Selection

The following table shows the I^2t (60 Hz half-wave 1 cyc) values for G3J models.

| Model | I^2t |
|--------------------------|-----------------------|
| G3J-T217BL | 2,660A ² s |
| G3J-S211BL G3J-T211BL | 1,260A ² s |
| G3J-S205BL G3J-T205BL | 121A ² s |
| G3J-S405BL G3J-T405BL | 260A ² s |
| G3J-S403BL G3J-T403BL | 260A ² s |

When selecting a fuse to protect a G3J, use a quick-breaking fuse for semiconductor protection that satisfies the following condition:
fuse's $I^2t < G3J$'s I^2t .

Operation

■ Soft-Start/Stop (Function of G3J-T)

The G3J-T is a solid state contactor that smoothly starts and stops machines and equipment connected to power supplies without damaging the machines, equipment, or power supplies.

Soft-start Time

The voltage imposed on the motor increases while ignition α is gradually reduced, thus gradually increasing the rotation speed of the motor.

Ramp-up Time

Ramp-up time is a period required for ignition α to become zero degrees with a 100% voltage imposed on the motor.

Starting Torque

Starting torque is determined by the value of ignition α immediately after the input signal is turned ON.

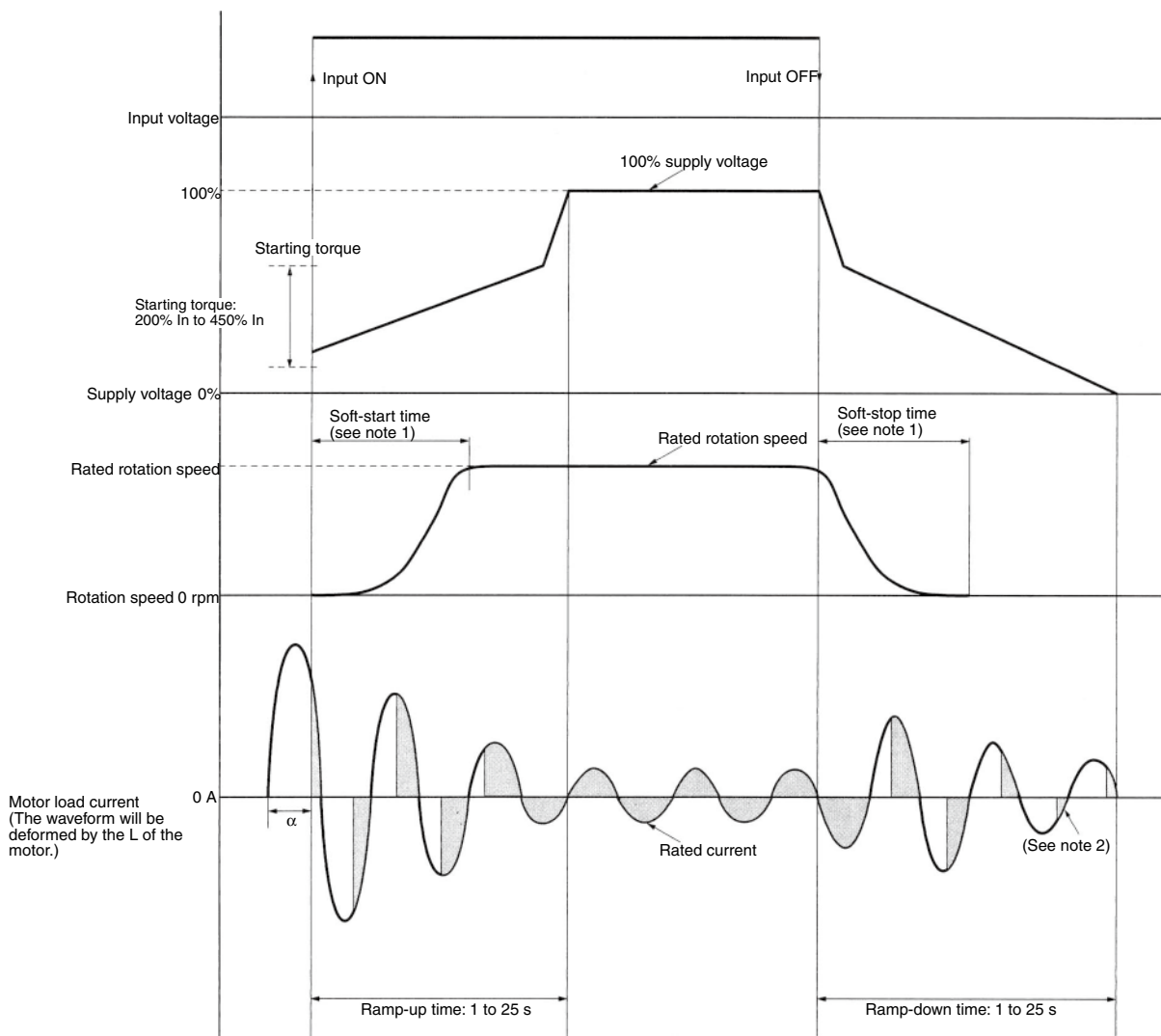
Soft-stop Time

The voltage imposed on the motor decreases while ignition α is gradually increased, thus gradually decreasing the rotation speed of the motor.

Ramp-down Time

Ramp-down time is a period required for ignition α to become 180 degrees with a 0% voltage imposed on the motor.

Soft-start/stop Characteristics



- Note: 1.** In addition to starting torque, ramp-up time, and ramp-down time, the soft-start time and soft-stop time vary with the load characteristics such as the inertia and friction factor of the load. Therefore, the soft-start time or soft-stop time will not increase beyond a certain point.
- 2.** Due to the soft-stop control characteristics, the load current continues flowing even after the motor stops. Set to the optimum value according to the adjustment steps.

■ Soft-start/stop Setting Method

Adjuster

Starting Torque Setting with the Starting Torque Adjuster

The starting torque of a motor can be set within a range from 200% to 450% In provided that the starting torque is 600% In when the motor is started at full voltage, which allows optimum motor control without any time lag at the time the motor starts.



Set with a Phillips or flat-blade screwdriver.

Ramp-up Time Setting with the Ramp-up Adjuster

The ramp-up time of a motor can be set within a range from 1 to 25 s, with which the soft-start time of the motor is adjusted until the motor rotates at full speed.



Set with a Phillips or flat-blade screwdriver.

Ramp-down Time Setting with the Ramp-down Adjuster

The ramp-down time of a motor can be set within a range from 1 to 25 s, with which the soft-stop time of the motor is adjusted until the motor decelerates to a stop.



Set with a Phillips or flat-blade screwdriver.

Adjustment Steps

1. Start and stop the motor with the factory settings.
Ramp-up adjuster: 1 s
Starting torque adjuster: 200% In
Ramp-down adjuster: 1 s
2. If the motor does not rotate smoothly, increase the starting torque.
3. Gradually increase the ramp-up time to adjust the start time.
4. Gradually increase the ramp-down time to adjust the stop time.
5. The soft-start time or soft-stop time will not increase beyond a certain point (depend on load). Do not set the ramp-up time or ramp-down time beyond this point.

Further Adjustment or Arrangement

1. Increase the starting torque if the motor does not start with a long soft-start time.
2. To start normally (i.e., not using soft-start) use a simple G3J model.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Safety Precautions for All Solid State Relays

Refer to the *Safety Precautions* section for each SSR for specific precautions applicable to that SSR.

⚠ CAUTION

Do not touch the SSR or the heat sink while the power is being supplied or immediately after the power supply has been turned OFF.
Touching the SSR or heat sink while it is hot may result in burns.



Do not touch the LOAD terminals on the SSR immediately after the power supply has been turned OFF.
Shock may result due to the electrical charge stored in the built-in snubber circuit.



Always attach the cover terminal if the SSR has one.
Contact with current-carrying parts may result in shock.



Always turn OFF the power supply before performing wiring.
Not doing so may result in shock.



Do not allow short-circuit current to flow to the load side of the SSR.
The SSR may explode if short-circuit current flows.



■ Precautions for Correct Use

For details, refer to *Technical Guide for Solid State Relays*.

■ Precautions for Safe Use

OMRON constantly strives to improve quality and reliability. SSRs, however, use semiconductors, and semiconductors may commonly malfunction or fail. In particular, it may not be possible to ensure safety if the SSRs are used outside the rated ranges. Therefore, always use the SSRs within the ratings. When using an SSR, always design the system to ensure safety and prevent human accidents, fires, and social harm in the event of SSR failure. System design must include measures such as system redundancy, measures to prevent fires from spreading, and designs to prevent malfunction.

1. Do not apply voltage or current in excess of the ratings to the terminals of the SSR.
Doing so may result in failure or burn damage.
2. Do not use the SSR with loose terminal screws.
Doing so may result in burn damage due to abnormal heat produced by the terminals.
3. Do not block the movement of the air surrounding the SSR or heat sink.
Abnormal heating of the SSR may result in shorting failures of the elements or burn damage.
4. Follow the *Precautions for Correct Use* when performing wiring or tightening the screws.
If the SSR is used with the wiring or screw tightening performed improperly, burn damage may occur due to abnormal heat generated when the power is being applied.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this catalog has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

COPYRIGHT AND COPY PERMISSION

This catalog shall not be copied for sales or promotions without permission.

This catalog is protected by copyright and is intended solely for use in conjunction with the product. Please notify us before copying or reproducing this catalog in any manner, for any other purpose. If copying or transmitting this catalog to another, please copy or transmit it in its entirety.