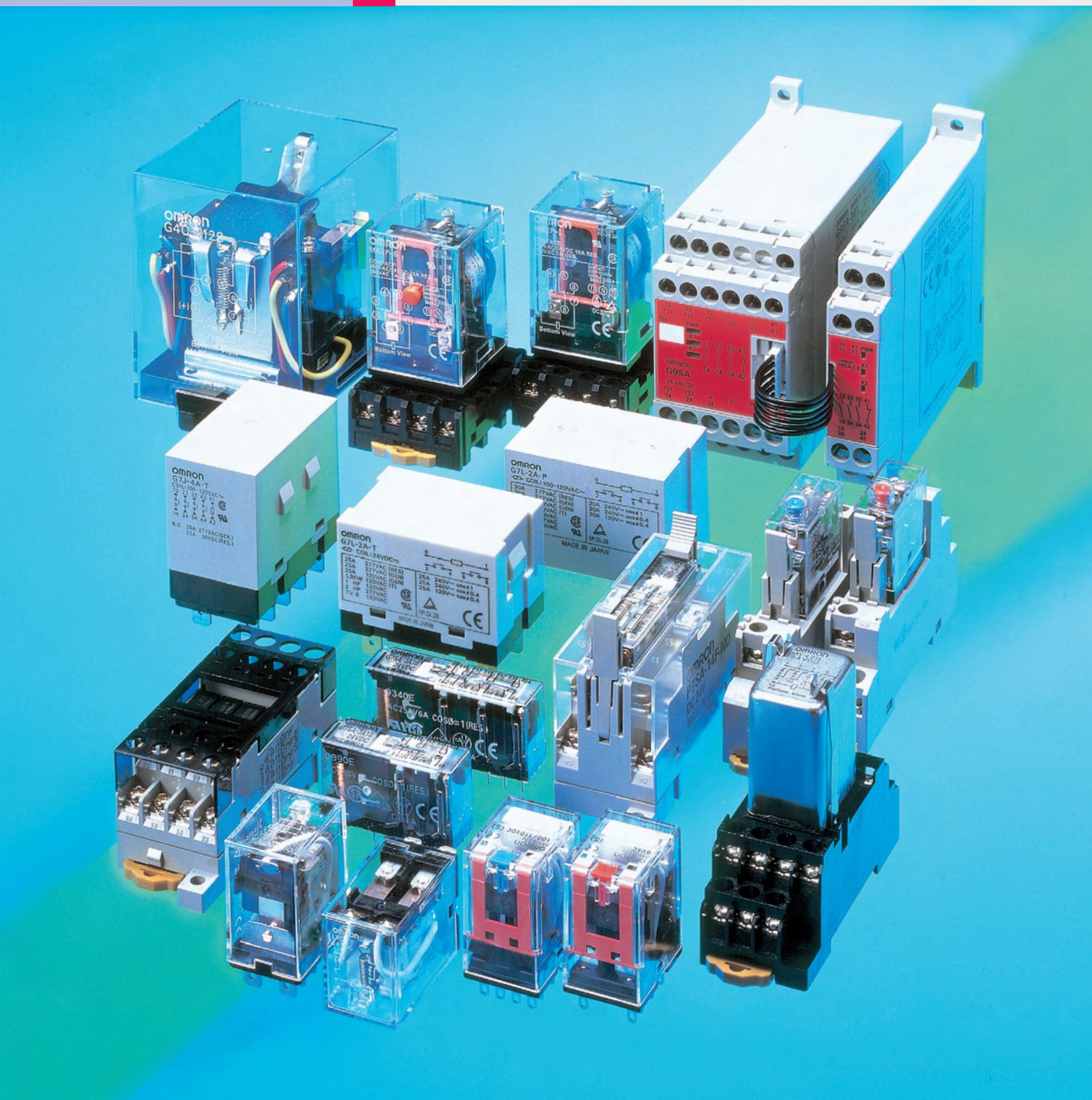
Cat. No. X034-E1-08A

OMRON

General-purpose Relays and Power Relays



OMRON, a global - yet local - company, committed to contributing to local communities around the world

OMRON Takeo, Japan

Date of establishment
5 APR '73
Number of employees
372 (as of JUNE '02)
Models produced
G7T, G2A, G2A-434, G2AK, G7L, MM, MMK, G7J, G6B4, G6D, G4Q, G9B, G7S, G9S

OMRON Kumamoto, Japan

Date of establishment
6 APR '72
Number of employees
508 (as of JULY '02)
Models produced
G2RS, MY, MYK, LY, G4F, G4B, Socket

OMRON ShenZhen

Date of establishment
6 MARCH '01
Number of employees
1283 (as of MAY '02)
Models produced
MY, Socket

OMRON Malaysia

Date of establishment
30 JAN '73
Number of employees
1125 (as of JUNE '02)
Models produced
Socket

OMRON Indonesia

Date of establishment
27 FEB '92
Number of employees
1811 (as of JULY '02)
Models produced
MK-I/-S, LY, G7L, Socket

Truly global companies, like OMRON, understand that different regions around the world - like the people that inhabit them - have different needs, concerns and ambitions. To best meet these different needs, OMRON has positioned itself to better understand and respond to the local needs of its customers in five major regions: North America, Europe, Asia Pacific, China and Japan. Each region maintains independent, yet highly integrated, sales, technical support, product development, and manufacturing resources to meet the needs of local communities. We call it our Multi-Local strategy, and it is where the true value of OMRON lies. This strategy forms the foundation of OMRON's core belief in building firm roots within the communities it serves - providing employment and returning profits. It is this core belief that guides OMRON's business expansion throughout the world.

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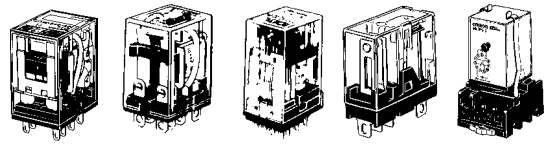
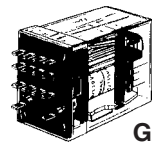
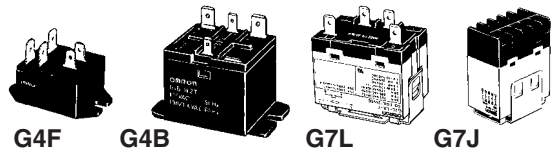
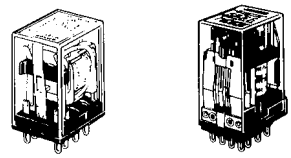
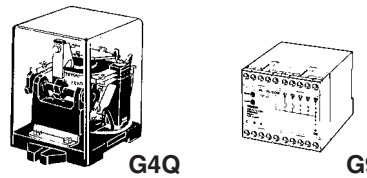
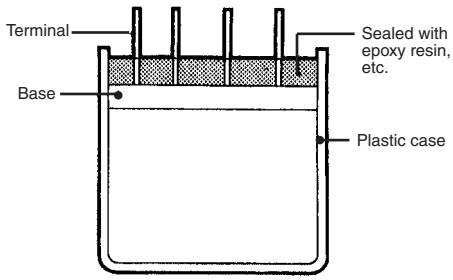
General-purpose Relays and Power Relays

Technical Information

■ Classification by Basic Operating and Housing

Classification item		Representative models	Features
General-purpose Relays	General-purpose Relays	 MY LY G2A G2RS MK-I/-S	The contacts of these Relays instantaneously turn ON when the coil is energized, and turn OFF when the coil is deenergized. These Relays do not have any special functions.
	Fully Sealed Relays 1)	 G2A-4□	The Relay mechanism is encapsulated in a plastic case, with the terminals and terminal block sealed by epoxy resin.
	Power Relays	 G4F G4B G7L G7J	These Relays are intended to switch heavy loads.
Special-purpose Relays	Latching Relays 2)	 MYK□ G2AK	The contacts of these Relays are magnetically or mechanically locked in either the energized or the deenergized position until a reset signal is input. Single-winding and double-winding coils are available for applying set or reset pulse voltage.
	Ratchet Relays and Stepping Relays 3)	 G4Q G9B	The contacts of Ratchet Relays alternately turn ON and OFF, or sequentially operate, when a pulse signal is input. The contacts of Stepping Relays shift ON or OFF sequentially with each input pulse.

1) Fully Sealed Relays



The Fully Sealed Relay is of a simple construction, in which the Relay is placed in a plastic case. The gaps between the case and the Relay terminals, and between the terminals and terminal block (base), are sealed with epoxy resin.

(1) There is no problem if the Relay is used on a flat surface. However, as much as possible, use it in an atmospheric pressure of 1,013 mb ±20%.

(2) The Fully Sealed Relay can be immersed for cleaning.
Note that the sealing of the case and the section filled with resin are degraded if solder flux adheres, or if heat is generated at the terminals. Due to its simple construction, the Fully Sealed Relay is not suitable for applications in an environment or installation location that requires a particularly high level of sealing. For applications in an atmosphere containing flammable or explosive gases, use the Hermetically Sealed Relay.

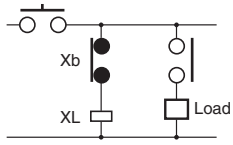
2) Latching Relays

These Latching Relays keep residual magnetism (MYK, G2AK, etc.)

- Avoid use in places where there are a lot of magnetic particles or dust.
- Avoid using in a magnetic field (of 70 oersted or greater).
- Give sufficient consideration to the vibration and shock produced by other Relays when they close and release.
- A continuous flow of current is possible through the set and reset coils. However, avoid applying voltage to the set coil and the reset coil at the same time.
- Avoid use under conditions where there are many surges in the power supply.

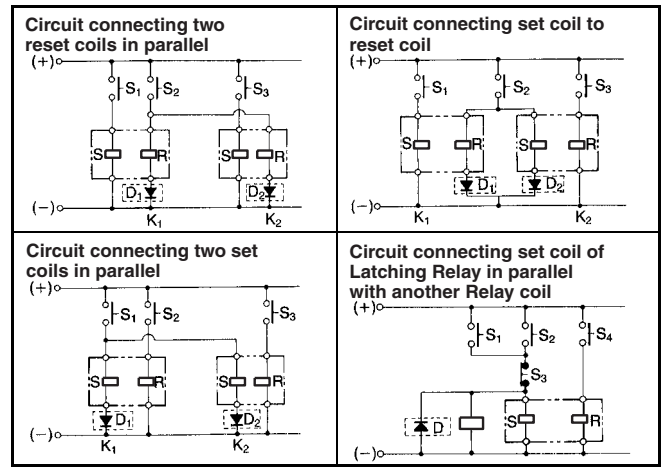
- When a large number of Relays are mounted in a row, make sure that the minimum mounting intervals have been observed between the various types of Relays.
- Relays are delivered in the reset condition, but we recommend that the reset voltage be applied before use as a starting procedure.
- When a diode is connected in the circuit, external noise and surges must be taken into account for the repetitive peak reverse voltage and the DC reverse voltage, and a diode with sufficient capacity used. Also, an average rectification current that is larger than the coil current should be used.
- Excitation with self contacts may not be kept normally. Avoid use in circuits such as the ones shown in the diagrams below.
- When DC specifications are used in circuits such as the following, the latching may be lost and so a diode should be connected (as the part marked D in the circuit diagram) or the circuit should be modified, or a Latching Relay with built-in diode used.

Incorrect



XL: Latching Relay
Xb: NC contact of Relay

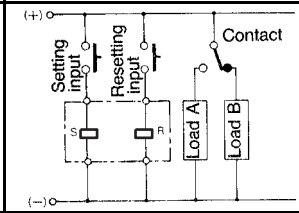
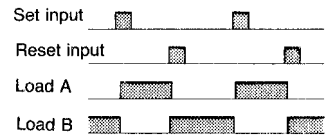
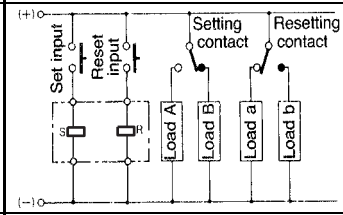
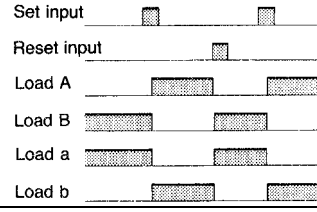
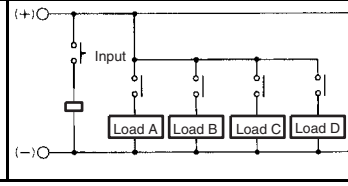
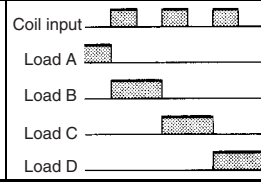
Notes on Circuit



Mechanical Latching Relay (Model MMK, etc.)

When installing more than one Latching Relay side by side, provide a sufficient distance between two adjacent Relays for efficient heat radiation. Provide a distance of about 20 mm in the vertical direction and about 15 mm in the horizontal direction.
A very slight gap is provided in the locking section of a Mechanical Latching Relay. Therefore, the resistances of this type of Relay to vibration and shock are slightly inferior to standard Latching Relays. Do not apply a voltage to the set and reset coils at the same time. If this happens, the Relay will be set.

3) Basic Operation of Ratchet Relays and Stepping Relays

Model	Basic circuit	Operation pattern	Outline
Double-winding Latching Relays Model MYK Model G2AK Model MKK Model MMK			In these Relays, the input pulse of the set coil causes the operating condition to be maintained magnetically or mechanically, whereas the input pulse to the reset coil side puts the Relay into the reset condition.
Ratchet Relay			In these Relays, the input pulse of the set coil causes the operating condition to be maintained mechanically, and similarly, the input pulse of the reset coil maintains the reset condition. The set and reset contacts are alternately switched ON and OFF.
Stepping Relays			In these Relays, the contacts shift ON or OFF sequentially with each coil input pulse.

Note: For details, consult OMRON.

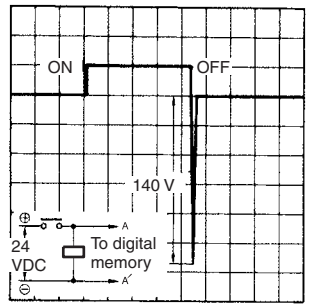
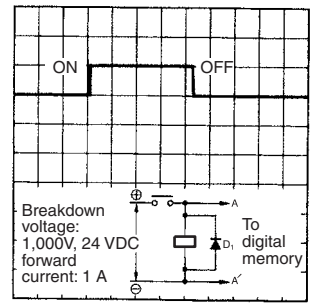
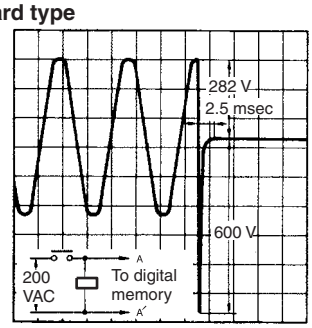
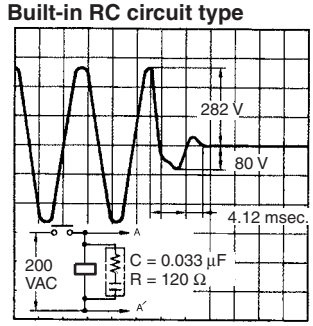
■ Classification by Coil Ratings

Except for a few models, two types of Relay coils are available: AC-operated and DC-operated.

Coil voltage	**AC**	6 V	12 V	24 V	48 V	50 V	100/110 V	110/120 V	200/220 V	220/240 V
	DC	6 V	12 V	24 V	48 V	---	100/110 V	110/120 V	200/220 V	220/240 V

■ Classification by the Built-in Noise Absorption Circuit

Some Relays are provided with a built-in element which absorbs the counterelectromotive force generated when the coil is switched OFF. These Relays are ideal for interfacing CPUs, PCs, and microcomputers.
The release time of these Relays is longer than that of the General Relay, as shown in the diagram below.

Noise absorber	Coil waveform	Model
Diode (for DC operation only)	**With Model MY (breakdown voltage of diode: 1,000V)** **Standard type**  **Built-in diode type** 	MY, LY, G2A, MKP, MMP
CR circuit (for AC operation only)	**With Model MY** **Standard type**  **Built-in RC circuit type** 	MY, LY

■ Classification by Operation Indicator

Some Relays are provided with an operation indicator that shows the operation state of the Relays, either by a lighting element, such as an LED, neon lamp, or incandescent lamp, or by mechanical means. By showing their exact states at a glance, these types of Relays greatly facilitate maintenance and troubleshooting.

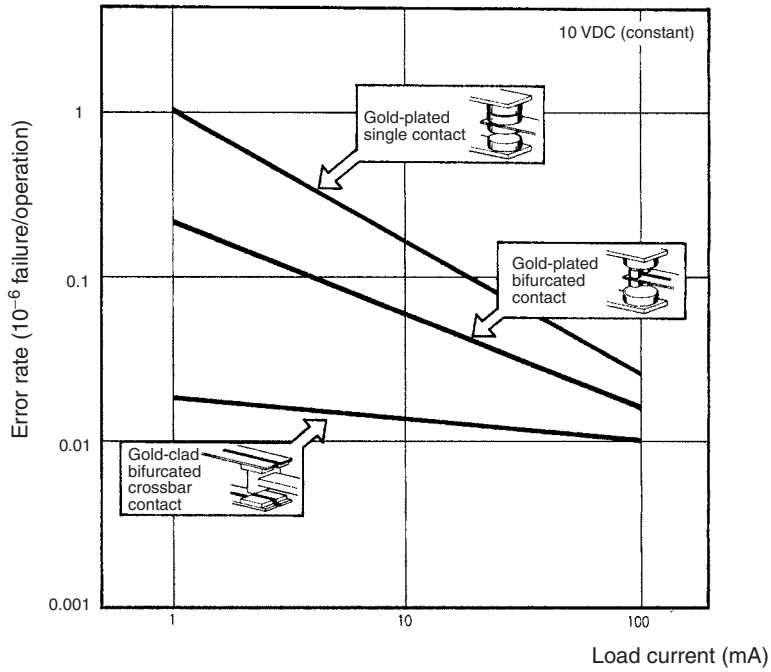
Indication method	Remarks	Model
Built-in indicator	LED Neon lamp Incad. lamp	MY, LY, G2A, MK□□P
Mechanical indicator	An indication plate moves according to the movement of the armature.	MY (New model), MYK, G2A(K), MK□□P, MKK□□P

■ Classification by Contact

- Generally, contact ratings are given based on a resistive load and an inductive load (cosϕ = 0.4 or L/R = 7 ms). The form and material of the contact have also been listed to aid in your selection of an optimum Relay taking into account the required service life along with the load.
- When Relays are used at very small load levels, the error rate will differ greatly depending on the contact material and the contact method, as shown in the chart below. For example, the error rate of bifurcated contacts is lower than that of single contacts, because the expectation of parallel redundancy is high.
- When the load is a DC power supply and the current is high, a switching error may arise from the connection and shorting of the arcing contacts, because the expectation of parallel redundancy is high.
- When the load is a DC power supply and the current is high, a switching error may arise from the connection and shorting of the arcing contacts. The MM Series of Arc Magnetic Blow-out Relays with built-in permanent magnets are available for such conditions.

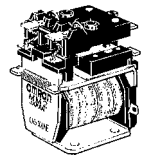
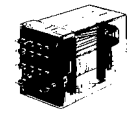
Example: Model MM□XP
Rated load 110 VDC, 7 A (L/R = 0)
110 VDC, 6 A (L/R = 7 ms)

• Error Rate Vs. Load Current



■ Classification by Sealing

OMRON Relays are divided into the following three types, by classifying their sealing.

Classification	Open Relays	Cased Relays	Fully Sealed Relays
Representative model	 **MM**	 **MY**	 **G2A-4□**
Construction	This Relay construction does not protect the Relay from contact with or penetration by foreign objects.	This Relay construction suppresses the adverse effects of dust on the Relay when it must be used in a dusty location.	These Relays are sealed in a resin case, or cover, so that it is difficult for atmospheres containing corrosive gases to affect the Relay.
Operating atmosphere	Normal atmosphere		• In an atmosphere containing organic gases such as ammonia or hydrogen sulfide • On the control panel for machine tools which produce quantities of dust and oil • In terminal equipment installed at a location where many people move about, creating a dusty atmosphere • In automatic vending machines and showcases installed outdoors • When the Relay is soldered on a PCB board which is to be immersed for cleaning

■ Classification by Terminal

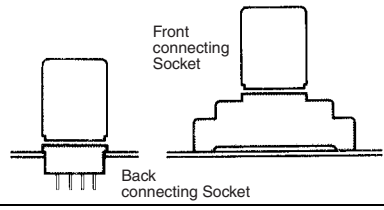
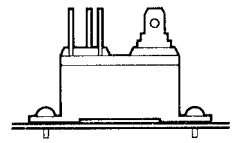
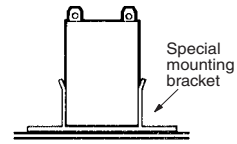
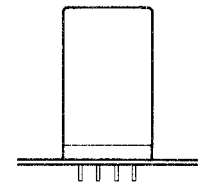
The following six types of terminals are available.

Item	Solder terminal	Screw terminal	Octal pin terminal	Quick connect terminal	Wire-wrap terminal	Denotes PCB terminal
Terminal form						
Representative Relay	MY, MYK, LY, G2A, G2AK	MM, G7L, G7J	MK, MM, G4Q	LY, G4F, G7L, G4B, G7J	Socket PY, PT, PL	MY, MYK, LY, MK, G2A, G2A-434, G2AK, G7L, G7J

• Some quick-connect terminals can be used with Faston receptacles and positive-lock connectors.
Example: G4F, G4B, and G7L

■ Classification by Mounting Style

Select the mounting style best suited to your application from the following four Relay mounting styles.

Classification	Socket mounting	Screw mounting	Bracket mounting	PCB mounting
Terminal form				
Representative Relays	MY, MK, G2RS, LY, MM, G2A, G4Q, G7L, G7S	MY, LY, G4F, G4B, G7L	G7L, G7J	MY, LY, G2A, G7L

■ Glossary

Contacts

Contact Form

The contact mechanism of the Relay.

Number of Contact Poles

The number of contact circuits.

Rated Load

The rated load of the contact of the Relay, which determines the characteristic performance of the contact of the Relay, is expressed by the switching voltage and switching current.

Maximum Switching Voltage

The switching voltage of the Relay determines the characteristic performance of the contact of the Relay. Do not apply voltage that exceeds the maximum switching voltage of the Relay.

Carry Current

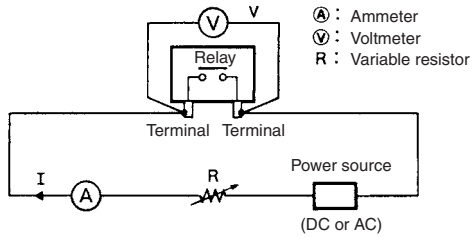
The value of the current which can be continuously applied to the Relay contacts without opening or closing them, which also allows the Relay to stay within the permissible temperature rise limit.

Maximum Switching (Contact) Current

A current which serves as a reference in determining the performance of the Relay contacts. This value will never exceed the carry current. When using a Relay, plan not to exceed this value.

Contact Resistance

The total resistance of the conductor, which includes specific resistivities, such as of the armature and terminal, and the resistance of the contacts. This value is determined by measuring the voltage drop across the contacts by the allowed test current shown in the table below.

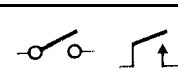
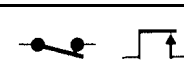
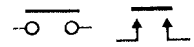
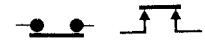
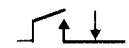
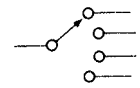
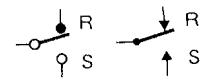
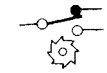


Test Current

Rated current or switched current (A)	Test current (mA)
0.01 or higher but less than 0.1	10
0.1 or higher but less than 1	100
1 or higher	1,000

To measure the contact resistance, a milliohmmeter can be also used, though the accuracy drops slightly.

Contact Symbol

NO contact	NC contact	SPDT contact
		
Double-break NO contact	**Double-break NO contact**	**Make-before-break contact**
		
Wiper contact	**Latching Relay contact**	**Ratchet Relay contact**
		

Make-before-break Contact

A contact arrangement in which part of the switching section is shared between both an NO and an NC contact. When the Relay operates or releases, the contact that closes the circuit operates before the contact that opens the circuit releases. Thus both the contacts are closed momentarily at the same time.

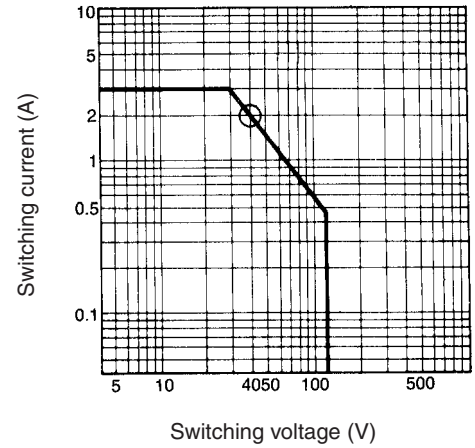
Maximum Switching Power

The maximum capacity value of the load which can be switched without causing problems of material break-down and/or electrical overload. When using a Relay, be careful not to exceed this value. For example, when switching voltage V_1 is known, max. switching current I_1 can be obtained at the point of intersection on the characteristic curve “Maximum switching power” below. Conversely, max. switching voltage V_1 can be operated if I_1 is known.

Max. switching current (I_1) =

$$\frac{\text{Maximum switching power [W(VA)]}}{\text{Switching voltage } (V_1)}$$

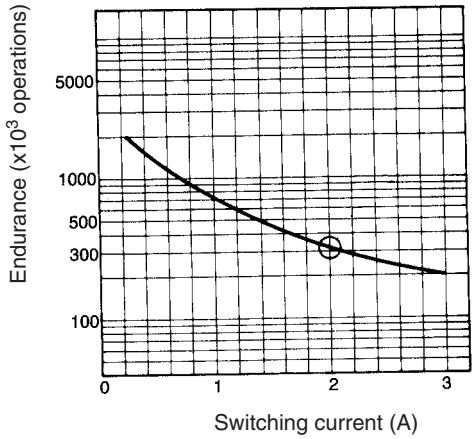
For instance, if the switching voltage = 40 V, the max. switching current = 2 A (see circled point on graph).



Electrical Endurance

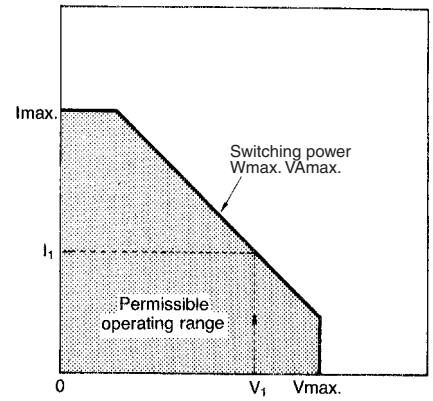
The electrical endurance of the Relay can be determined from the "Electrical life" curve shown below, based on the rated switching current (I_1) obtained above.

For instance, the electrical endurance for the max. switching current of 2 A is slightly over 300,000 operations (see circled point on graph below).



However, with a DC load, it may become difficult to break a circuit of 48 V or more, due to arcing. Determine suitability of the Relay in actual usage testing. Correlation between the contact ratings is as shown below.

Maximum Switching Power



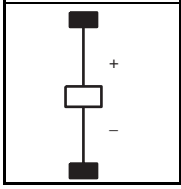
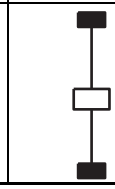
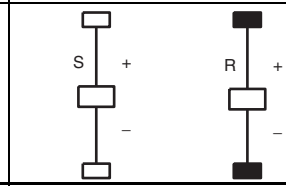
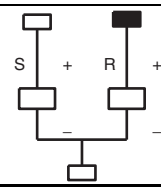
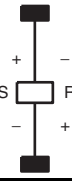
Failure Rate

The failure rate indicates the lower limit of the switching power of a Relay. Such minute load levels are found in microelectronic circuits. This value may vary, depending on operating frequency, operating conditions, expected reliability level of the Relay, etc. It is always recommended to double-check Relay suitability under actual load conditions.

In this catalog, the failure rate of each Relay is indicated as a reference value. It indicates error level at a reliability level of 60% (γ_{60}).

γ_{60} = 0.1 x 10^{-6}/operation means that one error is presumed to occur per 10,000,000 operations at the reliability level of 60%.

Coil

Single-stable		Double-winding		Single-winding latching
With pole	Without pole	4 terminals	3 terminals	
				

Coil Current (Applicable to AC-switching Type Only)

A current which flows through the coil when the rated voltage is applied to the coil at a temperature of 23°C. The tolerance is +15%, –20% unless otherwise specified.

Coil Voltage

A reference voltage applied to the coil when the Relay is used under the normal operation conditions. The following table lists the 100/110 VAC voltages.

Applicable power source	Inscription on Relay	Denomination in catalog
100 V 50 Hz	100 VAC 60 Hz	100 VAC 60 Hz
100 VAC 50 Hz 100 VAC 60 Hz	100 VAC	100 VAC
100 VAC 50 Hz 100 VAC 60 Hz 110 VAC 60 Hz	100/110 VAC 60 Hz 100 VAC 50 Hz	100/(110) VAC
100 VAC 50 Hz 100 VAC 60 Hz 110 VAC 50 Hz 110 VAC 60 Hz	100/110 VAC	100/110 VAC

Power Consumption

The power (=rated voltage x rated current) consumed by the coil when the rated voltage is applied to it. A frequency of 60 Hz is assumed if the Relay is intended for AC operation.
The current flows through the coil when the rated voltage is applied to the coil at a temperature of 23°C and with a tolerance of +15% and –20% unless otherwise specified.

Coil Resistance (Applicable to DC-switching Type Only)

The resistance of the coil measured at a temperature of 23°C with a tolerance of ±10% unless otherwise specified. (The coil resistance of an AC-switching Relay may be given for reference when the coil inductance is specified.)

Must-release (Must-reset) Voltage

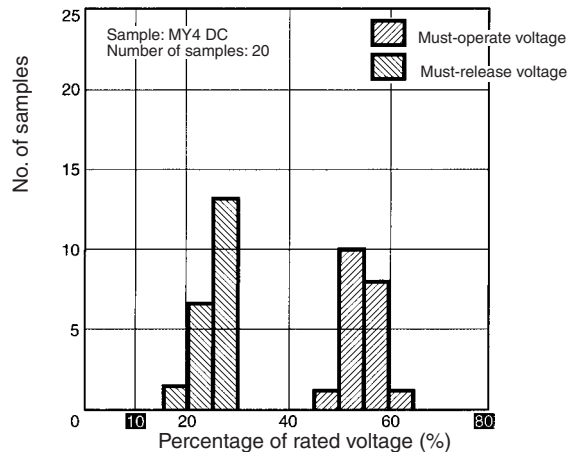
The threshold value of a voltage at which a Relay releases when the rated input voltage applied to the Relay coil in the operating state is decreased gradually.

Must-operate (Must-set) Voltage

The threshold value of a voltage at which a Relay operates when the input voltage applied to the Relay coil in the reset state is increased gradually.

Example: MY4 DC Models

The distributions of the must-operate voltage and the must-release voltage are shown in the following graph.
As shown in the graph, the Relay operates at voltages less than 80% of the rated voltage and releases at voltages greater than 10% of the rated voltage. Therefore, in this catalog, the must-operate and must-release voltages are taken to be 80% max. and 10% min. respectively of the rated voltage.



Hot Start

The ratings set forth in the catalog or data sheet are measured at a coil temperature of 23°C unless otherwise specified. However, some catalogs have the description “Hot start 85% (at Ta = 40°C)”. This means that the must-operate voltage when the Relay is operated after the rated current is consecutively applied to the coil at an ambient temperature of 40°C satisfies a maximum of 85% of the rated must-operate voltage.

Maximum Switching Voltage

The maximum value (or peak value, not continuous value) of permissible voltage fluctuations in the operating power supply of the Relay coil.

Minimum Pulse Width

The minimum width of the pulsating voltage required to set and reset a Latching Relay at a temperature of 23°C.

Coil Inductance

With DC Relays, the coil inductance is obtained by adding the square waveform to a time constant. With AC Relays, it is the value at the rated frequency. In both cases, the values will be different depending on whether the Relay is in the set or the reset condition.

Electrical Characteristics

Mechanical Endurance

The life of a Relay when it is switched at the rated operating frequency, but without the rated load.

Electrical Endurance

The life of a Relay when it is switched at the rated operating frequency, with the rated load applied to its constants.

Bounce

Bouncing is the intermittent opening and closing between contacts caused by vibration or shock resulting from collision between the Relay’s moving parts (poles and terminals) and the iron core and backstop, and collision between contacts.

Operate Bounce Time

The bounce time of the normally open (NO) contact of a Relay when the rated coil voltage is applied to the Relay coil, at an ambient temperature of 23°C.

Operate Time

The time that elapses after power is applied to a Relay coil until the NO contacts have closed, at an ambient temperature of 23°C.
Bounce time is not included. For the Relays having an operate time of less than 10 ms, the mean (reference) value of its operate time is specified as follows:

Operate time	5 ms max. (mean value: approx. 2.3 ms)

Release Bounce Time

The bounce time of the normally closed (NC) contact of a Relay when the coil is deenergized at an ambient temperature of 23°C.

Release Time

The time that elapses between the moment a Relay coil is deenergized until the NC contacts have closed, at an ambient temperature of 23°C. (With a Relay having SPST-NO or DPST-NO contacts, this is the time that elapses until the NO contacts have operated under the same condition.) Bounce time is not included. For Relays having a release time of less than 10 ms, the mean (reference) value of its release time is specified as follows:

Release time	5 ms max. (mean value: approx. 2.3 ms)

Reset Time (Applicable to Latching Relays Only)

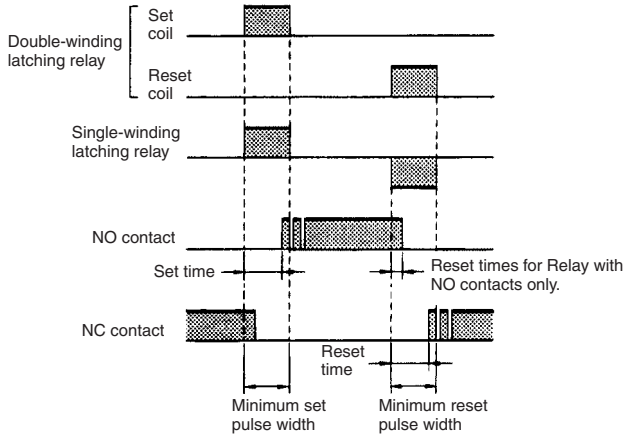
The time that elapses from the moment a Relay coil is deenergized until the NC contacts have closed, at an ambient temperature of 23°C. (With a Relay having SPST-NO or DPST-NO contacts, this is the time that elapses until the NO contacts have operated under the same condition.) Bounce time is not included. For Relays having an operate time of less than 10 ms, the mean (reference) value of its operate time is specified as follows:

Reset time	5 ms max. (mean value: approx. 2.3 ms)

Set Time (Applicable to Latching Relays Only)

The time that elapses after power is applied to a Relay coil until the NO contacts have closed, at an ambient temperature or 23°C. Bounce time is not included. For the Relays having an operate time of less than 10 ms, the mean (reference) value of its operate time is specified as follows:

Set time	5 ms max. (mean value: approx. 2.3 ms)



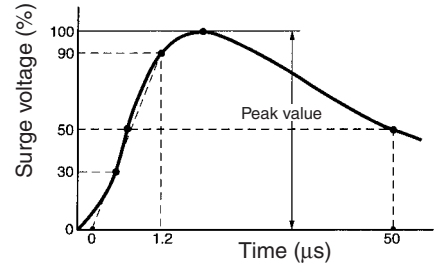
Dielectric Strength

The critical value which a dielectric can withstand without rupturing, when a high-tension voltage is applied for 1 minute between the following points:
Between coil and contact
Between contacts of different polarity
Between contacts of same polarity
Between set coil and reset coil
Between current-carrying metal parts and ground terminal

Note that normally a leakage current of 3 mA is detected; however, a leakage current of 1 mA or 10 mA may be detected on occasion.

Impulse Withstand Voltage

The critical value which the Relay can withstand when the voltage surges momentarily due to lightning, switching an inductive load, etc. The surge waveform which has a pulse width of +1.2 x 50 μs is shown below:



Insulation Resistance

The resistance between an electric circuit (such as the contacts and coil), and grounded, non-conductive metal parts (such as the core), or the resistance between the contacts. The measured values are as follows:

Rated insulation voltage	Measured value
60 V max.	250 V
61 V min.	500 V

Switching Frequency

The frequency or intervals at which the Relay continuously operates and releases, satisfying the rated mechanical and electrical service lives.

Shock Resistance

The shock resistance of a Relay is divided into two categories: Destruction, which quantifies the characteristic change of, or damage to, the Relay due to considerably large shocks which may develop during the transportation or mounting of the Relay, and malfunction durability, which quantifies the malfunction of the Relay while it is in operation.

Stray Capacitance

The capacitance measured between terminals at an ambient temperature of 23°C and a frequency of 1 kHz.

Vibration Resistance

The vibration resistance of a Relay is divided into two categories: Destruction, which quantifies the characteristic changes of, or damage to, the Relay due to considerably large vibrations which may develop during the transportation or mounting of the Relay, and Malfunction durability, which quantifies the malfunction of the Relay due to vibrations while it is in operation.

$\alpha = 0.002f^2A$

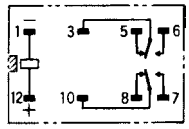
α: Acceleration of vibration
f: Frequency
A: Double amplitude

Operating

Single Stable Relays (Standard Type)

These are Relays in which the contacts switch in response to the energization and deenergization of the coil and do not have any special functions.

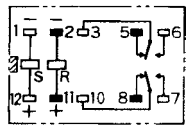
Terminal Arrangement/Internal Connections (Bottom view)



Double-winding Latching Relays

These are Relays that have a set coil and a reset coil, and have a latching mechanism enabling the set or reset condition to be locked.

Terminal Arrangement/Internal Connections (Bottom view)

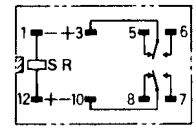


S: set coil
R: reset coil

Single-winding Latching Relays

These are Relays that have one coil, and switch between the set and reset condition according to the polarity of the applied voltage, and have a latching mechanism enabling this status to be locked.

Terminal Arrangement/Internal Connections (Bottom view)



S: set coil
R: reset coil

Stepping Relays

These are Relays in which the contacts shift ON or OFF sequentially with each coil input pulse.

Ratchet Relays

These are Relays in which the contacts alternately turn ON and OFF, or sequentially operate, when a pulse signal is input.

Precautions

General handling

- To maintain initial performance, be careful not to drop the Relay or subject it to shock.
- The case is so constructed that it will not come off with normal handling. To maintain initial performance, do not allow the case to come off.
- Use the Relay in a dry atmosphere containing little dust, SO_2, H_2S, and organic gases.
- Ensure that the voltage applied to the coil is not applied continuously in excess of the maximum permissible voltage.
- With DC-operated Relays that have a built-in diode or a built-in operation indication lamp, do not reverse the polarity connections when the polarity of the coil is specified.
- Do not use the Relay at a voltage or current greater than the specified values.
- Ensure that the ambient operating temperature does not exceed the specified value.
- With General-purpose Relays, leaving or using the Relay for a long time in an atmosphere of hydrogen sulfide gas or high temperature and high humidity will lead to the formation of a sulfide film or an oxidation film on the surface of the contact. In Miniature Relays, the contact force is weak and so the film cannot be destroyed mechanically. Also, with the very small loads, destruction of the film is not possible by arcing and so there will be contact instability and the occurrence of problems in performance and function. For these reasons, Fully Sealed Relays or Hermetically Sealed Relays should be used in atmospheres of harmful gases (such as H_2S, SO_2, NH_3, and Cl_2), humidity, and dust.
- The contact ratings of Relays approved by standards and the general ratings of the Relays could be different.
  When combining Relays with various types of Sockets, check the contact ratings of the Relays before use.

Operating Coils
AC-operated Relays

The power supply used to operate AC-operated Relays is almost always at the commercial frequency (50 or 60 Hz). Standard voltages are 6, 12, 24, 48, 100, and 200 VAC. Because of this, when the voltage is other than a standard voltage, the Relay will be a special-order item and so inconvenience may arise with respect to price, delivery period, and stability of performance. Consequently, a Standard-voltage Relay should be selected if at all possible.
In AC-operated Relays, there is a resistance loss of the shading coil, an overcurrent loss of the magnetic circuit, a hysteresis loss, as well as other losses. The coil input also increases and so in general it is normal for the temperature rise to be higher than in a DC-operated Relay. Also, at voltages less than the must-operate voltage (i.e., the minimum operation voltage), a vibration is produced which necessitates that attention be paid to the fluctuation of the power supply voltage.
For example, when the power supply voltage drops at the time of motor stating, the Relay will be reset while vibrating and the contacts will burn, fuse, or the self holding will go out of place. In AC-operated Relays, there is an inrush current. (When the armature is in a separated condition, the impedance is low and a current flows that is larger than the rated current; when the armature is in the closed condition, the impedance increases and a current flows which is of the rated value.) When a large number of Relays are used connected in series, this factor must be taken into account together with the power consumption.

DC-operated Relays

The power supply used to operate DC-operated Relays may have voltage as a standard or it may have current as a standard. When voltage is the standard, the rated coil voltages include 5, 6, 12, 24, 48, and 100 VDC. When current is the standard, the rated current in mA is listed in the catalog.
In DC-operated Relays, when the Relay is used in an application where it is operated at some limit value, either voltage or current, the current applied to the coil will gradually increase or decrease. It is important to note that this may delay the movement of the contacts resulting in failure to meet the specified control capacity. The coil resistance value of a DC-operated Relay may change by approximately 0.4% per °C due to changes in the ambient temperature and the heat radiated by the Relay itself. Therefore, it is important to note that increases in temperature will be accompanied by higher must-operate and must-release voltages.

Power Supply Capacity

The fluctuation of the power supply voltage over a long period will of course affect Relay operation, but momentary fluctuations will also be the cause of incorrect Relay operation.
For example, when a large solenoid, Relay, motor, heater, or other device is operated from the same power supply as the one that operates the Relay, or when a large number of Relays are used, if the power supply does not have sufficient capacity when these devices are operated simultaneously, the voltage drop may prevent the Relay from operating. On the other hand, when the voltage drop is estimated and the voltage increased accordingly, if the voltage is applied to the Relay when there is no voltage drop, this will cause heating of the coil.
Provide leeway in the capacity of the power supply and keep the voltage within the switching voltage range of the Relay.

Lower Limit Value of the Must-operate Voltage

Use of Relays at high temperatures or rise of coil temperature due to a continuous flow of current through the coil will result in an increase in coil resistance which means the must-operate voltage will also increase. This matter requires attention be paid to determining a lower limit value of the operation power supply voltage. The following example and explanation should be referred to when designing the power supply.

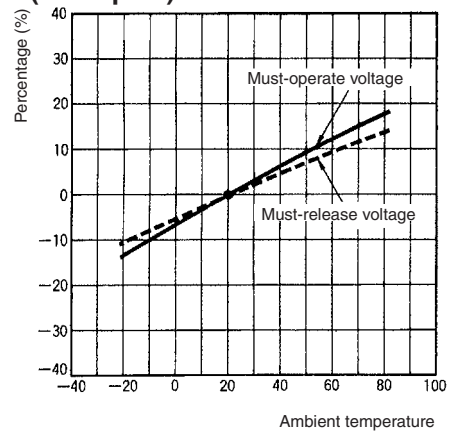
Note: Even though the rating is a voltage rating (as is the rating for all Standard Relays), the Relay should be thought of as being current operated.

Catalog values for model MY
Rated voltage: 24 VDC, coil resistance: 650 Ω, must-operate voltage: 80% or less of rated voltage, at a coil temperature of 23°C.

A rated current of 36.9 mA (24 VDC/650 Ω = 36.9 mA) flows through this Relay, which operates at 80% or less of this value i.e., at 29.5 mA or less (36.9 mA x 0.8 = 29.5 mA). When the present coil temperature rises by 10°C, the coil resistance will be 676 Ω (650 Ω x 1.04 = 676 Ω). To have the must-operate current of 29.5 mA flow in this condition, it will be necessary to apply a voltage of 19.94 V (29.5 mA x 676 Ω =19.94 v). This voltage (which is the must-operate voltage when the coil temperature is 33°C (23°C +10°C), is 83.1% (19.94/24 = 83.1%) of the rated voltage which represents an increase compared to when the coil temperature was 23°C.

• Coil Temperature vs. Mustoperate/release Voltage

(Examples)



[Determining lower-limit value of must-operate voltage]

ET > E x (Epv + 5*)/100 x {(T – Ta)/(234.5 + Ta) + 1}
where,

E:	Rated coil voltage [V]
Epv:	Must-operate voltage [%]
Ta:	Coil temperature determining Epv. Unless otherwise specified, 23°C
T:	Operating ambient temperature [°C]
ET:	Lower-limit value of must-operate voltage [V]

Note: In the above expression, it is assumed that the coil temperature is the same as the ambient temperature, and that T is the value to which the coil temperature has risen as a result of energizing the coil. *5 denotes the safety margin of 5 %.

Continuous Energization for Extended Periods (Months or Years)

In a circuit where the Relay does not release for months or even years with the power supplied, such as an emergency lamp, alarm facility, and error detector circuit in which the Relay releases only in case of an abnormality to issue an alarm signal through its NC contacts, it is recommended that the circuit be designed so that the Relay coil is not excited. This is because, as the coil temperature rises, the Relay is heated and, as a result, the contacts are increasingly corroded. In such applications, therefore, use of Latching Relays and stepping relays is recommended. If the use of the Single Stable Relay is essential, use a fully sealed model which has excellent environmental durability. It is also recommended that the fully sealed model of the Latching Relay be used.

Permissible Voltage for Continuous Use of Coil

The value of the permissible voltage for the continuous use of the coil is generally +10% to 15% of the rated voltage in the case of the AC-operated model and +15% to 20% of the rated voltage in the case of the DC-operated model. The temperature rise at this time is usually 30° to 65°C. This voltage of the DC-operated model may sometimes be expressed in terms of wattage [W], which is obtained by multiplying the coil current squared by the coil resistance (coil current^2 x coil resistance), so that the coil current is limited. The permissible voltage for the continuous use of the coil specified in the Data Sheet of the Relay in question is very important because, unless it is correctly observed, the insulation of the Relay may be thermally degraded, deformed, the other devices connected to the Relay, or even human beings using the Relay may be damaged. Therefore, be sure to observe the permissible voltage. Although Relays employing new wire materials for their coils to improve their characteristics are increasingly available in recent years, it is appropriate to assume that the insulation for these Relays is actually of type E and that the upper-limit value of the temperature rise is 80°C at an ambient temperature of 40°C.

Operate Time

The operate time of the AC-operated Relay considerably varies because of the phase when the switch for energizing the coil is turned ON, and, though it is expressed within a certain range, is about half a cycle (about 10 ms) in the case of a small Relay. However, if the Relay is large in size, the bounce increases, and the operate time is 7 to 10 ms and the release time is 9 to 18 ms. In the case of the DC-operated model, the greater the coil input, the shorter the operate time. However, if the operate time is too short, the bounce time of the NC contact may be prolonged.

Maximum Voltage

Do not use a Relay in such a manner that the maximum voltage specified in the Datasheet of the Relay is exceeded. The maximum voltage of a Relay is determined by various factors, such as coil temperature rise, durability of coil insulation materials, electrical and mechanical life expectancies, and general characteristics. If the maximum voltage is exceeded, the insulation materials may be degraded and the coil may be damaged by burning. In actual applications, however, Relays are often used with their maximum voltage exceeded in order to cope with the fluctuations in the supply voltage. In this case, observe the following points:

(1) Do not allow the coil temperature to exceed the value up to which the spool, the coil insulation materials, and winding wire can withstand.
The temperature up to which the frequently used wiring materials can endure is as shown in the table below (the values in this table are measured by the resistance method).

Wiring materials	Upper-limit value of coil temperature
Polyurethane	120°C
Polyester	130°C

[Measuring coil temperature by resistance method]

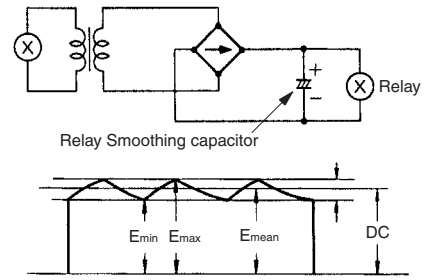
$t = (R_2 - R_1)/R1 \times (234.5 + T_1) + T_1$ [°C]

where,
R1: coil resistance before energization [Ω]
R2: coil resistance after energization [Ω]
T1: coil temperature before energization (ambient temperature): T1 [°C]
t: coil temperature after energization [°C]

(2) Confirm that there is not problem when the Relay is used in the actual application system.

Input Power Source

- The power source for DC-operated Relays is in principle either a battery or a DC power supply with a maximum ripple percentage of 5%. If the power is supplied to the Relay via a rectifier, the must-operate and must-release voltages vary with the ripple percentage. Therefore, check the voltages before actually using the Relay. If the ripple component is extremely large, vibration may occur. If this happens, it is recommended that a smoothing capacitor be inserted as shown below.



Ripple ratio (%) = $(E_{max} - E_{mm})/E_{mean}$ x 100%

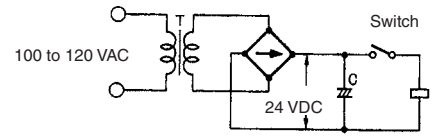
DC component Ripple percentage where, Emax:
maximum value of ripple component;
Emin: minimum value of ripple component;
Emean: mean value of DC component

- If a circuit where the voltage applied to the DC-operated coil increases or decreases extremely slowly, each contact of a Multipole Contact Relay may not operate at the same time as the other contacts, or the must-operate voltage may vary each time the Relay operates. As a consequence, the sequence of the circuit will not be correctly established. Therefore, the use of a Schmitt circuit is recommended in an important circuit to shape desirable waveforms.
- In a circuit where the Relay coil is applied voltage for a long time, use of a DC-operated Relay is recommended. If an AC-operated model is used, the coil temperature rises to a great value because of the interaction of the copper loss and iron loss (hysteresis of magnetic materials). From the viewpoints of reducing the temperature within the control panel and eliminating the vibration, therefore, the use of the DC model is more advantageous.

Voltage Applied to AC-operated Model

In principle, apply a voltage within +10% to –20% of the rated voltage to an AC-operated Relay to ensure the stable operation of the Relay. Note, however, that the voltage applied to the coil must be a sine wave. If the voltage is applied from a commercial power source, there is no problem. However, when using a AC voltage regulator, beat or abnormal heating may occur depending on the distortion of the waveform of the equipment. Although an AC-operated Relay is of construction that beat is eliminated by a standing coil, the distorted waveform may prevent the standing coil from operating correctly.
When motors, solenoids, or transformers are connected to the same power lines as those of the power supply of the control circuit of a Relay, the supply voltage to the Relay may drop when these devices operate, causing the Relay to vibrate and the contacts to be damaged by burning. This symptom is conspicuous especially when a small-capacity transformer is connected to the Relay, when the wiring length is too long, or when household or commercial cables small in diameter are used. If a trouble of this kind has occurred, examine how the voltage changes by using an oscilloscope or other instruments and take appropriate countermeasures such as employing Special Relays having operation characteristics suitable to the environments of your application and changing the Relay circuit into a DC circuit like the one shown below to absorb the fluctuations in the voltage by a capacitor.

- **Voltage Fluctuation Absorber Circuit with Capacitor 100-VAC Switch**



■ Coil

The most fundamental point to be observed is to apply the rated voltage to a Relay to make sure that the Relay accurately operates. Therefore, when using a Relay, this point must be abided by under any circumstances. Applying the rated voltage to the coil of a Relay is also important for the reason that the coil resistance changes depending on the type of the coil, voltage fluctuation, and temperature rise. On the other hand, however, the voltage applied to the coil must not exceed the maximum voltage specified in the Datasheet of the Relay; otherwise, the coil may be short-circuited and damaged by burning.

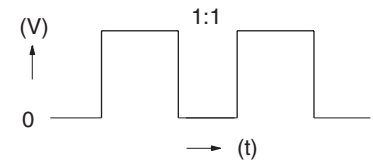
Coil Temperature Rise

When a current flows through the coil of a Relay, heat is generated because of the joule heat (copper loss) of the coil or, on alternate current, of the iron loss of the magnetic materials such as iron core. Consequently, the coil temperature rises. In addition, when a current flows through the contacts, heat is also generated from the contacts, which help the coil temperature rise further.

Temperature Rise Due to Pulse Voltage

When a Relay is applied a pulse voltage whose ON time is 2 minutes or less, the rise in the coil temperature is independent of the ON time, but is influenced by the ratio of the ON time to the OFF time. This temperature rise is much smaller than that when the Relay is used with continuously supplied power, and almost the same for any models of Relays.

Energization time	Temperature rise:
Continuous energization	100%
ON:OFF = 3:1	Approx. 80%
ON:OFF = 1:1	Approx. 50%
ON:OFF = 1:3	Approx. 35%



Changes in Must-operate Voltage Due to Coil Temperature Rise (Hot Start)

When the coil of a DC-operated Relay has been continuously energized, and when the power to the Relay has been once turned OFF and then immediately back ON again, the coil resistance increases because of the coil temperature rises. As a result, the must-operate voltage slightly increases. If the Relay is used in an atmosphere where the ambient temperature is high, the operate voltage also increases. The resistance thermal coefficient of a copper wire is about 0.4% per 1°C, and the coil resistance increases at this ratio. Therefore, to operate a Relay, a current higher than the operate current is necessary, and the current value increases with the coil resistance.

Surge Protection when Coil is OFF

The reverse voltage that is generated by the coil when it is OFF may cause the semiconductor to be damaged and equipment to malfunction. As a countermeasure, either attach a surge suppressor to both ends of the coil or select a model with a built-in surge suppressor (e.g., MY, LY). If a surge suppressor is attached, the release time for the Relay will be longer. Confirm operation with the circuit that will actually be used.

■ Contacts

The contacts are the most important constituents of a Relay. Their operations and characteristics are influenced by various factors such as contact materials, applied voltage and current (especially, voltage and current waveforms on turning ON/OFF power), load type, switching frequency, ambient temperature, contact construction, and the presence or absence of the switching speed bounce phenomena. When the contacts have been adversely influenced by any of or combination of these factors, phenomena such as contact transfer, metal deposition, abnormal wear, and increase in contact resistance occur. To extend the endurance of the contacts and to make sure that they always operate correctly, pay attention to the following points.

Voltage and Current of Contact Circuit

If a contact circuit contains induction, a considerably high counter electromotive force (emf) is generated. The higher the voltage applied to the contacts, the greater the energy of the counter emf, wearing the contacts. Therefore, the value of the current up to which the Relay makes or breaks must be appropriately controlled. If a DC voltage is applied to the contacts, the control capacity of the Relay significantly drops. This is because, on DC voltage, there is no zero point (current zero cross point) unlike on AC voltage, and therefore, if the Relay has generated arc once, the arc is difficult to disappear, resulting in a long arc time. In addition, because the current flows in only one direction, contact transfer, a phenomenon described shortly, occurs, wearing the contacts. The control capacity of a Relay is generally set forth on the Data Sheet of the Relay. However, observing this control capacity is not sufficient. Especially, in a special contact load circuit, the control capacity of the Relay must be confirmed by conducting a test with the actual load.

Current

When the contacts are closed or opened, the current has a significant influence on the contacts. For example, if the load is a motor or lamp, the higher the inrush current when the contacts are closed, the more the contacts are worn and the quantity of contact transfer increases. Consequently, the contacts will fuse and cannot be separated.

Contact Materials

It is important to select appropriate contact materials depending on the load current the contacts are to break or make. The following table lists the contact materials widely used and their features.

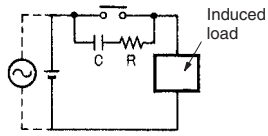
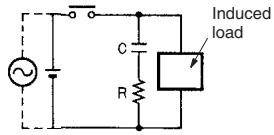
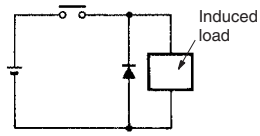
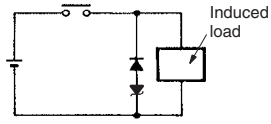
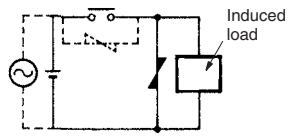
Contact Materials and Their Features

Low load current ◄				► High load current	
P.G.S alloy (platinum, gold, silver)	**AgPd (silver palladium)**	**Ag (silver)**	**AgNi (silver nickle)**	**AgSnIn (silver, tin, indium)**	**AgW (silver tungsten)**
High resistance to corrosion. Mainly used in minute current circuit (Au:Ag:Pt = 69:25:6)	High resistance to corrosion and sulfur. In dry circuit, likely to absorb organic gas and generate polymer, and thus gold-clad.	Highest conductance and thermal conductance of all metals. Low contact resistance, but easy to create sulfide film in sulfide gas. May cause faulty contact at low voltage and current.	Rivals with Ag in terms of conductance. Excellent resistance to arc.	Excellent resistance to metal deposition and wear.	High hardness and melting point. Excellent resistance to arc, metal deposition, and transfer, but high contact resistance and poor environmental durability.

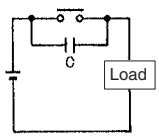
Contact Protection Circuit

It is recommended to employ a contact protection circuit to increase the service life of the Relay, to suppress noise, and to prevent generation of carbide and nitric acid which otherwise will be generated at the contacts when the Relay is opened. Unless used correctly, however, the protection circuit may produce adverse effects. Anyway, the release time of the Relay may be somewhat prolonged. The following table lists examples of contact protection circuits. Note that even Fully Sealed Relays, when used to break a load that may generate arc (for example, an inductive load such as a Relay coil) in highly humid environments, may generate nitric acid due to the NOx generated by the arc and water content, which may corrode the metallic parts of the Relay, causing the Relay to malfunction. Use a surge suppressor as the one shown in the table on the next page when the Relay is used in highly humid environments to break an arc-generating circuit frequently.

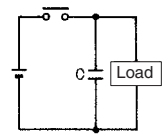
Examples of Surge Suppressors

Circuit example		Applicability		Features and remarks	Element selection
		AC	DC		
CR type		* (OK)	OK	*Load impedance must be much smaller than the RC circuit when the Relay operates on an AC voltage.	Optimum C and R values are: C: 1 to 0.5 uF for 1 A switching current R: 0.5 to 1 ohm for 1 V switching voltage However, these values do not always agree with the optimum values due to the nature of the load and the dispersion in the Relay characteristics. Confirm the optimum values through experiment. Capacitor C suppresses the discharge when the contacts are opened, while resistor R limits the current applied when the contacts are closed the next time. Generally, employ C whose dielectric strength is 200 to 300 V. If the circuit is used with AC power source, employ an AC capacitor (without polarity).
		OK	OK	The release time of the contacts will be delayed when a Relay or solenoid is used as the load. This circuit is effective if connected across the load when the supply voltage is 24 to 48 V. When the supply voltage is 100 to 240 V, connect the circuit across the contacts.	
Diode type		NG	OK	The energy stored in a coil (inductive load) is flowed to the coil as current by the diode connected in parallel with the coil, and is dissipated as Joule heat by the resistance of the inductive load. This type of circuit delays the release time more than the RC type.	Employ a diode having a reverse breakdown voltage of more than 10 times the circuit voltage, and a forward current rating greater than the load current. A diode having a reverse breakdown voltage two or three times that of the supply voltage can be used in an electronic circuit where the circuit voltage is not particularly high.
Diode + Zener diode type		NG	OK	This circuit is effective in an application where the diode type protection circuit alone is not sufficient because the release time is delayed too much.	The breakdown voltage to the Zener diode should be about the same as the supply voltage.
Varistor type		OK	OK	This circuit prevents a high voltage from being applied across the contacts by using the constant-voltage characteristic of a varistor. This circuit also somewhat delays the release time. This circuit is effective if connected across the load when the supply voltage is 24 to 48 V. If the supply voltage is 100 to 240 V, connect the circuit across the contacts.	The cutoff voltage Vc must satisfy the following conditions (on AC, it should be multiplied by 2) Contact dielectric strength > Vc > Supply voltage

Avoid use of a surge suppressor in the manners shown below.



This circuit arrangement is very effective for diminishing sparking (arcing) at the contacts when breaking the circuit. However, since electrical energy is stored in C (capacitor) when the contacts are open, short-circuit current of C flows into the contacts when they are closed. Therefore, metal deposition is likely to occur between mating contacts.



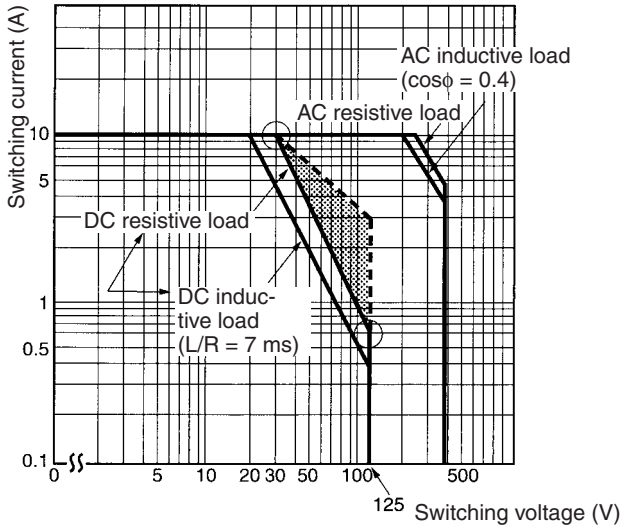
This circuit arrangement is very useful for diminishing sparking (arcing) at the contacts when breaking the circuit. However, since the charging current to C flows into the contacts when they are closed, metal deposition is likely to occur between the mating contacts.

Note: Although it is considered that switching a DC inductive load is more difficult than a resistive load, an appropriate contact protection circuit can achieve almost the same characteristics.

Load Switching

When the Relay is actually used, the switching power, switching lifetime, and switching conditions will vary greatly with the type of load, the ambient conditions, and the applied load. Confirm operation under the actual conditions in which the Relay will be used. The maximum switching powers for the Relays are shown in the following graph.

Maximum Switching Powers



Contacts

Load	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)
Rated load	AC: 250 V, 10 A DC: 30 V, 10 V	AC: 250 V, 7.5 A DC: 30 V, 5 V
Rated carry current	10 A	
Max. switching voltage	380 VAC, 125 VDC	
Max. switching current	10 A	

1. Resistive Loads and Inductive Loads

The switching power for an inductive load will be lower than the switching power for a resistive load due to the influence of the electromagnetic energy stored in the inductive load.

2. Switching voltage

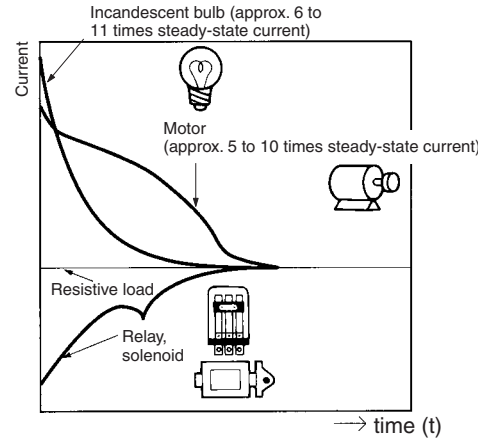
The switching power will be lower with DC loads than it will with AC loads. With DC loads, the switching power will be smaller for higher voltages. Using the values given in the graph *Maximum Values for Switching Power*, the switching power for DC loads at the minimum voltage is $W_{max.}$ = 300 W and at the maximum voltage it is lower, i.e., $W_{max.}$ = 75 W. This difference is the amount that the switching power drops because of the high switching voltage. Applying voltage or current between the contacts exceeding the maximum values will result in the following:

1. The carbon generated by load switching will accumulate around the contacts and cause deterioration of insulation.
2. Contact deposits and locking will cause contacts to malfunction.

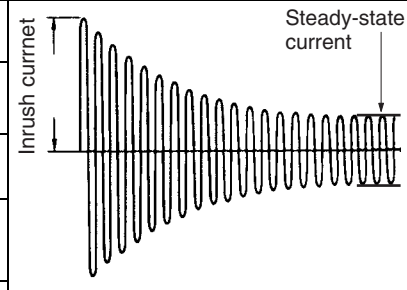
3. Switching current

Current applied to contacts when they are open or closed will have a large effect on the contacts. For example, when the load is a motor or a lamp, the larger the inrush current, the greater the amount of contact exhaustion and contact transfer will be, leading to deposits, locking, and other factors causing the contacts to malfunction. (Typical examples illustrating the relationship between load and inrush current are given below.) If a current greater than the rated current is applied and the load is from a DC power supply, the connection and shorting of arcing contacts will result in the loss of switching capability.

DC Loads and Inrush Current



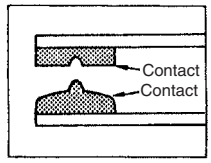
AC Loads and Inrush Current

Type of load	Ratio of inrush current to steady-state current	Waveform
Solenoid	Approx. 10	
Incandescent bulb	Approx. 10 to 15	
Motor	Approx. 5 to 10	
Relay	Approx. 2 to 3	
Capacitor	Approx. 20 to 50	
Resistive load	1	

DC Load Switching

To switch a DC load, the arching can be diminished more accurately by connecting contacts in series because this is equivalent to expanding the contact gap.

In switching a DC load, contact transfer may occur and the contacts may be prevented from releasing by the projection and recess created on the contact surface as shown below.

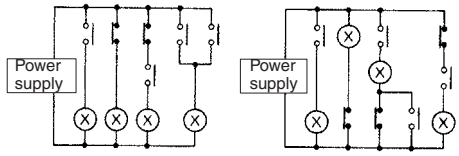


The projection is created because the surface of the contact is virtually spot-welded by the heat generated on the contact surface, and the recess is caused by vaporization and chemical actions. This may happen even when the Relay is used at a load current below the rated current of the Relay. It is therefore important to conduct an experiment to examine if this phenomenon occurs by mounting the Relay in the actual application system.

When the Relay is used to break a DC load, sometimes bluish green substances may be generated in the Relay case. These substances are nitric acid (HNO3) solidified by nitrogen contained in air combining with water content due to the arc discharge that is generated when the contacts are closed and opened. Models MMX and G7X are housed in cases with hole through which the gas is let out to prevent this solidification of nitric acid.

Potential Difference Circuit

In a circuit where the gap between adjacent contacts is small, the power source will be short-circuited if the potential difference exists between the adjacent contacts and the contacts are short-circuited. To prevent the power source from being short-circuited when using, for example, a Multi-pole Contact Relay, perform load connection as in the following figure:

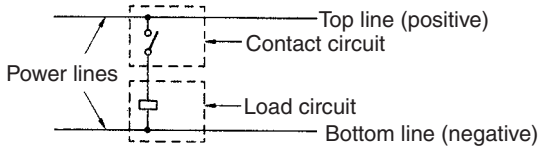


a. Desirable connection b. Undesirable connection

If the voltage of the load circuit is 20 V or less, or if no arc is generated by the switching of the Relay, use of load connection b is possible. Study your intended application carefully to determine whether load connection b can be used.

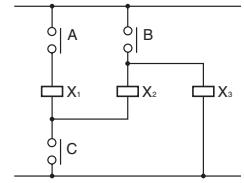
Sneak Circuit

When configuring a sequence circuit, care must be exercised that the circuit does not malfunction due to sneak current. When writing a sequence circuit diagram, it is important that, of the two power lines, the top be considered to be positive and the bottom, to be negative (this does not only apply to a DC circuit but also to an AC circuit), and that contact circuits (such as Relay contacts, timer contacts, and limit switch contacts) be connected to the positive line, while the load circuit (Relay coil, timer coil, magnet coil, solenoid coil, motor, and lamp) be connected to the negative line.



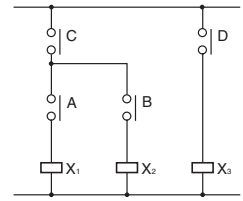
An example of a sneak circuit is shown below. After contacts A, B, and C have been closed, and thus Relays X1, X2, and X3 have operated, when contacts B and C are opened, a series circuit consisting of A, X1, X2, and X3 are formed, causing the Relay to generate beat or not to release.

Incorrect



An example of a correct circuit is shown below. In a DC circuit, the sneak current can be effectively prevented by using diodes.

Correct



■ Notes on Environment

Contact Degradation Due to Environment

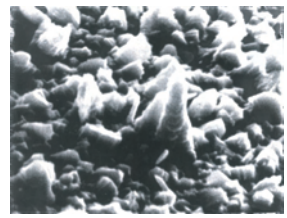
Even if the Relay is not used and just stored, the degradation of the contacts may progress, if the storage environment is not appropriate, due to the influences of the sulfur and chlorine contained in atmosphere. If the Relay is to be stored for such a long period as years, it is recommended to perform a conductivity test when the Relay is actually used, or to use Relays with gold-plated or gold-clad contacts.

Area	Detected elements	Result of observation of contact surface (Ag contact. Left for 12 months)
Chemical plant	Ag, S	Almost uniform and dense corrosive substances were observed on the entire surface of the contacts. As a result of analysis, Ag_2S was detected.
Steal mill	Ag, S	Irregular projections and recesses were observed and pillars of crystal were dispersed. As a result of analysis, Ag_2S was detected.
Highway	Ag, S, Cl	Circular crystal was sporadically observed. Ag_2S was extremely thin at the white portions.

Chemical factory

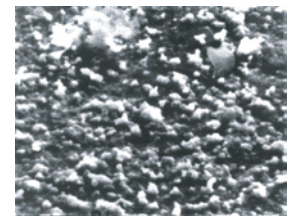
x 5,000

Steel mill



x 5,000

Highway



x 5,000

Electrolytic Corrosion

To prevent electrolytic corrosion, it is better not to ground the ground terminal or mounting stud of Relay. If it must be grounded and used in a high-temperature and high-humidity environment, electrolytic corrosion may occur if the grounding is improper, causing the coil wire to sever. In such a case, perform the grounding as follows:

(1) Ground the positive side of the power supply (see Figs. 1 and 2).

(2) In case the positive side cannot be grounded and therefore, the negative side of the power supply has to be grounded, connect a switch to the positive side so that the coil is connected to the negative side (see Fig. 3).

(3) Grounding the negative side of the power supply and connecting a switch to that side may cause electrolytic corrosion (see Fig. 4). Therefore, avoid such a practice.

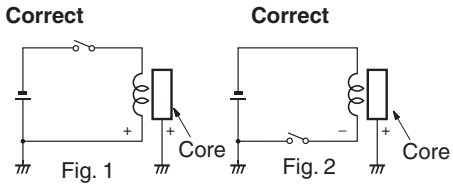


Fig. 1

Fig. 2

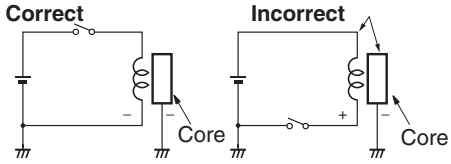


Fig. 3

Influences of External Magnetic Field

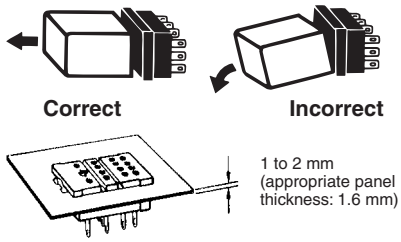
If devices having strong magnetic field, such as transformers and loudspeakers, are placed near these Relays, the characteristics of the Relays may be changed or the Relays may malfunction, though the extent of the characteristic change and malfunction varies depending on the intensity of the external magnetic field.

Installation and Circuit Connections

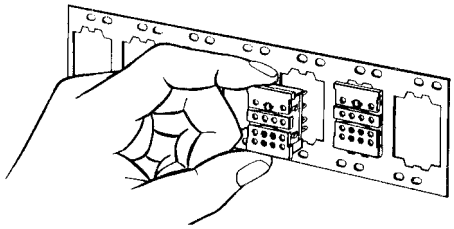
■ Mounting

A mounting direction is not especially specified. However, mount the Relay as much as possible so that vibration or shock is not applied in the moving direction of the contact.
When using a Front-connecting Socket for mounting, secure the Socket on the panel with screws after making the mounting hole on the panel. A Front-connecting Socket that can be snap-mounted on a track 35 mm wide (conforming to DIN) is also available.
The Back-connecting Socket can be snap-mounted on a panel. The recommended panel thickness is 1 to 2 mm.

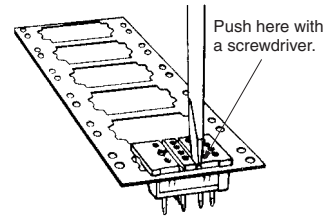
- Insert or remove the Relay into or from the connecting Socket at right angles to the Socket surface. If the Relay is inserted or removed diagonally, the Relay terminals will be bent and cannot be properly contacted or connected to the Socket.



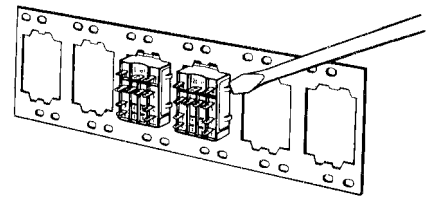
1. Insert the Socket into the cutout mounting hole on the panel from the wiring side.



2. Push the straps of the mounting bracket on the Socket with a flat-bladed screwdriver until all four projections on the two sides of the Socket emerge from the other side (back) of the mounting panel



3. When all four projections come out from the other side (back) of the panel, the connecting Socket is fixed on the panel.
4. To remove the connecting Socket from the mounting panel, lightly push the Socket from behind (wiring side) while holding down each projection in turn with a screwdriver

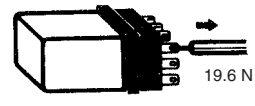


■ Connection

The cross section of a lead wire that is used to connect a Relay differs depending on the load current to be switched by the Relay. The general rule is to use a lead wire having the minimum cross-sectional area, as shown in the following.

Permissible current (A)	Cross-sectional area (mm^2)
2	0.2
3	0.3
5	0.5
7.5	0.75
12.5	1.25
15	2
20	2
30	3.5

- When connecting the lead wire to a Front-connecting Socket with screws, either use an appropriate connecting terminal such as a solderless terminal, or securely tighten the screws. Tighten the screws with a torque of 0.8 to 1.2 N•m.
- Employ lead wires of adequate length so that no excessive force (i.e., 19.6 N or more) is applied to the terminals. Perform the termination properly to prevent short-circuit that may be otherwise caused by stray strands of the lead wire.



Wiring to Sockets for Wirewrap Terminals

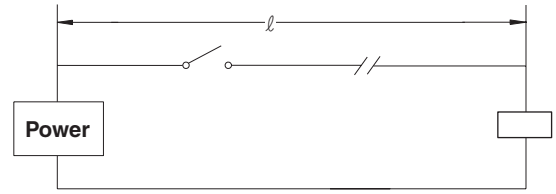
Refer to this table when using Sockets for the wire-wrap terminals.

Type	Wire winding condition	Pit type of wire-wrapping tool	Wire		Lead wire strip length	No. of windings	Standard terminal	Tensile force	Sleeve
			AWG	Diameter					
PY□□QN	With sheathed wire wound once	21-A	26	0.4 mm	43 to 44 (mm)	Approx. 8	1 x 1 mm	3 to 9 (kg)	1-B
		22-A	24	0.5 mm	36 to 37 (mm)	Approx. 6		4 to 13 (kg)	2-B
		23-A	22	0.65 mm	41 to 42 (mm)			4 to 15 (kg)	20-B
PT□□QN	Only wire wound (normal condition)	20-A	20	0.8 mm	37 to 38 (mm)	Approx. 4	1.0 x 1.5 mm	5 to 15 (kg)	

Note: A 0.65-dia. wire can be wound around the Type PY□□QN six times, while a 0.8-dia. wire can be wound around the type PT□□QN four times.

Guide for Cable Length

When the wiring distance "ℓ" from the power supply at the time of driving the Relay is quite long, sufficient voltage may not be applied to the coil. This will be solved by simply setting the power supply voltage higher, but when this is difficult, it will be necessary to assume a limit for the length of the wiring cable in advance as a guide.



Recommended Ohmage of Resistors with MY4 at 110 VAC

Stray capacitance (μF)	0.05 max.	0.05 to 0.15	0.15 to 0.17	0.17 to 0.19	0.19 to 0.23	0.23 to 0.30	0.30 to 0.42	0.42 min.
Ohmage (KΩ)	Not required	7	6	5	4	3	2	1
Watts (W)	---	2	2.5	3	4	5	8	15

Recommended Ohmage of Resistors with MY4 at 200/220 VAC

Stray capacitance (μF)	0.01 max.	0.01 to 0.12	0.12 to 0.14	0.14 to 0.15	0.15 to 0.18	0.18 min.
Ohmage (KΩ) 5W	Not required	8	7	6	5	4
Watts (W)	---	8	9	10	12	15

Note: 1. A CVV cable has a rated thickness of 2 mm^2 (7 strands) and a stray capacity of 0.15 to 0.25 (μF/km).

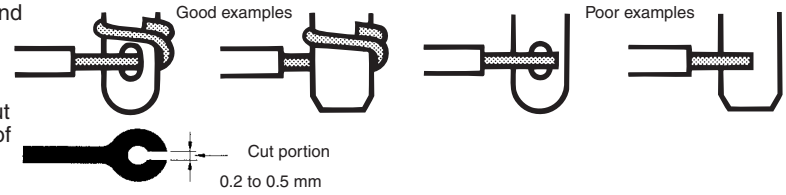
2. The figures given for Watts (W) in the above table are reference values only. Confirm the values with the circuit that is actually used.

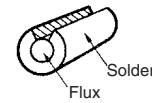
■ Soldering

Solder General-purpose Relays using hand soldering according to the following precautions.

Precautions in the Soldering Process

<table>
<tr><th>Item</th><th>Hand soldering</th></tr>
<tr><td>(1) Terminal connections of leads</td><td>Wrap the lead securely around the Relay terminal.

In Relays with printed circuit board terminals, making a cut in the round pattern portion of the printed circuit board will improve the reliability of the soldering connection without blocking the hole.
 
</td></tr>
<tr><td>(2) Soldering</td><td>After thinning the tip of the soldering iron, solder quickly and completely.
Solder: JIS Z 3282, H60, or H63 with a resin core (rosin type)
Soldering iron: 30 to 60 W
Soldering temperature: 280 to 300°C
Soldering time: Within approximately 3 seconds
The following type is recommended as one example of solder used in hand soldering. As shown in the diagram, a cut is made in the solder to prevent the scattering of the flux.

<table>
<tr><td>Suitable solder diameter</td><td>0.8 to 1.6</td></tr>
<tr><td>SN</td><td>58.8%</td></tr>
<tr><td>Amount of flux contained</td><td>1.67%</td></tr>
<tr><td>Spreading rate</td><td>90%</td></tr>
<tr><td>Storage</td><td>Within 3 months</td></tr>
</table>

</td></tr>
<tr><td>(3) Washing</td><td>Avoid washing as much as possible. Washing is not necessary when a rosin type flux is used.
When washing cannot be avoided, attention must be given to the choice of washing liquid and only the soldered surface should be washed to prevent the liquid from seeping inside the Relay.
Suitable washing liquids: Alcohol type
Undesirable washing liquids: Thinner types, trichlene types, and benzyl alcohol
Fully Sealed Relays can be completely washed. Some Relays use a formed material that provides a chemical-resistant quality; thinner, and trichlene washing liquids can be used with this type of Relay. Refer to the main test for details. When using ultrasonic cleaning, the contacts may stick lightly due to the ultrasonic energy, so this type of cleaning should be done over as short a time as possible. Boiling washes and jet propulsion washes are ideal.</td></tr>
</table>

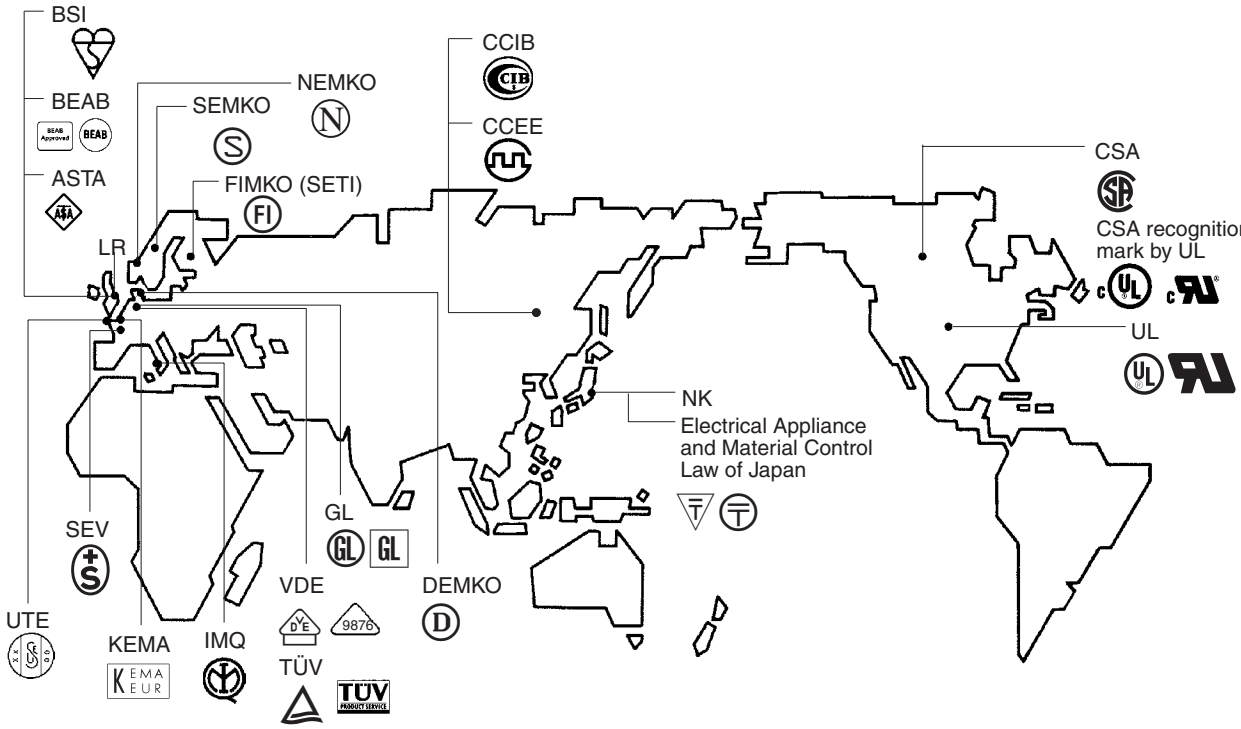
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J138-E1-01 In the interest of product improvement, specifications are subject to change without notice.

Standards

■ National Standards

Note: For detailed information about applicable standards, refer to the relevant catalog.



International Standards

IEC (International Electrotechnical Commission)

The IEC is a standardization commission founded in 1908 to promote unification and coordination of international standards relating to electricity. It is headquartered in Geneva, Switzerland.

IEC standards are provided to accomplish the aim of the above. The IEC strongly recommends all the member nations of the IEC to establish domestic standards that conform with those of the IEC.

At present, there are 50 member nations in the IEC. Based on reports from member nations on the latest science technologies in those nations, IEC standards are issued as technological standards relating to electricity. Established international safety standards provided by various countries and accepted worldwide are based on IEC standards.

In order to simplify approval procedures for electrical devices and promote smooth international trade, there is an international scheme called CB Scheme (Certification Body Scheme), which is authorized by IEC standards. Based on the CB Scheme, safety tests on electrical devices are conducted and certificates are issued if the devices are proved to meet IEC standards. Products issued with such certificates are acceptable in 30 countries in the world.

North America

UL Standards (Underwriters Laboratories INC.)

A nonprofit organization established in 1894 by the American association of fire insurance companies. Underwriters Laboratories (abbreviated to UL hereafter) conducts approval testing on all kinds of electrical products. In many U.S. cities and states, UL approval is legally required on all electrical items sold.
In order to obtain UL approval on an electrical product, all major internal components also require UL approval.

UL offers two classifications of approvals, the listing mark and the recognition mark.

A Listing Mark constitutes a entirely approval of a product. Products display the Listing Mark shown below.

LISTING MARK

The Recognition Mark applies to the components used in a product, and therefore constitutes a more conditional approval of a product. Products display the Recognition Mark shown below.

RECOGNITION MARK

The UL and CSA are unifying their standards with the adoption of a mutual approval system. Furthermore, they are adjusting their standards so that they will be in conformity with IEC standards.

Since October 1992, UL has been approved as a CO (council organization) and TO (test organization) by the SCC (Standard Council of Canada). This authorizes UL to conduct safety tests and certify products conforming to Canadian standards. The above marks are UL marks for products certifying that the products meet Canadian standards.

The designs of the listing marks and recognition marks have been revised as shown below. These marks have been effective since November 1998. The previous marks are valid until November 2007.

LISTING MARKS

	Marks for US	Marks for Canada	Marks for US and Canada
Previous mark			
New mark			

RECOGNITION MARKS

	Marks for US	Marks for Canada	Marks for US and Canada
Previous mark			
New mark			

CSA Standards (Canadian Standards Association)

This association descended from a nonprofit, non-government standardization organization established in 1919. In addition to industrial standardization, the association now carries out safety testing on electrical products.
CSA has closer ties to government agencies than UL, so that electrical products not approved by CSA cannot be sold in Canada. Non-approved goods being sold illegally may have to be withdrawn.

CSA approval is known as “certification,” and consequently, CSA-approved equipment is referred to as “certified equipment.” Products display the mark shown below. For a conditional certification, products display component acceptance mark.

The CSA is adjusting its standards so that they will be in conformity with UL and IEC standards.

CERTIFICATION MARK

China

GB (Guojia Biaozhun) Chinese National Standards

The GB are established Chinese national standards based on IEC standards.

Products such as home electronics appliances (e.g., televisions, washing machines, and microwave ovens), for which GB standards are obligatory, must be approved by CCIB (China Commodity Inspection Bureau) and CCEE (China Commission for Conformity Certification of Electrical Equipment). The marks shown below are respective marks of recognition.

CCIB Mark

CCEE Mark

Shipping Standards

LR (Lloyd's Register of Shipping)

These are the standards of the Lloyd's Register of Shipping, headquartered in London. All of the OMRON control components approved in LR are UMS ships, the unmanned engine-room ship classification in the Lloyd's Register.

Unlike the safety standards such as UL, the devices are checked to ensure that they can function sufficiently under the environmental conditions when they are used in ships.
When a device is approved, Lloyd's Register doesn't apply the passing mark on the product, but includes it on the list of approved products that it publishes every year.

NK (Nippon Kaiji Kyokai)

Nippon Kaiji Kyokai (NK), which was established in 1899 under a different name for the purpose of ensuring the safety of vessels and the maintenance of maritime environmental conditions, has been using the present name since 1946.

Automation equipment and devices receive tests and inspections based on the provisions of the steel-ship regulations and can be formally approved if the tests are passed.

Testing at the production factory can be partially or entirely omitted when automation equipment and devices that have been formally approved are installed on ships.

As a general rule, manufacturers of approved products indicate that the products being shipped have been approved. (It is also acceptable to affix a label to products which require it.)

Japan

Electrical Appliance and Material Control Law of Japan

The EAMCL was substantially revised in July 1995 in conformity with IEC standards, such as IEC335. Consequently, the previously-used symbol for second-grade appliances was abolished while the symbol for first-grade appliances remained unchanged. Furthermore, the range of applicable products has been greatly revised.

	First-grade appliance	Second-grade appliance
Previous symbol	282 products	216 products
Present symbol	165 products	333 products (no markings)

Europe

EN (European Norm) Standards

As part of EC unification, 18 European countries are going to integrate their national safety standards into EN standards. When EN standards come into effect, they shall apply as the unified standards in Europe in place of the current safety standards.

EN standards related to electricity are based on IEC standards and include requirements relating to countermeasures against electric shocks. EN codes consist of the prefix "EN" followed by five figures beginning with the figure 6 (e.g., EN60204).

Industrial products exported to Europe must satisfy IEC standards if the products do not fall under EN standards.

Industrial products exported to European countries from Japan or North America or traded between European countries must satisfy EN standards. Furthermore, 12 types of industrial products, such as machines, low-voltage devices, and EMC equipment, must bear CE markings. CE markings on a product indicate that the product meets safety standards specified by all related EC directives. For example, an industrial machine must satisfy the EC Machinery Directive, Low-voltage Directive (LVD), and EMC requirements.

CE MARKING

The following marks of recognition are used in European countries in accordance with EN standards.

VDE (Verband Deutscher Electroechnischer e.v.) in Germany

VDE (applicable to electrical appliances only)

VDE MARK

MONITORING MARK

TÜV (applicable to electrical appliances, machines, and automobiles)

TÜV Rheinland

TÜV Product Service

DEMKO (Danmarks Elektriske Materielkontrol)

NEMKO (Norges Elektriske Materiellkontroll)

FIMKO (Finlands Material Kontroll)

BSI (British Standards Institution)
Britain (applicable to industrial products)

BEAB (British Electrotechnical Approvals Board)
Britain (applicable to home electronics products)

ASTA (ASTA Certification Services)
Britain (applicable to general products)

KEMA (Keuring van Electrotechnische Materialen Nederland B. V.)

UTE (Union Technique De Electricite)

IMQ (Istituto Italiano del Marchio di Qualita)

SEMKO (Svenska Elektriska Materielkontroll Anstalten)

SEV (Schweizerischer Electrotechnischer Verein)

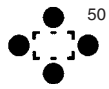
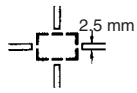
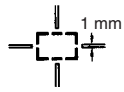
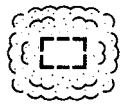
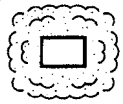
■ Enclosure Ratings

IP - □ □ □
1 2 3

Protection Specification Code (International Protection) (IEC529)

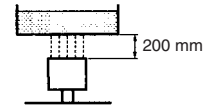
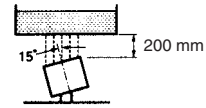
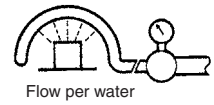
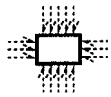
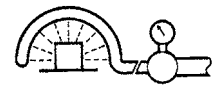
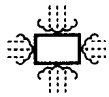
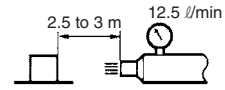
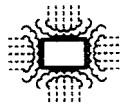
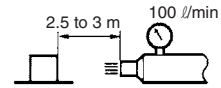
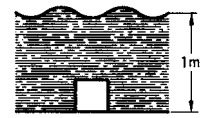
1. IEC Standards (IEC 529)

Protection Against Solid Foreign Objects

Grade	Protection	Criteria
0		No protection
1		Full penetration of 50-mm diameter of sphere not allowed. Contact with hazardous parts not permitted.
2		Full penetration of 12.5-mm diameter of sphere not allowed. The jointed test linger shall have adequate clearance from hazardous parts.
3		The access probe of 2.5-mm diameter shall not penetrate.
4		The access probe of 1.0-mm diameter shall not penetrate.
5	Dust protected 	Limited ingress of dust permitted (no harmful deposit).
6	Dust-tight 	Totally protected against ingress of dust.

2. IEC Standards

Protection Against Harmful Ingress of Water

Grade	Protection	Criteria	Examination method
0	No particular protection	No protection	No test
1	Rain 	Protected against vertically falling drops of water.	Spray water downwards in vertical direction for 10 minutes using a water-dripping test device. 
2	Rain 	Protected against vertically falling drops of water with enclosure tilted 15° from the vertical.	Tilt by 15° and spray water for 10 minutes (2.5 minutes in each direction) using a water-dripping test device. 
3	Rain 	Protected against sprays to 60° from the vertical.	Spray water up to 60° in both directions from the vertical axis for 10 minutes using the test device shown below. 
4	Water splash from all directions 	Protected against water splashed from all directions; limited ingress permitted.	Spray water from all directions for 10 minutes using the test device shown below. 
5	Housing jets from all directions 	Protected against low-pressure jets of water from all directions; limited ingress permitted.	Spray water from all directions for one minute per m^2 of external surface area and for a total time of no less than 3 minutes using the test device shown below.  Discharging nozzle dia.: 6.3
6	Strong hosing jets from all directions 	Protected against strong jets of water, e.g. for use on ship decks; limited ingress permitted.	Spray water from all directions for one minute per m^2 of external surface area and for a total time of no less than 3 minutes using the test device shown below.  Discharging nozzle dia.: 12.5
7	Temporary immersion 	Protected against the effects of immersion between 15 cm and 1 m.	Submerge for 30 minutes at the depth of 1 m (if the device is located lower than 850 mm). 
8	Continuous immersion 	Protected against long periods of immersion under pressure.	Test according to the conditions agreed upon between the manufacturer and user.

3. JEM (Japan Electrical Manufacturers Association Standards) Standards (JEM 1030)

Protection Against Oil

Grade	Protection	Criteria	Criteria
F	Oil proof	Protected against improper operation due to oil drops or spray from any direction.	No penetration of oil to the extent of interfering with proper operation after dropping the specified cutting oil on a test device for 48 hours at a rate of 0.5 ℓ per hour.
G	Oil resistant	Protected against penetration of oil drops or spray from any direction.	No penetration of oil after dropping the specified cutting oil on a test device for 48 hours at a rate of 0.5 ℓ per hour.

NEMA (National Electrical Manufactures Association)

Conversion from NEMA to IEC529 (Reverse conversion is not possible.)

NEMA250	IEC529
1	IP10
2	IP11
3	IP54
3R	IP14
3S	IP54

NEMA250	IEC529
4, 4X	IP56
5	IP52
6, 6P	IP67
12, 12K	IP52
13	IP54

Note: Based on the Appendix A of the NEMA Standard. Classification of the NEMA enclosure rating differs from that of the IEC529 in corrosion resistance, rust resistance, and watertightness.

Models Approved by International Standards

■ VDE

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
G2R-1( )-S	1	5, 6, 9, 12, 18, 24, 48, 60, 100, 110 VDC 12, 18, 24, 48, 50, 100/(110), 110, 120, 200/(220), 220, 230, 240 VAC	10 A 250 VAC (cosϕ = 1.0) 10 A 30 VDC (0 ms)	6166 (VDE0435) (EN60255-1) (EN60255-23) (EN60335-1)
G2R-2-S	2		5 A 250 VAC (cosϕ = 1.0) 5 A 30 VDC (0 ms)	
MY( ) (New model)	2	6, 12, 24, 48, 100/110 125 VDC 6, 12, 24, 48/50, 100/110, 110/120, 200/220, 220/240 VAC	10 A 250 VAC (cosϕ = 1.0) 10 A 30 VDC (0 ms)	112467UG (VDE0435)
	4		5 A 250 VAC (cosϕ = 1.0) 5 A 30 VDC (0 ms)	
LY( )-VD	1	6, 12, 24, 50, 110, 220 VAC 6, 12, 24, 48, 110 VDC	10 A 220 VAC (cosϕ = 1.0) 7 A 220 VAC (cosϕ = 0.4) 10 A 28 VDC (0 ms) 7 A 28 VDC (40 ms)	9903, 9947 (VDE0435)
	2		7 A 220 VAC (cosϕ = 1.0) 4 A 220 VAC (cosϕ = 0.4) 7 A 28 VDC (0 ms) 4 A 28 VDC (40 ms)	
G7S-4A2B G7S-3A3B	6	24 VDC	6 A 240 VAC (cosϕ = 1.0)	6611 (VDE0435) (IEC255) (prEN50205)

Socket

Model	Contact rating	File No.
P7S-14F	6 A, 250 VAC	No. 6611 (VDE0627)

■ TÜV

PCB Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
G7L-1A-P	SPST-NO	6, 12, 24, 48, 100, 110, 200, 220 VDC 12, 24, 50, 100 to 120, 200 to 240 VAC	20 A 240 VAC (cosϕ = 1.0) 20 A 240 VAC (cosϕ = 0.4)	R9051158 (VDE0435) (IEC255) (IEC950) (EN60950)
G7L-2A-P	DPST-NO		20 A 240 VAC (cosϕ = 1.0) 20 A 240 VAC (cosϕ = 0.4)	

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
G2A-□	4PDT	6, 12, 24, 50, 100/110 VAC 6, 12, 24, 48, 100 VDC	0.3 A 110 VAC (cosϕ = 1.0)	T9251326 (IEC255)
G2AK-□	2DPDT	6, 12, 24, 50, 100 VAC 6, 12, 24, 48 VDC		
MK-I/-S	2 3	6, 12, 24, 48, 100, 110 VDC 6, 12, 24, 48, 100, 110 200, 220, 240 VAC	10 A 250 VAC (cosϕ = 0.1) 10 A 28 VDC 7 A 250 VAC (cosϕ = 0.4)	R9051410 (VDE0435) (IEC255) (EN60950)
G4F-( )-TU	1	5 to 100 VDC	15 A 250 VAC (cosϕ = 1.0) 10 A 250 VAC (cosϕ = 0.4) 20 A 250 VAC (cosϕ = 1.0) 15 A 250 VAC (cosϕ = 0.4)	R9151218 (IEC255) (EN60335-1) (VDE0435)
G7L-1A-B□	SPST-NO	6, 12, 24, 48, 100, 110, 200, 220 VDC 12, 24, 50, 100 to 120, 200 to 240 VAC	30 A 240 VAC (cosϕ = 1.0) 25 A 240 VAC (cosϕ = 0.4) 30 A 120 VAC (cosϕ = 0.4)	R9051158 (VDE0435) (IEC255) (IEC950) (EN60950)
G7L-2A-B□	DPST-NO		25 A 240 VAC (cosϕ = 1.0) 25 A 240 VAC (cosϕ = 0.4)	
G7L-1A-T□	SPST-NO		25 A 240 VAC (cosϕ = 1.0) 25 A 240 VAC (cosϕ = 0.4)	
G7L-2A-T□	DPST-NO		25 A 240 VAC (cosϕ = 1.0) 25 A 240 VAC (cosϕ = 0.4)	
MY-□	2 3 4	6 to 125 VDC 6 to 240 VAC	MY2-02, F 5 A 250 VAC (cosϕ = 1.0) 2 A 250 VAC (cosϕ = 0.4) MY3 series 3 A 250 VAC (cosϕ = 1.0) 0.8 A 250 VAC (cosϕ = 0.4) MY4(Z)-02, F 3 A 250 VAC (cosϕ = 1.0) 0.8 A 250 VAC (cosϕ = 0.4)	R9151389 (IEC255) (EN60950) (EN60355-1)
LY-□	1 2 3 4	6 to 125 VDC 6 to 240 VAC	LY1, LY1-FD 15 A 110 VAC (cosϕ = 1.0) 10 A 110 VAC (cosϕ = 0.4) LY2, LY2-FD, LY3, LY3-FD, LY4, LY4-FD 10 A 110 VAC (cosϕ = 1.0) 7.5 A 110 VAC (cosϕ = 0.4)	R9251226 (IEC255)
G4B-( )	1	5, 6, 9, 12, 24, 48, 100, 110, 120 VDC 6, 12, 24, 100, 120, 200, 220 VAC	15 A 250 VAC (cosϕ = 1.0) 10 A 250 VAC (cosϕ = 0.4)	R9650822 (VDE0435)
G2R-1( )-S	1	5 to 110 VDC 5 to 240 VAC	10 A 250 VAC (cosϕ = 1.0) 10 A 30 VDC (0 ms)	R9151251 (IEC 255) (VDE 0435)
G2R-2-S	2		5 A 250 VAC (cosϕ = 1.0) 5 A 30 VDC (0 ms)	

■ UL

PCB Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
G7L-1A-P	SPST-NO	12 to 240 VAC 5 to 220 VDC	20 A 277 VAC (Resistive) 20 A 277 VAC (General Use) 20 A 120 VAC (General Use) 1.5 kW 120 VAC (Tungsten) 1.5 HP 120 VAC 3 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-10 120 VAC	E41643 (UL508) (UL1950)
G7L-2A-P	DPST-NO	12 to 240 VAC 5 to 220 VDC	20 A 277 VAC (Resistive) 20 A 277 VAC (General Use) 20 A 120 VAC (General Use) 1.3 kW 120 VAC (Tungsten) 1 HP 120 VAC 2 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-8 120 VAC	

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MY( ) (New model)	2	6 to 240 VAC 6 to 125 VDC	10 A 30 VDC (General Purpose) 10 A 250 VAC (General Purpose)	E41515 (UL508)
	4		5 A 30 VDC (General Purpose) 5 A 250 VAC (General Purpose)	
MY( )	2 3	6 to 240 VAC 6 to 125 VDC	5 A 28 VDC (Resistive) 5 A 240 VAC (General Use)	E41515 (UL508)
	4		5 A 240 VAC (General Use) between contacts of same polarity 5 A 28 VDC (Resistive) between contacts of same polarity	
LY( )	1	6 to 240 VAC 6 to 125 VDC	15 A 30 VDC (Resistive) 15 A 240 VAC (Resistive) TV-5 120 VAC (TV rating) 1/2 HP 120 VAC	E41643 (UL508)
	2		15 A 120 VAC (Resistive) 15 A 30 VAC (Resistive) 1/2 HP 120 VAC TV-3 120 VAC (TV rating)	
	3 4		10 A 30 VDC (Resistive) 10 A 240 VAC (General Use) 1/3 HP 240 VAC	
G2R-1( )-S	1	5 to 240 VAC 5 to 110 VDC	10 A, 30 VDC (Resistive) 10 A, 250 VAC (General Use) TV-3 (NO contact only)	E41515 (UL508)
G2R-2-S	2		5 A, 30 VDC (Resistive) 5 A, 250 VAC (General Use) TV-3 (NO contact only)	
G2A-( )-US	4PDT	6 to 125 VAC 6 to 120 VDC	1 A 120 VDC (General Use) 1 A 30 VDC (General Use)	E41515 (UL478) (UL1950)
G2A-434A-US G2A-4341P-US	4PDT	6 to 120 VAC 6 to 120 VDC	1 A 120 VDC (General Use) 1 A 30 VDC (General Use)	
G2AK-( )	DPDT	6 to 100 VDC 6 to 50 VAC	1 A 120 VAC (General Use) 1 A 30 VDC (General Use)	
MK-I/-S	2 3	6 to 240 VAC 6 to 110 VDC	10 A 250 VAC (Resistive) 10 A 28 VDC (Resistive) 7 A 250 VAC (General Use)	E41515 (UL508)

Model	Number of poles	Coil ratings	Contact ratings	File No.
G7L-1A-T( ) G7L-1A-B( )	SPST-NO	12 to 240 VAC 5 to 220 VDC	30 A 277 VAC (Resistive) 25 A 277 VAC (General Use) 30 A 120 VAC (General Use) 1.5 kW 120 VAC (Tungsten) 1.5 HP 120 VAC 3 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-10 120 VAC	E41643 (UL508) (UL1950)
G7L-2A-T( ) G7L-2A-B( )	DPST-NO	12 to 240 VAC 5 to 220 VDC	25 A 277 VAC (Resistive) 25 A 277 VAC (General Use) 25 A 120 VAC (General Use) 1.3 kW 120 VAC (Tungsten) 1 HP 120 VAC 2 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-8 120 VAC	E41643 (UL508) (UL1950)
G4F( )-US	1	5 to 100 VDC	15 A 250 VAC (Resistive) 15 A 30 VDC (Resistive) 10 A 250 VAC (General Use) 12FLA 150 VAC, 72LRA 150 VAC 10FLA 240 VAC, 60LRA 240 VAC 15FLA 120 VAC, 90LRA 120 VAC	E41643 (UL508) (UL484)
G4B-( )-US	1	6 to 240 VAC 6 to 120 VDC	15 A 28 VDC (Resistive) 15 A 120 VAC (General Use) 10 A 240 VAC (General Use) 1 HP 120 VAC TV-5 120 VAC	E41643 (UL508) (UL923)
G7J-( )-P G7J-( )-B G7J-( )-T	4PST-NO, 3PST-NO/ SPST-NC, DPST-NO/ DPST-NC	24 to 240 VAC 6 to 110 VDC	NO contact: 25 A 277 VAC (Resistive) 25 A 120 VAC (General Use) 25 A 277 VAC (General Use) 1.5 kW 120 VAC (Tungsten) 1.5 HP 120 VAC 3 HP 240/265/277 VAC 3-phase 3 HP 240/265/277 VAC 3-phase 5 HP 240/265/277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 277 VAC TV-10 120 VAC 25 A 30 VDC (Resistive) NC contact: 8 A 277 VAC (Resistive) 8 A 120 VAC (General Use) 8 A 277 VAC (General Use) 8 A 30 VDC (Resistive)	E41643 (UL508) (UL1950)
G7T-1122S	SPST-NO	12 to 125 VDC 24 to 240 VAC	1 A 125 VAC (Resistive) 1 A 125 VDC (Resistive) 5 A 30 VDC (Resistive) 1 A 250 VAC (General Purpose)	E41463 (UL508)
G7T-1112S	SPST-NO		5 A 125 VAC (Resistive) 5 A 250 VAC (General Use) 10 A 250 VAC (General Use) 10 A 30 VDC (Resistive) 1/2 HP 240 VAC	
G7S-4A2B	4PST-NO/ DPST-NC	24 VDC	6 A per pole, 20 A total 277 VAC (Resistive)	E41515 (UL508)
G7S-3A3B	3PST-NO/ 3PST-NC			

Safety Relay Unit

Model	Number of poles	Coil ratings	Contact ratings	File No.
G9S-200( )	DPST-NO	24 VDC	5 A 240 VAC (Resistive)	E95399
G9S-301	3PST-NO SPST-NC	24 VDC 24, 100, 120, 200, 240 VAC		
G9S-501	5PST-NO SPST-NC			
G9S-321-T( )	3PST-NO SPST-NC 2PST-NO (delay)			

Terminal Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
G6B-4( )	4	3 to 24 VDC	5 A 250 VAC (General Use) 5 A 30 VDC (Resistive) 1/6 HP 250 VAC 1/8 HP 250 VAC 360 WT 120 VAC (Tungsten) 250 VA 125 VAC (Pilot Duty) 250 VA 250 VAC (Pilot Duty) 26.4 VA 30 VDC (Pilot Duty) 530 VA 20 to 265 VAC (Pilot Duty) TV-2 120 VAC	E41643 (UL508)
G6B-47( )	4	3 to 24 VDC	8 A 250 VAC (General Use) 8 A 30 VDC (Resistive) 1/6 HP 250 VAC 1/8 HP 250 VAC 360 WT 120 VAC (Tungsten) 250 VA 125 VAC (Pilot Duty) 26.4 VA 30 VDC (Pilot Duty) 530 VA 20 to 265 VAC (Pilot Duty) TV-2 120 VAC	
G6D-F4B	4	12, 24 VDC	5 A 250 VAC (Resistive) 5 A 30 VDC (Resistive)	E87929 (UL508)
G3DZ-F4B	4	12, 24 VDC	0.3 A 3 to 264 VAC (Resistive) 0.3 A 3 to 125 VDC (Resistive)	

Sockets

Model	Contact ratings	File No.
PF083A PF113A	10 A 250 V	E87929
8PFA 8PFA1 11PFA 14PFA	7.5 A 250 V	
PY□ PYF□A PYF□A-E PYF□A-N	7 A 250 V	
PT08 PTF08A PTF08A-E	15 A 250 V	
PT11 PT14 PTF11A PTF14A PTF14A-E	10 A 250 V	
P2CF-08 P2CF-11	10 A 250 VAC	
P3G-08	6 A 250 VAC	
P3GA-11	6 A 250 VAC	
PL08 PL11 PLE08-0 PLE11-0	10 A 260 V	
P6B-06	8 A 250 VAC	
P6B-26P	5 A 250 VAC	
P6C	10 A 250 VAC	
P2R(F)-05, P2RF-05-E	10 A 300 VAC	
P2R(F)-08, P2RF-08-E	5 A 300 VAC	
P7S-14F	6 A 277 VAC	E87929 (UL508)

■ CSA

PCB Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
G7L-1A-P	SPST-NO	12 to 240 VAC 5 to 220 VDC	20 A 277 VAC (Resistive) 20 A 277 VAC (General Use) 20 A 120 VAC (General Use) 1.5 kW 120 VAC (Tungsten) 1.5 HP 120 VAC 3 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-10 120 VAC	LR35535 (CSA C22.2 (No.0, No.14, No.950))
G7L-2A-P	DPST-NO	12 to 240 VAC 5 to 220 VDC	20 A 277 VAC (Resistive) 20 A 277 VAC (General Use) 20 A 120 VAC (General Use) 1.3 kW 120 VAC (Tungsten) 1 HP 120 VAC 2 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-8 120 VAC	LR35535 (CSA C22.2 (No.0, No.14, No.950))

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MY( ) (New model)	2	6 to 240 VAC 6 to 125 VDC	10 A 30 VDC 10 A 250 VAC	LR31928 (CSA C22.2 (No.14))
	4		5 A 30 VDC between contacts of same polarity 5 A 250 VAC between contacts of same polarity	
MY( )	2 3	6 to 240 VAC 6 to 125 VDC	5 A 28 VDC (Resistive) 5 A 240 VAC (General Use)	LR31928 (CSA C22.2 (No.14))
	4		5 A 240 VAC (General Use) between contacts of same polarity 5 A 28 VDC (Resistive) between contacts of same polarity	
LY( )	1	6 to 240 VAC 6 to 125 VDC	15 A 30 VDC (Resistive) 15 A 120 VAC (General Use) TV-5 120 VAC 1/2 HP 120 VAC	LR31928 (CSA C22.2 (No.14))
	2		15 A 120 VAC (Resistive) 15 A 30 VAC (Resistive) 1/2 HP 120 VAC TV-3 120 VAC	
	3 4		10 A 30 VDC (Resistive) 10 A 240 VAC (General Use) 1/3 HP 240 VAC	
MK-I/-S	2 3	6 to 240 VAC 6 to 110 VDC	10 A 250 VAC (Resistive) 10 A 28 VDC (Resistive) 7 A 250 VAC (General Use)	LR35535 (CSA C22.2 (No.0, No.14))

Model	Number of poles	Coil ratings	Contact ratings	File No.
G7J-( )-B G7J-( )-T	4PST-NO, 3PST-NO/ DPST-NC, DPST-NO/ DPST-NC	24 to 240 VAC 6 to 110 VDC	NO contact: 25 A 277 VAC (Resistive) 25 A 120 VAC (General Use) 25 A 277 VAC (General Use) 1.5 kW 120 VAC (Tungsten) 1.5 HP 120 VAC 3 HP 240/265/277 VAC 3-phase 3 HP 240/265/277 VAC 3-phase 5 HP 240/265/277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 277 VAC TV-10 120 VAC 25 A 30 VDC (Resistive)	LR35535 (CSA C22.2 No.14, No.950)
			NC: 8 A 277 VAC (Resistive) 8 A 120 VAC (General Use) 8 A 277 VAC (General Use) 8 A 30 VDC (Resistive)	
G7L-1A-T( ) G7L-1A-B( )	SPST-NO	12 to 240 VAC 5 to 220 VDC	30 A 277 VAC (Resistive) 25 A 277 VAC (General Use) 30 A 120 VAC (General Use) 1.5 kW 120 VAC (Tungsten) 1.5 HP 120 VAC 3 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-10 120 VAC	LR35535 (CSA C22.2 No.0, No.14, No.950)
G7L-2A-T( ) G7L-2A-B( )	DPST-NO	12 to 240 VAC 5 to 220 VDC	25 A 277 VAC (Resistive) 25 A 277 VAC (General Use) 25 A 120 VAC (General Use) 1.3 kW 120 VAC (Tungsten) 1 HP 120 VAC 2 HP 277 VAC 20FLA/120LRA 120 VAC 17FLA/102LRA 265 VAC TV-8 120 VAC	
G4F( )-US	1	5 to 100 VDC	15 A 250 VAC (Resistive) 15 A 30 VDC (Resistive) 1 HP 125/250 VAC TV-3 AC	LR35535 (CSA C22.2 No.0, No.14)
G4B-( )-US	1	6 to 240 VDC 6 to 120 VDC	15 A 28 VDC (Resistive) 15 A 120 VAC (General Use) 10 A 240 VAC (General Use) 1 HP 120 VAC TV-5 AC 120 VAC	LR31928 (CSA C22.2 No.0, No.14)
G7T-1122S	SPST-NO	12 to 125 VDC 24 to 240 VDC	1 A 125 VAC (Resistive) 1 A 125 VDC (Resistive) 5 A 30 VDC (Resistive) 1 A 250 VAC (General Purpose)	LR31928
G7T-1112S	SPST-NO		5 A 125 VAC (Resistive) 5 A 250 VAC (General Use) 10 A 250 VAC (General Use) 10 A 30 VDC (Resistive) 1/2 HP 240 VAC	
G7S-4A2B	4PST-NO/ DPST-NC	24 VDC	6 A per pole, 20 A total 277 VAC (Resistive)	LR35535 (CSA C22.2)
G7S-3A3B	3PST-NO/ 3PST-NC			

Safety Relay Unit

Model	Number of poles	Coil ratings	Contact ratings	File No.
G9S-200( )	DPST-NO	24 VDC	5 A 240 VAC (Resistive)	LR35535
G9S-301	3PST-NO SPST-NC	24 VDC 24, 100, 120, 200, 240 VAC		
G9S-501	5PST-NO SPST-NC			
G9S-321-T( )	3PST-NO SPST-NC 2PST-NO (delay)			

Terminal Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
G6B-4( ) G6B-47( )	4	3 to 24 VDC	5 A 250 VAC (General Use) 5 A 30 VDC (General Use) 1/6 HP 250 VAC 1/8 HP 250 VAC 360 WT 120 VAC (Tungsten) 250 VA 125 VAC (Pilot Duty) 250 VA 250 VAC (Pilot Duty) 26.4 VA 30 VDC (Pilot Duty) 530 VA 20 to 265 VAC (Pilot Duty)	LR31928 (CSA C22.2 No. 0, No. 14)
G6D-F4B	4	12, 24 VDC	5 A 250 VAC (Resistive) 5 A 30 VDC (Resistive)	LR35535 (CSA C22.2 No. 14)
G3DZ-F4B	4	12, 24 VDC	0.3 A 3 to 264 VAC (Resistive) 0.3 A 3 to 125 VDC (Resistive)	

Sockets

Model	Contact ratings	File No.
PF083A PF113A	10 A, 250 V	LR31928
8PFA 8PFA1 11PFA 14PFA	7.5 A, 250 V	
PY□ PYF□A PYF□A-E PYF□A-N	7 A, 250 V	
PT08	15 A, 250 VAC	
PT11 PT14	10 A, 250 VAC	
PTF08A PTF08A-E	15 A, 240 VAC	
PTF11A PTF14A PTF14A-E	10 A, 240 VAC	
P2CF-08 P2CF-11	10 A, 250 VAC	LR22310
P3G-08 P3G-11	6 A, 250 VAC	
P3GA-11	6 A, 250 VAC	
PL08 PL11	10 A, 260 VAC	LR31928
P6B-06	8 A, 250 VAC	
P6B-26P	5 A, 250 VAC	
P6C	10 A, 250 VAC	
P2R(F)-05, P2RF-05-E	10 A, 300 VAC	
P2R(F)-08, P2RF-08-E	8 A, 300 VAC	
P7S-14F	6 A per pole, 20 A total 277 VAC	LR35535

■ SEV

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MY( ) (New model)	2	6 to 240 VAC 6 to 125 VDC	10 A 250 VAC 10 A 30 VDC	99.5 50902.01
	4		5 A 250 VAC 5 A 30 VDC	
MY( )	2 to 4	6 to 240 VAC 6 to 125 VDC	5 A 240 VAC1 5 A 28 VDC1	96.5 50869.01
LY( )	1	6 to 220 VAC 6 to 100 VDC	15 A 220 VAC1 15 A 24 VDC1	98.5 50071.02
	2 to 4	6 to 220 VAC 6 to 100 VDC	10 A 220 VAC1 10 A 24 VDC1	
G2R-1( )-S	1	5 to 240 VAC 5 to 110 VDC	10 A 250 VAC1 5 A 250 VAC3 10 A 30 VDC1	94.5 5143.01
G2R-2-S	2		5 A 250 VAC1 2 A 380 VAC1 5 A 30 VDC1	
MK-I/-S	2 3	6 to 240 VAC 6 to 110 VDC	10 A 250 VAC (N.O.) (cosϕ=1) 5 A 250 VAC (N.O.) (cosϕ=1) 10 A 28 VDC (N.O.) 5 A 28 VDC (N.C.) 7 A 250 VAC (cosϕ=0.4)	93.1 00981.02

■ SEMKO

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MK-I/-S	2 3	6 to 240 VAC 6 to 110 VDC	10 A 250 VAC (N.O.) (cosϕ=1) 5 A 250 VAC (N.O.) (cosϕ=1) 10 A 28 VDC (N.O.) 5 A 28 VDC (N.C.) 7 A 250 VAC (cosϕ=0.4)	9022267

■ DEMKO

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MK-I/-S	2 3	6 to 240 VAC 6 to 110 VDC	10 A 250 VAC (N.O.) (cosϕ=1) 5 A 250 VAC (N.O.) (cosϕ=1) 10 A 28 VDC (N.O.) 5 A 28 VDC (N.C.) 7 A 250 VAC (cosϕ=0.4)	92321

■ NEMKO

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MK-I/-S	2 3	6 to 240 VAC 6 to 110 VDC	10 A 250 VAC (N.O.) (cosϕ=1) 5 A 250 VAC (N.O.) (cosϕ=1) 10 A 28 VDC (N.O.) 5 A 28 VDC (N.C.) 7 A 250 VAC (cosϕ=0.4)	686798

■ KEMA

General Purpose Relays

Model	Coil ratings	Contact ratings	File No.
G7J-4A-B-KM G7J-4A-P-KM G7J-2A2B-B-KM G7J-2A2B-P-KM	200/240 VAC	Normally Open	93.9866.02-KCS
		AC1 class: 25 A 220 VAC 11.5 A 380 to 480 VAC AC3 class: 11.5 A 220 VAC 8.5 A 380 to 480 VAC	
G7J-3A1B-B-KM G7J-3A1B-P-KM	6, 12, 24, 48, 100 VDC 24, 50, 100/120, 200/240 VAC		

■ BIA

Safety Relay Units

Model	Number of poles	Coil ratings	Contact ratings	File No.
G9S-200( )	DPST-NO	24 VDC	5 A 240 VAC (Resistive)	R974021 (EN60204-1) (EN954-1)
G9S-301	3PST-NO/SPST-NC	24 VDC 24, 100, 120, 200, 240 VAC		
G9S-501	5PST-NO/SPST-NC			
G9S-321-T( )	3PST-NO/SPST-NC + DPST-NO (OFF-delay form)			

■ IMQ

General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MY( ) (New model)	2	6, 12, 24, 48/50, 100/110, 110/120, 200/220, 220/240 VAC 6, 12, 24, 48, 100/110, 125 VDC	10 A, 30 VDC 10 A, 250 VAC	EN013 to 016
	4		5 A, 250 VAC 5 A, 30 VDC	

■ LR

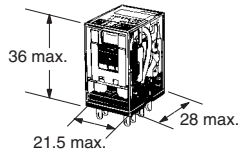
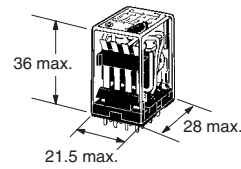
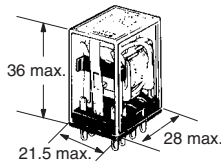
General Purpose Relays

Model	Number of poles	Coil ratings	Contact ratings	File No.
MY ( ) (New model)	2	6 to 240 VAC 6 to 125 VDC	10 A 250 VAC (Resistive) 2 A 250 VAC (PF 0.4) 10 A 30 VDC (Resistive) 2 A 30 VDC (7 ms)	98/10014
	4		5 A 250 VAC (Resistive) 0.8 A 250 VAC (PF 0.4) 5 A 30 VDC (Resistive) 1.5 A 30 VDC (7 ms)	
MY ( )	2	6 to 240 VAC 6 to 120 VDC	2 A 30 VDC (General Use) 2 A 200 VAC (General Use)	90/10270
	4		1.5 A 30 VDC (General Use) 0.8 A 200 VAC (General Use) 1.5 A 115 VAC (General Use)	
LY ( )	2, 4	6 to 240 VAC 6 to 110 VDC	7.5 A 230 VAC (cosϕ=0.4) 5 A 24 VDC (L/R=7 ms)	90/10269
MK2 (P)	2	6 to 240 VAC 6 to 200 VDC	7.5 (5) A 220 VAC (Resistive Load) 5 (3) A 24 VDC (Resistive Load) 3 (2) A 220 VAC (Inductive Load) 4 (2.5) A 24 VDC (Inductive Load)	91/0221
MK3 (P)	3		5 (3) A 220 VAC (Resistive Load) 3 (2) A 24 VDC (Resistive Load) 2 (1.2) A 220 VAC (Inductive Load) 2.5 (1.5) A 24 VDC (Inductive Load)	
MK□Z (P)	2, 3		3 A 220 VAC (Resistive Load) 2 A 24 VDC (Resistive Load) 1.2 A 220 VAC (Inductive Load) 1.5 A 24 VDC (Inductive Load)	
MM□ (B)	2, 3, 4	6 to 240 VAC 6 to 220 VDC	15 A 220 VAC (General Use) 10 A 24 VDC (General Use)	91/0219
MM□X (B)			10 A 110 VDC (Resistive Load) 7 A 110 VDC (Inductive Load)	
MM□P			7.5 A 220 VAC (General Use) 5 A 24 VDC (General Use)	
MM□XP			7 A 110 VDC (Resistive Load) 6 A 110 VDC (Inductive Load)	
MM□K (B)	2, 3, 4	6 to 200 VAC 6 to 220 VDC	10 A 220 VAC (General Use) 7 A 24 VDC (General Use)	91/0220
MM□XK (B)			7 A 110 VDC (Resistive Load) 6 A 110 VDC (Inductive Load)	
MM□KP			5 A 220 VAC (General Use) 4 A 24 VDC (General Use)	
MM□XKP			5 A 110 VDC (General Use)	
MYA (Excluding -LA12 and -LB12)	---	6 to 240 VAC 6 to 125 VDC	220 VAC 3 A (cosϕ=1) 220 VAC 0.8 A (cosϕ=0.4) 24 VDC 3 A (L/R=0 ms) 24 VDC 1.5 A (L/R=7 ms)	90/10035

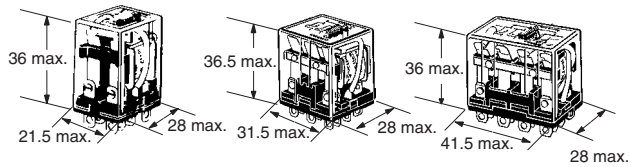
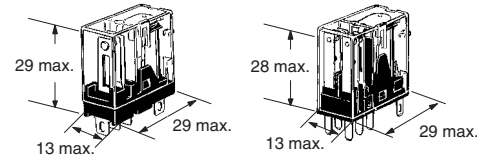
OMRON

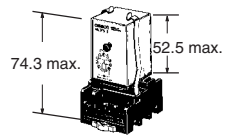
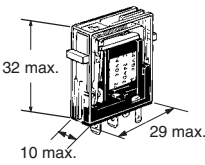
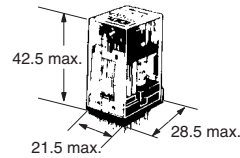
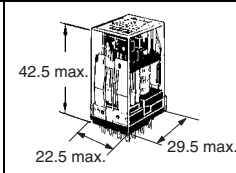
General-purpose Relays and Power Relays

Selection Guide

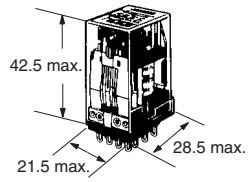
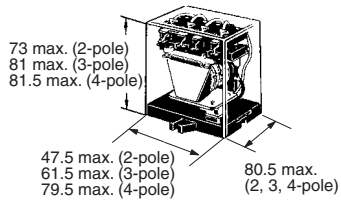
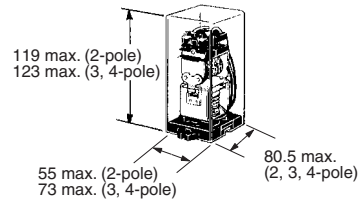
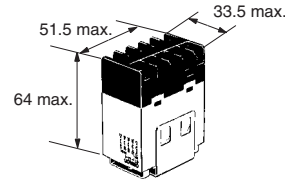
Classification		Control Panel Relay											
Model		**MY** **New model**			**MY3, MY□-02, MY□F**							**MYK** Latching type	
Appearances													
Features		Versatile relay, ideal for power and sequence control applications, meets many other application requirements.			Versatile relay, ideal for power and sequence control applications, meets many other application requirements.							Magnetic latching relay ideal for memory and data transmission circuits.	
Contact ratings	**Contact form**	DPDT	4PDT		DPDT	3PDT	4PDT					DPDT	
	Mechanism	Single	Single	Bifurcated	Single	Single			Bifurcated			Single	
	Material	Ag	Au-clad+Ag		Ag	Ag	Au-Plated+Ag					Au-Plated+Ag	
	Rated load* (Resistive load)	5 A at 250 VAC/ 30 VDC	3 A at 250 VAC/ 30 VDC		5 A at 220 VAC/ 24 VDC		3 A at 220 VAC/ 24 VDC					3 A at 220 VAC/ 24 VDC	
	Max. switched current	10 A	5 A		5 A		3 A					3 A	
	Failure rate (reference value)	1 mA at 5 VDC	1 mA at 1 VDC	100 μA at 1 VDC	1 mA at 5 VDC		1 mA at 1 VDC		100 μA at 1 VDC			1 mA at 1 VDC	
Coil ratings	**Rated voltage**	6 to 100/110 VDC 6 to 220/240 VAC			6 to 100/110 VDC 6 to 220/240 VAC							6 to 24 VDC 6 to 100 VAC	
	Power consumption (approx.)	0.9 W (DC) 0.9 to 1.2 VA (AC)			0.9 W (DC) 0.9 to 1.2 VA (AC)							Set: 1.3 W (DC) 0.6 to 0.9 VA (AC) Reset: 0.6 W (DC) 0.2 to 0.5 VA (AC)	
Endurance	**Mechanical**	50 x 10^6 (AC), 100 x 10^6 (DC)		20 x 10^6	50 x 10^6 (AC) 100 x 10^6 (DC)				20 x 10^6			100 x 10^6	
	Electrical	500 x 10^3	200 x 10^3	100 x 10^3	500 x 10^3	500 x 10^3	200 x 10^3		100 x 10^3			200 x 10^3	
Dielectric strength	**Between coil and contacts**	2,000 VAC for 1 min.			2,000 VAC for 1 min.							1,500 VAC for 1 min.	
	Between contacts of different polarities	2,000 VAC for 1 min.			2,000 VAC for 1 min.							1,500 VAC for 1 min.	
	Between contacts of same polarity	1,000 VAC for 1 min.			1,000 VAC for 1 min.							1,000 VAC for 1 min.	
	Between set and reset coil	---			---							1,000 VAC for 1 min.	
Ambient temperature		–55°C to 70°C			–55°C to 70°C							–55°C to 60°C	
Function		• Mechanical indicator • LED indicator • Built-in diode • Built-in CR • Test button • Arc barriers			• LED indicator • Built-in diode • Arc barriers							• Latching • Mechanical indicator	
Sealing		• Cased (unsealed)			• Cased (unsealed)							• Cased (unsealed)	
Terminal construction**													
Approved standards												---	
Page		49			62							74	

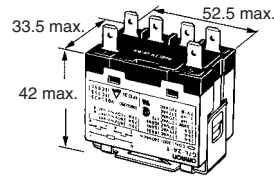
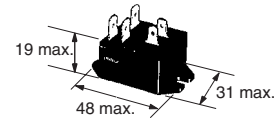
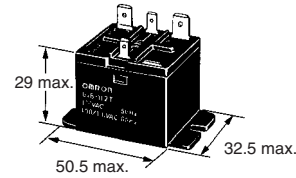
* Numbers in parentheses apply to cased (unsealed) types.
** denotes PCB terminal, plug-in (octal-pin) terminal, plug-in/solder terminal, quick-connect terminal, and screw terminal.

<table>
<tr><th colspan="10">Control Panel Relay</th></tr>
<tr><th colspan="6">LY</th><th colspan="4">G2RS</th></tr>
<tr><td colspan="6"> 
</td><td colspan="4"> 
</td></tr>
<tr><td colspan="6">Compact, general-purpose 15-A and 10-A relays ideal for many applications.</td><td colspan="4">Reliable and unique test button models now available.
High switching power (1 pole: 10 A).
Highly functional socket also available.</td></tr>
<tr><td>SPDT</td><td colspan="2">DPDT</td><td colspan="2">3PDT</td><td>4PDT</td><td>SPST-NO</td><td colspan="2">SPDT</td><td>DPDT</td></tr>
<tr><td>Single</td><td colspan="2">Bifurcated</td><td colspan="2">Single</td><td></td><td>Bifurcated</td><td>Single</td><td>Bifurcated</td><td>Single</td></tr>
<tr><td>Ag-alloy</td><td colspan="2">Ag</td><td colspan="2">Ag-alloy</td><td></td><td>Ag-alloy</td><td colspan="3"></td></tr>
<tr><td>15 A at 110 VAC/ 24 VDC</td><td>10 A at 110 VAC/ 24 VDC</td><td>5 A at 110 VAC/ 24 VDC</td><td colspan="3">10 A at 110 VAC/ 24 VDC</td><td>1A at 250 VAC/ 30 VDC</td><td>10 A at 250 VAC/ 30 VDC</td><td>1 A at 250 VAC/ 30 VDC</td><td>5 A at 250 VAC/ 30 VDC</td></tr>
<tr><td>15 A</td><td>10 A</td><td>7 A</td><td colspan="3">10 A</td><td>1 A</td><td>10 A</td><td>1 A</td><td>5 A</td></tr>
<tr><td colspan="2">100 mA at 5 VDC</td><td>10 mA at 5 VDC</td><td colspan="3">100 mA at 5 VDC</td><td>1 mA at 5 VDC</td><td>100 mA at 5 VDC</td><td>1 mA at 5 VDC</td><td>10 mA at 5 VDC</td></tr>
<tr><td colspan="6">6 to 100/110 VDC
6 to 220/240 VAC</td><td colspan="4">5 to 100 VDC
12 to 240 VAC</td></tr>
<tr><td colspan="4">0.9 W (DC)
0.9 to 1.2 VA (AC)</td><td>1.4 W (DC)
1.6 to 2.0 VA (AC)</td><td>1.5 W (DC)
1.95 to 2.5 VA (AC)</td><td colspan="4">0.53 W (DC)
0.7 to 0.9 VA (AC)</td></tr>
<tr><td colspan="6">50 x 10^6 (AC), 100 x 10^6 (DC)</td><td colspan="4">10 x 10^6 (AC), 20 x 10^6 (DC)</td></tr>
<tr><td>200 x 10^3</td><td colspan="2">500 x 10^3</td><td colspan="3">200 x 10^3</td><td colspan="4">100 x 10^3</td></tr>
<tr><td colspan="6">2,000 VAC for 1 min.</td><td colspan="4">5,000 VAC for 1 min.</td></tr>
<tr><td>---</td><td colspan="5">2,000 VAC for 1 min.</td><td>---</td><td colspan="3">3,000 VAC for 1 min.</td></tr>
<tr><td colspan="6">1,000 VAC for 1 min.</td><td colspan="4">1,000 VAC for 1 min.</td></tr>
<tr><td colspan="6">---</td><td>---</td><td colspan="3">---</td></tr>
<tr><td colspan="4">–25°C to 55°C</td><td colspan="2">–25°C to 40°C</td><td colspan="4">–40°C to 70°C</td></tr>
<tr><td colspan="6">• LED indicator
• Built-in diode
• Built-in CR
• Test button</td><td colspan="4">• LED indicator
• Test button
• Built-in diode</td></tr>
<tr><td colspan="6">Cased (unsealed)</td><td colspan="4">Cased (unsealed)</td></tr>
<tr><td colspan="6"></td><td colspan="4"></td></tr>
<tr><td colspan="6">LR</td><td colspan="4"></td></tr>
<tr><td colspan="6">78</td><td colspan="4">91</td></tr>
</table>

Classification		Control Panel Relay			
Model		MK-I/-S	G7T I/O	G2A	G2A-434 Fully sealed type
Appearances					
Features		Exceptionally reliable general-purpose relay features mechanical indicator/ test button.	These super-slim relays each measure only 29 x 10 x 32 mm (W x D x H) and come in AC and DC input models as well as SPST-NO and SPST-NC output models.	Four-pole, highly reliable miniature power relay ideal for sequence control.	Fully sealed version of G2A that performs well in adverse environments.
Contact ratings	Contact form	DPDT/3PDT	SPST-NO, SPST-NC SPDT	4PDT	4PDT
	Mechanism	Single	Input: Bifurcated crossbar output: Single	Bifurcated crossbar	
	Material	Ag	Input: AgAu + Ag Output: AgSnIn	Movable: Au-clad+Ag/Pd Stationary: Ag/Pd	
	Rated load* (Resistive load)	10 A (NO), 5 A (NC) at 250 VAC/28 VDC	Input: 1 A at 24 VDC, 50,000 operations min. 10 mA at 24 VDC, 10,000,000 operations min. Output: 5 A at 24 VDC, 1,000,000 operations min.	0.3 A at 110 VAC, 5,000,000 operations min. 0.5 A at 24 VDC, 5,000,000 operations min.	
	Max. switching current	10 A	Input: 1 A Output: 5 A	AC: 1 A DC: 3 A	AC: 0.7 A DC: 2 A
	Failure rate (reference value)	10 mA at 1 VDC	Input: 100 μA at 1 VDC Output: 10 mA at 5 VDC	1 mA at 100 m VDC	
Coil ratings	Rated voltage	6 to 125 VDC; 6 to 200/ 220 VAC	110/120 VAC, 220/240 VAC, 12 VDC, 24 VDC 100/110 VDC	6 to 100 VDC 6 to 200/220 VAC	
	Power consumption (approx.)	1.5 W (DC) 2.3 to 2.7 VA (AC)	0.7 VA (AC) 0.5 W (DC)	1.1 W (DC) 1.4 VA (AC)	
Endurance	Mechanical	5 x 10^6	50 x 10^6	100 x 10^6	
	Electrical	500 x 10^3	Input: 50 x 10^3 Output: 1,000 x 10^3	5,000 x 10^3	
Dielectric strength	Between coil and contacts	2,000 VAC for 1 min.	2,000 VAC for 1 min.	1,500 VAC for 1 min.	
	Between contacts of different polarities	2,000 VAC for 1 min.	---	1,500 VAC for 1 min.	
	Between contacts of same polarity	1,000 VAC for 1 min.	1,000 VAC for 1 min.	700 VAC for 1 min.	
	Between set and reset coils	---	---	---	
Ambient temperature		–10°C to 40°C	–40°C to 70°C	–10°C to 40°C	
Function		• Mechanical indicator	• Built-in mechanical operation indicator	• Mechanical indicator • LED indicator • Arc barriers	• Built-in diode • MBB contact
Sealing		Cased (unsealed)	Closed/cased	Cased (unsealed)	Fully sealed
Terminal construction**					
Approved standards				, IEC	, IEC
Page		101	113	119	127

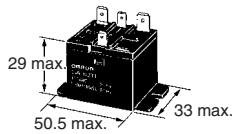
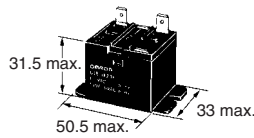
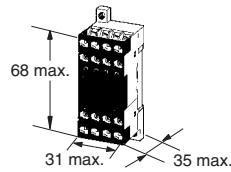
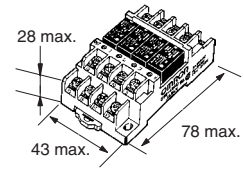
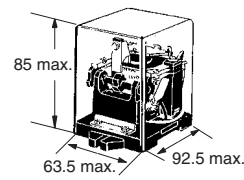
* Numbers in parentheses apply to cased (unsealed) types.
** denotes PCB terminal, plug-in (octal-pin) terminal, plug-in/solder terminal, quick-connect terminal, and screw terminal.

Control Panel Relay							Built-in Relay
G2AK Latching type	**MM**			**MMK** Latching type			**G7J**
							
Magnetic latching version of G2A ideal for sequence control.	Versatile relay satisfying most applications.			Mechanical latching relay boasting a wide variety of models.			Multi-pole power relay that withstands a momentary voltage drop. Wide range of applications with 100 V and 200 V coils. Both screw terminals and PCB terminals are available.
DPDT	DPDT	3PDT	4PDT	DPDT	3PDT	DPDT+ DPST-NO	4PST-NO, 3PST-NO/SPST-NC, DPST-NO/DPST-NC
Bifurcated	Single			Single			Double-break
Movable: Au-clad+Ag Stationary: Ag/Pd	Ag			Ag			Ag-alloy
0.3 A at 110 VAC, 5,000,000 operations min. 0.5 A at 24 VDC, 5,000,000 operations min.	15 (7.5) A at 220 VAC, 500,000 operations min. 10 (5) A at 24 VDC, 500,000 operations min.			10 (5) A at 220 VAC, 500,000 operations min. 7 (4) A at 24 VDC, 500,000 operations min.			25 A at 220 VAC, 100,000 operations min. 25 A at 30 VDC, 100,000 operations min. (For normally closed contacts, 8 A at 220 VAC, 8 A at 30 VDC)
AC: 1 A DC: 3 A	15 (7.5) A			10 (5) A			25 A
1 mA at 100 m VDC	10 mA at 5 VDC			10 mA at 5 VDC			100 mA at 24 VDC
6 to 48 VDC 6 to 100 VAC	6 to 200/220 VDC 6 to 240 VAC			6 to 200/220 VDC 6 to 200/(220) VAC			12 to 100 VDC 24 to 200/240 VAC
Set: 2 to 2.2 W (DC); 1.6 to 2 VA (AC) Reset: 1 to 1.2 W (DC); 0.5 to 1.2 VA (AC)	2.1 W (DC) 3.5 VA (AC)	2.7 W (DC) 5.1 VA (AC)		Set: 2.1 W (DC) 3.5 VA (AC) Reset: 2.8 W (DC) 4.1 VA (AC)	Set: 2.7 W (DC) 6 VA (AC) Reset: 2.8 W (DC) 4.1 VA (AC)		Approx. 2 W (DC) Approx. 1.8 to 2.6 VA (AC)
5×10^6	5×10^6			2.5×10^6			1×10^6
$5{,}000 \times 10^3$	500×10^3			500×10^3			100×10^3
1,500 VAC for 1 min.	2,000 VAC for 1 min.			2,000 VAC for 1 min.			4,000 VAC for 1 min.
1,500 VAC for 1 min.	2,000 VAC for 1 min.			2,000 VAC for 1 min.			4,000 VAC for 1 min.
700 VAC for 1 min.	1,500 VAC for 1 min.			1,500 VAC for 1 min.			2,000 VAC for 1 min.
1,000 VAC for 1 min.	---			2,000 VAC for 1 min.			---
–10°C to 40°C	–10°C to 55°C			–10°C to 55°C			–25°C to 60°C
• Latching (double binding) • Arc barrier • Mechanical indicator	• Operating indicator • Built-in diode			• Latching • DC-switching			• With test button
• Cased (unsealed) • Fully sealed	• Open • Cased (unsealed)			• Open • Cased (unsealed)			• Cased
							
UL, IEC	---			---			UL CSA VDE EN, IEC
133	139			154			166

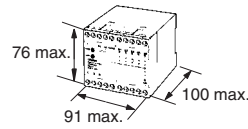
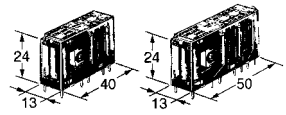
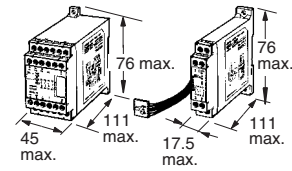
Classification		Built-in Relay					
Model		G7L			G4F		G4B-112T
Appearances							
Features		Multi-pole power relay that withstands a momentary voltage drop. Wide range of applications with 100 V and 200 V coils. Both screw terminals and PCB terminals are available.			High-power relay that breaks 20 A, carries 20 A and withstands 60-A inrush.		Compact power relay that breaks 15 A, carries 20 A and withstands 55-A inrush. AC specification coils also available.
Contact ratings	Contact form	SPST-NO	DPST-NO	SPST-NO, DPST-NO	SPST-NO	SPDT	SPST-NO
	Mechanism	Double-break			Single		Single
	Material	Ag-alloy			Ag-alloy		Ag-alloy
	Rated load* (Resistive load)	30 A at 220 VAC	25 A at 220 VAC	20 A at 220 VAC	20 A 220 VAC	15 A 220 VAC	15 A at 220 VAC/24 VDC
	Max. switched current	30 A	25 A	20 A	20 A	15 A	15 A
	Failure rate (reference value)	100 mA at 5 VDC			100 mA at 5 VDC		100 mA at 5 VDC
Coil ratings	Rated voltage	6 to 100 VDC 12 to 200/240 VAC			12, 24 VDC		12 to 100 VDC 100 VAC
	Power consumption (approx.)	1.9 W (DC) 1.7 to 2.5 VA (AC)			0.9 W (DC)		1.2 W (DC) 1.3 VA (AC)
Endurance	Mechanical	1×10^6			5×10^6		10×10^6
	Electrical	100×10^3			200×10^3		200×10^3
Dielectric strength	Between coil and contacts	4,000 VAC for 1 min.			2,000 VAC for 1 min.		2,000 VAC for 1 min.
	Between contacts of different polarities	---	2,000 VAC for 1 min. (DPST-NO only)		---		---
	Between contacts of same polarity	2,000 VAC for 1 min.			1,000 VAC for 1 min.		1,000 VAC for 1 min.
	Between set and reset coil	---			---		---
Ambient temperature		–25°C to 60°C			–25°C to 55°C		–10°C to 55°C
Function		• Test button (excluding P models)			---		---
Sealing		• Cased (unsealed)			• Cased (unsealed)		• Cased (unsealed)
Terminal construction**							
Approved standards							
Page		175			188		192

* Numbers in parentheses apply to cased (unsealed) types.

** denotes PCB terminal, plug-in (octal-pin) terminal, plug-in/solder terminal, quick-connect terminal, and screw terminal.

Built-in Relay		Terminal Relays		Special-purpose Relay
G4B-112T1	**G4B-112TP**	**G6D-F4B/G3DZ-F4B**	**G6B-4□□ND**	**G4Q** Ratchet type
				
Compact power relay that breaks 15 A, carries 20 A and withstands 55-A inrush. AC specification coils also available.		Easy to use, space-saving Terminal Relay with four-point output.	Compact Terminal Relay with 4 independent outputs.	Unique ratchet mechanism assures positive alternate transfer/switching operation.
SPST-NO	SPDT	4PST-NO	4PST-NO	DPDT
Single		Single	Single	Single
AgCdO	AgCdO	AgCdO	AgCdO	Ag
15 A at 250 VAC/24 VDC		3 A at 250 VAC, 3 A at 30 VDC	5 A at 250 VAC (30 VDC), 2 A at 250 VAC (30 VDC), 0.5 A at 250 VAC/VDC	5 A at 220 VAC/24 VDC, 500,000 steps min.
15 A		5 A	5 A	5 A
100 mA at 5 VDC		1,250 VAC, 150 W	10 mA at 5 VDC	6 to 100 VDC 6 to 200/(220) VAC
12 to 100 VDC 100 VAC		12 VDC, 24 VDC	5 VDC, 12 VDC, 24 VDC	100 mA at 5 VDC
1.2 W (DC) 1.3 VA (AC)		Approx. 200 mW per Relay	Approx. 200 mW per Relay	3.9 W (DC) 6.4 VA (AC)
10 x 10^6		20 x 10^6	50 x 10^6	5 x 10^6 (step)
200 x 10^3		100 x 10^3	100 x 10^3, 500 x 10^3 (for long-life at 2 A)	500 x 10^3 (step)
2,000 VAC for 1 min.		2,000 VAC, 50/60 Hz for 2 min.	2,000 VAC, 50/60 Hz for 1 min.	2,000 VAC for 1 min.
---		---	2,000 VAC, 50/60 Hz for 1 min.	2,000 VAC for 1 min.
1,000 VAC for 1 min.		700 VAC, 50/60 Hz for 1 min.	1,000 VAC, 50/60 Hz for 1 min.	1,000 VAC for 1 min.
---		---	---	---
–10°C to 55°C		–25°C to 55°C	–25°C to 55°C	–10°C to 55°C
---		LED indicator	LED indicator	---
• Cased (unsealed)		With Fully Sealed Relay	With Fully Sealed Relay	• Open • Cased (unsealed)

192		196	202	208

Classification		Special-purpose Relay	Safety Relay	Safety Relay Unit
Model		G9B	G7SA	G9SA
Appearances				
Features		Ideal for controlling pumps and production lines with six or twelve stepping circuits.	Safety relay that conforms to EN Standard. Forcibly guided contacts (EN50205 Class A) Suitable for safety circuits in press machinery, machine tools, and other production machinery.	Ideal for safety door and emergency stop switch circuits for machines in European countries.
Contact ratings	Contact form	SPST-NO	4PST-NO/ DPST-NC, 3PST-NO/3PST-NC	G9SA-301/TH301/EX301: 3PST-NO/ SPST-NC G9SA-501: 5PST-NO/SPST-NC G9SA-321-T□: 3PST-NO/SPST-NC OFF delay: DPST-NO G9SA-EX031-T□: OFF delay: 3PST-NO/SPST-NC
	Mechanism	Single	Single	Single
	Material	Ag-alloy	Ag+Au plating	Ag-alloy+Au plating
	Rated load* (Resistive load)	2 A at 250 VAC/ 30 VDC	3 A at 240 VAC/24 VDC, 100,000 operations min.	5 A at 250 VAC
	Max. switched current	2 A	6 A	---
	Failure rate (reference value)	10 mA at 5 VDC	10 mA at 5 VDC	1 mA at 5 VDC
Coil ratings	Rated voltage	100 VAC, 200 VAC, 24 VDC	24 VDC	24 VAC/DC, 100 to 240 VAC
	Power consumption (approx.)	24 VDC 90 mA max. 100 or 200 VAC 120 mA max.	0.8 W	G9SA-301/TH301: 1.8 VA/1.7 W (AC/DC). 9VA (AC) G9SA-501: 2.8 VA/2.6 W (AC/DC), 11 VA (AC) G9SA-321-T□: 3.5 VA/3.3 W (AC/DC), 12.5 VA (AC) **Note:** Added 2 VA/2 W for connecting to Expansion Units.
Endurance	Mechanical	10 x 10^6 (step)	10 x 10^6	5 x 10^6
	Electrical	300 x 10^3 (step)	100 x 10^3	100 x 10^3
Dielectric strength	Between coil and contact	1,500 VAC, 50/60 Hz for 1 min. between the power supply, C, S, and R terminals and other terminals 1,500 VAC, 50/60 Hz for 1 min. between the terminals, except the alarm output terminals and power supply terminals	2,500 VAC for 1 min.	2,500 VAC for 1 min. (Between control circuits, safety circuits, and auxiliary circuits) 2,500 VAC for 1 min. (Between safety circuits and auxiliary circuits) 2,500 VAC for 1 min. (Between safety circuits)
	Between contacts of different polarities		2,500 VAC for 1 min.	
	Between contacts of same polarity		1,500 VAC for 1 min.	
	Between set and reset coil		---	
Ambient temperature		–25°C to 55°C	–40°C to 85°C	–25°C to 55°C
Function		Alarm indicator, operating indicator	• Forced guide contact	Operating indicator
Sealing		Closed	• Cased	Closed
Terminal construction**				
Approved standards		---		
Page		213	219	225

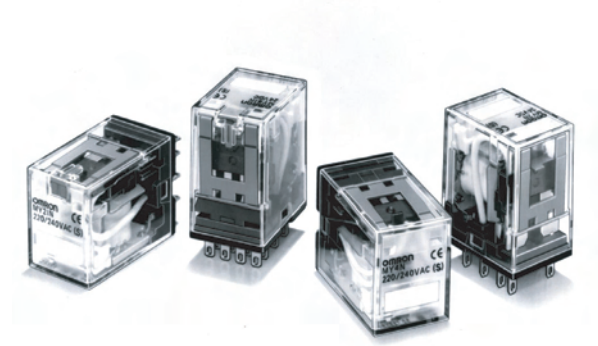
* Numbers in parentheses apply to cased (unsealed) types.
**  denotes PCB terminal,  plug-in (octal-pin) terminal,  plug-in/solder terminal,  quick-connect terminal, and  screw terminal.

General-purpose Relay

MY New model

Versatile and Function-filled Miniature Power Relay for Sequence Control and Power Switching Applications

- Many variations possible through a selection of operation indicators (mechanical and LED indicators), test button, built-in diode and CR (surge suppression), bifurcated contacts, etc.
- Arc barrier standard on 4-pole Relays.
- Dielectric strength: 2,000 VAC (coil to contact)
- Environment-friendly cadmium-free contacts.
- Safety standard approvals obtained.
- Wide range of Sockets (PY, PYF Series) and optional parts are available.
- Max. Switching Current: 2-pole: 10 A, 4-pole: 5 A
- Built-in mechanical operation indicator.
- Provided with nameplate.



Ordering Information

■ Relays

Standard Coil Polarity

Type	Contact form	Plug-in socket/Solder terminals		Without LED indicator
		Standard with LED indicator	With LED indicator and test button	
Standard	DPDT	MY2N	MY2IN	MY2
	4PDT	MY4N	MY4IN	MY4
	4PDT (bifurcated)	MY4ZN	MY4ZIN	MY4Z
With built-in diode (DC only)	DPDT	MY2N-D2	MY2IN-D2	---
	4PDT	MY4N-D2	MY4IN-D2	---
	4PDT (bifurcated)	MY4ZN-D2	MY4ZIN-D2	---
With built-in CR (220/240 VAC, 110/120 VAC only)	DPDT	MY2N-CR	MY2IN-CR	---
	4PDT	MY4N-CR	MY4IN-CR	---
	4PDT (bifurcated)	MY4ZN-CR	MY4ZIN-CR	---

Reverse Coil Polarity

Type	Contact form	Plug-in socket/Solder terminals	
		With LED indicator	With LED indicator and test button
Standard (DC only)	DPDT	MY2N1	MY2IN1
	4PDT	MY4N1	MY4IN1
	4PDT (bifurcated)	MY4ZN1	MY4ZIN1
With built-in diode (DC only)	DPDT	MY2N1-D2	MY2IN1-D2
	4PDT	MY4N1-D2	MY4IN1-D2
	4PDT (bifurcated)	MY4ZN1-D2	MY4ZIN1-D2

Note: When ordering, add the rated coil voltage and "(s)" to the model number. Rated coil voltages are given in the coil ratings table.

Example: MY2 6VAC (S)
- 6VAC: Rated coil voltage
- (S): New model

■ Accessories (Order Separately)

Sockets

Poles	Front-mounting Socket (DIN-track/ screw mounting)	Back-mounting Socket				
		Solder terminals		Wire-wrap terminals		PCB terminals
		Without clip	With clip	Without clip	With clip	
2	PYF08A-E PYF08A-N	PY08	PY08-Y1	PY08QN PY08QN2	PY08QN-Y1 PY08QN2-Y1	PY08-02
4	PYF14A-E PYF14A-N	PY14	PY14-Y1	PY14QN PY14QN2	PY14QN-Y1 PY14QN2-Y1	PY14-02

Socket Hold-down Clip Pairing

Relay type	Poles	Front-connecting Socket (DIN-track/ screw mounting)		Back-connecting Socket			
				Solder/Wire-wrap terminals		PCB terminals	
		Socket	Clip	Socket	Clip	Socket	Clip
Without 2-pole test button	2	PYF08A-E PYF08A-N	PYC-A1	PY08(QN)	PYC-P PYC-P2	PY08-02	PYC-P PYC-P2
	4	PYF14A-E PYF14A-N		PY14(QN)		PY14-02	
2-pole test button	2	PYF08A-E PYF08A-N	PYC-E1	PY08(QN)	PYC-P2	PY08-02	PYC-P2

Mounting Plates for Sockets

Socket model	For 1 Socket	For 18 Sockets	For 36 Sockets
PY08, PY08QN(2), PY14, PY14QN(2)	PYP-1	PYP-18	PYP-36

Note: PYP-18 and PYP-36 can be cut into any desired length in accordance with the number of Sockets.

Track and Accessories

Supporting Track (length = 500 mm)	PFP-50N
Supporting Track (length = 1,000 mm)	PFP-100N, PFP-100N2
End Plate	PFP-M
Spacer	PFP-S

Specifications

■ Coil Ratings

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V*	214.1 mA	183 mA	12.2 Ω	0.04 H	0.08 H	80% max.	30% min.	110%	1.0 to 1.2 VA (60 Hz)
	12 V	106.5 mA	91 mA	46 Ω	0.17 H	0.33 H				
	24 V	53.8 mA	46 mA	180 Ω	0.69 H	1.30 H				
	48/50 V*	24.7/ 25.7 mA	21.1/ 22.0 mA	788 Ω	3.22 H	5.66 H				
	110/120 V	9.9/10.8 mA	8.4/9.2 mA	4,430 Ω	19.20 H	32.1 H				0.9 to 1.1 VA (60 Hz)
	220/240 V	4.8/5.3 mA	4.2/4.6 mA	18,790 Ω	83.50 H	136.4 H				
DC	6 V*	151 mA		39.8 Ω	0.17 H	0.33 H		10% min.		0.9 W
	12 V	75 mA		160 Ω	0.73 H	1.37 H				
	24 V	37.7 mA		636 Ω	3.20 H	5.72 H				
	48 V*	18.8 mA		2,560 Ω	10.60 H	21.0 H				
	100/110 V	9.0/9.9 mA		11,100 Ω	45.60 H	86.2 H				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for rated currents and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. AC coil resistance and impedance are provided as reference values (at 60 Hz).

4. Power consumption drop was measured for the above data. When driving transistors, check leakage current and connect a bleeder resistor if required.

5. Rated voltage denoted by "*" will be manufactured upon request. Ask your OMRON representative.

■ Contact Ratings

Item	2-pole		4-pole		4-pole (bifurcated)	
	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R = 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R = 7 ms)
Rated load	5A, 250 VAC 5A, 30 VDC	2A, 250 VAC 2 A, 30 VDC	3 A, 250 VAC 3 A, 30 VDC	0.8 A, 250 VAC 1.5 A, 30 VDC	3 A, 250 VAC 3 A, 30 VDC	0.8 A, 250 VAC 1.5 A, 30 VDC
Carry current	10 A (see note)		5 A (see note)			
Max. switching voltage	250 VAC 125 VDC		250 VAC 125 VDC			
Max. switching current	10 A		5 A			
Max. switching power	2,500 VA 300 W	1,250 VA 300 W	1,250 VA 150 W	500 VA 150 W	1,250 VA 150 W	500 VA 150 W
Failure rate (reference value)	5 VDC, 1 mA		1 VDC, 1 mA		1 VDC, 100 μA	

Note: Don't exceed the carry current of a Socket in use. Please see page 57.

■ Characteristics

Item	All Relays
Contact resistance	100 mΩ max.
Operate time	20 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1.0 min (1,000 VAC between contacts of same polarity)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Endurance	See the following table.
Ambient temperature	Operating: –55°C to 70°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 35 g

Note: The values given above are initial values.

■ Endurance Characteristics

Pole	Mechanical life (at 18,000 operations/hr)	Electrical life (at 1,800 operations/hr under rated load)
2-pole	AC:50,000,000 operations min. DC:100,000,000 operations min.	500,000 operations min.
4-pole		200,000 operations min.
4-pole (bifurcated)	20,000,000 operations min.	100,000 operations min.

■ Approved Standards

VDE Recognitions (File No. 112467UG, IEC 255, VDE 0435)

No. of poles	Coil ratings	Contact ratings	Operations
2	6, 12, 24, 48/50, 100/110 110/120, 200/220, 220/240 VAC 6, 12, 24, 48, 100/110, 125 VDC	10 A, 250 VAC (cosϕ=1) 10 A, 30 VDC (L/R=0 ms)	10 x 10^3
4		5 A, 250 VAC (cosϕ=1) 5 A, 30 VDC (L/R=0 ms)	100 x 10^3 MY4Z AC; 50 x 10^3

UL508 Recognitions (File No. 41515)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 30 VDC (General purpose) 10 A, 250 VAC (General purpose)	6 x 10^3
4		5 A, 250 VAC (General purpose) 5 A, 30 VDC (General purpose)	

CSA C22.2 No. 14 Listings (File No. LR31928)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 30 VDC 10 A, 250 VAC	6 x 10^3
4		5 A, 250 VAC (Same polarity) 5 A, 30 VDC (Same polarity)	

IMQ (File No. EN013 to 016)

No. of poles	Coil ratings	Contact ratings	Operations
2	6, 12, 24, 48/50, 100/110 110/120, 200/220, 220/240 VAC 6, 12, 24, 48, 100/110, 125 VDC	10 A, 30 VDC 10 A, 250 VAC	10 x 10^3
4		5 A, 250 VAC 5 A, 30 VDC	100 x 10^3 MY4Z AC; 50 x 10^3

LR Recognitions (File No. 98/10014)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 250 VAC (Resistive) 2 A, 250 VAC (PF0.4) 10 A, 30 VDC (Resistive) 2 A, 30 VDC (L/R=7 ms)	50 x 10^3
4		5 A, 250 VAC (Resistive) 0.8 A, 250 VAC (PF0.4) 5 A, 30 VDC (Resistive) 1.5 A, 30 VDC (L/R=7 ms)	50 x 10^3

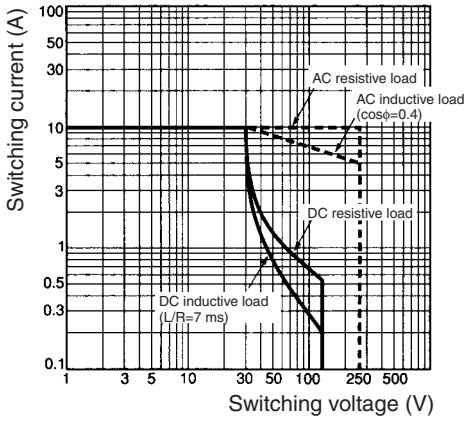
SEV Listings (File No. 99.5 50902.01)

No. of poles	Coil ratings	Contact ratings	Operations
2	6 to 240 VAC 6 to 125 VDC	10 A, 250 VAC 10 A, 30 VDC	10 x 10^3
4		5 A, 250 VAC 5 A, 30 VDC	100 x 10^3 MY4Z AC; 50 x 10^3

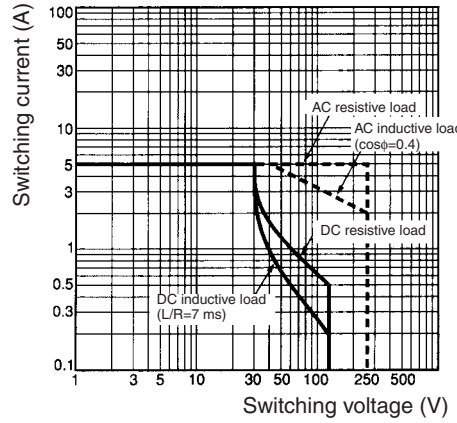
Engineering Data

Maximum Switching Power

MY2

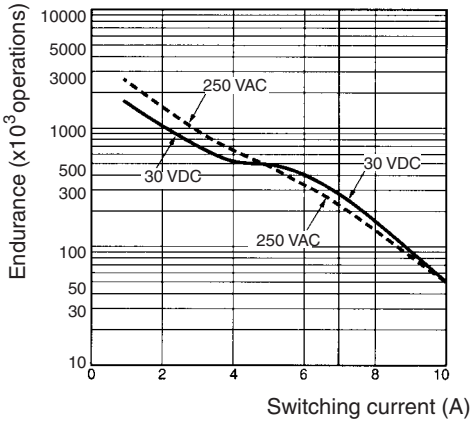


MY4, MY4Z

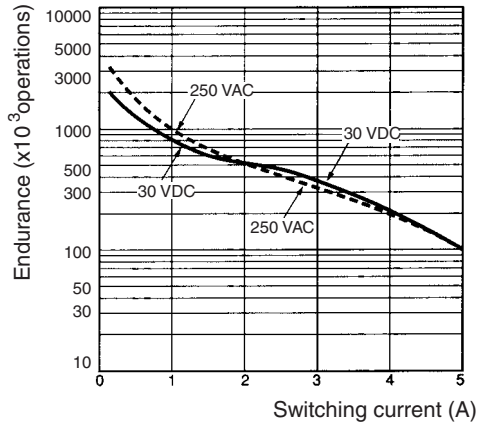


Endurance

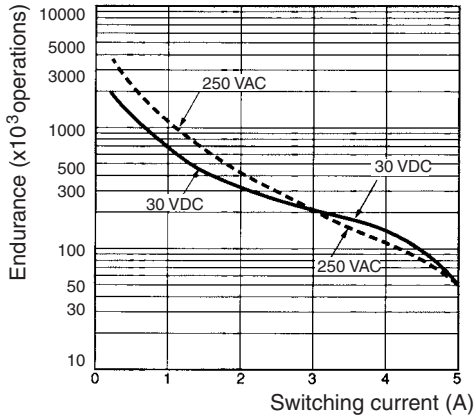
MY2 (Resistive Loads)



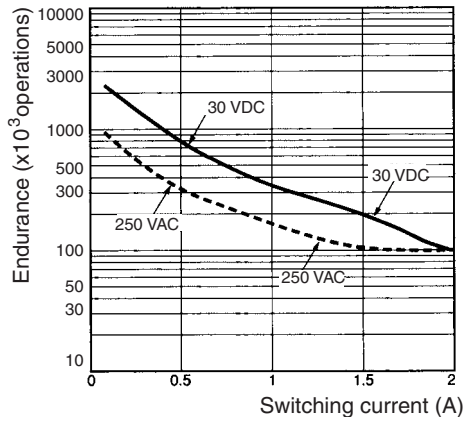
MY2 (Inductive Loads)



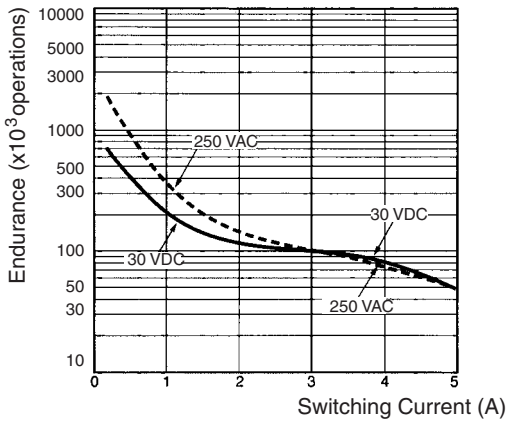
MY4 (Resistive Loads)



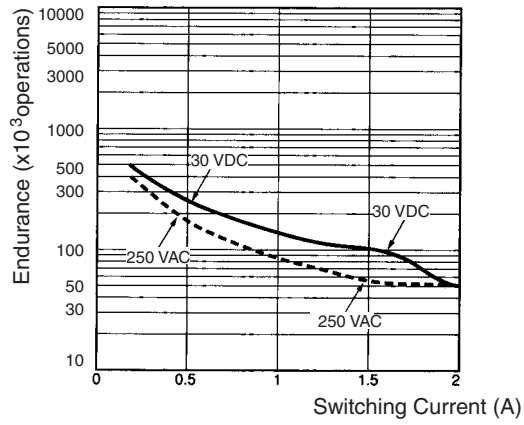
MY4 (Inductive Loads)



MY4Z (Resistive Loads)



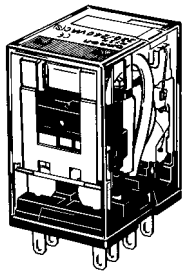
MY4Z (Inductive Loads)

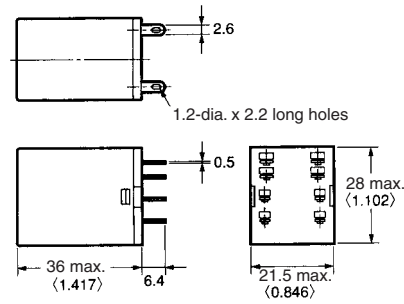


Dimensions

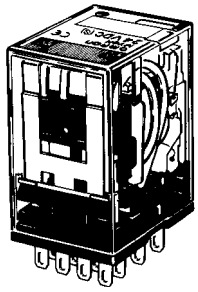
Note: All units are in millimeters unless otherwise indicated.

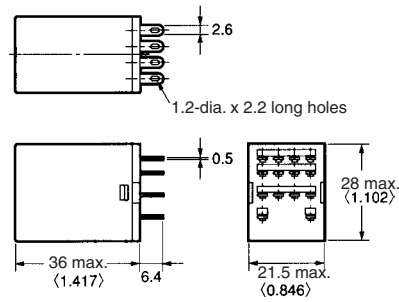
2-Pole Models



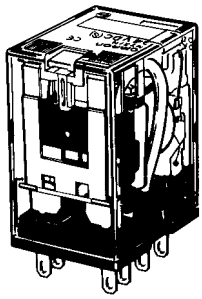


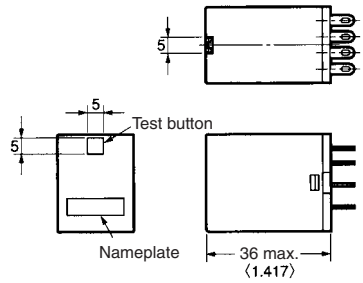
4-Pole Models





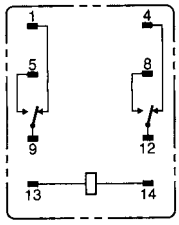
Models with Test Button



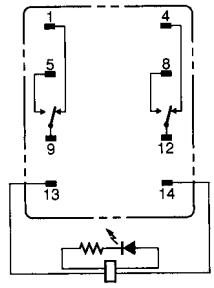


Terminal Arrangement/Internal Connections (Bottom View)

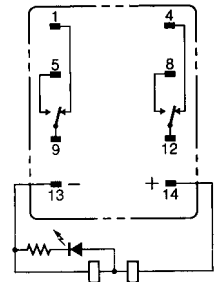
MY2



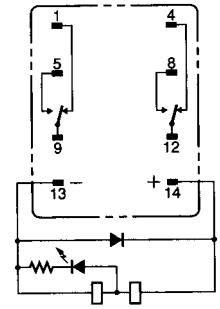
MY2N/MY2IN (AC Models)



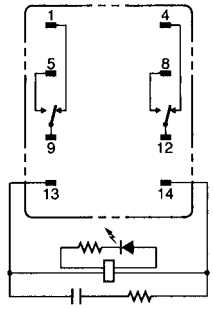
MY2N/MY2IN (DC Models)



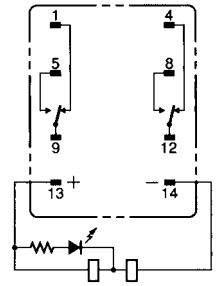
MY2N-D2/MY2IN-D2 (DC Models Only)



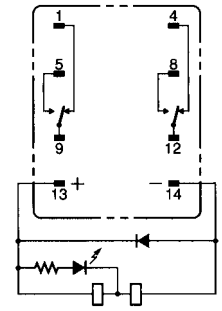
MY2N-CR/MY2IN-CR (AC Models Only)



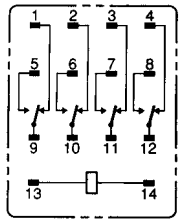
MY2N1/MY2IN1 (DC Models Only)



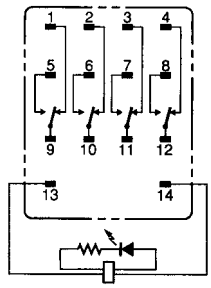
MY2N1-D2/MY2IN1-D2 (DC Models Only)



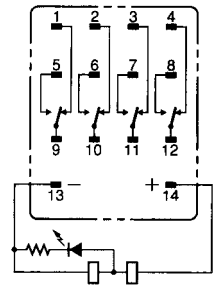
MY4(Z)



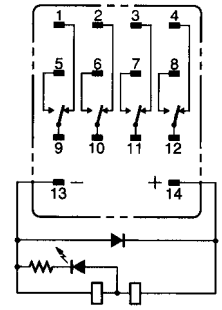
MY4(Z)N/MY4(Z)IN (AC Models)



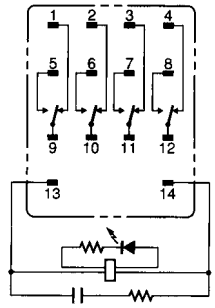
MY4(Z)N/MY4(Z)IN (DC Models)



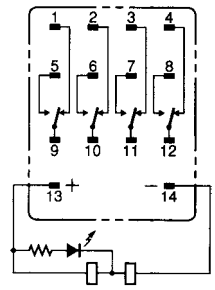
MY4(Z)N-D/MY4(Z)IN-D2 (DC Models Only)



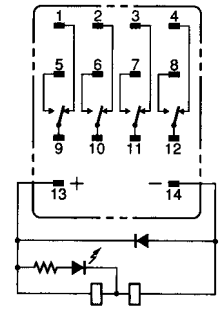
MY4(Z)N-CR/MY4(Z)IN-CR (AC Models Only)



MY4(Z)N1/MY4(Z)IN1 (DC Models Only)



MY4(Z)N1-D2/MY4(Z)IN1-D2 (DC Models Only)

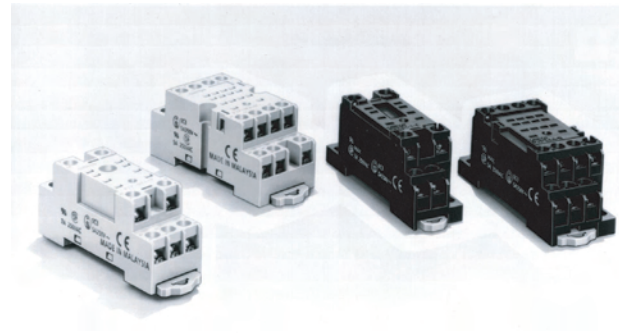


Note: The DC models have polarity.

Socket for MY

Track-mounted (DIN Track) Socket Conforms to VDE 0106, Part 100

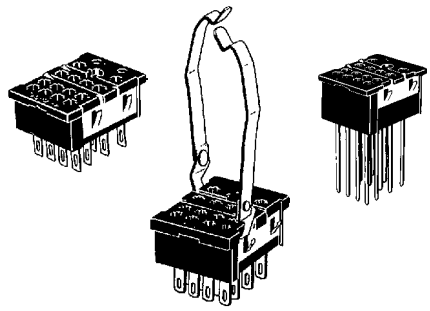
- Snap into position along continuous sections of any mounting track.
- Facilitates sheet metal design by standardized mounting dimensions.
- Design with sufficient dielectric separation between terminals eliminates the need of any insulating sheet.



■ Safety Standards for Sockets

Model	Standards	File No.
PYF08A-E, PYF08A-N PYF14A-E, PYF14A-N	UL508	E87929
	CSA22.2	LR31928

Back-connecting Sockets



■ Specifications

Item	Pole	Model	Carry current	Dielectric withstand voltage	Insulation resistance (see note 2)
Track-mounted Socket	2	PYF08A-E	7 A	2,000 VAC, 1 min	1,000 MΩ min.
		PYF08A-N (see note 3)	7 A (see note 4)		
	4	PYF14A-E	5 A		
		PYF14A-N (see note 3)	5 A (see note 4)		
Back-connecting Socket	2	PY08(-Y1)	7 A	1,500 VAC, 1 min	100 MΩ min.
		PY08QN(-Y1)			
		PY08-02			
	4	PY14(-Y1)	3 A		
		PY14QN(-Y1)			
		PY14-02			

Note: 1. The values given above are initial values.

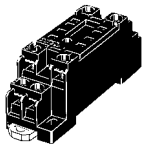
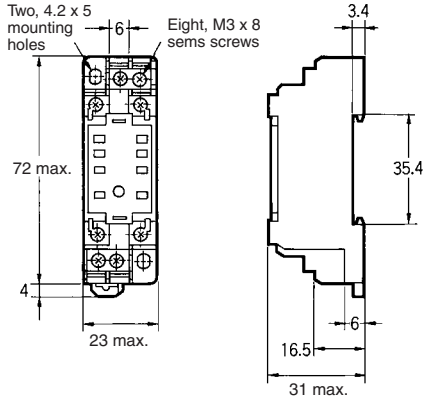
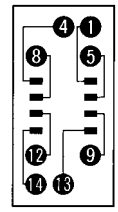
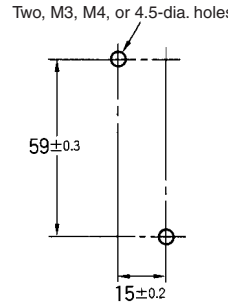
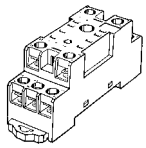
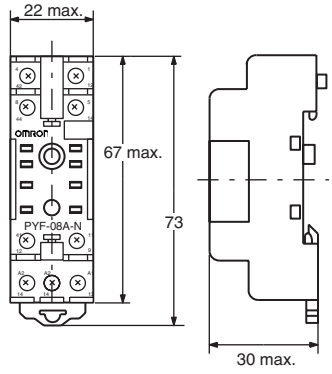
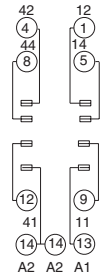
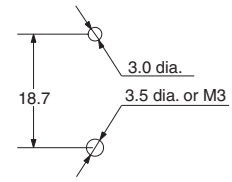
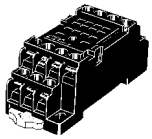
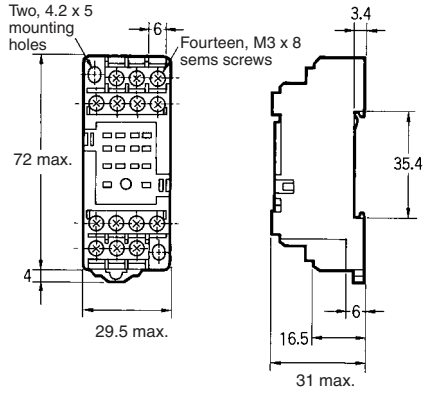
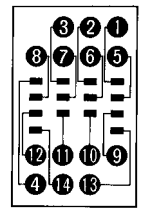
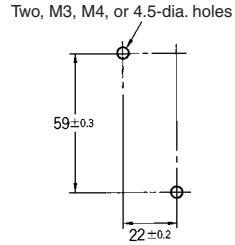
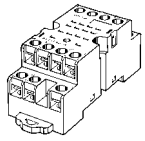
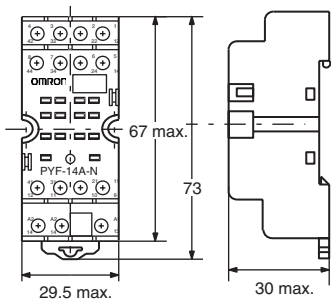
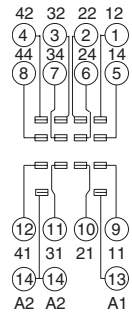
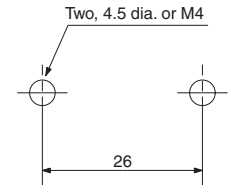
2. The values for insulation resistance were measured at 500 V at the same place as the dielectric strength.

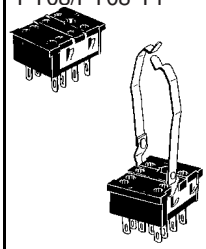
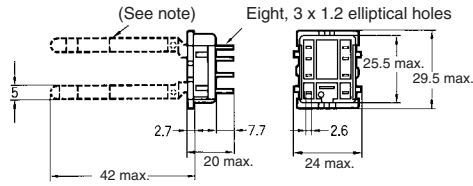
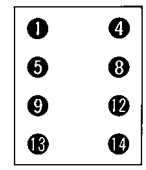
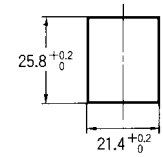
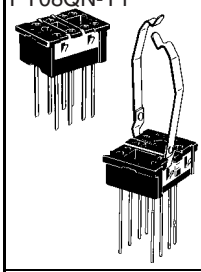
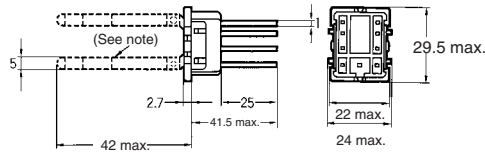
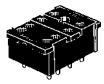
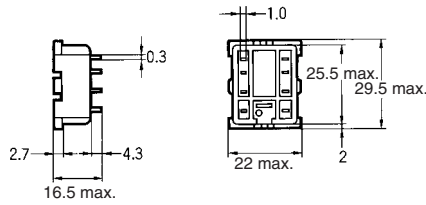
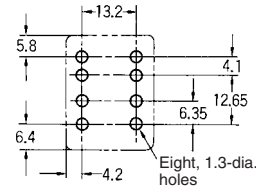
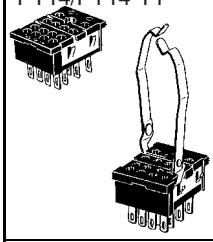
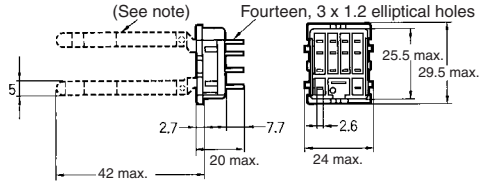
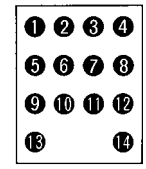
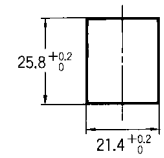
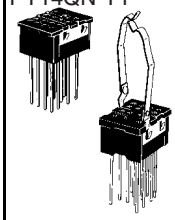
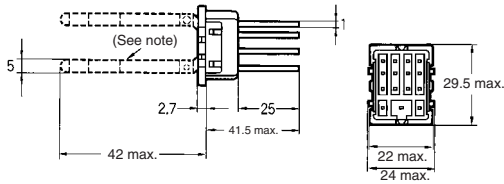
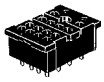
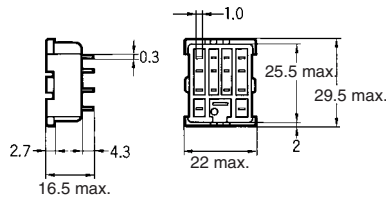
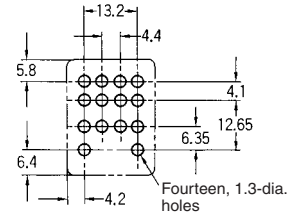
3. The maximum operating ambient temperature for the PYF08A-N and PYF14A-N is 55°C.

4. When using the PYF08A-N or PYF14A-N at an operating ambient temperature exceeding 40°C, reduce the current to 60%.

■ Dimensions

Note: All units are in millimeters unless otherwise indicated.

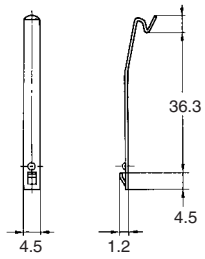
Socket	Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
PYF08A-E 			 (TOP VIEW) **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.
PYF08A-N 			 **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.
PYF14A-E 			 (TOP VIEW) **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.
PYF14A-N 			 **Note:** Track mounting is also possible. Refer to page 12 for supporting tracks.

Socket	Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PY08/PY08-Y1 	 **Note:** The PY08-Y1 includes sections indicated by dotted lines.		
PY08QN/ PY08QN-Y1 	 **Note:** The PY08QN-Y1 includes sections indicated by dotted lines.		
PY08-02 			
PY14/PY14-Y1 	 **Note:** The PY14-Y1 includes sections indicated by dotted lines.		
PY14QN/ PY14QN-Y1 	 **Note:** The PY14QN-Y1 includes sections indicated by dotted lines.		
PY14-02 			

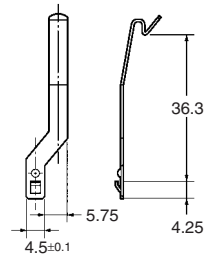
Note: Use a panel with plate thickness of 1 to 2 mm for mounting the Sockets.

Hold-down Clips

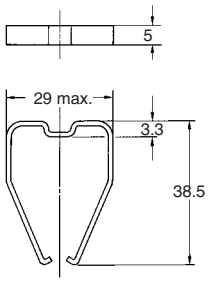
PYC-A1
(2 pcs per set)



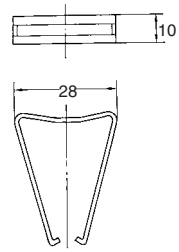
PYC-E1
(2 pcs per set)



PYC-P

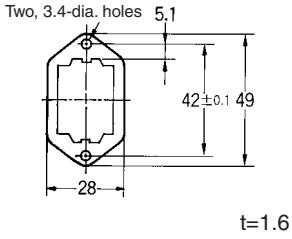


PYC-P2

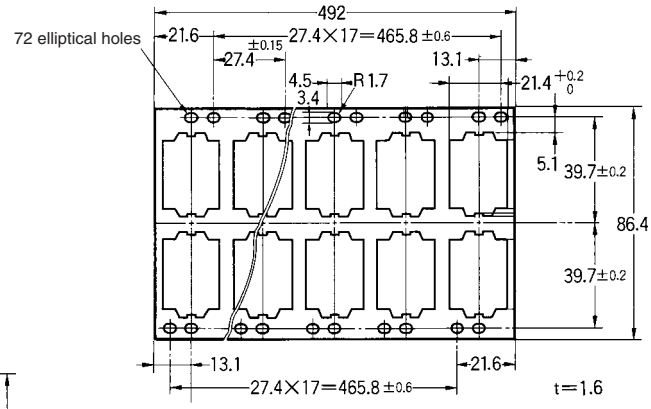


Mounting Plates for Back-connecting Sockets

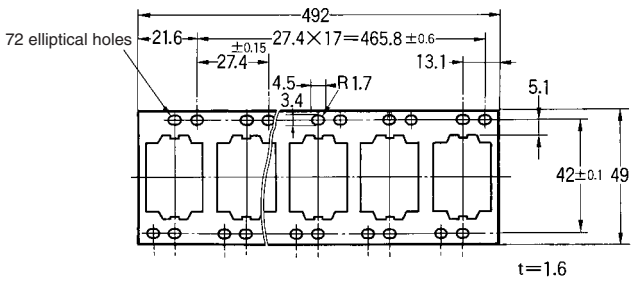
PYP-1



PYP-36



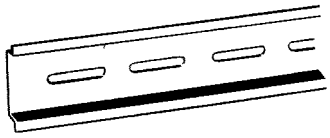
PYP-18

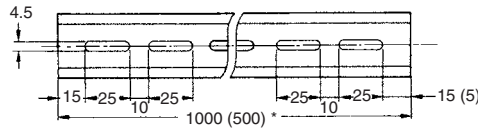


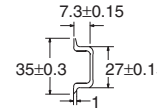
Tracks and Accessories

Supporting Tracks

PFP-50N/PFP-100N

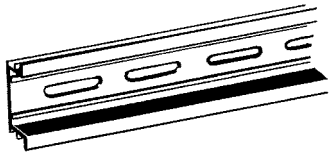


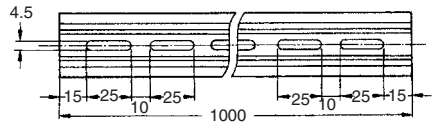


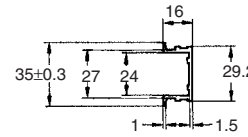


Note: The figure in the parentheses is for PFP-50N.

PFP-100N2

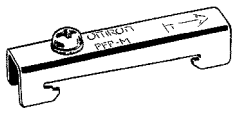


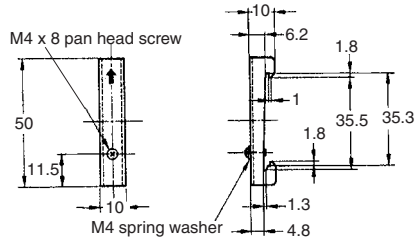




End Plate

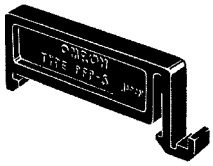
PFP-M

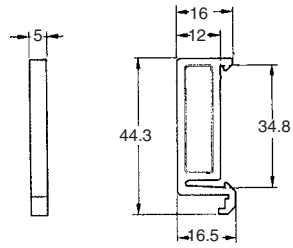




Spacer

PFP-S





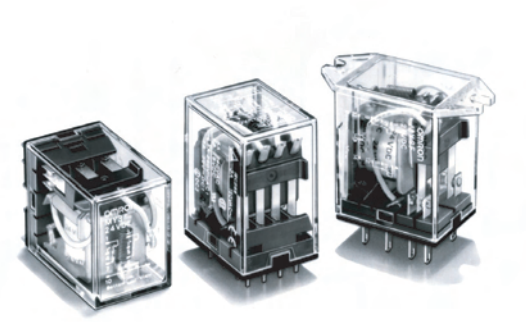
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J111-E1-02 In the interest of product improvement, specifications are subject to change without notice.

General-purpose Relay
MY

An Improved Miniature Power Relay with Many Models for Sequence Control and Power Applications

- A wide range of relay variations including ones with operation indicators, built-in diodes, etc.
- Arc barrier standard on 3- and 4-pole Relays.
- Dielectric strength: 2,000 VAC.



Ordering Information

■ List of Models

Type	Contact form	Plug-in socket/solder terminals		PCB terminals	Upper-mounting/ solder terminals
			With indicator		
Standard	DPDT	---	---	MY2-02	MY2F
	3PDT	MY3	MY3N	MY3-02	MY3F
	4PDT	---	---	MY4-02	MY4F
	4PDT (bifurcated)	---	---	MY4Z-02	MY4ZF
With built-in diode (DC only)	3PDT	MY3-D	MY3N-D2	---	---

Note: When ordering, add the rated coil voltage to the model number. Rated coil voltages are given in the coil ratings table.

Example: MY3, 6 VAC
Rated coil voltage

■ Accessories (Order Separately)

Sockets

Poles	Front-mounting Socket (DIN-track/screw mounting)	Back-mounting Socket				
		Solder terminals		Wire-wrap terminals		PCB terminals
		W/ clip	W/o clip	W/ clip	W/o clip	
3	PYF11A	PY11	PY11-Y1	PY11QN	PY11QN-Y1	PY11-02

Note: 1. Equipped with operation check terminal.
2. The PYF08A(-E), PYF11A, and PYF14A(-E) have been approved as individual Sockets by UL 508 and CSA C22.2.

Mounting Plates for Sockets

Socket model	For 1 Socket	For 18 Sockets	For 36 Sockets
PY11, PY11QN(2)	PYP-1	PYP-18	PYP-36

Note: PYP-18 and PYP-36 can be cut into any desired length in accordance with the number of Sockets.

Socket Hold-down Clip Pairing

Relay type	Poles	Front-connecting Sockets (track-/screw-mounted)		Back-connecting Sockets			
				Solder/wire-wrap terminals		PCB terminals	
		Socket	Clip	Socket	Clip	Socket	Clip
Standard, operation indicator, built-in diode	3	PYF11A	PYC-A1	PY11(QN)	PYC-P	PY11-02	PYC-P

Specifications

■ Coil Ratings

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consum. (Approx.)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V	214.1 mA	183 mA	12.2 Ω	0.04 H	0.08 H	80% max.	30% min.	110%	1.0 to 1.2 VA (60 Hz)
	12 V	106.5 mA	91 mA	46 Ω	0.17 H	0.33 H				
	24 V	53.8 mA	46 mA	180 Ω	0.69 H	1.30 H				
	50 V	25.7 mA	22 mA	788 Ω	3.22 H	5.66 H				
	100/110 V	11.7/12.9 mA	10/11 mA	3,750 Ω	14.54 H	24.6 H				0.9 to 1.1 VA (60 Hz)
	110/120 V	9.9/10.8 mA	8.4/9.2 mA	4,430 Ω	19.20 H	32.1 H				
	200/220 V	6.2/6.8 mA	5.3/5.8 mA	12,950 Ω	54.75 H	94.07 H				
	220/240 V	4.8/5.3 mA	4.2/4.6 mA	18,790 Ω	83.50 H	136.40 H				
DC	6 V	150 mA		40 Ω	0.17 H	0.33 H		10% min.		0.9 W
	12 V	75 mA		160 Ω	0.73 H	1.37 H				
	24 V	36.9 mA		650 Ω	3.20 H	5.72 H				
	48 V	18.5 mA		2,600 Ω	10.60 H	21.00 H				
	100/110 V	9.1/10 mA		11,000 Ω	45.60 H	86.20 H				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for rated currents and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperatures of 23°C.

3. AC coil resistance and impedance are provided as reference values (at 60 Hz).

4. Power consumption drop was measured for the above data. When driving transistors, check leakage current and connect a bleeder resistor if required.

■ Contact Ratings

Item	Double- or three-pole		Four-pole	
	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$=0.4, L/R=7 ms)	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$=0.4, L/R=7 ms)
Rated load	5 A, 220 VAC 5 A, 24 VDC	2 A, 220 VAC 2 A, 24 VDC	3 A, 220 VAC 3 A, 24 VDC	0.8 A, 220 VAC) 1.5 A, 24 VDC
Carry current	5 A		3 A	
Max. switching voltage	250 VAC 125 VDC		250 VAC 125 VDC	
Max. switching current	5 A	5 A	3 A	3 A
Max. switching power	1,100 VA 120 W	440 VA 48 W	660 VA 72 W	176 VA 36 W
Failure rate (reference value)*	Standard type: 100 mA, 5 VDC		Standard types: 1 mA, 1 VDC Bifurcated type: 100 μA, 1 VDC	

***Note:** P level: λ_{60} = 0.1 x 10^{-6}/operation, reference value

■ Characteristics

Item	All Relays
Contact resistance	50 mΩ max.
Operate time	20 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (1,000 VAC between contacts of same polarity)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Endurance	See following table.
Ambient temperature*	Operating: (standard): –55°C to 70°C (with no icing) Built-in LED indicator; built-in diode: –55°C to 60°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 35 g

Note: The values given above are initial values.

Endurance Characteristics

Contact form	Mechanical life (at 18,000 operations/hr)	Electrical life (at 1,800 operations/hr under rated load)
Normal	AC: 50,000,000 operations min. DC: 100,000,000 operations min.	2-,3-pole: 500,000 operations min. 4-pole: 200,000 operations min.
With bifurcated contacts	4-pole: 20,000,000 operations min.	4-pole: 100,000 operations min.

Note: See following tables for real load life expectancies.

■ Endurance Under Real Loads

MY2

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC motor	50 W, 100 VAC single-phase with 2.8-A in-rush current, 0.4-A carry current	ON for 2 s, OFF for 30 s	100,000 operations
		50 W, 100 VAC single-phase with 1.6-A in-rush current, 1-A carry current	ON for 1 s, OFF for 30 s	300,000 operations
	AC solenoid	24 W with 1-A carry current	ON for 1.5 s, OFF for 1.5 s	4,000,000 operations

MY4

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC solenoid	50 VA with 2-A inrush current, 0.7-A carry current	ON for 1 s, OFF for 3 s	25,000 operations
	DC magnetic switch	25 W with L/R = 40 ms , 0.2-A carry current		
	AC magnetic switch	35 VA with 1.5-A inrush current, 0.35-A carry current		500,000 operations
24 VDC	DC solenoid	40 W with L/R = 10 ms, 1.6-A carry current	ON for 0.5 s, OFF for 1.5 s	5,000,000 operations
		30 W with L/R = 10 ms with 0.34-A carry current	ON for 0.5 s, OFF for 1.5 s	6,000,000 operations

■ Approved Standards

Some MY Relays are available in models meeting various safety standards. When ordering, you must specify the desired standards. Refer to *Ordering Information* for specific models. Note that the rating recognized by the various standards sometimes vary from the ratings of the individual Relays.

UL 508 Recognitions (File No. 41515)

No. of poles	Coil ratings	Contact ratings	Operations
2, 3	6 to 240 VAC 6 to 125 VDC	5 A, 28 VDC (Resistive) 5 A, 240 VAC (General use)	6×10^3
4		5 A, 240 VAC (General use) (Same polarity) 5 A, 28 VDC (Resistive) (Same polarity)	

CSA C22.2 No. 14 Listings (File No. LR31928)

No. of poles	Coil ratings	Contact ratings	Operations
2, 3	6 to 240 VAC 6 to 125 VDC	5 A, 28 VDC (Resistive) 5 A, 240 VAC (General use)	6×10^3
4		5 A, 240 VAC (General use) (Same polarity) 5 A, 28 VDC (Resistive) (Same polarity)	

SEV Listings (File No. 99.5 50902.01)

No. of poles	Coil ratings	Contact ratings
2, 3, 4	6 to 240 VAC 6 to 125 VDC	5 A, 240 VAC1 5 A, 28 VDC1

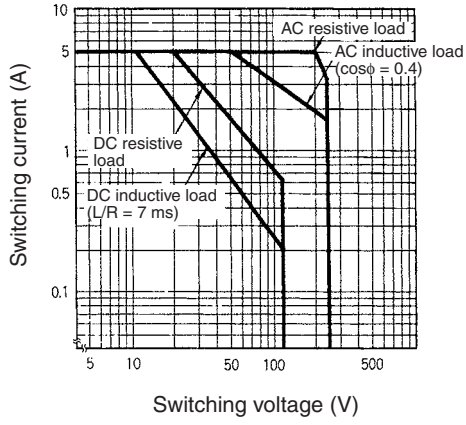
LR (No. 563KOB-204524)

No. of poles	Coil ratings	Contact ratings
2	6 to 240 VAC 6 to 120 VDC	2 A, 200 VAC (General use) 2 A, 30 VDC (General use)
4		0.8 A, 200 VAC (General use) 1.5 A, 115 VAC (General use) 1.5 A, 30 VDC (General use)

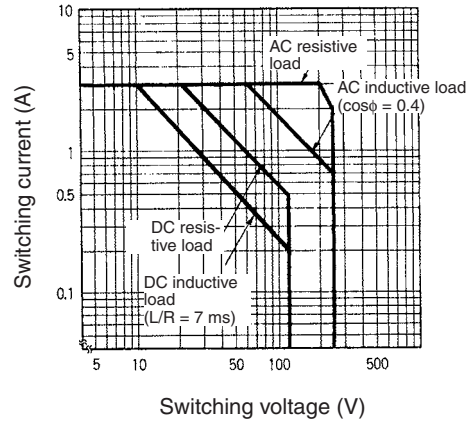
Engineering Data

Maximum Switching Power

MY2-02, MY2F, MY3 Series

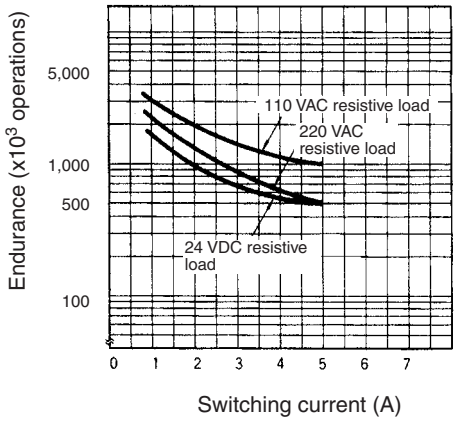


MY4(Z)-02, MY4F, MY4ZF

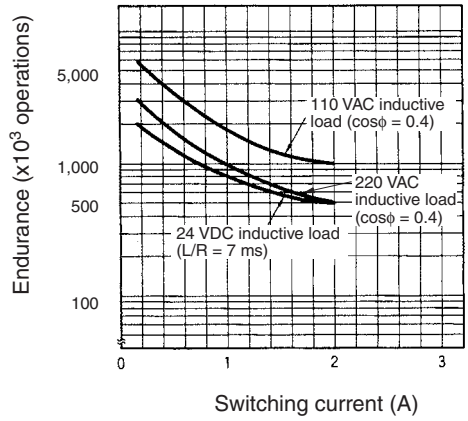


Endurance

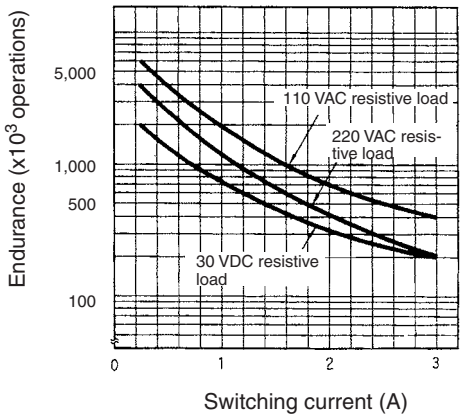
MY2-02, MY2F, MY3 Series (Resistive Loads)



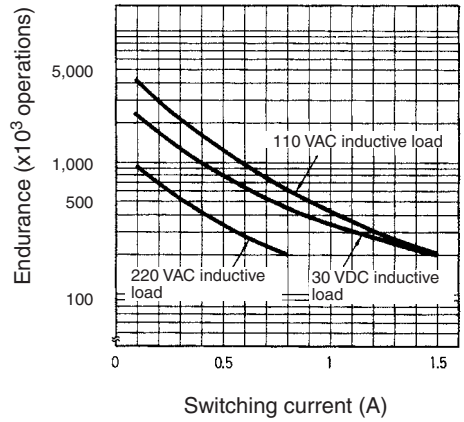
MY2-02, MY2F, MY3 Series (Inductive Loads)



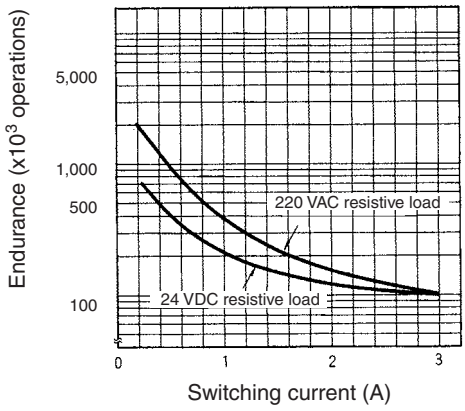
MY4-02, MY4F (Resistive Loads)



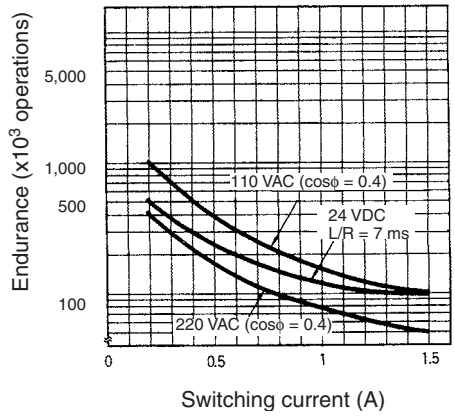
MY4-02, MY4F (Inductive Loads)



MY4Z-02, MY4ZF (Resistive Loads)



MY4Z-02, MY4ZF (Inductive Loads)

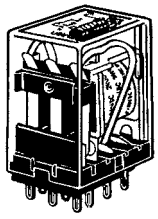


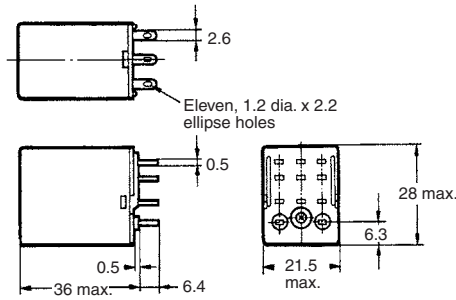
Dimensions

Note: All units are in millimeters unless otherwise indicated.

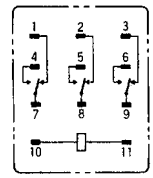
Relays with Solder Terminals

MY3, MY3N, MY3-D, MY3N-D2



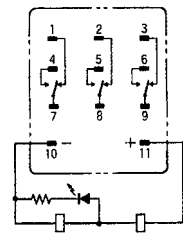


MY3

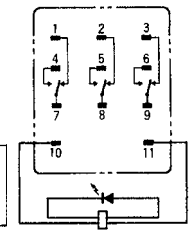


MY3N

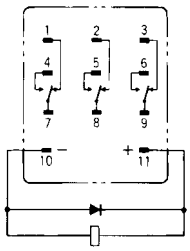
DC Type



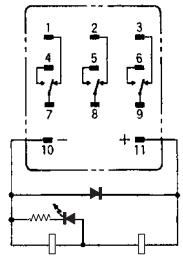
AC Type



MY3-D



MY3N-D2



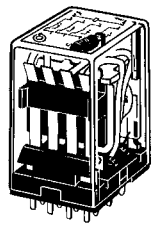
Note: 1. AC type is equipped with a coil disconnection self-diagnostic function.

2. Do not reverse the polarity of DC Relays.

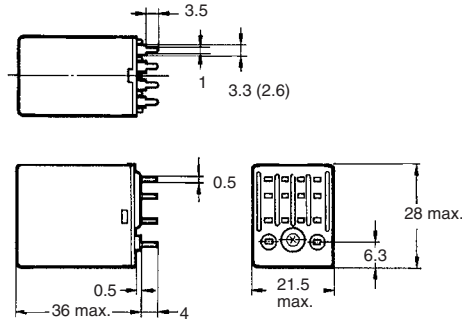
3. The terminal arrangement and internal connections of the above Relays are as same as these of MY□ Relays.

Relays with PCB Terminals

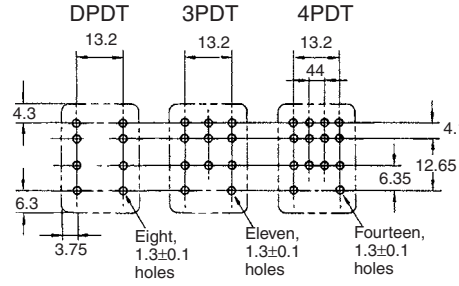
MY□-02



MY4-02 (4PDT)



PC Board Mounting Holes



Note: The tolerance is ±0.1.

Note: 1. The figures in the parentheses are for MY4-02.

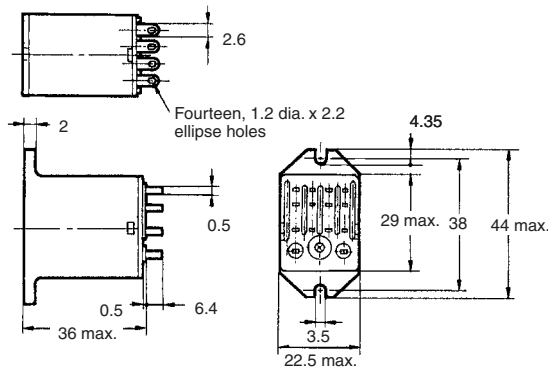
2. The above dimensions also apply to the DPDT and 3PDT Relays.

3. The internal connections of the above Relays are as same as these of MY□ Relays.

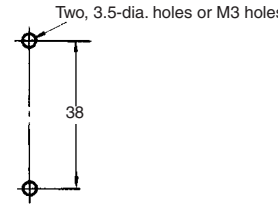
Upper-mounting Relays

MY□F

MY4F



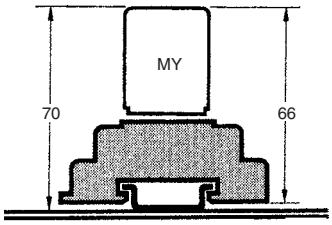
Mounting Holes



Note: 1. The above dimensions also apply to the DPDT, and 3PDT Relays.
2. The internal connections of the above Relays are as same as these of MY□ Relays.

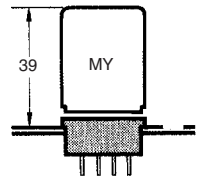
Mounting Height with Socket

DIN Track/Surface-mounting Socket



PYF11A

Back-mounting Socket

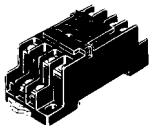


PY□

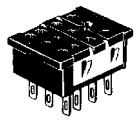
Note: The PYF( )A can be track-mounted or screw-mounted.

Sockets

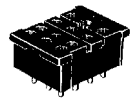
PYF11A



PY11

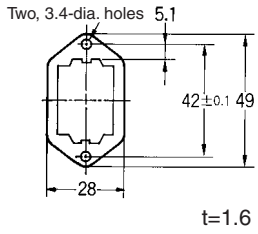


PY11-02

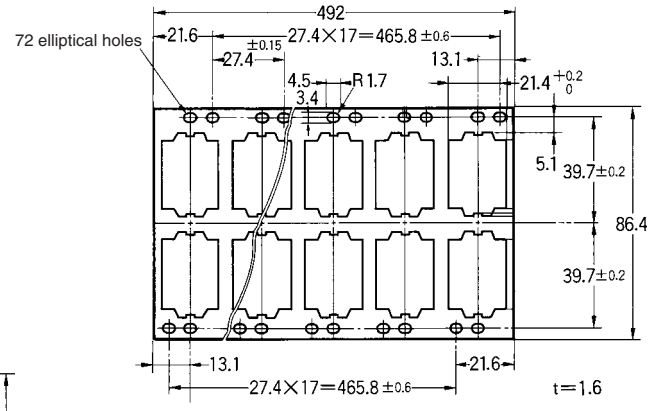


Mounting Plates for Backconnecting Sockets

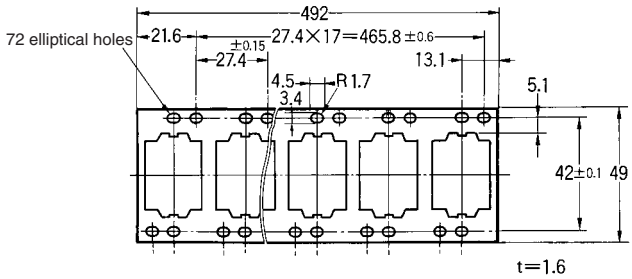
PYP-1



PYP-36

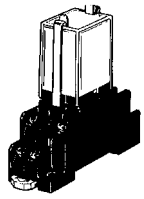
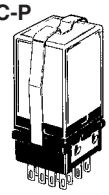
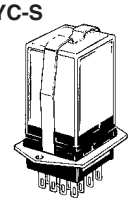


PYP-18



Hold-down Clips

Hold-down clips are used to hold Relays to Sockets and prevent them from coming loose due to vibration or shock.

Connection to Socket		Connection to mounting plate
PYC-A1 	PYC-P 	PYC-S 

■ Safety Standards for Sockets

Item	Standards	File No.
PYF11A	UL508	E87929
	CSA22.2	LR31928

Precautions

Refer to page 11 for general precautions.

■ Connections

Do not reverse polarity when connecting DC-operated Relays with built-in diodes or indicators or high-sensitivity DC-operated Relays.

■ Mounting

- Whenever possible, mount Relays so that it is not subject to vibration or shock in the same direction as that of contact movement.

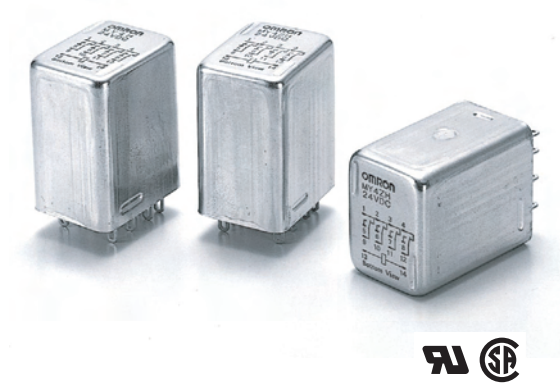
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J001-E1-12 In the interest of product improvement, specifications are subject to change without notice.

Hermetically Sealed Relay
MY4H

Hermetically Sealed Relay Ideal for Hazardous Locations

- Class 1 Division 2 approved.
- Fully hermetically sealed for hazardous locations.
- Cadmium-free contacts for environment-friendly use.
- Models with bifurcated contact also available.
- Conforms to UL508 and CSA 22.2.



Model Number Structure

■ Model Number Legend

MY-□ □ □-□-□
1 2 3 4 5

1. **Number of Poles**
   4: 4 poles
2. **Contact**
   Blank: Single
   Z: Bifurcated
3. **Enclosure ratings**
   H: Hermetically sealed
4. **Approval**
   US: Class 1 Division 2 approval
5. **Rated voltage**
   12 VDC, 24 VDC, 24 VAC, 110/120 VAC

Ordering Information

■ List of Models

Type	Contact form	Plug-in socket/solder terminals
Hermetically sealed	4PDT 4PDT (bifurcated)	MY4H-US MY4ZH-US

Specifications

■ Ratings

Coil

Rated voltage (V)		Rated current (mA)		Coil resistance (Ω)	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
DC	12	75		160	80% max.	10% min.	110%	900 mW
	24	36.9		650				
AC	110/120	9.9/10.8	8.4/9.2	4,430		30% min.		0.9-1.1 VA (60 Hz)
	24	53.8	46	180				

Contact Ratings

Contact material		Ag alloy
Rated load	Resistive p.f.=1	110 VAC, 3 A 24 VDC, 3 A
	Inductive p.f.=0.4 L/R–7 ms	110 VAC, 8 A 24 VDC, 1.5 A
Rated carry current		3 A
Max. switching voltage		125 VAC, 125 VDC
Max. switching current		3 A
Max. switching power		330 VA 72 W

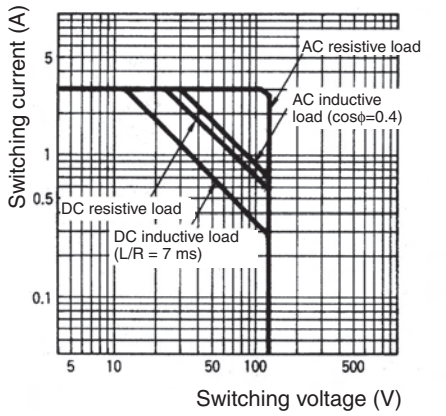
■ Characteristics

Contact resistance	50 mΩ max.
Operate time	20 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	1,000 VAC, 1 min between coil and contacts 1,000 VAC, 1 min between contacts of different polarity 700 VAC, 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: When energized: 200 m/s^2 When not energized: 200 m/s^2
Endurance	Mechanical: Single contact: 50,000,000 operations Bifurcated contact: 5,000,000 operations Electrical: 100,000 operations. (Single contact) 50,000 operations. (Bifurcated contact)
Ambient temperature	Operating: –25 to 60°C
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 50 g

Engineering Data

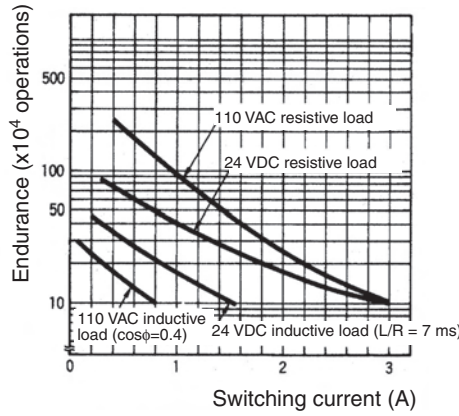
Maximum Switching Power

MY4(Z)H



Endurance

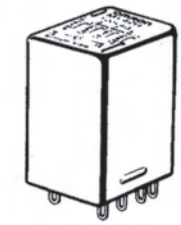
MY4H

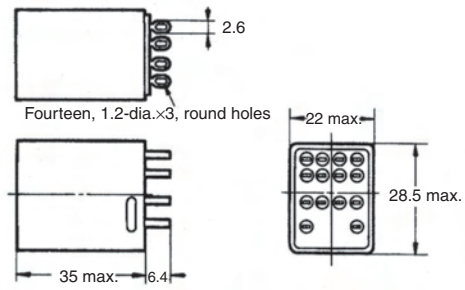


Note: The endurance is half for bifurcated contact models.

Dimensions

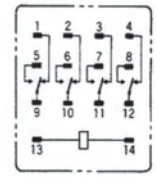
Solder Terminal Models
MY4(Z)H





Terminal Arrangement/ Internal Connections

(BOTTOM VIEW)

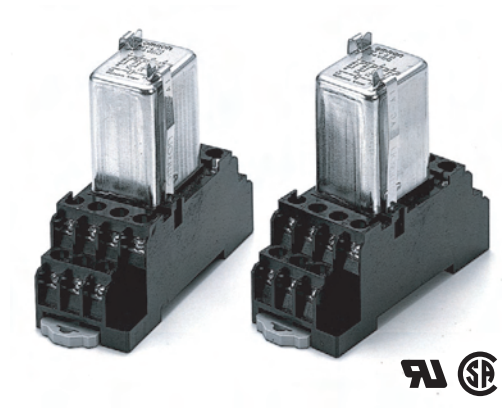


(There is no coil polarity.)

Socket

Track-mounted Socket Conforming to Class 1 Division 2

- Special Socket with Class 1 Division 2 approval.
- Holding clips contribute to safety by preventing the Relay falling out of the Socket due to vibration.



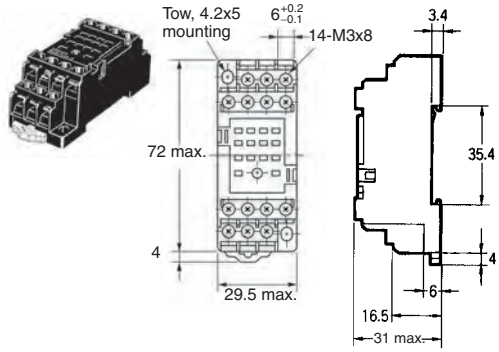
■ Ordering Information

Item	Pole	Mode
Track-mounted socket	4	PYF14A-E-US

Note: 1. Class 1 Division 2 approval is obtained for use with the MY4(Z)H Relay.
2. Clips are not included.

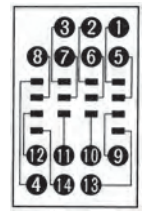
■ Dimensions

PYF14A-E-US

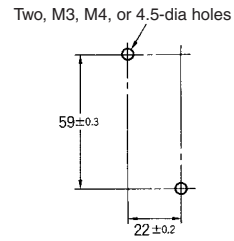


Terminal Arrangement/ Internal Connections

(Top View)



Mounting Holes

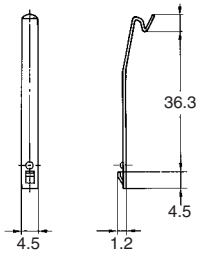


(TOP VIEW)

Note: Track mounting is also possible.

■ Accessory (Option)

PYC-A1
(2 pcs per set)



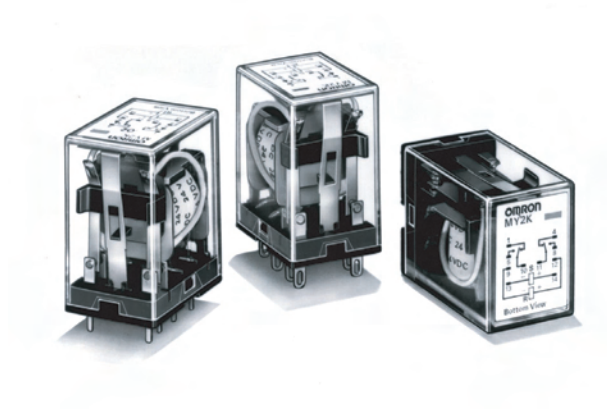
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J131-E1-02 In the interest of product improvement, specifications are subject to change without notice.

General-purpose Latching Relay
MYK

Magnetic Latching Relay Ideal for Memory and Data Transmission Circuits

- Double-winding latch system that holds residual magnetism.
- Changes due to aging are negligible because of use of special magnetic materials, thus ensuring long continuous holding time.
- Little change in characteristics such as contact follow, contact pressure, etc., throughout its long life.
- Excellent vibration/shock resistance.
- Easy monitoring of ON/OFF operation thanks to the built-in operation indicator mechanism.
- Same outline dimensions as the MY Miniature Power Relay.



Ordering Information

■ List of Models

Contact form	Plug-in/solder terminal model	PCB terminal model
DPDT	MY2K	MY2K-02

■ Accessories (Order Separately)

Connecting Sockets

No. of poles	Front-connecting Socket	Back-connecting Socket		
	Screw terminals	Solder terminals	Wire-wrap terminals	PCB terminals
Without Relay Hold-down Clip	PYF14A-E PYF14A PYF14-N	PY14	PY14QN	PY14-02
With Hold-down Clip	---	PY14-Y1	PY14QN-Y1	---

Note: Refer to the MY Datasheet for detail information on the Relay Hold-down Clips and Relay-mounting Sockets.

Specifications

■ Coil Ratings

Rated voltage		Set coil			Reset coil			Must-set voltage	Must-reset voltage	Max. voltage	Power consumption (Approx.)	
		Rated current		Resistance	Rated current		Resistance	% of rated voltage			Set coil	Reset coil
		50 Hz	60 Hz		50 Hz	60 Hz						
AC	12 V	57 mA	56 mA	72 Ω	39 mA	38.2 mA	130 Ω	80% max.	80% max.	110%	0.6 to 0.9 (60 Hz)	0.2 to 0.5 (60 Hz)
	24 V	27.5 mA	26.4 mA	320 Ω	18.6 mA	18.1 mA	550 Ω					
	50 V	14.0 mA	13.4 mA	1,400 Ω	3.5 mA	3.4 mA	3,000 Ω					
	100 V	7.1 mA	6.9 mA	5,400 Ω	3.5 mA	3.4 mA	3,000 Ω					
DC	12 V	110 mA		110 Ω	50 mA		235 Ω				1.3 W	0.6 W
	24 V	52 mA		470 Ω	25 mA		940 Ω					

Note: 1. For AC models, the rated current values are half-wave rectified current values measured with a DC ammeter.

2. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC rated current, and +15% for DC coil resistance.

3. The AC coil resistance values are for reference only.

4. Performance characteristic data are measured at a coil temperature of 5°C to 35°C.

■ Contact Ratings

Item	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4) (L/R = 7 ms)
Rated load	3 A at 220 VAC, 3 A at 24 VDC	0.8 A at 220 VAC, 1.5 A at 24 VDC
Rated carry current	3 A	
Max. switching voltage	250 VAC, 125 VDC	
Max. switching current	3 A	
Max. switching power	660 VA, 72 W	176 VA, 36 W
Failure rate* (reference value)	1 mA at 1 VDC	

***Note:** P level: λ_{60} = 0.1 x 10^{-6}/operation

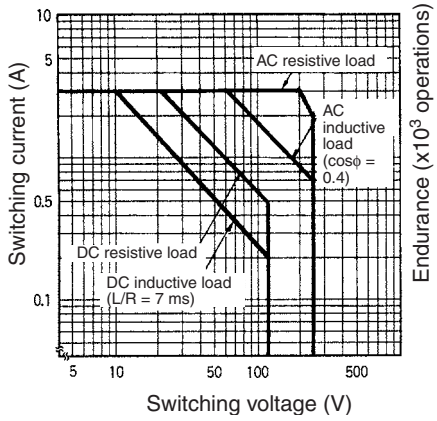
■ Characteristics

Contact resistance	50 mΩ max.
Set time	Time: AC: 30 ms max.; DC: 15 ms max.
	Min. pulse width: AC: 60 ms.; DC: 15 ms.
Reset time	Time: AC: 30 ms max.; DC: 15 ms max.
	Min. pulse width: AC: 60 ms.; DC: 15 ms.
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min (1,000 VAC between contacts of same polarity and between set and reset coils)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Endurance	Mechanical: 100,000,000 operations min. (at 18,000 operations/hr) Electrical: 200,000 operations min. (at 1,800 operations/hr)
Ambient temperature	Operating: –55°C to 60°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 30 g

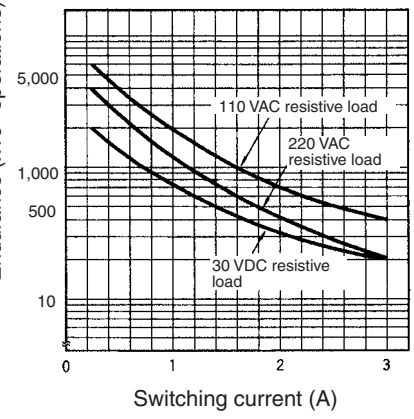
Note: The data shown above are initial values.

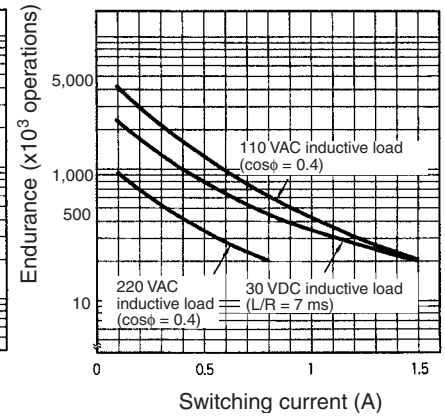
Engineering Data

Maximum Switched Power



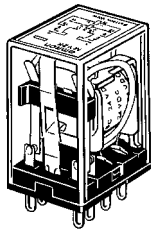
Endurance

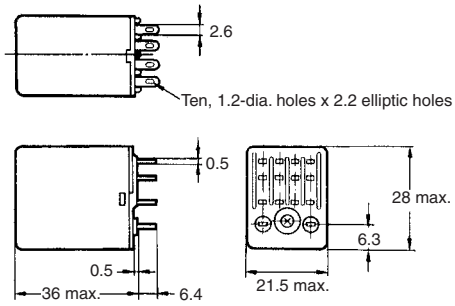




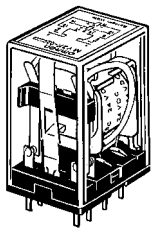
Dimensions

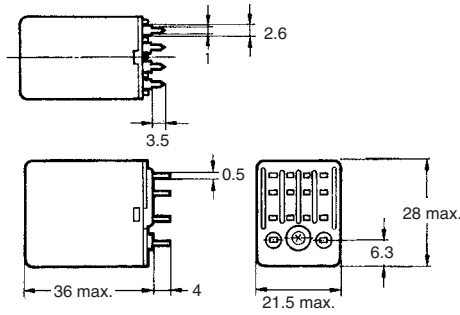
MY2K



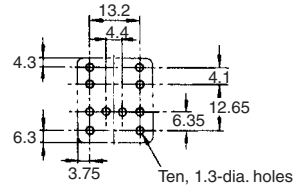


MY2K-02





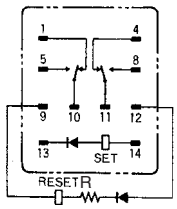
Mounting Holes (Bottom View)



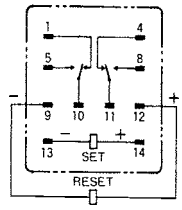
Note: Dimensional tolerances are ±0.1 mm.

Terminal Arrangement/Internal Connections (Bottom View)

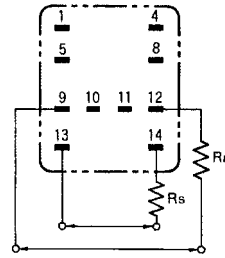
AC Model



DC Model



Use at 220 VAC



Rs: 7.3 kΩ 3 W
Rr: 14.3 kΩ 1 W

Note: 1. Resistor is for ampere-turn compensation and is incorporated in the Relay rated at 50 VAC or above.

2. Pay attention to the polarity of the set and reset coils, as incorrect connection of positive and negative terminal will result in the Relay malfunctioning.

When using the Relay rated at 110 VAC at a supply voltage of 220 VAC, be sure to connect external resistors Rs and Rr to the Relay.

If the supply voltage is applied to the set and reset coils at the same time, the Relay will be put in the set state.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

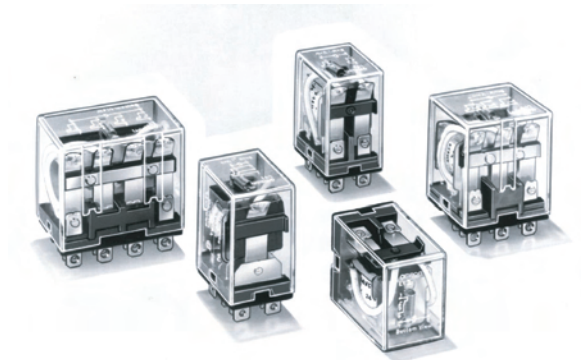
Cat. No. J013-E1-02

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

General-purpose Relay
LY

A Miniature Power Relay

- Equipped with arc barrier.
- Dielectric strength: 2,000 V.
- Built-in diode models added to the LY Series.
- Single-pole and double-pole models are applicable to operating coils with ratings of 100/110 VAC, 110/120 VAC, 200/220 VAC, 220/240 VAC, or 100/110 VDC).
- Three-pole and four-pole models are applicable to operating coils with ratings of 100/110 VAC, 200/220 VAC, or 100/110 VDC).



CE UL CSA SEV VDE LR

Ordering Information

■ Open Relays

Type	Contact form	Plug-in/solder terminals	Plug-in/solder terminals with LED indicator	PCB terminals	Upper-mounting Plug-in/solder terminals
Standard	SPDT	LY1	LY1N	LY1-0	LY1F
	DPDT	LY2	LY2N	LY2-0	LY2F
	DPDT (bifurcated)	LY2Z	LY2ZN	LY2Z-0	LY2ZF
	3PDT	LY3	LY3N	LY3-0	LY3F
	4PDT	LY4	LY4N	LY4-0	LY4F
With built-in diode (DC only)	SPDT	LY1-D	LY1N-D2	---	---
	DPDT	LY2-D	LY2N-D2	---	---
	DPDT (bifurcated)	LY2Z-D	LY2ZN-D2	---	---
	3PDT	LY3-D	---	---	---
	4PDT	LY4-D	LY4N-D2	---	---
With built-in CR (AC only)	SPDT	---	---	---	---
	DPDT	LY2-CR	LY2N-CR	---	---
	DPDT (bifurcated)	LY2Z-CR	LY2ZN-CR	---	---

Note: 1. When ordering, add the rated coil voltage to the model number. Rated coil voltages are given in the coil ratings table.

Example: LY2, 6 VAC
└── Rated coil voltage

2. Relays with #187 quick connect terminals are also available with SPDT and DPDT contact. Ask your OMRON representative for details.

3. SEV models are standard Relays excluding DPDT (bifurcated) models.

4. VDE- or LR- qualifying Relays must be specified when ordering.

■ Accessories (Order Separately)

Sockets

Poles	Front-connecting Socket	Back-connecting Socket		
	DIN track/screw terminals	Plug-in/solder terminals	Wrapping terminals	PCB terminals
1 or 2	PTF08A-E, PTF08A	PT08	PT08QN	PT08-0
3	PTF11A	PT11	PT11QN	PT11-0
4	PTF14A-E, PTF14A	PT14	PT14QN	PT14-0

Note: 1. For PTF08-E and PTF14A-E, see "Track Mounted Socket."

2. PTF□A (-E) Sockets have met UL and CSA standards: UL 508/CSA C22.2.

Mounting Plates for Sockets

Socket model	For 1 Socket	For 10 Sockets	For 12 Sockets	For 18 Sockets
PT08 PT08QN	PYP-1	---	---	PYP-18
PT11 PT11QN	PTP-1-3	---	PTP-12	---
PT14 PT14QN	PTP-1	PTP-10	---	---

Socket-Hold-down Clip Pairings

Relay type	Poles	Front-connecting Sockets		Back-connecting Sockets	
		Socket model	Clip model	Socket model	Clip model
Standard, bifurcated contacts operation indicator, built-in diode	1, 2	PTF08A-E, PTF08A	PYC-A1	PT08(QN), PT08-0	PYC-P
	3	PTF11A		PT11(QN), PT11-0	
	4	PTF14A-E, PTF14A		PT14(QN), PT14-0	
CR circuit	2	PTF08A-E, PTF08A	Y92H-3	PT08(QN), PT08-0	PYC-1

Specifications

■ Coil Ratings

Single- and Double-pole Relays

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consum. (approx.)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V	214.1 mA	183 mA	12.2 Ω	0.04 H	0.08 H	80% max.	30% min.	110%	1.0 to 1.2 VA (60 Hz)
	12 V	106.5 mA	91 mA	46 Ω	0.17 H	0.33 H				
	24 V	53.8 mA	46 mA	180 Ω	0.69 H	1.30 H				
	50 V	25.7 mA	22 mA	788 Ω	3.22 H	5.66 H				
	100/110 V	11.7/12.9 mA	10/11 mA	3,750 Ω	14.54 H	24.6 H				0.9 to 1 VA (60 Hz)
	110/120 V	9.9/10.8 mA	8.4/9.2 mA	4,430 Ω	19.20 H	32.1 H				
	200/220 V	6.2/6.8 mA	5.3/5.8 mA	12,950 Ω	54.75 H	94.07 H				
	220/240 V	4.8/5.3 mA	4.2/4.6 mA	18,790 Ω	83.50 H	136.40 H				
DC	6 V	150 mA		40 Ω	0.16 H	0.33 H		10% min.		0.9 W
	12 V	75 mA		160 Ω	0.73 H	1.37 H				
	24 V	36.9 mA		650 Ω	3.20 H	5.72 H				
	48 V	18.5 mA		2,600 Ω	10.6 H	21.0 H				
	100/110 V	9.1/10 mA		11,000 Ω	45.6 H	86.2 H				

Note: See notes on the bottom of next page.

Three-pole Relays

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consum. (approx)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V	310 mA	270 mA	6.7 Ω	0.03 H	0.05 H	80% max.	30% min.	110%	1.6 to 2.0 VA (60 Hz)
	12 V	159 mA	134 mA	24 Ω	0.12 H	0.21 H				
	24 V	80 mA	67 mA	100 Ω	0.44 H	0.79 H				
	50 V	38 mA	33 mA	410 Ω	2.24 H	3.87 H				
	100/110 V	14.1/16 mA	12.4/13.7 mA	2,300 Ω	10.5 H	18.5 H				
	200/220 V	9.0/10.0 mA	7.7/8.5 mA	8,650 Ω	34.8 H	59.5 H				
DC	6 V	234 mA		25.7 Ω	0.11 H	0.21 H		10% min.		1.4 W
	12 V	112 mA		107 Ω	0.45 H	0.98 H				
	24 V	58.6 mA		410 Ω	1.89 H	3.87 H				
	48 V	28.2 mA		1,700 Ω	8.53 H	13.9 H				
	100/110 V	12.7/13 mA		8,500 Ω	29.6 H	54.3 H				

Note: See notes under next table.

Four-pole Relays

Rated voltage		Rated current		Coil resistance	Coil inductance (reference value)		Must operate voltage	Must release voltage	Max. voltage	Power consum. (approx)
		50 Hz	60 Hz		Arm. OFF	Arm. ON	% of rated voltage			
AC	6 V	386 mA	330 mA	5 Ω	0.02 H	0.04 H	80% max.	30% min.	110%	1.95 to 2.5 VA (60 Hz)
	12 V	199 mA	170 mA	20 Ω	0.10 H	0.17 H				
	24 V	93.6 mA	80 mA	78 Ω	0.38 H	0.67 H				
	50 V	46.8 mA	40 mA	350 Ω	1.74 H	2.88 H				
	100/110 V	22.5/25.5 mA	19/21.8 mA	1,600 Ω	10.5 H	17.3 H				
	200/220 V	11.5/13.1 mA	9.8/11.2 mA	6,700 Ω	33.1 H	57.9 H				
DC	6 V	240 mA		25 Ω	0.09 H	0.21 H		10% min.		1.5 W
	12 V	120 mA		100 Ω	0.39 H	0.84 H				
	24 V	69 mA		350 Ω	1.41 H	2.91 H				
	48 V	30 mA		1,600 Ω	6.39 H	13.6 H				
	100/110 V	15/15.9 mA		6,900 Ω	32 H	63.7 H				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for rated currents and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperatures of 23°C.

3. AC coil resistance and impedance are provided as reference values (at 60 Hz).

4. Power consumption drop was measured for the above data. When driving transistors, check leakage current and connect a bleeder resistor if required.

■ Contact Ratings

Relay	Single contact				Bifurcated contacts	
	1-pole		2-, 3- or 4-pole		2-pole	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)
Rated load	110 VAC 15 A 24 VDC 15 A	110 VAC 10 A 24 VDC 7 A	110 VAC 10 A 24 VDC 10 A	110 VAC 7.5 A 24 VDC 5 A	110 VAC 5A 24 VDC 5 A	110 VAC 4 A 24 VDC 4A
Rated carry current	15 A		10 A		7 A	
Max. switching voltage	250 VAC 125 VDC		250 VAC 125 VDC		250 VAC 125 VDC	
Max. switching current	15 A		10 A		7 A	
Max. switching power	1,700 VA 360 W	1,100 VA 170 W	1,100 VA 240 W	825 VA 120 W	550 VA 120 W	440 VA 100 W
Failure rate (reference value)*	100 mA, 5 VDC		100 mA, 5 VDC		10 mA, 5 VDC	

***Note:** P level: λ_{60} = 0.1 x 10^{-6}/operation, reference value

■ Characteristics

Item	All except Relays with bifurcated contacts	Relays with bifurcated contacts
Contact resistance	50 mΩ max.	
Operate time	25 ms max.	
Release time	25 ms max.	
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity	
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2	
Endurance	Mechanical: AC: 50,000,000 operations min. (at 18,000 operations/hr) DC: 1,00,000,000 operations min. (at 18,000 operations/hr) Electrical: Single-, three-, and four-pole: 200,000 operations min. (at 1,800 operations/hr under rated load) Double-pole: 500,000 operations min. (at 1,800 operations/hr under rated load)	
Ambient temperature*	Operating: Single- and double-pole standard, bifurcated-contact Relays: –25°C to 55°C (with no icing) (–25°C to 70°C if carry current is 4 A or less) All other Relays: –25°C to 40°C (with no icing) (–25°C to 55°C if carry current is 4 A or less)	
Ambient humidity	Operating: 5% to 85%	
Weight	Single- and double-pole: approx. 40 g, three-pole: approx. 50 g, four-pole: approx. 70 g	

Note: 1. The values given above are initial values.

2. The upper limit of 40°C for some Relays is because of the relationship between diode junction temperature and the element used.

■ Endurance Under Real Loads (reference only)

LY1

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC motor	400 W, 100 VAC single-phase with 35-A inrush current, 7-A current flow	ON for 10 s, OFF for 50 s	50,000 operations
	AC lamp	300 W, 100 VAC with 51-A inrush current, 3-A current flow	ON for 5 s, OFF for 55 s	100,000 operations
		500 W, 100 VAC with 78-A inrush current, 5-A current flow		25,000 operations
	Capacitor (2,000 μF)	24 VDC with 50-A inrush current, 1-A current flow	ON for 1 s, OFF for 6 s	100,000 operations
	AC solenoid	50 VA with 2.5-A inrush current, 0.25-A current flow	ON for 1 s, OFF for 2 s	1,500,000 operations
		100 VA with 5-A inrush current, 0.5-A current flow		800,000 operations

LY2

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC motor	200 W, 100 VAC single-phase with 25-A inrush current, 5-A current flow	ON for 10 s, OFF for 50 s	200,000 operations
	AC lamp	300 W, 100 VAC with 51-A inrush current, 3-A current flow	ON for 5 s, OFF for 55 s	80,000 operations
	Capacitor (2,000 μF)	24 VDC with 50-A inrush current, 1-A current flow	ON for 1 s, OFF for 15 s	10,000 operations
		24 VDC with 20-A inrush current, 1-A current flow		150,000 operations
	AC solenoid	50 VA with 2.5-A inrush current, 0.25-A current flow	ON for 1 s, OFF for 2 s	1,000,000 operations
		100 VA with 5-A inrush current, 0.5-A current flow		500,000 operations

LY4

Rated voltage	Load type	Conditions	Operating frequency	Electrical life
100 VAC	AC motor	200 W, 200 VAC triple-phase with 5-A inrush current, 1-A current flow	ON for 10 s, OFF for 50 s	500,000 operations
		750 W, 200 VAC triple-phase with 18-A inrush current, 3.5 A current flow		70,000 operations
	AC lamp	300 W, 100 VAC with 51-A inrush current, 3-A current flow	ON for 5 s, OFF for 55 s	50,000 operations
	Capacitor (2,000 μF)	24 VDC with 50-A inrush current, 1-A current flow	ON for 1 s, OFF for 15 s	5,000 operations
		24 VDC with 20-A inrush current, 1-A current flow	ON for 1 s, OFF for 2 s	200,000 operations
	AC solenoid	50 VA with 2.5-A inrush current, 0.25-A current flow	ON for 1 s, OFF for 2 s	1,000,000 operations
		100 VA with 5-A inrush current, 0.5-A current flow		500,000 operations

■ Approved Standards

UL 508 Recognitions (File No. 41643)

No. of poles	Coil ratings	Contact ratings	Operations
1	6 to 240 VAC 6 to 125 VDC	15 A, 30 VDC (Resistive) 15 A, 240 VAC (General use) TV-5, 120 VAC 1/2 HP, 120 VAC	6×10^3
			25×10^3
2		15 A, 28 VDC (Resistive) 15 A, 120 VAC (Resistive) 12 A, 240 VAC (General use) 1/2 HP, 120 VAC	6×10^3
			25×10^3
3 and 4		10 A, 30 VDC (Resistive) 10 A, 240 VAC (General use) 1/3 HP, 240 VAC	6×10^3

CSA 22.2 No. 14 Listings (File No. LR31928)

No. of poles	Coil ratings	Contact ratings	Operations
1	6 to 240 VAC 6 to 125 VDC	15 A, 30 VDC (Resistive) 15 A, 120 VAC (General use) 1/2 HP, 120 VAC TV-5, 120 VAC	6×10^3
			25×10^3
2		15 A, 30 VDC (Resistive) 15 A, 120 VAC (Resistive) 1/2 HP, 120 VAC TV-3, 120 VAC	6×10^3
3 and 4		10 A, 30 VDC (Resistive) 10 A, 240 VAC (General use)	

SEV Listings (File No. D3,31/137)

No. of poles	Coil ratings	Contact ratings	Operations
1	6 to 240 VAC 6 to 125 VDC	15 A, 24 VDC 15 A, 220 VAC	6×10^3
2 to 4		10 A, 24 VDC 10 A, 220 VAC	

TÜV (File No. R9251226) (IEC255)

No. of poles	Coil ratings	Contact ratings	Operations
1 to 4	6 to 125 VDC 6 to 240 VAC	LY1, LY1-FD 15 A, 110 VAC ($\cos\phi$=1) 10 A, 110 VAC ($\cos\phi$=0.4) LY2, LY2-FD, LY3, LY3-FD, LY4, LY4-FD 10 A, 110 VAC ($\cos\phi$=1) 7.5 A, 110 VAC ($\cos\phi$=0.4)	100×10^3

VDE Recognitions (No. 9903UG and 9947UG)

No. of poles	Coil ratings	Contact ratings	Operations
1	6, 12, 24, 50, 110, 220 VAC 6, 12, 24, 48, 110 VDC	10 A, 220 VAC ($\cos\phi$=1) 7 A, 220 VAC ($\cos\phi$=0.4) 10 A, 28 VDC (L/R=0 ms) 7 A, 28 VDC (L/R=7 ms)	200×10^3
2		7 A, 220 VAC ($\cos\phi$=1) 4 A, 220 VAC ($\cos\phi$=0.4) 7 A, 28 VDC (L/R=0 ms) 4 A, 28 VDC (L/R=7 ms)	

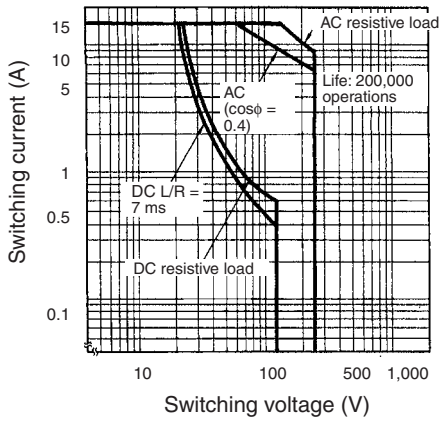
LR Recognitions (No. 563KOB-204523)

No. of poles	Coil ratings	Contact ratings
2, 4	6 to 240 VAC 6 to 110 VDC	7.5 A, 230 VAC (PF0.4) 5 A, 24 VDC (L/R=7 ms)

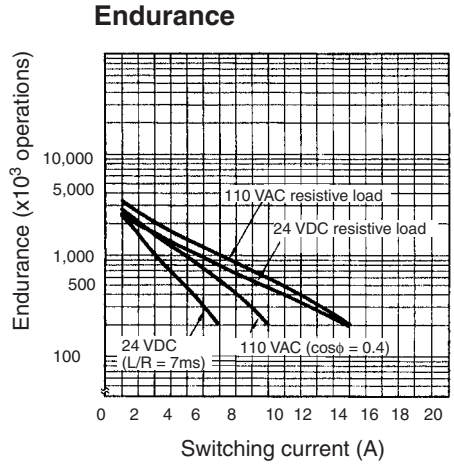
Engineering Data

LY1

Maximum Switching Power

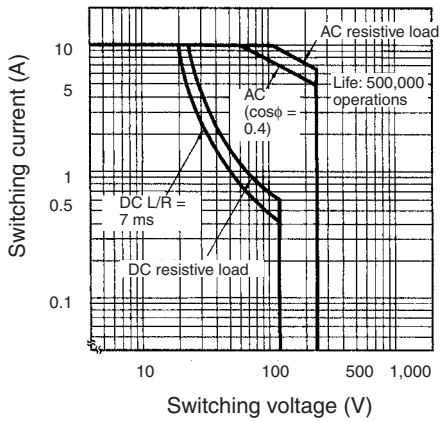


Endurance

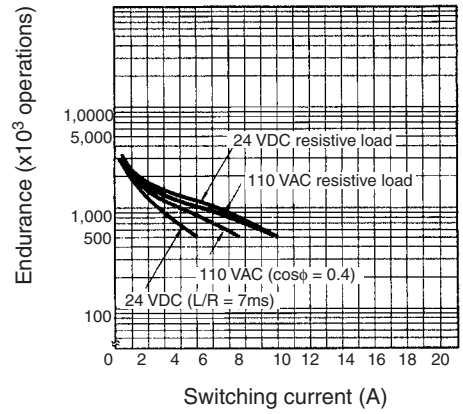


LY2

Maximum Switching Power

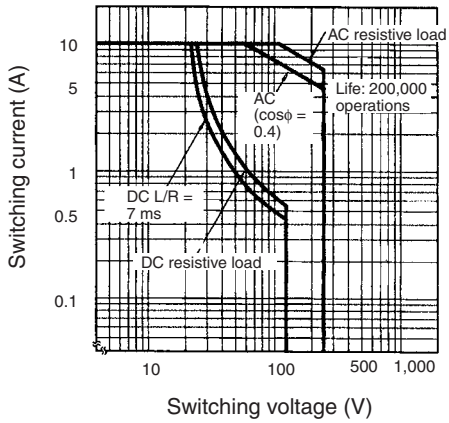


Endurance

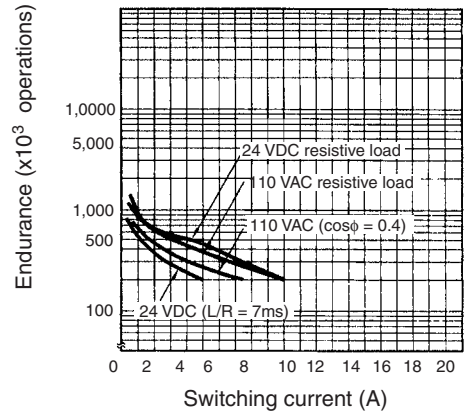


LY3 and LY4

Maximum Switching Power

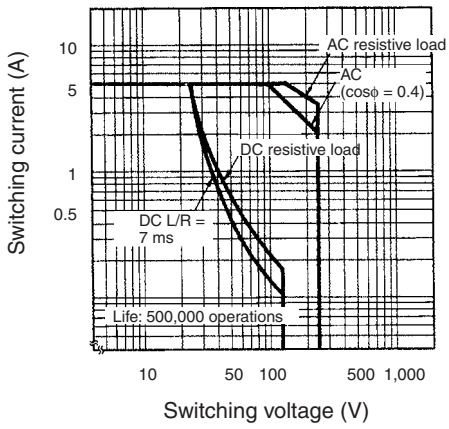


Endurance

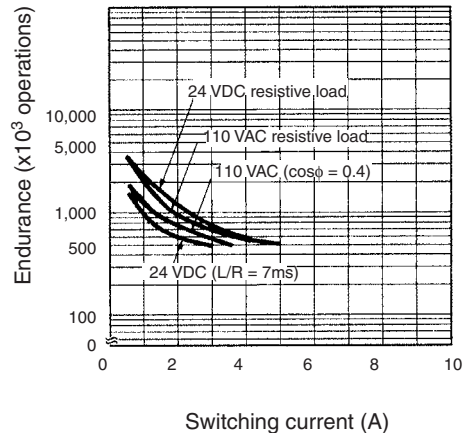


LY2Z

Maximum Switching Power



Endurance

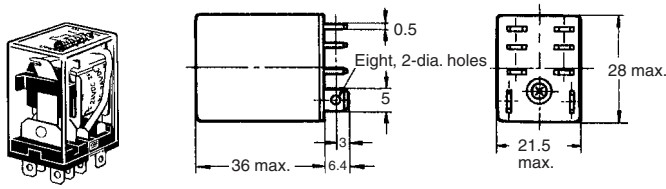


Dimensions

Note: All units are in millimeters unless otherwise indicated.

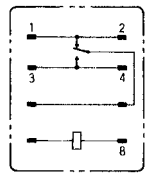
Relays with Solder/Plug-in Terminals

LY1
LY1N (-D2)
LY1-D

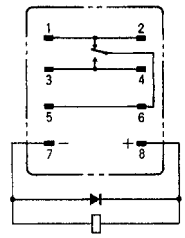


Terminal Arrangement/Internal Connections (Bottom View)

LY1

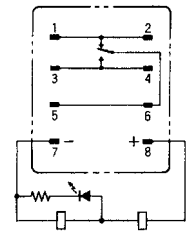


LY1-D

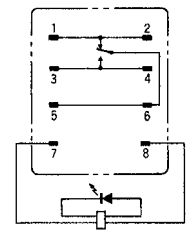


LY1N

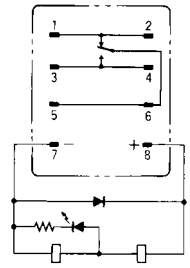
DC Model



AC Model



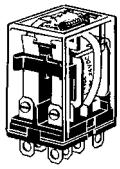
LY1N-D2

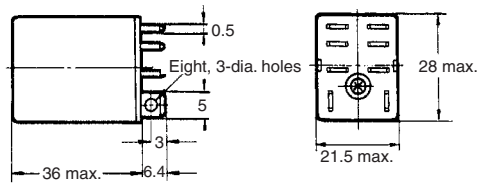


Note: The DC models have polarity.

LY2
LY2-D
LY2N
LY2N-D2

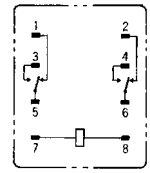
LY2Z
LY2Z-D
LY2ZN
LY2ZN-D2



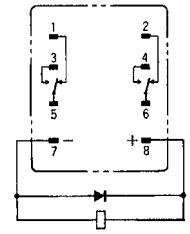


Terminal Arrangement/Internal Connections (Bottom View)

LY2(Z)

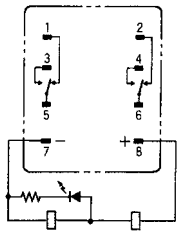


LY2(Z)-D

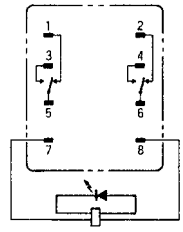


LY2(Z)N

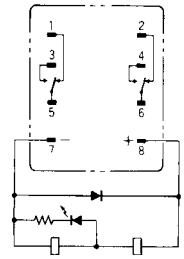
DC Model



AC Model

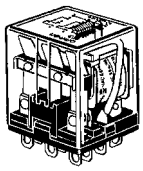


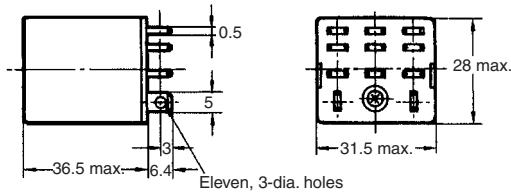
LY2(Z)N-D2



Note: The DC models have polarity.

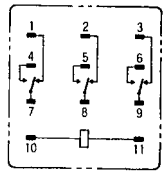
LY3Z
LY3N
LY3-D



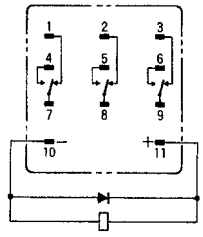


Terminal Arrangement/Internal Connections (Bottom View)

LY3

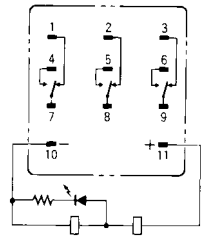


LY3-D

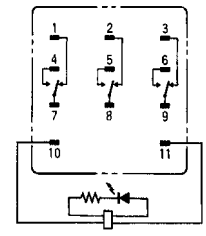


LY3N

DC Model



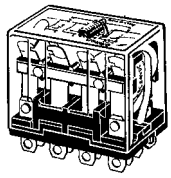
AC Model

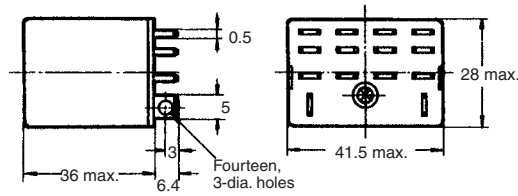


Note: The DC models have polarity.

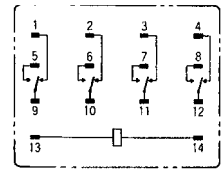
LY4 LY4N
LY4-D LY4N-D2

Terminal Arrangement/Internal Connections (Bottom View)

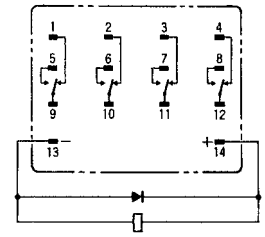




LY4

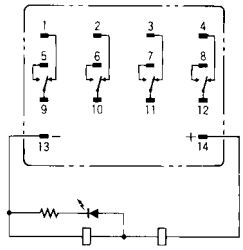


LY4-D

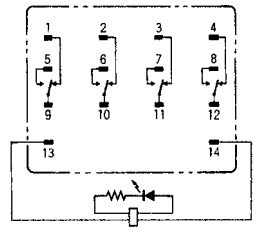


LY4N

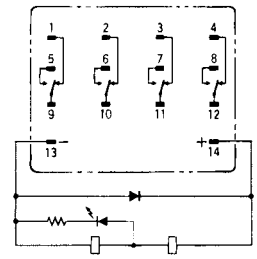
DC Model



AC Model



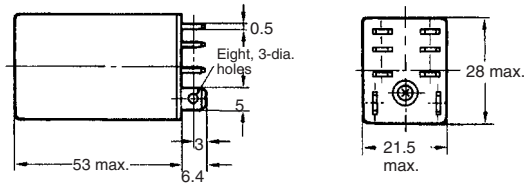
LY4N-D2



Note: The DC models have polarity.

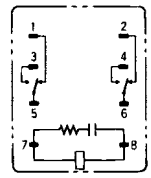
LY2-CR
LY2Z-CR
LY2N-CR
LY2ZN-CR

Terminal Arrangement/Internal Connections (Bottom View)

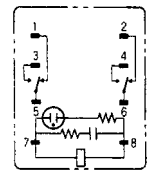


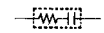
Model: LY2N-CR

LY2(Z)-CR



LY2(Z)N-CR



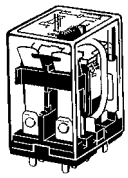


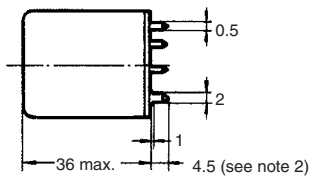
CR Element
C: 0.033 μF
R: 120 Ω

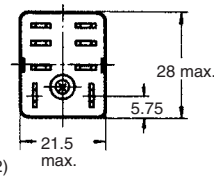
Relays with PCB Terminals

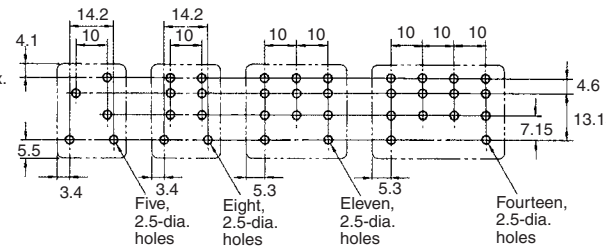
LY1-0 LY3-0
LY2-0 LY4-0

PC Board Holes (Bottom View)







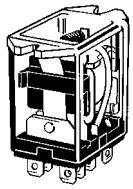


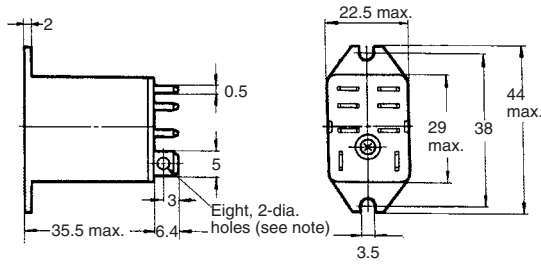
Note: 1. The above model is the LY2-0.
2. This figure is 6.4 for the LY1-0

Note: 1. The tolerance for the above figures is 0.1 mm.
2. Besides the terminals, some part of the LY1-0 carries current. Due attention should be paid when mounting the LY1-0 to a double-sided PC board.

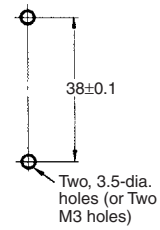
Upper-mounting Relays

LY1F
LY2F



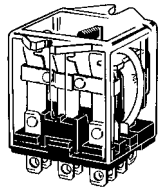


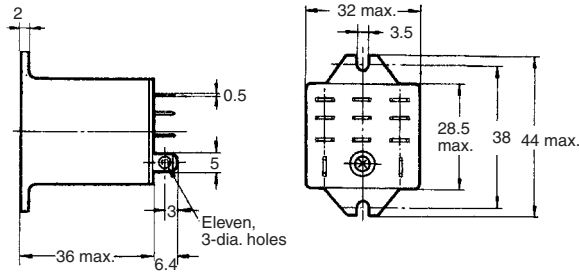
Mounting Holes

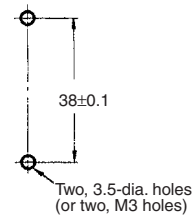


Note: 1. Eight 3-dia. holes should apply to the LY2F model.

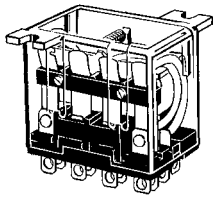
LY3F

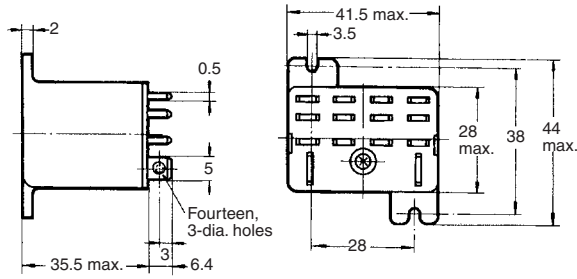




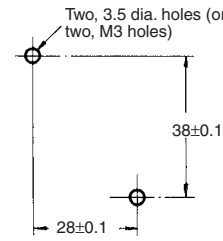


LY4F





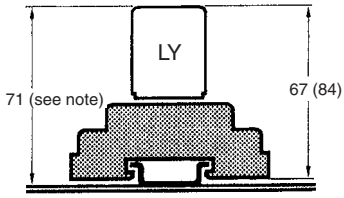
Mounting holes



Mounting Height with Socket

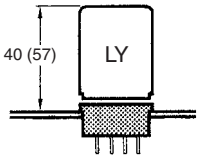
The following Socket heights should be maintained.

Front-connecting



PTF□A (-E)

Back-connecting

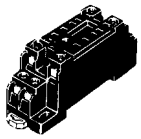


PT□

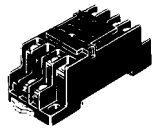
Note: 1. The PTF□A (-E) can be track-mounted or screw-mounted.
2. For the LY□-CR (CR circuit built-in type) model, this figure should be 88.

Sockets

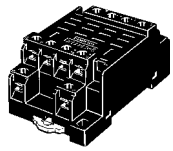
PTF08A-E



PTF11A

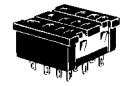


PTF14A-E

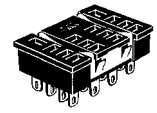


PT08

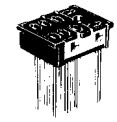
PT11



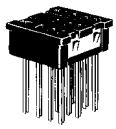
PT14



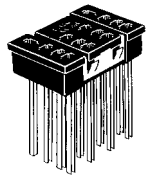
PT08QN



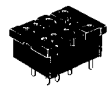
PT11QN



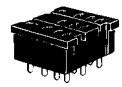
PT14QN



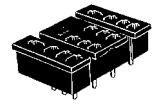
PT08-0



PT11-0

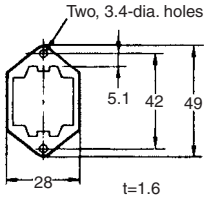


PT14-0

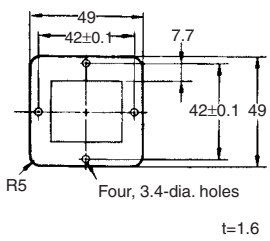


Mounting Plates for Back-connecting

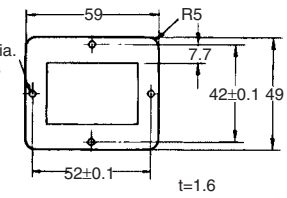
PYP-1



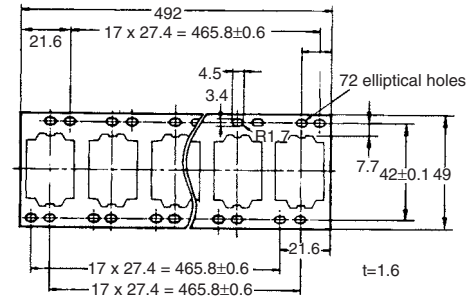
PTP-1-3



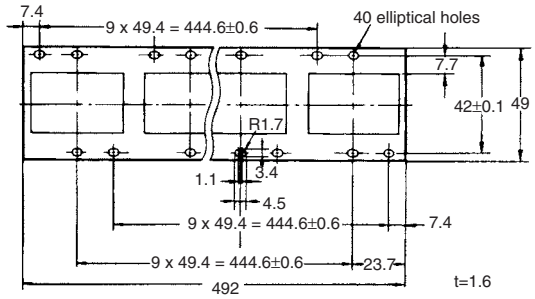
PTP-1



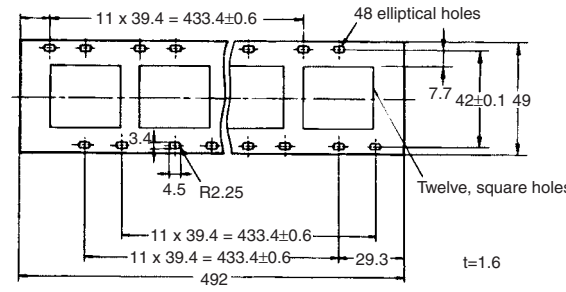
PYP-18



PTP-10

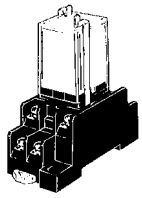
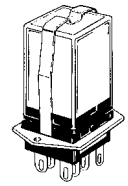
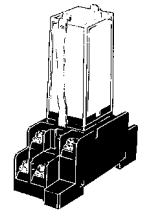


PTP-12



■ Hold-down Clips

Hold-down clips are used to hold Relays to Sockets and prevent them from coming loose due to vibration or shock.

Used with Socket		Used with Socket mounting plate	For CR circuit built-in Relay	
PYC-A1	PYC-P	PYC-S	Y92H-3	PYC-1
				

Precautions

Refer to page 11 for general precautions.

■ Connections

Do not reverse polarity when connecting DC-operated Relays with built-in diodes or indicators.

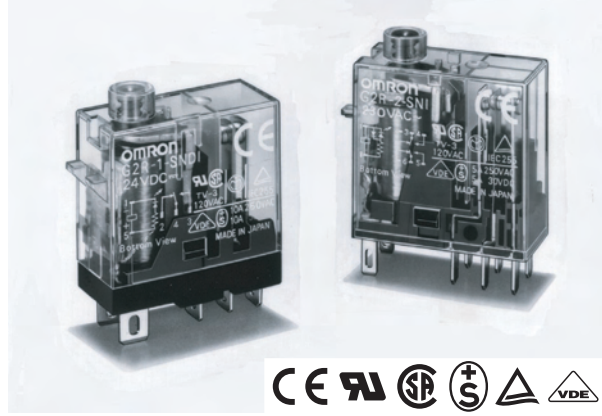
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J002-E1-10

General-purpose Relay
G2RS

The New-generation General-purpose Relay

- Reliable and unique test button models now available.
- High switching power (1-pole: 10 A)
- Highly functional Socket also available.
- Space-saving (29 (H) x 13 (W) x 29 (D))
- Conforms to UL508, CSA22.2, VDE0435 (C250 insulation grade).
- 8-mm creepage distance / 8-mm air distance



Model Number Structure

■ Model Number Legend

G2R □-□ □ □ - □ □ -□
1 2 3 4 5 6 7

1. **Relay Function**
   Blank: General-purpose
2. **Number of Poles**
   1: 1 pole
   2: 2 poles
3. **Contact Form**
   Blank: SPDT
   A: SPST-NO
4. **Contact Type**
   Blank: Single
   3: Bifurcated crossbar
5. **Terminals**
   S: Plug-in
6. **Classification**
   Blank: General-purpose
   N: LED indicator
   D: Diode
   ND: LED indicator and diode
   I: Test button
7. **Rated Coil Voltage**

Ordering Information

■ List of Models

Classification		Enclosure rating	Coil ratings	Contact form			
				SPST-NO	SPDT	DPST-NO	DPDT
Plug-in terminal	General-purpose	Unsealed	AC/DC	---	G2R-1-S	---	G2R-2-S
	LED indicator			---	G2R-1-SN	---	G2R-2-SN
	LED indicator with test button			---	G2R-1-SNI	---	G2R-2-SNI
	Diode		DC	---	G2R-1-SD	---	G2R-2-SD
	LED indicator and diode			---	G2R-1-SND	---	G2R-2-SND
	LED indicator and diode with test button			---	G2R-1-SNDI	---	G2R-2-SNDI
Plug-in terminal (Bifurcated crossbar contact)	General-purpose		AC/DC	G2R-1A3-S	G2R-13-S	---	---
	LED indicator			G2R-1A3-SN	G2R-13-SN	---	---
	LED indicator and diode		DC	G2R-1A3-SND	G2R-13-SND	---	---

Note: When ordering, add the rated coil voltage to the model number.
Example: G2R-1-S 12 VDC
└── Rated coil voltage

■ Accessories (Order Separately)

Connecting Sockets

Number of poles	Applicable Relay model	Track/surface-mounting Socket	Back-mounting Socket	
			Terminals	Model
1 pole	G2R-1-S(N)(D)(ND)(NI)(NDI)G2R-13-S (G2R-1A3-S)	P2RF-05-E P2RF-05	PCB terminals	P2R-05P, P2R-057P
			Solder terminals	P2R-05A
2 poles	G2R-2-S(N)(D)(ND)(NI)(NDI)	P2RF-08-E P2RF-08	PCB terminals	P2R-08P, P2R-087P
			Solder terminals	P2R-08A

Note: See *Dimensions* for details on Socket size.

Mounting Tracks

Applicable Socket	Description	Model
Track-connecting Socket	Mounting track	50 cm (ℓ) x 7.3 mm (t): PFP-50N 1 m (ℓ) x 7.3 mm (t): PFP-100N 1 m (ℓ) x 16 mm (t): PFP-100N2
	End plate	PFP-M
	Spacer	PFP-S
Back-connecting Socket	Mounting plate	P2R-P*

*Used to mount several P2R-05A and P2R-08A Connecting Sockets side by side.

Specifications

■ Coil Ratings

Rated voltage		Rated current*		Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		Armature OFF	Armature ON	% of rated voltage			
AC	12 V	93 mA	75 mA	65 Ω	0.19	0.39	80% max.	30% max.	110%	0.9 VA at 60 Hz (0.7 VA at 60 Hz) (see note)
	24 V	46.5 mA	37.5 mA	260 Ω	0.81	1.55				
	100/(110) V	11 mA	9/(10.6) mA	4,600 Ω	13.34	26.84				
	120 V	9.3 mA	7.5 mA	6,500 Ω	21	42				
	200/(220) V	5.5/4.0 mA	4.5/(5.3) mA	20,200/(25,000) Ω	51.3	102				
	220 V	5.1 mA	4.1 mA	25,000 Ω	57.5	117				
	230 V	4.7/(3.7) mA	3.8/(3.1) mA	26,850/(30,000) Ω	62	124				
	240 V	4.7 mA	3.8 mA	30,000 Ω	65.5	131				

Note: 1. Rated voltage of bifurcated crossbar contact type: 100/(110) VAC, 200/(220) VAC, 230 VAC (Approx. 0.7 VA at 60 Hz)

2. Depending on the type of Relay, some Relays do not have coil specifications. Contact your OMRON representative for more details.

Rated voltage		Rated current*	Coil resistance*	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50/60 Hz		Armature OFF	Armature ON	% of rated voltage			
DC	5 V	106 mA	47 Ω	0.20	0.39	70% max.	15% min.	110%	0.53 W
	6 V	88.2 mA	68 Ω	0.28	0.55				
	12 V	43.6 mA	275 Ω	1.15	2.29				
	24 V	21.8 mA	1,100 Ω	4.27	8.55				
	48 V	11.5 mA	4,170 Ω	13.86	27.71				
	100 V	5.3 mA	18,860 Ω	67.2	93.2				

Note: Rated voltage of bifurcated crossbar contact type: 12 VDC, 24 VDC

■ Contact Ratings

Plug-in Terminal Relays

Number of poles	1 pole		2 poles	
Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4; L/R = 7 ms)
Rated load	10 (1) A at 250 VAC; 10 (1) A at 30 VDC	7.5 A at 250 VAC; 5 A at 30 VDC	5 A at 250 VAC; 5 A at 30 VDC	2 A at 250 VAC; 3 A at 30 VDC
Rated carry current	10 (1) A		5 A	
Max. switching voltage	380 VAC, 125 VDC		380 VAC, 125 VDC	
Max. switching current	10 (1) A		5 A	
Max. switching power	2,500 (250) VA, 300 (30) W	1,875 VA, 150 W	1,250 VA, 150 W	500 VA, 90 W
Failure rate (reference value)	100 mA at 5 VDC (1 mA at 5 VDC)		10 mA at 5 VDC	

Note: 1. P level: λ_{60} = 0.1 x 10^{-6}/operation

2. ( ): Bifurcated crossbar contact type.

■ Characteristics

Standard Relays

Item	1 pole	2 poles
Contact resistance	30 mΩ max.	50 mΩ max.
Operate (set) time	15 ms max.	
Release (reset) time	AC: 10 ms max.; DC: 5 ms max. (w/built-in diode: 20 ms max.)	
Max. operating frequency	Mechanical: 18,000 operations/hr Electrical: 1,800 operations/hr (under rated load)	
Insulation resistance	1,000 MΩ min. (at 500 VDC)	
Dielectric strength	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity	5,000 VAC, 50/60 Hz for 1 min between coil and contacts*; 3,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2 when energized; 100 m/s^2 when not energized	
Endurance	Mechanical: AC coil: 10,000,000 operations min.; DC coil: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr under rated load)	
Ambient temperature	Operating: –40°C to 70°C (with no icing)	
Ambient humidity	Operating: 5% to 85%	
Weight	Approx. 17 g (plug-in terminal: approx. 20 g)	

Note: Values in the above table are the initial values.

*2,000 VAC, 50/60 Hz for 1 minute when the P2R-05A or P2R-08A Socket is mounted.

■ Approved Standards

UL 508 (File No. E41643)

Model	Contact form	Coil ratings	Contact ratings	Operations
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-1A-S	SPST-NO			25 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
				25 x 10^3

CSA 22.2 No.0, No.14 (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings	Operations
G2R-1-S	SPDT	5 to 110 VDC 5 to 240 VAC	10 A, 30 VDC (resistive) 10 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
G2R-1A-S	SPST-NO			25 x 10^3
G2R-2-S	DPDT		5 A, 30 VDC (resistive) 5 A, 250 VAC (general use) TV-3 (NO contact only)	6 x 10^3
				25 x 10^3

SEV (SEV 1025-1, IEC 158-1)

Contact form	Coil ratings	Contact ratings
1 pole	5 to 110 VDC 5 to 240 VAC	10 A, 250 VAC1 5 A, 250 VAC3 10 A, 30 VDC1
2 poles	5 to 110 VDC 5 to 240 VAC	5 A, 250 VAC1 2 A, 380 VAC1 5 A, 30 VDC1

TÜV (IEC 255, VDE 0435)

Contact form	Coil ratings	Contact ratings	Operations
1 pole	3 to 110 VDC, 6 VAC to 240 VAC (for Standards coil)	10 A, 250 VAC ($\cos\phi$ = 1.0) 10 A, 30 VDC (0 ms)	100 x 10^3
2 poles		5 A, 250 VAC ($\cos\phi$ =1.0) 5 A, 30 VDC (0 ms) 2.5 A, 250 VAC ($\cos\phi$ = 0.4)	100 x 10^3

VDE (IEC 255, VDE 0435)

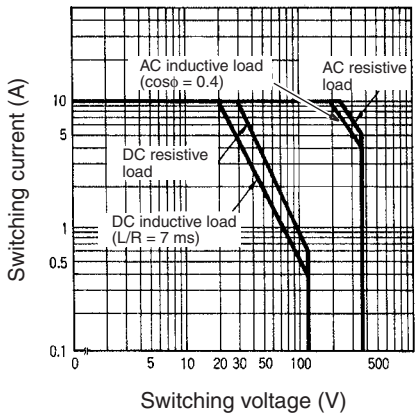
Contact form	Coil ratings	Contact ratings	Operations
1 pole	5, 6, 9, 12, 18, 24, 48, 60, 100, 110 VDC 12, 18, 24, 48, 50, 100/(110), 110, 120, 200/(220), 220, 230, 240 VAC	10 A, 250 VAC ($\cos\phi$ = 1.0) 10 A, 30 VDC (0 ms)	100 x 10^3
2 poles	5, 6, 9, 12, 18, 24, 48, 60, 100, 110 VDC 12, 18, 24, 48, 50, 100/(110), 110, 120, 200/(220), 220, 230, 240 VAC	5 A, 250 VAC ($\cos\phi$ =1.0) 5 A, 30 VDC (0 ms)	100 x 10^3

Engineering Data

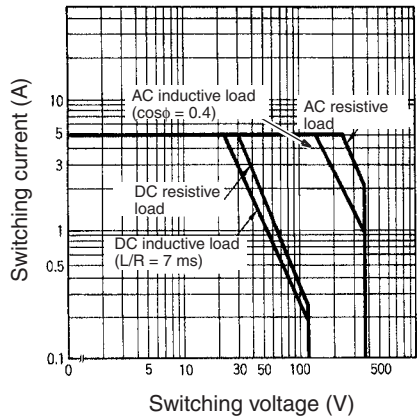
Maximum Switching Power

Plug-in Relays

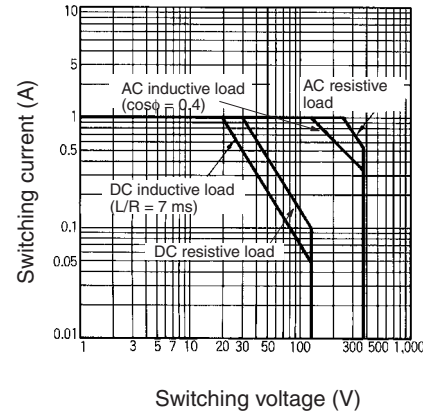
G2R-1-S



G2R-2-S



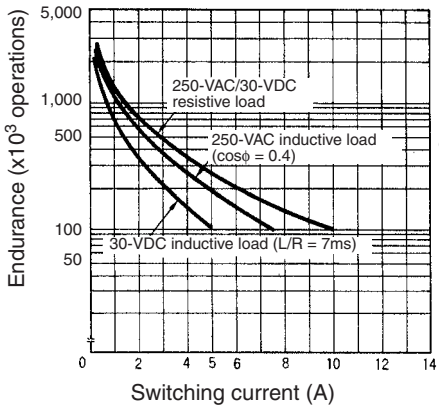
G2R-13-S, G2R-1A3-S



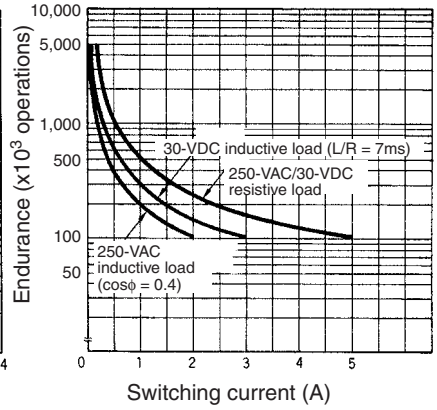
Endurance

Pulg-in Relays

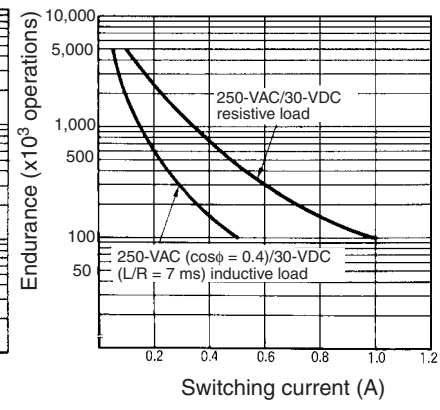
G2R-1-S



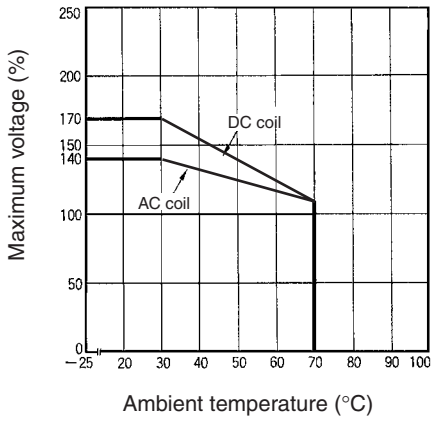
G2R-2-S



G2R-13-S, G2R-1A3-S



Ambient Temperature vs Maximum Coil Voltage



Note: The maximum voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

Dimensions

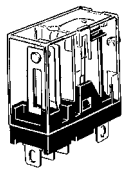
Note: 1. All units are in millimeters unless otherwise indicated.

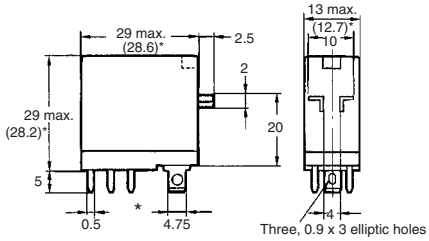
2. Orientation marks are indicated as follows:

Relays with Plug-in Terminals

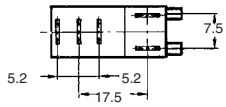
SPDT Relays

G2R-1-S, G2R-1-SD, G2R-1-SN, G2R-1-SND, G2R-1-SNI, G2R-1-SNDI
G2R-13-S, G2R-13-SD, G2R-13-SN, G2R-13-SND

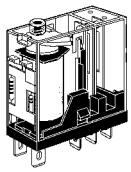


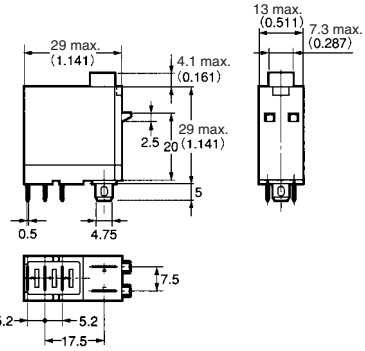


*This terminal is SPDT only.



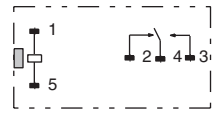
*Average value



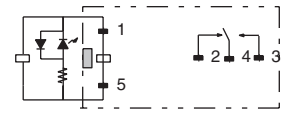


Terminal Arrangement/Internal Connections (Bottom View)

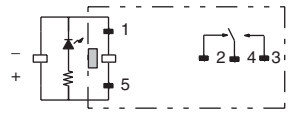
G2R-1-S, G2R-13-S



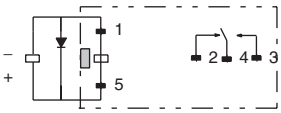
G2R-1-SN, G2R-1-SNI, G2R-13-SN (AC)



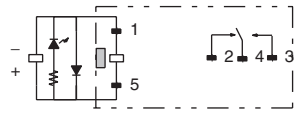
G2R-1-SN, G2R-1-SNI, G2R-13-SN (DC)



G2R-1-SD, G2R-13-SD (DC)



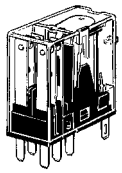
G2R-1-SND, G2R-1-SNDI, G2R-13-SND (DC)

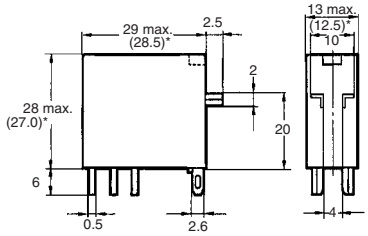


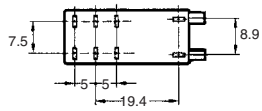
(After confirming coil polarity, wire correctly.) (Except G2R-1-S, G2R-13-S)

DPDT Relays

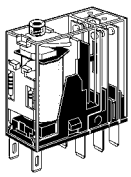
G2R-2-S, G2R-2-SD, G2R-2-SN, G2R-2-SNI, G2R-2-SNDI
G2R-2-SND

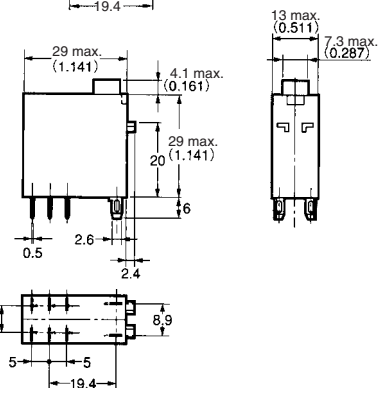






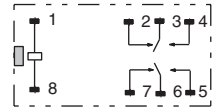
*Average value



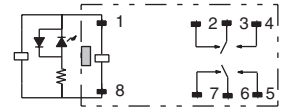


Terminal Arrangement/Internal Connections (Bottom View)

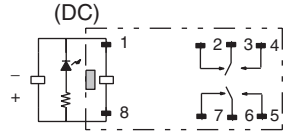
G2R-2-S



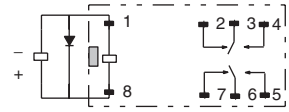
G2R-2-SN G2R-2-SNI (AC)



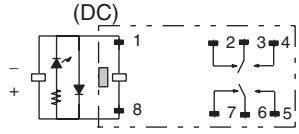
G2R-2-SN G2R-2-SNI (DC)



G2R-2-SD (DC)



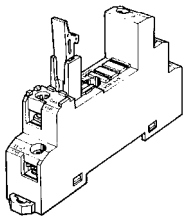
G2R-2-SND G2R-2-SNDI (DC)

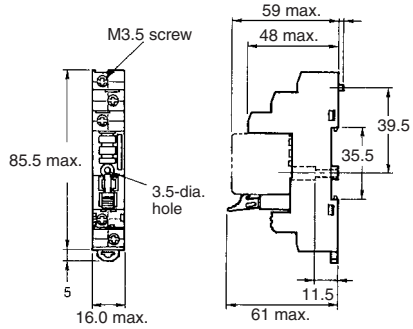


(After confirming coil polarity, wire correctly.)

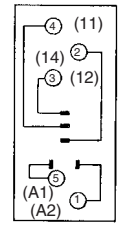
Track/Surface Mounting Sockets

P2RF-05-E

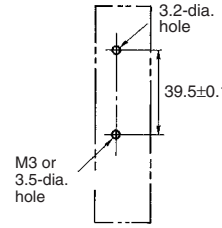




Terminal Arrangement (Top View)

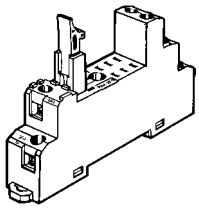


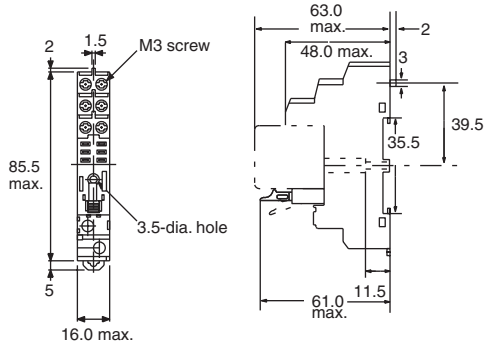
Mounting Holes (for Surface Mounting)



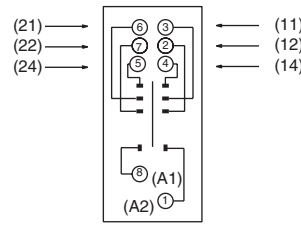
Note: Pin numbers in parentheses apply to DIN standard.

P2RF-08-E

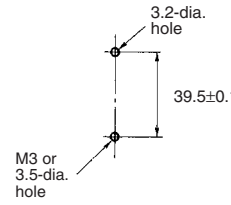




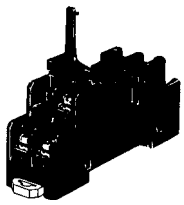
Terminal Arrangement (Top View)

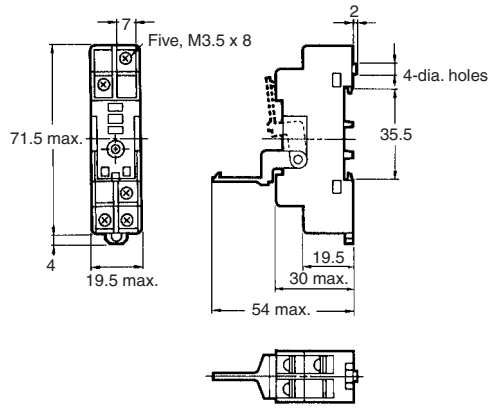


Mounting Holes (for Surface Mounting)

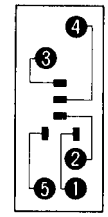


P2RF-05

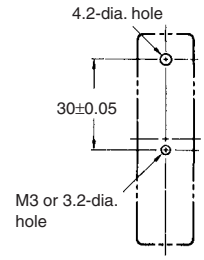




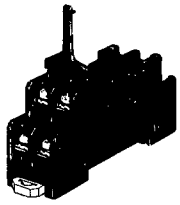
Terminal Arrangement (Top View)

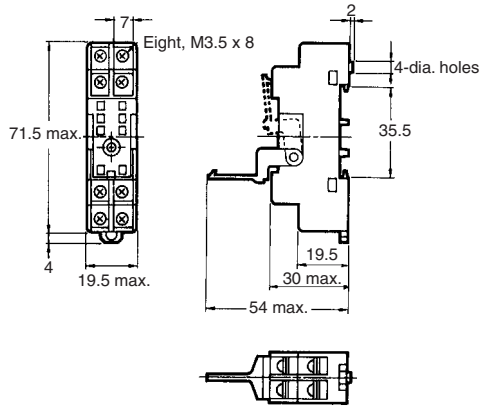


Mounting Holes (for Surface Mounting)

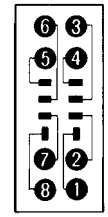


P2RF-08

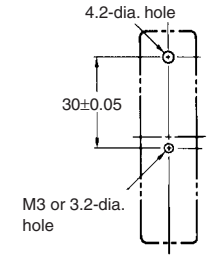




Terminal Arrangement (Top View)

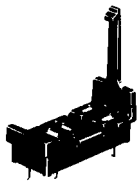


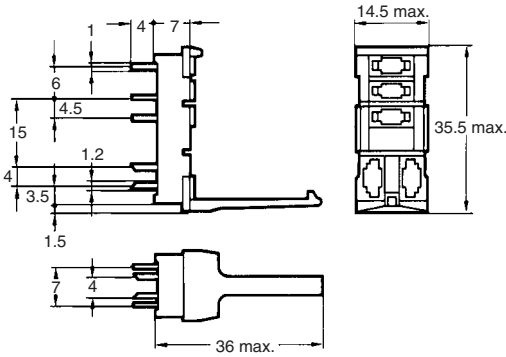
Mounting Holes (for Surface Mounting)



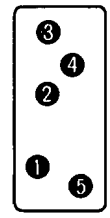
Back-connecting Sockets

P2R-05P (1-pole)



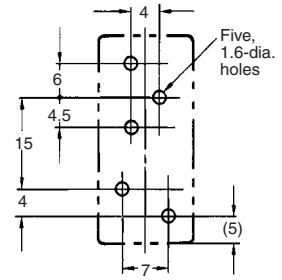


Terminal Arrangement (Bottom View)

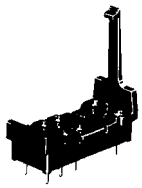


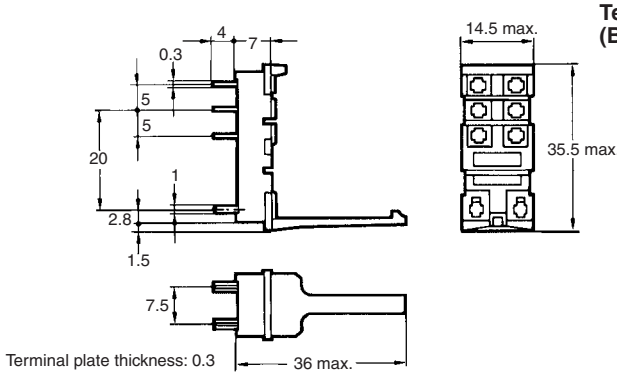
Mounting Holes

Tolerance: ±0.1

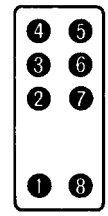


P2R-08P (2-pole)

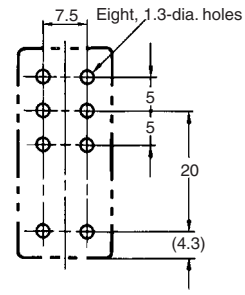




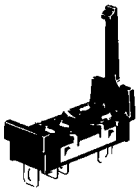
Terminal Arrangement (Bottom View)

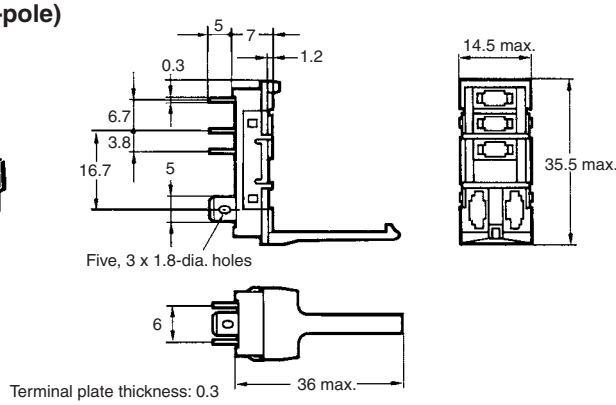


Mounting Holes

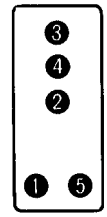


P2R-05A (1-pole)

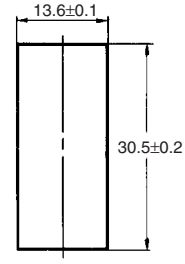




Terminal Arrangement (Bottom View)

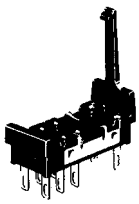


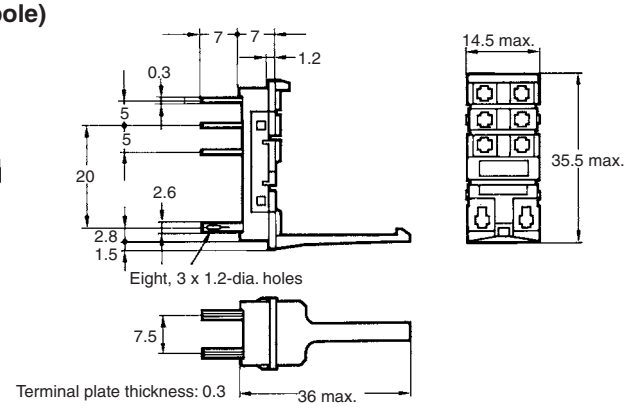
Panel Cutout

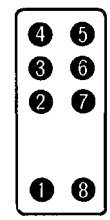


Recommended thickness of the panel is 1.6 to 2.0 mm

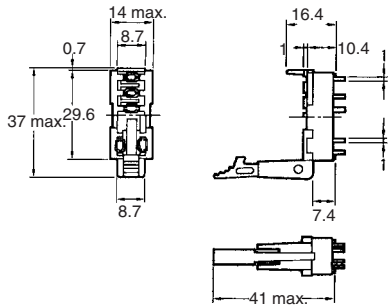
P2R-08A (2-pole)



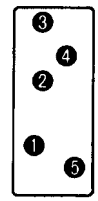




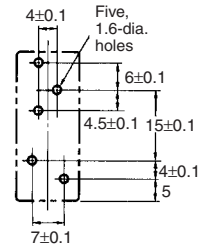
P2R-057P



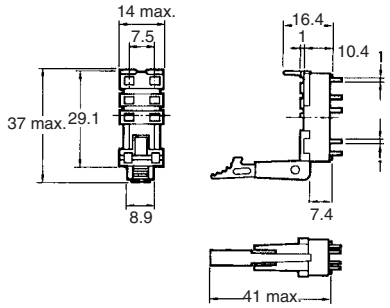
Terminal Arrangement (Bottom View)



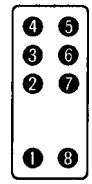
Mounting Holes



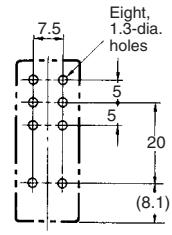
P2R-087P



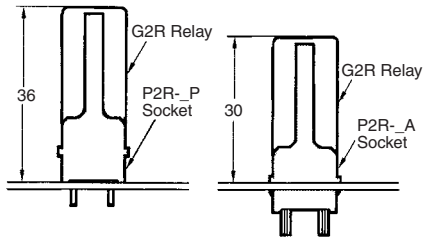
Terminal Arrangement (Bottom View)



Mounting Holes

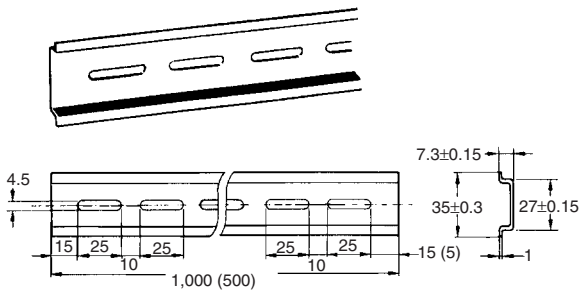


Mounting Height of Relay with Socket

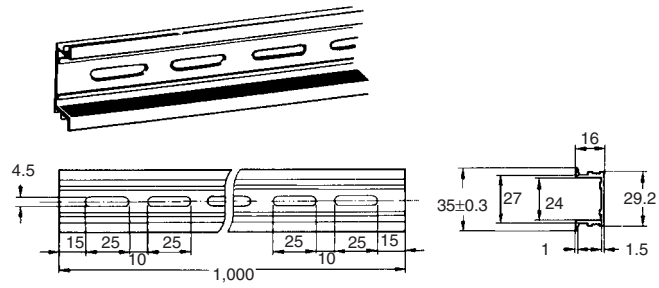


Mounting Tracks

PFP-100N, PFP-50N



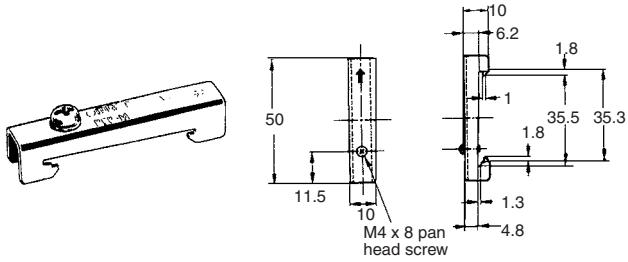
PFP-100N2



It is recommended to use a panel 1.6 to 2.0 mm thick.

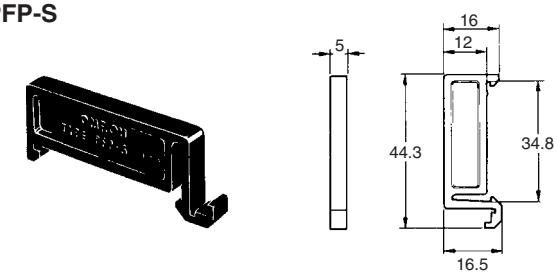
End Plate

PFP-M



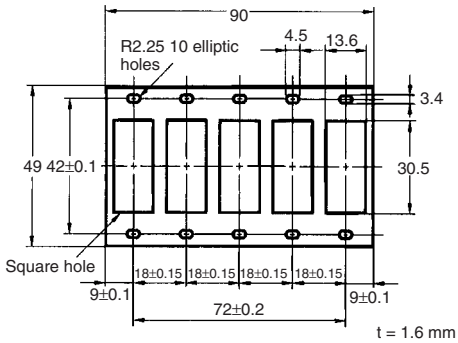
Spacer

PFP-S



Mounting Plate for Back-connecting Socket

P2R-P



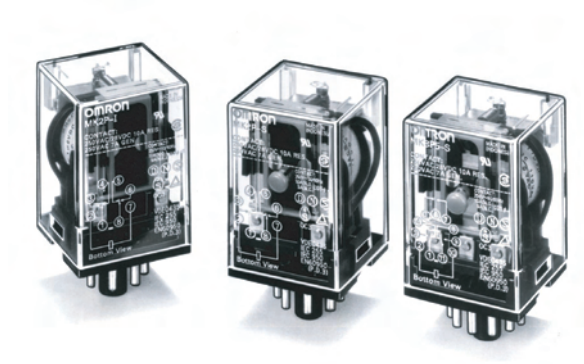
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J114-E1-02 In the interest of product improvement, specifications are subject to change without notice.

General-purpose Relay
MK-I/-S

Exceptionally Reliable General-purpose Relay Features Mechanical Indicator/Push Button

- Breaks relatively large load currents despite small size.
- Long life (minimum 100,000 electrical operations) assured by silver contacts.
- Built-in operation indicator (Mechanical, LED), push button, diode surge suppression, varistor surge suppression.
- Standard models are UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV (IEC), and VDE.
- Conforming to CENELEC standards.



Model Number Structure

■ Model Number Legend

Standard Models

MK □ □ □ - □ - □ □
1 2 3 4 5 6

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
4. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
5. **Approved Standards**
   Blank: UL, CSA, DEMKO, NEMKO SEMKO, SEV, TÜV
   VD: VDE
6. **Rated Voltage**
   (Refer to *Coil Ratings*)

Special Accessories

MK □ □ □ □ - □ - □ - □ □
1 2 3 4 5 6 7 8

1. **Contact Form**
   2: DPDT
   3: 3PDT
2. **Cover**
   P: Dust cover
3. **Classification**
   N: LED indicator
   D: Diode
   V: Varistor
   ND: LED indicator and diode
   NV: LED indicator and varistor
4. **Coil Polarity**
   Blank: Standard
   1: Reverse
   (Refer to *Terminal Arrangement/ Internal Connections)*
5. **Internal Connection Construction**
   Blank: Standard
   2 or 5: Non-standard connection
   (Refer to *Terminal Arrangement/ Internal Connections)*
6. **Mechanical Indicator Push Button**
   S: Mechanical indicator and push button
   I: Mechanical indicator
7. **Approved Standards**
   Blank: UL and CSA only
   VD: VDE (N and D models only)
8. **Rated Voltage**
   (Refer to *Coil Ratings*)

Ordering Information

■ List of Models

Type	Terminal	Contact form	Internal connection (see note 3)	With mechanical indicator	With mechanical indicator and pushbutton	Coil ratings	Approved standards
Standard	Plug-in	DPDT	Standard	MK2P-I	MK2P-S	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV
			Non-standard	MK2P2-I	MK2P2-S		
		3PDT	Standard	MK3P-I	MK3P-S		
			Non-standard	MK3P2-I MK3P5-I	MK3P2-S MK3P5-S		
LED Indicator (see note 2)		DPDT	Standard	MK2PN□-I	MK2PN□-S	AC (∿), DC (⎓)	UL, CSA
			Non-standard	MK2PN□-2-I	MK2PN□-2-S		
		3PDT	Standard	MK3PN□-I	MK3PN□-S		
			Non-standard	MK3PN□-2-I MK3PN□-5-I	MK3PN□-2-S MK3PN□-5-S		
Diode (see note 2)		DPDT	Standard	MK2PD□-I	MK2PD□-S	DC (⎓)	UL, CSA
			Non-standard	MK2PD□-2-I	MK2PD□-2-S		
		3PDT	Standard	MK3PD□-I	MK3PD□-S		
			Non-standard	MK3PD□-2-I MK3PD□-5-I	MK3PD□-2-S MK3PD□-5-S		
Varistor		DPDT	Standard	MK2PV-I	MK2PV-S	AC (∿)	UL, CSA
			Non-standard	MK2PV-2-I	MK2PV-2-S		
		3PDT	Standard	MK3PV-I	MK3PV-S		
			Non-standard	MK3PV-2-I MK3PV-5-I	MK3PV-2-S MK3PV-5-S		
VDE approved		DPDT	Standard	MK2P-I-VD	MK2P-S-VD	AC (∿), DC (⎓)	UL, CSA, SEV, DEMKO, NEMKO, SEMKO, TÜV, VDE
			Non-standard	MK2P2-I-VD	MK2P2-S-VD		
		3PDT	Standard	MK3P-I-VD	MK3P-S-VD		
			Non-standard	MK3P2-I-VD MK3P5-I-VD	MK3P2-S-VD MK3P5-S-VD		
LED Indicator VDE approved		DPDT	Standard	MK2PN-I-VD	MK2PN-S-VD	AC (∿), DC (...)	UL, CSA, VDE
			Non-standard	MK2PN-2-I-VD	MK2PN-2-S-VD		
		3PDT	Standard	MK3PN-I-VD	MK3PN-S-VD		
			Non-standard	MK3PN-2-I-VD	MK3PN-2-S-VD		
				MK3PN-5-I-VD	MK3PN-5-S-VD		
Diode VDE approved		DPDT	Standard	MK2PD-I-VD	MK2PD-S-VD	DC (...)	UL, CSA, VDE
			Non-standard	MK2PD-2-I-VD	MK2PD-2-S-VD		
		3PDT	Standard	MK3PD-I-VD	MK3PD-S-VD		
			Non-standard	MK3PD-2-I-VD	MK3PD-2-S-VD		
				MK3PD-5-I-VD	MK3PD-5-S-VD		

Note: **1.** When ordering, add the rated voltage to the model number. Rated voltages are given in the coil ratings table in *Specifications*.

Example: MK3P5-S 230 VAC
Rated voltage

2. This DC coil comes in two types: standard coil polarity and reversed coil polarity. Refer to *Terminal Arrangement/Internal Connections.*

Example: MK2PN1-I 24 VDC
Reverse polarity

3. Refer to *Terminal Arrangement/Internal Connections* for non-standard internal connection.

4. The gold plating thickness depends on the request.

Example: MK3P-I AP3 24 VAC
Gold plating thickness: 3 μm

■ Accessories (Order Separately)

Item		Model
Track-mounted Socket	8-pin type	PF083A-E
	11-pin type	PF113A-E
Hold-down Clip		PFC-A1

Specifications

■ Coil Ratings

UL, CSA, DEMKO, NEMKO, SEMKO, SEV, TÜV

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		60 Hz	50 Hz					
AC (∿)	6 V	360 mA	404 mA	3.9 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.3 VA (at 60 Hz) Approx. 2.7 VA (at 50 Hz)
	12 V	180 mA	202 mA	16.9 Ω				
	24 V	88.0 mA	98.0 mA	62.0 Ω				
	50 V	39.0 mA	46.3 mA	330 Ω				
	100 V	24.8 mA	28.4 mA	1,010 Ω				
	110 V	21.0 mA	24.7 mA	1,240 Ω				
	120 V	18.0 mA	20.2 mA	1,520 Ω				
	200 V	12.1 mA	14.2 mA	4,520 Ω				
	220 V	11.0 mA	12.9 mA	5,130 Ω				
	230 V	10.5 mA	12.3 mA	6,170 Ω				
	240 V	9.2 mA	10.3 mA	6,450 Ω				
DC (⎓)	6 V	255 mA		23.5 Ω		15% min. of rated voltage		Approx. 1.5 W
	12 V	126 mA		95 Ω				
	24 V	56 mA		430 Ω				
	48 V	29.5 mA		1,630 Ω				
	100 V	14.7 mA		6,800 Ω				
	110 V	15.1 mA		7,300 Ω				

VDE

Rated voltage		Rated current		Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
		50 Hz	60 Hz					
AC (∿)	6 V	380 mA	325 mA	4.4 Ω	80% max. of rated voltage	30% min. of rated voltage	90% to110% of rated voltage	Approx. 2.0 VA (at 60 Hz) Approx. 2.4 VA (at 50 Hz)
	12 V	175 mA	145 mA	19.0 Ω				
	24 V	91.0 mA	76.5 mA	70.7 Ω				
	50 V	42.0 mA	36.0 mA	330 Ω				
	100 V	24.0 mA	20.5 mA	1,150 Ω				
	110 V	21.5 mA	18.0 mA	1,400 Ω				
	120 V	20.0 mA	17.0 mA	1,600 Ω				
	200 V	11.2 mA	9.4 mA	5,110 Ω				
	220 V	10.2 mA	8.7 mA	5,800 Ω				
	230 V	9.6 mA	8.1 mA	6,990 Ω				
	240 V	9.4 mA	7.9 mA	7,400 Ω				
DC (⎓)	6 V	225 mA		26.7 Ω		15% min. of rated voltage		Approx. 1.3 W
	12 V	116 mA		107 Ω				
	24 V	56.0 mA		440 Ω				
	48 V	29.0 mA		1,660 Ω				
	100 V	13.1 mA		7,660 Ω				
	110 V	12.5 mA		8,720 Ω				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. ∿ indicates AC and ⎓ indicates DC (IEC417 publications).

4. For 200 VDC applications, a 100-VDC Relay is supplied with a fixed 6.8 kΩ, 30 W resistor. Be sure to connect the resistor in series with the coil.

5. For models with the LED indicator built in, add an LED current of approximately 0 through 5 mA to the rated current.

■ Contact Ratings

Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4)
Contact mechanism	Single	
Contact material	Ag	
Rated load	10 A at 250 VAC 10A at 28 VDC	7 A at 250 VAC
Rated carry current	10 A	
Max. switching voltage	250 VAC, 250 VDC	
Max. switching current	10 A	
Max. switching power	2,500 VA, 280 W	1,750 VA

■ Characteristics

Contact resistance	50 mΩ max.
Operate time	AC: 20 ms max. DC: 30 ms max.
Release time	20 ms max.
Max. operating frequency	Mechanical:18,000 operations/hr Electrical:1,800 operations/hr (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,500 VAC, 50/60 Hz for 1 min between coil and contacts; 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity, terminals of the same polarity; 2,500 VAC, 50/60 Hz fro 1 min between current-carrying parts, non-current-carrying parts, and terminals of opposite polarity
Vibration resistance	Destruction:10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction:10 to 55 to 10 Hz, 0.5-mm single amplitude (1.0-mm double amplitude)
Shock resistance	Destruction:1,000 m/s^2 (approx. 100G) Malfunction:100 m/s^2 (approx. 10G);
Endurance	Mechanical:10,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical:Refer to *Engineering Data*.
Error rate (reference value)	10 mA at 1 VDC
Ambient temperature	Operating:–10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Approx. 85 g

Note: The data shown are initial values.

■ Approved Standards

The following ratings apply to all models.

UL 508 (File No. E41515)/CSA 22.2 No.0/14 (File No. LR35535)

Coil ratings	Contact ratings	Operations
6 to 110 VDC 6 to 240 VAC	10 A, 28 VDC (resistive) 10 A, 250 VAC (resistive) 7 A, 250 VAC (general use)	100,000 cycles

SEV, DEMKO, NEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) (cosϕ = 1) 5 A, 250 V∿ (NC) (cosϕ = 1) 10 A, 28 V⎓ (NO) 5 A, 28 V⎓ (NC) 7 A, 250 V∿ (cosϕ = 0.4)	100,000 cycles

SEMKO

Coil ratings	Contact ratings	Operations
6 to 110 V⎓ 6 to 240 V∿	10 A, 250 V∿ (NO) (cosϕ = 1) 5 A, 250 V∿ (NC) (cosϕ = 1)	100,000 cycles

TÜV (VDE 0435 Teil 201/05'90, IEC 255 Teil 1-00/'75, EN 60950/'88

(TÜV File No.: R9051410)

Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ (cosϕ = 1) 10 A, 28 V⎓ 7 A, 250 V∿ (cosϕ = 0.4)	IEC 255-1-00 Item 3.1.4 Pollution Degree 3, Overvoltage Category II Pick up class - class 2 Temperature class - class b	100,000 cycles

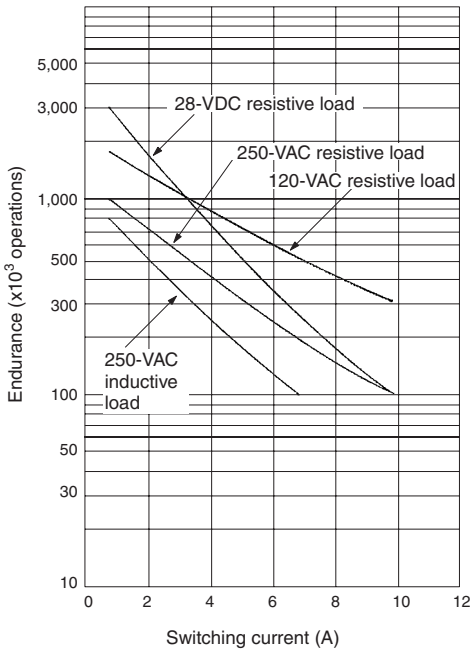
VDE (VDE 0435 Teil 201/05'83, IEC 255 Teil 1-00/'75)

(VDE File No.: NR 5340)

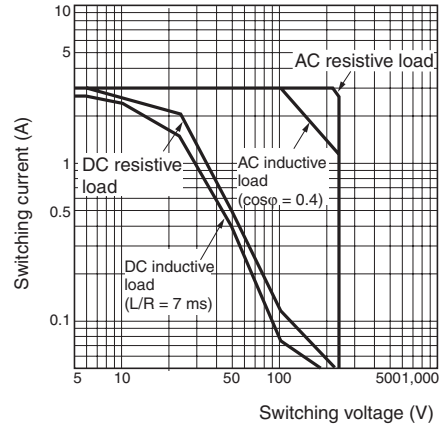
Coil ratings	Contact ratings	Conditions	Operations
6, 12, 24, 48, 100 110 V⎓ 6, 12, 24, 50, 100, 110 115, 120, 200, 220 230, 240 V∿	10 A, 250 V∿ (cosϕ = 1) 10 A, 28 V⎓ 7 A, 250 V∿ (cosϕ ⎓ 0.4)	C/250 - class 1, class C	100,000 cycles

Engineering Data

■ Electrical Endurance



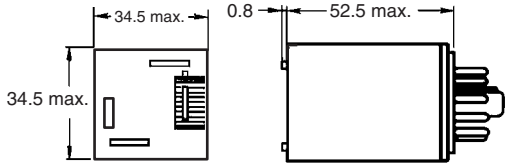
■ Maximum Switching Power



Dimensions

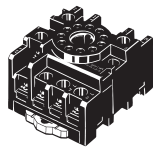
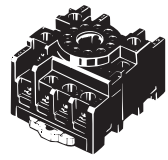
Note: All units are in millimeters unless otherwise indicated.

■ Relays



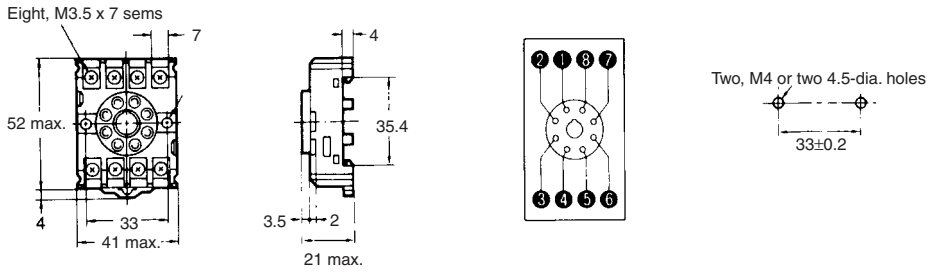
Sockets

See below for Socket dimensions.

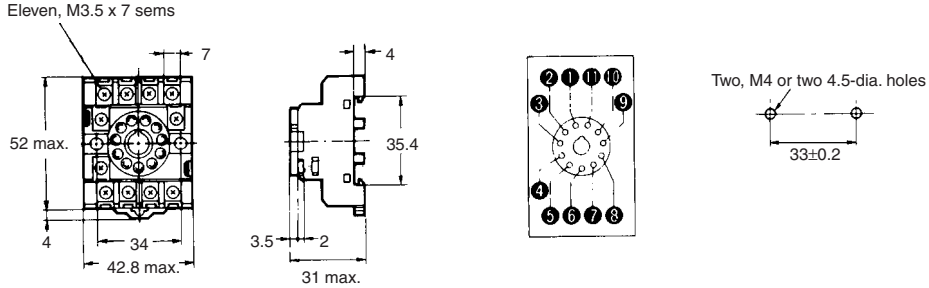
Socket	Surface-mounting Socket (for track or screw mounting)	
	Finger-protection models	---
Maximum carry current	10 A	5 A
2 poles	PF083A-E	PF083A
3 poles	PF113A-E 	PF113A 

Note: Use the Surface-mounting Sockets (i.e., finger-protection models) with "-E" at the end of the model number. When using the PF083A and PF113A, be sure not to exceed the Socket's maximum carry current of 5 A. Using at a current exceeding 5 A may lead to burning. Round terminals cannot be used for finger-protection models. Use Y-shaped terminals.

PF083A-E (Conforming to EN 50022)

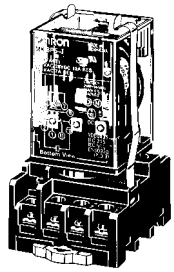


PF113A-E (Conforming to EN 50022)



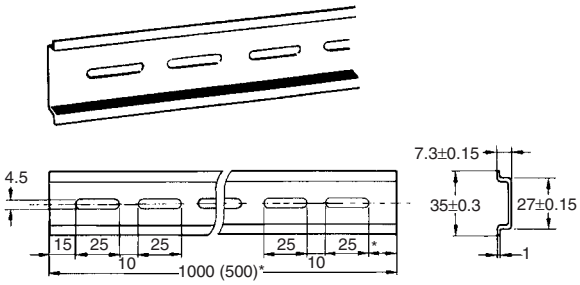
Hold-down Clips

PFC-A1



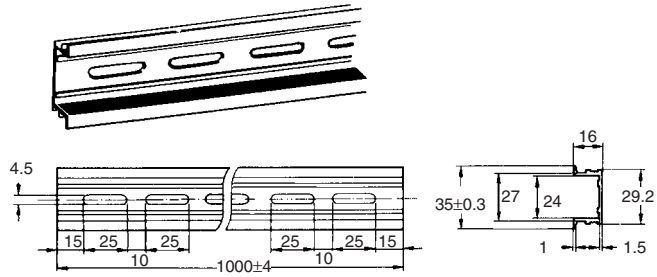
Mounting Tracks

PFP-100N, PFP-50N
(Conforming to EN 50022)



* This dimension applies to the PFP-50N Mounting Track.

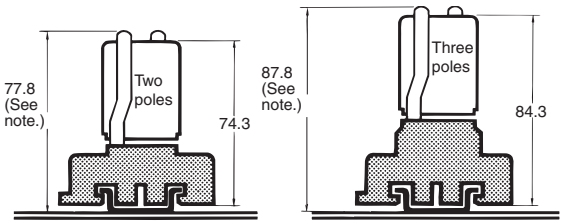
PFP-100N2
(Conforming to EN 50022)



* A total of twelve 25 x 4.5 elliptic holes is provided with six holes cut from each track end at a pitch of 10 mm.

Mounting Height with Sockets

Surface-mounting Sockets

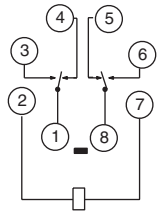
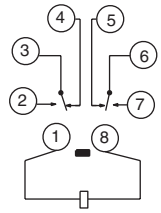
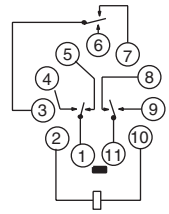
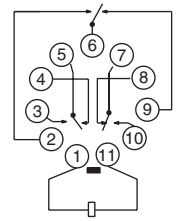
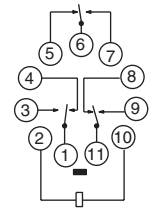


PF083A(-E) PF113A(-E)

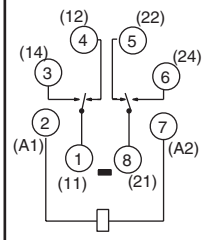
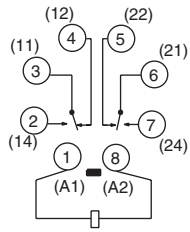
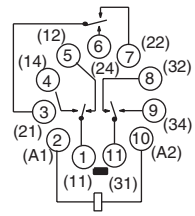
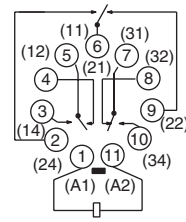
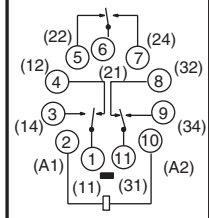
Note: PF083A(-E) and PF113A(-E) allow either track or screw mounting.

Terminal Arrangement/Internal Connection (Bottom View)

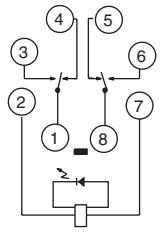
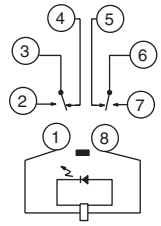
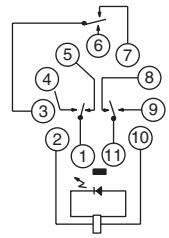
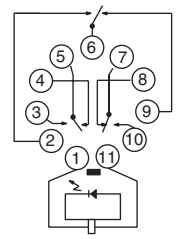
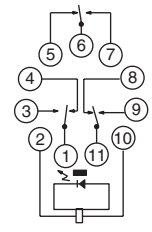
Standard (AC/DC Coil)

MK2P-I, -S	MK2P2-I, -S	MK3P-I, -S	MK3P2-I, -S	MK3P5-I, -S
				

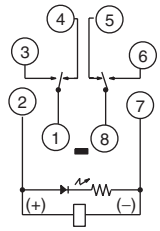
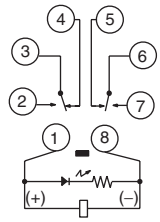
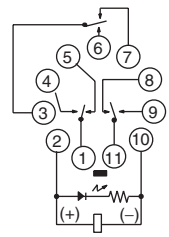
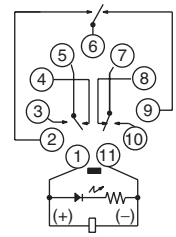
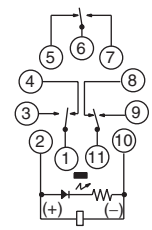
VDE-approved Type (AC/DC Coil) ( ): Dual Numbering

MK2P-I-VD, -S-VD	MK2P2-I-VD, -S-VD	MK3P-I-VD, -S-VD	MK3P2-I-VD, -S-VD	MK3P5-I-VD, -S-VD
				

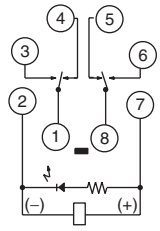
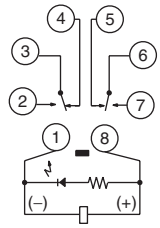
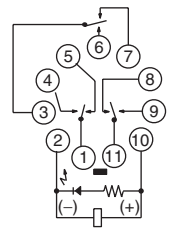
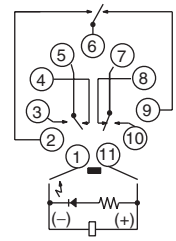
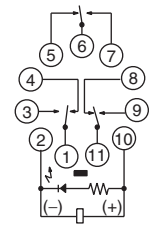
LED Indicator Type (AC Coil)

MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S
				

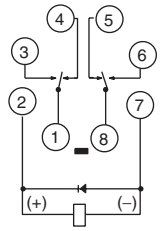
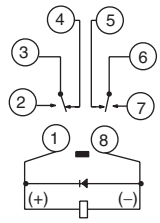
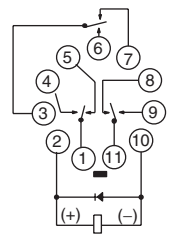
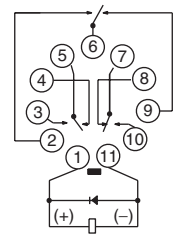
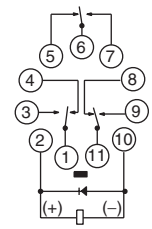
LED Indicator Type (DC Coil: Standard Polarity)

MK2PN-I, -S	MK2PN-2-I, -S	MK3PN-I, -S	MK3PN-2-I, -S	MK3PN-5-I, -S
				

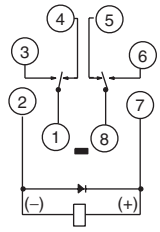
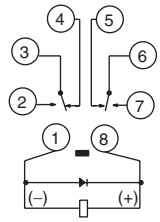
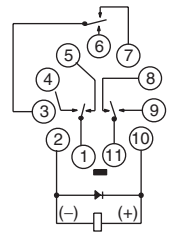
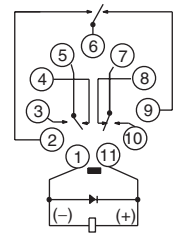
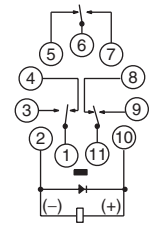
LED Indicator Type (DC Coil: Reverse Polarity)

MK2PN1-I, -S	MK2PN1-2-I, -S	MK3PN1-I, -S	MK3PN1-2-I, -S	MK3PN1-5-I, -S
				

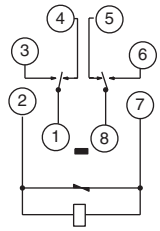
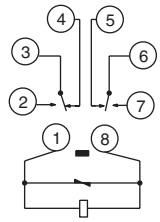
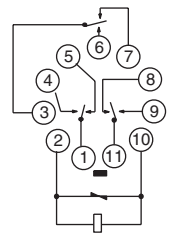
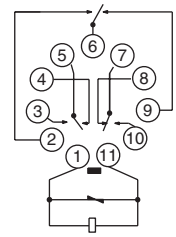
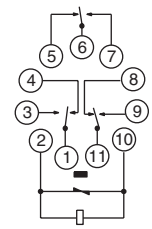
Diode Type (DC Coil: Standard Polarity)

MK2PD-I, -S	MK2PD-2-I, -S	MK3PD-I, -S	MK3PD-2-I, -S	MK3PD-5-I, -S
				

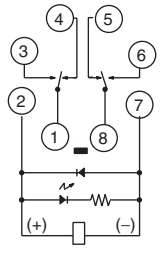
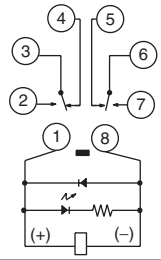
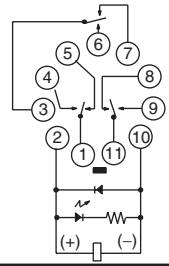
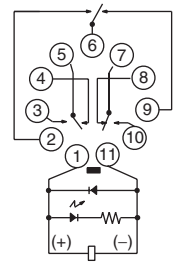
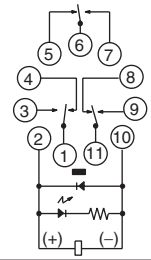
Diode Type (DC Coil: Reverse Polarity)

MK2PD1-I, -S	MK2PD1-2-I, -S	MK3PD1-I, -S	MK3PD1-2-I, -S	MK3PD1-5-I, -S
				

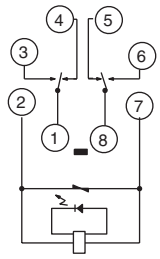
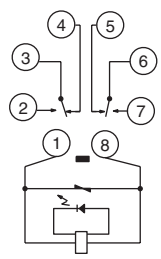
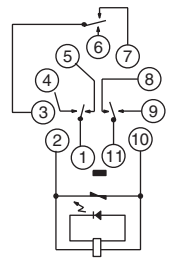
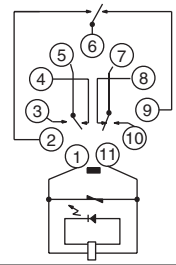
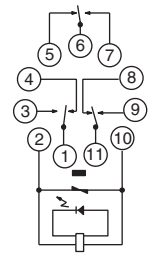
Varistor Type (AC Coil)

MK2PV-I, -S	MK2PV-2-I, -S	MK3PV-I, -S	MK3PV-2-I, -S	MK3PV-5-I, -S
				

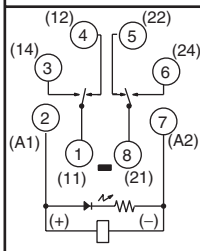
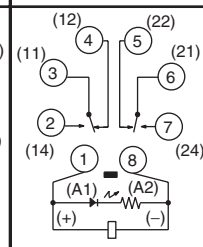
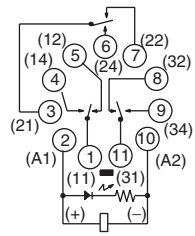
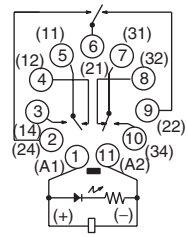
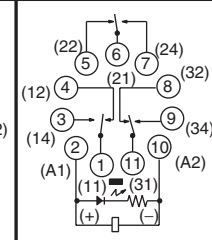
LED Indicator and Diode Type (DC Coil)

MK2PND-I, -S	MK2PND-2-I, -S	MK3PND-I, -S	MK3PND-2-I, -S	MK3PND-5-I, -S
				

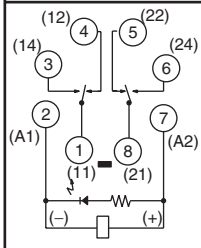
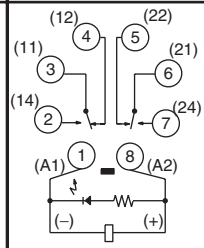
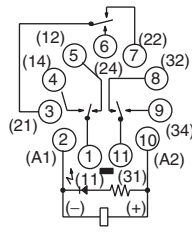
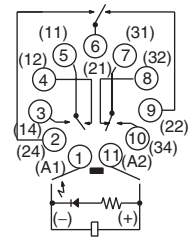
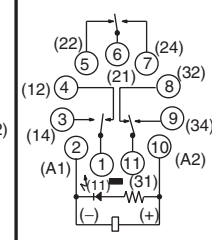
LED Indicator and Varistor Type (AC Coil)

MK2PNV-I, -S	MK2PNV-2-I, -S	MK3PNV-I, -S	MK3PNV-2-I, -S	MK3PNV-5-I, -S
				

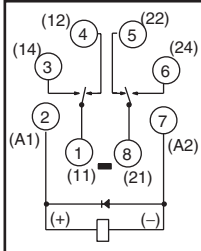
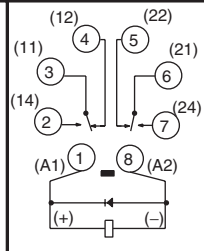
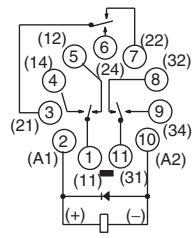
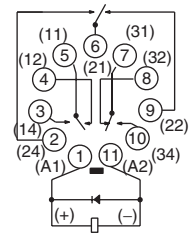
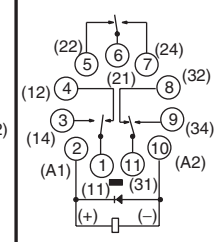
VDE Approved Type LED Indicator Type (DC Coil: Standard Polarity) ( ): Dual Numbering

MK2PN-I-VD, -3-VD	MK2PN-2-I-VD, -3-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

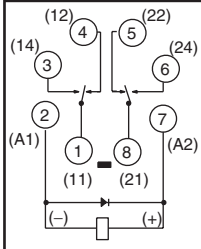
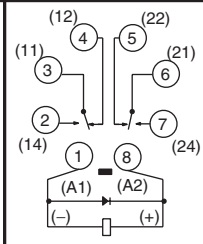
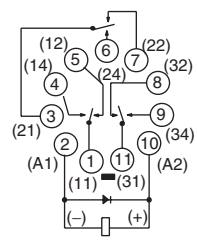
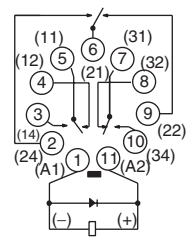
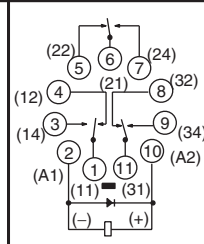
VDE Approved Type LED Indicator Type (DC Coil: Reverse Polarity)

MK2PN1-I-VD, -S-VD	MK2PN1-2-I-VD, -S-VD	MK3PN1-I-VD, -S-VD	MK3PN1-2-I-VD, -S-VD	MK3PN1-5-I-VD, -S-VD
				

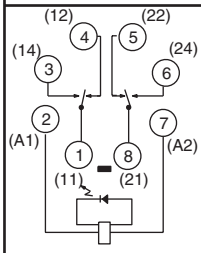
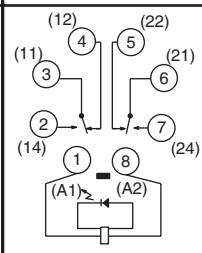
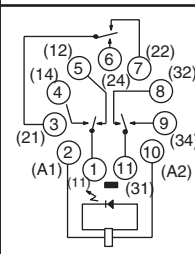
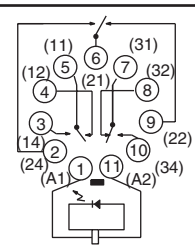
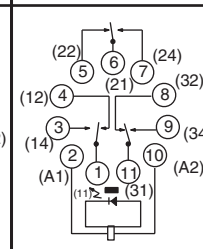
VDE Approved Type Diode Type (DC Coil: Standard Polarity)

MK2PD-I-VD, -S-VD	MK2PD-2-I-VD, -S-VD	MK3PD-I-VD, -S-VD	MK3PD-2-I-VD, -S-VD	MK3PD-5-I-VD, -S-VDS
				

VDE Approved Type
Diode Type
(DC Coil:
Reverse Polarity)

MK2PD1-I-VD, -S-VD	MK2PD1-2-I-VD, -S-VD	MK3PD1-I-VD, -S-VD	MK3PD1-2-I-VD, -S-VD	MK3PD1-5-I-VD, -S-VD
				

VDE Approved Type
LED Indicator Type
(AC Coil)

MK2PN-I-VD, -S-VD	MK2PN-2-I-VD, -S-VD	MK3PN-I-VD, -S-VD	MK3PN-2-I-VD, -S-VD	MK3PN-5-I-VD, -S-VD
				

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

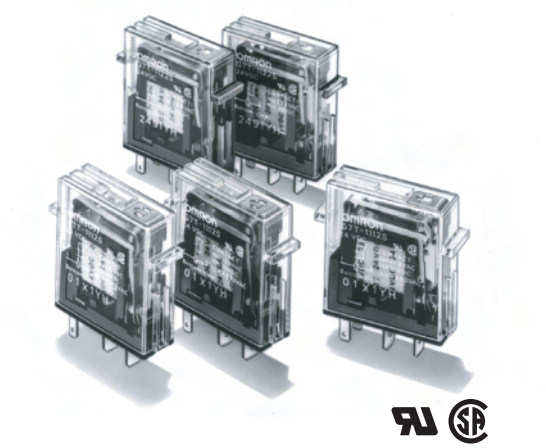
Cat. No. J011-E1-06

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

I/O Relay
G7T

Slim-styled I/O Relay Saves Space in Panel

- SPST-NO, SPST-NC, and SPDT contact forms available for output (SPST-NO only for input).
- Ultra-slim housing measuring 29 (W) x 10 (D) x 32 (H) mm.
- All Output Relays provide a long endurance (1,000,000 operations at 5 A), while all Input Relays provide microswitching power (100 μA at 1 V).
- Approved by UL and CSA standards.



Ordering Information

Classification		Coil rated voltage	Model
Input (bifurcated contact)	SPST-NO	12 VDC	G7T-1122S (see note 2)
		24 VDC	
		100/110 VAC	
		200/220 VAC	
Output (single contact)	SPST-NO	12 VDC	G7T-1112S (see note 2)
		24 VDC	
	SPST-NC	12 VDC	G7T-1012S
		24 VDC	
	SPDT	12 VDC	G7T-112S
		24 VDC	

Note: 1. When ordering, add the rated voltage to the model number. Rated voltages are given in the coil ratings table in *Specifications*.
Example: G7T-112S 12 VDC
└── Rated voltage

2. The G7T-1122S and G7T-1112S are approved by UL and CSA. Contact your OMRON representative for the coil ratings of other models. The G7T-112S cannot be used in place of the G7TC. The G7T-112S can only be used with the P7TF-05 Socket.

Model Number Legend

G7T-□□□□S
1 2 3 4 5

1. No. of Contact Poles

2. Contact Form
No indication: Transfer contact
Number: Number of NO contacts

3. Contact Mechanism
1: Single contact
2: Bifurcated contact

4. Enclosure Construction
2: Casing

5. Terminal Type
S: Plug-in Terminal

■ Accessories

Socket

Applicable Relay	Model
All G7T I/O Relay and the G3TA models.	P7TF-05

P70 Indicator Module

Remove the transparent style strip of the Socket and mount this module. It will function as an operation indicator with surge suppression.

Model		Applicable Relay coil voltage	Remarks
For AC Relay	**P70A**	100/110 VAC	Surge suppressing system with varistor
		200/220 VAC	
For DC Relay	**P70D**	12/24 VDC	Surge suppressing system with diode

Note: 1. Order the Indicator Module that is suited to the Relay coil voltage.

2. The Indicator Module for DC Relays has a multiple power supply common to 12 and 24 VDC.

Specifications

■ Ratings

Coil Ratings (Common to Both Input and Output)

Item / Rated voltage (V)		Rated current 50 Hz	Rated current 60 Hz	Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
AC	**100/110**	8.2/9 mA	7/7.7 mA	8,700 Ω	80% max. of rated value	30% min. of rated value	110% of rated value	0.7 VA
	200/220	4.1/4.5 mA	3.5/3.85 mA	33,300 Ω				
DC	**12**	42 mA		290 Ω	80% max. of rated value	10% min. of rated value	110% of rated value	0.5 W
	24	21 mA		1,150 Ω				
	100/110	5 mA		20,000 Ω	80% max. of rated value	10% min. of rated value	110% of rated value	0.5 W

Note: 1. The rated current and coil resistance values are measured at a coil temperature of 23°C. Tolerances of AC rated current are +15%, –20% and tolerances of coil resistance are ±15%.

2. Four rated voltages or currents are available to single AC models used with the P7TF-05 Socket. Only three rated voltages or currents are available, however, when the Relay is used in place of the G7TC.

3. The operating characteristics values are for a coil temperature of 23°C.

4. The maximum voltage is one that is applicable to the Relay coil instantaneously at 23°C and not continuously.

Contact Ratings

Classification / Item	For input		For output	
	Resistive load (cosϕ = 1)	**Inductive load (cosϕ = 0.4, L/R = 7 ms)**	**Resistive load (cosϕ = 1)**	**Inductive load (cosϕ = 0.4, L/R = 7 ms)**
Contact mechanism	Crossbar bifurcated		Single	
Contact material	AgAu-clad Ag		AgSnIn	
Rated load	1 A at 24 VDC	0.5 A at 24 VDC	5 A at 24 VDC 2 A at 220 VAC	2 A at 24 VDC 1 A at 220 VAC
Rated carry current	1 A		5 A	
Max. switching voltage	250 VAC, 125 VDC			
Max. switching current	1 A	0.5 A	5 A	2 A
Failure rate (reference value)	100 μA at 1 VDC		10 mA at 5 VDC	

■ Characteristics

Contact resistance (see note 2)	50 mΩ max.
Operate time (see note 3)	15 ms max.
Release time (see note 3)	15 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hour Electrical: 1,800 operations/hour (under rated load)
Insulation resistance (see note 4)	100 MΩ (at 500 VDC)
Dielectric strength	Between coil and contacts: 2,000 VAC, 50/60 Hz for 1 minute Between contacts of same polarity: 1,000 VAC, 50/60 Hz for 1 minute
Vibration resistance	Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Malfunction: 200 m/s^2
Mechanical endurance	50,000,000 operations
Electrical endurance (see note 5)	Input:10,000,000 operations (10 mA) or 50,000 operations (1 A) with resistive load 2,500,000 operations (10 mA) or 20,000 operations (1 A) with inductive load Output:1,000,000 operations with rated load
Error rate (level P) (Reference value) (see note 6)	Input: 100 μA at 1 VDC Output: 10 mA at 5 VDC
Ambient temperature	Operating:–40°C to 70°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85% (with no icing or condensation)
Weight	Approx. 17 g

Note: 1. The above values are all initial values.

2. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.

3. The operate and the release times were measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. This value was measured at a switching frequency of 120 operations per minute.

■ Socket Ratings

Features

- Easily mounts or dismounts the G7T I/O Relay.
- Also mounts the Indicator Module (with surge suppressing function).
- Only 19 mm in width.
- Terminals corresponding to the NO and NC contacts of a Relay are arranged on top of the Socket to enhance maintainability.
- Also permits mounting of the G3TA Solid-state I/O Relay.

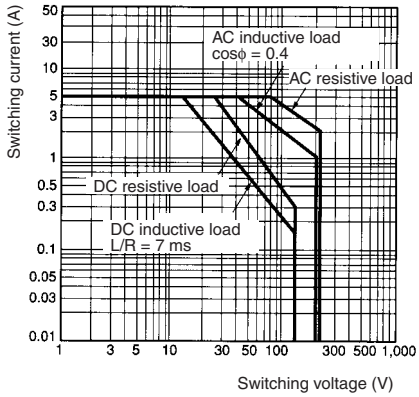
Specifications

Model	P7TF-05
Contact resistance	10 mΩ max.
Dielectric strength	2,000 VAC for 1 minute
Insulation resistance	100 MΩ (at 500 VDC)
Vibration resistance	10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	200 m/s^2
Ambient temperature	Operating: 0°C to 55°C
Ambient Humidity	Operating: 5% to 85%
Weight	Approx. 28 g

Engineering Data

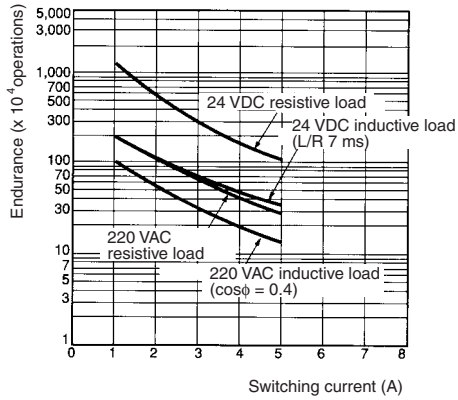
Maximum Switching Power

(Output Model with Life of 1,000,000 Operations)

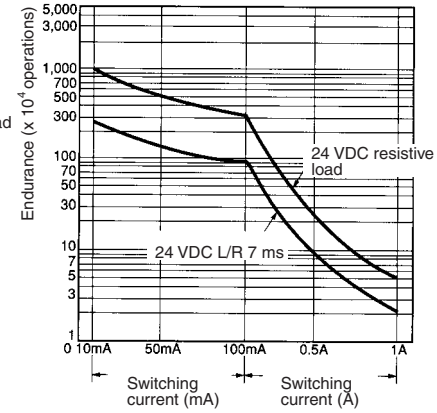


Electrical Endurance

Output Relay



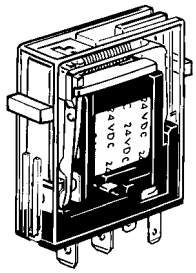
Input Relay

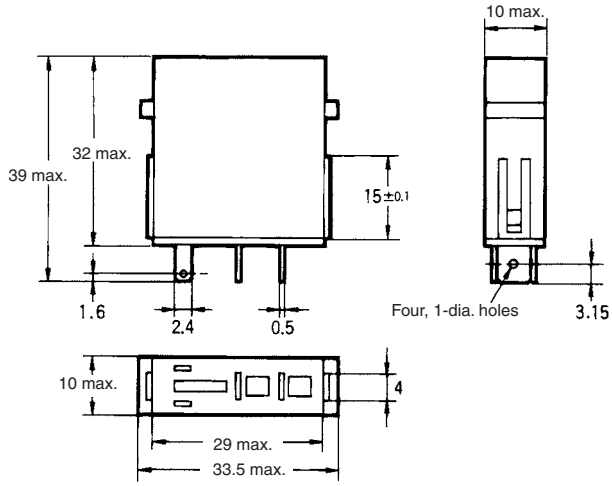


Dimensions

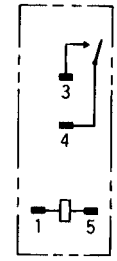
Note: All units are in millimeters unless otherwise indicated.

SPST-NO Type
G7T-1122S (for input)
G7T-1112S (for output)

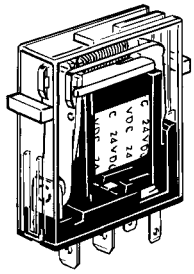


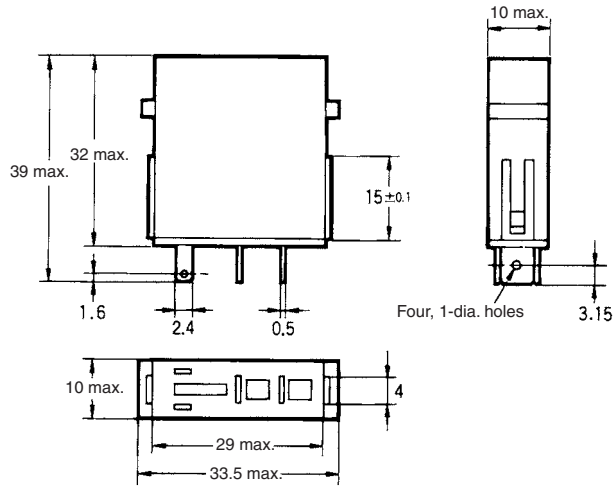


Terminal Arrangement/ Internal Connections (Bottom View)

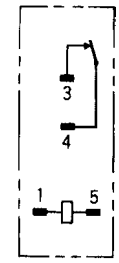


SPST-NC Type
G7T-1012S (for output)

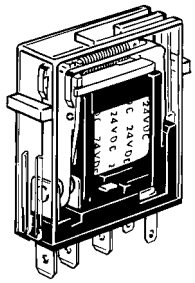


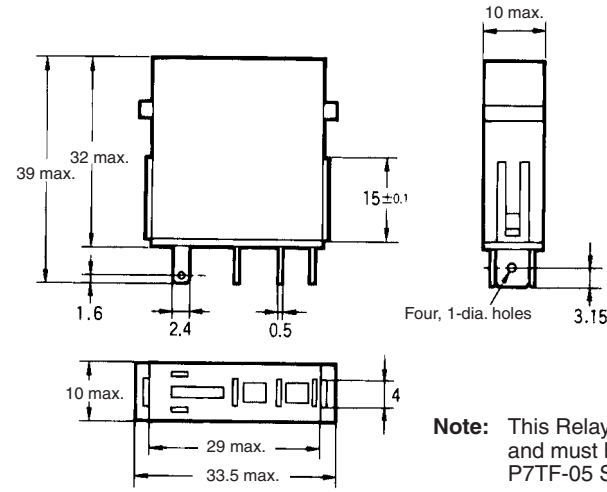


Terminal Arrangement/ Internal Connections (Bottom View)

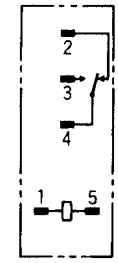


SPDT Type
G7T-112S (for output)





Terminal Arrangement/ Internal Connections (Bottom View)

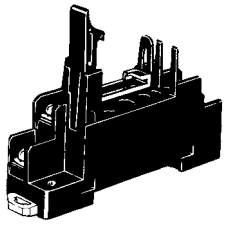


Note: This Relay cannot be used as an I/O relay terminals and must be used in combination with the exclusive P7TF-05 Socket.

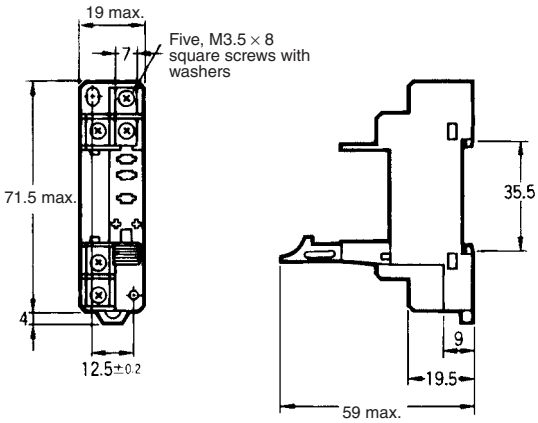
■ Accessories

Socket

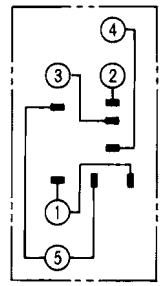
P7TF-05

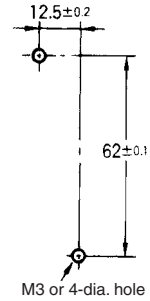


Dimensions



Internal Connections (Top View)

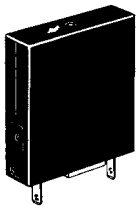




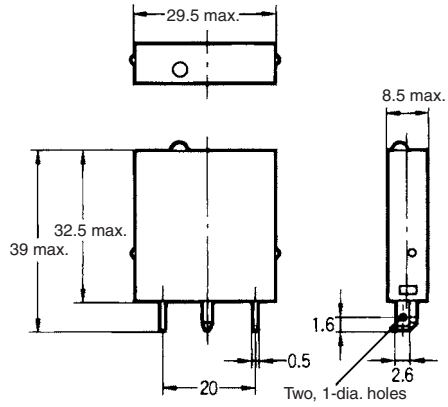
Note: If the I/O SSR or Indicator Module is used, be aware that the polarity of terminal 1 is positive.

Indicator Module (with Surge Suppressing Function)

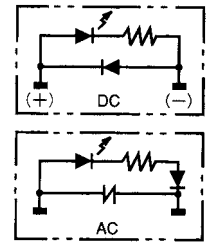
P70



Dimensions



Internal Connections



Precautions

Refer to page 11 for general precautions.

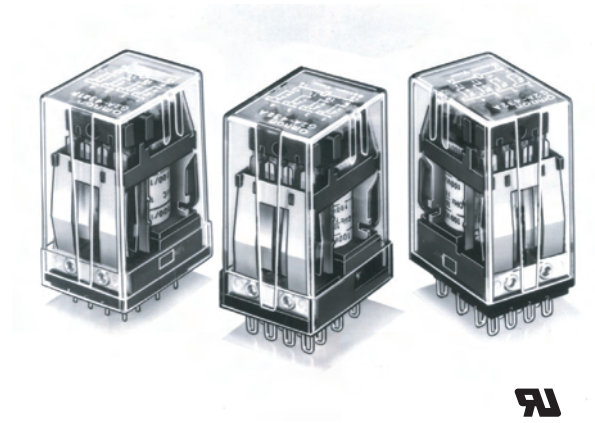
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J044-E1-02

Power Relay
G2A

Highly Reliable, 4-pole Miniature Relay Ideal for Sequence Control

- Card lift-off employed for greater life and stable quality.
- Long endurance and stable quality are assured by card lift-off system.
- Mounting interchangeability with MY-series Relays.
- Operation indicator mechanism incorporated for at-a-glance monitoring of ON/OFF operation. In addition, a built-in operation indicator model is also included in this Relay Series.



Ordering Information

Classification		Plug-in terminals/Solder terminals	PCB terminals
Standard model		G2A-432A	G2A-4321P
Arc barrier equipped model		G2A-432AY	---
Built-in diode model		G2A-432A-D	G2A-4321P-D
Built-in operation indicator model		G2A-432A-N	---
Built-in operation indicator and diode model		G2A-432A-N1	---
UL-approved model	**Standard model**	G2A-432A-US	G2A-4321P-US
	Arc barrier equipped model	G2A-432AY-US	---

Note: 1. When placing your order, add the coil voltage rating listed in the specifications to the model number as shown below.
Example: G2A-432A 100/110 VAC
└── Rated coil voltage
2. Built-in diode model and the operating coil of the G2A-432A-N1 are available only with DC ratings.
3. The Latching Relay (G2AK) and Fully sealed Relay (G2A-434A) developed based on the G2A are also available in this series.

Model Number Legend

G2A-□□□□□-□
1 2 3 4 5 6

1. Number of Poles and Contact Form
4: 4PDT
2. Contact Type
3: Crossbar bifurcated
3. Enclosure Construction
2: Casing
4. Terminal Shape
A: Plug-in
1P: PCB
5. Safety Breaking Mechanism
None: No
Y: Arc barrier
6. Special Element
None: Standard
D: Built-in diode
N: Built-in operation indicator
N1: Built-in operation indicator and diode
US: UL-approved

Note: 1. The coil of the G2A-432A-N1 or a built-in diode model operates with DC only.
2. The G2A Series include the G2A-434A Power Relay and G2AK Latching Relay. Refer to page 133 for details.
3. Built-in indicator models satisfying international standards are available. Contact your OMRON representative for details.

■ Relays Other than Standard Models

Arc barrier equipped	Built-in diode	Built-in operation indicator
G2A-432AY	**G2A-432A-D**	**G2A-432A-N**
The arc barrier equipped model is a relay designed to prevent arc short-circuiting between phases and can be used in a circuit which has potential difference between phases. The switching power of such a circuit with potential difference must be limited to less than 1/2 the rated load when using this Relay.	The built-in diode model is a relay which incorporates a diode for absorption of the reverse voltage that may be generated when the coil is de-energized. Because the release time of this model is longer than the standard model, pay adequate attention to this point in designing a circuit. Also, pay attention to the + polarity of the coil. The reverse-breakdown voltage of the diode is 1,000 V.	The built-in operation indicator model has a newly added operation indicator to the conventional operation indication mechanism and facilitates operation monitoring without being affected by ambient illumination. With the -N model (rated at 16, 12, 24, and 48 VDC) and -N1 model rated at 6, 12, 24, 48, and 100 VDC), pay attention to the + polarity of the coil.

■ Accessories

Sockets

Track mounting Screw terminals	Front-connecting Socket	Solder terminals		Wire-wrap terminals		PCB terminals
		Without Hold-down Clip	With Hold-down Clip	Without Hold-down Clip	With Hold-down Clip	
PYF14A	PYF14(-E), PYF14A-TU, PYF14T	PY14, PY14-3 (see note)	PY14-Y2	PY14QN(2)	PY14QN(2)-Y2	PY14-0, PY14-02

Note: With monitor terminal.

Relay Hold-down Clips

For Front-connecting Socket	PYC-A2
For Back-connecting Socket	PYC-3/PYC-5
For Socket Mounting Plate	PYC-2

Socket Mounting Plates

For one Socket	PYP-1
For 18 Sockets	PYP-18
For 36 Sockets	PYP-38

Specifications

■ Coil Ratings

The rated currents for some of the built-in operation indicator models differ from the values given in this table. Refer to note 5 below.

Rated voltage	Rated current		Coil resistance	Coil inductance (ref. value)		Must operate	Must release	Max. voltage	Power consumption
	50 Hz	60 Hz		Armature OFF	Armature ON	% of rated voltage			
6 VAC	295 mA	233 mA	8.9 Ω	0.048 H	0.065 H	80 % max.	30 % min.	110 %	Approx. 1.4 VA
12 VAC	148 mA	117 mA	34 Ω	0.166 H	0.257 H				
24 VAC	73 mA	58 mA	136 Ω	0.691 H	1.04 H				
50 VAC	35 mA	28 mA	530 Ω	3.08 H	4.53 H				
100/ 110 VAC	17.7/ 21.4 mA	14/ 16.8 mA	2,200 Ω	12.42/ 12.38 H	18/16.4 H				
200/ 220 VAC	8.9/ 10.8 mA	7/8.4 mA	8,800 Ω	42.2/ 41.8 H	72/65.5 H				
6 VDC	176 mA		34 Ω	0.14 H	0.26 H		10 % min.	110 %	Approx. 1.1 W
12 VDC	88 mA		136 Ω	0.6 H	1.0 H				
24 VDC	45 mA		530 Ω	2.7 H	4.6 H				
48 VDC	22 mA		2,200 Ω	11 H	19 H				
100 VDC	11.4 mA		8,800 Ω	43 H	73 H				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance and coil inductance values are for reference only.

3. Performance characteristic data is measured at a coil temperature of 23°C.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at an ambient temperature of 23°C and not continuously.

5. For built-in operation indicator models rated at 6, 12, and 24 VDC, add an LED current of approx. 5 mA to the rated currents.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4) (L/R = 7 ms)
Contact type	Crossbar bifurcated	
Contact material	Movable: AgAu-clad AgPd Fixed: AgPd	
Rated load	0.3 A at 110 VAC 0.5 A at 24 VDC	0.2 A at 110 VAC 0.3 A at 24 VDC
Rated carry current	3 A	
Max. switching power	250 VAC, 125 VDC	

■ Characteristics

Classification	Standard/Acr barrier equipped/Built-in operation indicator models (G2A-□-N)	Built-in diode/Built-in operation indicator models (G2A-□-N1)
Contact resistance (see note 2)	100 mΩ max.	
Operate time (see note 3)	15 ms max.	
Release time (see note 3)	15 ms max.	30 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hour Electrical: 1,800 operations/hour (under rated load)	
Insulation resistance (see note 4)	100 MΩ min. (at 500 VDC)	
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min between coil and contacts and contacts of different polarities (700 VAC between contacts of same polarity)	
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)	
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2	
Error rate (level P) (Reference value) (see note 6)	1 mA at 100 mVDC	
Endurance	Mechanical: 100,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical: 5,000,000 operations min. (under rated load and at operating frequency of 1,800 operations/hour) (see note 5)	
Ambient temperature	Operating:–10°C to 40°C (with no icing or condensation)	
Ambient humidity	Operating:5% to 85%	
Weight	Approx. 38 g	

Note: 1. The data shown above are initial values.

2. The contact resistance was measured with 0.1 A at 5 VDC using the voltage drop method.

3. The operate or release time was measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. This value was measured at a switching frequency of 60 operations per minute.

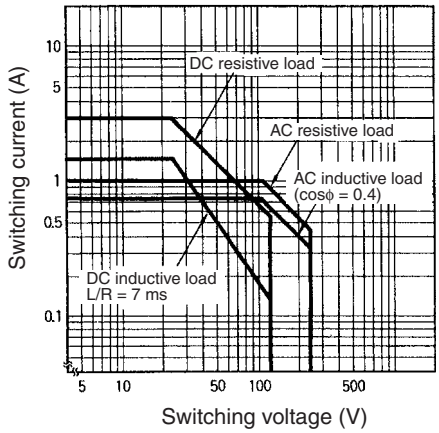
■ Approved by Standards

UL508 (File No. E41515)

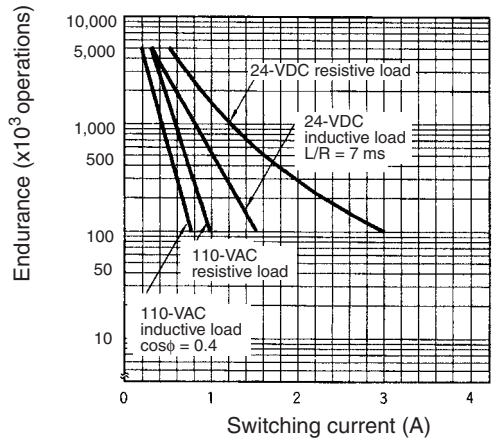
Model	Coil ratings	Contact ratings
G2A-□-US	6 to 120 VAC 6 to 120 VDC	1 A 120 VAC (resistive load) 1 A 30 VDC (inductive load)

Engineering Data

Maximum Switching Power

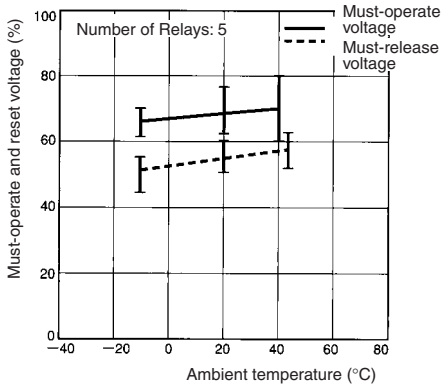


Endurance

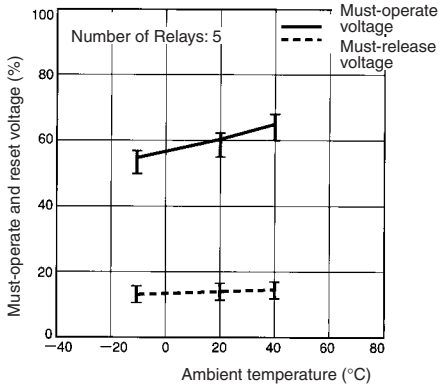


Ambient Temperature vs. Must-operate and Must-release Voltage

G2A AC (60 Hz)

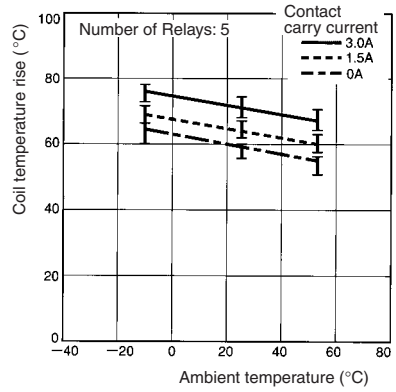


G2A DC

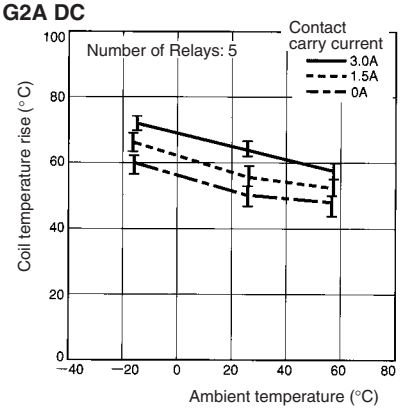


Ambient Temperature vs. Coil Temperature Rise

G2A 110 VAC (50 Hz)

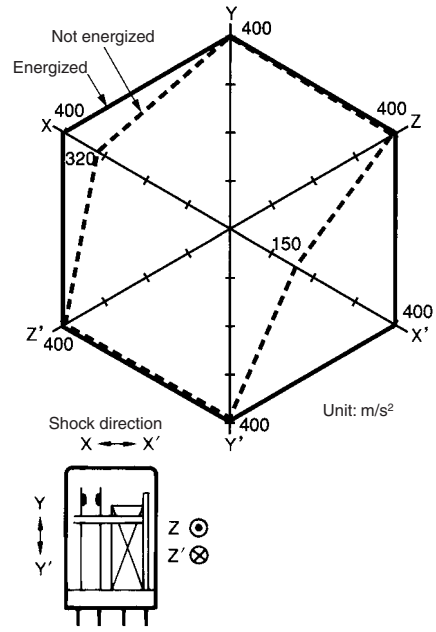


G2A DC



Malfunctioning Shock

G2A-432A 100/110 VAC

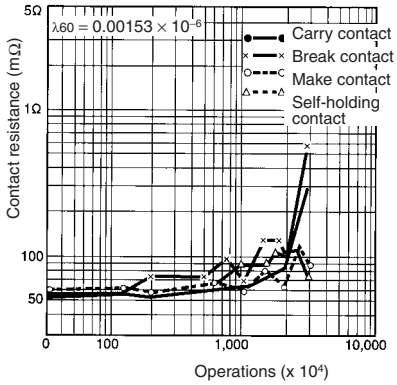


Number of samples = 5

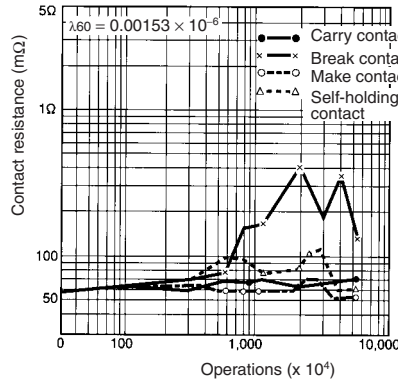
Measurement conditions: Impose a shock of 100 m/s² in the ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

Contact Reliability (JIS C 4530 Allen-Bradley Test Circuit)

100 VAC

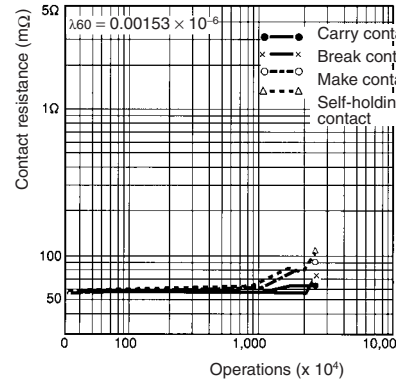


24 VDC



Contact Reliability (Improved Allen-Bradley Test Circuit)

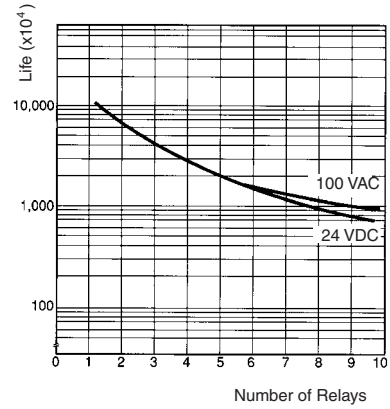
Contact load: 1 mA at 5 VDC (resistive load)
Failure criterion contact resistance: 100 Ω



Coil Self-load Life Curve

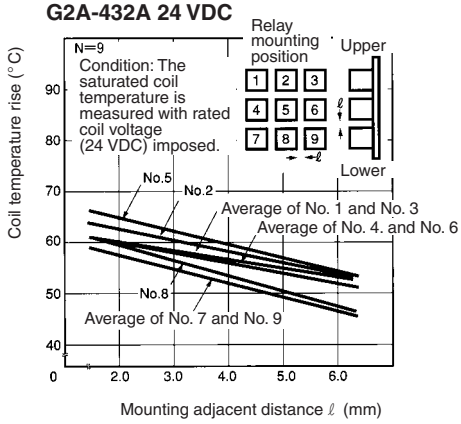
(Unit: mA)

Model	Specifications	No. of Relays				
		1	2	3	5	10
G2A-432A	100 VAC, 60 Hz	14	28	42	70	140
	24 VDC	45	90	135	225	450

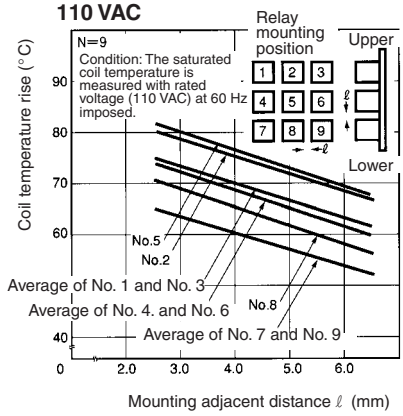


Relay Mounting Adjacent Distance vs. Coil Temperature Rise

G2A-432A 24 VDC

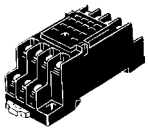
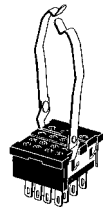
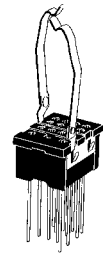


110 VAC



Accessories (Order Separately)

Connecting Sockets

Front-connecting Socket	Back-connecting Socket					
DIN track/screw mounting	Solder terminals		Wire-wrap terminals		PCB terminals	
PYF14A(-E) PYF14A-TU PYF14T	PY14 PY14-Y3	PY14-Y2 (with Relay Hold-down Clip)	PY14QN(2)	PY14QN(2)-Y2 (with Relay Hold-down Clip)	PY14-0	PY14-02
						

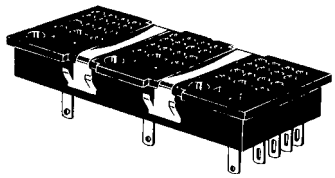
Note: 1. The PYF□A-TU is a high-humidity relay with nickel-plated rustproof terminal screws that are the same as the PYF□A in size.

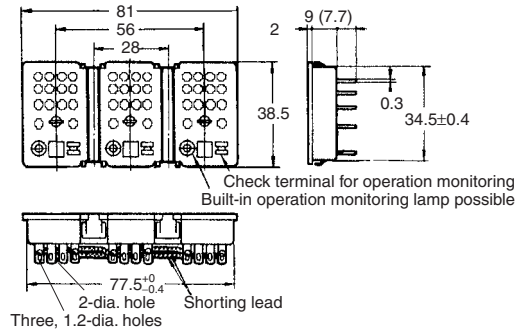
2. The PYF14T is slightly different from the PYF14A(-TU) in shape and size.

3. The PYF□A-E is a finger-protection model, for which round terminals are not available. Use fork-shaped terminals or equivalent ones instead.

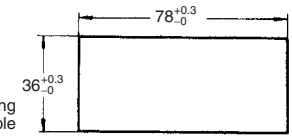
PY14-3 Back-connecting Socket

(with check terminals for operation monitoring)



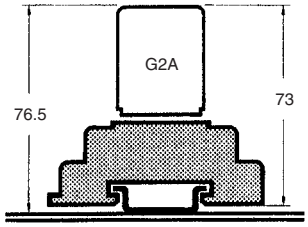


Panel Cutout



Relay Mounting Height with Socket

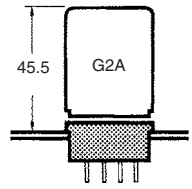
With Front-connecting Socket



PYF14A

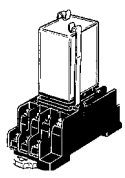
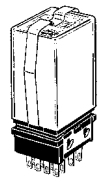
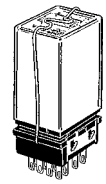
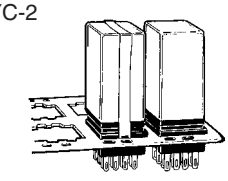
Note: PYF14A can be used for both DIN track mounting and screw mounting.

With Back-connecting Socket



PY14 Socket

Relay Hold-down Clips

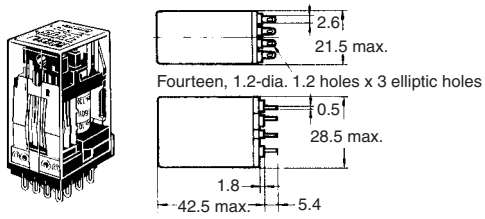
For Front-connecting Socket	For Back-connecting Socket		For Socket mounting plate
PYC-A2	PYC-3	PYC-5	PYC-2
			

Note: When using a Relay Hold-down Clip for the built-in operation indicator model, use of the PYC-A2 or PYC-5, which allows easy viewing of the indicator, is recommended.

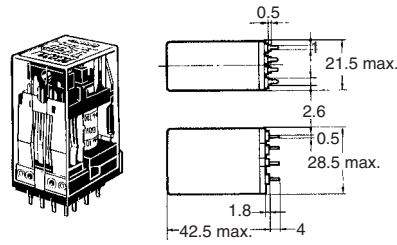
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Dimensional tolerances are ±0.1 mm.

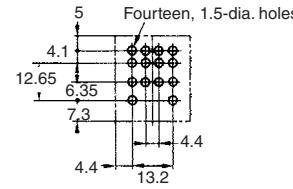
Solder Terminal Models



PCB Terminal Models

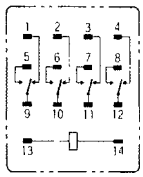


Mounting Holes on PCB (Bottom View)

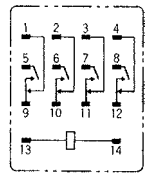


Terminal Arrangement/Internal Connections (Bottom View)

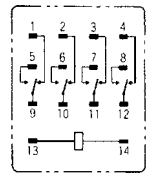
Standard Models



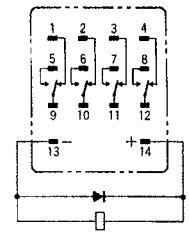
Make-before-break Contact Models



Arc Barrier Equipped Models

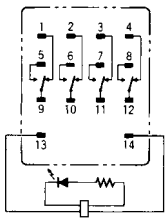
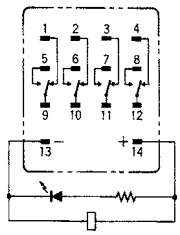
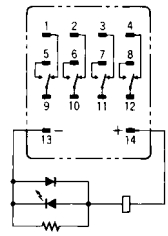


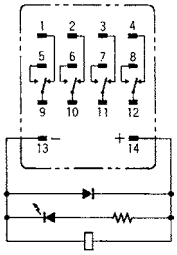
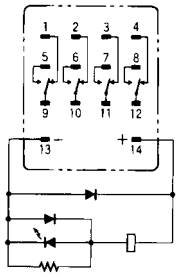
Built-in Diode Models



Built-in Operation Indicator Models

Color of operation indicator
AC model: Red
DC model: Green

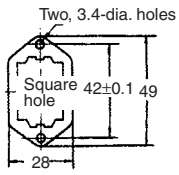
G2A-432A-N		
100/110, 200/220 VAC 6, 12, 24, 50 VDC	6, 12, 24 VDC	48, 100 VDC
		

G2A-432A-N1	
6, 12, 24 VDC	48, 100 VDC
	

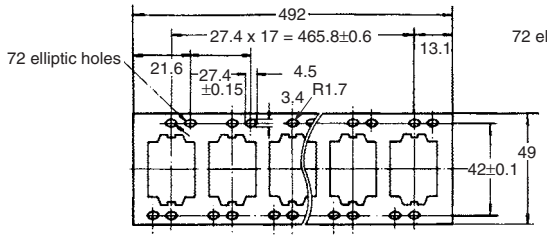
Note: Do not reverse the polarity of the coil of DC Relays that have a built-in indicator or diode.

Socket Mounting Plates (t = 1.6 mm)
Use any of these plates when mounting two or more Sockets side-by-side

PYP-1 (for Single Socket Mounting)

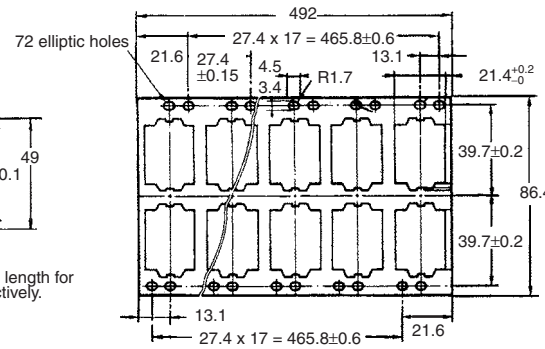


PYP-18 (for Mounting 18 Sockets)



Note: PYP-18 and PYP-36 can be cut to a desired length for mounting less than 18 or 36 Sockets, respectively.

PYP-36 (for Mounting 36 Sockets)



Precautions

Refer to page 11 for general precautions.

A DC coil model with a built-in indicator or built-in diode has coil polarity. Be sure to wire the terminals correctly, otherwise the diode may be broken or the operating indicator may not be lit. Furthermore, as a result of the short-circuiting of the built-in diode, the devices in the circuit may be damaged.

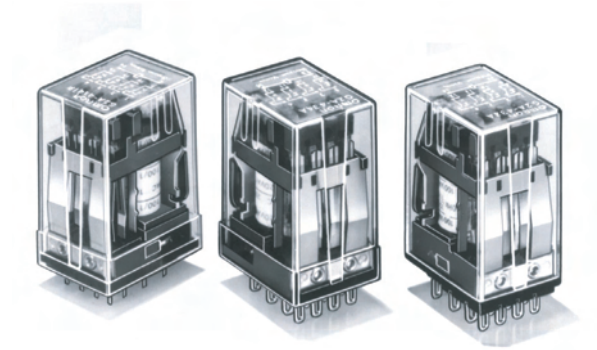
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J014-E1-02 In the interest of product improvement, specifications are subject to change without notice.

Power Relay
G2A-434

Fully Sealed Version of G2A that Displays Its Power in Adverse Environments

- Exhibits stable performance in an adverse atmosphere of harmful gas, moisture, or powdery dust due to its hermetically sealed construction.
- All the mechanical components of the Relay have been annealed to prevent gas generation inside the Relay.
- Economical as compared with a hermetically sealed relay in a metallic enclosure.



Ordering Information

Contact form	Classification	Plug-in terminals	PCB terminals
4PDT	Standard model	G2A-434A(-D)(-N)(-N1)	G2A-4341P
	UL-approved model	G2A-434A-US	G2A-4341P-US

Note: When placing your order, add the coil voltage rating to the model number as shown below.
Example: G2A-434A-VS 200/220 VAC
└── Rated coil voltage

Model Number Legend

G2A-□□□□□-□
1 2 3 4 5 6

1. **Number of Poles and Contact Form**
   4: 4PDT
2. **Contact Type**
   3: Crossbar bifurcated
3. **Enclosure Construction**
   4: Fully sealed
4. **Terminal Shape**
   A: Plug-in
   1P: PCB
5. **Safety Breaking Mechanism**
   None: No
   Y: Arc barrier
6. **Special Elements**
   None: Standard
   D: Built-in diode
   N: Built-in operation indicator
   N1: Built-in operation indicator and diode
   US: UL-approved

■ Accessories (Order Separately)

Sockets

Classification	DIN Track-mounting Socket	Back-connecting Socket			
	Screw terminals	Solder terminals	Wire-wrap terminals	PCB terminals	
Without Hold-down Clip	PYF14A(-E) PYF14A-TU PYF14T	PY14 PY14-3	PY14QN(2)	PY14-0	PY14-02
With Hold-down Clip	---	PY14-Y2	PY14QN(2)-Y2	---	---

Note: See the G2A datasheet for detailed information on Relay Hold-down Clips and Socket Mounting Plates.

Specifications

■ Coil Ratings

Rated voltage	Current		Coil resistance	Coil inductance (ref. value)		Must operate	Must release	Max. voltage	Power consumption
	50 Hz	60 Hz		Armature OFF	Armature ON	% of rated voltage			
6 VAC	295 mA	233 mA	8.9 Ω	0.048 H	0.065 H	80 % max.	30 % min.	110 %	Approx. 1.4 VA
12 VAC	148 mA	117 mA	34 Ω	0.166 H	0.257 H				
24 VAC	73 mA	58 mA	136 Ω	0.691 H	1.04 H				
50 VAC	35 mA	28 mA	530 Ω	3.08 H	4.53 H				
100/ 110 VAC	17.7/ 21.4 mA	14/ 16.8 mA	2,200 Ω	12.42/ 12.38 H	18/16.4 H				
200/ 220 VAC	8.9/ 10.8 mA	7/8.4 mA	8,800 Ω	42.2/ 41.8 H	72/65.5 H				
6 VDC	176 mA		34 Ω	0.14 H	0.26 H		10 % min.		Approx. 1.1 W
12 VDC	88 mA		136 Ω	0.6 H	1.0 H				
24 VDC	45 mA		530 Ω	2.7 H	4.6 H				
48 VDC	22 mA		2,200 Ω	11 H	19 H				
100 VDC	11.4 mA		8,800 Ω	43 H	73 H				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance and coil inductance values are for reference only.

3. Performance characteristic data is measured at a coil temperature of 23°C.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at 23°C and not continuously.

5. For built-in operation indicator models rated at 6, 12, and 24 VDC, add an LED current of approx. 5 mA to the rated currents.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4) (L/R = 7 ms)
Contact mechanism	Crossbar bifurcated	
Contact material	Movable:AgAu-clad AgPd Fixed:AgPd	
Rated load	0.3 A at 110 VAC 0.5 A at 24 VDC	0.2 A at 110 VAC 0.3 A at 24 VDC
Rated carry current	2 A	
Max. switching voltage	250 VAC, 125 VDC	
Max. switching current	AC: 0.7 A DC: 2 A	AC: 0.5 A DC: 1 A

■ Characteristics

Contact resistance (see note 2)	100 mΩ max.
Operate time (see note 3)	15 ms max.
Release time (see note 3)	15 ms max.
Max. operating frequency	Mechanical: 18,000 operations/hour Electrical: 1,800 operations/hour (under rated load)
Insulation resistance (see note 4)	100 MΩ min. (at 500 VDC)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 minute between coil and contact and between contacts of different polarities (700 VAC between contacts of same polarities)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2
Error rate (level P) (Reference value) (see note 5)	1 mA at 100 mVDC
Endurance	Mechanical: 100,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical: 5,000,000 operations min. (under rated load and at operating frequency of 1,800 operations/hour) (see note 6)
Ambient temperature	Operating:–10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating:5% to 85%
Weight	Approx. 39 g

Note: 1. The data shown above are initial values.

2. The contact resistance was measured with 0.1 A at 5 VDC using the voltage drop method.

3. The operate and release times were measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. This value was measured at a switching frequency of 60 operations per minute.

6. The electrical endurance was measured at an ambient temperature of 23°C.

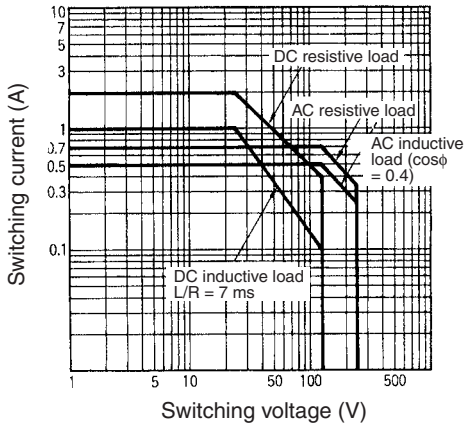
■ Approved by Standards

UL508 (File No. E41515)

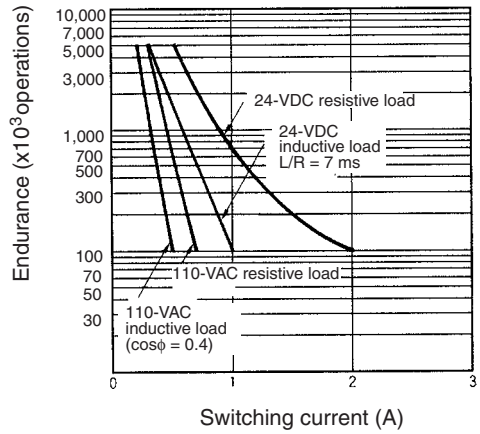
Model	Coil ratings	Contact ratings
G2A-434A-US G2A-4341P-US	6 to 120 VAC 6 to 120 VDC	1 A 120 VAC (resistive load) 1 A 30 VDC (inductive load)

Engineering Data

Maximum Switching Power

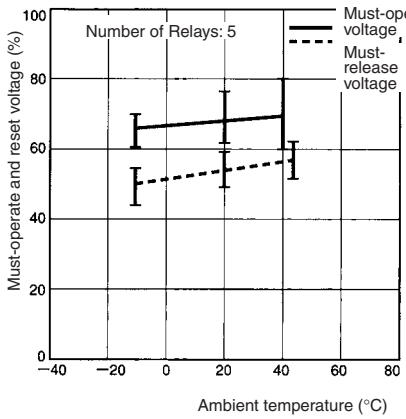


Endurance

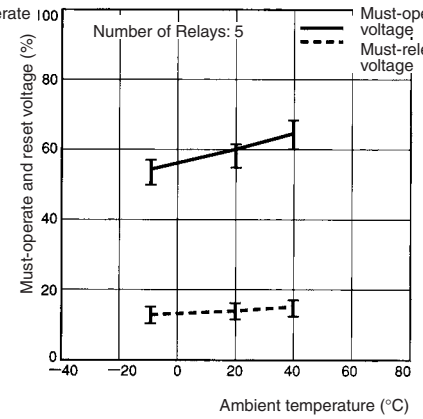


Ambient Temperature vs. Must-operate and Must-release Voltage

G2A-434A AC (60 Hz)

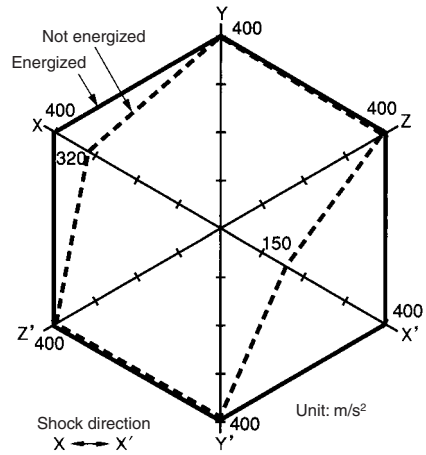


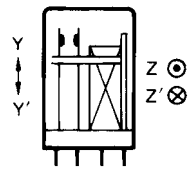
G2A-434A DC



Malfunctioning Shock

G2A-434A 100/110 VAC



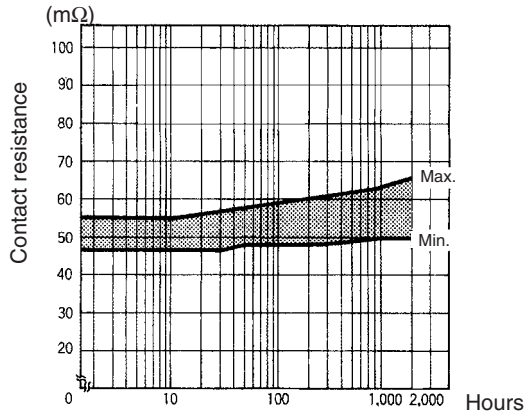


Number of samples: 5

Measurement conditions: Impose a shock of 100 m/s² in the ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

H_2S Gas Data (Reference)

G2A-434A 24 VDC



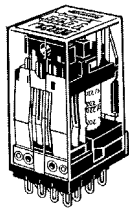
Measurement:
Sample is left in an atmosphere of H_2S gas with concentration of 2 to 5 ppm at 40°+5°/–0°C and at 75% to 80%, then taken out from the gas atmosphere at fixed time intervals, and left for 30 minutes or more at room temperature and humidity. The contact resistance values before and after the test are measured.

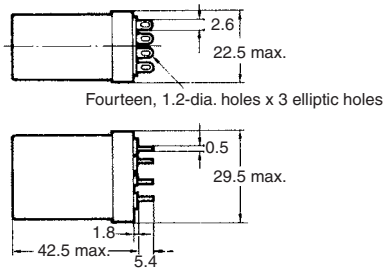
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. Dimensional tolerances are ±0.1 mm.

Plug-in Terminal/Solder Terminal Models

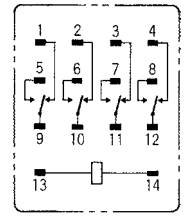
G2A-434A (-US)
G2A-434A-D
G2A-434-N (1)





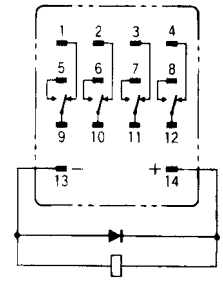
Terminal Arrangement/Internal Connections
(Bottom View)

G2A-434A-(US)

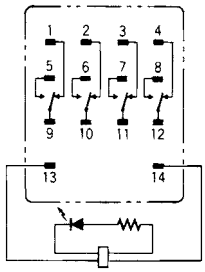
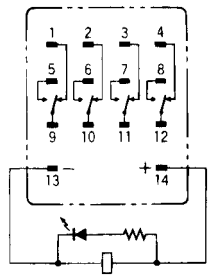
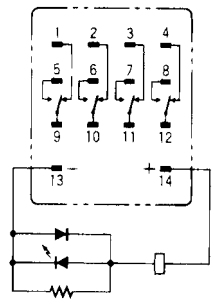
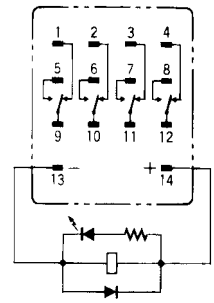
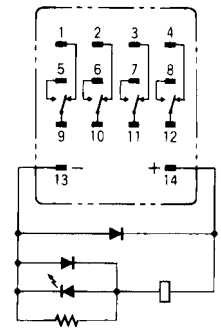


(No coil polarity)

G2A-434A-D



Be sure to wire the terminals with the correct polarity.

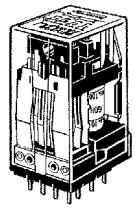
G2A-434A-N			G2A-434A-N1	
6, 12, 24, 50, 100/110, 200/220 VAC	6, 12, 24 VDC	48, 100 VDC	6, 12, 24 VDC	48, 100 VDC
				

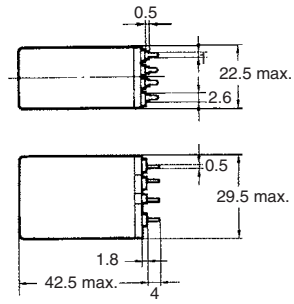
Operation indicator color
AC model: Red
DC model: Green

Note: DC models have coil polarity. Be sure to wire the terminals with the correct polarity.

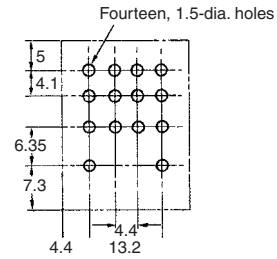
PC Terminal Model

G2A-4341P (-US)

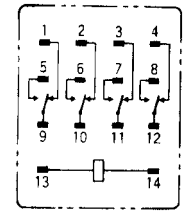




Mounting Holes on PCB
(Bottom View)



Terminal Arrangement
(Bottom View)



The coil has no polarity.

Precautions

Refer to page 11 for general precautions.

DC models with a built-in indicator or built-in diode have coil polarity.
Be sure to wire the terminals with the correct polarity.

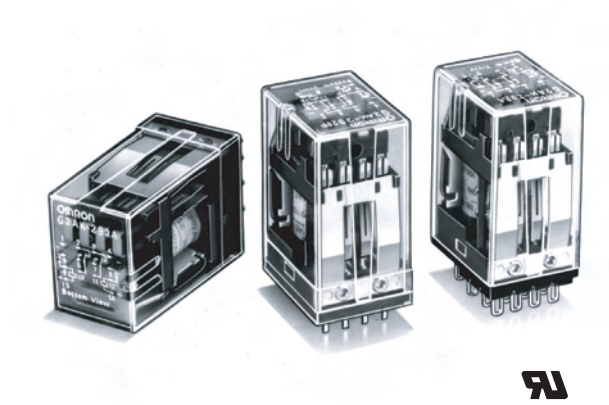
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J118-E1-02 In the interest of product improvement, specifications are subject to change without notice.

Latching Relay
G2AK

Magnetic Latching Version of G2A Ideal for Sequence Control

- Double-winding latch system with continuous rating.
- Terminals pulled from the respective junctions between the built-in diodes and set and reset coils allow the built-in diodes to be externally connected for coil surge absorption.
- Excellent vibration/shock resistance with minimal secular decrease in latching power.
- Easy monitoring of ON/OFF operation due to the built-in operation indicator mechanism.
- Same outline dimensions as the standard models of G2A.



Ordering Information

Contact form	Classification	Plug-in terminals	PCB terminals
DPDT	**Standard model**	G2AK-232A	G2AK-2321P
	Arc barrier equipped model	G2AK-232AY	---
	Fully sealed model	G2AK-234A	---

Note: 1. When placing your order, add the coil voltage rating to the model number as shown below.
Example: G2AK-232A 100 VAC
└── Rated coil voltage

2. The applicable rated voltage range can be increased by connecting an external resistor. Refer to *Specifications* for details.
3. Models meeting UL standards must be specified when ordering. Add "-US" after the model number.

Model Number Legend

G2AK-□□□□□-□
1 2 3 4 5 6

1. Number of Poles (Contact Form)
2: DPDT

2. Contact Type
3: Crossbar bifurcated

3. Enclosure Construction
2: Casing
4: Fully sealed

4. Terminal Shape
A: Plug-in terminal
1P: PCB terminal

5. Safety Breaking Mechanism
None: No
Y: Arc barrier

6. Approved Standards
None: Standard
US: UL-approved

Arc barrier equipped model	Fully sealed model
The arc barrier equipped model is a relay designed to prevent arc short-circuiting between phases and can be used in a circuit which has potential difference between phases. The switching power of such a circuit with potential difference must be limited to less than 1/2 the rated load when using this Relay.	The fully sealed model is a relay in a gas-tight plastic enclosure and thus exhibits stable performance in an adverse atmosphere of harmful gas, moisture, or powdery dust.

■ Accessories (Order Separately)

Sockets

Item	DIN Track-mounting Socket	Back-connecting Relay			
	Screw terminals	Solder terminals	Wire-wrap terminals	PCB terminals	
Without Hold-down Clip	PYF14A(-E) PYF14A-TU PYF14T	PY14 PY14-3	PY14QN(2)	PY14-0	PY14-02
With Hold-down Clip	---	PY14-Y2	PY14QN-Y2	---	---

Note: See the G2A Datasheet for detailed information on the Relay Hold-down Clips and Socket Mounting Plates.

Specifications

■ Coil Ratings

Rated voltage	Set coil			Reset coil			Set voltage	Reset voltage	Max. voltage	Power consumption	
	Rated current		Coil resistance	Rated current		Coil resistance				Set coil	Reset coil
	50 Hz	60 Hz		50 Hz	60 Hz						
6 VAC	308 mA	300 mA	6.5 Ω	72 mA	70 mA	32 Ω	80% max. of rated voltage	80% max. of rated voltage	110% of rated voltage	Approx. 1.6 to 2.0 VA	Approx. 0.5 to 1.2 VA
12 VAC	162 mA	158 mA	28 Ω	40 mA	39 mA	125 Ω					
24 VAC	66 mA	64 mA	145 Ω	22.6 mA	22 mA	460 Ω					
50 VAC	34 mA	33 mA	590 Ω	11.3 mA	11 mA	1,900 Ω					
100 VAC	19 mA	18.5 mA	2,150 Ω	12.3 mA	12 mA	3,600 Ω					
6 VDC	360 mA		14 Ω	160 mA		32 Ω				Approx. 2.0 to 2.2 W	Approx. 1.0 to 1.2 W
12 VDC	170 mA		65 Ω	85 mA		125 Ω					
24 VDC	85 mA		270 Ω	50 mA		460 Ω					
48 VDC	44 mA		1,050 Ω	24 mA		1,900 Ω					

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%, –20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance values are for reference only.

3. Performance characteristics data are measured at a coil temperature of 23°C.

4. The rated current of the AC operating coil is half-wave rectified current and is measured with a DC ammeter.

5. The peak reverse-breakdown voltage of the built-in diode is 1,000V.

6. The set coil of the Relay rated at 6 VDC is of the 5-minute rating. However, when it is used by connecting a diode is series, it can be of the continuous rating.

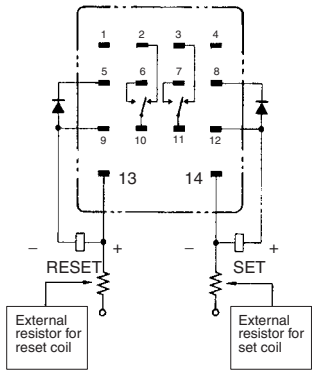
7. By connecting an external resistor to each of the set and reset coils as shown in the table below, the rated current of the Relay can be increased.

8. The maximum voltage is one that is applicable instantaneously to the Relay coil at 23°C and not continuously.

Rated voltage	Connected coil voltage	External resistor			
		Set coil		Reset coil	
		Resistance	Capacity	Resistance	Capacity
110 VAC	100 VAC	0.27 kΩ	0.5 W min.	0.39 kΩ	1/4 W min.
200 VAC	100 VAC	2.7 kΩ	5 W min.	8.2 kΩ	3 W min.
220 VAC	100 VAC	3.3 kΩ	6 W min.	9.1 kΩ	3 W min.
100 VDC	48 VDC	1.1 kΩ	10 W min.	2.0 kΩ	6 W min.

Note: Use a resistor having the above resistance value with tolerances of ±10% for external connection.

Method of Connection



- Reset side
  DC coil: Connect terminal No. 13 to terminal No. 9 or No. 13 to No. 5.
  AC coil: Connect terminal No. 13 to terminal No. 5.
- Set side
  DC coil: Connect terminal No. 14 to terminal No. 12 or No. 14 to No. 8.
  AC coil: Connect terminal No. 14 to terminal No. 8.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4) (L/R = 7 ms)
Contact type	Crossbar bifurcated	
Contact material	Movable:Au-clad AgPd Fixed:AgPd	
Rated load	0.3 A at 110 VAC 0.5 A at 24 VDC	0.2 A at 110 VAC 0.3 A at 24 VDC
Rated carry current	3 A	
Max. switching voltage	250 VAC, 125 VDC	

■ Characteristics

Contact resistance (see note 2)	100 mΩ max.
Set time (see note 3)	AC: 25 ms max.; DC: 15 ms max.
Reset time (see note 3)	AC: 25 ms max.; DC: 15 ms max.
Min. pulse width	AC: 50 ms; DC: 30 ms
Max. operating frequency	Mechanical: 18,000 operations/hour Electrical: 1,800 operations/hour (under rated load)
Insulation resistance (see note 4)	100 MΩ min. (at 500 VDC)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 minute between coil and contact (700 VAC between contacts of same pole) (1,000 VAC between set and reset coils)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude) (for contact malfunction); 3.0-mm double amplitude (for armature malfunction)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 100 m/s^2, 300 m/s^2
Endurance	Mechanical: 5,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical: 5,000,000 operations min. (under rated load and at operating frequency of 1,800 operations/hour) (see note 5)
Error rate (level P) (Reference value) (see note 6)	1 mA at 100 mVDC
Ambient temperature	Operating:–10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating:5% to 85%
Weight	Approx. 38 g

Note: 1. The data shown above are initial values.

2. The contact resistance was measured with 0.1 A at 5 VDC using the fall-of-potential method.

3. The set or reset time was measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. This value was measured at a switching frequency of 60 operations per minute.

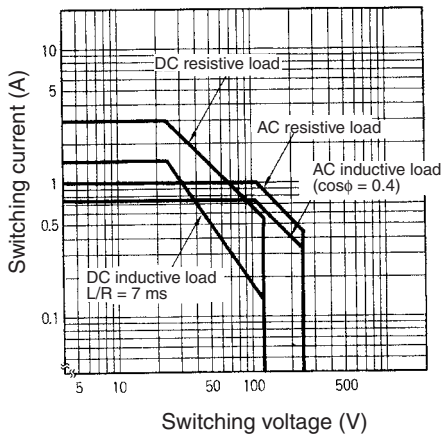
■ Approved by Standards

UL (File No. E41515)

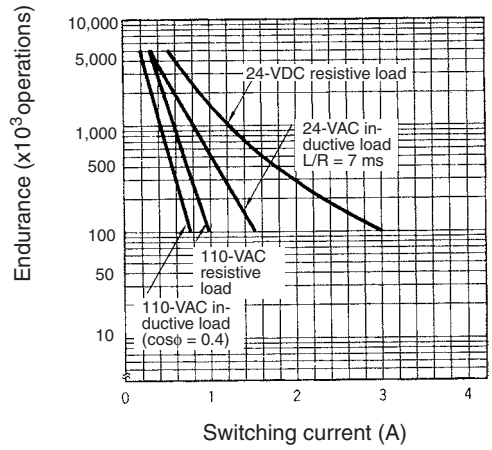
Model	Coil ratings	Contact ratings
G2AK-□	6 to 100 VAC 6 to 50 VDC	1 A 120 VAC (resistive load) 1 A 30 VDC (inductive load)

Engineering Data

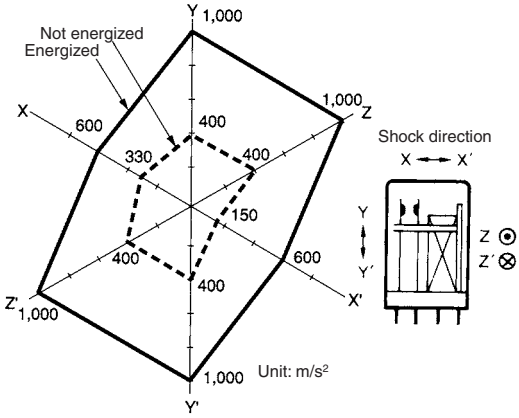
Maximum Switching Power



Endurance



Malfunctioning Shock

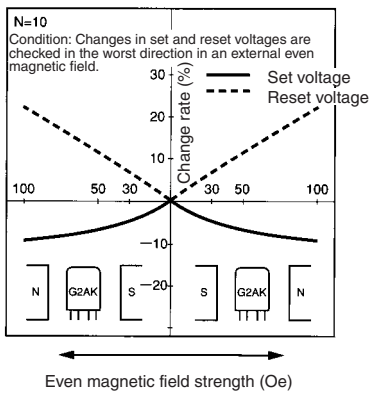


Number of samples = 5

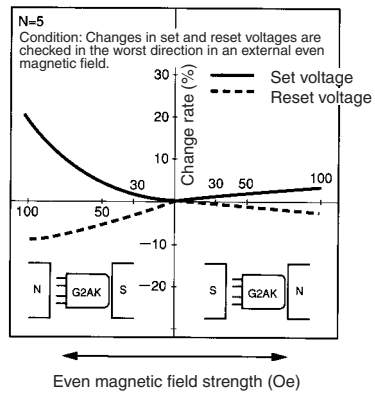
Measurement conditions: Impose a shock of 100 m/s² in the ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

Changes in Operating Characteristics vs. External Magnetic Field

G2AK-232A 24 VDC (Mean Value)

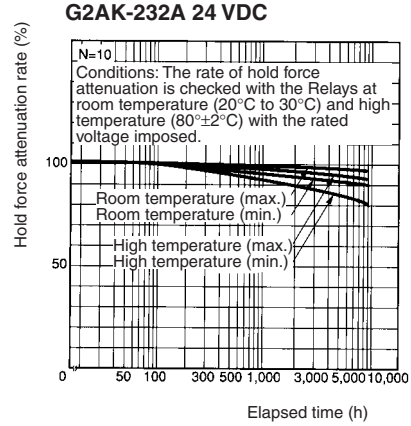


(Mean Value)

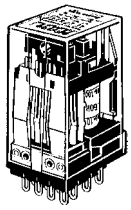


Hold Force Attenuation vs. Elapsed Time

G2AK-232A 24 VDC



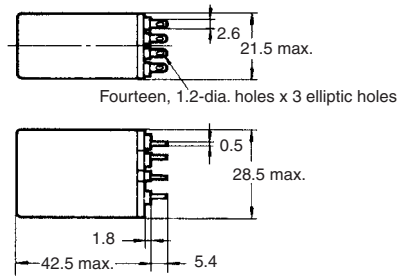
Dimensions



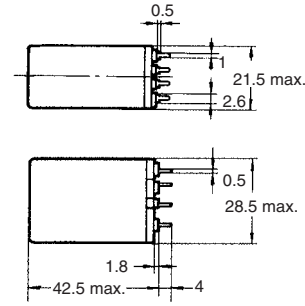
G2AK-232

Arc Barrier Equipped Models

with Plug-in Terminals
G2AK-232A(Y)

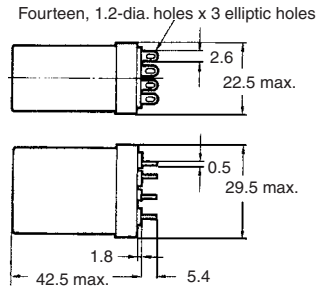


with PCB Terminals
G2AK-2321P(Y)

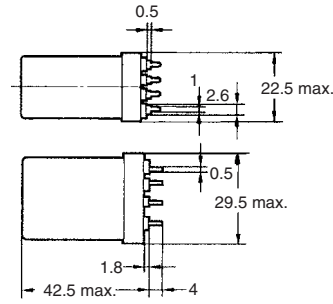


Fully Sealed Models

with Plug-in Terminals
G2AK-234A

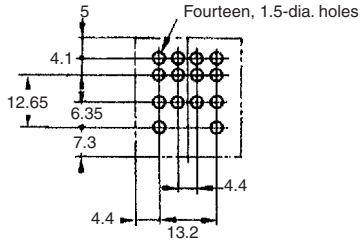


with PCB Terminals
G2AK-2341P

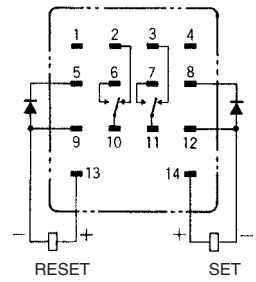


Mounting Holes on PCB (Bottom View)

Note: Dimensional tolerances are ±0.1 mm



Terminal Arrangement/Internal Connections (Bottom View)



Note: Terminals (Nos. 12 and 9) are pulled from the respective junctions between the diode and set coil and between the diode and reset coil. Use these terminals through external connection for selective use or non-use of the diodes as well as for surge prevention.

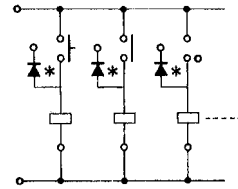
Precautions

Refer to page 11 for general precautions.

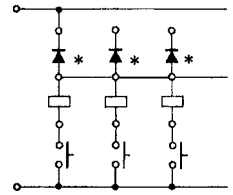
The G2AK can be used for special purposes by utilizing its built-in diodes.

When built-in diodes are not required

- With the DC-coil Latching Relay, the built-in diodes become unnecessary for a circuit in which a coil operating switch is incorporated for each of the set and reset coils as shown on the right.

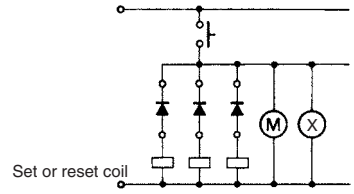


- With the DC/AC-coil Latching Relay, if the junctions between the set coil and built-in diode and between the reset coil and built-in diode are connected as shown on the right, only one of the built-in diode is required and the rest of the diodes become unnecessary. However, a coil operating switch is required for each coil. In this case, because of the diode characteristics, the load rating must be 0.5 A or less.



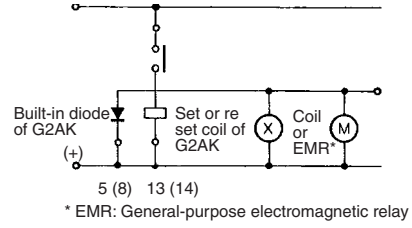
When built-in diodes are required

- When using the AC-coil Latching Relay which operates on commercial AC input, the built-in diodes are required.
- With the DC/AC-coil Latching Relay, the built-in diodes are required for an inductive electrical equipment circuit which consists of two or more set/reset coils, motor M, general electromagnetic coil X, etc. per coil operating switch as shown on the right.



Examples of built-in diode applied circuit

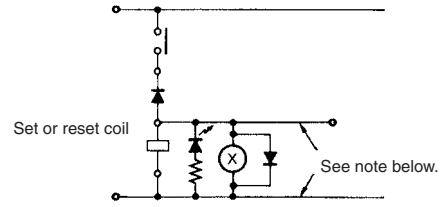
- With the DC-coil Latching Relay, the built-in diode(s) can be used for surge absorption. in this case, pay attention to the polarity of the coil. Note that the 5-minute rating applies only to the set coil rated at 6 VDC and the continuous rating for other DC coil voltages remains unchanged.



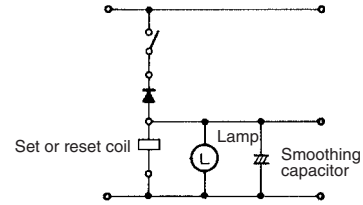
* EMR: General-purpose electromagnetic relay

The figures above represent the terminal numbers. The figures in parentheses represent the terminals on the set side.

- With the AC-coil Latching Relay, a half-wave rectified power supply can be obtained as shown on the right. This can be used as a power supply for light-emitting diodes. However, because of the diode characteristics, the load rating must be 0.5 A or less.



Note: If a smoothing capacitor is used as shown on the right, the waveform of the current that flows into the set or reset coil changes from half wave to that of nearly direct current. In other words, ripple is improved but the coil temperature rises, which may adversely affect the set or reset voltage. Therefore, avoid circuit configuration with an electronic device which improves ripple, such as a capacitor.



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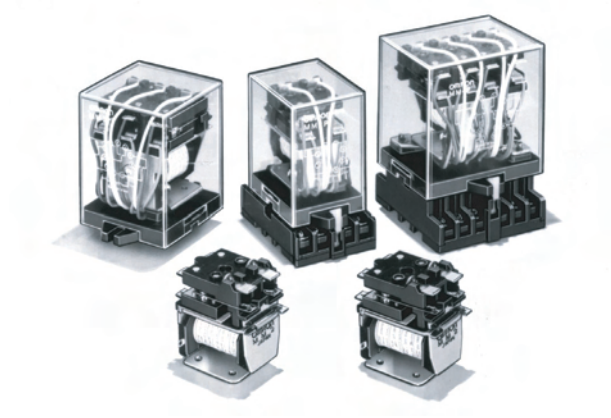
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J117-E1-02 In the interest of product improvement, specifications are subject to change without notice.

Power Relay
MM

Stable Contact Reliability and Long Life

- Easy to mount, wire, and use.
- A large selection of models including various contact forms, DC-switching models, and open models.
- Mechanical life: 5,000,000 operations; electrical life (under rated load): 500,000 operations.
- Models also available with built-in diodes and for use as auxiliary power relays.



Ordering Information

Type	Contact form	Open structure		Cased
		Solder terminals	Screw terminals	Plug-in (octal pins) terminals
Standard	DPDT	MM2	MM2B	MM2P
	3PDT	MM3	MM3B	MM3P
	4PDT	MM4	MM4B	MM4P
DC-switching	DPDT	MM2X	MM2XB	MM2XP
	3PDT	MM3X	MM3XB	MM3XP
	4PDT	MM4X	MM4XB	MM4XP
With built-in diode	DPDT	---	---	MM2P-D
	4PDT	---	---	MM4P-D
DC-switching with built-in diode	DPDT	---	---	MM2XP-D
	4PDT	---	---	MM4XP-D
With operation indicator	DPDT	---	---	MM2PN
	3PDT	---	---	MM3PN
	4PDT	---	---	MM4PN
DC-switching with operation indicator	DPDT	---	---	MM2XPN
	3PDT	---	---	MM3XPN
	4PDT	---	---	MM4XPN
Conforming to auxiliary power relay specifications	4PDT	---	---	MM4P-JD
		---	---	MM4XP-JD

Models Conforming to Auxiliary Power Relay Specifications

The MM4P-JD and MM4XP-JD satisfy the ratings of auxiliary relays provided in JEC-2500 (1987) standards for power protective relays specified by the Japan Electromechanical Commission. Furthermore, the MM4P-JD and MM4XP-JD satisfy the ratings of multi-contact relays provided in JEC-174D (1979) standards for power auxiliary relays.

These models work at operation level B specified by JEC-174D (1979) standards and the hot start of the relays is possible after the coils radiate heat.

In accordance with JEC-2500 (1987) standards, the coil of each model withstands a 130% DC load or 115% AC load.

Note: 1. When ordering, add the rated coil voltage to the model number. Rated coil voltages are given in the coil ratings table.
Example: MM2, 6 VAC
Rated coil voltage
2. Latching Relays based on the MM Series are also available. Refer to the MMK.
3. Models with built-in varistors (AC operation) are also available in addition to those with built-in diodes. Ask your OMRON representative for details.

Model Number Legend

MM□□□□-□
1 2 3 4 5

1. Contact Form
2: DPDT
3: 3PDT
4: 4PDT

2. Type (See Note)
None: Standard
X: DC-switching

3. Terminal Shape
None: Solder
B: Screw
P: Plug-in

4. Operation Indicator
None: Not provided
N: Provided

5. Built-in Diode
None: Not provided
D: Provided

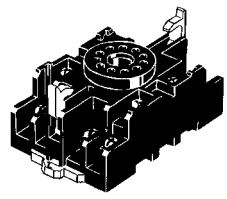
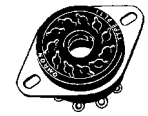
Note: The suffix "JD" indicates models conforming to auxiliary power relay specifications.

■ Accessories (Order Separately)

Mounting Brackets

Mounting Bracket (S bracket)	R99-03MM

Sockets

Relay model	DIN Track/Front-connecting Socket (screw terminals)	Back-connecting Socket (solder terminals)
MM2(X)P(-D)	8PFA	PL08
MM3P	11PFA 	PL11 
MM3XP, MM4(X)P(-D)	14PFA	PL15
MM4(X)P-JD	14PFA	---

Specifications

■ Coil Ratings

Open Coils (with Solder or Screw Terminals)

Rated voltage (V)		Rated current (mA)				Coil resistance (Ω)		Must-operate voltage	Must-release voltage	Max. voltage	Power consumption (VA or W)	
		DP		3P or 4P		DP	3P or 4P					
		50 Hz	60 Hz	50 Hz	60 Hz			% of rated voltage			Initial	Rated
AC	6	790	655	1,120	950	1.1	0.5	80% max.	30% min. (60 Hz) 25% min. (50 Hz)	110%	Approximately 4.1 (DP) Approximately 6.3 (3P or 4P)	Approximately 3.9 (DP) Approximately 5.7 (3P or 4P)
	12	395	325	560	480	4.7	2.0					
	24	195	160	280	240	19	8.5					
	50	94	78	134	114	82	36					
	100/(110)	47	39/45	67	57/66	340	150					
	200/(220)	23.5	19.5/ 22.5	33.5	28.5/33	1,540	620					
DC	6	340		450		17.5	13.4	70% max.	10% min.		Approximately 2.1 (DP) Approximately 2.7 (3P or 4P)	
	12	176		220		68	54					
	24	87		94		275	255					
	48	41		52		1,180	930					
	100/110	17/19		22/24.5		5,750	4,500					
	200/220	8.6/9.5		11/12		23,200	18,000					

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance values are reference values.

3. Performance characteristic data are measured at a coil temperature of 23°C.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at an ambient temperature of 23°C and not continuously.

Covered Coils (Plug-in Terminals)

The rated current may vary if the Relay has a built-in operating indicator (see note 4).

Rated voltage (V)		Rated current (mA)				Coil resistance (Ω)		Coil inductance (H)				Must-operate voltage	Must-release voltage	Max. voltage	Power consumption (VA or W)	
		DP		3P or 4P		DP	3P or 4P	DP		3P or 4P						
		50 Hz	60 Hz	50 Hz	60 Hz			Contact release	Contact operate	Contact release	Contact operate	% of rated voltage			Initial	Rated
AC	6	690	590	975	850	1.1	0.5	0.02	0.02	0.01	0.03	80% max.	30% min. (60 Hz) 25% min. (50 Hz)	110%	Approx. 4.1 VA (DP) Approx. 6.3 VA (3P or 4P)	Approx. 3.5 VA (DP) Approx. 5.1 VA (3P or 4P)
	12	345	295	490	430	4.7	2.0	0.07	0.01	0.04	0.07					
	24	170	145	245	210	19	8.5	0.28	0.41	0.18	0.28					
	50	82	70	117	102	82	36	1.2	1.7	0.75	1.2					
	100/(110)	41	35/40	58.5	51/58	340	150	4.8	6.7	3	4.5					
	200/(220)	20.5	17.5/ 20	29	25.5/ 29	1,540	620	20	25.6	12	19					
DC	6	340		450		17.5	13.4	0.2	0.36	0.23	0.35	70% max.	10% min.		Approx. 2.1 W (DP) Approx. 2.7 W (3P or 4P)	
	12	176		220		68	54	0.74	1.0	0.87	1.4					
	24	87		94		275	255	4.2	5.8	5.6	9.2					
	48	41		52		1,180	930	20.4	26	27.3	45.5					
	100/110	17/19		22/24.5		5,750	4,500	81.6	92.5	61.4	96.5					
	200/220	8.6/9.5		11/12		23,200	18,000	340	380	158	250					

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance and coil inductance values are for reference only.

3. Performance characteristic data are measured at a coil temperature of 23°C.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at an ambient temperature of 23°C and not continuously.

5. The rated current of a model with a built-in LED indicator at 6, 12, 24, or 50 VAC or 6, 12, 24, or 48 VDC increases by approximately 10 mA due to the current consumption of the LED. The rated current of a model with a built-in neon lamp indicator at 100 (110) or 200 (220) VAC or 100/110 or 200/220 VDC increases by approximately 0.2 mA due to the current consumption of the neon lamp.

Coils (Conforming to Auxiliary Power Relay Specifications)

Rated voltage (V)		Rated current (mA)		Coil resistance (Ω)	Coil inductance (H)		Must-operate voltage	Must-release voltage	Max. voltage	Operation level (JEC-174D)	Power consumption (VA or W)	
		50 Hz	60 Hz		Contact release	Contact operate	% of rated voltage				Initial	Rated
AC	24	245	210	8.5	0.18	0.28	80% max.	30% min. (60 Hz) 25% min. (50 Hz)	110%	B Hot start after coil heated	Approx. 6.3 VA	Approx. 5.1 VA
	50	117	102	36	0.75	1.2						
	100/(110)	58.5	51/58	150	3	4.5						
	110	53	46	182	3.6	5.5						
	115	51	44	210	4	6.2						
	200/(220)	29	25.5/29	620	12	19						
	220	26.5	23	780	15	21						
DC	24	94		255	5.6	9.2	70% max.	10% min.			Approx. 2.7 W	
	48	52		930	27.3	45.5						
	100/110	22/24.5		4,500	61.4	96.5						
	125	22		5,800	90	130						
	200/220	11/12		18,000	158	250						

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance and coil inductance values are for reference only.

3. Performance characteristic data are measured at a coil temperature of 23°C.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at 23°C and not continuously.

■ Contact Ratings

Standard Relays

Item	Open Relays		Covered Relays	
	MM2(B), MM3(B), MM4(B)		MM2P(N, D), MM3P(N), MM4P(N, D)	
	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)
Contact type	Single			
Contact material	Ag			
Rated load	15 A at 220 VAC 10 A at 24 VDC		7.5 A at 220 VAC 5 A at 24 VDC	
Rated carry current	15 A		7.5 A	
Max. switching voltage	250 VAC, 250 VDC		250 VAC, 250 VDC	
Max. switching current	15 A		7.5 A	

DC-switching Relays/Built-in Diode Relays

Item	Open Relays		Covered Relays	
	MM2X(B), MM3X(B), MM4X(B)		MM2XP(-D), MM3XP, MM4XP(-D)	
	Resistive load (cosϕ = 1)	Inductive load (L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (L/R=7 ms)
Contact type	Single			
Contact material	Ag			
Rated load	10 A at 110 VDC	7 A at 110 VDC	7 A at 110 VDC	6 A at 110 VDC
Rated carry current	15 A		7.5 A	
Max. switching voltage	250 VDC		250 VDC	
Max. switching current	15 A		7.5 A	

Note: 1. When switching DC inductive loads at 125 V or more, an unstable region exists for a contact current of between 0.5 and 2.5 A. The Relay will not turn OFF in this region. Use a contact current of 0.5 A or less when switching 125 VDC or more.

2. If L/R exceeds 7 ms when switching DC inductive loads, an arc-breaking time of up to 50 ms must be considered in application and the circuit must be designed to ensure that an arc-breaking time of 50 ms is not exceeded.

Contacts (Conforming to Auxiliary Power Relay Specifications)

Item	MM4P-JD		MM4XP-JD	
	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)	Resistive load	Inductive load (cosϕ = 0.4, L/R = 7 ms)
Contact type	Single			
Contact material	Ag			
Rated load	5 A at 220 VAC, 5 A at 24 VDC		5 A at 110 VDC	
Rated carry current	5 A			
Max. switching voltage	250 VAC, 250 VDC			
Max. switching current	5 A			

Note: 1. A model for DC loads is not in stable operation when switching an inductive load within a operating current range between 0.5 and 2.5 A at a minimum of 125 VDC, where the load cannot be switched.

2. A model for DC loads can switch an inductive load with an L/R of 7 ms or greater on condition that the maximum arc shutoff time is 50 ms. Be sure to design the circuit so that the maximum arc shutoff time will not exceed 50 ms.

■ Characteristics

Standard Relays

Item	Open Relays	Covered Relays
Contact resistance (see note 2)	25 mΩ max.	50 mΩ max.
Operate time (see note 3)	AC: 25 ms max. DC: 50 ms max.	
Release time (see note 3)	30 ms max. (100 ms max. for Built-in Diode Relays)	
Max. operating frequency	Mechanical:7,200 operations/hr Electrical:1,800 operations/hr (under rated load)	
Insulation resistance (see note 4)	100 MΩ min. (at 500 VDC)	
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min between contacts of same polarity 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity (and between coil and contacts)	
Vibration resistance	Destruction:10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction:10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)	
Shock resistance	Destruction:1,000 m/s^2 Malfunction:100 m/s^2	
Endurance	Mechanical:5,000,000 operations min. (at 7,200 operations/hr) Electrical:500,000 operations min. (at 1,800 operations/hr under rated load) (see note 5)	
Error rate (level P) (Reference value) (see note 6)	10 mA at 5 VDC	
Ambient temperature	Operating:–10°C to 55°C (with no icing or condensation)	
Ambient humidity	Operating:5% to 85%	
Weight	Standard models:DC-switching models MM2 approx. 160 gMM2X approx. 165 gMM2XP approx. 225 g MM3 approx. 270 gMM3X approx. 275 gMM3XP approx. 395 g MM4 approx. 300 gMM4X approx. 310 gMM4XP approx. 420 g MM2P approx. 220 g MM3P approx. 360 g MM4P approx. 410 g	

Note: 1. The data shown above are initial values.

2. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.

3. The operate or release time was measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. This value was measured at a switching frequency of 60 operations per minute.

Relays (Conforming to Auxiliary Power Relay Specifications)

Item	Covered Relays
Contact resistance (see note 2)	50 mΩ max.
Operate time (see note 3)	AC: 25 ms max., DC: 50 ms max.
Release time (see note 3)	30 ms max.
Max. operating frequency	Mechanical:1,800 operations/hr Rated load:1,800 operations/hr
Insulation resistance (see note 4)	100 MΩ min.
Dielectric strength	Between coil and contact: 2,000 VAC, 50/60 Hz for 1 minute Between contacts of different polarities: 2,000 VAC, 50/60 Hz for 1 minute Between contacts of same polarity: 1,500 VAC, 50/60 Hz for 1 minute
Vibration resistance	Destruction:10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction:10 to 22 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction:300 m/s^2 Malfunction:30 m/s^2
Endurance	Mechanical:5,000,000 operations min. (at 1,800 operations/hr) Electrical:500,000 operations min. (at 1,800 operations/hr with rated load) (see note 5)
Error rate (level P) (Reference value) (see note 6)	10 mA at 5 VDC
Ambient temperature	Operating:–10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating:5% to 85%
Weight	MM4P-JD:approx. 410 g MM4XP-JD:approx. 420 g

Note: 1. The data shown above are initial values.

2. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.

3. The operate or release time was measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. This value was measured at a switching frequency of 60 operations per minute.

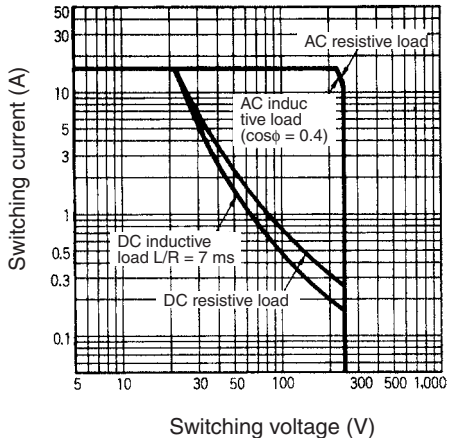
Engineering Data

■ Standard Relays

Maximum Switching Power

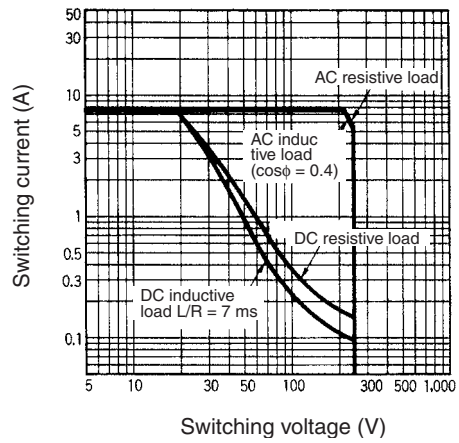
Open Relays

MM□(B)



Cased Relays

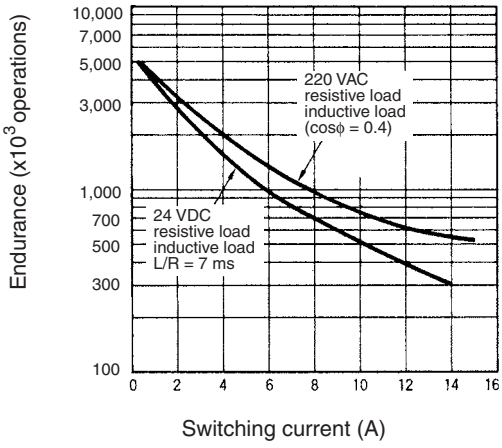
MM□P(N, -D)



Endurance

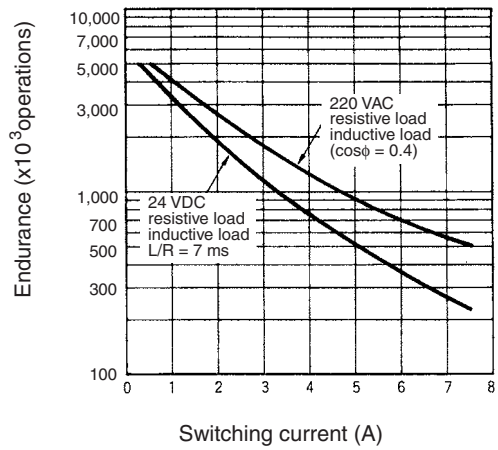
Open Relays

MM□(B)



Cased Relays

MM□P(N, -D)

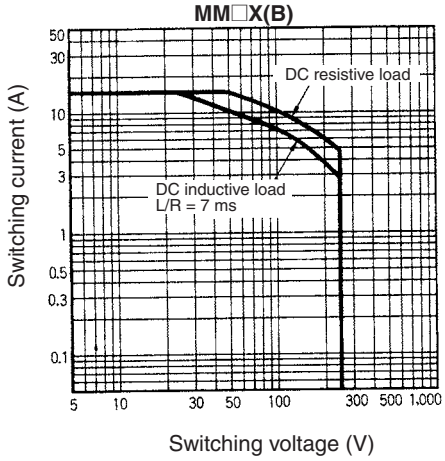


■ DC-switching Relays

Maximum Switching Power

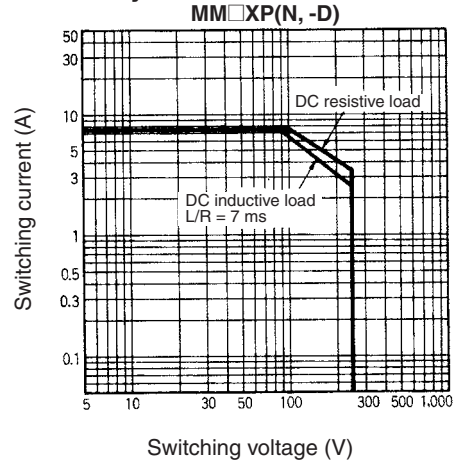
Open Relays

MM□X(B)



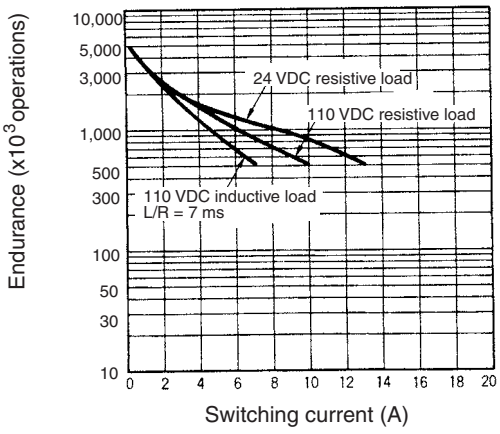
Cased Relays

MM□XP(N, -D)

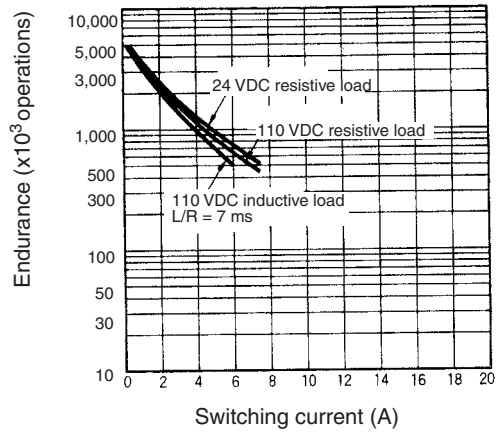


Endurance

Open Relays



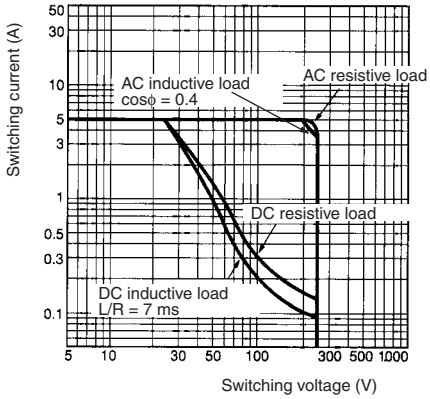
Cased Relays



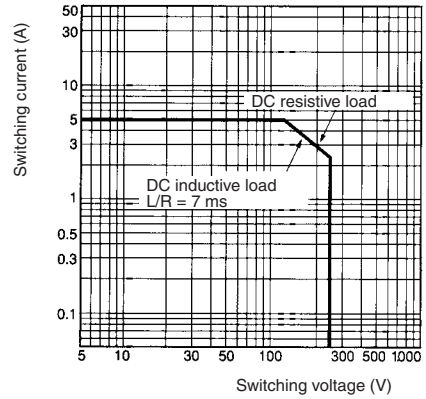
■ Relays Conforming to Auxiliary Power Relay Specifications

Maximum Switching Power

MM4P-JD

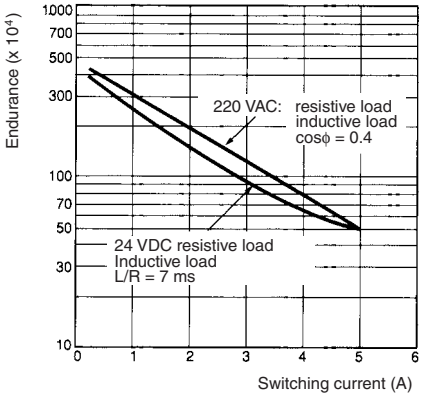


MM4XP-JD

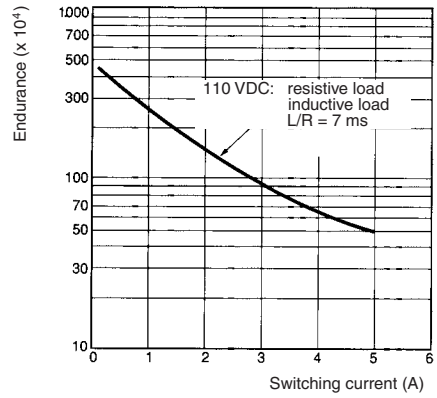


Endurance Curve

MM4P-JD

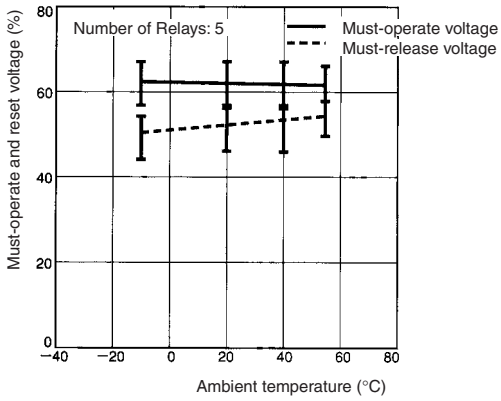


MM4XP-JD

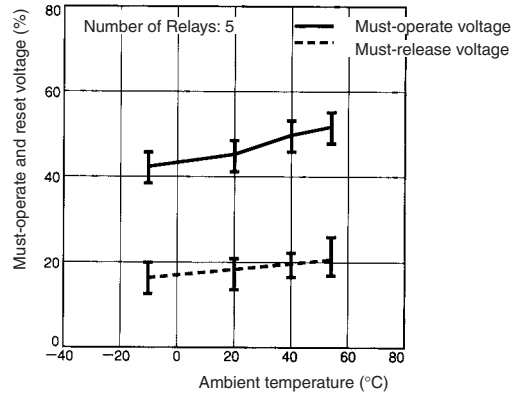


Ambient Temperature vs. Must-operate and Must-release Voltage

MM2P AC (60 Hz)

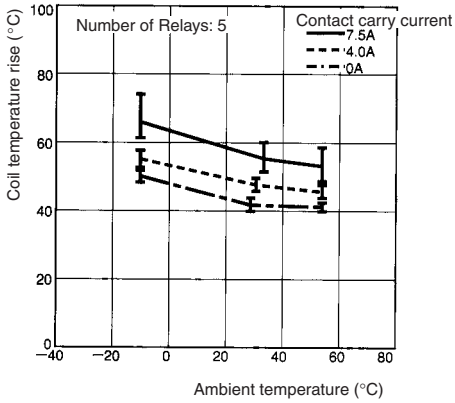


MM2P DC

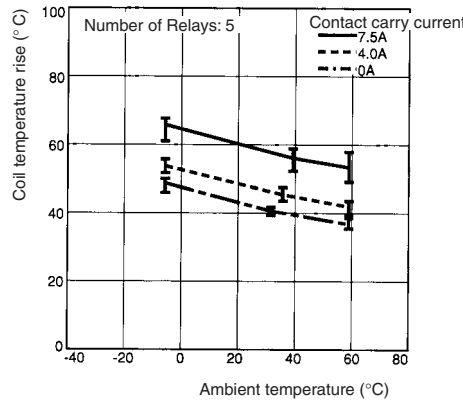


Ambient Temperature vs. Coil Temperature Rise

MM2P 110 VAC (60 Hz)

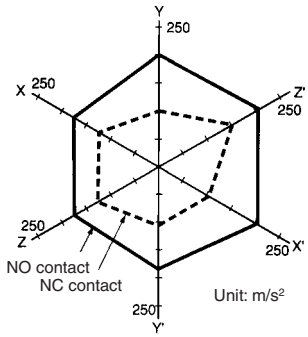


MM2P DC



Malfunctioning Shock

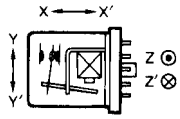
MM2P AC



Number of samples: 5

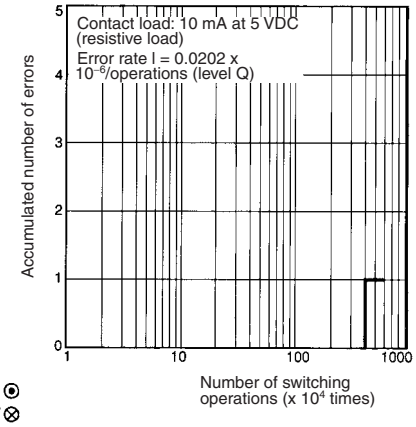
Measurement conditions: Impose a shock of 50 m/s² in the ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

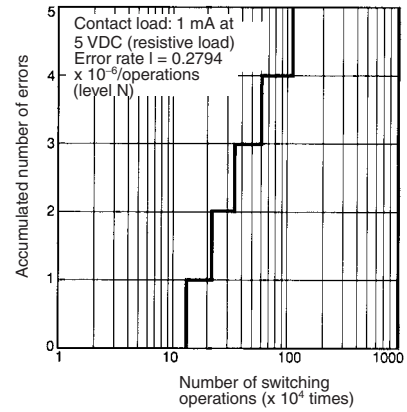
Shock direction



Contact Reliability (Improved Allen-Bradley Test Circuit)

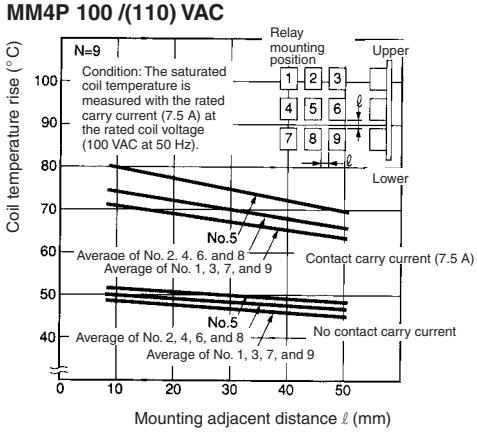
MM4P 24 VDC





Relay Mounting Adjacent Distance vs. Coil Temperature Rise

MM4P 100 /(110) VAC



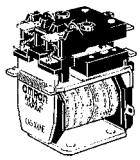
Dimensions

Note: All units are in millimeters unless otherwise indicated.

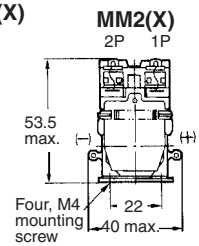
■ Standard Relays

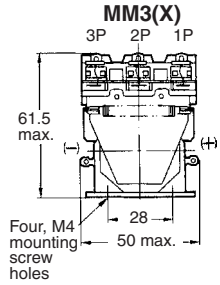
Open Relays

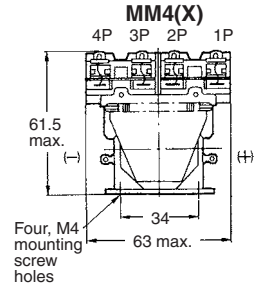
Solder Terminals
MM2(X), MM4(X), MM3(X)

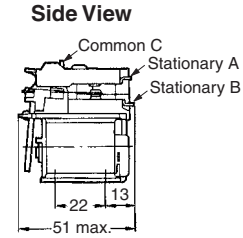


MM2



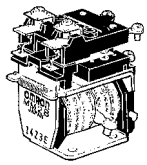




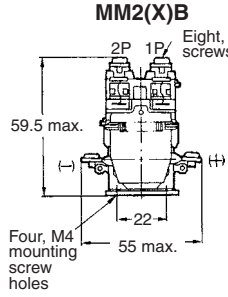


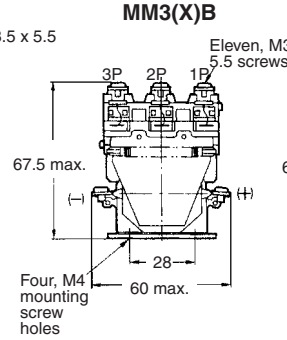
Note: Connect the common (C) of MM□X to positive (+).

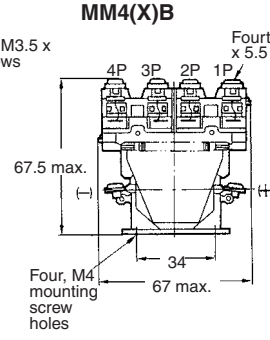
Screw Terminals
MM2(X)B, MM3(X)B, MM4(X)B

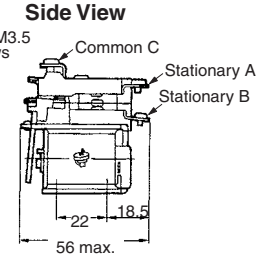


MM2B





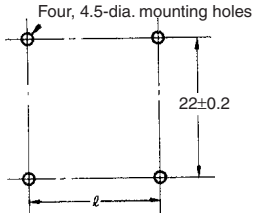




Note: Connect the common (C) of MM□XB to positive (+).

Mounting Holes (Bottom View)

Direct mounting

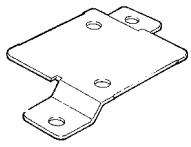


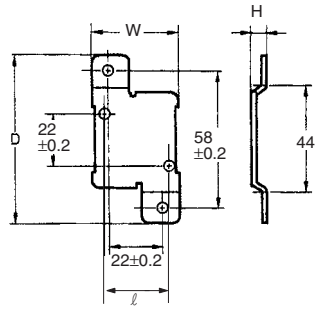
Length of ℓ
DPDT: 22±0.2
3PDT: 28±0.2
4PDT: 34±0.2

Mounting Bracket (S Bracket)

R99-03MM□

The S Bracket can be used to mount a Relay with open solder or screw terminals.

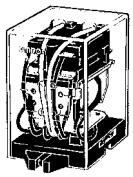




	R99-03MM2 (DPDT)	R99-03MM3 3PDT, 4PDT
ℓ	22	28, 34
D	71 max.	71 max.
W	36 max.	46 max.
H	6 max.	6 max.

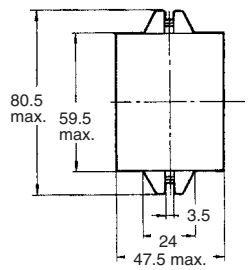
Cased Relays

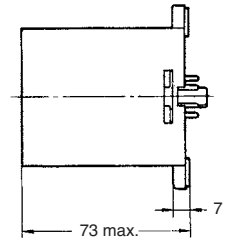
Plug-in Terminals

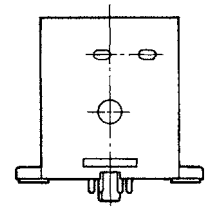


MM2P(N, D)
MM2XP(N, -D)

MM2P

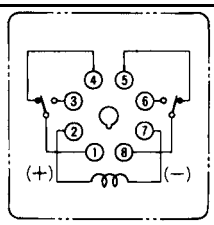
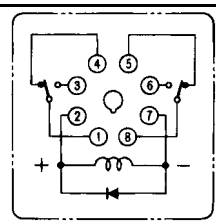
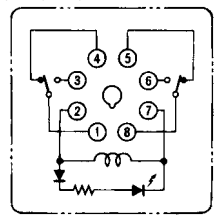
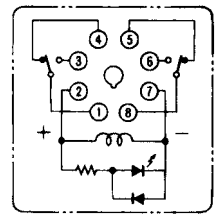
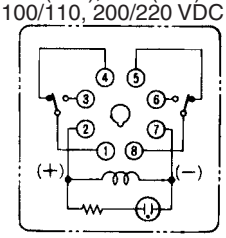
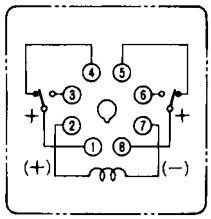
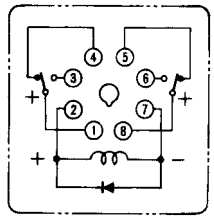
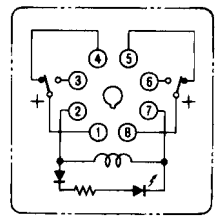
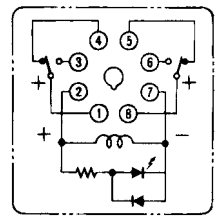
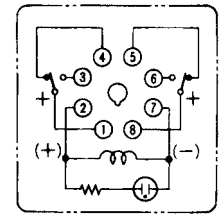




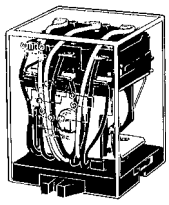


Note: As shown in the diagram, there are three 10-dia. holes in the side of the case for the MM2XP(N, D). When a case-protection plate is attached, the width of the Relay will be 48 mm max.

Terminal Arrangement

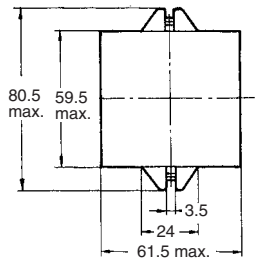
MM2P	MM2P-D	MM2PN	MM2PN	MM2PN
		6, 12, 24, 50 VAC 	6, 12, 24, 48 VAC 	100/(110), 200/(220) VAC 100/110, 200/220 VDC 
MM2XP	**MM2XP-D**	**MM2XPN**	**MM2XPN**	**MM2XPN**
		6, 12, 24, 50 VAC 	6, 12, 24, 48 VAC 	100/(110), 200/(220) VAC 100/110, 200/220 VDC 

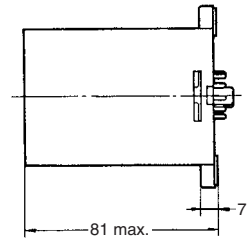
Note: Wire the terminals correctly with no mistakes in coil polarity.



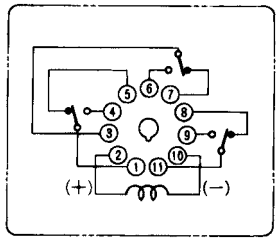
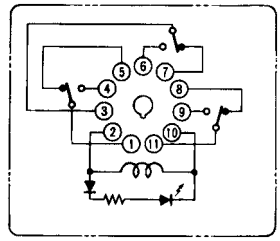
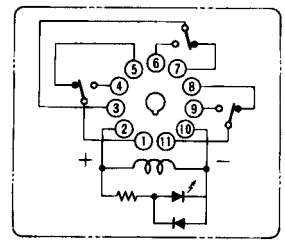
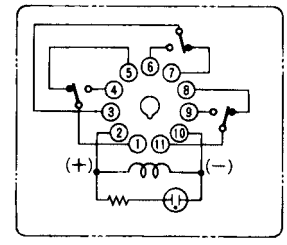
MM3P(N)

MM3P



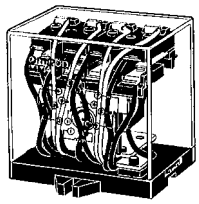


Terminal Arrangement

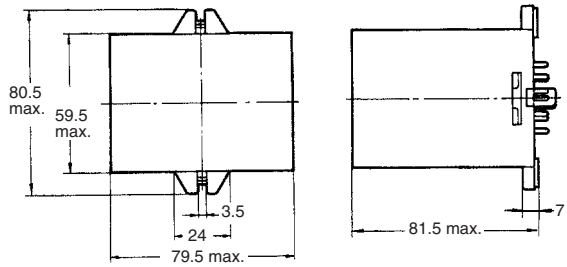
MM3P	MM3PN	MM3PN	MM3PN
	6, 12, 24, 50 VAC 	6, 12, 24, 48 VAC 	100/(110), 200/(220) VAC 100/110, 200/220 VDC 

Note: Wire the terminals correctly with no mistakes in coil polarity.

MM3PXP(N)
MM4P(N, -D)
MM4XP(N, -D)

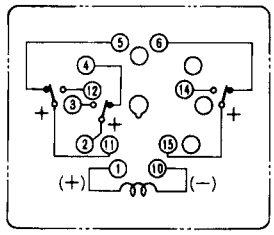
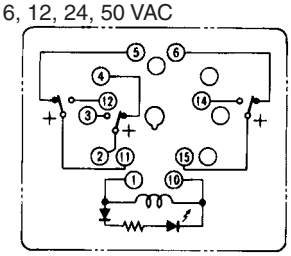
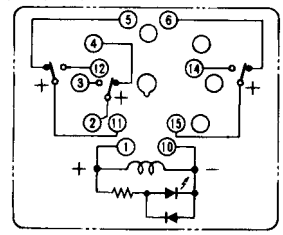
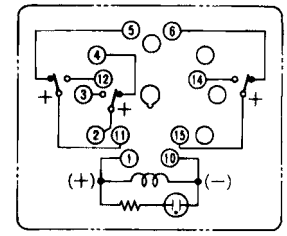


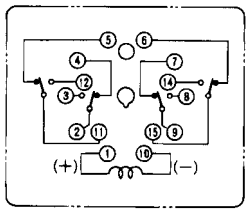
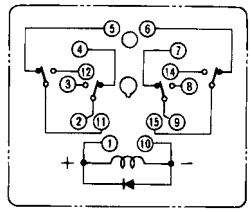
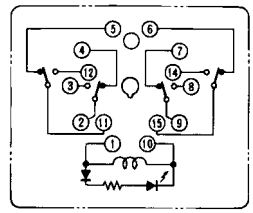
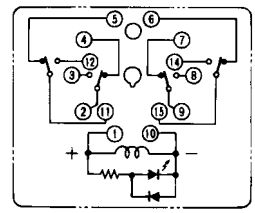
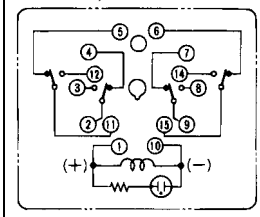
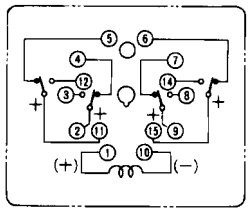
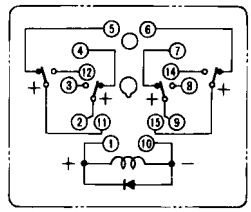
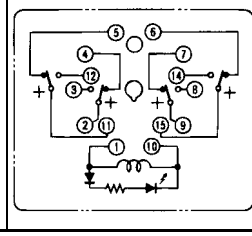
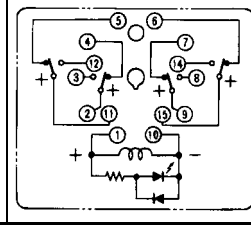
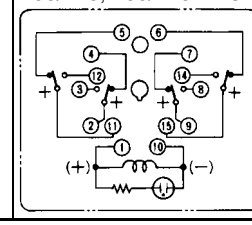
MM4P



Note: As shown in the diagram, there are three 10-dia. holes in the side of the case for MM□XP(N, D). When a case-protection plate is attached, the width of the Relay will be 80 mm max.

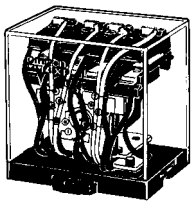
Terminal Arrangement

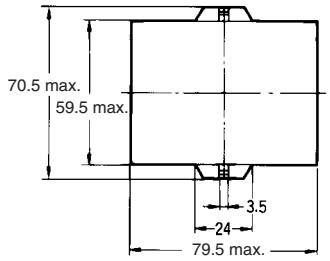
MM3XP	MM3XPN	MM3XPN	MM3XPN
	6, 12, 24, 50 VAC 	6, 12, 24, 48 VDC 	100/(110), 200/(220) VAC 100/110, 200/220 VDC 

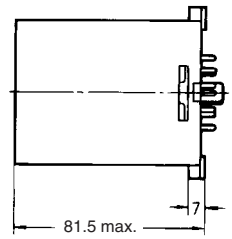
MM4P	MM4P-D	MM4PN	MM4PN	MM4PN
		6, 12, 24, 50 VAC 	6, 12, 24, 48 VDC 	100/(110), 200/(220) VAC 100/110, 200/220 VDC 
MM4XP	**MM4XP-D**	**MM4XPN**	**MM4XPN**	**MM4XPN**
		6, 12, 24, 50 VAC 	6, 12, 24, 48 VDC 	100/(110), 200/(220) VAC 100/110, 200/220 VDC 

Note: Wire the terminals correctly with no mistakes in coil polarity.

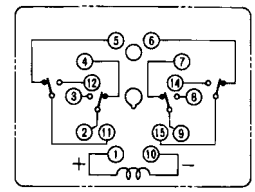
MM4P-JD



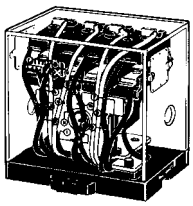


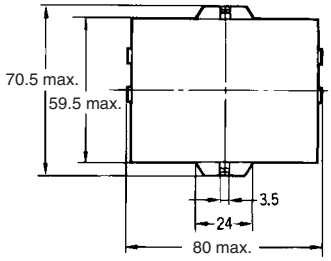


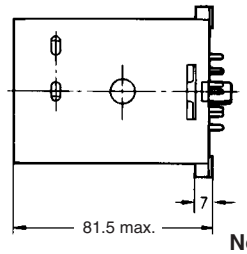
Terminal Arrangement

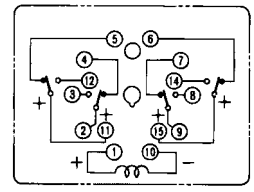


MM4XP-JD





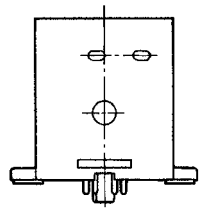




Note: Make sure that all common connections are the same in polarity. The markings of the common connections on the casing all show "+" but the polarity of the common connections can be either all negative or all positive.

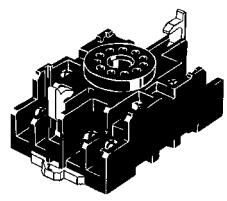
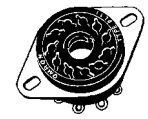
■ Relays with Operation Indicators

Dimensions are the same as those for standard Relays except that there are three 10-mm holes in the case as shown below.



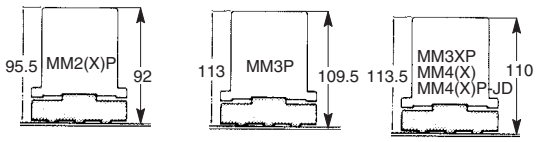
Accessories

■ Sockets

Relay model	DIN Track/Front-connecting Socket (screw terminals)	Back-connecting Socket (solder terminals)
MM2(X)P(-D)	8PFA	PL08
MM3P	11PFA 	PL11 
MM3XP, MM4(X)P(-D)	14PFA	PL15
MM4(X)P-JD	14PFA	---

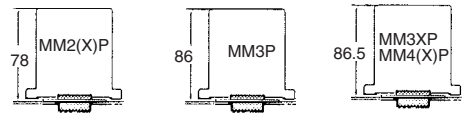
Mounting Height of Relay with Connecting Socket

DIN Track Mounting



8PFA 11PFA 14PFA

Back Mounting



PL08 PL11 PL15

Precautions

Refer to page 11 for general precautions.

■ Connection

- Use proper crimp terminals or 1.2- to 2-dia. single-conductor wire to connect screw terminals.
- Connect loads to DC-switching Relays so that arcs from adjacent terminals will not strike each other. E.g., connect all common terminals to the same polarity.
- Screw Terminal Model:
  Do not bend the coil terminals, otherwise the coil wire may be disconnected. Make sure that the tightening torque applied to each terminal is 1.27 N • m and the insertion force is 49 N for 10 s.
- Do not reverse polarity when connecting open DC-switching Relays, including 3- and 4-pole models.

■ Installation

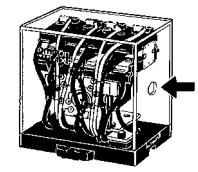
- Do not install the Relays where iron dust can adhere to the contacts or coil. Such dust can prevent the armature from moving freely and inhibit proper electrical contact.
- Relays can generate arcs externally. Either install the Relay in a location where a nearby object will not burn or use a covered Relay.
- DC-switching Relays contain a permanent magnet in the insulation base. Do not place a magnet or magnetic object near this base. Doing so will reduce the power of the permanent magnet, thus reducing Relay capacity.
- Insert PL Back-mounting Sockets from the back of the panel.
- Separate Relays from each other by at least 20 mm when mounting multiple Relays together.
- Relays should be mounted with the armature facing down.

■ Wiring

When connecting a load to the contact terminals of a model for DC loads, consider the polarity of the contact terminals so that the generated arcs on the adjacent poles will not collide. If the common connections of the Relay are all positive or all negative, no arc collision will occur.

■ MMXP

The MMXP has a hole in the Relay case to allow gas to escape. Do not use this Relay in locations subject to excessive dust.



■ Contact Loads

The contact load should be greater than the power consumption of the coil. If it is less than this power consumption or if the Relay is operated very infrequently, the contact can change chemically thus causing unstable operation.

■ Soldering

When soldering solder terminals, do not let flux or other foreign matter adhere to contacts or do not let the coil terminals become bent. Also, solder as quickly as possible because excessive heat may damage the coil.

■ Storage

A model for DC loads incorporates a permanent magnetic for arc suppression. Keep floppy disks away from the Relay, otherwise the data on the floppy disk may be damaged.

■ Operating Environment

Do not use the Relay in places with flammable gas, otherwise an explosion may result due to an arc generated from the Relay

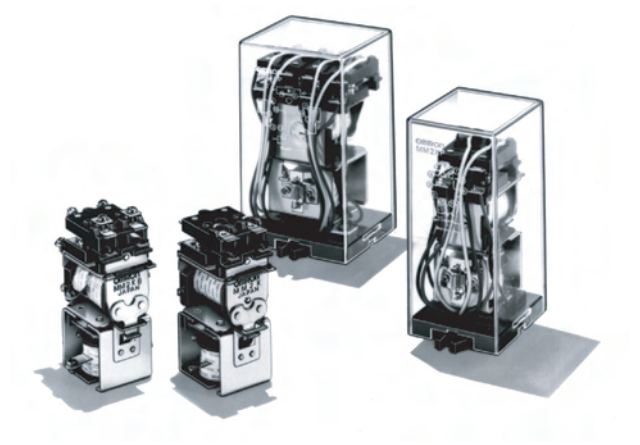
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J031-E1-08

Latching Relay
MMK

Mechanically Latching Relays Based on the MM Power Relay

- Low power consumption due to mechanical latch for economic operation.
- Relays with mixed coil specifications can be produced (e.g., AC set coil and DC reset coil).
- Operational response fast enough to enable pulse signal power applications.
- Ambient operating temperature: –10°C to 55°C.



Ordering Information

Type	Contact form	Open structure		Cased
		Solder terminals	Screw terminals	Plug-in (octal pins) terminals
Standard	DPDT	MM2K	MM2KB	MM2KP
	3PDT	MM3K	MM3KB	MM3KP
	4PDT	MM4K	MM4KB	---
	DPDT+DPST-NO	---	---	MM4KP
DC-switching	DPDT	MM2XK	MM2XKB	MM2XKP
	3PDT	MM3XK	MM3XKB	MM3XKP
	4PDT	MM4XK	MM4XKB	---
	DPDT+DPST-NO	---	---	MM4XKP
Conforming to auxiliary power relay specifications	DPDT+DPST-NO	---	---	MM4KP-JD MM4XKP-JD

Models Conforming to Auxiliary Power Relay Specifications

The MM4KP-JD and MM4XKP-JD satisfy the ratings of auxiliary relays provided in JEC-2500 (1987) standards for power protective relays specified by the Japan Electromechanical Commission. Furthermore, the MM4KP-JD and MM4XKP-JD satisfy the ratings of multi-contact relays provided in JEC-174D (1979) standards for power auxiliary relays.

These models work at operation level A specified by JEC-174D (1979) standards and the hot start of the relays is possible after the coils radiate heat.

In accordance with JEC-2500 (1987) standards, the coil of each model withstands a 130% DC load or 115% AC load.

Note: When ordering, add the rated coil voltage to the model number. Rated coil voltages are given in the coil ratings table.
Example: MM2K, 6 VAC
└── Rated coil voltage

Model Number Legend

MM□□K□
1 2 3

1. Contact Form
- 2: DPDT
- 3: 3PDT
- 4: 4PDT (open structure type)/ DPDT+DPST-NO (cased type)

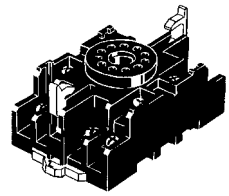
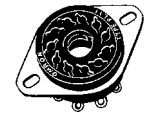
2. Type (see note)
- None: Standard
- X: DC-switching

3. Terminal Shape
- None: Solder
- B: Screw
- P: Plug-in

Note: The suffix “JD” indicates models conforming to auxiliary power relay specifications.

■ Accessories (Order Separately)

Sockets

Relay	DIN Track/Front-connecting Socket	Back-connecting Socket
	Screw terminals	Solder terminals
MM2(X)KP	11PFA 	PL11 
MM3(X)KP **MM4(X)KP**	14PFA	PL15
MM4(X)KP-JD	14PFA	---

Mounting Brackets

Contact form	Model
DPDT	R99-03MM2K
3PDT	R99-03MM3K
4PDT	R99-03MM4K

Specifications

■ Coil Ratings

Set Coil

Rated voltage		Rated current (mA)								Coil resistance (Ω)		Set volt.	Max volt.	Power consum.
		DP				3P, 4P								
		Open Relays		Cased		Open Relays		Cased						
		50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	DP	3P, 4P	% of rated voltage		
AC	6 V	790	655	690	590	1,285	1,100	1,165	1,000	1.1	0.46	80% max.	110%	**Initial:**
	12 V	395	325	345	295	640	550	580	500	4.7	1.9			DP: Approx. 6.2 VA
	24 V	195	160	170	145	320	275	290	250	19	8.2			3P, 4P: Approx. 12 VA
	50 V	94	78	82	70	154	132	140	120	82	34			**Rated:**
	100/ (110) V	47	39/45	41	35/40	77	66/76	70	60/68	340	141			DP: Approx. 3.5 VA (3.9 VA)
	200/ (220) V	23.5	19.5/ 22.5	20.5	17.5/ 20	38.5	33/38	35	30/34	1,540	563			3P, 4P: Approx. 6 VA (6.6 VA)
DC	6 V	340				450				17.5	13.4			DP: Approx. 2.1 W
	12 V	176				220				68	54			3P, 4P: Approx. 2.7 W
	24 V	87				94				275	255			
	48 V	41				52				1,180	930			
	100/ 110 V	17/19				22/24.5				5,750	4,500			
	200/ 220 V	8.6/9.5				11/12				23,200	18,000			

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. The AC coil resistance values are reference values.

4. Values in parentheses are for open relays.

5. The maximum voltage is one that is applicable instantaneously to the Relay coil at an ambient temperature of 23°C and not continuously.

Reset Coil

Rated voltage		Rated current (mA)		Coil resistance (Ω)	Reset voltage	Maximum voltage	Power consumption
		50 Hz	60 Hz		% of rated voltage		
AC	6 V	770	690	2.3	80% max.	110%	Initial: Approx. 6.5 VA Rated: Approx. 4.1 VA
	12 V	385	345	9.2			
	24 V	191	170	35			
	50 V	92	82	175			
	100/(110) V	46	41/46	739			
	200/(220) V	23	20/23	3,030			
DC	6 V	422		14.2			Approx. 2.8 W
	12 V	215		56			
	24 V	109		220			
	48 V	58		832			
	100/110 V	25/27		4,040			
	200/220 V	12.2/13.5		16,330			

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. The AC coil resistance values are reference values.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at an ambient temperature of 23°C and not continuously.

Coils (Conforming to Auxiliary Power Relay Specifications)

Rated voltage (V)		Rated current (mA)				Coil resistance (Ω)		Set voltage	Reset voltage	Max. voltage	Operation level (JEC-174D)	Power consumption			
		Set coil		Reset coil		Set coil	Reset coil					Set coil		Reset coil	
		50 Hz	60 Hz	50 Hz	60 Hz			% of rated voltage				Set	Rated	Set	Rated
AC	24	245	210	191	170	8.5	35	80% max.	80% max.	110%	A	Approx. 6.3 VA	Approx. 5.1 VA	Approx. 6.5 VA	Approx. 4.1 VA
	50	117	102	92	82	36	175								
	100/(110)	58.5	51/58	46	41/46	150	739								
	110	53	46	42	37.3	182	835								
	115	51	44	40	35.7	210	885								
	200/(220)	29	25.5/29	23	20.5/23	620	3,030								
	220	26.5	23	21	18.6	780	3,420								
DC	24	94		109		255	220					Approx. 2.7 W		Approx. 2.8 W	
	48	52		58		930	832								
	100/110	22/24.5		25/27		4,500	4,040								
	125	22		23.5		5,800	5,330								
	200/220	11/12		12.2/13.5		18,000	16,330								

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance and coil inductance values are for reference only.

3. Performance characteristic data are measured at a coil temperature of 23°C.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at an ambient temperature of 23°C and not continuously.

■ Contact Ratings

Standard Relays

Item	Open Relays: MM2K(B), MM3K(B), MM4K(B)		Covered Relays: MM2KP, MM3KP, MM4KP	
	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)
Contact mechanism	Single			
Contact material	Ag			
Rated load	10 A at 220 VAC 7 A at 24 VDC		5 A at 220 VAC 4 A at 24 VDC	
Rated carry current	10 A		5 A	
Max. switching voltage	250 VAC, 250 VDC		250 VAC, 250 VDC	
Max. switching current	10 A		5 A	

DC-switching Relays

Item	Open Relays: MM2XK(B), MM3XK(B), MM4XK(B)		Covered Relays: MM2XKP, MM3XKP, MM4XKP	
	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ=0.4, L/R=7 ms)
Contact mechanism	Single			
Contact material	Ag			
Rated load	7 A at 110 VDC	6 A at 110 VDC	5 A at 110 VDC	
Rated current flow	10 A		5 A	
Max. switching voltage	250 VAC, 250 VDC		250 VAC, 250 VDC	
Max. switching current	10 A		5 A	

Note: 1. When switching DC inductive loads at 125 V or more, an unstable region exists for a switching current of between 0.5 and 2.5 A. The Relay will not turn OFF in this region. Use a switching current of 0.5 A or less when switching 125 VDC or more.

2. If L/R exceeds 7 ms when switching DC inductive loads, an arc-breaking time of up to 50 ms must be considered in application and the circuit must be designed to ensure that an arc-breaking time of 50 ms is not exceeded.

Contacts (Conforming to Auxiliary Power Relay Specifications)

Item	MM4KP-JD		MM4XKP-JD	
	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R= 7 ms)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4, L/R= 7 ms)
Contact mechanism	Single			
Contact material	Ag			
Rated load	5 A at 220 VAC, 4 A at 24 VDC		5 A at 110 VDC	
Rated carry current	5 A			
Max. switching voltage	250 VAC, 250 VDC			
Max. switching current	5 A			

Note: 1. A model for DC loads is not in stable operation when switching an inductive load within a switching current range between 0.5 and 2.5 A at a minimum of 125 VDC, where the load cannot be switched.

2. A model for DC loads can switch an inductive load with an L/R of 7 ms or greater on condition that the maximum arc shutoff time is 50 ms. Be sure to design the circuit so that the maximum arc shutoff time will not exceed 50 ms.

■ Characteristics

Item	Open or bifurcated-contact Relays
Contact resistance (see note 2)	50 mΩ max.
Set time (see note 3)	AC: 30 ms max.; DC: 60 ms max. (minimum pulse width for AC and DC: 100 ms)
Reset time (see note 3)	30 ms max. (minimum pulse width for AC and DC: 100 ms)
Max. operating frequency	Mechanical: 1,800 operations/hr Electrical: 1,800 operations/hr (under rated load)
Insulation resistance (see note 4)	100 MΩ min. (at 500 VDC)
Dielectric strength	1,500 VAC, 50/60 Hz for 1 min between contacts of same polarity 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity, between contacts and coil, and between set and reset coils
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375 mm single amplitude (0.75 mm double amplitude) Malfunction: 10 to 35 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 500 m/s^2 Malfunction: 50 m/s^2
Endurance	Mechanical: 2,500,000 operations min. (at 1,800 operations/hr) Electrical: 500,000 operations min. (at 1,800 operations/hr under rated load) (see note 5)
Error rate (level P) (Reference value) (see note 6)	10 mA at 5 VDC
Ambient temperature	Operating:–10°C to 55°C (with no icing or condensation)
Ambient humidity	Operating:5% to 85%
Weight	Standard Relays / DC-switching Relays MM2K: Approx. 255 g / MM2XK: Approx. 260 g MM3K: Approx. 390 g / MM2XK: Approx. 395 g MM4K: Approx. 420 g / MM4XK: Approx. 430 g MM2KP: Approx. 375 g / MM2XKP: Approx. 380 g MM3KP: Approx. 550 g / MM3XKP: Approx. 555 g MM4KP: Approx. 570 g / MM4XKP: Approx. 580 g

Note: 1. The data shown above are initial values.

2. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.

3. The set or reset time was measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

6. This value was measured at a switching frequency of 60 operations per minute.

■ Characteristics (Conforming to Auxiliary Power Relay Specifications)

Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.375 mm single amplitude (0.75 mm double amplitude) Malfunction: 10 to 22 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 300 m/s^2 Malfunction: 30 m/s^2
Endurance	Mechanical: 2,500,000 operations min. (at 1,800 operations/hr) Electrical: 500,000 operations min. (at 1,800 operations/hr under rated load) (see note 2)
Error rate (level P) (Reference value) (see note 3)	10 mA at 5 VDC
Ambient temperature	Operating: –10°C to 40°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	MM4KP-JD: Approx. 570 g MM4XKP-JD: Approx. 580 g

Note: 1. The data shown above are initial values.

2. The electrical endurance was measured at an ambient temperature of 23°C.

3. This value was measured at a switching frequency of 60 operations per minute.

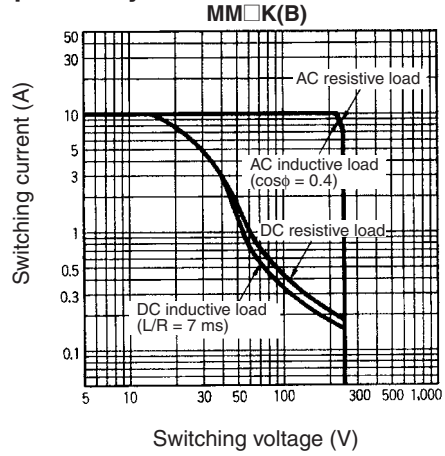
Engineering Data

■ Standard Relays

Maximum Switching Power

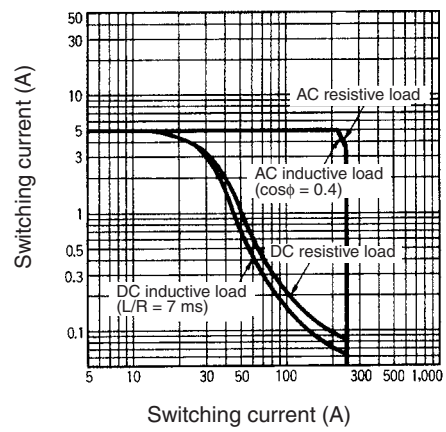
Open Relays

MM□K(B)



Cased Relays

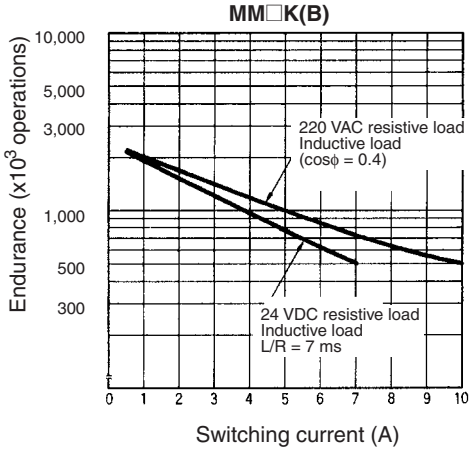
MM□KP



Endurance

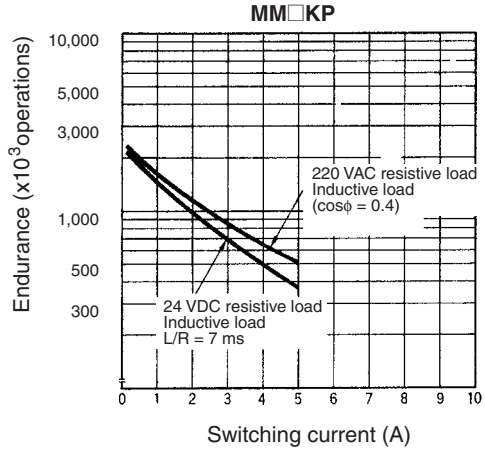
Open Relays

MM□K(B)



Cased Relays

MM□KP

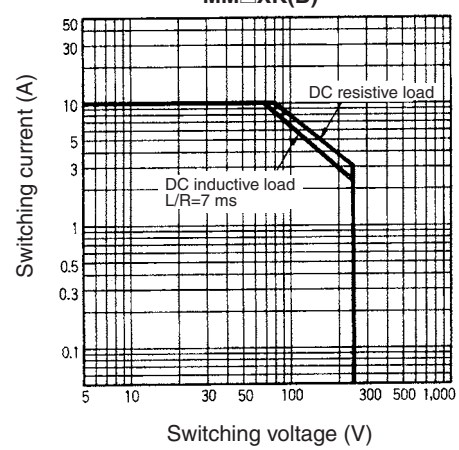


■ DC-switching Relays

Maximum Switching Power

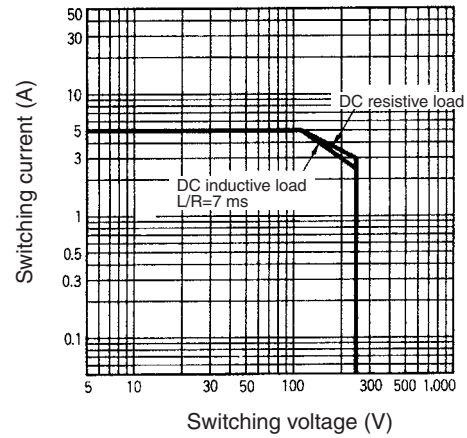
Open Relays

MM□XK(B)



Cased Relays

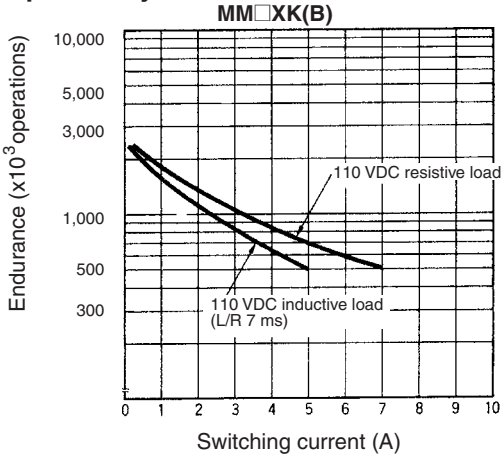
MM□XKP



Endurance

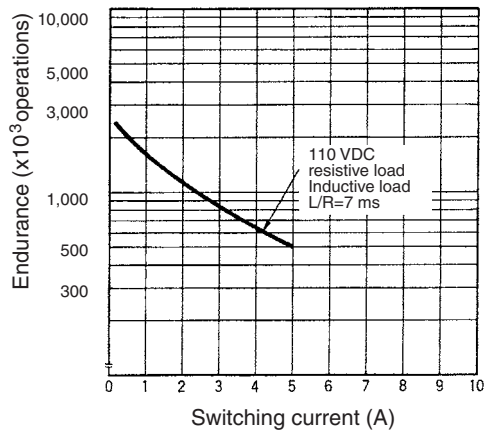
Open Relays

MM□XK(B)



Cased Relays

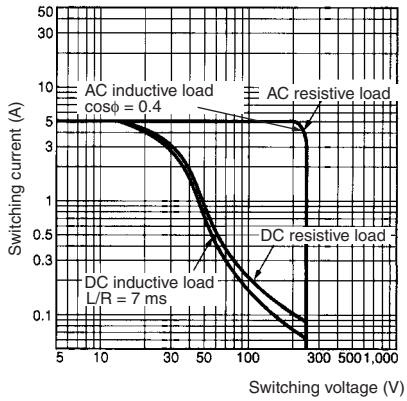
MM□XKP



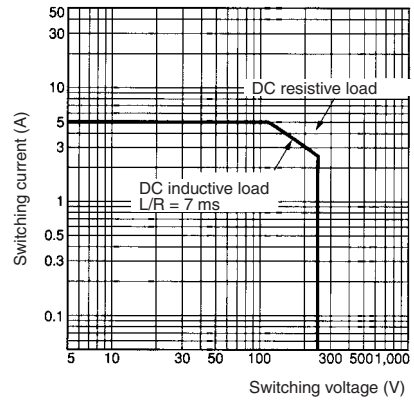
■ Relays Conforming to Auxiliary Power Relay Specifications

Maximum Switching Power

MM4KP-JD

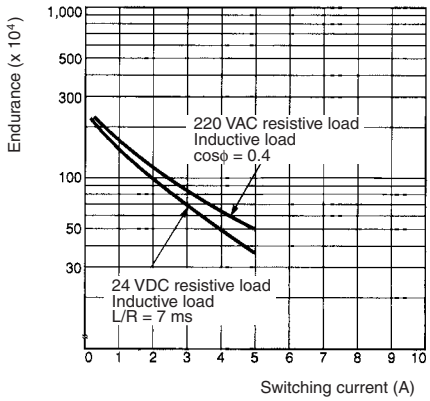


MMX4KP-JD

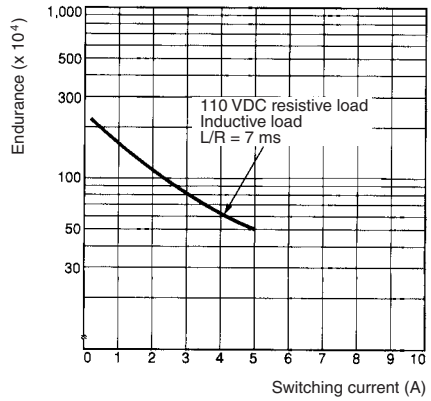


Endurance Curve

MM4KP-JD

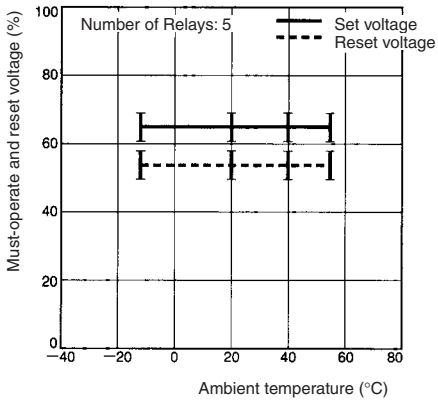


MM4XKP-JD

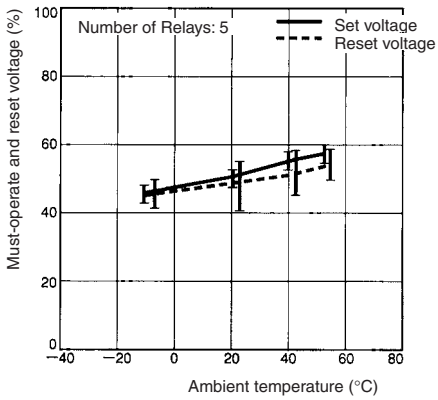


Ambient Temperature vs. Set and Reset Voltage

MM4KP AC (60 Hz)

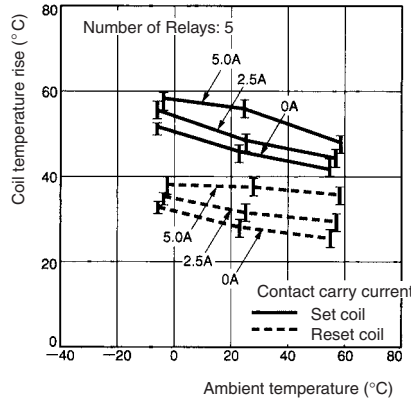


MM4KP DC

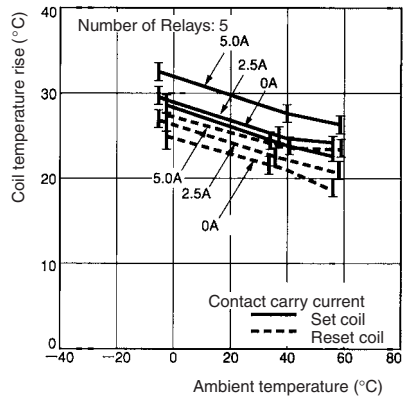


Ambient Temperature vs. Coil Temperature Rise

MM4KP 110 VAC (60 Hz)

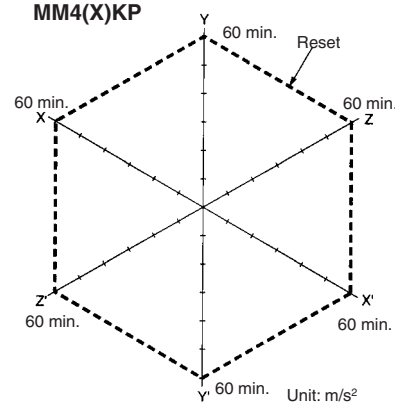


MM4KP DC



Malfunctioning Shock

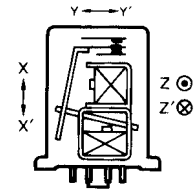
MM4(X)KP



Number of samples: 3

Measurement conditions: Impose a shock of 50 m/s² in the ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

Shock direction

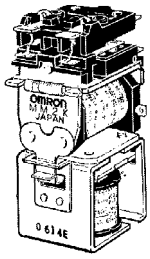


Dimensions

Note: All units are in millimeters unless otherwise indicated.

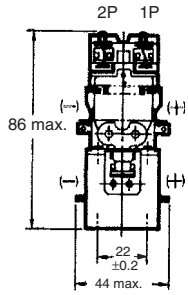
■ Open Relays with Solder Terminals

MM2(X)K, MM3(X)K, MM4(X)K

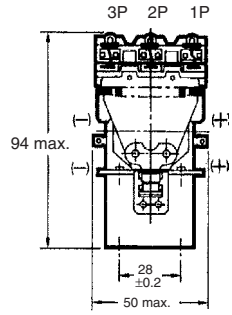


MM2K

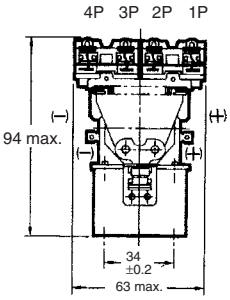
MM2(X)K



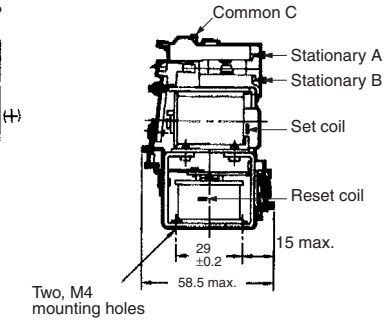
MM3(X)K



MM4(X)K



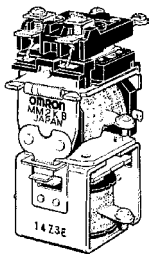
Side View



Note: Connect the common (C) of MM□XK to positive (+).

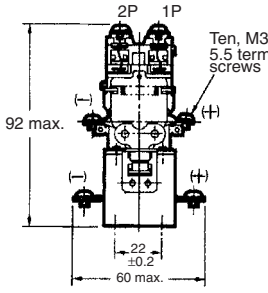
■ Open Relays with Screw Terminals

MM2(X)KB, MM3(X)KB, MM4(X)KB

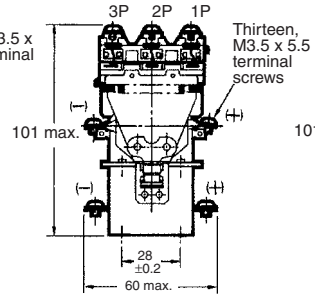


MM2KB

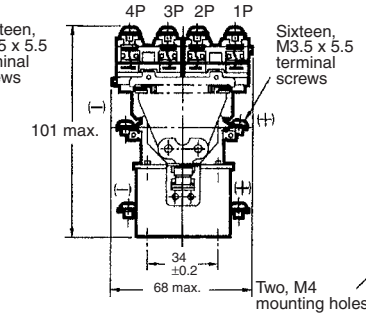
MM2(X)KB



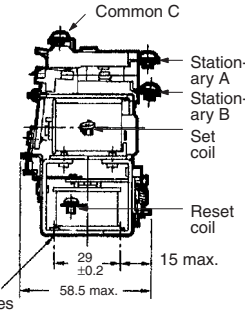
MM3(X)KB



MM4(X)KB



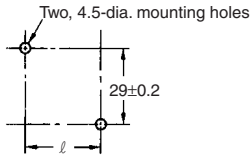
Side View



Note: Connect the common (C) of MM□XKB to positive (+).

Mounting Holes (Direct Mounting)

Note: The tolerance is ±0.2.

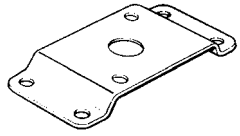


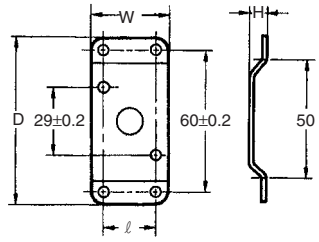
Dimensions of : ℓ
2-pole: 22±0.2 mm
3-pole: 28±0.2 mm
4-pole: 34±0.2 mm

Mounting Bracket (S Bracket)

R99-03MM ( )K

The S Bracket can be used to mount a Relay with open solder or screw terminals.

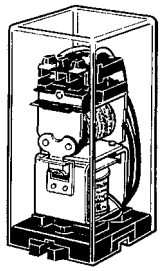




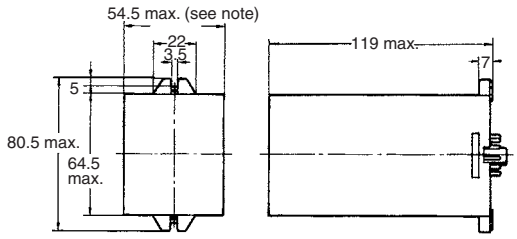
Item	R99-03MM2K (DPDT)	R99-03MM3K (3PDT)	R99-03MM4K (4PDT)
ℓ	22±0.2	28±0.2	34±0.2
D	71 max.	71 max.	71 max.
W	33 max.	39 max.	45 max.
H	6 max.	6 max.	6 max.

■ Cased Relays with Plug-in Terminal

MM2(X)KP



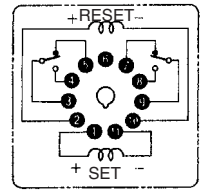
MM2KP



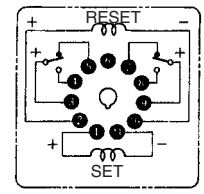
Note: It is recommended that 55 mm min. is allowed for this side because the MM2XKP has a curved protective plate on the side.

Terminal Arrangement/ Internal Connections (Bottom View)

Standard Relays

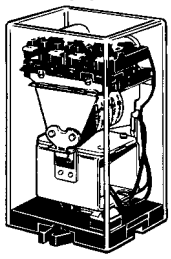


DC-switching Relays

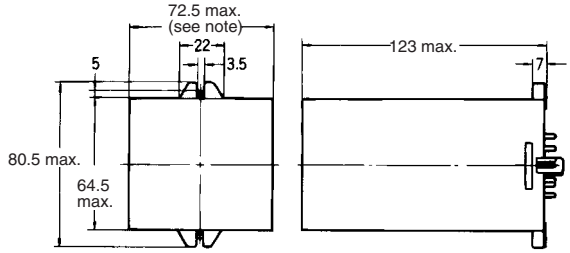


Note: Connect the common (C) to positive (+). Make sure that all common connections are the same in polarity. The markings of the common connections on the casing all show "+" but the polarity of the common connections can be either all negative or all positive.

MM3(X)KP
MM4(X)KP



MM4KP

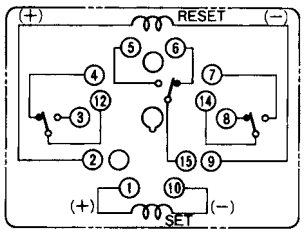


Note: It is recommended that 73 mm min. is allowed for this side because the MM3XKP and MM4XKP have a curved protective plate on the side.

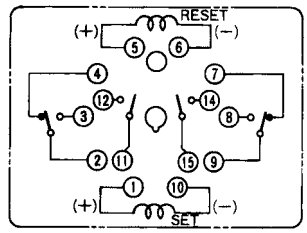
Terminal Arrangement/ Internal Connections (Bottom View)

Standard Relays

MM3KP

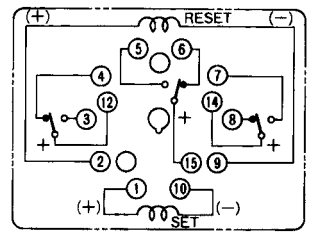


MM4KP

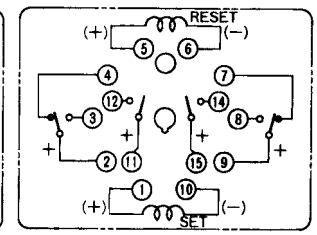


DC-switching Relays

MM3XKP

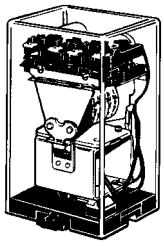


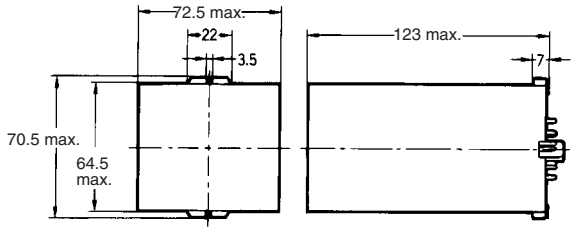
MM4XKP



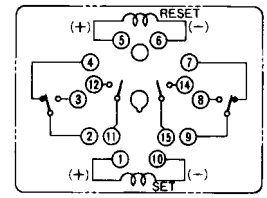
Note: Connect the common (C) to positive (+).
Make sure that all common connections are the same in polarity. The markings of the common connections on the casing all show "+" but the polarity of the common connections can be either all negative or all positive.

MM4KP-JD



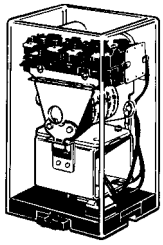


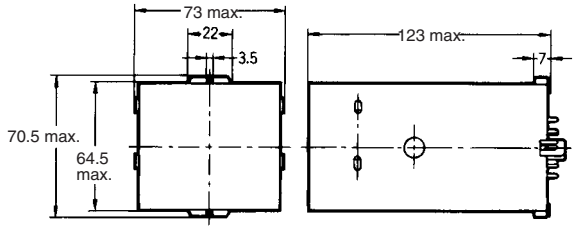
Terminal Arrangement/ Internal Connections (Bottom View)

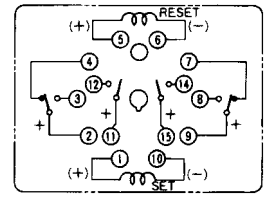


Note: The MM4KP-JD is DPDT and DPST-NO.

MM4XKP-JD



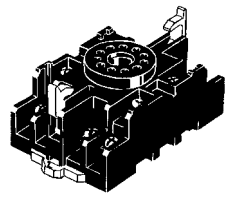
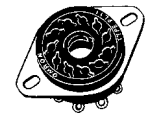




Note: The MM4XKP-JD is DPDT and DPST-NO. Make sure that all common connections are the same in polarity. The markings of the common connections on the casing all show "+" but the polarity of the common connections can be either all negative or all positive.

Accessories

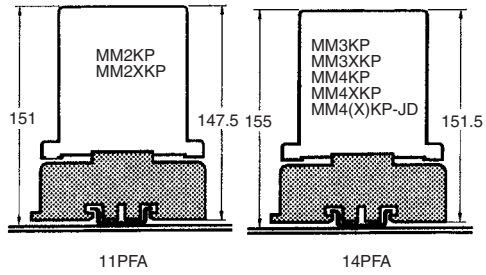
■ Sockets

Relay model	DIN Track/Front-connecting Socket	Back-connecting Socket
	Screw terminals	Solder terminals
MM2(X)KP	11PFA 	PL11 
MM3(X)KP **MM4(X)KP**	14PFA	PL15
MM4(X)KP-JD	14PFA	---

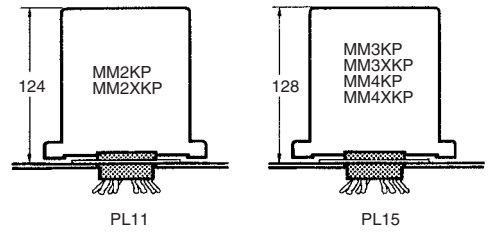
Note: When using the MM□KP-JD by itself, the PL15 Back-connecting Socket cannot be used.

■ Height with Socket

DIN Track/Front-connecting Socket



Back-connecting Socket



Note: □PFA can be both track-mounted and screw-mounted.

Precautions

Refer to page 11 for general precautions.

■ Mounting

Make sure that the Relay is free from iron powder or iron core, otherwise the iron dust may adhere to the Relay. As a result the movable contact may not operate properly.

An arc may be generated between the contacts in switching operation. Be sure to keep combustible objects away from the Relay. If the arc will have a bad effect around the Relay, the use of a model with a casing is recommended.

A model switching DC load incorporates an insulation base with a small built-in permanent magnet. Be sure to keep magnets or ferrous objects away from the permanent magnet, otherwise the capacity of the maximum switching current may drop.

The PL Back-connecting Socket must be flush-mounted from the surface of the panel.

If two or more Relays are mounted together, make sure that a minimum space of 20 mm is provided between adjacent Relays.

Be sure to mount the Relay so that the movable contact is in the downward direction.

■ Connection

- For DC-switching Relays, connect the common (C) to positive (+).
- Use proper crimp terminals or 1.2- to 2-dia. single-conductor wire to connect screw terminals.

Screw Terminal Model

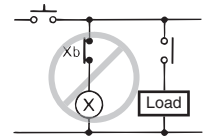
Do not bend the coil terminals, otherwise the coil wire may be disconnected. Make sure that the tightening torque applied to each terminal is 1.27 N • m and the insertion force is 49 N for 10 s.

Solder Terminal Model

Make sure that Relay terminals are free of flux or other foreign substance before soldering the Relay terminals. Finish soldering the Relay terminals quickly, otherwise the coil wire may be broken.

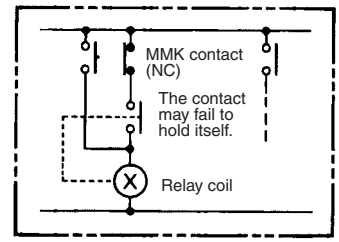
■ Circuits

- You cannot use single contact to demagnetize the reset coil as shown below.



Ⓧ : Latching Relay coil
Xb : NC contact of the Relay

- NC contacts can remain open for a few milliseconds when the reset coil turns ON and OFF. NO contact can remain open for a few milliseconds when the set coil turns ON and OFF while the Relay is latched. Design your circuits to allow for this.



- Do not allow voltage to be applied simultaneously to both the set and reset coil. If voltage is applied simultaneously, the Relay will be set.
- There is no reason to apply voltage to Latching Relays continuously because they will latch properly with a single pulse of sufficient width. Continuously applying voltage will only waste power.
- A model for DC loads incorporates a permanent magnetic for arc suppression. Keep floppy disks away from the Relay, otherwise the data on the floppy disk may be damaged.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J033-E1-02 In the interest of product improvement, specifications are subject to change without notice.

Power Relay
G7J

A High-capacity, High-dielectric-strength, Multi-pole Relay Used Like a Contactor

- Miniature hinge for maximum switching power for motor loads as well as resistive and inductive loads.
- No contact chattering for momentary voltage drops up to 50% of rated voltage.
- Withstanding more than 4 kV between contacts that are different in polarity and between the coil and contacts.
- Flame-resistant materials (UL94V-0-qualifying) used for all insulation material.
- Standard models approved by UL and CSA.

Model Number Structure

■ Model Number Legend

G7J - □ - □ - □
1 2 3

1. Contact Form
4A: 4PST-NO
3A1B: 3PST-NO/SPST-NC
2A2B: DPST-NO/DPST-NC

2. Terminal Shape
P: PCB terminals
B: Screw terminals
T: Quick-connect terminals (#250 terminal)

3. Contact Structure
Z: Bifurcated contact
None: Single contact

Note: For bifurcated contact type, output is 1NO (4PST-NO) or 1NC (3PST-NO/SPST-NC).

Ordering Information

■ List of Models

Mounting type	Contact form	PCB terminals	Screw terminals	Quick-connect terminals
PCB mounting	4PST-NO	G7J-4A-P, G7J-4A-PZ	---	---
	3PST-NO/SPST-NC	G7J-3A1B-P, G7J-3A1B-PZ	---	---
	DPST-NO/DPST-NC	G7J-2A2B-P	---	---
W-bracket (see note)	4PST-NO	---	G7J-4A-B, G7J-4A-BZ	G7J-4A-T, G7J-4A-TZ
	3PST-NO/SPST-NC	---	G7J-3A1B-B, G7J-3A1B-BZ	G7J-3A1B-T, G7J-3A1B-TZ
	DPST-NO/DPST-NC	---	G7J-2A2B-B	G7J-2A2B-T

Note: These Relays need a W-bracket (sold separately) for mounting.
When ordering specify the voltage.
Example: G7J-4A-P 240 VAC
└── Rated coil voltage

PCB Terminals

Contact form	Rated voltage (V)	Model
4PST-NO	24, 50, 100 to 120, 200 to 240 VAC	G7J-4A-P
	12, 24, 48, 100 VDC	
3PST-NO/ SPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-3A1B-P
	12, 24, 48, 100 VDC	
DPST-NO/DPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-2A2B-P
	12, 24, 48, 100 VDC	

PCB Terminals (Bifurcated Contact)

Contact form	Rated voltage (V)	Model
4PST-NO	200 to 240 VAC 24 VDC	G7J-4A-PZ
3PST-NO/ SPST-NC	12, 24 VDC	G7J-3A1B-PZ

W-bracket Screw Terminals

Contact form	Rated voltage (V)	Model
4PST-NO	24, 50, 100 to 120, 200 to 240 VAC	G7J-4A-B
	12, 24, 48, 100 VDC	
3PST-NO/ SPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-3A1B-B
	12, 24, 48, 100 VDC	
DPST-NO/ DPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-2A2B-B
	12, 24, 48, 100 VDC	

■ Accessories (Order Separately)

Name	Model	Applicable Relay
W-bracket	R99-04 for G5F	G7J-4A-B G7J-3A1B-B G7J-2A2B-B G7J-4A-T G7J-3A1B-T G7J-2A2B-T

Screw Terminals (Bifurcated Contact)

Contact form	Rated voltage (V)	Model
3PST-NO/ SPST-NC	200 to 240 VAC	G7J-3A1B-BZ
	6, 12, 24, 48, 100 VDC	

Tab Terminals

Contact form	Rated voltage (V)	Model
4PST-NO	24, 50, 100 to 120, 200 to 240 VAC	G7J-4A-T
	12, 24, 48, 100 VDC	
3PST-NO/ SPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-3A1B-T
	12, 24, 48, 100 VDC	
DPST-NO/ DPST-NC	24, 50, 100 to 120, 200 to 240 VAC	G7J-2A2B-T
	12, 24, 48, 100 VDC	

Tab Terminals (Bifurcated Contact)

Contact form	Rated voltage (V)	Model
4PST-NO	200 to 240 VAC	G7J-4A-TZ

Consult your OMRON representative for details on models not mentioned in this document.

Application Examples

- Compressors for air conditioners and heater switching controllers.
- Switching controllers for power tools or motors.
- Lamp controls, motor drivers, and power supply switching controllers in copy machines, facsimile machines, and other office equipment.
- Power controllers for packers or food processing equipment.
- Power controllers for inverters.

Specifications

■ Coil Ratings

Rated voltage		Rated current	Coil resistance	Must-operate voltage	Must-release voltage	Max. voltage	Power consumption
AC	**24 VAC**	75 mA	---	75% max. of rated voltage	15% min. of rated voltage	110% of rated voltage	Approx. 1.8 to 2.6 VA
	50 VAC	36 mA	---				
	100 to 120 VAC	18 to 21.6 mA	---				
	200 to 240 VAC	9 to 10.8 mA	---				
DC	**6 VDC**	333 mA	18 Ω		10% min. of rated voltage		Approx. 2.0 W
	12 VDC	167 mA	72 Ω				
	24 VDC	83 mA	288 Ω				
	48 VDC	42 mA	1,150 Ω				
	100 VDC	20 mA	5,000 Ω				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance. (The values given for AC rated current apply at 50 Hz or 60 Hz.)

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. The maximum voltage is one that is applicable to the Relay coil at 23°C.

■ Contact Ratings

Item	Resistive load (cos ϕ = 1)	Inductive load (cosϕ = 0.4)	Resistive load
Contact mechanism	Double break		
Contact material	Ag alloy		
Rated load	NO: 25 A at 220 VAC (24 A at 230 VAC) NC: 8 A at 220 VAC (7.5 A at 230 VAC)		NO: 25 A at 30 VDC NC: 8 A at 30 VDC
Rated carry current	NO: 25 A (1 A) NC: 8 A (1 A)		
Max. switching voltage	250 VAC		125 VDC
Max. switching current	NO: 25 A (1 A) NC: 8 A (1 A)		

Note: The values in parentheses indicate values for a bifurcated contact.

■ Characteristics

Contact resistance (see note 2)	50 mΩ max.
Operate time (see note 3)	50 ms max.
Release time (see note 3)	50 ms max.
Max. operating frequency	Mechanical: 1,800 operations/hr Electrical: 1,800 operations/hr
Insulation resistance (see note 4)	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC, 50/60 Hz for 1 min between coil and contacts 4,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 2,000 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage	10,000 V between coil and contact (with 1.2 x 50 μs impulse wave)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: NO:10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) NC:10 to 26 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: NO:100 m/s^2 NC:20 m/s^2
Endurance	Mechanical: 1,000,000 operations min. (at 1,800 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr) (see note 5)
Error rate (see note 6)	100 mA at 24 VDC (bifurcated contact: 24 VDC 10 mA)
Ambient temperature	Operating: –25°C to 60°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Weight	PCB terminal: approx. 140 g Screw terminal: approx. 165 g Quick-connect terminal: approx. 140 g

Note: 1. The above values are all initial values.
2. The contact resistance was measured with 1 A at 5 VDC using the voltage drop method.
3. The operate and the release times were measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.
4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.
5. The electrical endurance was measured at an ambient temperature of 23°C.
6. This value was measured at a switching frequency of 60 operations per minute.

■ Approved Standards

The G7J satisfies the following international standards. Approval for some international markings and symbols are still pending, however, and information on them will be added when they are approved.

UL (File No. E41643)
CSA (File No. LR35535)

Coil ratings	Contact ratings		Number of test operations
24 to 265 VAC 6 to 110 VDC	NO contact	25 A 277 VAC, Resistive	30,000
		25 A 120 VAC, General Use	
		25 A 277 VAC, General Use	
		25 A 240 VAC, General Use	100,000
		1.5 kW 120 VAC, Tungsten	6,000
		1.5 hp 120 VAC	
		3 hp 240/265/277 VAC	
		3-phase 3 hp 240/265/277 VAC	30,000
		3-phase 5 hp 240/265/277 VAC	
		20FLA/120LRA 120 VAC	
		17FLA/102LRA 277 VAC	
		TV-10 120 VAC	25,000
		25 A 30 VDC, Resistive	30,000
		*1 A 277 VAC, General Use	6,000
	NC contact	8 A 277 VAC, Resistive	30,000
		8 A 120 VAC, General Use	
		8 A 277 VAC, General Use	
		8 A 30 VDC, Resistive	
		*1 A 277 VAC, General Use	6,000

Note: *These ratings are bifurcated contact ratings.

Reference

UL approval: UL508 for industrial control devices
UL1950 for information processing equipment including business machines

CSA approval: CSA C22.2 No. 14 for industrial control devices
CSA C22.2 No. 950 for information processing equipment including business machines

VDE (File No. 5381UG)

Model	Coil ratings	Contact ratings	
		NO contact	NC contact
G7J-4A-B(P) (T) (Z) G7J-2A2B(P) (T) G7J-3A1B-B(P) (T) (Z)	6, 12, 24, 48, 100 VDC 24, 50, 100 to 120, 200 to 240 VAC	25 A 240 VAC cosϕ = 0.4 25 A 240 VAC cosϕ = 1 25 A 30 VDC L/R ≥ 1 *1 A 240 VAC cosϕ = 0.4	8 A 240 VAC cosϕ = 0.4 8 A 240 VAC cosϕ = 1 8 A 30 VDC L/R ≥ 1 *1 A 240 VAC cosϕ = 0.4

Note: Add the suffix "-KM" to the model number when ordering.

*These ratings are bifurcated contact ratings.

Reference

VDE approval: EN60255-1-00: 1997
EN60255-23: 1996

KEMA (File No. 2001291.02)

Model	Coil ratings	Contact ratings
		NO contact
G7J-4A-B(P) (T) (Z) G7J-2A2B(P) (T)	200 to 240 VAC	Class AC1: 25 A at 220 VAC 11.5 A at 380 to 480 VAC Class AC3: 11.5 A at 220 VAC and 8.5 A at 380 to 480 VAC *Class AC1: 1 A at 220 VAC
G7J-3A1B-B(P) (T) (Z)	6, 12, 24, 48, 100 VDC 24, 50, 100 to 120, 200 to 240 VAC	

Note: Add the suffix "-KM" to the model number when ordering.

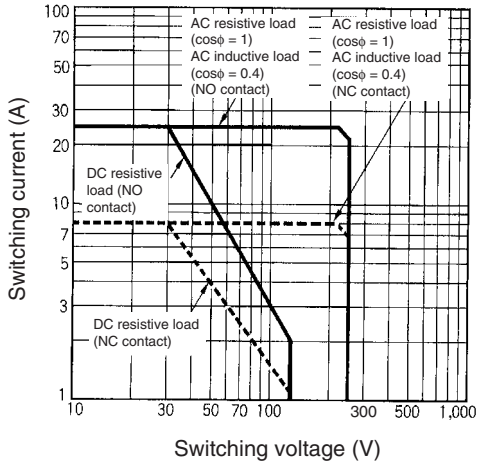
*This rating is the bifurcated contact rating.

Reference

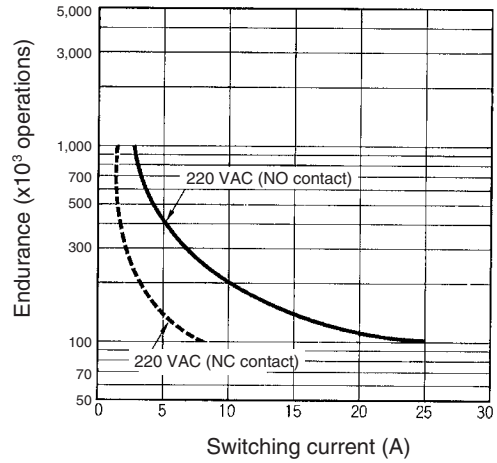
KEMA approval: EN60947-4-1 for contacts
IEC947-4-1 for contacts

Engineering Data

■ Maximum Switching Power

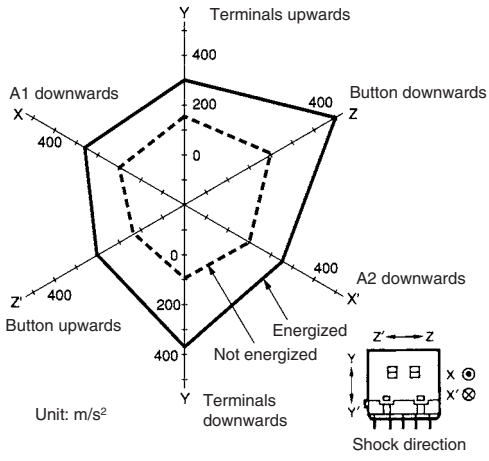


■ Endurance



■ Malfunctioning Shock

G7J-2A2B



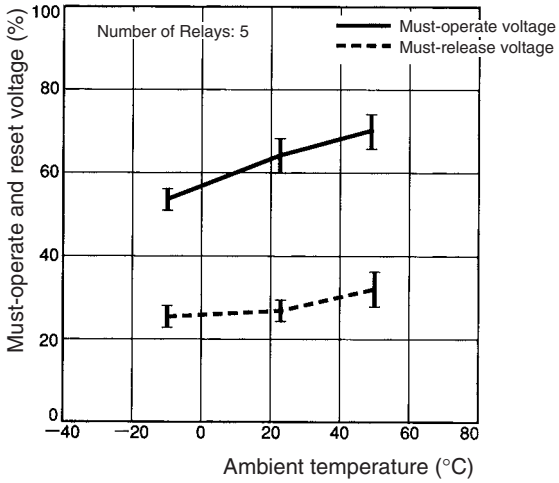
Number of samples: 5

Measurement conditions: Increase and decrease the specified shock gradually imposed in ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

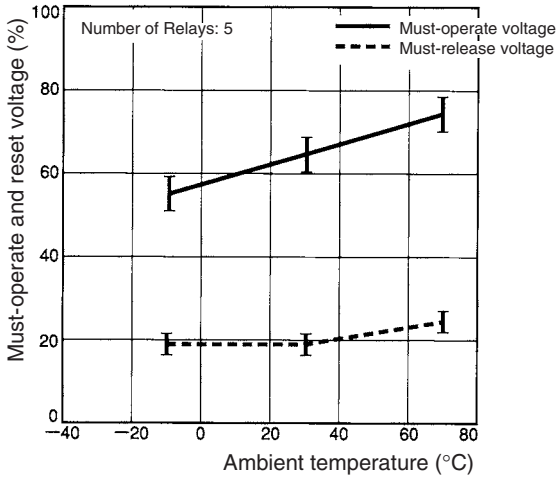
Criteria: There must not be any contact separation for 1 ms or greater with a shock of 100 m/s² imposed when the coil is energized or with a shock of 20 m/s² when the coil is not energized.

■ Ambient Temperature vs. Must-operate and Must-release Voltage

G7J 100 to 120 VAC

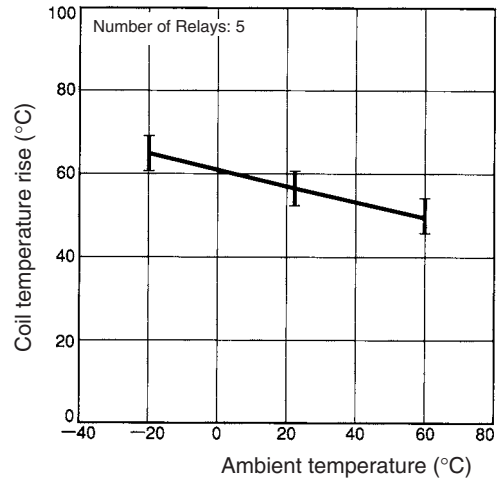


G7J 24 VDC

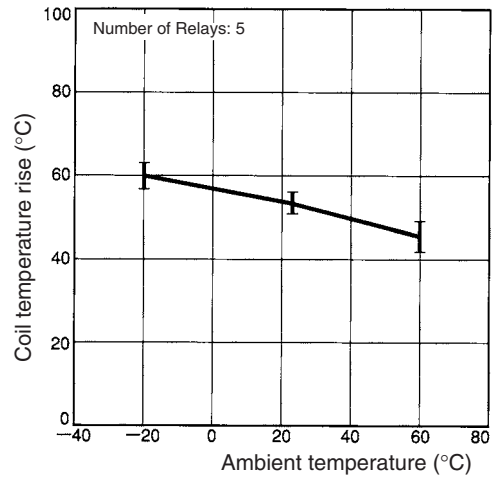


■ Ambient Temperature vs. Coil Temperature Rise

G7J-4A 100 to 120 VAC



G7J-4A 24 VDC



Motor Load

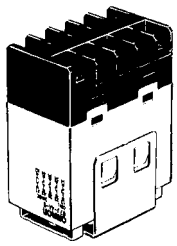
Item	G7J-4A-P, G7J-3A1B-P, G7J-4A-B, G7J-3A1B-B, G7J-4A-T, G7J-3A1B-T
Load	3ϕ, 220 VAC, 2.7 kW (with a inrush current of 78 A and a breaking current of 13 A)
Endurance	Electrical: 100,000 operations min.

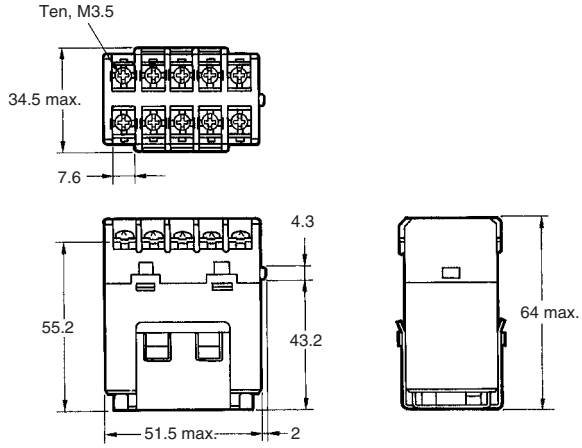
Dimensions

Note: All units are in millimeters unless otherwise indicated.

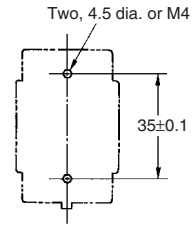
Screw Terminals with W-bracket

G7J-4A-B, G7J-4A-BZ, G7J-3A1B-B, G7J-3A1B-BZ, G7J-2A2B-B



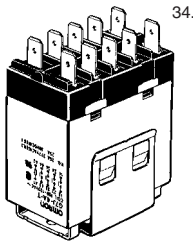


Mounting Holes

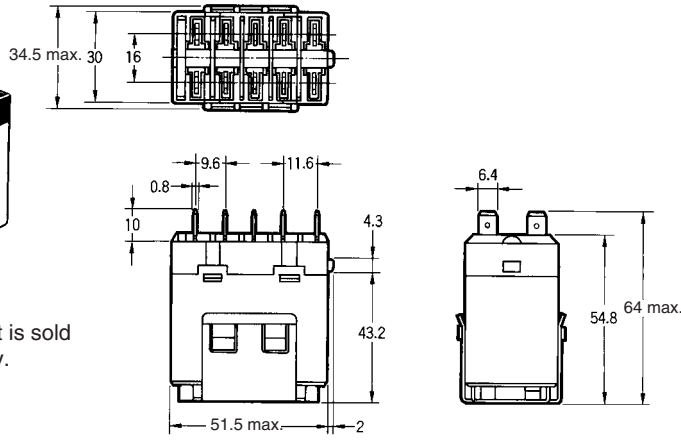


Quick-connect Terminals with W-bracket

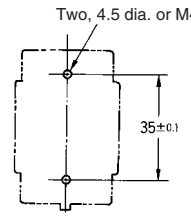
G7J-4A-T, G7J-4A-TZ, G7J-3A1B-T, G7J-3A1B-TZ, G7J-2A2B-T



Note: W-bracket is sold separately.

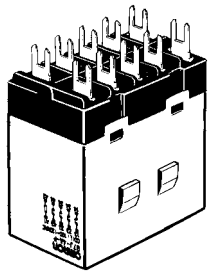


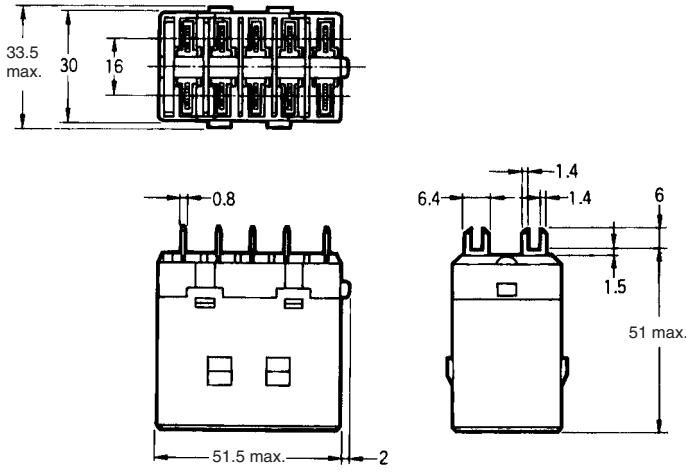
Mounting Holes



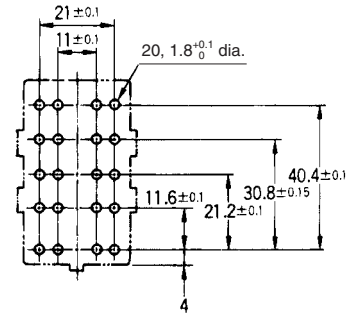
PCB Terminals with PCB Mounting

G7J-4A-P, G7J-4A-PZ, G7J-3A1B-P, G7J-3A1B-PZ, G7J-2A2B-P



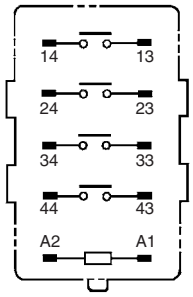


Mounting Dimensions

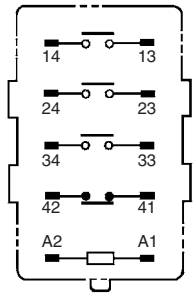


■ Terminal Arrangement/Internal Connections

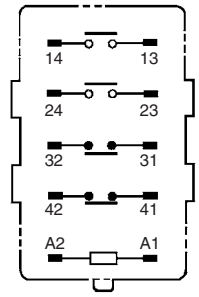
G7J-4A-P(B) (T) (Z)



G7J-3A1B-P(B) (T) (Z)



G7J-2A2B-P(B) (T)

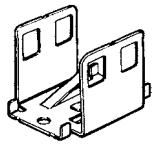


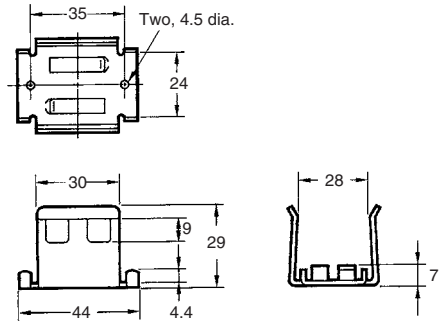
The coil has no polarity.

Note: Terminals 43 and 44 of the G7J-4A-P(B)(T)(Z) and contacts 41 and 42 of the G7J-3A1B-P(B)(T)(Z) are bifurcated contacts.

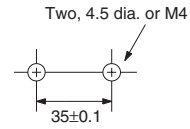
■ Accessories (Order Separately)

R99-04 W-bracket (for G5F)





Mounting Holes



Precautions

■ Correct Use

Installation

PCB Terminal-equipped Relays weigh approximately 140 g. Be sure that the PCB is strong enough to support them. We recommend dual-side through-hole PCBs to reduce solder cracking from heat stress.

Mount the G7J with its test button facing downwards. The Relay may malfunction due to shock if the test button faces upwards. Be careful not to press the test button by mistake because the contacts will go ON if the test button is pressed.

Be sure to use the test button for test purposes only.
The test button is used for Relay circuit tests, such as a circuit continuity test. Do not attempt to switch the load with the test button.

If a voltage is applied to the coil, the test button will retract in an ON state (i.e., an excited state).

Micro Loads

The G7J is used for switching power loads, such as motor, transformer, solenoid, lamp, and heater loads. Do not use the G7J for switching minute loads, such as signals. Use a Relay with a bifurcated contact construction for switching micro loads, in which case, however, only SPST-NO or SPST-NC output is obtained.

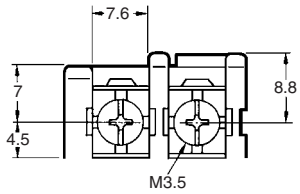
Soldering PCB Terminals

Be sure to solder the PCB terminals manually only. In the case of automatic soldering, some flux may stick to the test button and the G7J. As a result, the G7J may malfunction.

The G7J is not of enclosed construction. Therefore, do not wash the G7J with water or any detergent.

Connecting

Refer to the following diagram when connecting a wire with a screw terminal to the G7J.



Allow suitable slack on leads when wiring, and do not subject the terminals to excessive force.

Tightening torque: 0.98 N·m

Do not impose excessive external force on the G7J in the horizontal or vertical directions when inserting the G7J to the Faston receptacle or pulling the G7J out from the Faston receptacle. Do not attempt to insert or pull out more than one G7J Unit together.

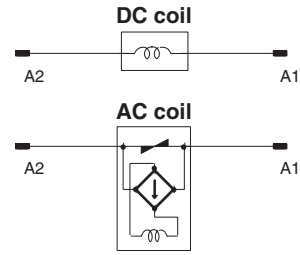
Do not solder the tab terminals.

Terminal	Receptacle	Housing
#250 terminal (6.35 mm in width)	AMP170333-1 (170327-1) AMP170334-1 (170328-1) AMP170335-1 (170329-1)	AMP172076-1: natural AMP172076-4: yellow AMP172076-5: green AMP172076-6: blue

Note: Numbers in parentheses are for air feed use.

Operating Coil

Internal Connections of Coils



If a transistor drives the G7J, check the leakage current, and connect a bleeder resistor if necessary.

The AC coil is provided with a built-in full-wave rectifier. If a triac, such as an SSR, drives the G7J, the G7J may not release. Be sure to perform a trial operation with the G7J and the triac before applying them to actual use.

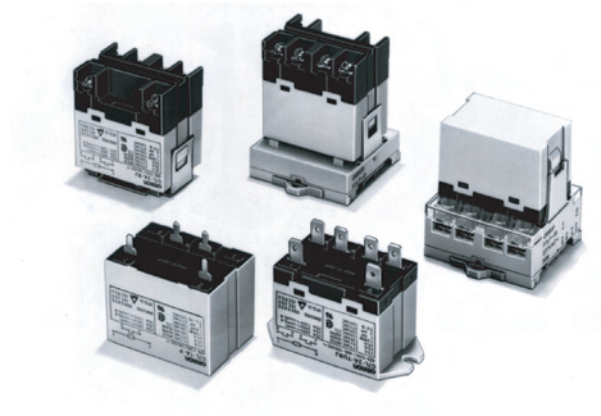
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J088-E1-03A In the interest of product improvement, specifications are subject to change without notice.

Power Relay
G7L

A High-capacity, High-dielectric-strength Relay Compatible with Momentary Voltage Drops

- No contact chattering for momentary voltage drops up to 50% of rated voltage.
- Wide-range AC-activated coil that handles 100 to 120 or 200 to 240 VAC at either 50 or 60 Hz.
- Miniature hinge for maximum switching power, particularly for inductive loads.
- Flame-resistance materials (UL94V-0-qualifying) used for all insulation material.
- Quick-connect, screw, and PCB terminals, and DIN track mounting available.



Model Number Structure

■ Model Number Legend

G7L -□□-□□□□,□
1 2 3 4 5

1. Contact Form
1A: SPST-NO
2A: DPST-NO

2. Terminal Shape
T: Quick-connect terminals
P: PCB terminals
B: Screw terminals

3. Mounting Construction
Blank: E-bracket
UB: Upper bracket

4. Special Functions
Blank: Standard mode
J: With test button

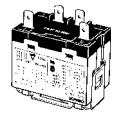
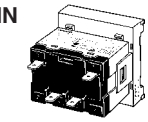
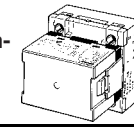
5. Rated Coil Voltage
AC: 12, 24, 50, 100 to 120, 200 to 240
DC: 6, 12, 24, 48, 100

Ordering Information

Mounting type	Contact form	Quick-connect terminals	Screw terminals	PCB terminals
E-bracket	SPST-NO	G7L-1A-T	G7L-1A-B	---
	DPST-NO	G7L-2A-T	G7L-2A-B	---
E-bracket (with test button)	SPST-NO	G7L-1A-TJ	G7L-1A-BJ	---
	DPST-NO	G7L-2A-TJ	G7L-2A-BJ	---
Upper bracket	SPST-NO	G7L-1A-TUB	G7L-1A-BUB	---
	DPST-NO	G7L-2A-TUB	G7L-2A-BUB	---
Upper bracket (with test button)	SPST-NO	G7L-1A-TUBJ	G7L-1A-BUBJ	---
	DPST-NO	G7L-2A-TUBJ	G7L-2A-BUBJ	---
PCB mounting	SPST-NO	---	---	G7L-1A-P
	DPST-NO	---	---	G7L-2A-P

Note: 1. When ordering, add the rated coil voltage to the model number.
Example: G7L-1A-T 12 VAC (∿)
Rated coil voltage

■ Accessories (Order Separately)

Terminals	Contact form	Model	R99-07 E-brackets 	P7LF-D DIN Track Mounting Adapter 	P7LF-06 Front-connecting Socket 
Quick-connect terminals	SPST-NO	G7L-1A-T	Yes	Yes	Yes
		G7L-1A-TJ	Yes	Yes	Yes
	DPST-NO	G7L-2A-T	Yes	Yes	Yes
		G7L-2A-TJ	Yes	Yes	Yes
Screw terminals	SPST-NO	G7L-1A-B	Yes	Yes	No
		G7L-1A-BJ	Yes	Yes	No
	DPST-NO	G7L-2A-B	Yes	Yes	No
		G7L-2A-BJ	Yes	Yes	No

Applicable Relay	Name	Model
G7L-1A-T/G7L-1A-TJ/G7L-1A-B/G7L-1A-BJ G7L-2A-T/G7L-2A-TJ/G7L-2A-B/G7L-2A-BJ	E-bracket	R99-07
	Adapter	P7LF-D
G7L-1A-T/G7L-1A-TJ/G7L-2A-T/G7L-2A-TJ	Front-connecting Socket	P7LF-06
G7L-1A-B/G7L-1A-BJ/G7L-1A-BUB/G7L-1A-BUBJ G7L-2A-B/G7L-2A-BJ/G7L-2A-BUB/G7L-2A-BUBJ	Cover	P7LF-C

Application Examples

- Compressors for air conditioners and heater switching controllers.
- Switching controllers for power tools or motors.
- Power controllers for water heaters.
- Power controllers for dryers.
- Lamp controls, motor drivers, and power supply switching in copy machines, facsimile machines, and other office equipment.
- Lighting controllers.
- Power controllers for packers or food processing equipment.
- Magnetron control in microwaves.

Specifications

■ Coil Ratings

Rated voltage		Rated current	Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
AC (∿)	12 V	142 mA	---	75% max. of rated voltage	15% min. of rated voltage	110% of rated voltage	1.7 to 2.5 VA (60 Hz)
	24 V	71 mA	---				
	50 V	34 mA	---				
	100 to 120 V	17.0 to 20.4 mA	---	75 V	18 V	132 V	
	200 to 240 V	8.5 to 10.2 mA	---	150 V	36 V	264 V	
DC (⎓)	6 V	317 mA	18.9 Ω	75% max. of rated voltage	15% min. of rated voltage	110% of rated voltage	1.9 W
	12 V	158 mA	75 Ω				
	24 V	79 mA	303 Ω				
	48 V	40 mA	1220 Ω				
	100 V	19 mA	5260 Ω				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. Performance characteristic data are measured at a coil temperature of 23°C.

3. ∿ indicates AC and ⎓ indicates DC (IEC417 publications).

■ Contact Ratings

Model	G7L-1A-T□/G7L-1A-B□		G7L-2A-T□/G7L-2A-B□		G7L-1A-P/G7L-2A-P	
	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)
Rated load	30 A, 220 VAC (∿)	25 A, 220 VAC (∿)	25 A, 220 VAC (∿)		20 A, 220 VAC (∿)	
Rated carry current	30 A		25 A		20 A	
Max. switching voltage	250 VAC (∿)					
Max. switching current	30 A		25 A		20 A	
Max. switching power	6,600 VAC (∿)	5,500 VAC (∿)	5,500 VAC (∿)		4,400 VAC (∿)	
Failure rate* (reference value)	100 mA, 5 VDC (⎓)					

***Note:** P level: λ_{60} = 0.1 x 10^{-6}/operation

■ Characteristics

Contact resistance	50 mΩ max.
Operate time	30 ms max.
Release time	30 ms max.
Max. operating frequency	Mechanical:1,800 operations/hr Electrical:1,800 operations/hr (under rated load)
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	4,000 VAC min., 50/60 Hz for 1 min between coil and contacts 2,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity (DPST-NO model)
Impulse withstand voltage	10,000 V between coil and contact (with 1.2 x 50 μs impulse wave)
Vibration resistance	Destruction:10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction:10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)
Shock resistance	Destruction:1,000 m/s^2 Malfunction:100 m/s^2
Endurance	Mechanical:1,000,000 operations min. (at 1,800 operations/hr) Electrical:100,000 operations min. (at 1,800 operations/hr under rated load)
Ambient temperature	Operating: –25°C to 60°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Weight	Quick-connect terminal models:approx. 90 g PCB terminal models:approx. 100 g Screw terminal models: approx. 120 g

Note: The values given above are initial values.

■ Approved by Standards

UL 508, 1950 Recognitions (File No. E41643)
CSA 22.2 No.14 Listings (File No.LR35535)

Model	Contact form	Coil ratings	Contact ratings	Operations
G7L-1A-T□ G7L-1A-B□	SPST-NO	12 to 240 VAC 5 to 220 VDC	30 A, 277 VAC (RES) 25 A, 277 VAC (GEN) 30 A, 120 VAC (GEN)	100×10^3 (CSA; 30×10^3)
			1.5 kW, 120 VAC (T) 1.5 HP, 120 VAC	6×10^3
			3 HP, 277 VAC	100×10^3 (CSA; 6×10^3)
			20 FLA/120 LRA, 120 VAC 17 FLA/102 LRA, 265 VAC	30×10^3
			TV-10, 120 VAC	25×10^3
G7L-2A-T□ G7L-2A-B□	DPST-NO		25 A, 277 VAC (RES) 25 A, 277 VAC (GEN) 25 A, 120 VAC (GEN)	100×10^3 (CSA; 30×10^3)
			1.3 kW, 120 VAC (T) 1 HP, 120 VAC	6×10^3
			2 HP, 277 VAC	100×10^3
			20 FLA/120 LRA, 120 VAC 17 FLA/102 LRA, 265 VAC	30×10^3
			TV-8, 120 VAC	25×10^3
G7L-1A-P	SPST-NO		20 A, 277 VAC (RES) 20 A, 277 VAC (GEN) 20 A, 120 VAC (GEN)	100×10^3
			1.5 kW, 120 VAC (T) 1.5 HP, 120 VAC	6×10^3
			3 HP, 277 VAC	100×10^3 (CSA; 6×10^3)
			20 FLA/120 LRA, 120 VAC 17 FLA/102 LRA, 265 VAC	30×10^3
			TV-10, 120 VAC	25×10^3
G7L-2A-P	DPST-NO		20 A, 277 VAC (RES) 20 A, 277 VAC (GEN) 20 A, 120 VAC (GEN)	100×10^3 (CSA; 30×10^3)
			1.3 kW, 120 VAC (T) 1 HP, 120 VAC	6×10^3
			2 HP, 277 VAC	100×10^3
			20 FLA/120 LRA, 120 VAC 17 FLA/102 LRA, 265 VAC	30×10^3
			TV-8, 120 VAC	25×10^3

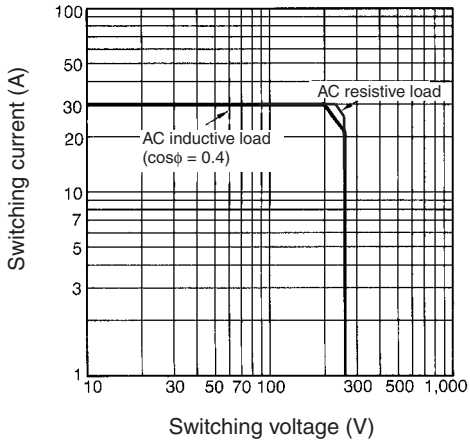
TÜV: File No. R9051158 (VDE 0435, IEC 255, IEC 950, EN60950)

Model	Contact Form	Coil ratings	Contact ratings	Operations
G7L-1A-B□	SPST-NO	6, 12, 24, 48, 100, 110, 200, 220 VDC 12, 24, 50, 100 to 120, 200 to 240 VAC	30 A, 240 VAC (cosϕ=1.0) 25 A, 240 VAC (cosϕ=0.4) 30 A, 120 VAC (cosϕ=0.4)	100×10^3
G7L-2A-B□	DPST-NO		25 A, 240 VAC (cosϕ=1.0) 25 A, 240 VAC (cosϕ=0.4)	
G7L-1A-T□	SPST-NO		25 A, 240 VAC (cosϕ=1.0) 25 A, 240 VAC (cosϕ=0.4)	
G7L-2A-T□	DPST-NO		25 A, 240 VAC (cosϕ=1.0) 25 A, 240 VAC (cosϕ=0.4)	
G7L-1A-P	SPST-NO		20 A, 240 VAC (cosϕ=1.0) 20 A, 240 VAC (cosϕ=0.4)	
G7L-2A-P	DPST-NO		20 A, 240 VAC (cosϕ=1.0) 20 A, 240 VAC (cosϕ=0.4)	

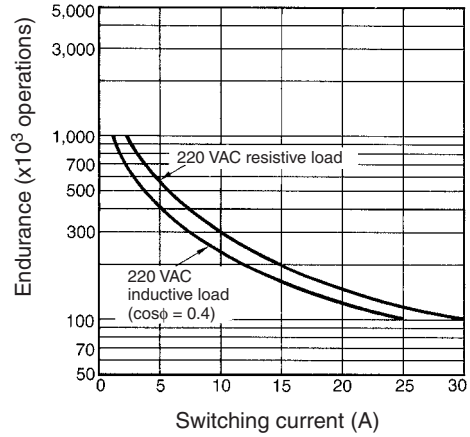
Engineering Data

G7L-1A-T/G7L-1A-B

Maximum Switching Power

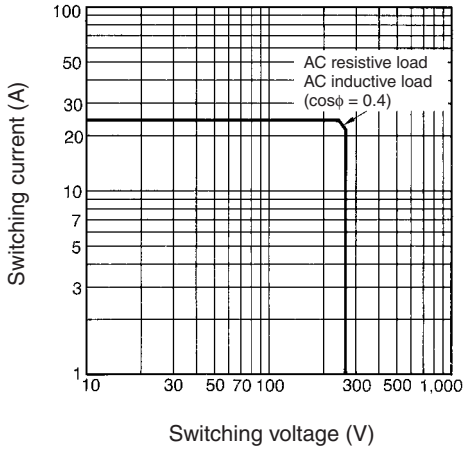


Endurance

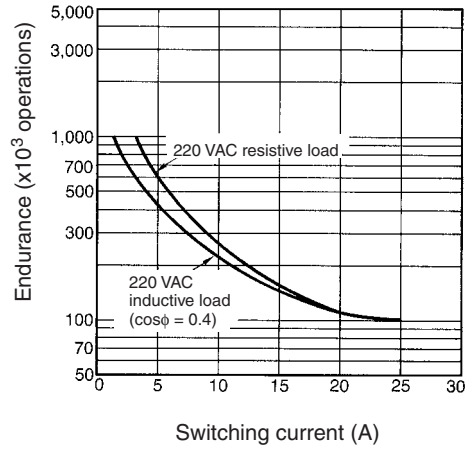


G7L-2A-T/G7L-2A-B

Maximum Switching Power

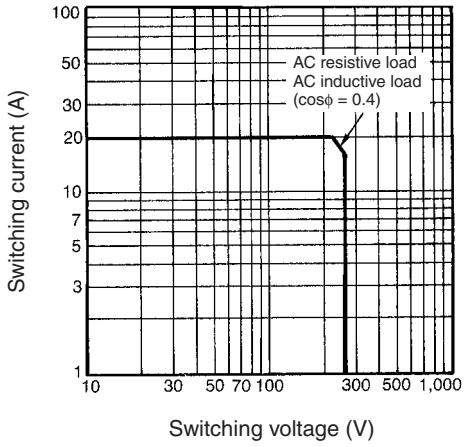


Endurance

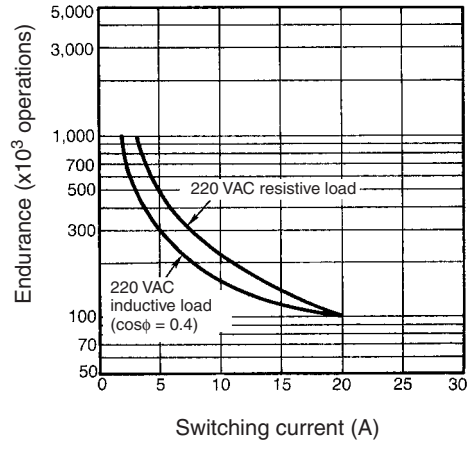


G7L-1A-P/G7L-2A-P

Maximum Switching Power



Endurance

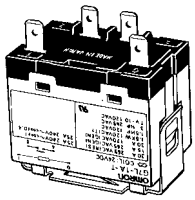


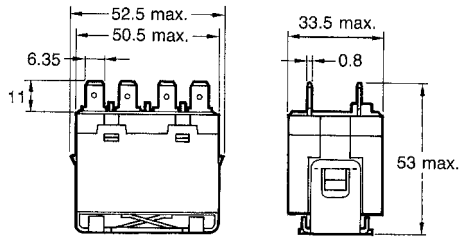
Dimensions

Note: 1. All units are in millimeters unless otherwise indicated.
2. E-brackets are sold separately.

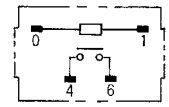
■ Quick-connect Terminals with E-bracket

G7L-1A-T

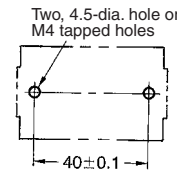




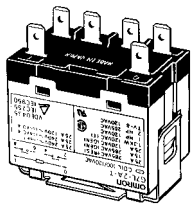
Terminal Arrangement/ Internal Connections (Top View)

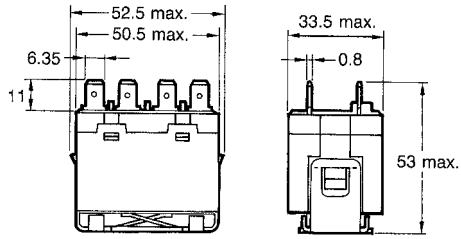


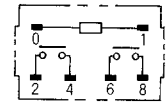
Mounting Holes



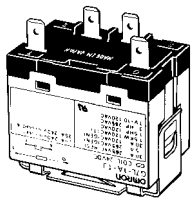
G7L-2A-T

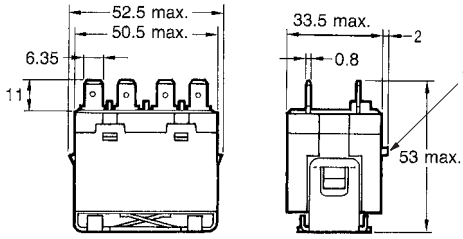


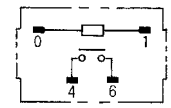




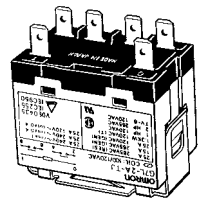
G7L-1A-TJ with Test Button

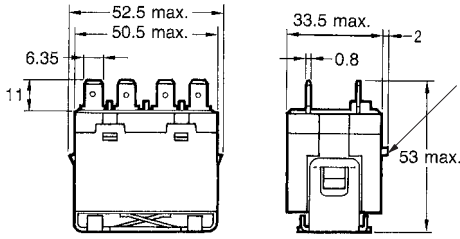


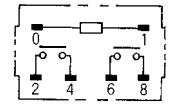




G7L-2A-TJ with Test Button



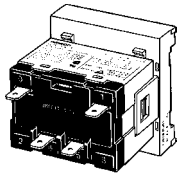


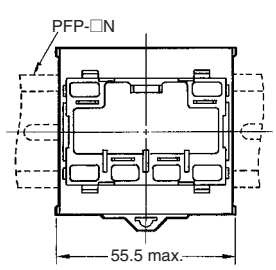


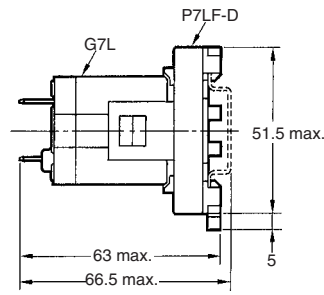
■ Quick-connect Terminals with DIN Track Mounting Adapter

Note: 1. The DIN Track Mounting Adapter and DIN tracks are sold separately.
2. The DIN Track Mounting Adapter can be track-mounted or screw-mounted.

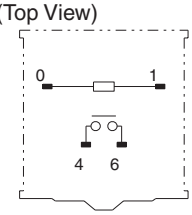
G7L-1A-T



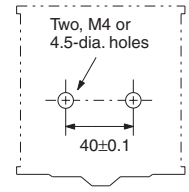




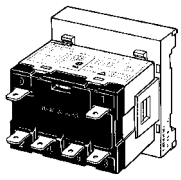
Terminal Arrangement/ Internal Connections (Top View)

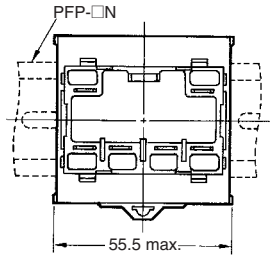


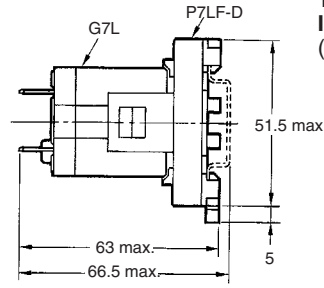
Mounting Holes



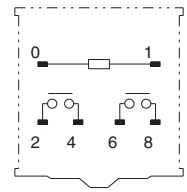
G7L-2A-T



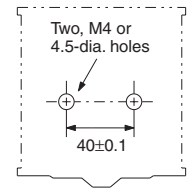




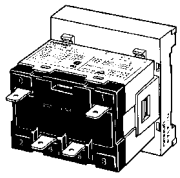
Terminal Arrangement/ Internal Connections (Top View)

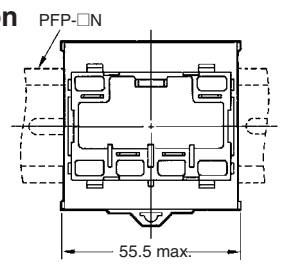


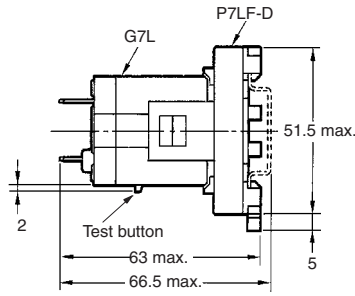
Mounting Holes

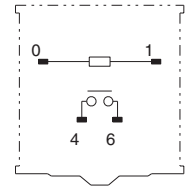


G7L-1A-TJ with Test Button

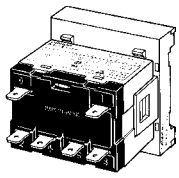


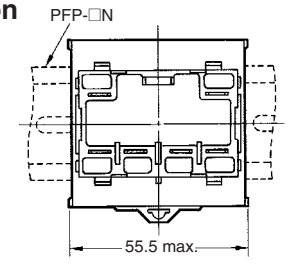


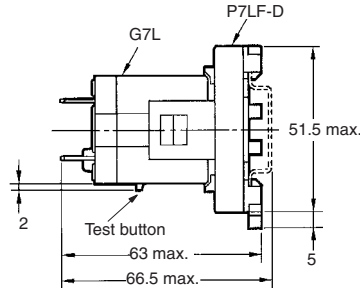


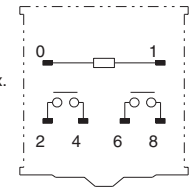


G7L-2A-TJ with Test Button







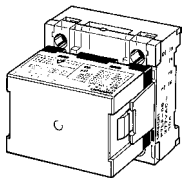


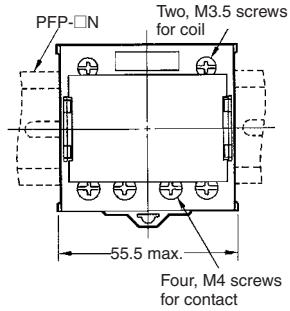
■ Quick-connect Terminals with Front-connecting Socket

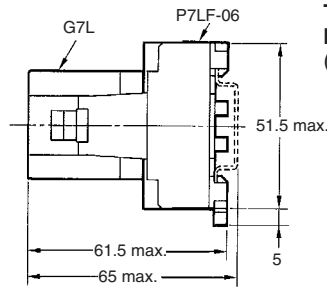
Note: 1. The Front-connecting Socket and DIN tracks are sold separately.

2. The Front-connecting Socket can be track-mounted or screw-mounted.

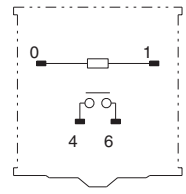
G7L-1A-T



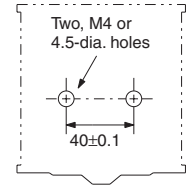




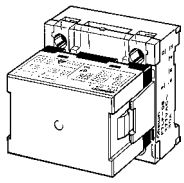
Terminal Arrangement/ Internal Connections (Top View)

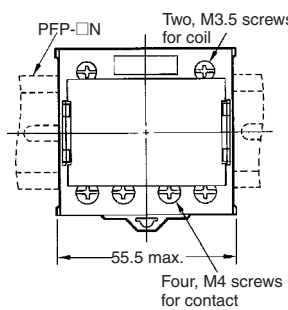


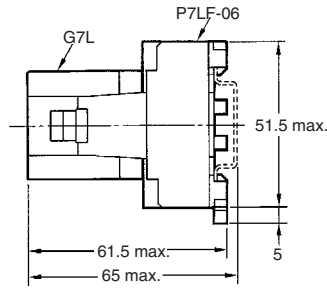
Mounting Holes

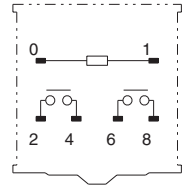


G7L-2A-T

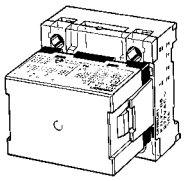


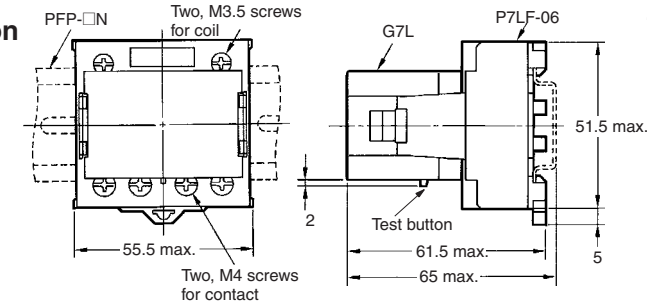




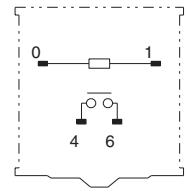


G7L-1A-TJ with Test Button

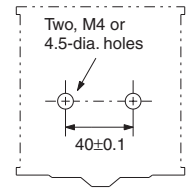




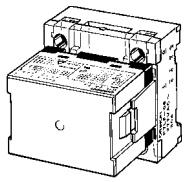
Terminal Arrangement/ Internal Connections (Top View)

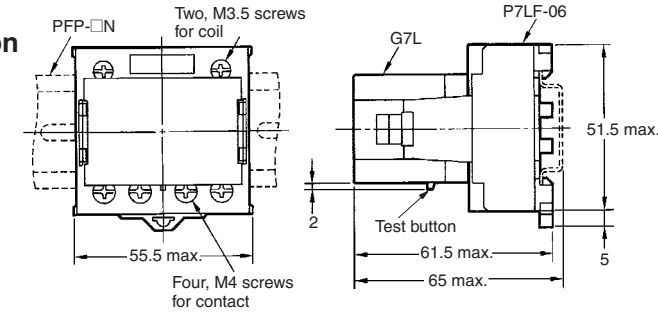


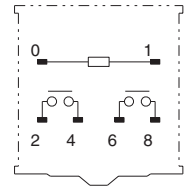
Mounting Holes



G7L-2A-TJ with Test Button

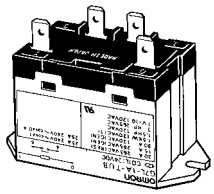


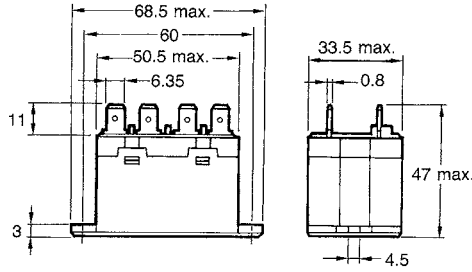




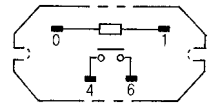
■ Quick-connect Terminals with Upper Bracket

G7L-1A-TUB

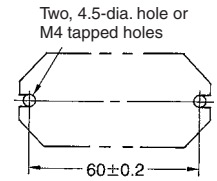




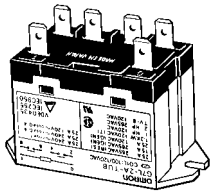
Terminal Arrangement/ Internal Connections (Top View)

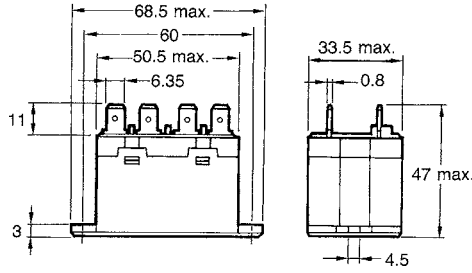


Mounting Holes

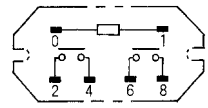


G7L-2A-TUB

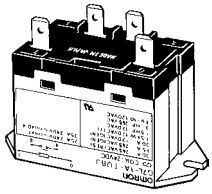


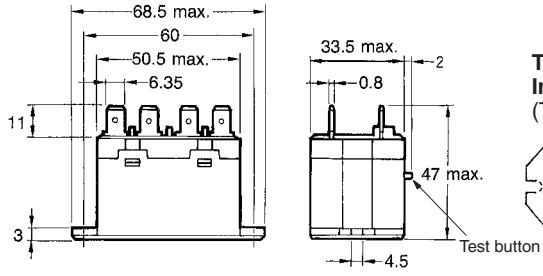


Terminal Arrangement/ Internal Connections (Top View)

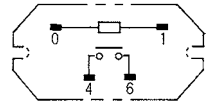


G7L-1A-TUBJ with Test Button

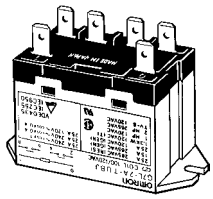


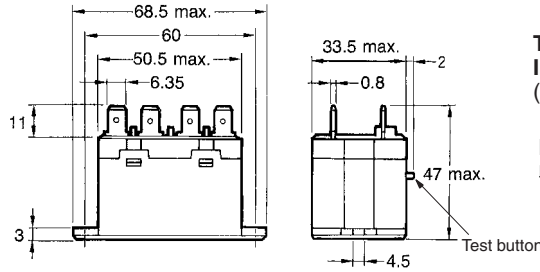


Terminal Arrangement/ Internal Connections (Top View)

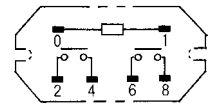


G7L-2A-TUBJ with Test Button

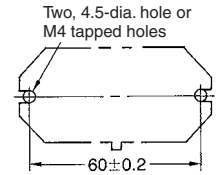




Terminal Arrangement/ Internal Connections (Top View)



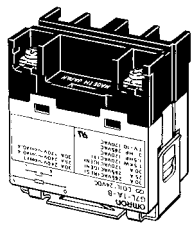
Mounting Holes

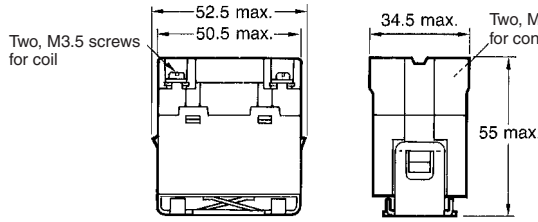


■ Screw Terminals with E-bracket

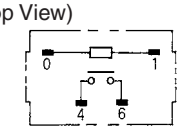
Note: E-brackets are sold separately.

G7L-1A-B

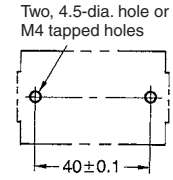




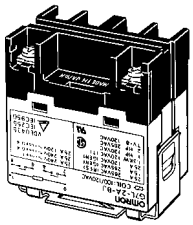
Terminal Arrangement/ Internal Connections (Top View)

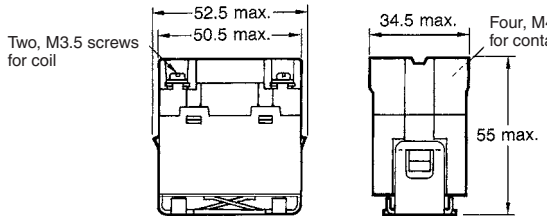


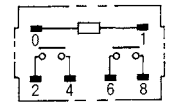
Mounting Holes



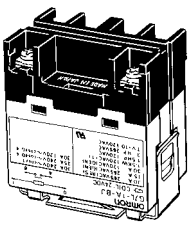
G7L-2A-B

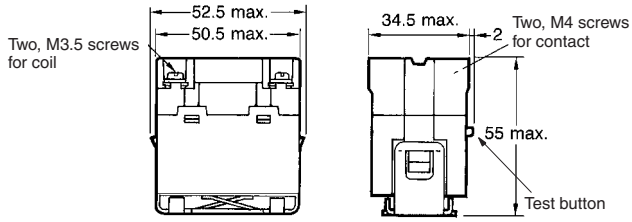


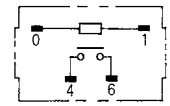




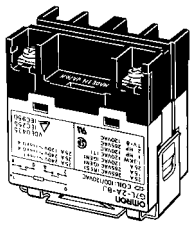
G7L-1A-BJ with Test Button

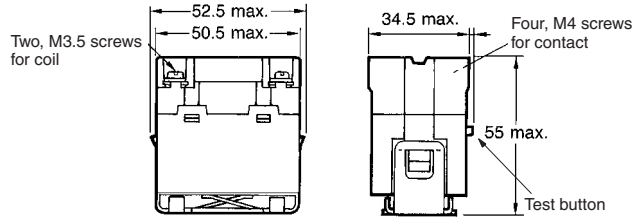


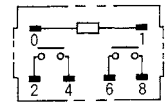




G7L-2A-BJ with Test Button



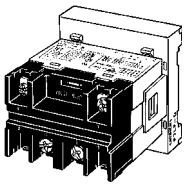


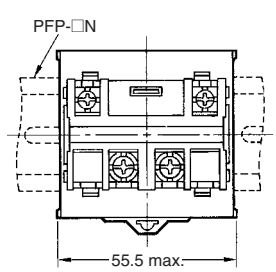


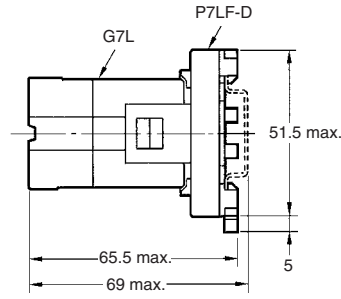
■ Screw Terminals with DIN Track Mounting Adapter

Note: 1. The DIN Track Mounting Adapter and DIN tracks are sold separately.
2. The DIN Track Mounting Adapter can be track-mounted or screw-mounted.

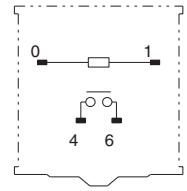
G7L-1A-B



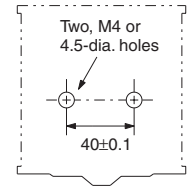




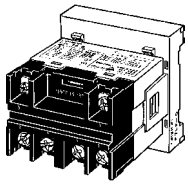
Terminal Arrangement/ Internal Connections (Top View)

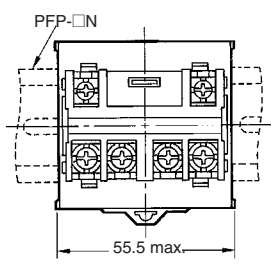


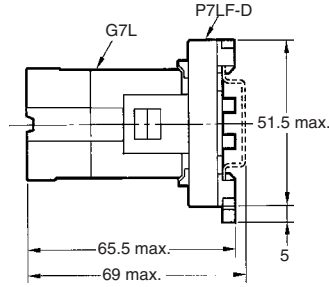
Mounting Holes

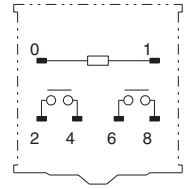


G7L-2A-B

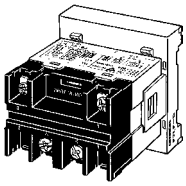


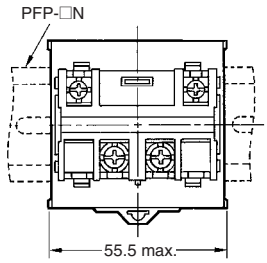


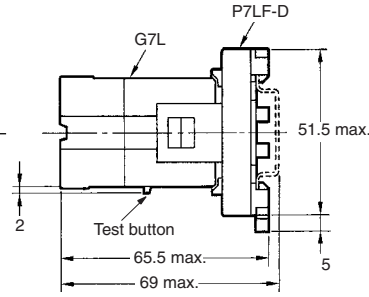


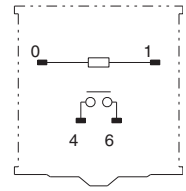


G7L-1A-BJ with Test Button

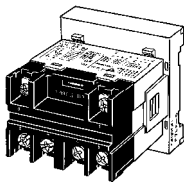


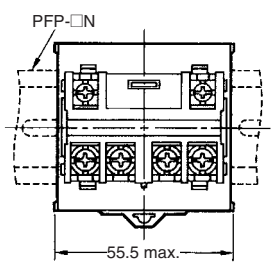


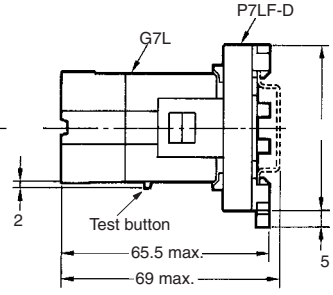


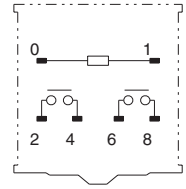


G7L-2A-BJ with Test Button



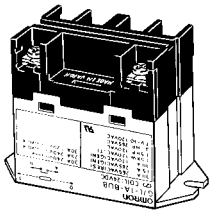


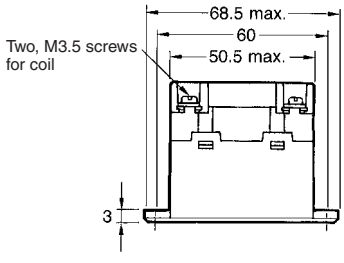


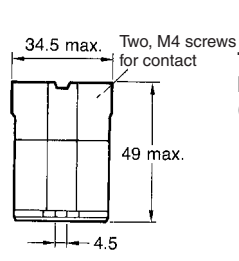


■ Screw Terminals with Upper Bracket

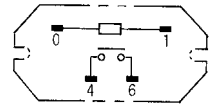
G7L-1A-BUB



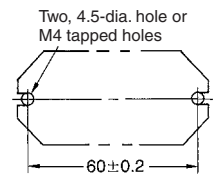




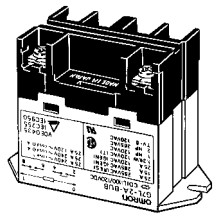
Terminal Arrangement/ Internal Connections (Top View)

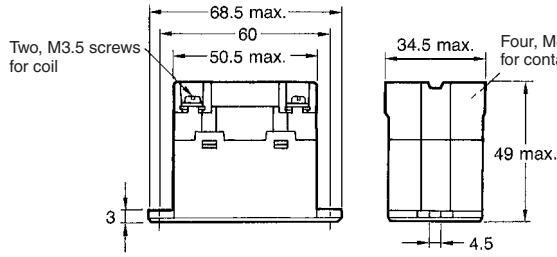


Mounting Holes

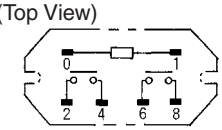


G7L-2A-BUB

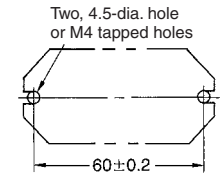




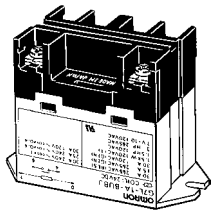
Terminal Arrangement/ Internal Connections (Top View)

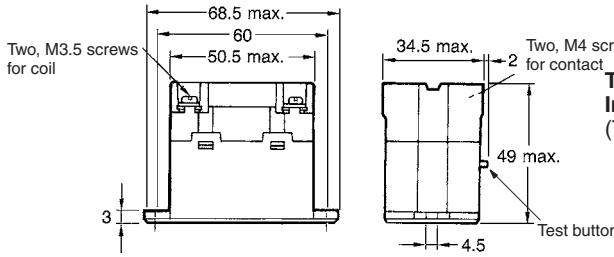


Mounting Holes

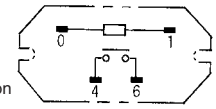


G7L-1A-BUBJ with Test Button

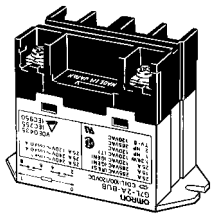


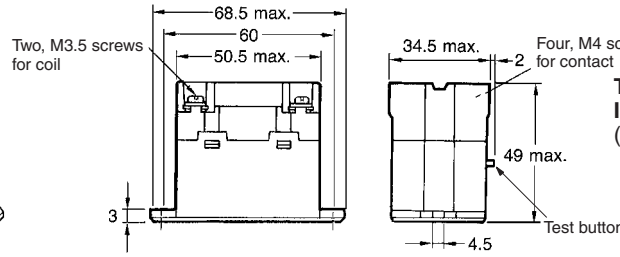


Terminal Arrangement/ Internal Connections (Top View)

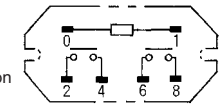


G7L-2A-BUBJ with Test Button



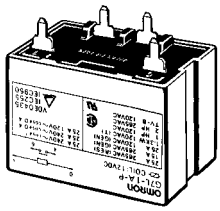


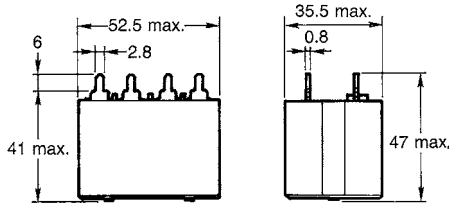
Terminal Arrangement/ Internal Connections (Top View)



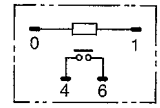
■ PCB Terminals with PCB Mounting

G7L-1A-P

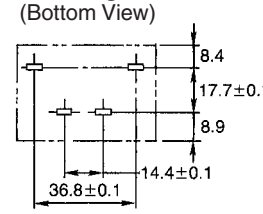




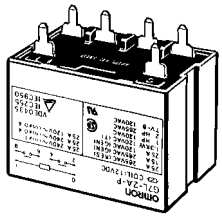
Terminal Arrangement/ Internal Connections (Top View)

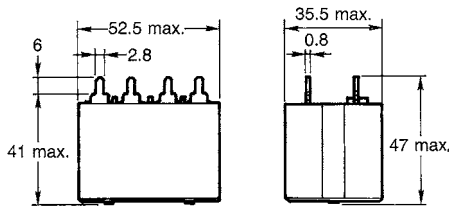


Mounting Holes (Bottom View)

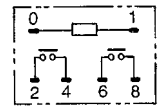


G7L-2A-P

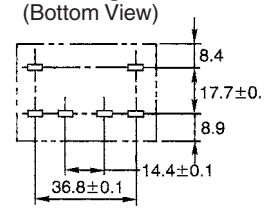




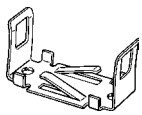
Terminal Arrangement/ Internal Connections (Top View)

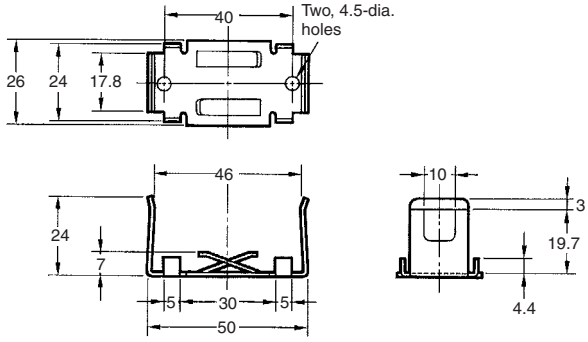


Mounting Holes (Bottom View)

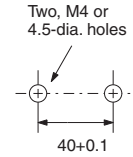


R99-07G7L E-bracket

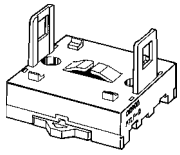


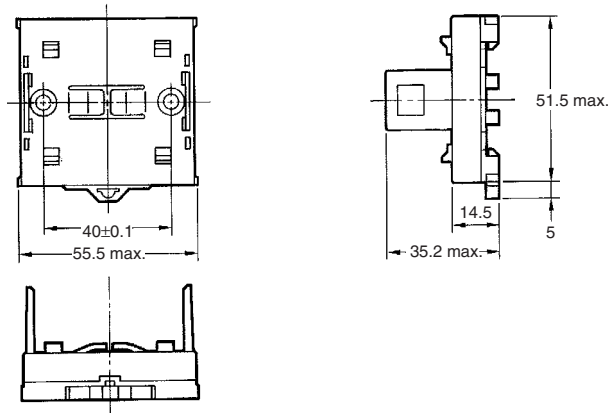


Mounting Holes (Bottom View)

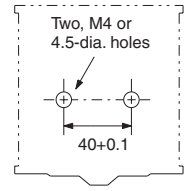


P7LF-D Adapter

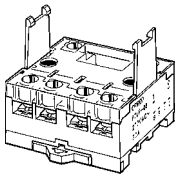


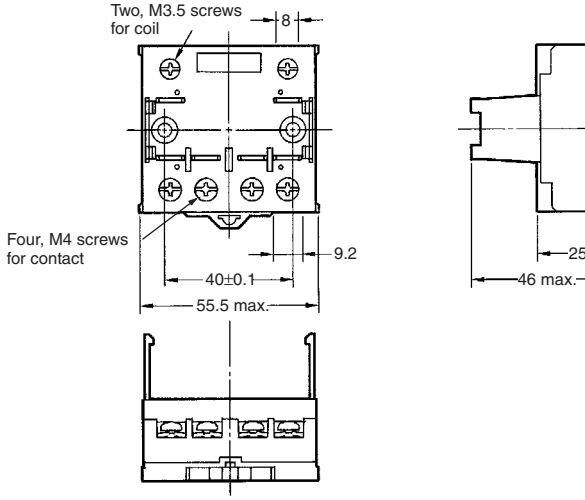


Mounting Holes (Bottom View)

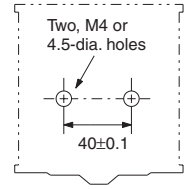


P7LF-06 Front-connecting Socket

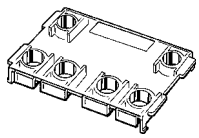


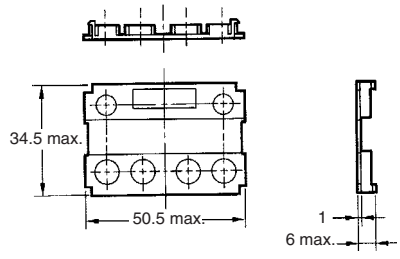


Mounting Holes (Bottom View)



P7LF-C Cover

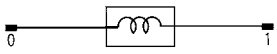




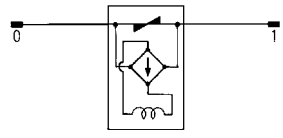
Put the P7LF-C cover onto the terminals in order to protect the user from electric shock.

■ Internal Coil Circuit

DC Operating Coil



AC Operating Coil



Precautions

Refer to page 11 for general precautions.

■ Installation

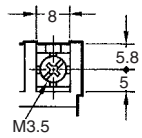
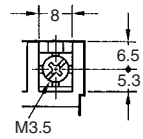
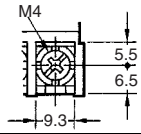
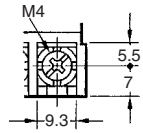
- Although there are not specific limits on the installation site, it should be as dry and dust-free as possible.
- PCB Terminal-equipped Relays weigh approximately 100 g. Be sure that the PCB is strong enough to support them. We recommend dual-side through-hole PCBs to reduce solder cracking from heat stress.
- Quick-connect terminals can be connected to Faston receptacle #250 and positive-lock connectors.
- Allow suitable slack on leads when wiring, and do not subject the terminals to excessive force.
- Mounting torque (upper-bracket models): 0.98 N·m
- G7L Relays with test buttons must be mounted facing down.
- Be careful not to touch the test button accidentally. Doing so may turn ON the contact.
- Be sure to use the test button for test purposes only (with test-button models). The test button is used for Relay circuit tests, such as circuit continuity tests. Do not attempt to switch the load with the test button.

■ Cleaning PCB Terminals

- PCB terminals have flux-tight construction which prevents flux from penetrating into the Relay base housing, e.g., due to capillary action up the terminals when Relay is soldered onto the PCB. This type of Relay cannot be immersed for cleaning.

■ Connecting

- Refer to the following table when connecting a wire with a crimp-style terminal to the G7L.

Terminals	Screw terminals	Front-connecting Socket
Coil		
Contact		

Tightening torque: Coil: 0.98 N·m
Contact: 1.37 N·m

■ Rated Current Flow

When using B-series (screw) products, the rated current from the screw terminals (M4) should be 20 A or less according to jet standard (electrical appliance and material control law of Japan).

■ Minute Loads

The G7L is used for switching power loads, such as motor, transformer, solenoid, lamp, and heater loads. Do not use the G7L for switching minute loads, such as signals.

■ Operating Coil

If a transistor drives the G7L check the leakage current, and connect a bleeder resistor if necessary.

The AC coil is provided with a built-in full-wave rectifier. If a triac, such as an SSR, drives the G7L, the G7L may not release. Be sure to perform a trial operation with the G7L and the triac before applying them to actual use.

■ DIN Track Mounting Adapter and Front-connecting Socket

DIN Track Mounting

- Use a DIN-conforming 50-cm track or 1-m track (both are sold separately) for mounting a number of G7L Relays.
  Cut and shorten the track to an appropriate length it if the required track length is less than 50 cm.
- The DIN Track Mounting Adapter and Front-connecting Socket can be mounted on the G7L with just one hand and dismounted with ease by using a screwdriver.
- To support the G7L mounted on a DIN Track Mounting Adapter or Front-connecting Socket, use the PFP-M End Plate. Put the End Plate onto the DIN Track Mounting Adapter or Front-connecting Socket so that the surface mark of the End Plate faces upwards. Then tighten the screw of the End Plate securely with a screwdriver.

Screw Mounting

- Screw-mount the DIN Track Mounting Adapter or Front-connecting Socket securely after opening screw mounting holes on them.
- When cutting or opening holes on the panel after the Front-connecting Socket is mounted, take proper measures so that the cutting chips will not fall onto the Relay terminals. When cutting or opening holes on the upper part of the panel, mask the Front-connecting Socket properly with a cover.

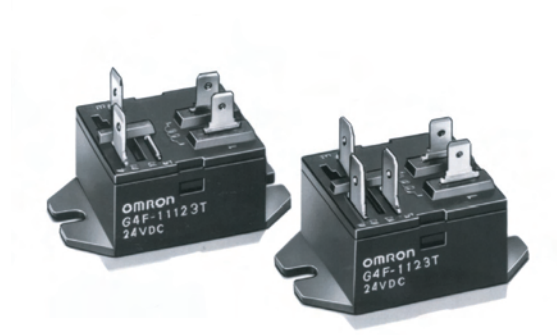
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J055-E1-04A

Power Relay
G4F

High-power Relay that Breaks 20 A, Carries 20 A, and Withstands 60-A Inrush

- Miniature, high-capacity power relay ideal for incorporation in non-industrial equipment to switch such loads as motor, transformer, lamp, heater, etc.
- Creepage distance of more than 4 mm.
- Nonflammable insulating materials employed meet UL94V-0



Ordering Information

Classification	Contact form	Coil terminal	Load contact terminal	Model
Standard model	**SPST-NO**	PCB terminal	Quick connect #250	G4F-11123T
	SPDT			G4F-1123T
UL/CSA approved model	**SPST-NO**			G4F-11123T-US
	SPDT			G4F-1123T-US
VDE/TÜV approved model	**SPST-NO**			G4F-11123T-TU
	SPDT			G4F-1123T-TU

Note: 1. When ordering, add the rated coil voltage to the model number
Example: G4F-1123T, 12 VDC
└── Rated coil voltage

Specifications

■ Coil Ratings

Voltage	Current	Resistance	Coil inductance (H) (ref. value)		Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
			Armature OFF	Armature ON	% of rated voltage			
12 VDC	75 mA	160 Ω	1.3	1.9	70% max.	10% min.	110%	0.9 W
24 VDC	37.5 mA	640 Ω	5.8	9.5				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerances of ±10%.
2. Performance characteristic data are measured at 23°C coil temperature.

■ Contact Ratings

Model	G4F-1123T(-US) (-TU)		G4F-11123T(-US) (-TU)	
Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4)	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 1)
Rated load	15 A at 220 VAC	10 A at 220 VAC	20 A at 220 VAC	15 A at 220 VAC
Max. inrush current	55 A		60 A	
Rated carry current	20 A			
Max. switching voltage	250 VAC			
Max. switching current	15 A		20 A	
Max. switching power	3,300 VA	2,200 VA	4,400 VA	3,300 VA
Failure rate (reference value)	100 mA at 5 VDC			

■ Characteristics

Contact resistance	30 mΩ max.
Operate time	20 ms max.
Release time	10 ms max.
Operating frequency	Mechanical: 18,000 operations/hour Electrical: 1,800 operations/hour (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 minute (1,000 VAC between contacts of same polarity)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 Malfunction: 200 m/s^2
Ambient temperature	Operating: –25°C to 55°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Endurance	Mechanical: 5,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical: 200,000 operations min. (at operating frequency of 1,800 operations/hour under rated load)
Weight	Approx. 40 g

Note: The data shown above are initial values.

■ Motor Load Ratings (Reference Only)

Model	Load conditions	Operating frequency	Electrical Endurance
G4F-1123T	110 VAC (cosϕ = 0.7) Inrush: 55 A (0.2 sec.) Break: 15 A	ON: 1 sec. OFF: 10 sec.	200 (X 10^3 operations min.)
G4F-11123T	110 VAC (cosϕ = 0.7) Inrush: 60 A (0.2 sec.) Break: 20 A		

■ Approved Standard

UL508 484 Recognitions (File No. E41643)

Model	Coil ratings	Contact ratings	Operations
G4F-( )-US	5 to 100 VDC	15 A, 250 VAC (Resistive) 15 A, 30 VDC (Resistive) 10 A, 250 VAC (General use)	6 x 10^3
		12 FLA 150 VAC, 72 LRA 150 VAC 10 FLA 240 VAC, 60 LRA 240 VAC	30 x 10^3

CSA C22.2 No. 14 (File No. LR 35535)

Model	Coil ratings	Contact ratings	Operations
G4F-( )-US	5 to 100 VDC	15 A, 250 VAC (Resistive) 15 A, 30 VDC (Resistive)	6 x 10^3
		1 HP 125/250 VAC (Motor load) TV-3 AC	25 x 10^3

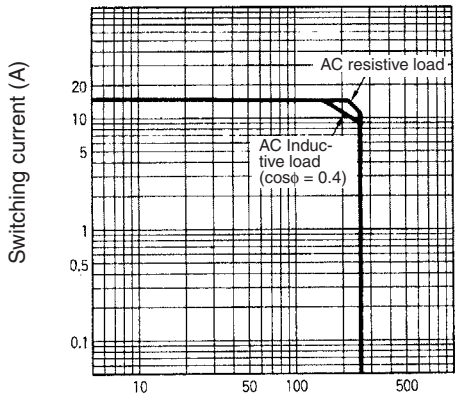
TÜV File No. R9151218 (IEC 255, EN 60335-1, VDE 0435)

Model	Coil ratings	Contact ratings	Operations
G4F-( )-TU	5 to 100 VDC	15 A, 250 VAC (cosϕ=1) 10 A, 250 VAC (cosϕ=0.4) 20 A, 250 VAC (cosϕ=1) 15 A, 250 VAC (cosϕ=0.4)	100 x 10^3

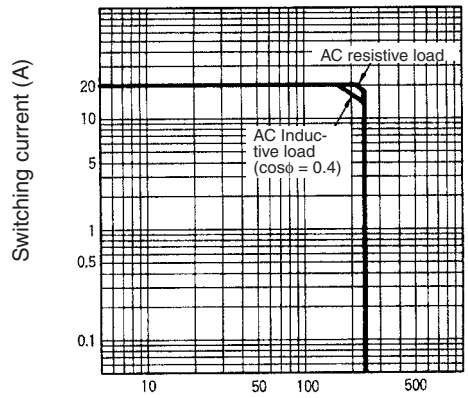
Engineering Data

Maximum Switching Power

G4F-1123T(-US) (-TU)

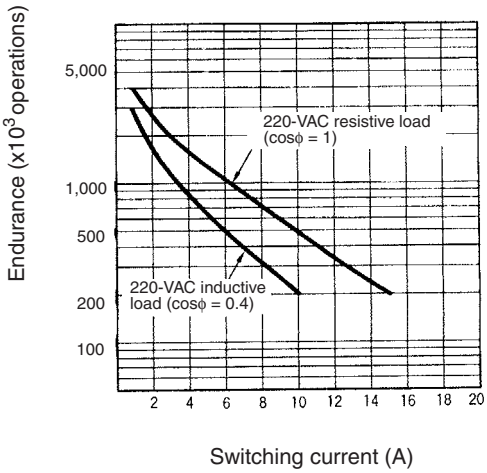


G4F-11123T(-US) (-TU)

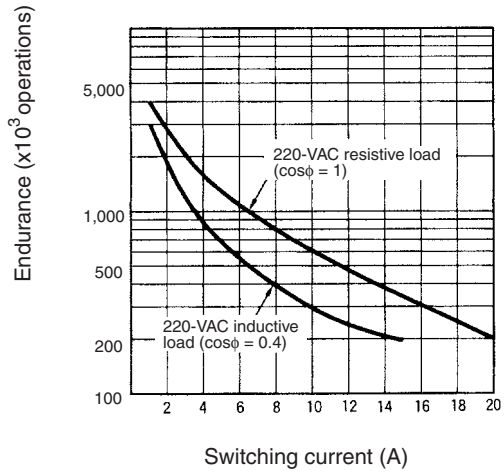


Electrical Endurance

G4F-1123T(-US) (-TU)



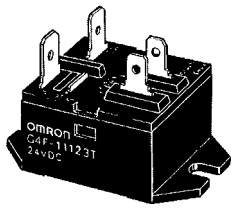
G4F-1112TP(-US) (-TU)

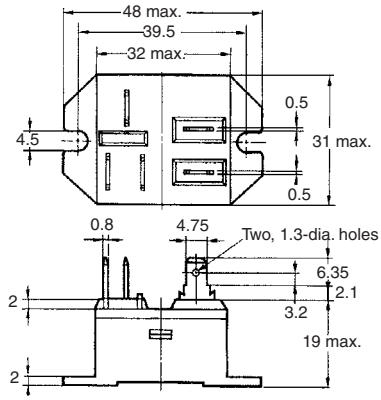


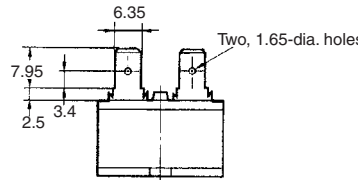
Dimensions

Note: All units are in millimeters unless otherwise indicated.

G4F-11123T(-US) (-TU)







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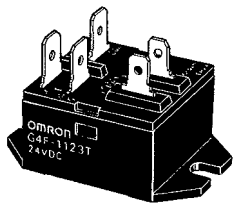
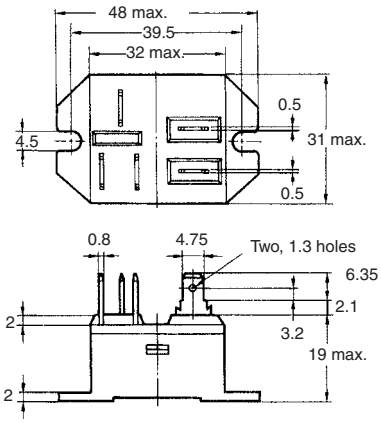
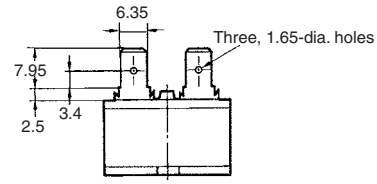
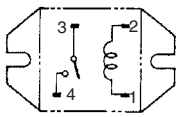




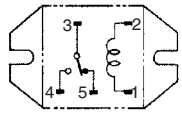


Terminal Arrangement/Internal Connections (Top View)

G4F-11123T(-US) (-TU)



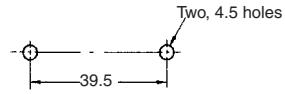
G4F-1123T(-US) (-TU)



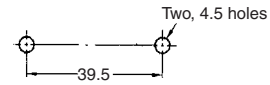
Note: This type has no polarity.

Mounting Holes

G4F-11123T(-US) (-TU)



G4F-1123T(-US) (-TU)



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J041-E1-06

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

Power Relay
G4B

High-power Relay that Breaks 15 A, Carries 20 A and Withstands 55-A Inrush

- Miniature, built-in use relay ideal for switching motor load, lamp load, heater, etc.
- Creepage distance of more than 2 mm.
- Upper mounting bracket type for easy wiring and mounting.

Ordering Information

Contact form	Load contact terminal	Coil terminal	Model
SPST-NO	Quick connect #250	Quick connect #110	G4B-112T-US
		Quick connect #187	G4B-112T1-US
		PCB board	G4B-112TP-US
SPDT		Quick connect #110	G4B-112T-C-US
		Quick connect #187	G4B-112T1-C-US
		PC board	G4B-112TP-C-US

Note: 1. When ordering, add the rated coil voltage listed below to the model number.
Example: G4B-112T-US, 100 VAC
Rated coil voltage

Specifications

■ Coil Ratings

Rated voltage		Rated current		Resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption (approx.)
		50 Hz	60 Hz		% of rated voltage			
AC	6 V	254 mA	217 mA	---	80% max.	30% min.	110%	1.3VA (60 Hz)
	12 V	126.5 mA	108 mA	---				
	24 V	63 mA	54 mA	---				
	50 V	30.5 mA	26 mA	---				
	100 V	15.2 mA	13 mA	---				
	120 V	12.6 mA	10.8 mA	---				
DC	6 V	200 mA		30 Ω		10% min.		1.2 W
	12 V	89 mA		135 Ω				
	24 V	50 mA		480 Ω				
	48 V	25 mA		1,920 Ω				
	100 V	12 mA		8,300 Ω				

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)	Inductive load (cosϕ = 0.4) (L/R = 7ms)
Rated load	15 A at 220 VAC 15 A at 24 VDC	10 A at 220 VAC 7 A at 24 VDC
Rated carry current	20 A	
Max. switching voltage	250 VAC 125 VDC	
Max. switching current	15 A	
Max. switching power	3,300 VA 360 W	2,200 VA 168 W
Failure rate (reference value)	100 mA at 5 VDC	

■ Characteristics

Contact resistance	30 mΩ max.
Operate time	20 ms max.
Release time	20 ms max.
Operating frequency	Mechanical: 18,000 operations/hour Electrical: 1,800 operations/hour (under rated load)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 minute (1,000 VAC between noncontinuous contacts)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)
Shock resistance	Mechanical: 1,000 m/s^2 Malfunction: 200 m/s^2
Ambient temperature	Operating: –10°C to 55°C (with no icing)
Ambient humidity	Operating: 5% to 85%
Endurance	Mechanical: 10,000,000 operations min. (at operating frequency of 18,000 operations/hour) Electrical: 200,000 operations min. (at operating frequency of 1,800 operations/hour under rated load)
Weight	Approx. 44 g

Note: The data shown above are initial values.

■ Actual Load Ratings (Reference Only)

Type of Load	Conditions	Endurance
AC motor	100 VAC (cosϕ=1) 600 W Inrush: 55 A Steady state: 15 A	100,000 operations min.

Note: The data shown above are based on the test for G4B-112T1.

■ Approved Standard

UL508 923 Recognitions (File No. E41643)

Model	Coil ratings	Contact ratings	Operations
G4B-( )-US	6 to 240 VAC 6 to 120 VDC	15 A, 28 VDC (Resistive) 15 A, 120 VAC (General use) 10 A, 240 VAC (General use) 1 HP, 120 VAC	6×10^3
		TV-5, 120 VAC	25×10^3

CSA C22.2 No. 14 (File No. LR31928)

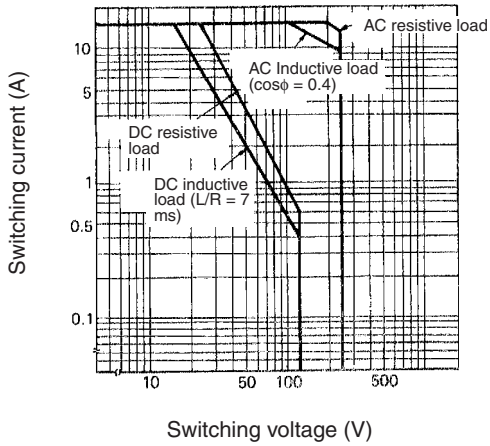
Model	Coil ratings	Contact ratings	Operations
G4B-( )-US	6 to 240 VAC 6 to 120 VDC	15 A, 28 VDC (Resistive) 15 A, 120 VAC (General use) 10 A, 240 VAC (General use) 1 HP, 120 VAC	6×10^3
		TV-5, 120 VAC	25×10^3

TÜV (File No. R9650822, VDE0435)

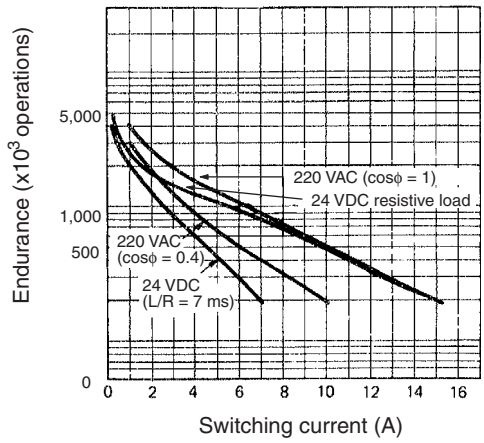
Model	Coil ratings	Contact ratings	Operations
G4B-( )	5, 6, 9, 12, 24, 48, 100, 110, 120 VDC 6, 12, 24, 100, 120, 200, 220 VAC	15 A, 250 VAC (cosϕ=1.0) 10 A, 250 VAC (cosϕ=0.4)	200×10^3

Engineering Data

Maximum Switching Power



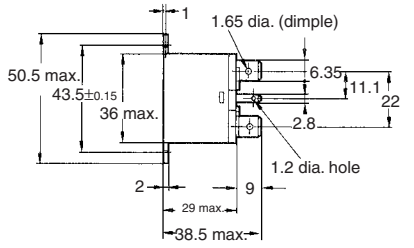
Electrical Endurance



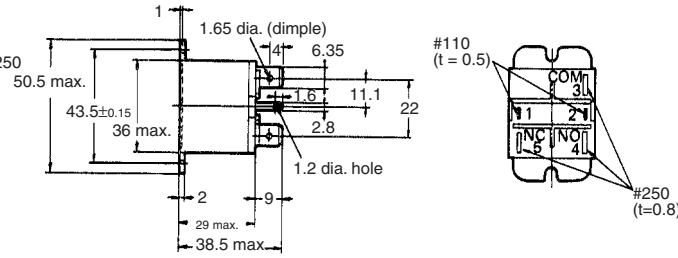
Dimensions

Note: All units are in millimeters unless otherwise indicated.

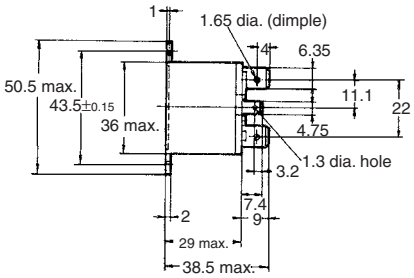
G4B-112T-US



G4B-112T-C-US



G4B-112T1-US



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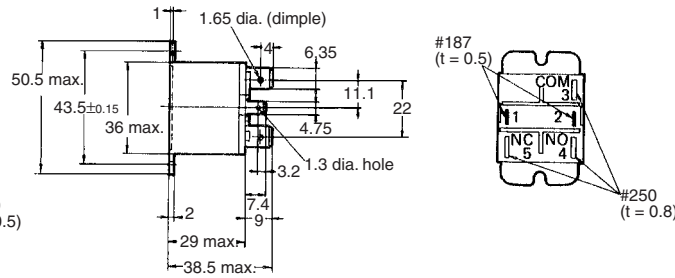
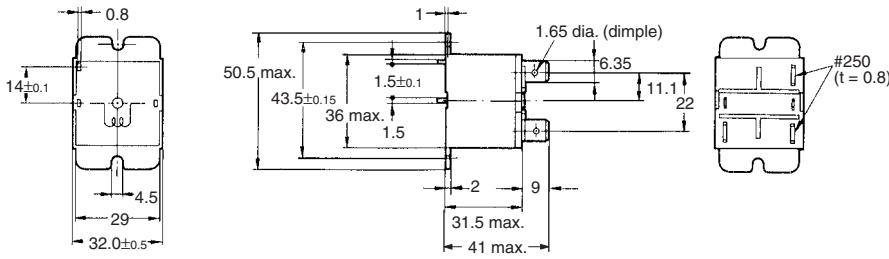


G4B-112TP-US



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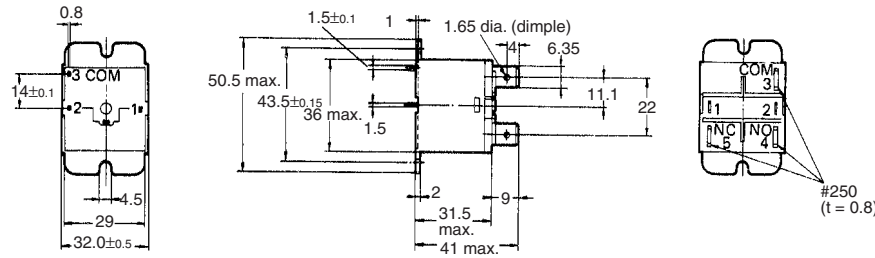
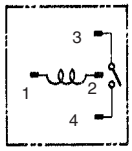


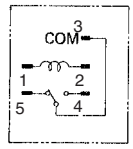
Terminal Arrangement/Internal Connections

G4B-112T-US
G4B-112T1-US



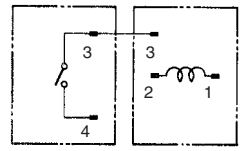
(Top View)

G4B-112T-C-US
G4B-112T1-C-US



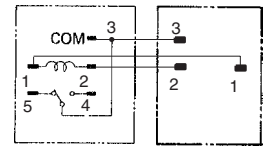
(Top View)

G4B-112TP-US



(Top View) (Bottom View)

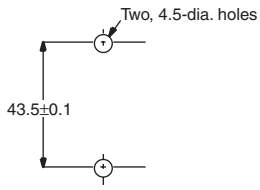
G4B-112TP-C



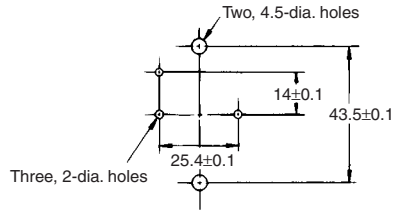
(Top View) (Bottom View)

Mounting Holes (bottom view)

G4B-112T(-C)-US
G4B-112T1(-C)-US



G4B-112TP(-C)-US



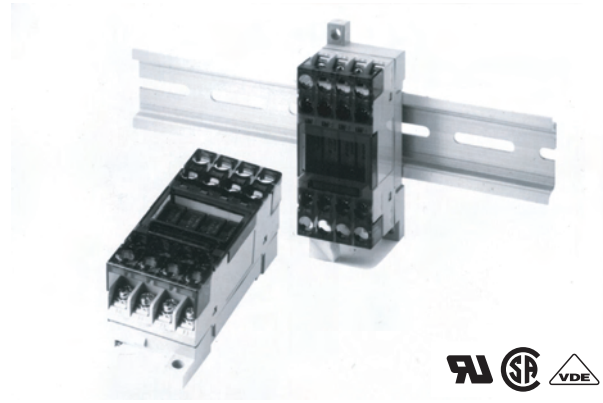
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J038-E1-04

Terminal Relay

G6D-F4B/G3DZ-F4B

Easy-to-use, Space-saving Terminal Relay with Four-point Output



- Almost the same size as PYF Socket: 31 x 35 x 68 mm (W x H x D)
- Each terminal circuit (with coil or contact) is independent from one another.
- Short Bar ensures easy connection of common and adjacent terminals.
- Provided with a terminal cover that prevents electric-shock accidents.
- Relay and MOS FET relay models are available.
- LED operation indicator.
- Built-in diode absorbs coil surge.
- Mounts either on DIN track or screws.
- Tool for easy mounting or removal of Relays provided.

Model Number Structure

■ Model Number Legend

G6D/G3DZ-□□
1 2

1. Terminal Form
F: Flat type

2. Number of Relays Mounted
4B: 4

Ordering Information

■ List of Models

Output	Contact configuration	Terminals	Rated coil voltage	Model
Relay output	SPST-NO × 4	Phillips head screw terminal	12 VDC	G6D-F4B
			24 VDC	
Power MOS FET relay output			12 VDC	G3DZ-F4B
			24 VDC	

Note: When ordering add the rated coil voltage to the model number.
Example: G6D-F4B 24 VDC
Rated coil voltage

Specifications

■ Ratings

Coil Ratings (per G6D Relay)

Rated voltage	Rated current	Coil resistance	Must operate voltage	Must release voltage	Max. voltage	Power consumption
12 VDC	18.7 mA	720 Ω	70% max. (see note 1)	10% min.	130%	Approx. 200 mW
24 VDC	10.5 mA	2,880 Ω				

Note: 1. The must operate voltage is 75% or less of the rated voltage if the Relay is mounted upside down.
2. Rated current and coil resistance were measured at a coil temperature of 23°C with a tolerance of ±10%.
3. Operating characteristics were measured at a coil temperature of 23°C.
4. The maximum allowable voltage is the maximum value of the allowable voltage range for the relay coil operating power supply. There is no continuous allowance.
5. The rated current includes the terminal's LED current.

Contact Ratings (per G6D Relay)

Item	Resistive load (cosϕ = 1)
Rated load	3 A at 250 VAC, 3 A at 30 VDC
Rated carry current	5 A
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A
Max. permissible capacity (reference value)	1,250 VA, 150 W
Error rate (reference value) (see note)	5 VDC, 10 mA

Note: This value is for a switching frequency of 120 times per minute.

■ Power MOS FET Relay Specifications

Input (per G3DZ Power MOS FET Relay)

Rated voltage	Operating voltage	Must operate voltage level	Must release voltage level	Input impedance	Rated current
12 VDC	9.6 to 14.4 VDC	9.6 VDC max.	1 VDC min.	2 kΩ±20%	8.0 mA±20%
24 VDC	19.2 to 28.8 VDC	19.2 VDC max.		4 kΩ±20%	8.2 mA±20%

Note: The rated current includes the terminal's LED current.

Output (per G3DZ Power MOS FET Relay)

Load voltage	Load current	Inrush current
3 to 264 VAC 3 to 125 VDC	100 μ to 0.3 A	6 A (10 ms)

■ Characteristics

Item	G6D-F4B
	Relay output
Contact resistance (see note 2)	100 mΩ max.
Must operate time (see note 3)	10 ms max.
Release time (see note 3)	10 ms max.
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between coil and contacts.
	1,500 VAC, 50/60 Hz for 1 min between contacts of different polarity
	750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage (between coil and contacts)	4,000 V (1.2 × 50 μs)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)
Shock resistance	Destruction: 500 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 20,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (3 A at 250 VAC, resistive load) 100,000 operations min. (3 A at 30 VDC, resistive load) (at 1,800 operations /hr)
Ambient temperature	Operating: –25°C to 55°C (with no icing)
Ambient humidity	Operating: 45% to 85%
Weight	Approx. 65 g

Note: 1. The above values are initial values.

2. Measurement condition: 1 A at 5 VDC

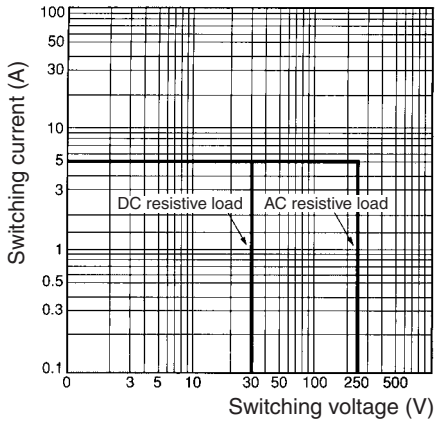
3. Ambient temperature condition: 23°C

Item	G3DZ-F4B
	Power MOS FET relay output
Must operate time	10 ms max.
Release time	15 ms max.
Output ON-resistance	2.4 Ω max.
Leakage current at OFF state	10 μA max. (at 125 VDC)
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between input and output terminals
	1,500 VAC, 50/60 Hz for 1 min between contacts of different polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)
Shock resistance	Destruction: 500 m/s^2
Ambient temperature	Operating: –25°C to 55°C (with no icing)
Ambient humidity	Operating: 45% to 85%
Weight	Approx. 65 g

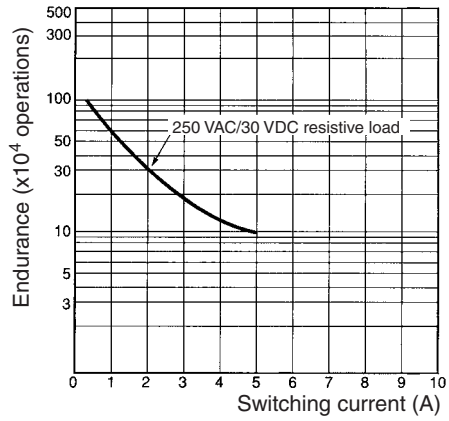
Engineering Data

■ Maximum Switching Power

G6D-F4B

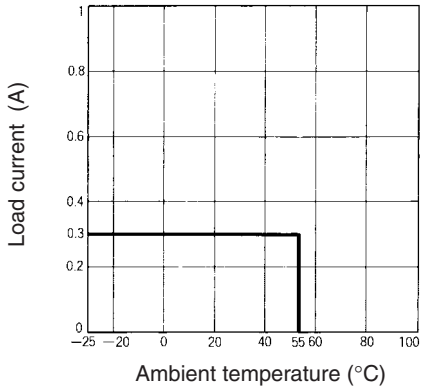


■ Endurance



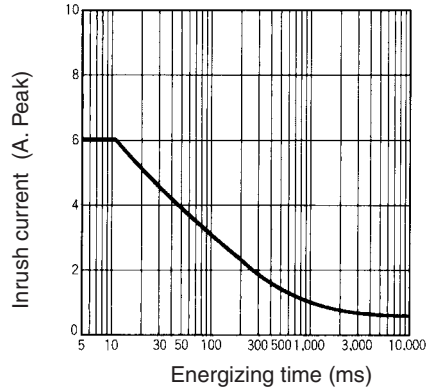
■ Load Current vs. Ambient Temperature

G3DZ-F4B



■ Inrush Current Resistivity: Non-repetitive

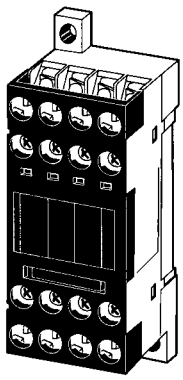
Keep the inrush current to half the rated value if it occurs repetitively.

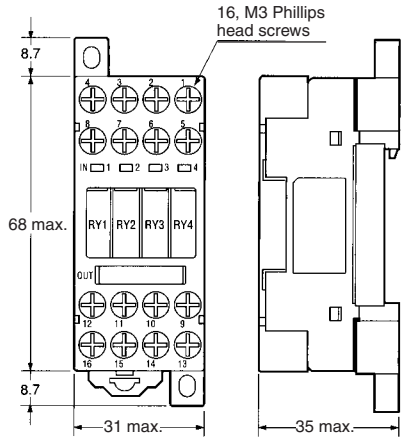


Dimensions

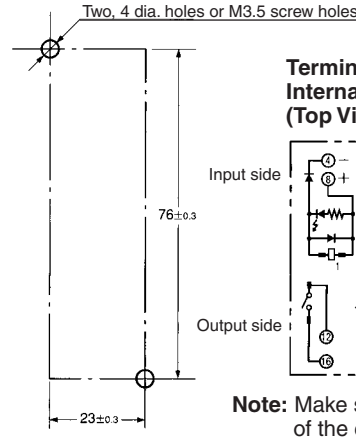
Note: All units are in millimeters unless otherwise indicated.

G6D-F4B
G3DZ-F4B

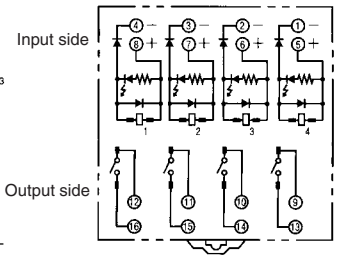




Mounting Dimensions



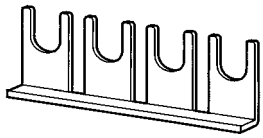
Terminal Arrangement/ Internal Connections (Top View)

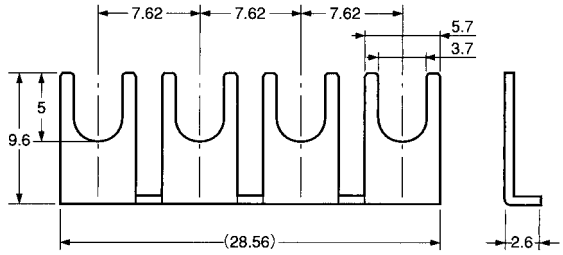


Note: Make sure that the polarity of the coil is correct.

■ Accessories (Order Separately)

G6D-4-SB Short Bar





Applicable model	Model
G6D-F4B	G6D-4-SB
G3DZ-F4B	

Relay Mounting Products

Name	Model
Mounting track	PFP-100N
	PFP-50N
	PFP-100N2
End plate	PFP-M
Spacer	PFP-S

Short Bar

Applicable Terminal Relay	Model
G6D-F4B	G6D-4-SB
G3DZ-F4B	

Replacement Relays

Applicable Terminal Relay	Rated voltage	Model
G6D-F4B	12 VDC	G6D-1A (see note)
	24 VDC	
	12 VDC	G6D-1A-AP (see note)
	24 VDC	
G3DZ-F4B	12 VDC	G3DZ-2R6PL
	24 VDC	

Note: Error rate (P level) for the G6D-1A is 5 V at 10 mA and that for the G6D-1A-AP is 5 V at 1 mA.

Precautions

Wiring

Be sure to turn OFF the power when wiring the Unit and do not touch the charged terminals of the Unit. Otherwise, an electric shock may result.

Do not apply overvoltage to the input terminals. Otherwise, the Unit may malfunction or burn.

Relay Models

Do not connect the Unit to loads exceeding the rated switching power (switching voltage or current). Otherwise, faulty insulation, contact weld, or faulty contact of Relays, or damage to Relays may result, or the Relays may malfunction or burn.

The life of Relays varies with the switching condition. Test the Relays under the actual operating conditions before using the Relays within the permissible switching frequency. The use of deteriorated Relays may result in the faulty insulation of the Relays or cause the Relays to burn.

Do not use the Unit in locations with inflammable gas. Otherwise, a fire or explosion due to the heat of the Relays or sparks from the Relays may result when they are switched.

SSR Output (Power MOS FET Relay Model)

Do not connect the Unit to loads consuming a total current exceeding the rated output current of the Unit. Otherwise, the output element of the Unit may be damaged and a short or open-circuit malfunction may result.

If the Unit is connected to a DC inductive load, connect a diode to the Unit to protect the Unit from counter-electromotive voltage, otherwise the counter-electromotive voltage may damage the output element and a short or open-circuit malfunction may result.

■ Correct Use

Mounting

When mounting two or more Units, reduce the current and ON duty and provide an appropriate distance between the Units so that the ambient temperature will not exceed 55°C.

Relay Replacement

Use the Relay Removal Tool provided with the Unit to dismount a Relay.

Be sure to turn OFF the power to the Unit before replacing a Relay.

When mounting a Relay, insert the Relay vertically so that the relay terminals will come in contact with the socket contact pins properly.

Do not mount Relays that are different to one another in voltage.

Wiring

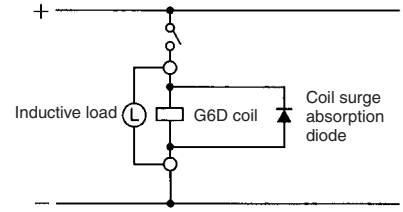
Pay utmost attention not to make mistakes with the polarity of the input terminals.

Coil Voltage

Make sure not to impose voltage exceeding the permissible voltage on the coil continuously.

Do not connect any inductive load in parallel to the coil input as shown in the following example or power supply with a surge voltage. Otherwise, the surge absorption diode will be damaged.

Do Not Use the Following Circuit



Handling

Do not drop, shock, or vibrate the Unit excessively. Otherwise, damage to the Unit may result or the Unit may malfunction.

Make sure that all the Relays are properly mounted before use.

Screw Tightening Torque

Tighten each terminal screw to a torque of 0.78 to 1.18N·m.

Tighten each mounting screw to a torque of 0.59 to 0.98 N·m.

Installation Environment

Do not install the Unit in the following locations. Otherwise, damage to the Unit may result or the Unit may malfunction.

Locations with direct sunlight.

Locations with an ambient temperature range not within –25°C to 55°C.

Locations with rapid temperature changes resulting in condensation or locations with relative humidity ranges not within 45% to 85%.

Locations with corrosive or inflammable gas.

Locations with excessive dust, salinity, or metal powder.

Locations with vibration or shock affecting the Unit.

Locations with water, oil, or chemical sprayed on the Unit.

Disassembly, Repair, and Modification

Do not disassemble, repair, or modify the Unit. Otherwise, an electric shock may result or the Unit may malfunction.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

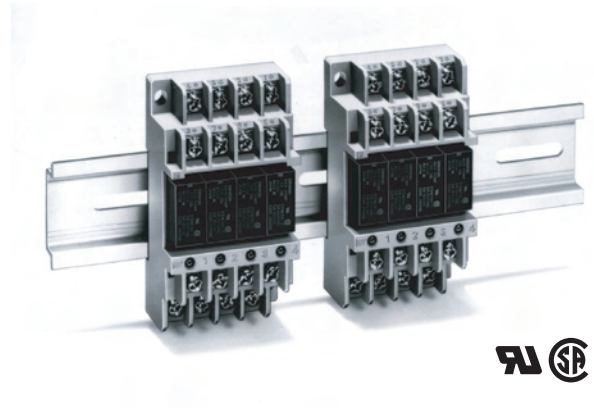
Cat. No. J115-E1-02

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

Terminal Relay
G6B-4□□ND

Compact Terminal Relay with 4 Independent Outputs

- Equipped with four G6B Mini-relays that are compact, highly sensitive, and highly resistant to dielectric surges, and that can switch 5 amps of power.
- Sealed plastic construction used for relays.
- Easy wiring with separated input/output terminals.
- Special P6B Mounting Socket used to facilitate maintenance (except for high-reliability models).
- Standard models meet UL508 and CSA requirements.
- DIN Track mounting, and screw mounting models are available.



Model Number Structure

■ Model Number Legend

G6B-□□□□ND
1 2 3

Note: UL508 and CSA requirements met by standard models.

1. Number of Poles
- 4: 4 poles (4PST-NO standard circuit)
- 47: 4 poles (4PST-NO long-life circuit)
- 48: 4 poles (4PST-NO high-reliability circuit)

2. Mounting
- None: DIN Track or screw mounting
- F: Screw mounting

3. Input Terminal
- B: Phillips screw (3.5 mm) terminals (4 independent points)
- B1: Flat-bladed screw terminals (4 points with same common)
- P: Connector terminals (4 independent points)

Ordering Information

■ List of Models

Classification	Contact form	Mounting method	Terminals	Rated voltage	Model
Equipped with operation indicator and diode to absorb coil surge	4PST (standard)	DIN Track or screw mounting	Phillips screw terminal	5 VDC 12 VDC 24 VDC	G6B-4BND
	4PST (long-life)	DIN Track or screw mounting	Phillips screw terminal	5 VDC 12 VDC 24 VDC	G6B-47BND
	4PST (high reliability)	DIN Track or screw mounting	Phillips screw terminal	5 VDC 12 VDC 24 VDC	G6B-48BND
	4PST (standard)	Screw mounting	Flat-bladed screw terminal	5 VDC 12 VDC 24 VDC	G6B-4FB1ND
	4PST (standard)	Screw mounting	Connector	5 VDC 12 VDC 24 VDC	G6B-4FPND

Note: 1. For replacement relays, use relays with the same voltage specifications as the relays provided with the Terminal when it was purchased. Longer operating life can be achieved by replacing the G6B-4□□ND with the G6B-1147P-FD-US.

2. Standard models are also available without relays mounted to the sockets. To obtain such terminals, replace the "G6B" portion of the model number with "P6BF." For example, to order G6B-4BND with empty sockets, use model number P6BF-4BND. Also specify voltage specifications for models with operation indicators.

Specifications

■ Ratings

Coil Ratings (per G6B Relay)

Rated voltage	5 VDC	12 VDC	24 VDC
Rated current	35.5 mA	19.1 mA	10.7 mA
Coil resistance	125 Ω	720 Ω	2,880 Ω
Must operate voltage	80% max. of rated voltage		
Must release voltage	10% min. of rated voltage		
Max. voltage	130% of rated voltage		
Power consumption	Approx. 200 mW		

Note: 1. Rated current and coil resistance were measured at a coil temperature of 23°C with a tolerance of ±20%.

2. Operating characteristics were measured at a coil temperature of 23°C.

3. The maximum allowable voltage is the maximum value of the allowable voltage range for the relay coil operating power supply. There is no continuous allowance.

4. Diodes to absorb coil surge are equivalent to S5688J (reverse voltage resistance: 600 V; forward current: 1 A).

Contact Ratings

Classification	G6B-4BND (standard), G6B-47BND (long-life)		G6B-48BND (high-reliability)	
Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4, L/R = 7 ms)	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4, L/R = 7 ms)
Rated load	5 A at 250 VAC, 5 A at 30 VDC	2 A at 250 VAC, 2 A at 30 VDC	2 A at 250 VAC, 2 A at 30 VDC	0.5 A at 250 VAC, 0.5 A at 30 VDC
Rated carry current	5 A		2 A	
Max. switching voltage	380 VAC, 125 VDC			
Max. switching current	5 A		2 A	
Max. switching power	1,250 VA, 150 W	500 VA, 60 W	500 VA, 60 W	125 VA, 15 W
Error rate (reference value) (see note)	10 mA at 5 VDC		1 mA at 1 VDC	

Note: This value fulfills the P reference value of opening/closing at a rate of 120 times per min (ambient operating environment and determination criteria according to JIS C5442).

■ Characteristics

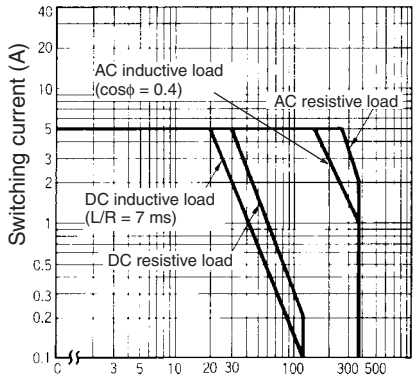
Contact resistance (see note 2)	100 mΩ max.
Operate time	10 ms max. (approx. 3 ms)
Release time	15 ms max. (approx. 4 ms)
Switching power	Mechanical: 18,000 operations/hr Rated load: 1,800 operations/hr
Insulation resistance	1,000 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between coil and contacts 2,000 VAC, 50/60 Hz for 1 min between contacts of different polarity 1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity 250 VAC, 50/60 Hz for 1 min between coils of different polarity
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5-mm double amplitude)
Shock resistance	Destruction: 1,000 m/s^2 (approx. 100G) Malfunction: 100 m/s^2 (approx. 10G)
Endurance	Mechanical: 50,000,000 operations min. (at 18,000 operations/hr) Electrical: 100,000 operations min. (at 1,800 operations/hr, rated load) 500,000 operations min. for long-life at 2 A 100,000 operations min for long-life at 5 A
Ambient temperature	Operating: –25°C to 55°C (with no icing or condensation) Storage: –25°C to 55°C (with no icing or condensation)
Ambient humidity	Operating: 35% to 85%
Weight	Approx. 75 g

Note: 1. The above values are initial values.

2. Measurement condition: 1 A at 5 VDC

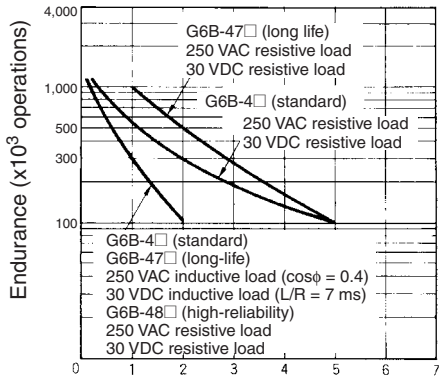
Engineering Data

■ Maximum Switching Power



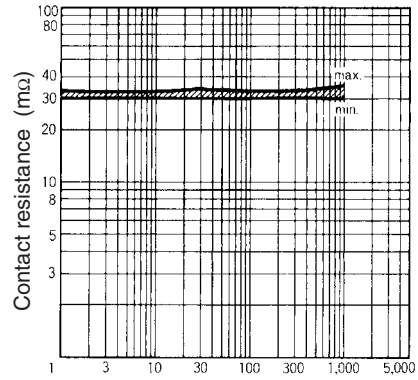
Switching voltage (V)

■ Endurance



Switching current (A)

■ Contact Reliability (High-reliability Models)



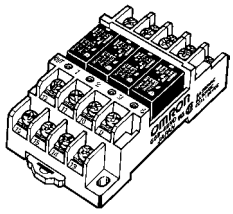
Number of switching operations
($\times 10^4$ times)

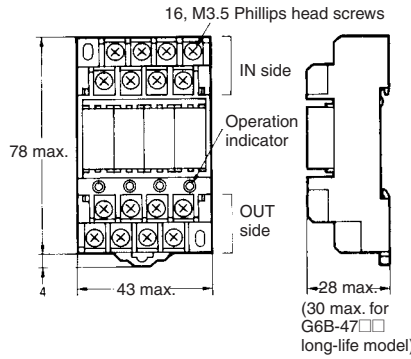
Dimensions

Note: All units are in millimeters unless otherwise indicated.

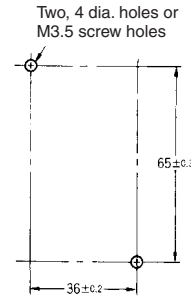
Philip Screw Terminals

G6B-4BND
G6B-47BND
G6B-48BND
Note: G6B-4BND is shown in illustration (terminal numbers are incised).

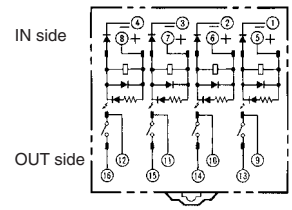




Mounting Holes



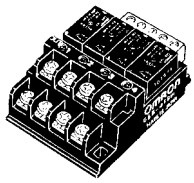
Terminal Arrangement/ Internal Connections (Top View)

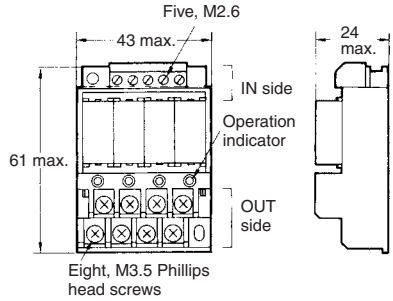


Note: Do not reverse the coil polarity.

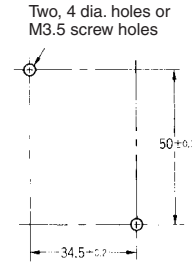
Flat Screw Terminal

G6B-4FB1ND

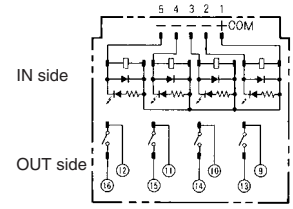




Mounting Holes



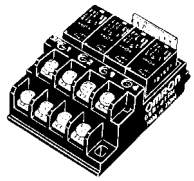
Terminal Arrangement/ Internal Connections (Top View)

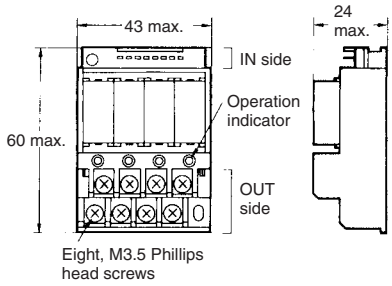


Note: Do not reverse the coil polarity.

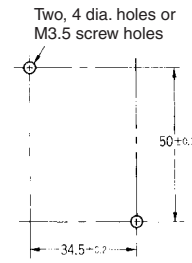
Connector Terminal

G6B-4FPND

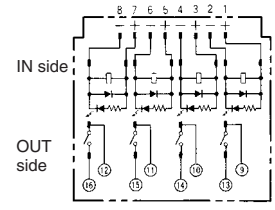




Mounting Holes



Terminal Arrangement/ Internal Connections (Top View)



Note: Do not reverse the coil polarity.

■ Accessories (Order Separately)

Replacement Relays

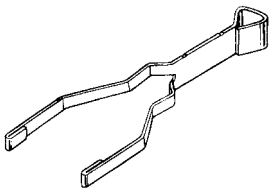
Applicable terminal relay	Rated voltage	Model
G6B-4BND	5 VDC 12 VDC 24 VDC	G6B-1114P-FD-US
G6B-47BND	5 VDC 12 VDC 24 VDC	G6B-1174P-FD-US

Note: Relays cannot be replaced for G6B-48BND, which is mounted directly to boards.

Relay Mounting Products

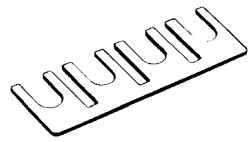
Name	Model
Relay Removal Tool	P6B-Y1
Short Bars	G6B-4-SB
Mounting Track	PFP-100N
	PFP-50N
	PFP-100N2
End Plate	PFP-M
Spacer	PFP-S

P6B-Y1 Relay Removal Tool

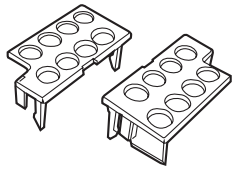


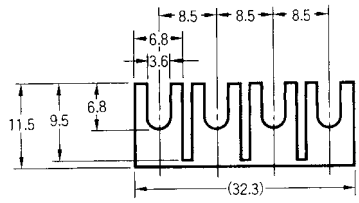
G6B-4-SB Short Bars

Short Bars are used to wire crossovers for common terminals for coils or contacts.



G6B-4-C Terminal Covers (Two per set)





Precautions

Wiring

Be sure to turn OFF the power when wiring the Unit and do not touch the charged terminals of the Unit. Otherwise, an electric shock may result.

Do not apply overvoltage to the input terminals. Otherwise, the Unit may malfunction or burn.

Relay Models

Do not connect the Unit to loads exceeding the rated switching power (switching voltage or current). Otherwise, faulty insulation, contact weld, or faulty contact of Relays, or damage to Relays may result, or the Relays may malfunction or burn.

The life of Relays varies with the switching condition. Test the Relays under the actual operating conditions before using the Relays within the permissible switching frequency. The use of deteriorated Relays may result in the faulty insulation of the Relays or cause the Relays to burn.

Do not use the Unit in locations with inflammable gas. Otherwise, a fire or explosion due to the heat of the Relays or sparks from the Relays may result when they are switched.

■ Correct Use

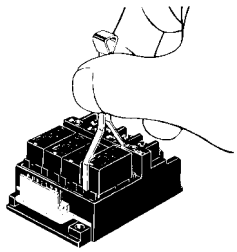
Mounting

Heat generated by the relays must be considered when gang-mounting. Space must be provided between the relays or other methods must be taken to maintain the relays' ambient temperature at 55 °C or lower.

Replacement of Relays

G6B-4□□ND

Use the P6B-Y1 Removal Tool as shown in the following diagram.



Be sure to turn OFF the power to the Unit before replacing a Relay.

Relays must be inserted straight onto the socket connector pins to ensure proper connection.

G6B-48BND models (high reliability) are connected directly to boards to increase reliability and the relays are thus not replaceable. If relay replacement is necessary, use the P6BF-4BND Terminal Sockets together with the G6B-1184P Mini Relays. P6BF-4BND Terminal Sockets are equipped with relay replacement sockets.

Do not mount Relays that are different to one another in voltage.

Relays Mounted

G6B-4□□ND standard: G6B-1114P-FD-US
G6B-4□□ND long life: G6B-1174P-FD
G6B-4□□ND high reliability: G6B-1184P-US
Replacement is not possible for G6B-48BND.

Wiring

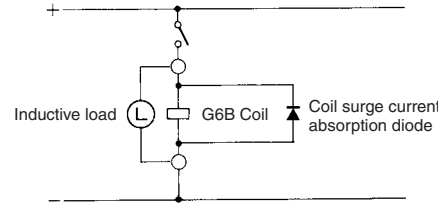
Be sure to connect the input terminals with the correct polarity.

Coil Voltage

Be sure not to impose voltage exceeding the permissible voltage on the coil continuously.

Do not use the relays when other inductive loads are connected in parallel with the coil input or when there are surges during power supply because the built-in diodes used to absorb surge may be destroyed.

Do Not Use the Following Circuit



Handling

Do not drop, shock, or vibrate the Unit excessively. Otherwise, damage to the Unit may result or the Unit may malfunction.

Make sure that all the Relays are properly mounted before use.

Screw Tightening Torque

Tighten each terminal screw to a torque of 0.78 to 1.18N·m.

Tighten each mounting screw to a torque of 0.59 to 0.98 N·m.

Installation Environment

Do not install the Unit in the following locations. Otherwise, damage to the Unit may result or the Unit may malfunction.

Locations with direct sunlight.

Locations with an ambient temperature range not within 0°C to 55°C.

Locations with rapid temperature changes resulting in condensation or locations with relative humidity ranges not within 10% to 90%.

Locations with corrosive or inflammable gas.

Locations with excessive dust, salinity, or metal powder.

Locations with vibration or shock affecting the Unit.

Locations with water, oil, or chemical sprayed on the Unit.

Disassembly, Repair, and Modification

Do not disassemble, repair, or modify the Unit. Otherwise, an electric shock may result or the Unit may malfunction.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

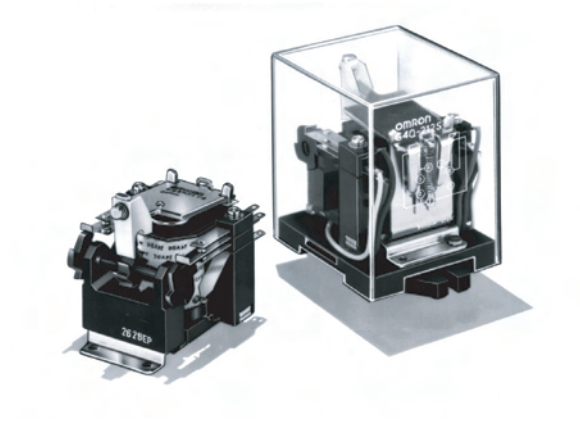
Cat. No. J098-E1-02A

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

Ratchet Relay
G4Q

Unique Ratchet Mechanism Assures Positive Alternate Transfer/Switching Operation

- Each contact in the double-pole contact mechanism performs alternate make-brake operation at each pulse input and is thus ideal for alternate operation or transfer/switching operation of a motor.
- Positive operation is assured due to the unique ratchet mechanism.
- Satisfies dielectric strength of 2,000 VAC.
- Low power consumption.
  (AC: approx. 6.4 VA; DC: approx. 3.9 W)



Ordering Information

Open Models

Item	DPDT	
	Rated voltage (V)	Model
Basic model	6 VAC	G4Q-211A
	12 VAC	
	24 VAC	
	50 VAC	
	100/(110) VAC	
	200/(220) VAC	
	6 VDC	
	12 VDC	
	24 VDC	
	48 VDC	
	100 VDC	
	200 VDC	

Plug-in Models

Item	DPDT	
	Rated voltage (V)	Model
Basic model	6 VAC	G4Q-212S
	12 VAC	
	24 VAC	
	50 VAC	
	100/(110) VAC	
	200/(220) VAC	
	6 VDC	
	12 VDC	
	24 VDC	
	48 VDC	
	100 VDC	
	200 VDC	

Note: When ordering, add the rated coil voltage (listed in *Specifications*) to the model number.
Example: G4Q-211A, 24 VAC
Rated coil voltage

Model Number Legend

G4Q-□□□□
1 2 3 4

1. Contact Form
2: DPDT

2. Contact Type
1: Single

3. Enclosure Construction
1: No casing
2: Casing

4. Terminal Shape
A: Solder
S: Plug-in

■ Accessories (Order Separately)

DIN track/Front-connecting Socket	Back-connecting Socket
Screw terminal	Solder terminal
8PFA1	PL08

Specifications

■ Coil Ratings

Item		Current (mA)		Resistance (Ω)	Must operate	Must release	Max. voltage	Power consumption	
Rated voltage (V)		50 Hz	60 Hz		% of rated voltage			Initial	Rated
AC	6	1,233	1,067	0.54	80 % max.	10 % min.	110 % max.	Approx. 13.5 VA	Approx. 6.4 VA
	12	614	531	2.24					
	24	307	266	8.7					
	50	148	128	42.7					
	100/ (110)	74	64/73.5	160					
	200/ (220)	37	32/36.8	671					

Item		Current (mA)		Resistance (Ω)	Must operate	Must release	Max. voltage	Power consumption
Rated voltage (V)		50 Hz	60 Hz		% of rated voltage			
DC	6	640		9.4	5 % min.			Approx. 3.9 W
	12	320		37.5				
	24	155		155				
	48	80		600				
	100	39		2,580				
	200	19.2		10,400				

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of +15%/–20% for AC rated current and ±15% for DC coil resistance.

2. The AC coil resistance values are for reference only.

3. Performance characteristic data is measured at a coil temperature of 23°C.

4. The maximum voltage is one that is applicable instantaneously to the Relay coil at an ambient temperature of 23°C and not continuously.

5. The AC power consumption is measured at 60 Hz.

■ Contact Ratings

Load	Resistive load ($\cos\phi$ = 1)	Inductive load ($\cos\phi$ = 0.4) (L/R = 7 ms)
Contact mechanism	Single	
Contact material	Silver alloy	
Rated load	5 A at 220 VAC, 5 A at 24 VDC	3 A at 220 VAC, 4 A at 24 VDC
Rated carry current	5 A	
Max. switching voltage	250 VAC, 250 VDC	
Max. switching current	5 A	

■ Characteristics

Contact resistance (See note 2.)	50 mΩ max.
Operate time (See note 3.)	60 ms max.
Max. operating frequency	Mechanical: 1,200 operations/hr Electrical: 1,200 operations/hr (under rated load)
Insulation resistance (See note 4.)	100 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between coil and contact (1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity) (2,000 VAC between contacts of different polarities)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.5 mm single amplitude (1.0 mm double amplitude)
Shock resistance	Destruction: 500 m/s^2 Malfunction: 100 m/s^2
Endurance	Mechanical: 5,000,000 operations min. (at operating frequency of 1,200 operations/hr) Electrical: 500,000 operations min. (under rated load and at operating frequency of 1,200 operations/hr) (See note 5.)
Error rate (See note 6.)	1 A at 5 VDC (0.1 A at 5 VDC)
Ambient temperature	Operating: –10°C to 55°C (with no icing or no condensation)
Ambient humidity	Operating: 5% to 85%
Weight	Open model: Approx. 240 g; cased model: Approx. 340 g

Note: 1. The data shown above are initial values.

2. The contact resistance was measured with 0.1 A at 5 VDC using the voltage drop method.

3. The operate time was measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

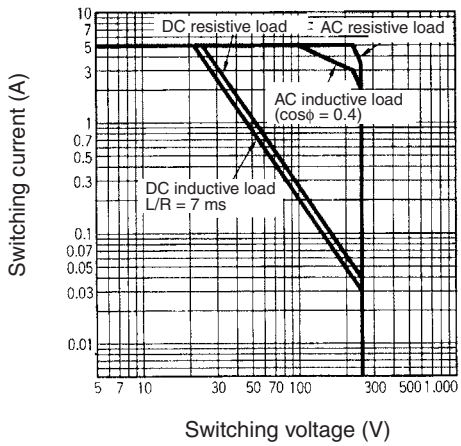
4. The insulation resistance was measured with a 500-VDC megger applied to the same places as those used for checking the dielectric strength.

5. The electrical endurance was measured at an ambient temperature of 23°C.

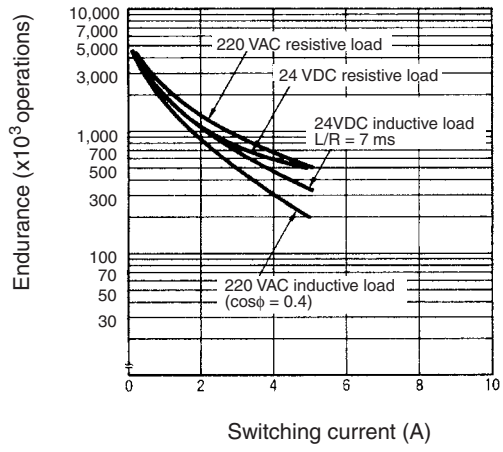
6. This value was measured at a switching frequency of 60 operations per minute. The value in parentheses is for the cased model.

Engineering Data

Maximum Switching Power

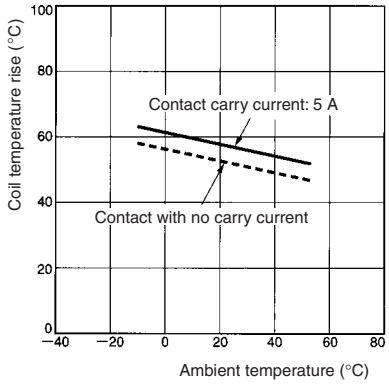


Electrical Endurance

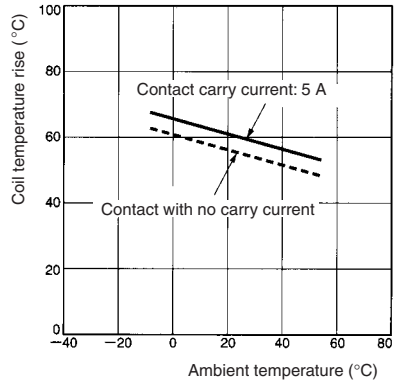


Ambient Temperature vs. Coil Temperature Rise

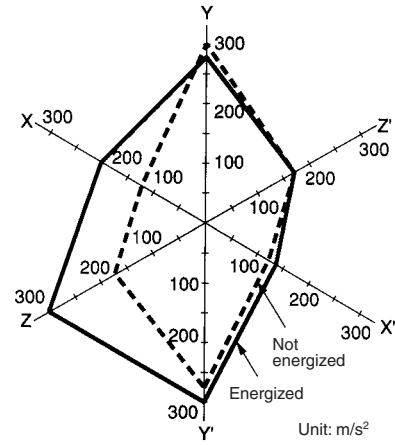
100 VAC 50 Hz



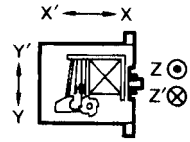
24 VDC



Malfunctioning Shock



Shock direction

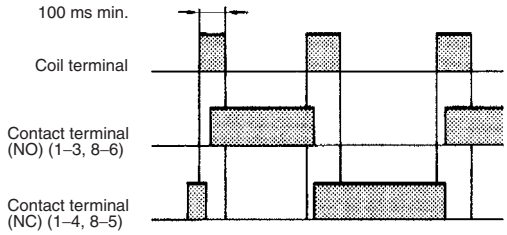


Number of samples: 5

Measurement conditions: Impose a shock of 100 m/s² in the ±X, ±Y, and ±Z directions three times each with the Relay energized and not energized to check the shock values that cause the Relay to malfunction.

Operation

Operation Timing Chart



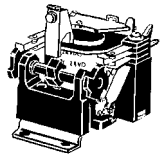
Note: When a pulse for application to the coil is used, such a pulse should have a width of 100 ms or more. If a pulse is applied with a width less than the operate time, the cam may fail to rotate fully.

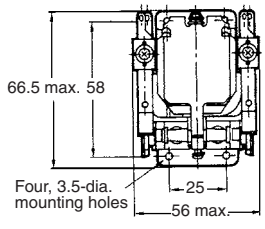
Dimensions

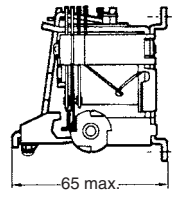
Note: All units are in millimeters unless otherwise indicated.

Open Model

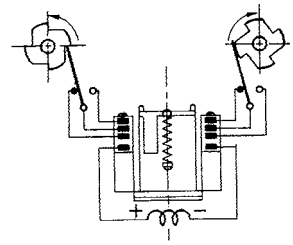
G4Q-211A



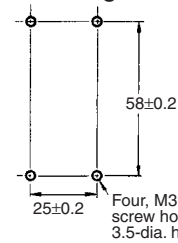




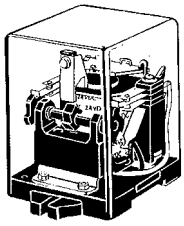
Terminal Arrangement/ Internal Connections

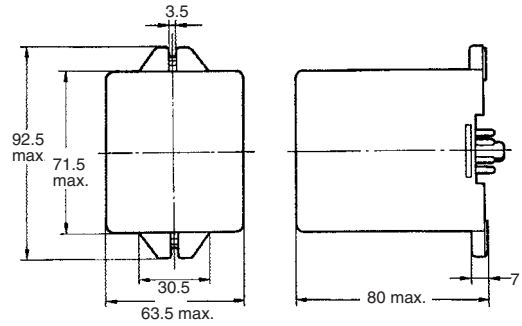


Mounting Holes

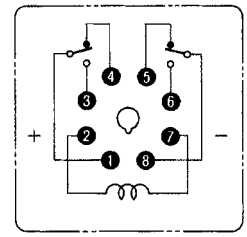


Plug-in Terminal Model
G4Q-212S



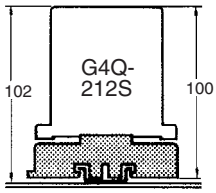


Terminal Arrangement/ Internal Connections
(Bottom view)



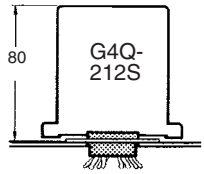
Relay Mounting Height with Socket

With Front-connecting Socket



8PFA1

With Back-connecting Socket



PL08

Precautions

Refer to page 11 for general precautions.

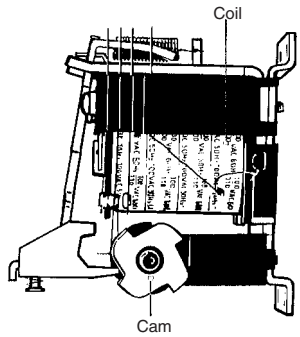
■ Surface Mounting Socket

Be sure to provide a mounting space according to the width of the Relay. The width of the Relay is 63.5 mm and the width of the Socket is 51 mm.

■ Mounting

Mount the Relay so that the coil faces upward and the cam faces downwards with the mounting plate secured vertically. Do not change the cam angle.

Make sure that Relay terminals are free of flux or any other foreign substance before soldering the Relay terminals.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J070-E1-04 In the interest of product improvement, specifications are subject to change without notice.

Stepping Relay Unit
G9B

Ideal for Controlling Pumps and Production Lines with Six or Twelve Stepping Circuits

- Built-in relays switch 2 A at 250 VAC or 30 VDC.
- Initialization of stepping with reset input.
- Uses memory that stores setting status for 10 days without power. All internal contacts are released when no power is supplied.
- Detects an internal element malfunction caused by external noise, indicates the malfunction with an alarm indicator, and turns the relay alarm output ON. (An internal relay malfunction or internal relay contact weld cannot be detected.)
- With safety-design terminals which prevent electric shock accidents.
- With easy-to-see indicators which display the stepping status.

Ordering Information

No. of steps	Rated voltage	Model
6	24 VDC	G9B-06
	100 VAC	
	200 VAC	
12	24 VDC	G9B-12
	100 VAC	
	200 VAC	

Note: When ordering specify the voltage.
Example: G9B-06 24 VDC
└── Rated voltage

Model Number Legend

G9B-□
1

1. No. of steps
06: 6 steps
12: 12 steps

Specifications

■ Contact Ratings

Load	Resistive load (cosϕ = 1)
Rated load	2 A at 250 VAC/30 VDC
Rated carry current	2 A
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	2 A

■ Characteristics

Operating voltage range	85% to 110% of rated voltage
Power consumption	24 VDC:90 mA max. 100 or 200 VAC:120 mA max.
Contact resistance (See note 2.)	100 mΩ max.
Operate time (See note 3.)	50 ms max.
Release time (See note 3.)	50 ms max.
Min. pulse time	100 ms max.
Error detecting time	100 ms max.
Insulation resistance (at 500 VDC)	100 MΩ min. between the power supply, control, output, and R terminals 100 MΩ min. between the terminals, except the alarm output terminals and power output terminals
Dielectric strength	1,500 V, 50/60 Hz for 1 min between the power supply, control, output, and R and other terminals 1,500 V, 50/60 Hz for 1 min between the terminals, except the alarm output terminals and power output terminals
Noise immunity	Noise level: 1.5 kV, pulse width: 50 ns/1 μs (600 V for 24-VDC model)
Vibration resistance	Destruction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5 mm double amplitude) Malfunction: 10 to 55 to 10 Hz, 0.75-mm single amplitude (1.5 mm double amplitude)
Shock resistance	Destruction: 500 m/s^2 Malfunction: 200 m/s^2
Endurance	Mechanical: 10,000,000 steps min. Electrical: 300,000 steps min. (See note 4.)
Error rate (See note 5.)	10 mA at 5 VDC
Ambient temperature	Operating: –25°C to 55°C (with no icing or condensation)
Ambient humidity	Operating: 5% to 85%
Terminal strength	Tightening torque: 0.98 N • m Tensile strength: 49 N
Weight	Twelve-step model: approx. 450 g; Six-step model: approx. 400 g

Note: 1. The data shown above are initial values.

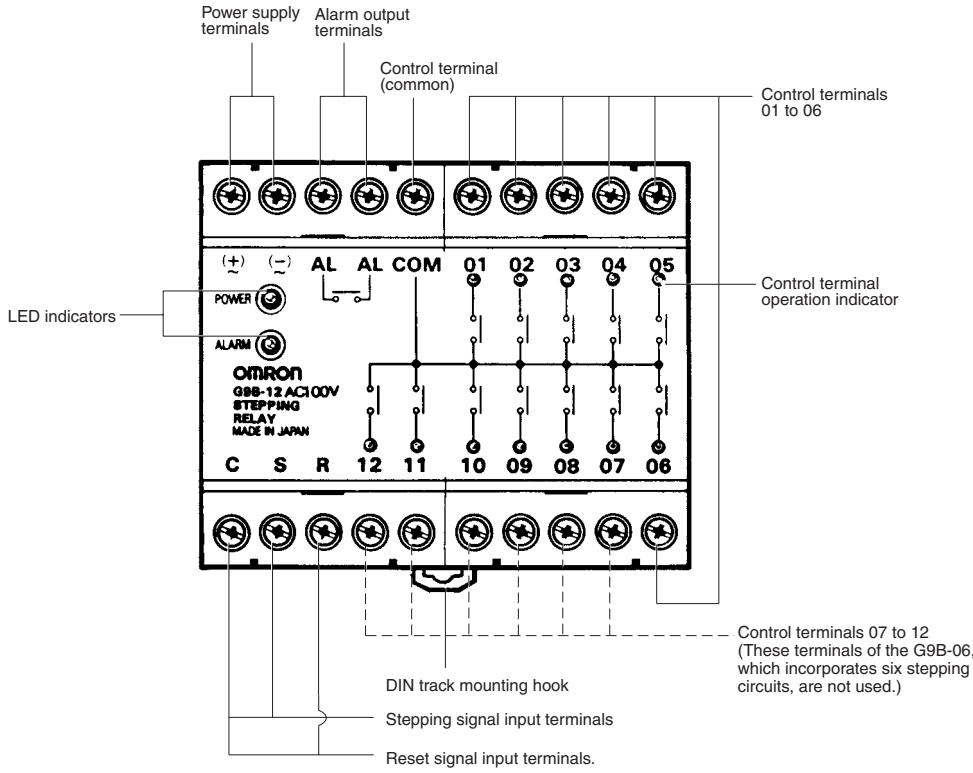
2. The contact resistance was measured with 0.1 A at 5 VDC using the fall-of-potential method.

3. The operate time and release time was measured with the rated voltage imposed with any contact bounce ignored at an ambient temperature of 23°C.

4. The electrical endurance was measured at an ambient temperature of 23°C.

5. This value was measured at a switching frequency of 120 operations per minute.

Nomenclature

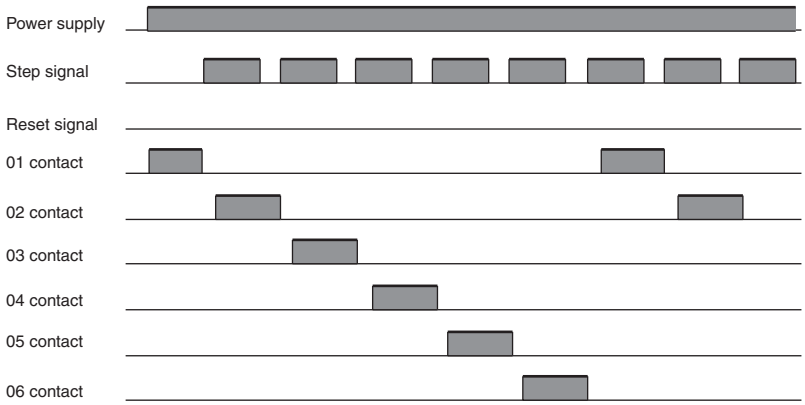


Display		Description
POWER	Lit	Lit when power is supplied to the G9B and the G9B is ready to operate or in operation.
	Not lit	Not lit when power is not supplied to the G9B.
ALARM	Lit	Lit when there is a control contact error (i.e., when a built-in relay driving element is malfunctioning).
	Not lit	Lit when the G9B is in normal operation.

Operation

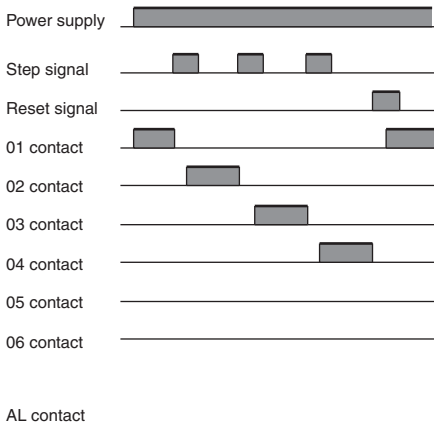
■ Timing Chart

Normal Operation with No Reset Signal



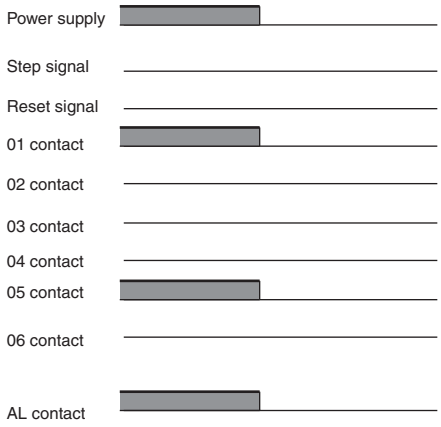
A different contact is selected in numerical order per step signal pulse. When the contact currently selected is 06, 01 will be selected with the next step signal input.

Normal Operation with Reset Signal



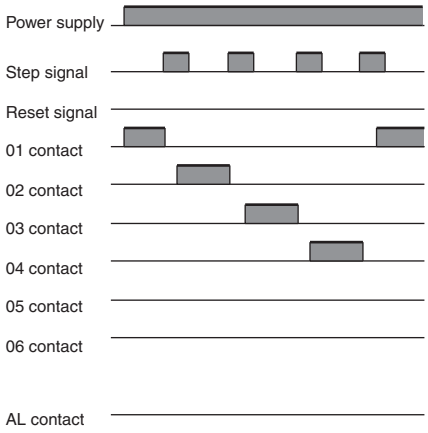
The G9B switches an active control terminal over to another control terminal and makes it active whenever the G9B receives a single step input pulse. If a reset signal is input to a control terminal of the G9B when the G9B is in stepping operation, terminal 1 of the G9B will become active.

Emergency Case (ON Error)



If an internal contact of the G9B is incorrectly turned ON by the internal relay driving element that drives the internal contact due to external noise, the G9B will reset itself to its default status (i.e., contact 01 of the G9B will be turned ON) and turn its alarm contact ON so that the ALARM indicator of the G9B will become lit. When the G9B is turned OFF, the alarm contact will turn OFF and the ALARM indicator will not be lit. In this example, contact 05 is incorrectly turned ON.

Emergency Case (ON Error)

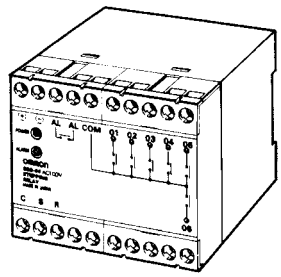


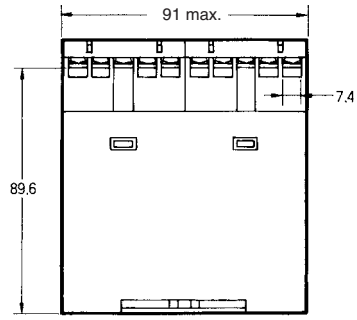
If an internal contact of the G9B is incorrectly turned OFF by the internal relay driving element that drives the internal contact due to external noise, the G9B will reset itself to its default status (i.e., contact 01 of the G9B will be turned ON) when the internal contact incorrectly turned OFF becomes active. In this example, contact 05 is incorrectly turned OFF.

Dimensions

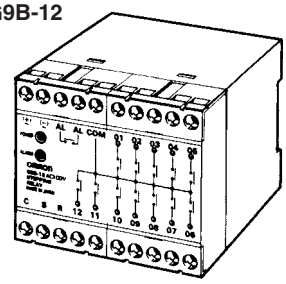
Note: All units are in millimeters unless otherwise indicated.

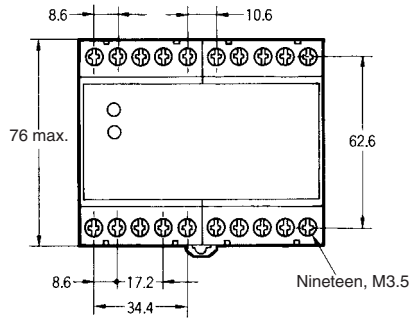
G9B-06

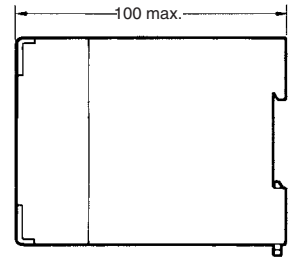




G9B-12

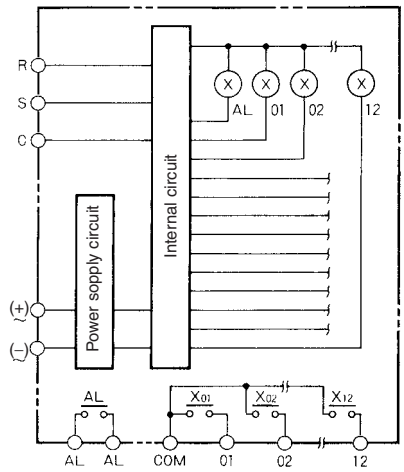






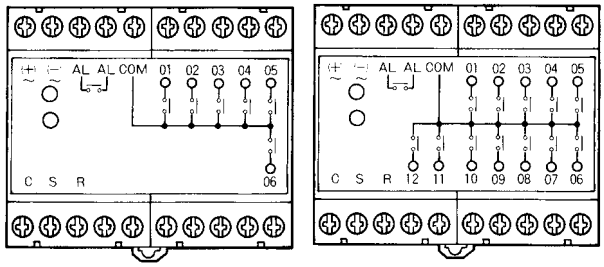
Installation

■ Internal Circuit



■ Terminal Arrangement

G9B-06 **G9B-12**

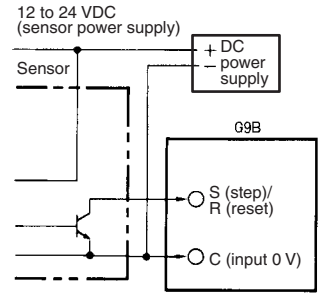


■ Input Connections

The inputs of the G9B are no-voltage (short-circuited or open) inputs.

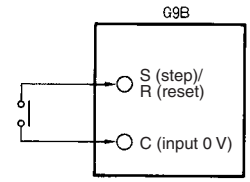
No-contact Input

(Connection to NPN open collector output sensor.)



Operates with transistor ON

Contact Input



Operates with relay ON

No-voltage Input Signal Level

No-contact input	**1.** Short-circuit Level (transistor ON) Residual voltage:1 V max. Impedance when ON:1 kΩ max.
	2. Open Level (transistor OFF) Impedance when OFF: 100 kΩ max.
Contact input	Use contacts which can adequately switch 3 mA at 24 VDC

Note: 1. Two-wire sensors cannot be used.

2. When using three-wire sensors, only NPN open-collector models can be used.

Precautions

Refer to page 11 for general precautions.

■ Memory Backup Function

The G9B has a built-in memory that stores the setting status for 10 days without power. All contacts are released when no power is supplied. When the G9B is turned ON again, the internal contacts will be set to the previous setting status.

When power is not supplied, the output contacts will turn OFF. If a reset signal is input while power is not being supplied, the next step will be step 01 when power is restored.

When 24 VDC is supplied to the G9B, make sure that the polarity of the power is correct.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

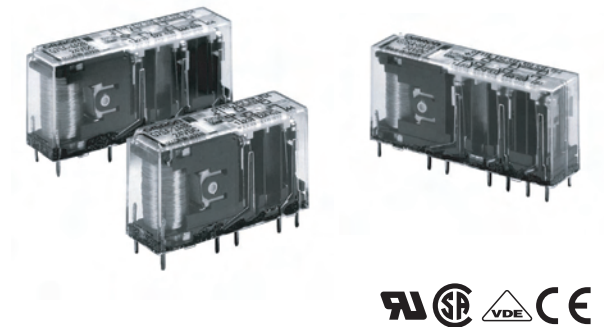
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J100-E1-02 In the interest of product improvement, specifications are subject to change without notice.

Relays with Forcibly Guided Contacts
G7SA

Slim Relays with Forcibly Guided Contacts Conforming to EN Standards

- EN50205 Class A, approved by VDE.
- Ideal for use in safety circuits in production machinery.
- Four-pole and six-pole Relays are available.
- The Relay's terminal arrangement simplifies PWB pattern design.
- Reinforced insulation between inputs and outputs. Reinforced insulation between some poles.
- UL, CSA approval.
- CE marking.



Ordering Information

Relays with Forcibly Guided Contacts

Type	Sealing	Poles	Contacts	Rated voltage	Model
Standard	Flux-tight	4 poles	3PST-NO, SPST-NC	24 VDC	G7SA-3A1B
			DPST-NO, DPST-NC		G7SA-2A2B
		6 poles	5PST-NO, SPST-NC		G7SA-5A1B
			4PST-NO, DPST-NC		G7SA-4A2B
			3PST-NO, 3PST-NC		G7SA-3A3B

Sockets

Type		LED indicator	Poles	Rated voltage	Model
Track-mounting	Track mounting and screw mounting possible	No	4 poles	---	P7SA-10F
			6 poles		P7SA-14F
		Yes	4 poles	24 VDC	P7SA-10F-ND
			6 poles		P7SA-14F-ND
Back-mounting	PCB terminals	No	4 poles	---	P7SA-10P
			6 poles		P7SA-14P

■ Model Number Legend

G7SA-□A□B
1 2

1. NO Contact Poles
- 2: DPST-NO
- 3: 3PST-NO
- 4: 4PST-NO
- 5: 5PST-NO

2. NC Contact Poles
- 1: SPST-NC
- 2: DPST-NC
- 3: 3PST-NC

Specifications

■ Ratings

Coil

Rated voltage	Rated current	Coil resistance	Must-operate voltage	Must-release voltage	Max. voltage	Power consumption
24 VDC	4 poles: 15 mA 6 poles: 20.8 mA	4 poles: 1,600 Ω 6 poles: 1,152 Ω	75% max. (V)	10% min. (V)	110% (V)	4 poles: Approx. 360 mW 6 poles: Approx. 500 mW

Note: 1. The rated current and coil resistance are measured at a coil temperature of 23°C with tolerances of ±15%.

2. Performance characteristics are based on a coil temperature of 23°C.

3. The value given for the maximum voltage is for voltages applied instantaneously to the Relay coil (at an ambient temperature of 23°C) and not continuously.

Contacts

Load	Resistive load (cos ϕ =1)
Rated load	6 A at 250 VAC, 6 A at 30 VDC
Rated carry current	6 A
Max. switching voltage	250 VAC, 125 VDC
Max. switching current	6 A
Max. switching capacity (reference value)	1,500 VA, 180 W

■ Characteristics

Sockets

Model	Continuous current	Dielectric strength	Insulation resistance
P7SA-14□	6 A (see note 1)	2,500 VAC for 1 min. between poles	100 MΩ min. (see note 2)

Note: 1. If the P7SA-1□F is used between 55 and 85°C, reduce the continuous current (from 6 A) by 0.1 A for every degree.

2. Measurement conditions: Measurement of the same points as for the dielectric strength at 500 VDC.

3. When using the P7SA-1□F-ND at 24 VDC, use at an ambient operating temperature from –25 to 55°C.

Relays with Forcibly Guided Contacts

Contact resistance		100 mΩ max. (The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.)
Operating time (see note 2)		20 ms max.
Response time (see note 2)		10 ms max. (The response time is the time it takes for the normally open contacts to open after the coil voltage is turned OFF.)
Release time (see note 2)		20 ms max.
Maximum operating frequency	**Mechanical**	36,000 operations/hr
	Rated load	1,800 operations/hr
Insulation resistance		100 MΩ min. (at 500 VDC) (The insulation resistance was measured with a 500-VDC megger at the same places that the dielectric strength was measured.)
Dielectric strength (see notes 3, 4)		Between coil contacts/different poles: 4,000 VAC, 50/60 Hz for 1 min (2,500 VAC between poles 3–4 in 4-pole Relays or poles 3–5, 4–6, and 5–6 in 6-pole Relays.) Between contacts of same polarity: 1,500 VAC, 50/60 Hz for 1 min
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	**Destruction**	1,000 m/s^2
	Malfunction	100 m/s^2
Durability	**Mechanical**	10,000,000 operations min. (at approx. 36,000 operations/hr)
	Electrical	100,000 operations min. (at the rated load and approx. 1,800 operations/hr)
Min. permissible load (see note 5) (reference value)		5 VDC, 1 mA
Ambient temperature (see note 6)		Operating: –40°C to 85°C (with no icing or condensation) Storage: –40°C to 85°C (with no icing or condensation)

Ambient humidity	Operating: 35% to 85% Storage: 35% to 85%
Weight	4 poles: Approx. 22 g 6 poles: Approx. 25 g
Approved standards	EN61810-1 (IEC61810-1), EN50205, UL508, CSA22.2 No. 14

Note: 1. The values listed above are initial values.

2. These times were measured at the rated voltage and an ambient temperature of 23°C. Contact bounce time is not included.

3. Pole 3 refers to terminals 31–32 or 33–34, pole 4 refers to terminals 43–44, pole 5 refers to terminals 53–54, and pole 6 refers to terminals 63–64.

4. When using a P7SA Socket, the dielectric strength between coil contacts/different poles is 2,500 VAC, 50/60 Hz for 1 min.

5. Min. permissible load is for a switching frequency of 300 operations/min.

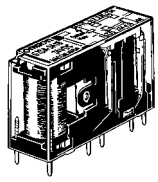
6. When operating at a temperature between 70°C and 85°C, reduce the rated carry current (6 A at 70°C or less) by 0.1 A for each degree above 70°C.

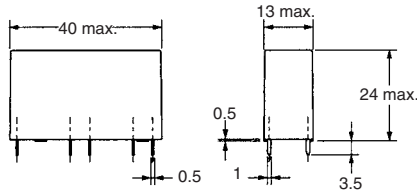
Dimensions

Note: All units are in millimeters unless otherwise indicated. The diagrams are drawn in perspective.

■ Relays with Forcibly Guided Contacts

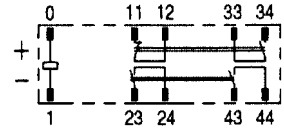
G7SA-3A1B
G7SA-2A2B



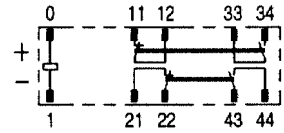


Terminal Arrangement/ Internal Connection Diagram (Bottom View)

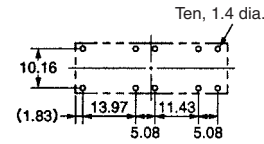
G7SA-3A1B



G7SA-2A2B

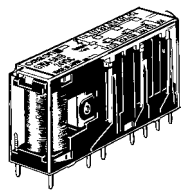


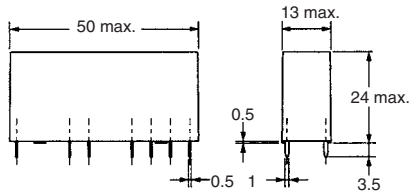
Printed Circuit Board Design Diagram (Bottom View)
(±0.1 tolerance)



Note: Terminals 23-24, 33-34, and 43-44 are normally open. Terminals 11-12 and 21-22 are normally closed.

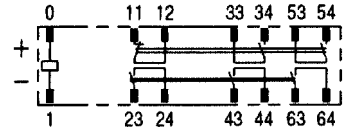
G7SA-5A1B
G7SA-4A2B
G7SA-3A3B



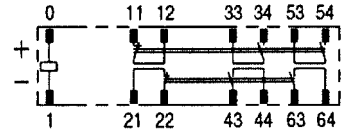


Terminal Arrangement/ Internal Connection Diagram (Bottom View)

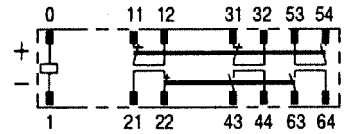
G7SA-5A1B



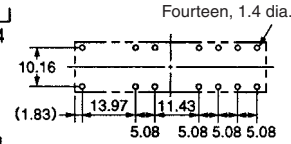
G7SA-4A2B



G7SA-3A3B



Printed Circuit Board Design Diagram (Bottom View)
(±0.1 tolerance)

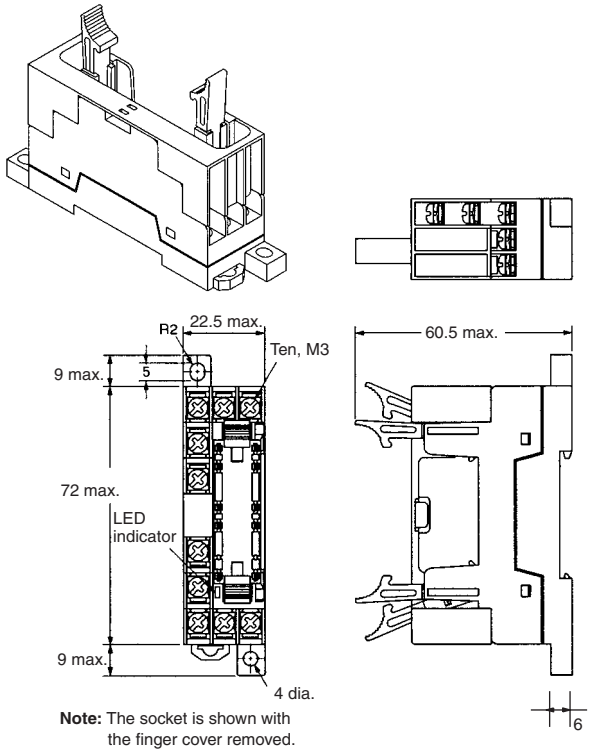


Note: Terminals 23-24, 33-34, 53-54, and 63-64 are normally open. Terminals 11-12, 21-22, and 31-32 are normally closed.

■ Sockets

Track-mounting Socket

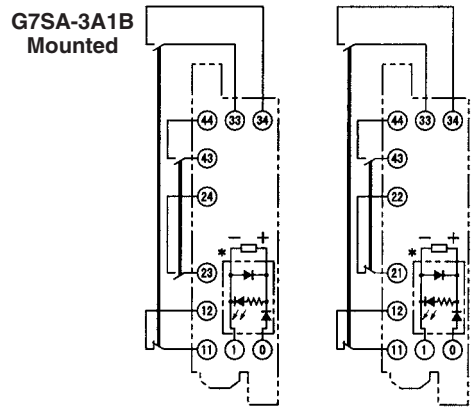
P7SA-10F, P7SA-10F-ND



Note: The socket is shown with the finger cover removed.

Note: Only the -ND Sockets have LED indicators.

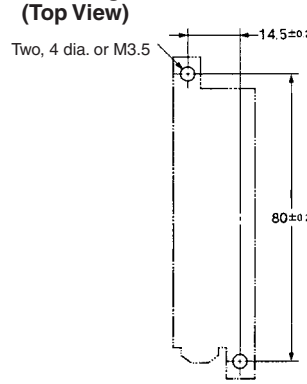
Terminal Installation/Internal Connection Diagram (Top View)



* This display circuit is available only for "-ND" models.

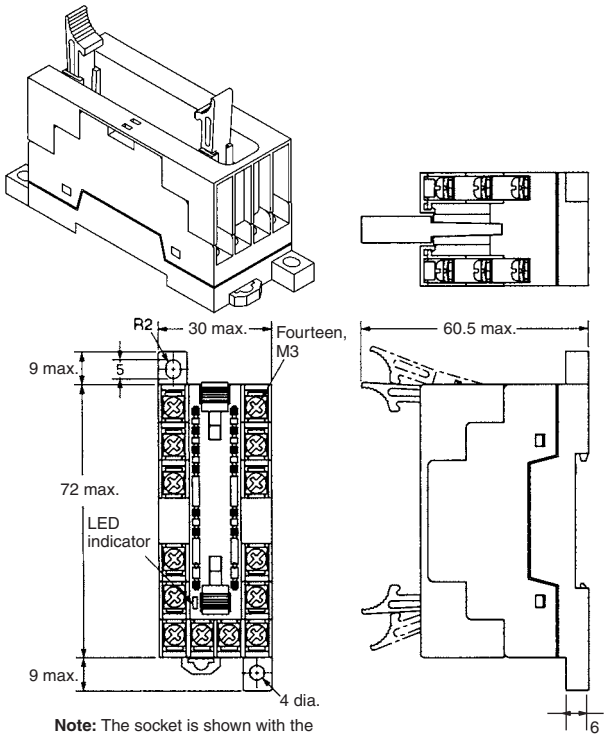
Note: Terminals 23-24, 33-34, and 43-44 are normally open. Terminals 11-12 and 21-22 are normally closed.

Mounting Hole Placement Diagram (Top View)



Track-mounting Socket

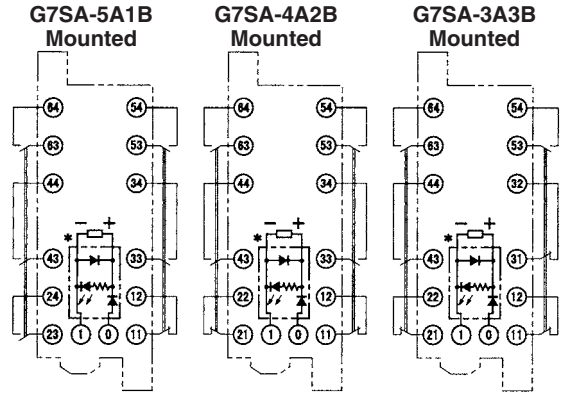
P7SA-14F, P7SA-14F-ND



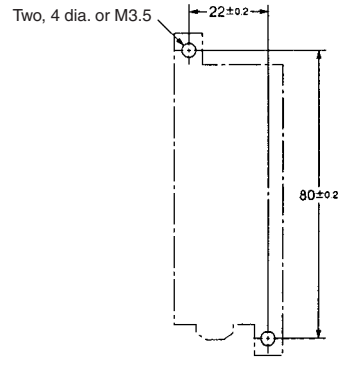
Note: The socket is shown with the finger cover removed.

Note: Only the -ND Sockets have LED indicators.

Terminal Arrangement/Internal Connection Diagram (Top View)



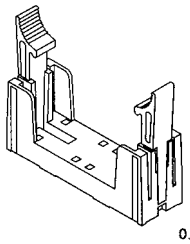
Mounting Hole Placement Diagram (Top View)

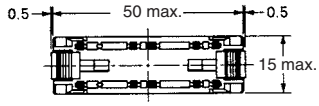


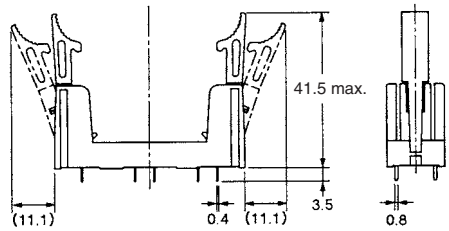
* This display circuit is available only for "-ND" models.

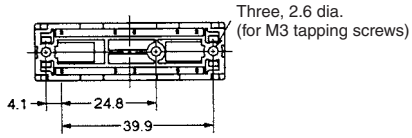
Note: Terminals 23-24, 33-34, 43-44, 53-54, and 63-64 are normally open. Terminals 11-12, 21-22, and 31-32 are normally closed.

P7SA-10P Back-mounting Socket (for PCB)



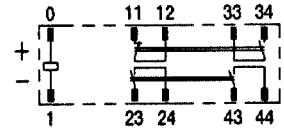




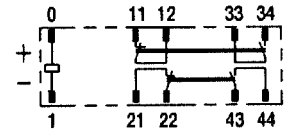


Terminal Arrangement/Internal Connection Diagram (Bottom View)

G7SA-3A1B Mounted

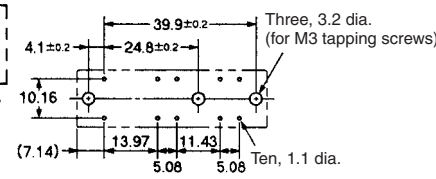


G7SA-2A2B Mounted



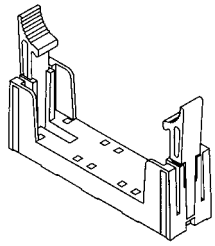
Mounting Hole Placement (Bottom View)

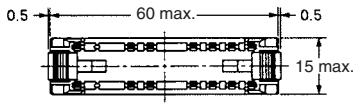
(±0.1 tolerance)

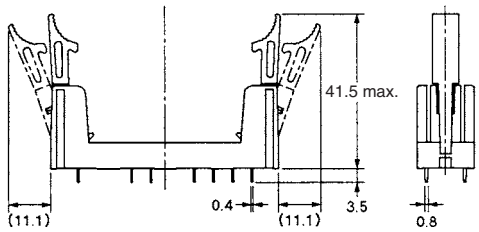


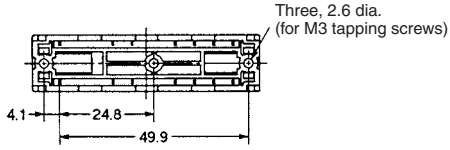
Note: Terminals 23-24, 33-34, and 43-44 are normally open. Terminals 11-12 and 21-22 are normally closed.

P7SA-14P Back-mounting Socket (for PCB)



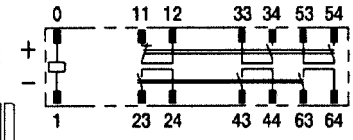




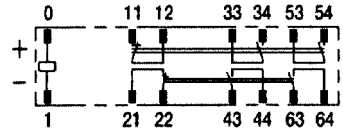


Terminal Arrangement/Internal Connection Diagram (Bottom View)

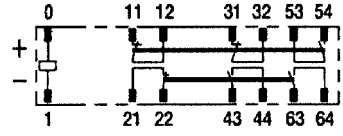
G7SA-5A1B Mounted



G7SA-4A2B Mounted

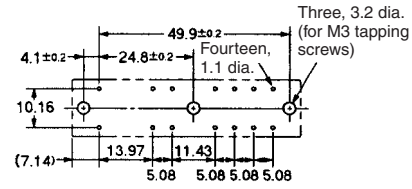


G7SA-3A3B Mounted



Mounting Hole Placement (Bottom View)

(±0.1 tolerance)



Note: Terminals 23-24, 33-34, 43-44, 53-54, and 63-64 are normally open. Terminals 11-12, 21-22, and 31-32 are normally closed.

Precautions

⚠ Caution

Do not touch the terminal area of the Relays or the socket terminal area (charged area) while power is ON. Electric shock will result.

Relays with Forcibly Guided Contacts

A Relay with Forcibly Guided Contacts is a Relay with which a safety category circuit can be configured.

Wiring

Use one of the following wires to connect to the P7SA-10F/10F-ND/14F/14F-ND.

Stranded wire: 0.75 to 1.5 mm^2
Solid wire: 1.0 to 1.5 mm^2

Tighten each screw of the P7SA-10F/10F-ND/14F/14F-ND to a torque of 0.98 N·m securely.

Wire the terminals correctly with no mistakes in coil polarity, otherwise the G7SA will not operate.

Cleaning

The G7SA is not of enclosed construction. Therefore, do not wash the G7SA with water or detergent.

Forcibly Guided Contacts (from EN50205)

If an NO contact becomes welded, all NC contacts will maintain a minimum distance of 0.5 mm when the coil is not energized. Likewise if an NC contact becomes welded, all NO contacts will maintain a minimum distance of 0.5 mm when the coil is energized.

■ Correct Use

Relays with Forcibly Guided Contacts

While the Relay with Forcibly Guided Contacts has the previously described forcibly guided contact structure, it is basically the same as an ordinary relay in other respects. Rather than serving to prevent malfunctions, the forcibly guided contact structure enables another circuit to detect the condition following a contact weld or other malfunction. Accordingly, when a contact weld occurs in a Relay with Forcibly Guided Contacts, depending on the circuit configuration, the power may not be interrupted, leaving the Relay in a potentially dangerous condition (as shown in Fig. 1.)

To configure the power control circuit to interrupt the power when a contact weld or other malfunction occurs, and to prevent restarting until the problem has been eliminated, add another Relay with Forcibly Guided Contacts or similar Relay in combination to provide redundancy and a self-monitoring function to the circuit (as shown in Fig. 2).

The G9S/G9SA Safety Relay Unit, which combines Relays such as the Relay with Forcibly Guided Contacts in order to provide the above-described functions, is available for this purpose. By connecting a contactor with appropriate input and output to the Safety Relay Unit, the circuit can be equipped with redundancy and a self-monitoring function.

Fig 1

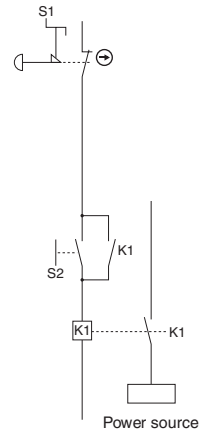
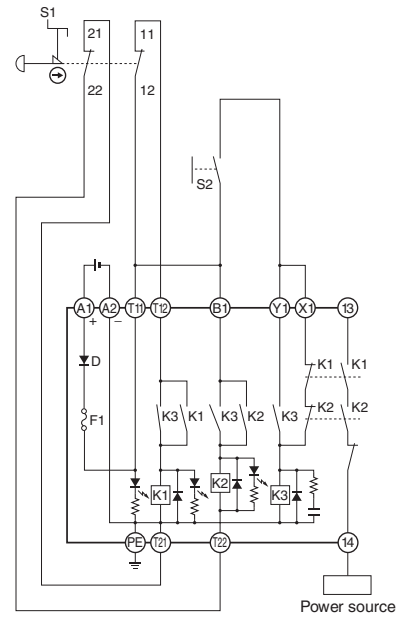


Fig 2



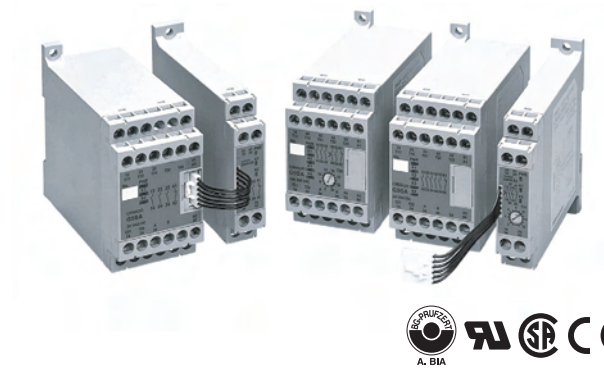
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. J120-E1-02 In the interest of product improvement, specifications are subject to change without notice.

Safety Relay Unit
G9SA

The G9SA Series Offers a Complete Line-up of Compact Units.

- Four kinds of 45-mm wide Units are available:
  A 3-pole model, a 5-pole model, and models with 3 poles and 2 OFF-delay poles, as well as a Two-hand Controller.
  Also available are 17.5-mm wide Expansion Units with 3 poles and 3 OFF-delay poles.
- Simple expansion connection.
- OFF-delay models have 15-step OFF-delay settings.
- Conforms to EN standards. (BG approval)
- Approved by UL and CSA.
- Both DIN track mounting and screw mounting are possible.



Ordering Information

Emergency-stop Units

Main contacts	Auxiliary contact	Number of input channels	Rated voltage	Model	Category
3PST-NO	SPST-NC	1 channel or 2 channels possible	24 VAC/VDC	G9SA-301	4
			100 to 240 VAC		
5PST-NO	SPST-NC	1 channel or 2 channels possible	24 VAC/VDC	G9SA-501	
			100 to 240 VAC		

Emergency-stop OFF-delay Units

Main contacts	OFF-delay contacts	Auxiliary contact	Number of input channels	OFF-delay time	Rated voltage	Model	Category
3PST-NO	DPST-NO	SPST-NC	1 channel or 2 channels possible	7.5 s	24 VAC/VDC	G9SA-321-T075	Main contacts: 4 OFF-delay contacts: 3
					100 to 240 VAC		
				15 s	24 VAC/VDC	G9SA-321-T15	
					100 to 240 VAC		
				30 s	24 VAC/VDC	G9SA-321-T30	
					100 to 240 VAC		

Note: The following 15-step OFF-delay time settings are available:
T075: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, and 7.5 s
T15: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 s
T30: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, and 30 s

Two-hand Controller

Main contacts	Auxiliary contact	Number of input channels	Rated voltage	Model	Category
3PST-NO	SPST-NC	2 channels	24 VAC/VDC	G9SA-TH301	4
			100 to 240 VAC		

Expansion Unit

The Expansion Unit connects to a G9SA-301, G9SA-501, G9SA-321, or G9SA-TH301.

Main contacts	Auxiliary contact	Model	Category
3PST-NO	SPST-NC	G9SA-EX301	4

Expansion Units with OFF-delay Outputs

The Expansion Unit connects to a G9SA-301, G9SA-501, G9SA-321, or G9SA-TH301.

Main contact form	Auxiliary contact	OFF-delay time	Model	Category
3PST-NO	SPST-NC	7.5 s	G9SA-EX031-T075	3
		15 s	G9SA-EX031-T15	
		30 s	G9SA-EX031-T30	

Note: The following 15-step OFF-delay time settings are available:
T075: 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, and 7.5 s
T15: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 s
T30: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, and 30 s

■ Model Number Legend

G9SA-□□□□□□-□□□□
1 2 3 4 5 6

1. **Function**
   None: Emergency stop
   EX: Expansion Unit
   TH: Two-hand Controller
2. **Contact Configuration (Safety Output)**
   0: None
   3: 3PST-NO
   5: 5PST-NO
3. **Contact Configuration (OFF-delay Output)**
   0: None
   2: DPST-NO
   3: 3PST-NO
4. **Contact Configuration (Auxiliary Output)**
   0: None
   1: SPST-NC
5. **Input Configuration (for G9SA-301/501/321)**
   None: 1-channel or 2-channel input possible
6. **OFF-delay Time (Max. setting time)**
   None: No OFF-delay
   T075: 7.5 seconds
   T15: 15 seconds
   T30: 30 seconds

Specifications

■ Ratings

Power Input

Item	G9SA-301/TH301	G9SA-501	G9SA-321-T□
Power supply voltage	24 VAC/VDC: 24 VAC, 50/60 Hz, or 24 VDC 100 to 240 VAC: 100 to 240 VAC, 50/60 Hz		
Operating voltage range	85% to 110% of rated power supply voltage		
Power consumption (See note.)	24 VAC/VDC: 1.8 VA/1.7 W max. 100 to 240 VAC: 9 VA max.	24 VAC/VDC: 2.8 VA/2.6 W max. 100 to 240 VAC: 11 VA max.	24 VAC/VDC: 3.5 VA/3.3 W max. 100 to 240 VAC: 12.5 VA max.

Note: When an Expansion Unit is connected, the power consumption is increased by 2 VA/2 W max.

Inputs

Item	G9SA-301/321-T□/TH301	G9SA-501
Input current (See note.)	40 mA max.	60 mA max.

Note: When an Expansion Unit is connected, the input current is increased by 30 mA max.

Contacts

Item	G9SA-301/501/321-T□/TH301/EX301/EX031-T□
	Resistive load (cos ϕ =1)
Rated load	250 VAC, 5 A
Rated carry current	5 A

■ Characteristics

Item		G9SA-301/TH301	G9SA-501/321-T□	G9SA-EX301/EX031-T□
Contact resistance (see note 1)		100 mΩ		
Operating time		30 ms max. (not including bounce time)		
Response time (see note 2)		10 ms max. (not including bounce time)		
Insulation resistance (see note 3)		100 MΩ min. (at 500 VDC)		
Dielectric strength	**Between different outputs**	2,500 VAC, 50/60 Hz for 1 min		
	Between inputs and outputs			
	Between power inputs and outputs			
	Between power inputs and other inputs (only for 100 to 240-V models)			
Vibration resistance		10 to 55 Hz, 0.75-mm double amplitude		
Shock resistance	**Destruction**	300 m/s^2		
	Malfunction	100 m/s^2		
Durability	**Mechanical**	5,000,000 operations min. (at approx. 7,200 operations/hr)		
	Electrical	100,000 operations min. (at approx. 1,800 operations/hr)		
Minimum permissible load (reference value)		5 VDC, 1 mA		
Ambient temperature		Operating: –25°C to 55°C (with no icing or condensation) Storage: –25°C to 85°C (with no icing or condensation)		
Ambient humidity		Operating: 35% to 85% Storage: 35% to 85%		
Terminal tightening torque		0.98 N·m		
Weight (see note 4)		Approx. 210 g	Approx. 270 g	Approx. 130 g
Approved standards		EN954-1, EN60204-1, EN574 (-TH301), UL508, CSA C22.2 No. 14		
EMC		EMI: EN55011 group 1 class A EMS: EN50082-2 group 1		

Note: 1. The contact resistance was measured with 1 A at 5 VDC using the voltage-drop method.

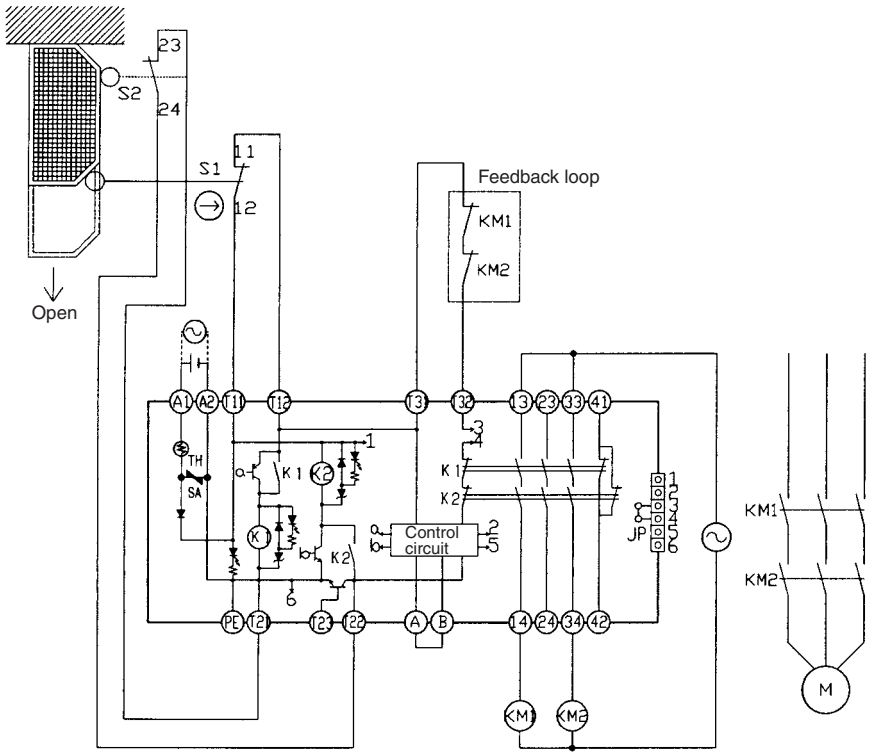
2. The response time is the time it takes for the main contact to open after the input is turned OFF.

3. The insulation resistance was measured with 500 VDC at the same places that the dielectric strength was checked.

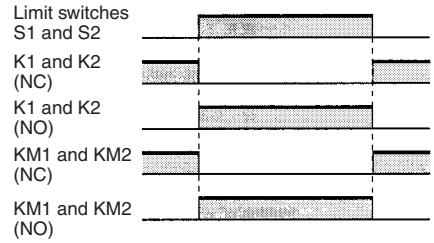
4. Weight shown is for 24-VAC/VDC type. For 100 to 240-VAC type, add approximately 20 g.

Application Examples

G9SA-301 (24 VAC/VDC) with 2-channel Limit Switch Input/Auto-reset



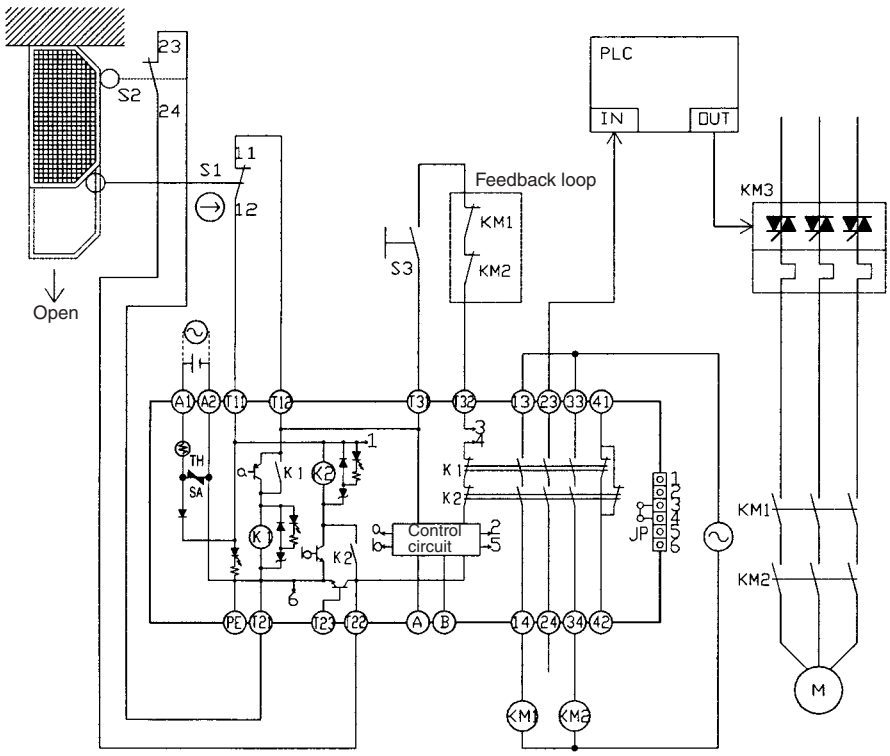
Timing Chart



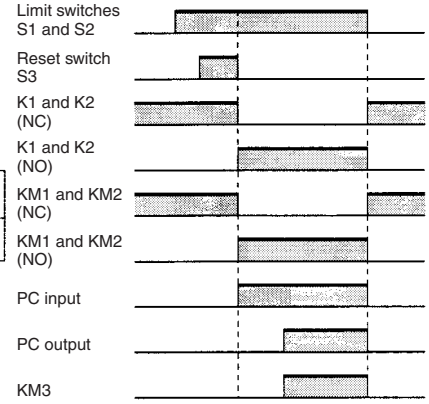
S1:	Safety Limit Switch with direct opening mechanism (D4D or D4B) ⊖
S2:	Limit switch
KM1 and KM2:	Magnetic Contactor
M:	3-phase motor

Note: This circuit achieves EN954-1 Safety Category 4.

G9SA-301 (24 VAC/VDC) with 2-channel Limit Switch Input/Manual-reset



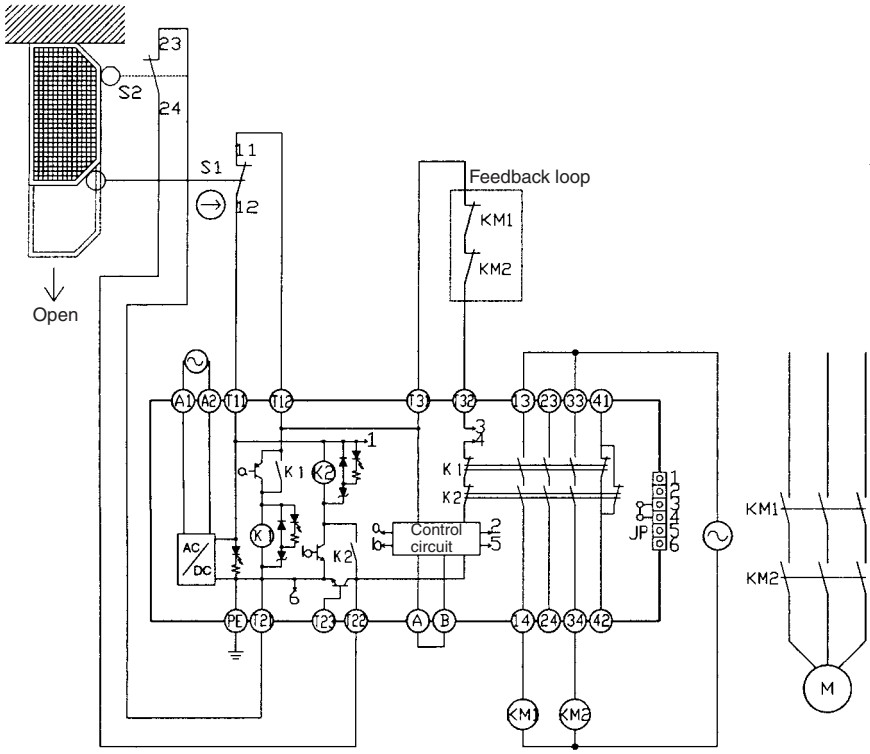
Timing Chart



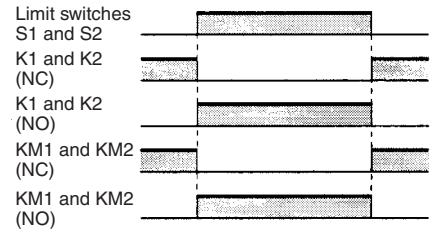
S1:	Safety Limit Switch with direct opening mechanism (D4D or D4B) ⊖
S2:	Limit switch
S3:	Reset switch
KM1 and KM2:	Magnetic Contactor
KM3:	G3J Solid-state Contactor (G3J)
M:	3-phase motor

Note: This circuit achieves EN954-1 Safety Category 4.

G9SA-301 (100 to 240 VAC) with 2-channel Limit Switch Input/Auto-reset



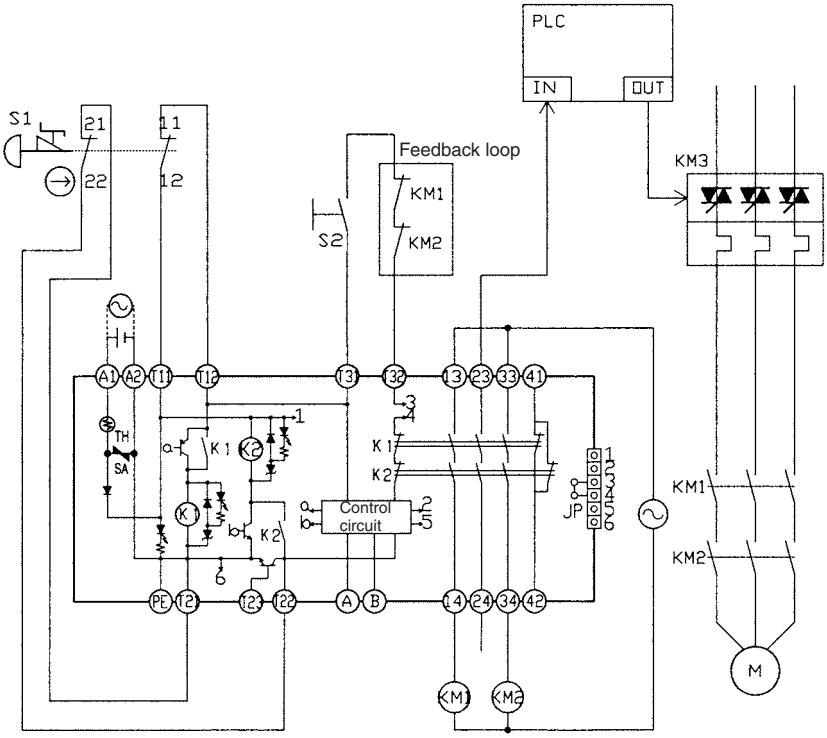
Timing Chart



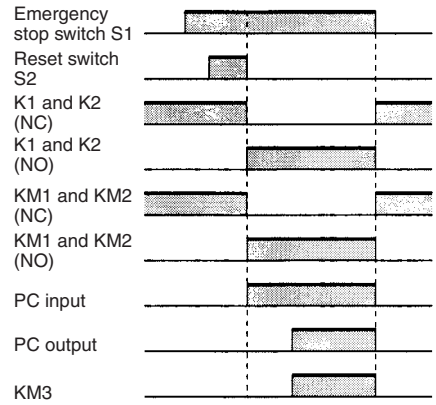
S1: Safety Limit Switch with direct opening mechanism (D4D or D4B) ⊖
S2: Limit switch
KM1 and KM2: Magnetic Contactor
M: 3-phase motor

Note: This circuit achieves EN954-1 Safety Category 4.

G9SA-301 (24 VAC/VDC) with 2-channel Emergency Stop Switch Input/Manual-reset



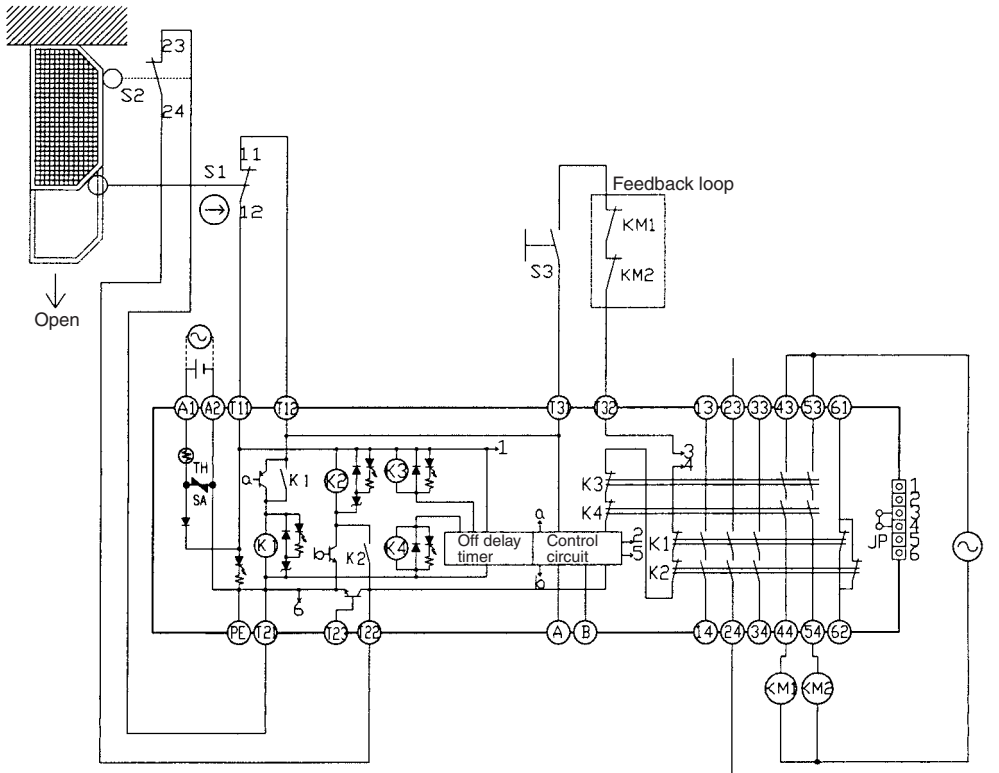
Timing Chart

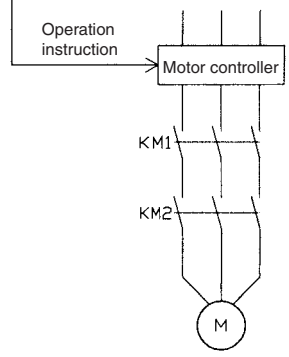


S1: Emergency stop switch with direct opening mechanism (A165E or A22E) ⊖
S2: Reset switch
KM1 and KM2: Magnetic Contactor
KM3: G3J Solid-state Contactor (G3J)
M: 3-phase motor

Note: This circuit achieves EN954-1 Safety Category 4.

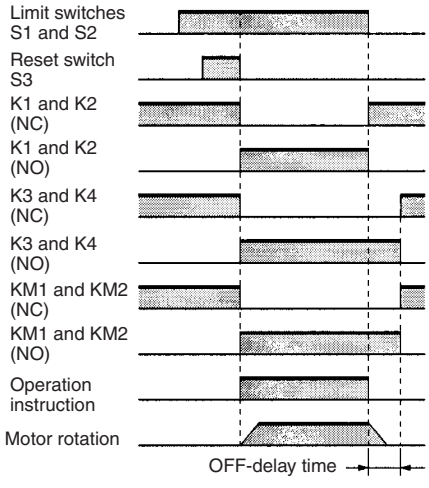
G9SA-321-T□ (24 VAC/VDC) with 2-channel Limit Switch Input/Manual-reset





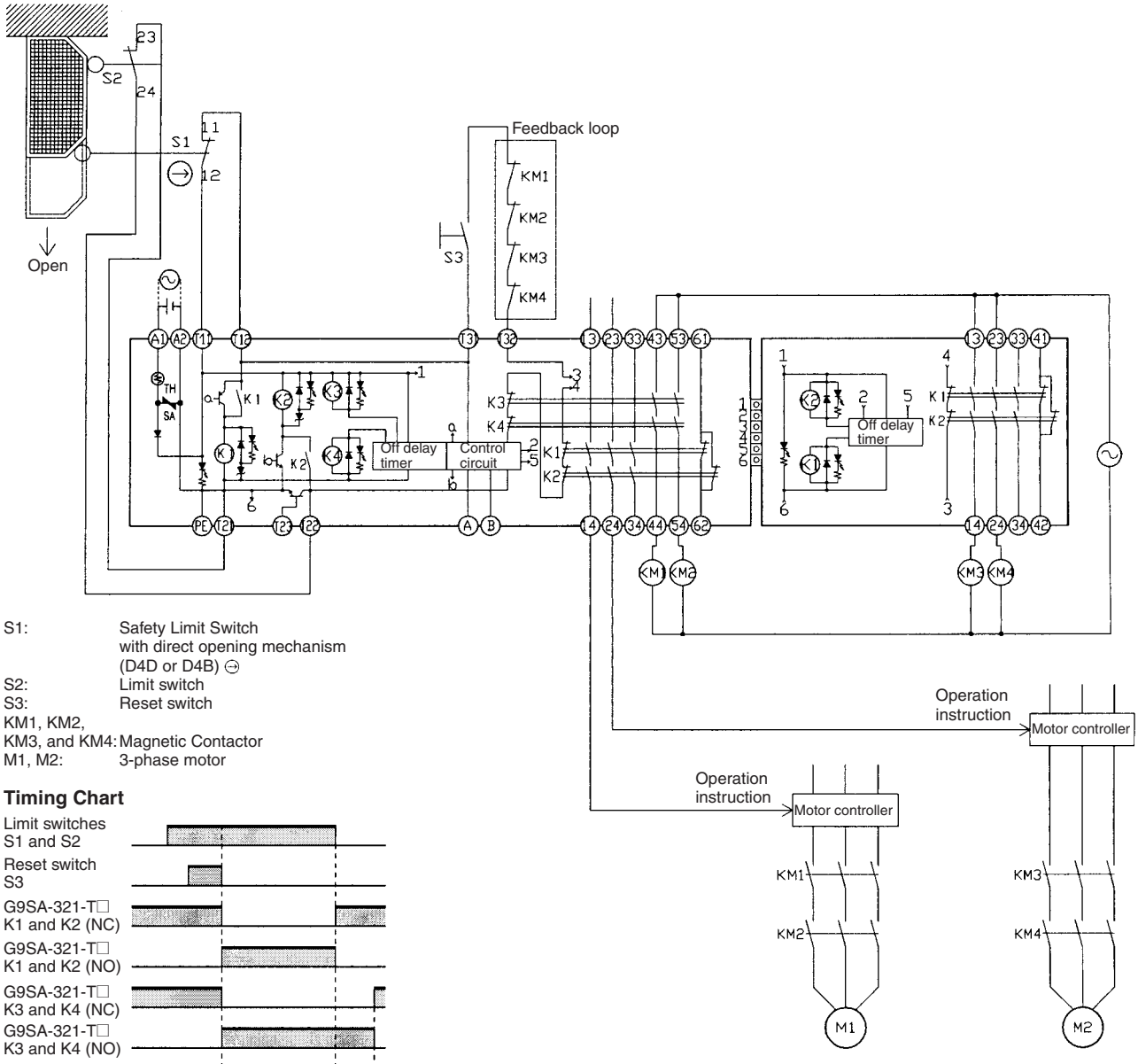
S1: Safety Limit Switch with direct opening mechanism (D4D or D4B) ⊖
S2: Limit switch
S3: Reset switch
KM1 and KM2: Magnetic Contactor
M: 3-phase motor

Timing Chart



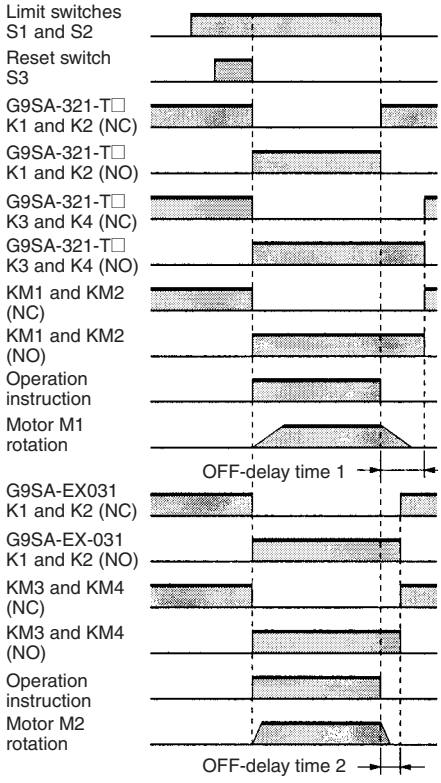
Note: This circuit achieves EN954-1 Safety Category 4. The OFF-delay output, however, achieves EN954-1 Safety Category 3.

G9SA-321-T□ (24 VAC/VDC) + G9SA-EX031-T□ with 2-channel Limit Switch Input/ Manual-reset



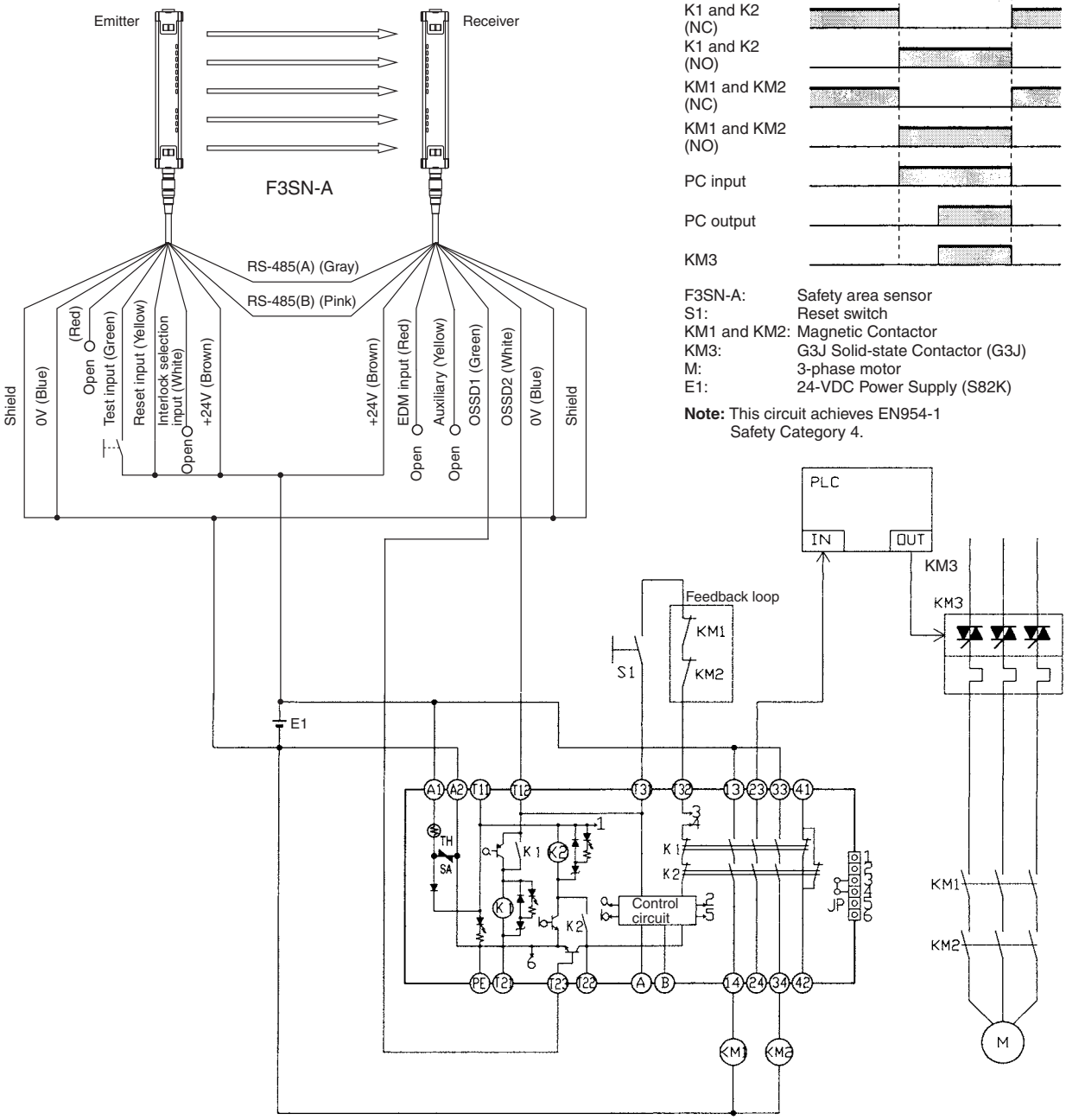
S1: Safety Limit Switch with direct opening mechanism (D4D or D4B) ⊖
S2: Limit switch
S3: Reset switch
KM1, KM2, KM3, and KM4: Magnetic Contactor
M1, M2: 3-phase motor

Timing Chart



Note: This circuit achieves EN954-1 Safety Category 4. The OFF-delay output, however, achieves EN954-1 Safety Category 3.

G9SA-301 (24 VAC/VDC) with 2-channel Safety Area Sensor/Manual-reset

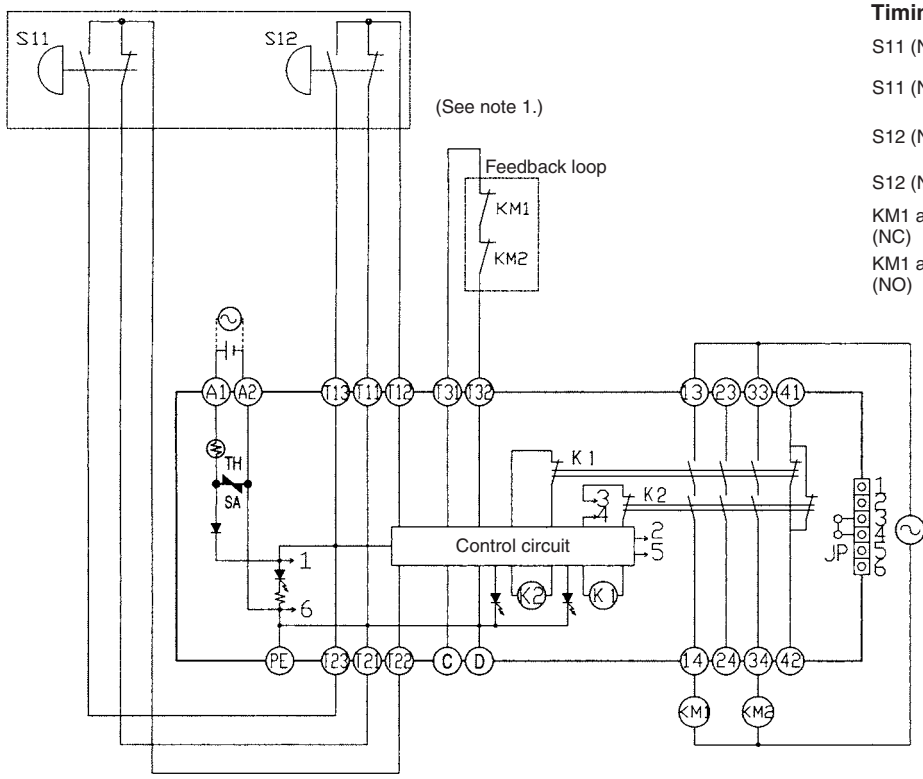


Timing Chart

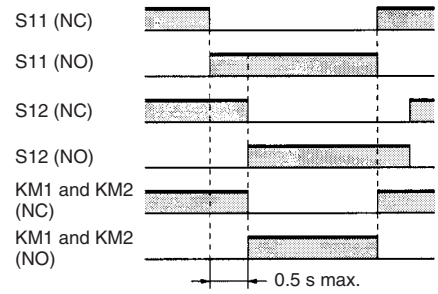
F3SN-A:	Safety area sensor
S1:	Reset switch
KM1 and KM2:	Magnetic Contactor
KM3:	G3J Solid-state Contactor (G3J)
M:	3-phase motor
E1:	24-VDC Power Supply (S82K)

Note: This circuit achieves EN954-1 Safety Category 4.

G9SA-TH301 (24 VDC) with 2-hand Inputs/Auto-reset



Timing Chart



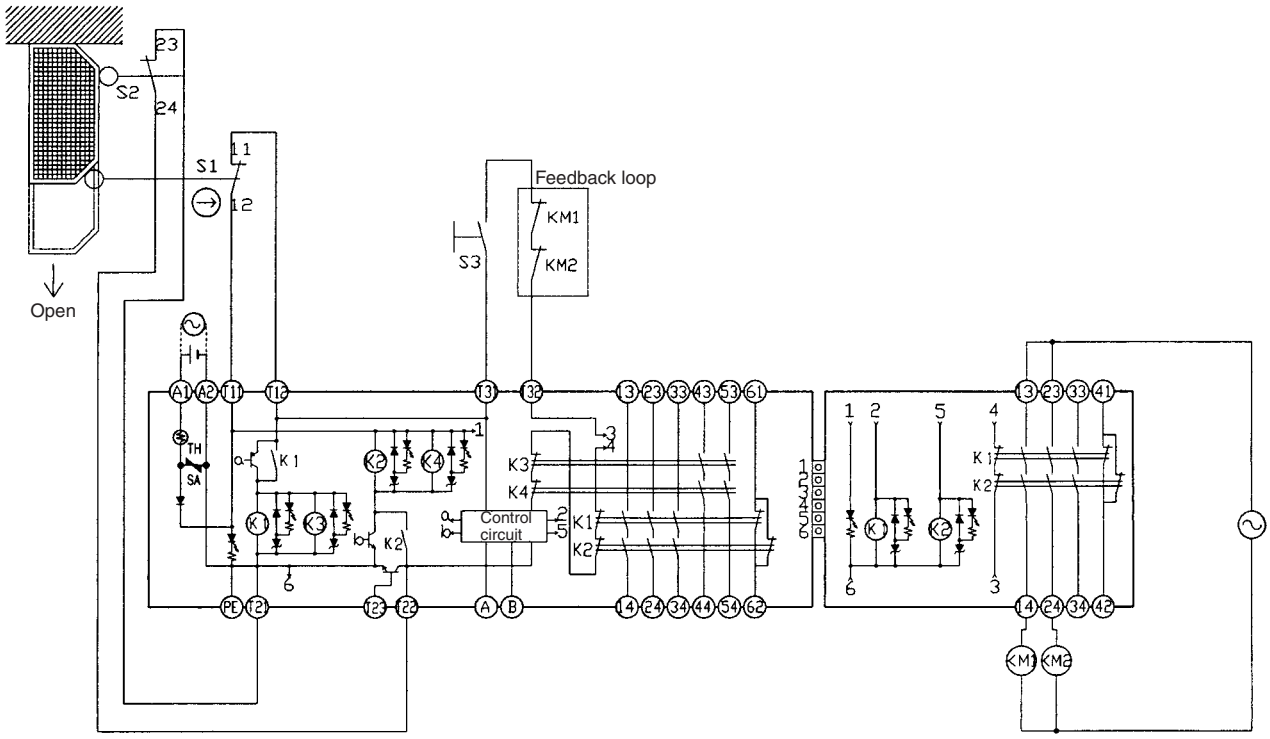
Input time difference operates only when the difference is 0.5 s max.

S11, S12: Two-hand pushbutton switches
KM1 and KM2: Magnetic Contactor

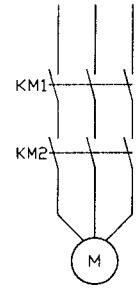
Note: 1. Use a 1NC+1NO switch for S11 and S12.

2. This circuit achieves EN954-1 Safety Category 4.

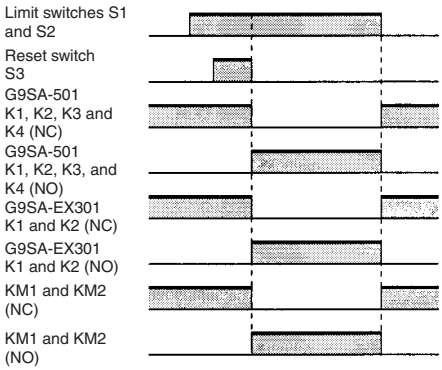
G9SA-501 (24 VAC/VDC) and G9SA-EX301 with 2-channel Limit Switch Input/ Manual-reset



S1:	Safety Limit Switch with direct opening mechanism (D4D or D4B) ⊖
S2:	Limit switch
S3:	Reset switch
KM1 and KM2:	Magnetic Contactor
M:	3-phase motor



Timing Chart

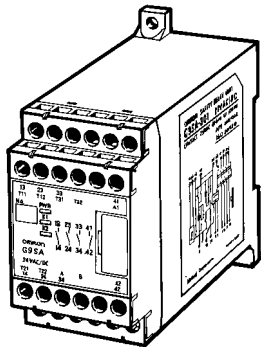


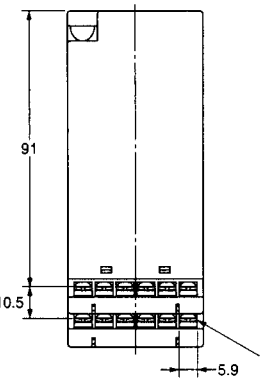
Note: This circuit achieves EN954-1 Safety Category 4.

Dimensions

Note: All units are in millimeters unless otherwise indicated. The diagrams are drawn in perspective.

G9SA-301
G9SA-501
G9SA-321-T□
G9SA-TH301

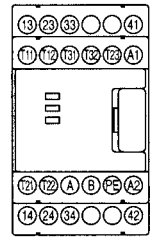




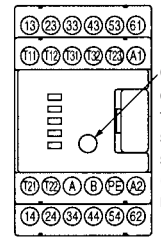
G9SA-301: Twenty, M3
G9SA-501: Twenty-four, M3
G9SA-321-T□: Twenty-four, M3
G9SA-TH301: Twenty-one, M3

Terminal Arrangement

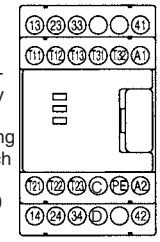
G9SA-301

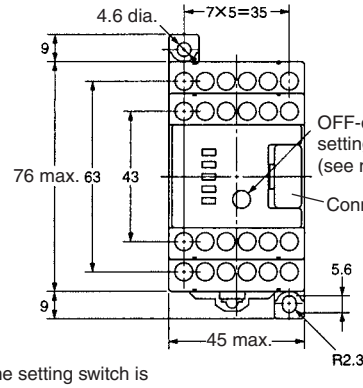


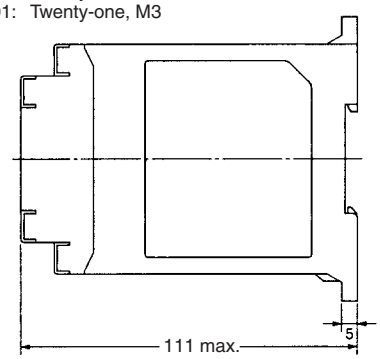
G9SA-501
G9SA-321-T□



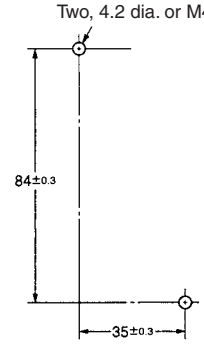
G9SA-TH301





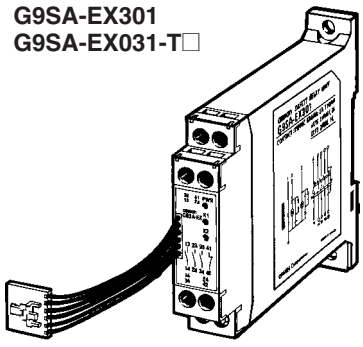


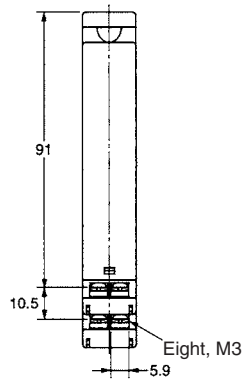
Mounting Holes



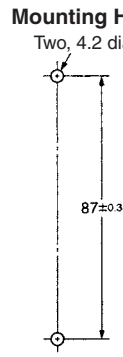
Note: The OFF-delay time setting switch is found on the G9SA-321-T□ only.

G9SA-EX301
G9SA-EX031-T□



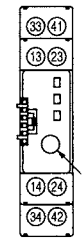


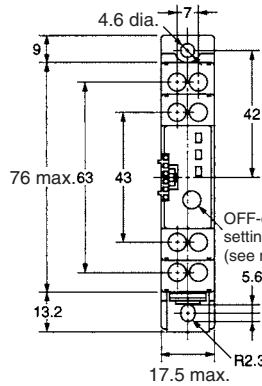
Mounting Holes

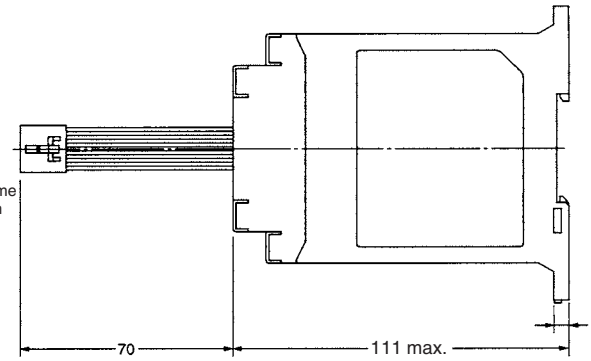


Terminal Arrangement

G9SA-EX301
G9SA-EX031-T□





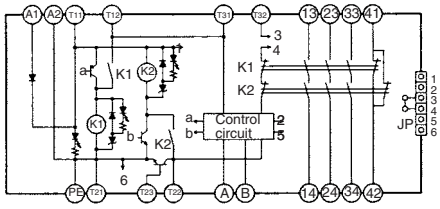


Note: The OFF-delay time setting switch is found on the G9SA-EX031-T□ only.

Installation

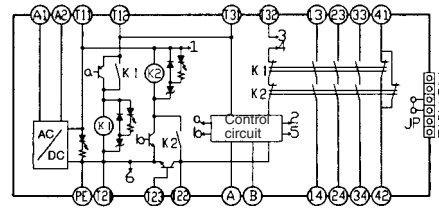
■ Internal Connections

G9SA-301 (24 VAC/VDC)



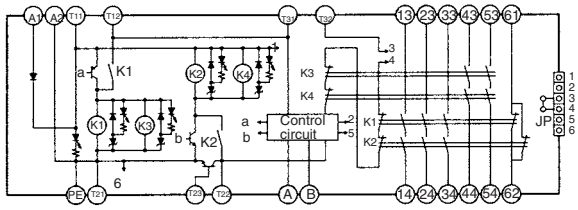
(See note 3.) (See note 1.)

G9SA-301 (100 to 240 VAC)



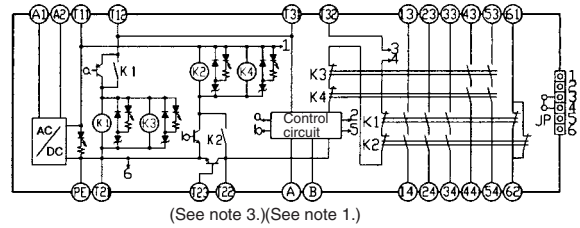
(See note 3.)(See note 1.)

G9SA-501 (24 VAC/VDC)



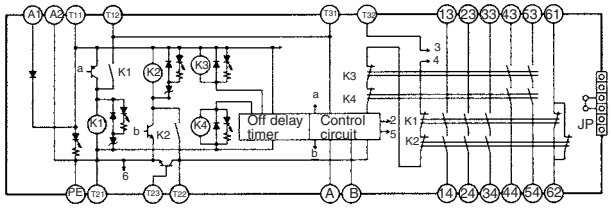
(See note 3.) (See note 1.)

G9SA-501 (100 to 240 VAC)



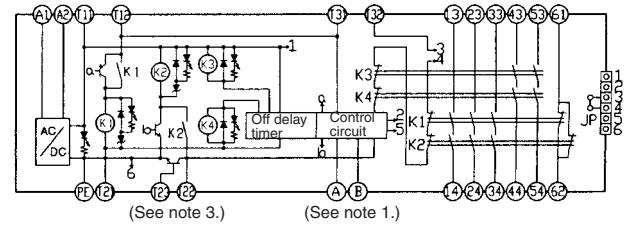
(See note 3.)(See note 1.)

G9SA-321-T□ (24 VAC/VDC)



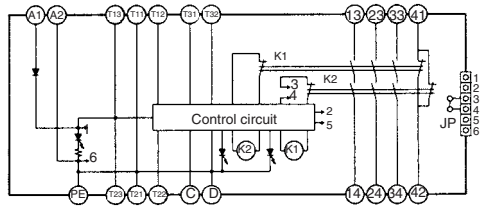
(See note 3.) (See note 1.)

G9SA-321-T□ (100 to 240 VAC)



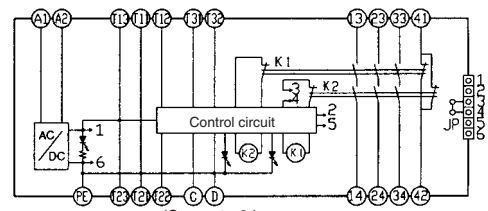
(See note 3.) (See note 1.)

G9SA-TH301 (24 VAC/VDC)



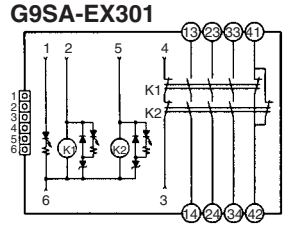
(See note 2.)

G9SA-TH301 (100 to 240 VAC)

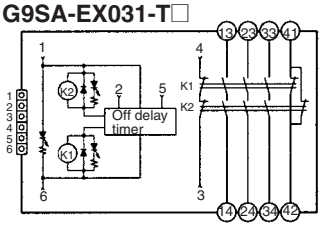


(See note 2.)

G9SA-EX301



G9SA-EX031-T□



Note: 1. Use terminals A and B to switch reset mode.
A to B open: Manual reset
A to B closed: Auto-reset

2. Use terminals C and D to switch input conditions.
C to D open: DPDT input.
C to D closed: DPST-NC input. (Make sure T11 and T21 are open.)

3. Use terminal T23 with + common 2-channel input. When using T23, make sure that T21 and T22 are open. For 1-channel input, make sure T12 and T23 are closed.

4. With 100 to 240-VAC type, be sure to connect PE to a protective ground. With 24-VAC/VDC type, if the power supply is not connected to a protective ground, be sure to connect PE to a protective ground.

5. With 24-VAC/VDC type, the power supply terminals A1 and A2 have polarities. A2 is the negative pole.

Precautions

⚠ Caution

Do not touch the terminal area of the Relays or the socket terminal area (charged area) while power is ON. Electric shock will result.

Wiring

Turn OFF the G9SA before wiring the G9SA. Do not touch the terminals of the G9SA while the power is turned ON, because the terminals are charged and may cause an electric shock.

Use the following to wire the G9SA.
Stranded wire: 0.75 to 1.5 mm^2
Solid wire: 1.0 to 1.5 mm^2

Tighten each screw to a torque of 0.78 to 1.18 N·m, or the G9SA may malfunction or generate heat.

External inputs connected to T11 and T12 or T21 and T22 of the G9SA-301 must be no-voltage contact inputs.

PE is a ground terminal.

When a machine is grounded at the positive, the PE terminal should not be grounded.

Mounting Expansion Units

Turn OFF the G9SA before connecting the Expansion Unit.

When an Expansion Unit is being used, remove the connector cover from the G9SA Safety Relay Unit (G9SA-301, G9SA-501, G9SA-321□, or G9SA-TH301) and insert the connector of the Expansion Unit's connector cable.

Applicable Safety Category (EN954-1)

G9SA-series Relays meet the requirements of Safety Category 4 of the EN954-1 standards when they are used as shown in the examples provided by OMRON. The Relays may not meet the standards in some operating conditions. The OFF-delay output of models G9SA-321-T□ and EX031-T□, however, conform to Safety Category 3.

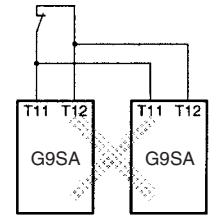
The applicable safety category is determined from the whole safety control system. Make sure that the whole safety control system meets EN954-1 requirements.

Mounting Multiple Units

When mounting multiple Units close to each other, the rated current will be 3 A. Do not apply a current higher than 3 A.

Connecting Inputs

If using multiple G9SA models, inputs cannot be made using the same switch. This is also true for other input terminals.



Earth Short

A positive thermistor is built into the G9SA circuits, so you can detect earth short breakdowns and breakdown shorts between channel 1 and channel 2. If the short breakdown is canceled, reset is automatic.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

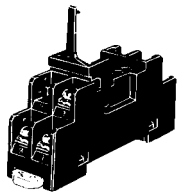
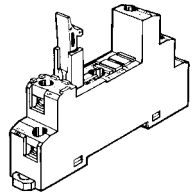
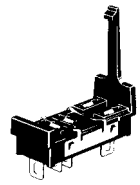
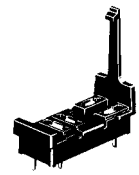
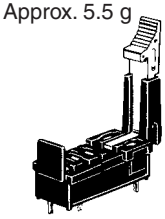
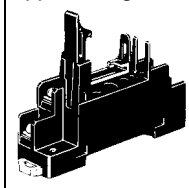
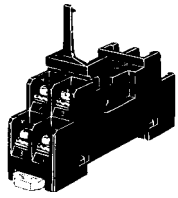
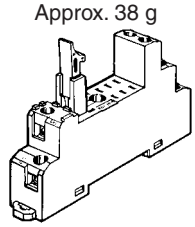
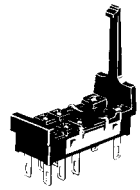
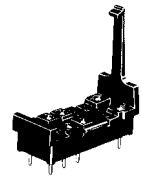
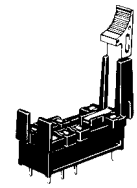
Cat. No. J121-E1-03

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

General-purpose Relays and Power Relays

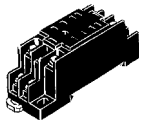
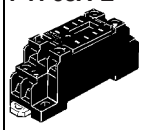
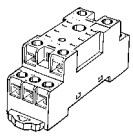
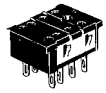
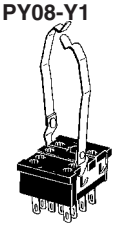
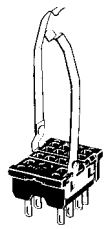
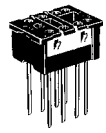
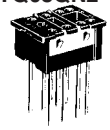
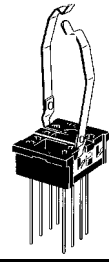
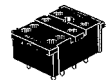
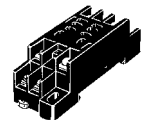
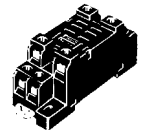
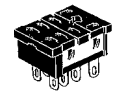
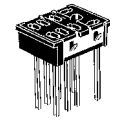
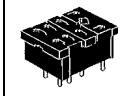
Sockets

Square Sockets

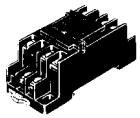
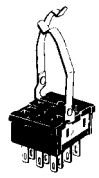
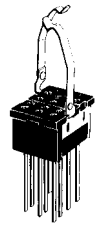
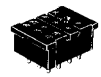
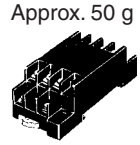
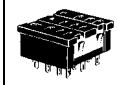
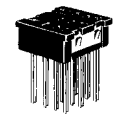
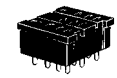
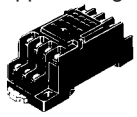
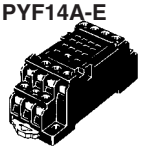
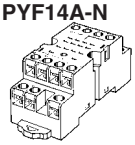
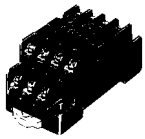
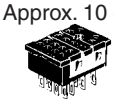
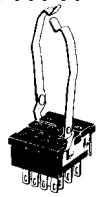
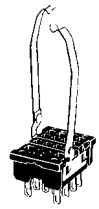
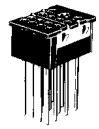
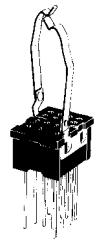
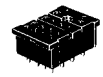
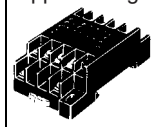
Item	P2RF (Track-mounting) *see page 246		P2R *see page 248			P7TF (Track-mounting) *see page 249
	Screw terminal		Solder terminal	PCB terminal		Screw terminal
5 pins	**P2RF-05** Approx. 27 g 	**P2RF-05-E** Approx. 38 g 	**P2R-05A** Approx. 5 g 	**P2R-05P** Approx. 5 g 	**P2R-057P** Approx. 5.5 g 	**P7TF-05** Approx. 28 g 
8 pins	**P2RF-08** Approx. 33 g 	**P2RF-08-E** Approx. 38 g 	**P2R-08A** Approx. 5 g 	**P2R-08P** Approx. 5 g 	**P2R-087P** Approx. 5.5 g 	---

Note: □-E Models are of finger-protect construction. Round terminals cannot be used. Use Y-shaped terminals.

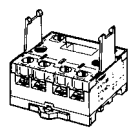
Square Sockets

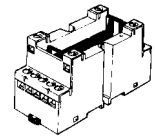
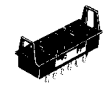
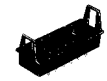
Item	PYF (Track-mounting) *see page 250	PY (back-connecting) *see page 252			PTF (Track-mounting) *see page 253	PT (back-connecting) *see page 255		
	Screw terminal	Solder terminal	Wrapping terminal	PCB terminal	Screw terminal	Solder terminal	Wrapping terminal	PCB terminal
8 pins	**PYF08A** Approx. 32 g  **PYF08A-E**  **PYF08A-N** 	**PY08** Approx. 8 g  **PY08-Y1**  **PY08-Y3** 	**PYQ08QN** Approx. 12 g  **PYQ08QN2**  **PYQ08QN-Y1** **PYQ08QN2-Y1** 	**PY08-02** Approx. 7.2 g 	**PTF08A** Approx. 39 g  **PTF08A-E** 	**PT08** Approx. 11 g 	**PT08QN** Approx. 10.4 g 	**PT08-0** Approx. 8 g 

Note: □-E and □-N Models are of finger-protect construction. Round terminals cannot be used. Use Y-shaped terminals.

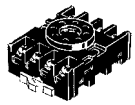
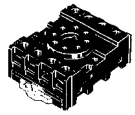
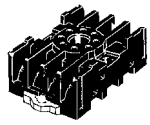
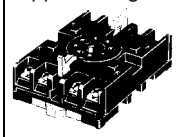
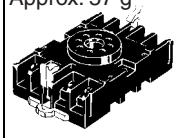
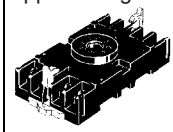
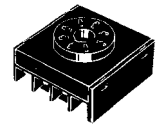
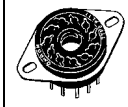
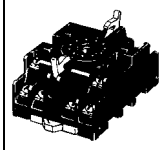
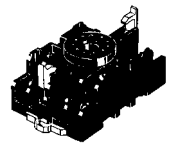
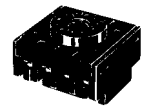
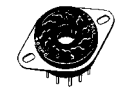
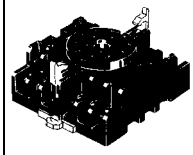
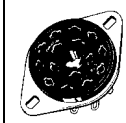
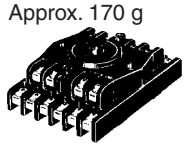
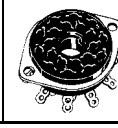
Item	PYF (Track-mounting) *see page 250	PY (back-connecting) *see page 252			PTF (Track-mounting) *see page 253	PT (back-connecting) *see page 255		
	Screw terminal	Solder terminal	Wrapping terminal	PCB terminal	Screw terminal	Solder terminal	Wrapping terminal	PCB terminal
11 pins	**PYF11A** Approx. 46 g 	**PY11** Approx. 9 g  **PY11-Y1** 	**PY11QN** **PY11QN2**  **PY11QN-Y1** **PY11QN2-Y1** 	**PY11-02** 	**PTF11A** Approx. 50 g 	**PT11** Approx. 13 g 	**PT11QN** 	**PT11-0** Approx. 12.2 g 
14 pins	**PYF14A** Approx. 49 g  **PYF14A-E**  **PYF14A-N**  **PYF14T** Approx. 53 g 	**PY14** Approx. 10 g  **PY14-Y1**  **PY14-Y2** 	**PY14QN** **PY14QN2** Approx. 14 g  **PY14QN-Y1** **PY14QN2-Y1** **PY14QN-Y2** **PY14QN2-Y2** 	**PY14-02** 	**PTF14A** Approx. 60 g  **PTF14A-E** 	**PT14** Approx. 17 g 	**PT14QN** Approx. 20 g 	**PT14-0** Approx. 16.2 g 

Note: □-E and □-N Models are of finger-protect construction. Round terminals cannot be used. Use Y-shaped terminals.

Item	P7LF (Track-mounting) *see page 256
	Screw terminal
6 pins	**P7LF-06** Approx. 60 g 

Item	P7S *see page 257		
	Screw terminal (Track-mounting)	Solder terminal	PCB terminal
14 pins	**P7S-14F** Approx. 75 g 	**P7S-14A** Approx. 10 g 	**P7S-14P** Approx. 10 g 

Round Sockets

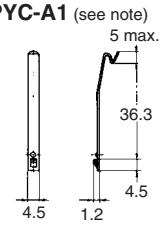
Item	PF (Track-mounting) *see page 258	P2CF (Track-mounting)	PFA (Track-mounting)	P3G (Track-mounting)	PL (back-connecting) *see page 261		
					Solder terminal	Wrapping terminal	PCB terminal
8 pins	**PF083A** Approx. 34 g  **PF083A-E**  **PF085A** Approx. 40 g 	**P2CF-08** Approx. 55 g 	**8PFA** Approx. 57 g  **8PFA1** Approx. 66 g 	**P3G-08** Approx. 40 g 	**PL08** Approx. 14 g 	**PL08-Q** Approx. 15 g 	**PLE08-0** Approx. 10.6 g 
11 pins	**PF113A** Approx. 47 g  **PF113A-E** 	**P2CF-11** Approx. 70 g 	**11PFA** Approx. 74 g 	**P3GA-11** (see note) Approx. 47 g 	**PL11** Approx. 15 g 	**PL11-Q** Approx. 18.5 g 	**PLE11-0** Approx. 10.8 g 
14 pins	---	---	**14PFA** Approx. 104 g 	---	**PL15** Approx. 28 g 	---	---
20 pins	**PF202** Approx. 170 g 	---	---	---	**PL20** Approx. 17 g 	---	---

Note: This model succeeds the P3G-11 for which production was stopped in March 1991.

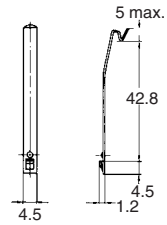
■ Hold-down Clips

For Square Sockets

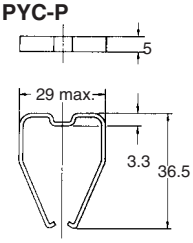
PYC-A1 (see note)



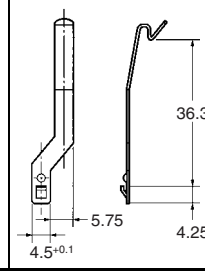
PYC-A2 (see note)



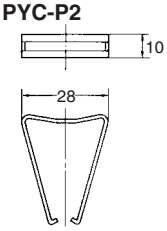
PYC-P



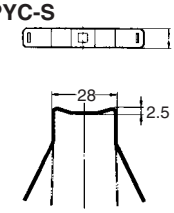
PYC-E1 (see note)



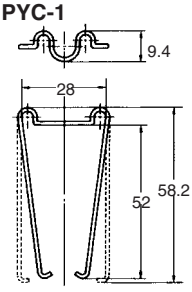
PYC-P2



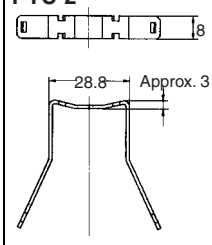
PYC-S



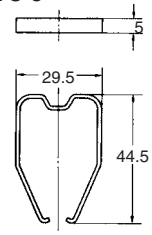
PYC-1



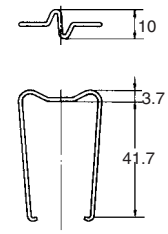
PYC-2



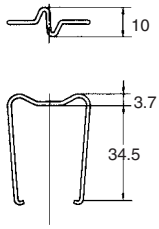
PYC-3



PYC-5

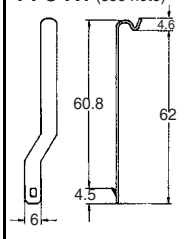


PYC

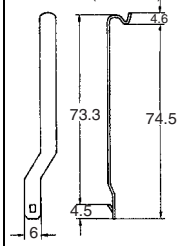


For Round Sockets

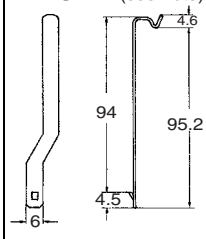
PFC-A1 (see note)



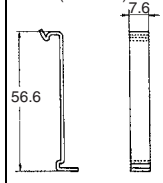
PEC-A6 (see note)



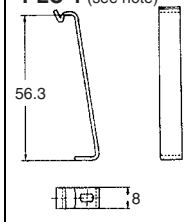
PEC-A7 (see note)



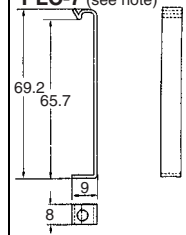
PLC (see note)



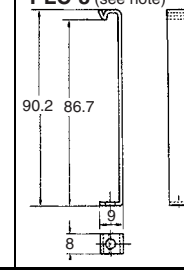
PLC-1 (see note)



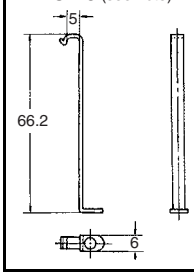
PLC-7 (see note)



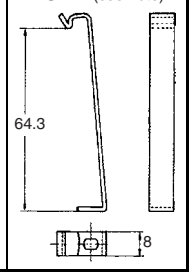
PLC-8 (see note)



PLC-10 (see note)



PLC-12 (see note)



Note: There are 2 pieces per set.

■ Models Used with Sockets

Group	Model	Pin No.	Socket	
			Front-connecting	Back-connecting
MY(K)	MY2	8	PYF	PY
	MY3	11		
	MY4, MY2K	14		
LY	LY1, LY2	8	PTF	PT
	LY3	11		
	LY4	14		
G2A(K)	G2A, G2A-434, G2AK	14	PYF	PY
MK(K)	MK2P	8	PF083A(-E)	PL
	MK3P, MK2KP	11	PF113A(-E)	
MM(K)	MM2(X)P	8	8PFA	
	MM3P, MM2(X)KP	11	PFA	
	MM3XP, MM3(X)KP, MM4(X)P, MM4(X)KP	14		
G4Q	---	8	8PFA1	
G7L	G7L-□A-T(J)	6	P7LF	---

■ Models Used with Hold-down Clips

Square Sockets

Item	PYF□A(-E, -N), PTF□A(-E)	PY□(QN), PT□(QN)	PY□-02, PT□-0
MY( ), MY( )N, MY( )N-D2, MY( )N-CR, MY2K, LY( ), LY( )N, G3H, G3F, G3FD, G3FM	PYC-A1	PYC-P, PYC-S	PYC-P
MY4IN		PYC-P, PYC-P2	PYC-P, PYC-P2
MY2IN	PYC-E1	PYC-P2	PYC-P2
LY( )-CR	Y92H-3	PYC-1	PYC-1
G2A(K) Series	PYC-A2	PYC-2, PYC-3, PYC-5	PYC-3, PYC-5

Note: Pin numbers 08, 11, or 14 apply to □.

Round Sockets

Item	PF083A, PF113A	PL08(-Q), PL11(-Q)	PLE08-0, PLE11-0
MK2P Series, MK2KP, MK3P□ (-US), G3B	PFC-A1	PLC	PLC-10
MK3ZP, MK3LP		PLC-1	
MYA-NA1, -NB1, MYA-LA1, -LB1, MYA-NA2, -NB2 MYA-LA2, -LB2	PFC-A6	PLC-7	---
MYA-LA12, -LB12	PFC-A7	PLC-8	---

Note: 1. 8PFA(I), 11PFA, and 14PFA has hooks that can hold a Relay.

2. PL15, PL20, PF202, and Sockets that are not listed in the above table should be mounted to a panel after opening mounting holes on the panel.

3. A Hold-down Clip for PF085A is sold together with Relays that can be used with PF085A.

■ Socket Performance Characteristics

Item	Carry current	Dielectric strength	Insulation resistance (see note 2)
P2RF-05(-E)	10 A	Between contacts of same polarity: 1,000 VAC for 1 min Between coil and contact: 4,000 VAC for 1 min	1,000 MΩ min.
P2RF-08(-E)	5 A	Between contact of different polarity: 3,000 VAC for 1 min Between contacts of same polarity: 1,000 VAC for 1 min Between coil and contact: 4,000 VAC for 1 min	1,000 MΩ min.
P2R-057P	10 A	Between contacts of same polarity: 1,000 VAC for 1 min Between coil and contact: 5,000 VAC for 1 min	1,000 MΩ min.
P2R-087P	5 A	Between contact of different polarity: 3,000 VAC for 1 min Between contacts of same polarity: 1,000 VAC for 1 min Between coil and contact: 5,000 VAC for 1 min	1,000 MΩ min.
P2R-05A	10 A	Between contacts of same polarity: 1,000 VAC for 1 min Between ground terminal and other terminals: 1,500 VAC for 1 min Between coil and contact: 4,000 VAC for 1 min	1,000 MΩ min.
P2R-08A	5 A	Between contact of different polarity: 3,000 VAC for 1 min Between contacts of same polarity: 1,000 VAC for 1 min Between ground terminal and other terminals: 1,500 VAC for 1 min Between coil and contact: 4,000 VAC for 1 min	1,000 MΩ min.
P7TF-05	5 A	Between terminals: 2,000 VAC for 1 min	100 MΩ min.
PYF08A-E	7 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
PYF08A-N	7 A (see note 3)	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
PYF11A	5 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
PYF14A-E	5 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
PYF14A-N	5 A (see note 3)	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
PY08(-Y1)	7 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY08QN(-Y1)	7 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY08-02	7 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY11(-Y1)	5 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY11QN(-Y1)	5 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY11-02	5 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY14(-Y1)	3 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY14QN(-Y1)	3 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PY14-02	3 A	Between terminals: 1,500 VAC for 1 min	100 MΩ min.
PTF□□A	10 A	Between terminals: 2,000 VAC for 1 min	100 MΩ min.
PT□□	10 A	Between terminals: 2,000 VAC for 1 min	100 MΩ min.
PT□□QN	10 A	Between terminals: 2,000 VAC for 1 min	100 MΩ min.
PT□□-0	10 A	Between terminals: 2,000 VAC for 1 min	100 MΩ min.

Item	Carry current	Dielectric strength	Insulation resistance (see note 2)
P7LF-06	30 A	Between contact of different polarity: 2,000 VAC for 1 min Between contacts of same polarity: 2,000 VAC for 1 min Between coil and contact: 4,000 VAC for 1 min	1,000 MΩ min.
PF□□□A	5 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
P2CF	5 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
P3G(A)	6 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
8PFA(1)	10 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
11PFA(1)	10 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
PL□□(-Q)	10 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
PLE□□-0	10 A	Between terminals: 2,000 VAC for 1 min	1,000 MΩ min.
P6D-04P	5 A	Between contacts of same polarity: 1,000 VAC for 1 min Between coil and contact: 3,000 VAC for 1 min	100 MΩ min.
P7S-14□	6 A	Between terminals: 2,500 VAC for 1 min Between ground terminal and other terminals (P7S-14A): 2,000 VAC for 1 min	100 MΩ min.

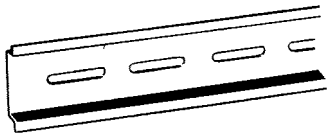
Note: 1. The values given above are initial values.

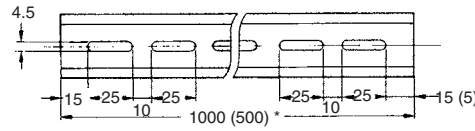
2. The values for insulation resistance were measured at 500 V at the same place as the dielectric strength.

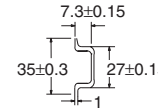
3. The maximum operating ambient temperature for the PYF08A-N and PYF14A-N is 55°C. When using the PYF08A-N or PYF14A-N at an operating ambient temperature exceeding 40°C, reduce the current to 60%.

■ Track and Accessories

Mounting Track
PFP-100N
PFP-50N

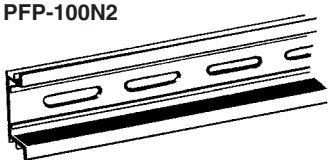


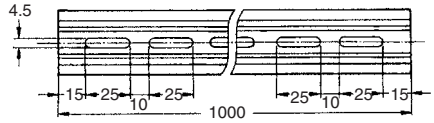


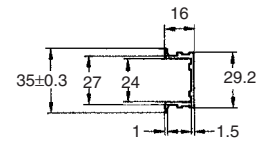


Note: The figure in the parentheses is for PFP-50N.

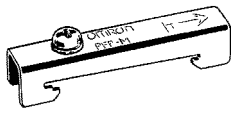
Mounting Track
PFP-100N2

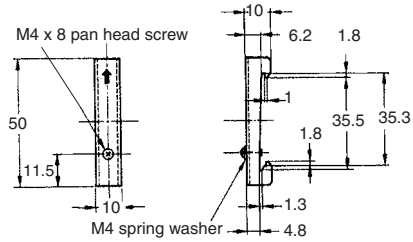




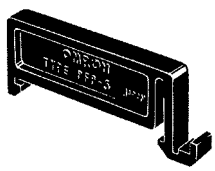


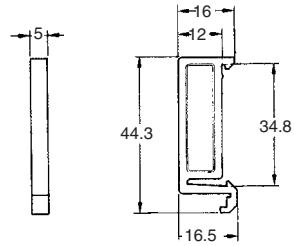
End Plate
PFP-M





Spacer
PFP-S

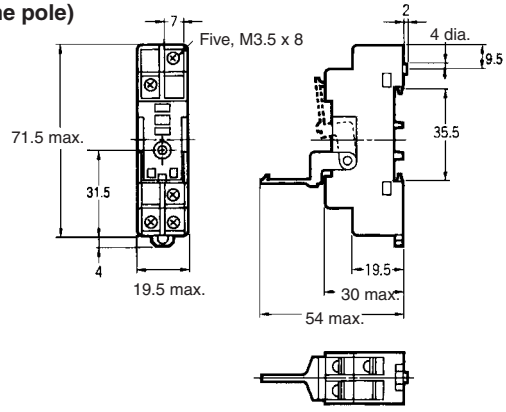
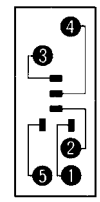
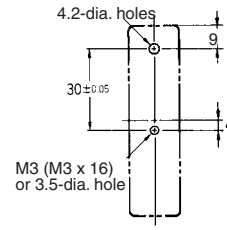
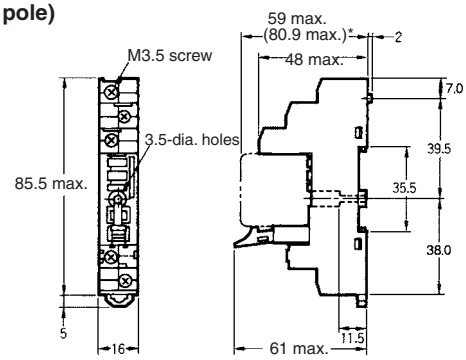
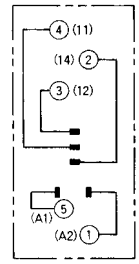
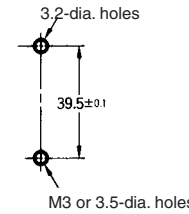
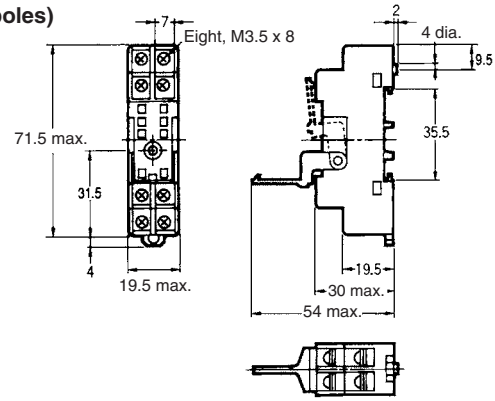
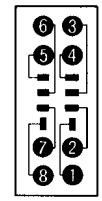
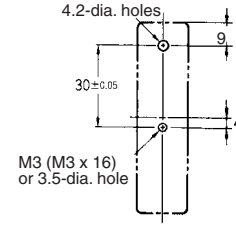


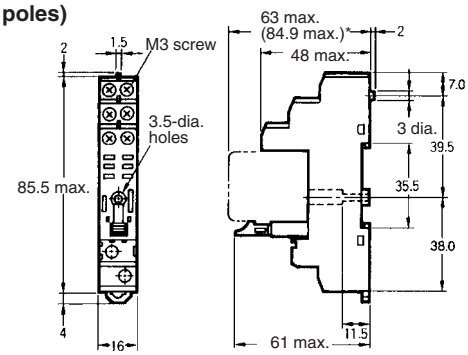
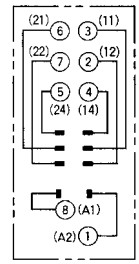
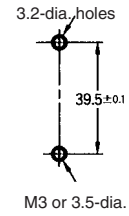


Dimensions

Note: All units are in millimeters unless otherwise indicated.

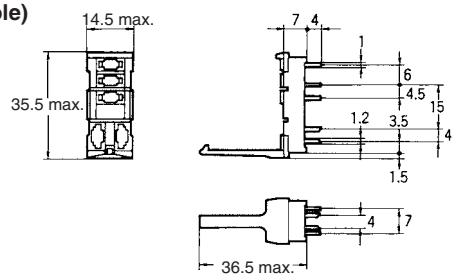
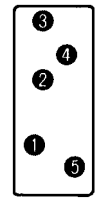
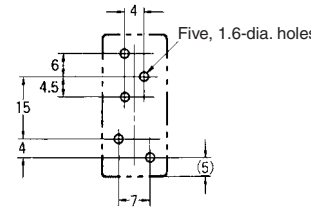
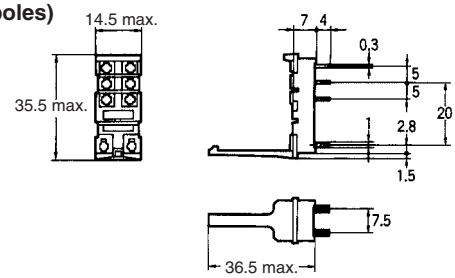
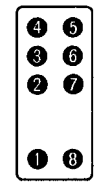
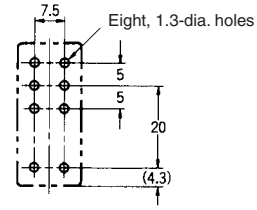
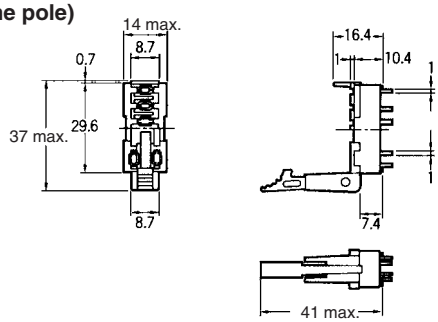
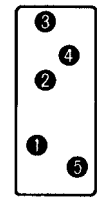
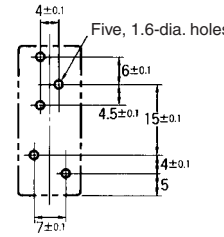
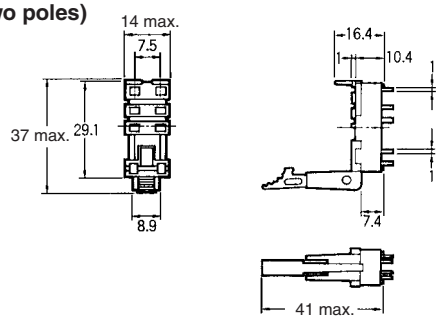
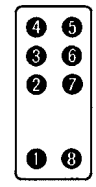
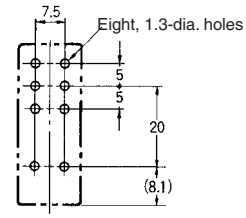
■ P2RF

Dimensions	Terminal arrangement/Internal connections (top view)	Mounting holes (top view)
P2RF-05 (One pole) 		 **Note:** Track-mounting is also possible.
P2RF-05-E (One pole)  * When mounted on H3RN-1□.	 **Note:** Figures in parentheses are DIN standard numbers.	 **Note:** Track-mounting is also possible.
P2RF-08 (Two poles) 		 **Note:** Track-mounting is also possible.

Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes (top view)
P2RF-08-E (Two poles)  * When mounted on H3RN-2□.	 **Note:** Figures in parentheses are DIN standard numbers.	 **Note:** Track-mounting is also possible.

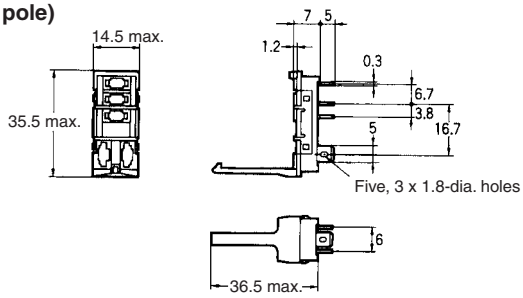
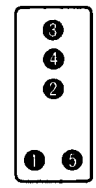
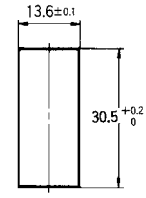
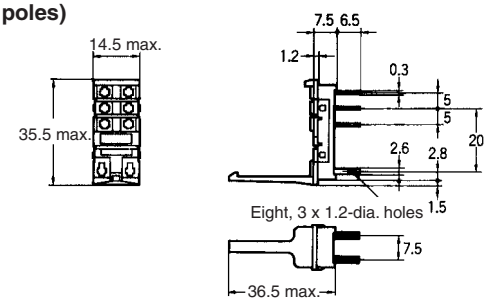
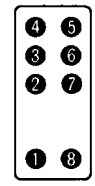
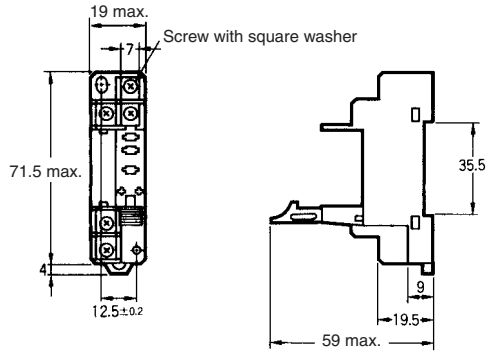
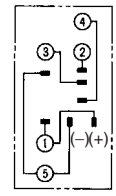
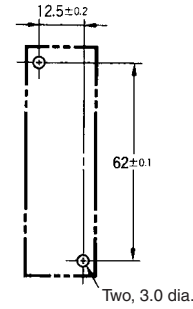
Note: When indicator modules with an I/O SSR are used, the No. 1 pin becomes positive.

■ P2R

Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes (bottom view)
P2R-05P (One pole) 		
P2R-08P (Two poles) 		
P2R-057P (One pole) 		
P2R-087P (Two poles) 		

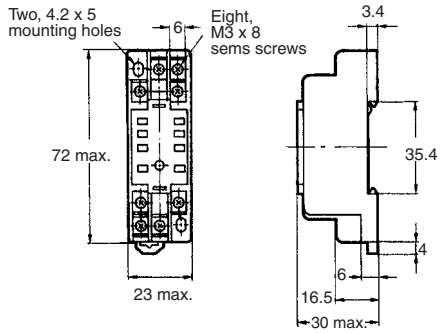
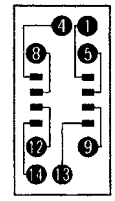
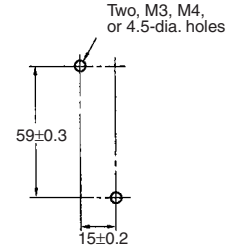
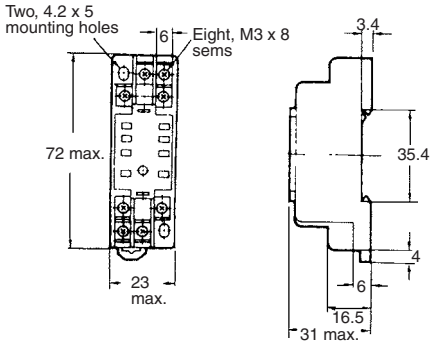
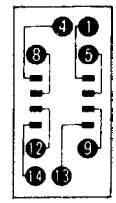
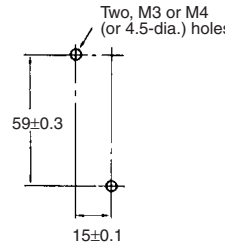
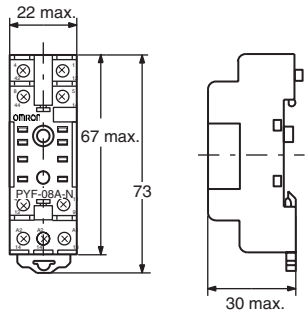
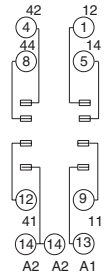
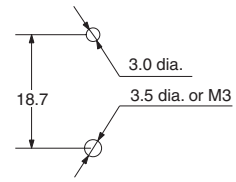
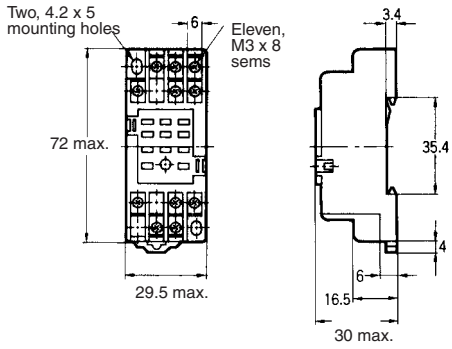
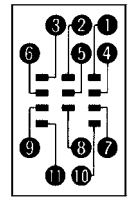
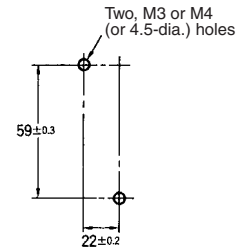
Note: When indicator modules with an I/O SSR are used, the No. 1 pin becomes positive.

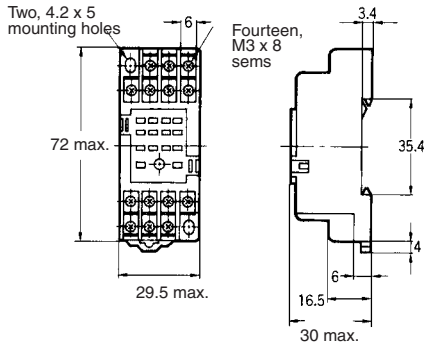
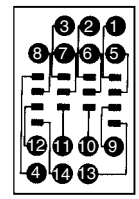
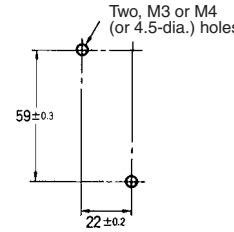
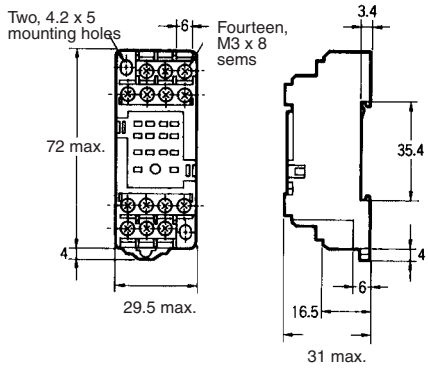
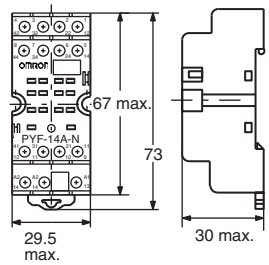
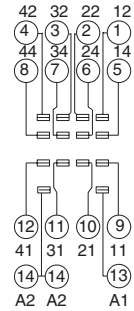
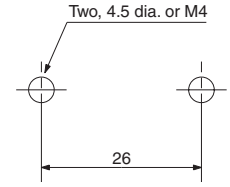
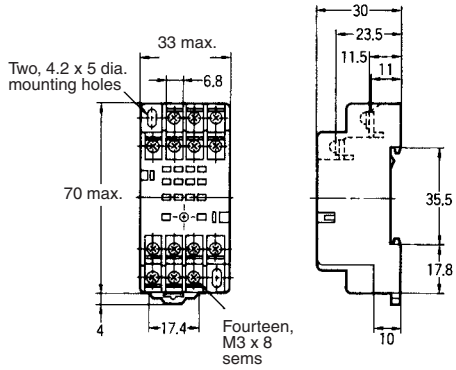
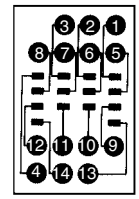
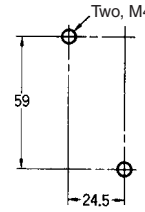
■ P2R/P7TF

Dimensions	Terminal arrangement/ Internal connections	Mounting holes
P2R-05A (One pole) 	 **(Bottom view)**	 Use panel with thickness of 1.6 to 2.0 mm.
P2R-08A (Two poles) 	 **(Bottom view)**	
P7TF-05 	 **(Top view)**	 **(Top view)** **Note:** Track-mounting is also possible.

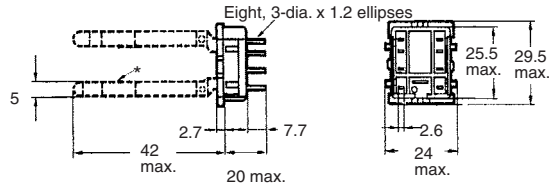
Note: When indicator modules with an I/O SSR are used, the No. 1 pin becomes positive.

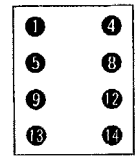
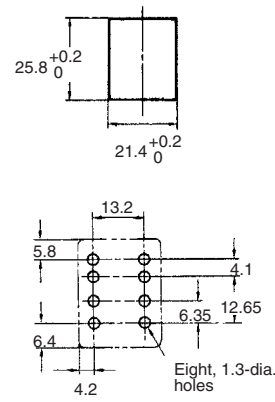
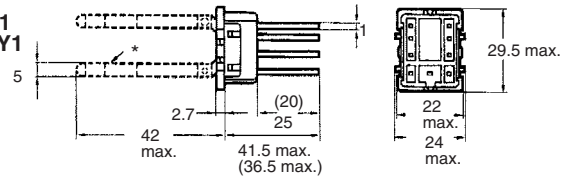
■ PYF Dimensions

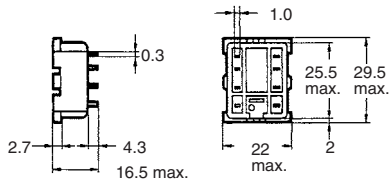
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes (top view)
PYF08A 		 **Note:** Track-mounting is also possible.
PYF08A-E 		 **Note:** Track-mounting is also possible.
PYF08A-N 		 **Note:** Track-mounting is also possible. Refer to page 245 for Mounting Tracks.
PYF11A 		 **Note:** Track-mounting is also possible.

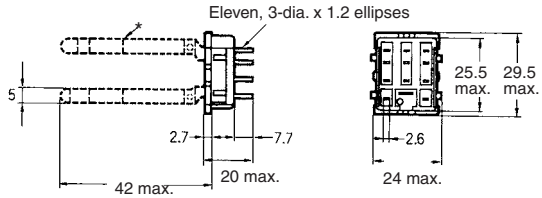
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes (top view)
PYF14A 		 **Note:** Track-mounting is also possible.
PYF14A-E 		
PYF14A-N 		 **Note:** Track-mounting is also possible. Refer to page 245 for Mounting Tracks.
PYF14T 		 **Note:** Track-mounting is also possible.

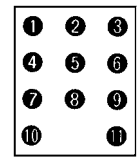
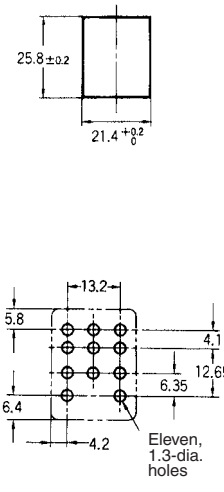
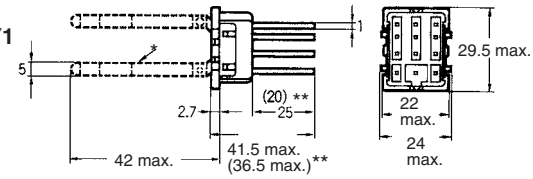
■ PY Dimensions

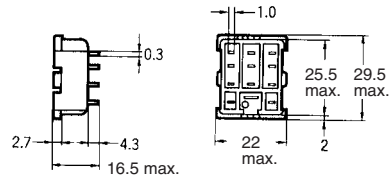
<table>
<tr><th>Dimensions</th><th>Terminal arrangement/
Internal connections
(bottom view)</th><th>Mounting holes</th></tr>
<tr><td>PY08
PY08-Y1
PY08-Y3
 

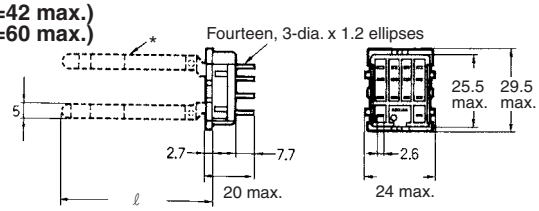
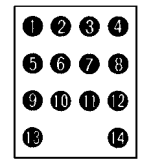
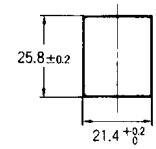
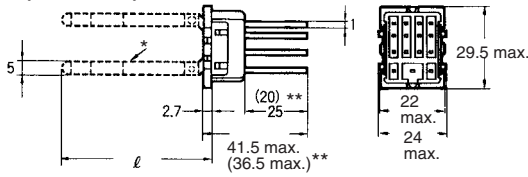
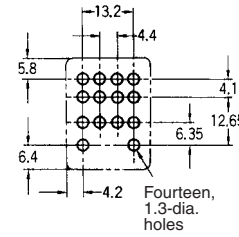
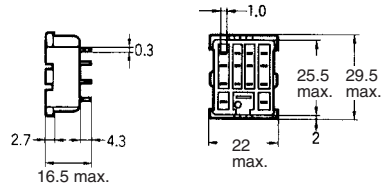
Note: PY08-Y1 includes the part outlined by the dashed lines above.</td><td rowspan="4">  </td><td rowspan="4"> 
</td></tr>
<tr><td>PY08QN
PY08QN2
PY08QN-Y1
PY08QN2-Y1
 

Note: 1. PY08QN(2)-Y1 includes the part outlined by the dashed lines above.
2 The figures in the parentheses are for PY08QN2.</td></tr>
<tr><td>PY08-02
 

Note: PY08-Y1 includes the part outlined by the dashed lines above.</td></tr>
<tr><td>PY11
PY11-Y1
 

Note: PY11-Y1 includes the part outlined by the dashed lines above.</td><td rowspan="2">  </td><td rowspan="2"> 
</td></tr>
<tr><td>PY11QN
PY11QN2
PY11QN-Y1
PY11QN2-Y1
 

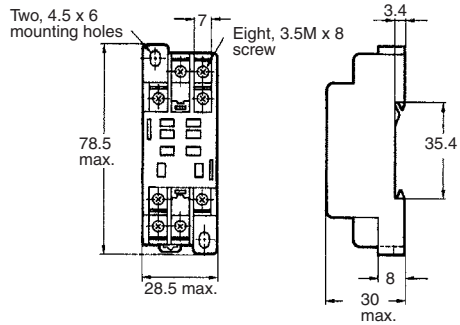
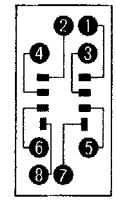
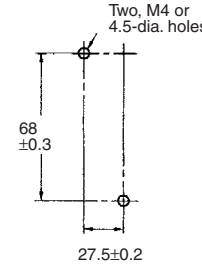
Note: 1. PY11QN(2)-Y1 includes the part outlined by the dashed lines above.
2 The figures in the parentheses are for PY11QN2 (-Y1).</td></tr>
<tr><td>PY11-02
 
</td></tr>
</table>

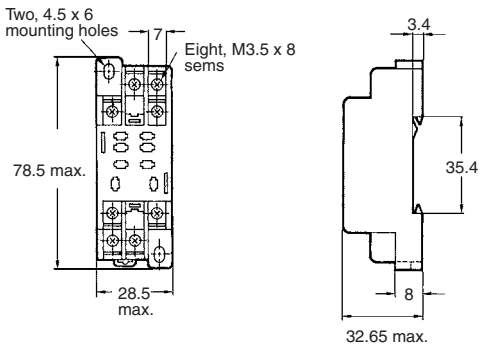
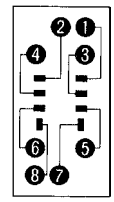
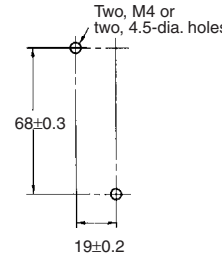
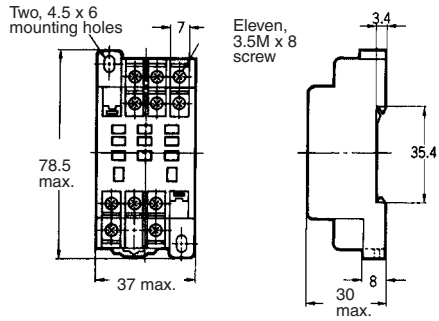
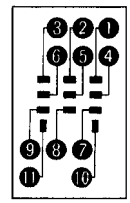
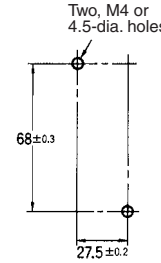
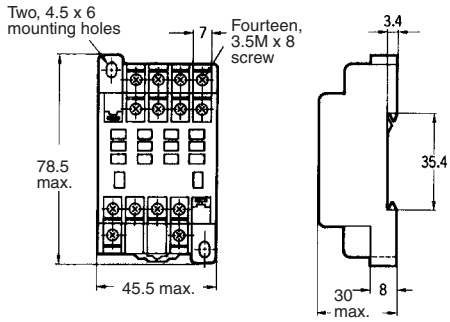
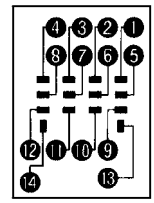
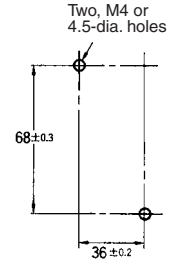
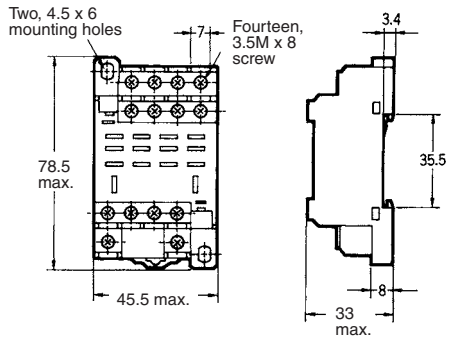
Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PY14 **PY14-Y1 (ℓ=42 max.)** **PY14-Y3 (ℓ=60 max.)**  **Note:** PY14-Y1 includes the part outlined by the dashed lines above.		
PY14QN, PY14QN2 **PY14QN-Y1 (ℓ=42 max.)** **PY14QN2-Y1 (ℓ=42 max.)** **PY14QN-Y2 (ℓ=49 max.)** **PY14QN2-Y2 (ℓ=49 max.)** **PY14QN-Y3 (ℓ=60 max.)** **PY14QN2-Y3 (ℓ=60 max.)**  **Note:** 1. PY11QN(2)-Y1 includes the part outlined by the dashed lines above. 2 The figures in the parentheses are for PY11QN2 (-Y1).		
PY14-02 		

Note: **1.** Use a panel with a thickness of 1 to 2 mm when mounting a Socket on it.

2. The PY14-Y1 and the PY14QN-Y1 can be used with MY4-series models and the MY2K.

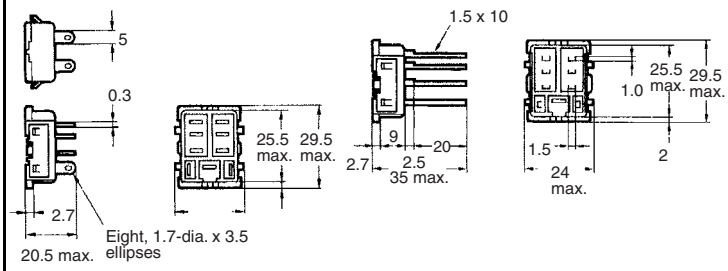
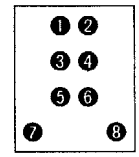
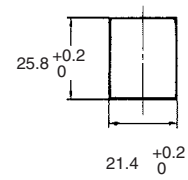
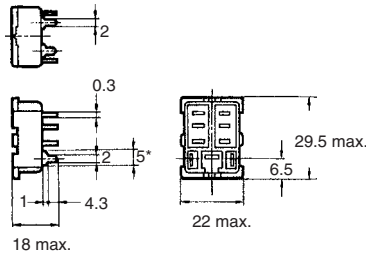
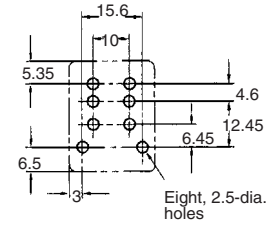
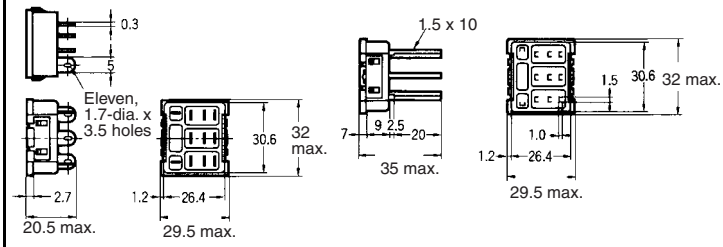
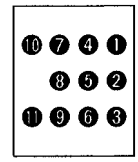
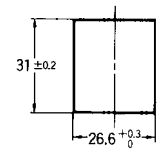
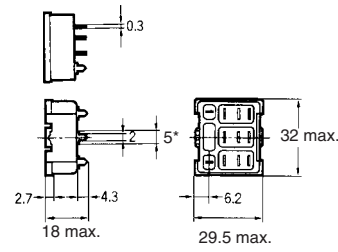
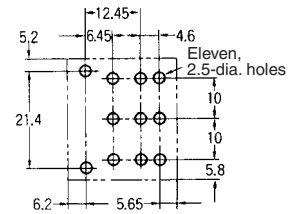
■ PTF Dimensions

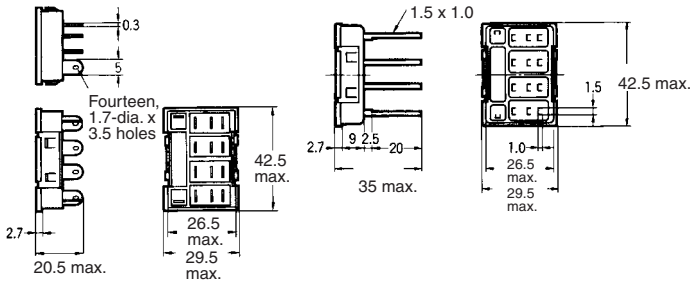
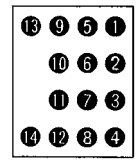
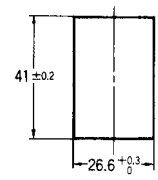
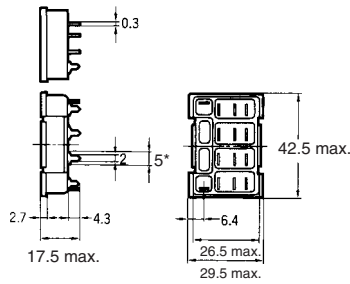
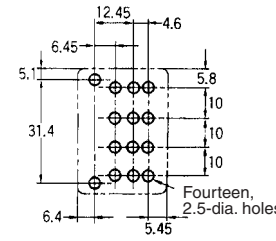
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes (top view)
PTF08A 		 **Note:** Track-mounting is available. See page 245.

Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes (top view)
PTF08A-E 		 **Note:** Track-mounting is available. See page 245.
PTF11A 		 **Note:** Track-mounting is available. See page 245.
PTF14A 		 **Note:** Track-mounting is available. See page 245.
PTF14A-E 		

Note: If PTF08A and PT08 are used in combination with LY1 with a total current flow of 10 A minimum, terminals 1 and 2, 3 and 4, 5 and 6 respectively should be short-circuited.

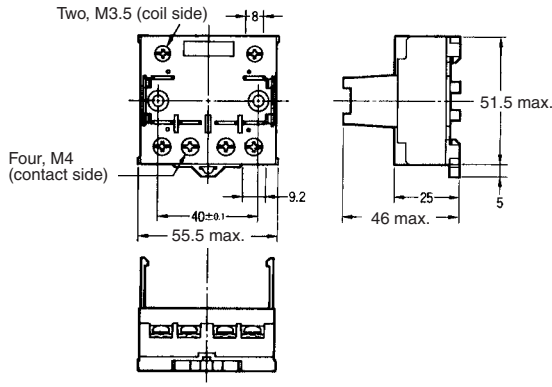
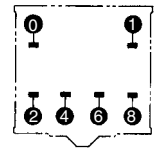
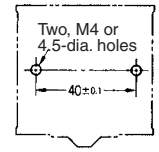
■ PT Dimensions

Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PT08 **PT08QN** 		
PT08-0  *Keep a proper distance between the Socket and PCB patterns.		 The tolerance is ±0.1.
PT11 **PT11QN** 		
PT11-0  *Keep a proper distance between the Socket and PCB patterns.		 The tolerance is ±0.1.

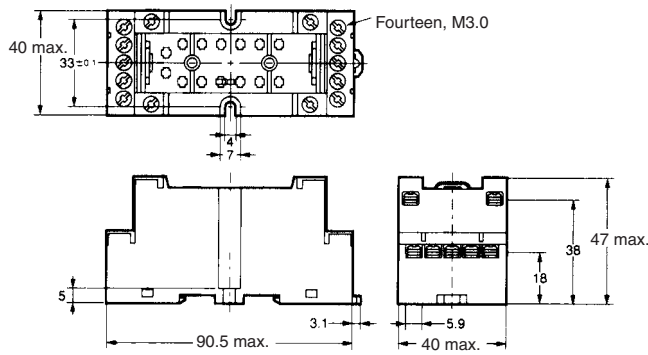
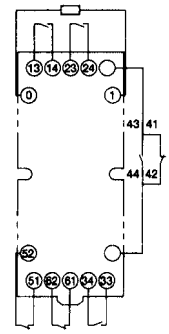
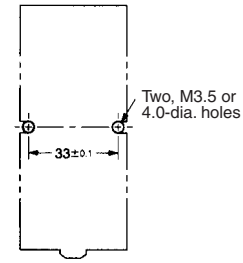
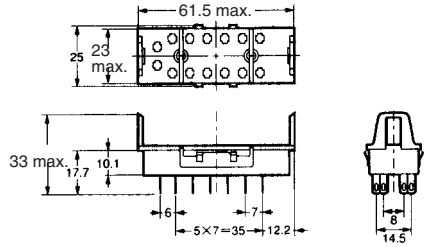
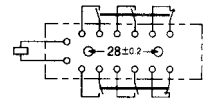
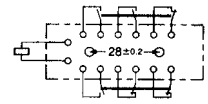
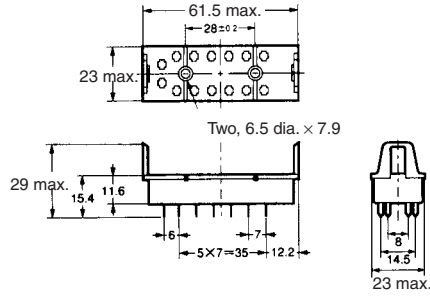
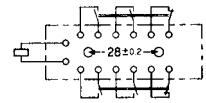
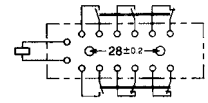
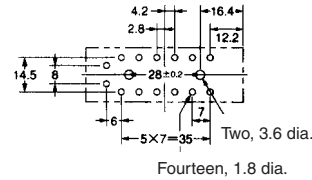
Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PT14 **PT14QN** 		
PT14-0  *Keep a proper distance between the Socket and PCB patterns.		 The tolerance is ±0.1.

Note: Use a panel with a thickness of 1 to 2 mm when mounting a Socket on it.

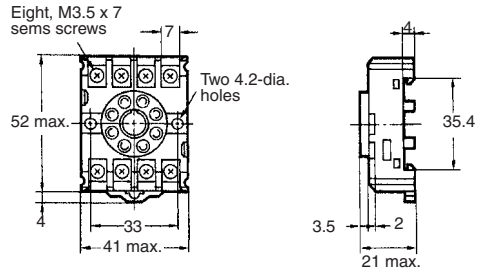
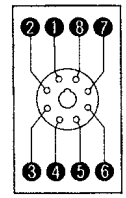
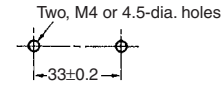
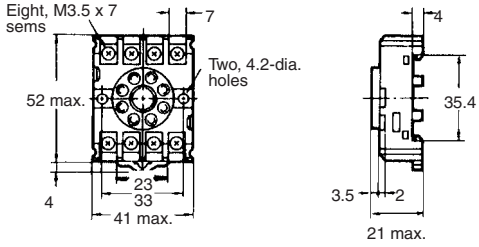
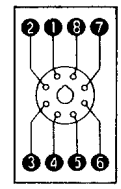
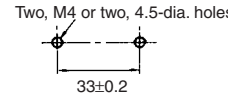
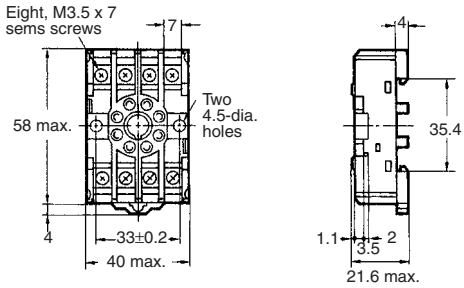
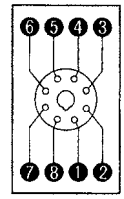
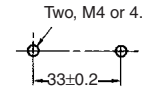
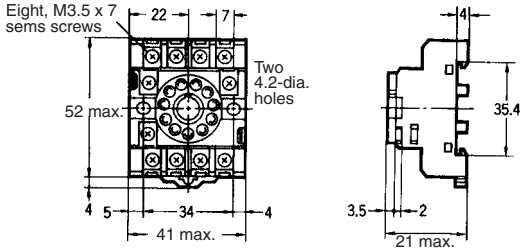
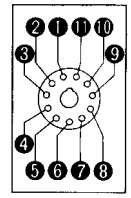
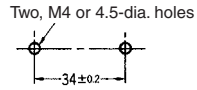
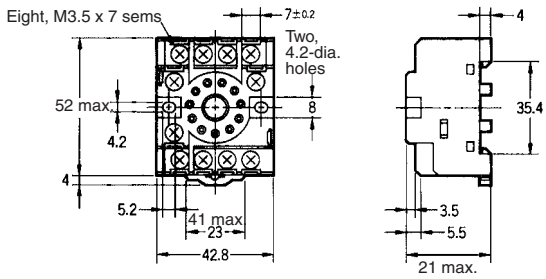
■ P7LF Dimensions

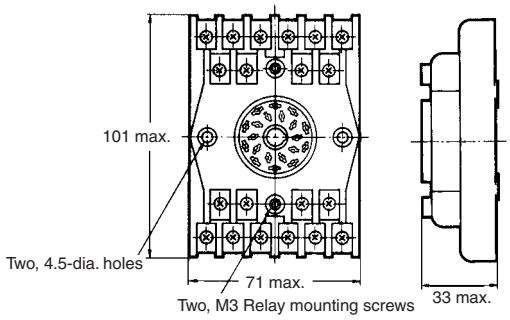
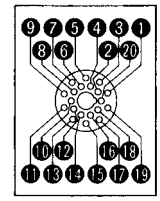
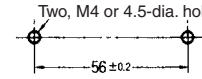
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
P7LF-06 		

■ P7S Dimensions

Dimensions	Terminal arrangement/ Internal connections	Mounting holes
P7S-14F 	 (top view)	
P7S-14A 	G7S-4A2B  G7S-3A3B  (bottom view)	
P7S-14P 	G7S-4A2B  G7S-3A3B  (bottom view)	

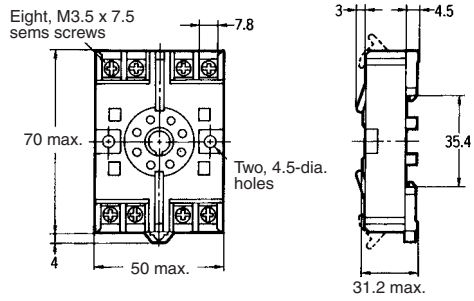
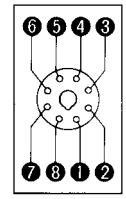
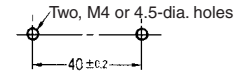
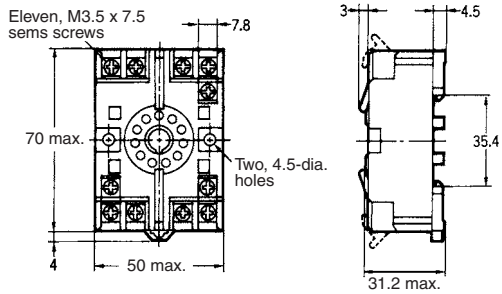
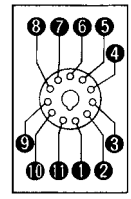
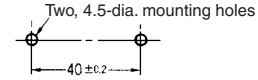
■ PF Dimensions

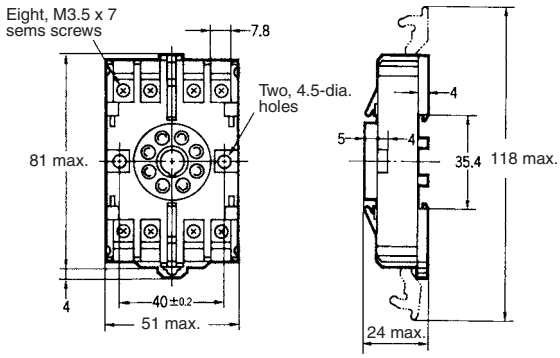
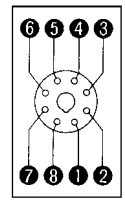
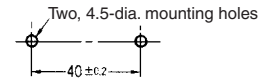
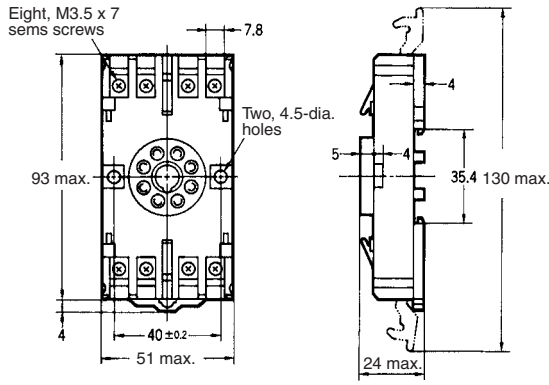
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
PF083A 		 **Note:** Track-mounting is available. See page 245.
PF083A-E 		
PF085A 		 **Note:** Track-mounting is available. See page 245.
PF113A 		 **Note:** Track-mounting is available. See page 245.
PF113A-E 		

Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
PF202 		

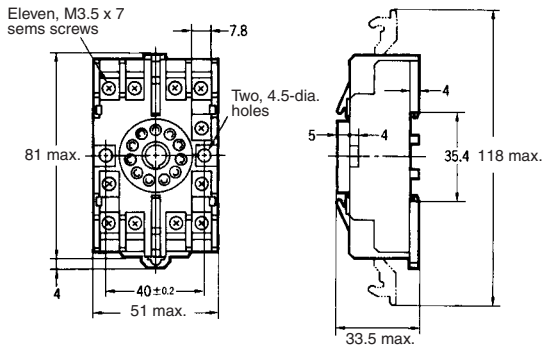
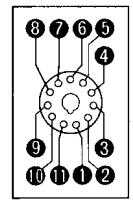
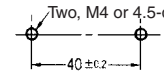
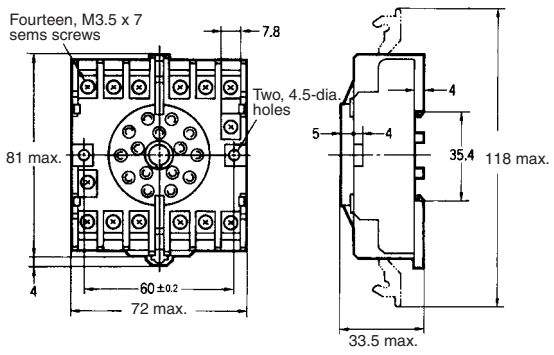
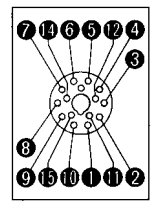
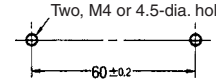
Note: The key groove of PF083A and PF113A (used with MK Relays) are on the upside.

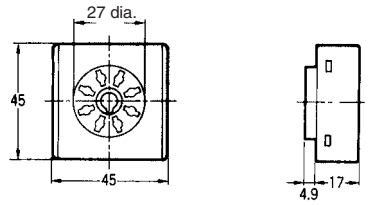
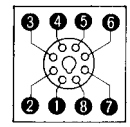
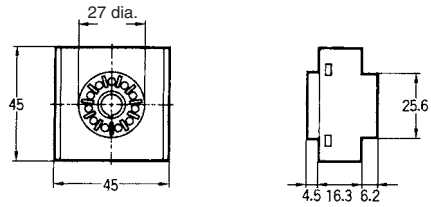
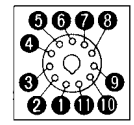
■ P2CF/PFA Dimensions

Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
P2CF-08 		 **Note:** Track-mounting is available. See page 245.
P2CF-11 		 **Note:** Track-mounting is available. See page 245.

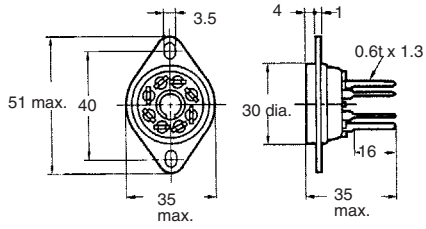
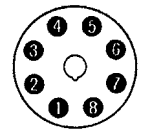
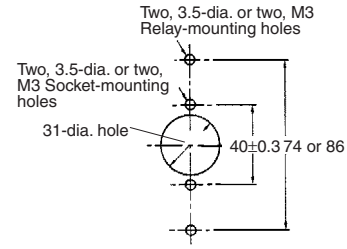
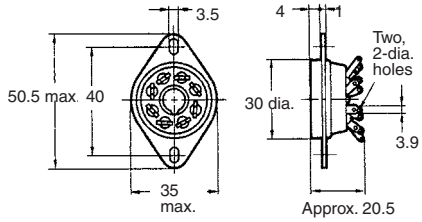
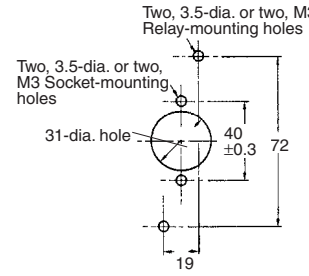
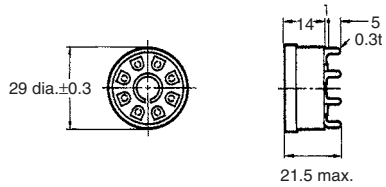
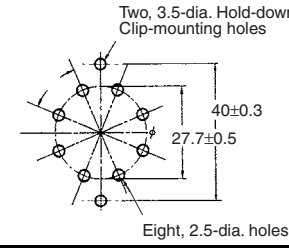
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
8PFA 		 **Note:** Track-mounting is available. See page 245.
8PFA1 		

■ PFA/P3G/P3GA Dimensions

Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
11PFA 		 **Note:** Track-mounting is available. See page 245.
14PFA 		 **Note:** Track-mounting is available. See page 245.

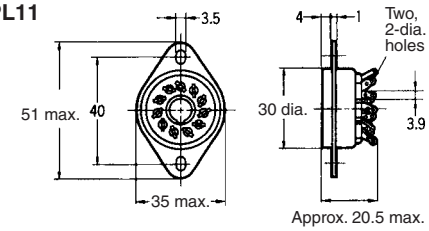
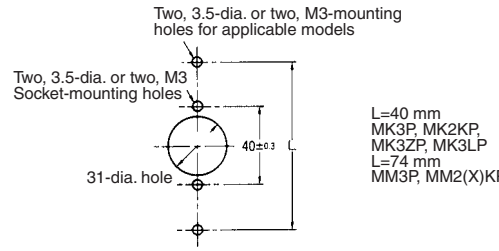
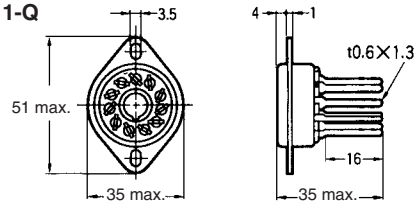
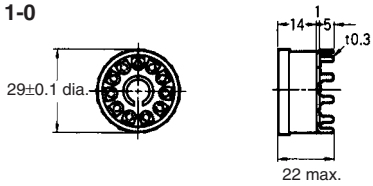
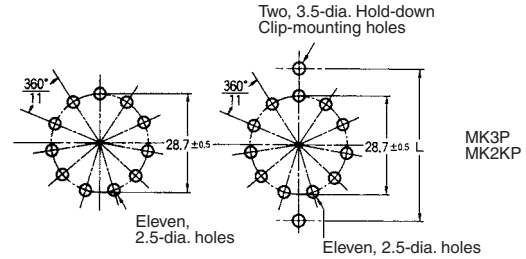
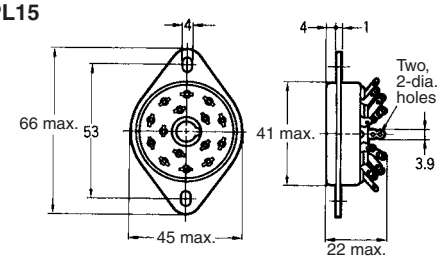
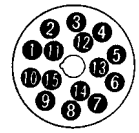
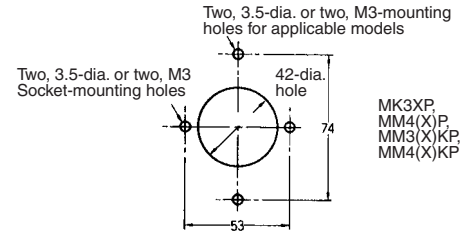
Dimensions	Terminal arrangement/ Internal connections (top view)	Mounting holes
P3G-08 		---
P3GA-11 		---

■ PL Dimensions

Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PL08 		
PL08-Q 		
PLE08-0 		

Note: When mounting, pay due attention to the direction of the key groove of applicable Relays.

■ PL Dimensions

Dimensions	Terminal arrangement/ Internal connections (bottom view)	Mounting holes
PL11 		
PL11-Q 		
PLE11-0 		
PL15 		
PL20