Panasonic
ideas for life

1.5 mm CONTACT GAP. 1 FORM A 22A POWER RELAY

LF-G RELAYS (ALFG)

FEATURES

1. Contact gap: 1.5 mm .059 inch
EN61810-1 certified: 2.5 kV surge breakdown voltage (between contacts)
Compliant with European photovoltaic standard (VDE0126).

2. High capacity
High capacity control possible at 22A 250V AC rating.

3. High insulation resistance
Creepage distance between contact and coil terminal: Min. 8 mm .315 inch
Clearance distance between contact and coil terminal: Min. 6.5 mm .256 inch
Surge breakdown voltage: 6 kV

4. Low coil holding voltage contributes to saving energy of equipment
The coil holding voltage can be reduced up to 45% of the nominal coil voltage.
Power consumption at the lowest coil holding voltage: 280 mW equivalent
*Coil holding voltage is the coil voltage after 100 ms from the applied nominal coil voltage.
*When the ambient temperature during use is 85°C 185°F, make the coil holding voltage between 45% and 80% of the nominal coil voltage.

5. Conforms to the safety standard
VDE approved

TYPICAL APPLICATIONS

1. Photovoltaic power generation systems
2. Uninterruptible Power Supplies (UPS)
3. Home appliances
4. Office equipment

RoHS Directive compatibility information
http://www.mew.co.jp/ac/e/environment/

ORDERING INFORMATION

ALFG [1] [P] [F] [ ] [ ]

LF-G relay

Contact arrangement
1: 1 Form A

Terminal shape
P: PCB type

Coil insulation class
F: UL Class F (standard)

Coil voltage (DC)
09: 9V, 12: 12V, 18: 18V, 24: 24V

Note: VDE approved type is standard.

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LF-G (ALFG)

TYPES

Contact arrangement	Nominal coil voltage	Part No.
1 Form A	9V DC	ALFG1PF09
	12V DC	ALFG1PF12
	18V DC	ALFG1PF18
	24V DC	ALFG1PF24

Standard packing: Carton: 50 pcs.; Case: 200 pcs.

RATING

1. Coil data

Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. allowable voltage (at 20°C 68°F)
9V DC	70%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	155.2mA	58Ω	1,400mW	120%V of nominal voltage
12V DC			116.5mA	103Ω		
18V DC			78.3mA	203Ω		
24V DC			58.6mA	410Ω		

2. Specifications

Characteristics	Item		Specifications
Contact	Arrangement		1 Form A
	Initial contact resistance, max.		Max. 100 mΩ (By voltage drop 6 V DC 1A)
	Contact material		$AgSnO_2$ type
Rating	Nominal switching capacity (resistive load)		22A 250V AC
	Max. switching power (resistive load)		5,500VA
	Max. switching voltage		250V AC
	Max. switching current		22A (AC)
	Min. switching capacity*1		100mA 5V DC
Electrical characteristics	Contact gap (Initial)		Min. 1.5 mm .059 inch
	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC)
	Breakdown voltage (Initial)	Between open contacts	2,500 Vrms for 1 min. (Detection current: 10 mA)
		Between contact and coil	4,000 Vrms for 1 min. (Detection current: 10 mA)
	Surge breakdown voltage*2 (Between contact and coil)		6,000 V (initial)
	Temperature rise		Max. 95°C 203°F (By resistive method, nominal voltage applied to the coil; contact carrying current: 22A, at 60°C 140°F) Max. 70°C 158°F (By resistive method, 80%V of nominal voltage applied to the coil; contact carrying current: 22A, at 85°C 185°F)
	Coil holding voltage*3		45 to 100%V (contact carrying current: 22A, at 60°C 140°F) 45 to 80%V (contact carrying current: 22A, at 85°C 185°F)
	Operate time (at nominal voltage) (at 20°C 68°F)		Max. 20 ms (excluding contact bounce time.)
	Release time (at nominal voltage) (at 20°C 68°F)		Max. 10 ms (excluding contact bounce time.) (without diode)
Mechanical characteristics	Shock resistance	Functional	Min. 100 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.)
		Destructive	Min. 1,000 m/s² (Half-wave pulse of sine wave: 6 ms.)
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 1.5 mm (Detection time: 10μs.)
		Destructive	10 to 55 Hz at double amplitude of 1.5 mm
Expected life	Mechanical		Min. 10^6 (at 180 cpm)
	Electrical	Resistive load	22A 250V AC, Min. 3×10^4 (at 20 cpm)
		Inductive load (Destructive)	22A 250V AC ($\cos\phi$ = 0.8), Min. 3×10^4 (on:off = 0.1s:10s)
		Inductive load (Over load)	35A 250V AC ($\cos\phi$ = 0.8), Min. 50 (on:off = 0.1s:10s)
Conditions	Conditions for operation, transport and storage*4		Ambient temperature: –40°C to +60°C –40°F to +140°F (–40°C to +85°C –40°F to +185°F, Coil holding voltage is when 45 to 80%V of nominal coil voltage is applied.) Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) Air pressure: 86 to 106 kPa
	Max. operating speed		20 cpm (at rated load)
Unit weight			Approx. 23 g .81 oz

Notes: *1 This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.
*2 Wave is standard shock voltage of ±1.2×50μs according to JEC-212-1981
*3 Coil holding voltage is the coil voltage after 100 ms from the applied nominal coil voltage.
*4 The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to 1. Usage, transport and storage conditions in NOTES.

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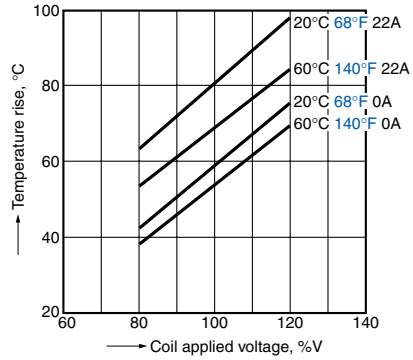
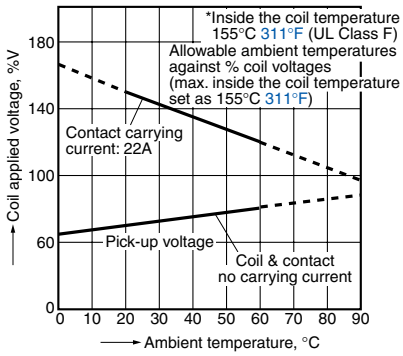
REFERENCE DATA

1. Coil temperature rise

Sample: ALFG1PF09, 6 pcs.
Point measured: coil inside
Ambient temperature: 20°C 68°F, 60°C 140°F
Contact carrying current: 22A



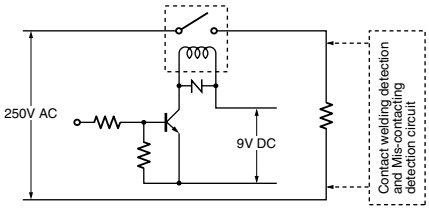
2. Ambient temperature characteristics and coil applied voltage



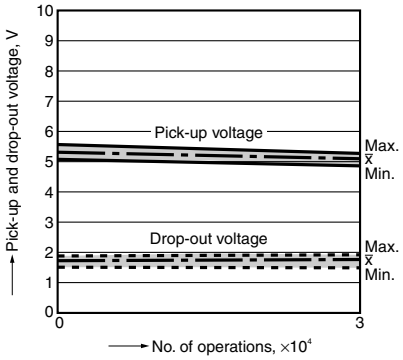
3. Electrical life test
(22A 250V AC Resistive load)

Sample: ALFG1PF09, 6 pcs.
Operation frequency: ON:OFF = 1.5s:1.5s
Ambient temperature: 85°C 185°F

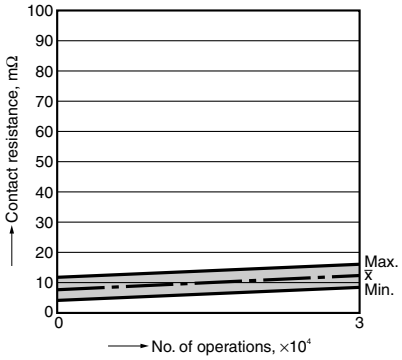
Circuit:



Change of pick-up and drop-out voltage



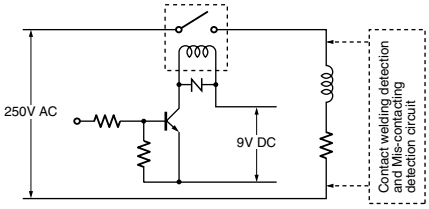
Change of contact resistance



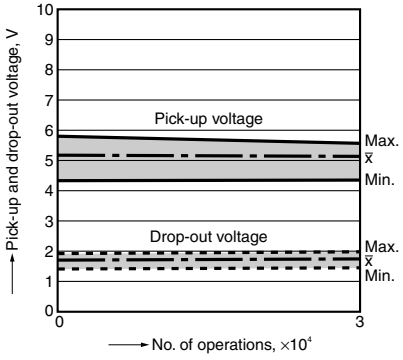
4. Electrical life test
(22A 250V AC cosϕ = 0.8 Inductive load)

Sample: ALFG1PF09, 6 pcs.
Operation frequency: ON:OFF = 0.1s:10s
Ambient temperature: 85°C 185°F

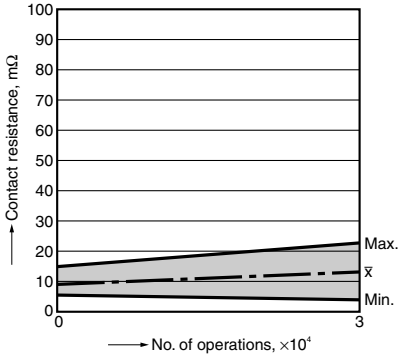
Circuit:



Change of pick-up and drop-out voltage



Change of contact resistance



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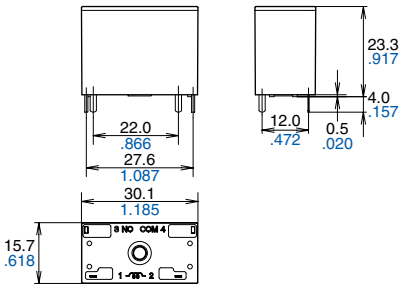
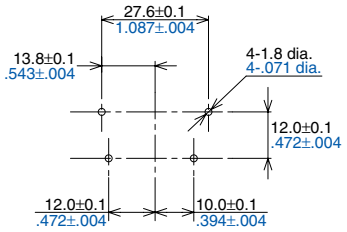
LF-G (ALFG)

DIMENSIONS (Unit: mm inch)

External dimensions



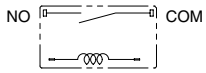
PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

Dimension:	General tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

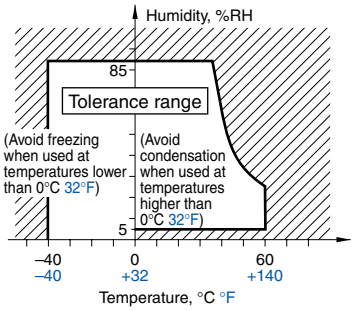
Schematic (Bottom view)



NOTES

1. Usage, transport and storage conditions

1) Temperature:
–40 to +60°C –40 to +140°F
–40 to +85°C –40 to +185°F (When coil holding voltage is 45% to 80% of the nominal coil voltage)
2) Humidity: 5 to 85% RH
(Avoid freezing and condensation.)
The humidity range varies with the temperature. Use within the range indicated in the graph below.
3) Atmospheric pressure: 86 to 106 kPa
Temperature and humidity range for usage, transport, and storage



4) Condensation
Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.
5) Freezing
Condensation or other moisture may freeze on the relay when the temperatures is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.
6) Low temperature, low humidity environments
The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

2. Solder and cleaning conditions

1) Please obey the following conditions when soldering automatically.
(1) Preheating: Within 120°C 248°F (solder surface terminal portion) and within 120 seconds
(2) Soldering iron: 260°C±5°C 500°F±41°F (solder temperature) and within 6 seconds (soldering time)
2) Since this is not a sealed type relay, do not clean it as is. Also, be careful not to allow flux to overflow above the PC board or enter the inside of the relay.

3. Certification

1) This relay is VDE certified.
2) This relay, when used at the nominal current of 10A, complies with the Electrical Appliance and Material Safety Law (300 V AC).
The terminals of this relay can only be connected with solder.

4. Others

1) For precautions regarding use and explanations of technical terminology, please refer to “Relay Technical Data Book”.
2) To ensure good operation, please keep the voltage on the coil ends to ±5% (at 20°C 68°F) of the rated coil operation voltage. Also, please be aware that the pick-up voltage and drop-out voltage may change depending on the temperature and conditions of use.
3) Keep the ripple rate of the nominal coil voltage below 5%.
4) The cycle lifetime is defined under the standard test condition specified in the JIS C5442 standard (temperature 15 to 35°C 59 to 95°F, humidity 25 to 75%). Check this with the real device as it is affected by coil driving circuit, load type, activation frequency, activation phase, ambient conditions and other factors.
Also, be especially careful of loads such as those listed below.
(1) When used for AC load-operating and the operating phase is synchronous. Rocking and fusing can easily occur due to contact shifting.
(2) Highly frequent load-operating
When highly frequent opening and closing of the relay is performed with a load that causes arcs at the contacts, nitrogen and oxygen in the air is fused by the arc energy and HNO_3 is formed. This can corrode metal materials.
Three countermeasures for these are listed here.
• Incorporate an arc-extinguishing circuit.
• Lower the operating frequency
• Lower the ambient humidity
5) Heat, smoke, and even a fire may occur if the relay is used in conditions outside of the allowable ranges for the coil ratings, contact ratings, operating cycle lifetime, and other specifications. Therefore, do not use the relay if these ratings are exceeded.
6) If the relay has been dropped, the appearance and characteristics should always be checked before use.
7) Incorrect wiring may cause unexpected events or the generation of heat or flames.

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