

Ground Fault Relay K6EL

CSM_K6EL_DS_E_9_1

Economical, Compact, High-performance, DIN 48 × 48-mm Ground Fault Relay for Low Voltages

- Performs continuous monitoring and detection of ground faults in low-voltage circuits due to the deterioration of insulation in electrical devices.
- Higher reliability ensured with improved resistance to high-frequency noise when used for inverter loads.
- Ground Fault Relays and through-type ZCTs (zero-phase current transformers) are mutually compatible.
- The through-type ZCTs are equipped with test terminals, allowing operation tests for Ground Fault Relays to be performed with ease.



Model Number Structure

■ Model Number Legend

K6EL-

1 2 3

1. Ground Fault Relay

2. Operating Time and Reset Method

None: 0.1 s manual reset

A: 0.3/0.8 s (switchable) manual reset

3. Sensed Current

30: 30 mA (fixed)

50: 50 mA/150 mA (switchable)

100: 100 mA/200 mA (switchable)

200: 200 mA/500 mA (switchable)

500: 500 mA/1,000 mA (switchable)

Ordering Information

■ List of Models

Ground Fault Relays

		Type	High-sensitivity models	Medium-sensitivity models		
Type	Operating time	Sensed current	30 mA (fixed)	100 mA/200 mA (switchable)	200 mA/500 mA (switchable)	500 mA/1,000 mA (switchable)
High-speed models	Less than 0.1 s		K6EL-30	K6EL-100	K6EL-200	K6EL-500
Delayed models	0.3/0.8 s (switchable)		---	K6EL-A100	K6EL-A200	K6EL-A500

ZCTs (Zero-phase Current Transformers)

		Type	Indoor through-type models		Indoor separate-type models	
Rated current	Sensed current		Model	Diameter of through-hole	Model	Diameter of through-hole
50 A			OTG-L21	21 mm	---	---
100 A			OTG-L30	30 mm	---	---
200 A			OTG-L42	42 mm	OTG-CN52	52 mm
400 A			OTG-L68	68 mm	OTG-CN77	77 mm
600 A			OTG-L82	82 mm	OTG-CN112	112 mm
1,000 A			OTG-L156	156 mm	---	---

■ Ground Fault Relay and ZCT Combinations

(OK: Compatible)

Ground Fault Relay	K6EL-30	K6EL-100, -200, -500 K6EL-A100, -A200, -A500
ZCT		
OTG-L21 (50 A)	OK	OK
OTG-L30 (100 A)	OK	OK
OTG-L42 (200 A)	OK	OK
OTG-L68 (400 A)	---	OK
OTG-L82 (600 A)	---	OK
OTG-L156 (1,000 A)	---	OK
OTG-CN52 (200 A)	---	OK
OTG-CN77 (400 A)	---	OK
OTG-CN112 (600 A)	---	OK

Note: 1. "OK" indicates groupings that can be combined freely.
2. Combinations with the OTG-LA□□ are also possible.

■ Options

Flush Mounting Adapters

Model
Y92F-30
Y92F-71

Front Cover

Model
Y92A-48B (Hard Cover)
Y92A-48D(Soft Cover)

Note: The Front Cover can be attached when the Y92F-30 Adapter is used to mount the Ground Fault Relay to a panel.

Specifications

■ Ground Fault Relay Ratings

Item		Type	High-speed models		Delayed models		Delayed high-sensitivity models	
Control power supply			100/110 VAC or 200/220 VAC, 50/60 Hz (same for all)					100 VAC
Rated current			Depends on the ZCT					
Sensed current			50% to 100% of the rated sensed current					
Non-operating current			0% to 50% of the rated sensed current					
Rated short-time current			2,500 A					
Ground fault indication method			LED (red)					
Test method			Relay operation confirmed using a test button. (Independent of ZCT connection.)					
Reset method		Manual	Either press the reset button or turn the control power supply OFF and ON again.					
Built-in contacts	Contact form		SPDT+SPST-NO					SPDT
	Carrying current		5 A					3 A
	Rated load			cosφ = 1	cosφ = 0.4 (L/R = 7 ms)		cosφ = 1	
			240 VAC	5 A	2 A		220 VAC, 3 A	
			110 VDC	0.3 A	0.2 A			
			30 VDC	5 A	3 A			
Power (VA) consumption			3 VA max.					
Weight			Approx. 110 g					

■ Ground Fault Relay Characteristics

Item	Type	High-speed models	Delayed models	Delayed high-sensitivity models
Operating time		Less than 0.1 s	0.3 s/0.8 s (switchable)	Less than 0.5 s
Inertial non-operating time		---	0.1 s when set to 0.3 s 0.5 s when set to 0.8 s	
Control power supply range		80% to 110% of the control power supply voltage		
Operating temperature range		-10 to 55 °C (with no icing)		
Operating humidity range		45% to 85% (with no condensation)		
Insulation resistance		5 MΩ min. at 500 VDC (between charged parts and the mounting panel)		
Dielectric strength		1,500 VAC, 50/60 Hz for 1 min (between charged parts and the mounting panel)		
Lightning impulse dielectric strength		1.2/50 μs, 7,000 V (between control power supply terminals)		
Lightning impulse operation failure		1.2/50 μs, 7,000 V (primary side of ZCT)		
Vibration resistance		Destruction: 16.7 Hz, 4-mm double amplitude for 1 min		
Shock resistance		98 m/s ²		

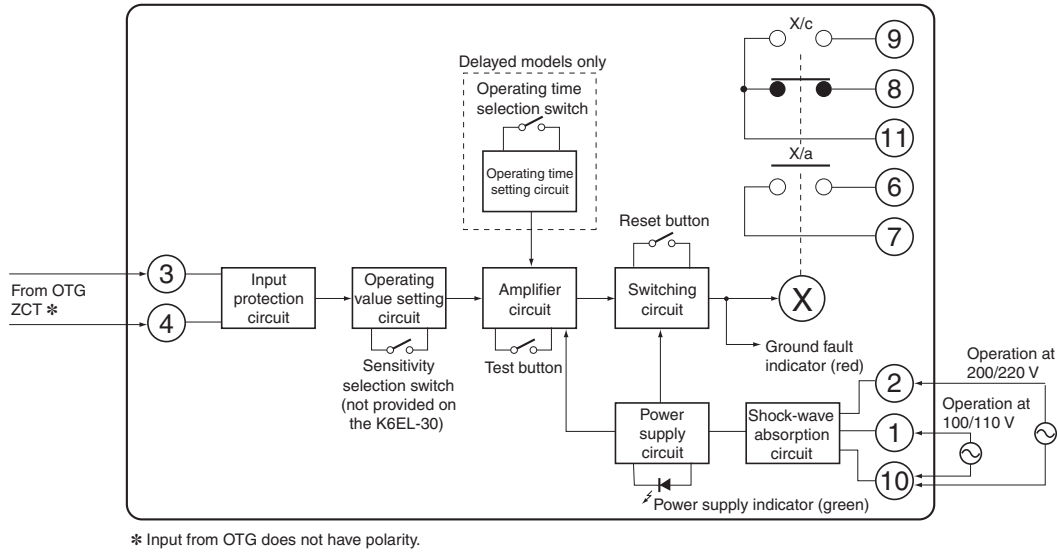
Note: The range for an operating time of 0.3 s is 0.15 to 0.45 s and the range for an operating time of 0.8 s is 0.6 to 1.2 s.

■ ZCT (Zero-phase Current Transformer)

Item	Structure Model	Indoor through-type models					Indoor separate-type models			
		OTG-L21	OTG-L30	OTG-L42	OTG-L68	OTG-L82	OTG-L156	OTG-CN52	OTG-CN77	OTG-CN112
Rated current		50 A	100 A	200 A	400 A	600 A	1,000 A	200 A	400 A	600 A
Diameter of through-hole		21 mm	30 mm	42 mm	68 mm	82 mm	156 mm	52 mm	77 mm	112 mm
Rated voltage		600 VAC max., 50/60 Hz, single-phase/three-phase								
Output terminal polarity		None (The ZCT's output terminals k and l can be connected to either input terminals 3 or 4 of the Relay.) (See note.)								
Insulation resistance		100 MΩ min. (between charged metal parts and ground)								
Dielectric strength		2,200 VAC, 50/60 Hz for 1 min (between charged metal parts and ground)								
Ambient operating temperature		-10 to 60 °C (with no icing)								
Weight		Approx. 90 g	Approx. 130 g	Approx. 230 g	Approx. 480 g	Approx. 700 g	Approx. 6.6 kg	Approx. 1.3 kg	Approx. 2.5 kg	Approx. 3.5 kg

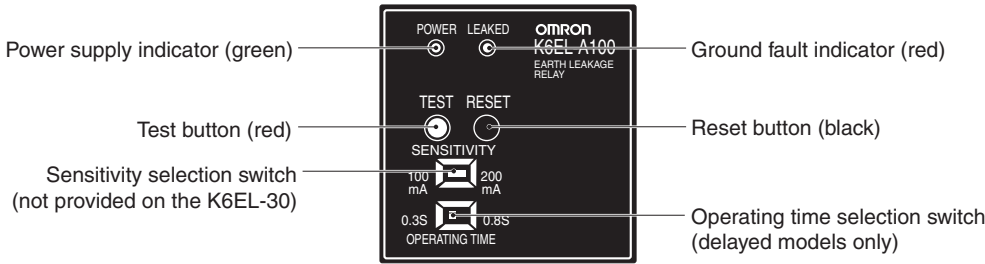
Note: Do not connect ZCT output terminals k and l to ground. Doing so may result in damage to the Relay.

Internal Block Diagram



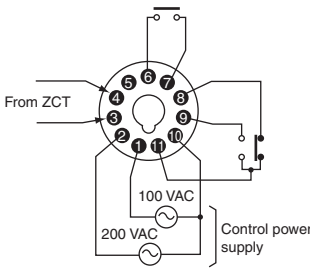
* Input from OTG does not have polarity.

Nomenclature

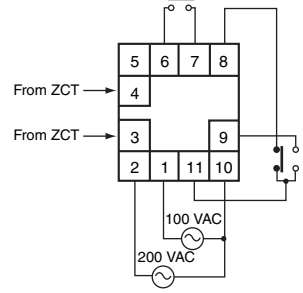


Connections

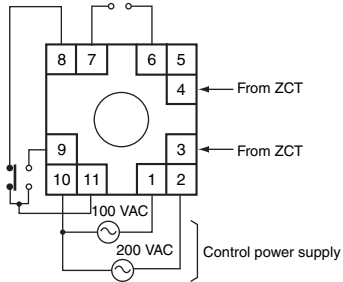
Ground Fault Relay
(from Pin Side)



Ground Fault Relay with P3GA-11
(from Terminal Side)

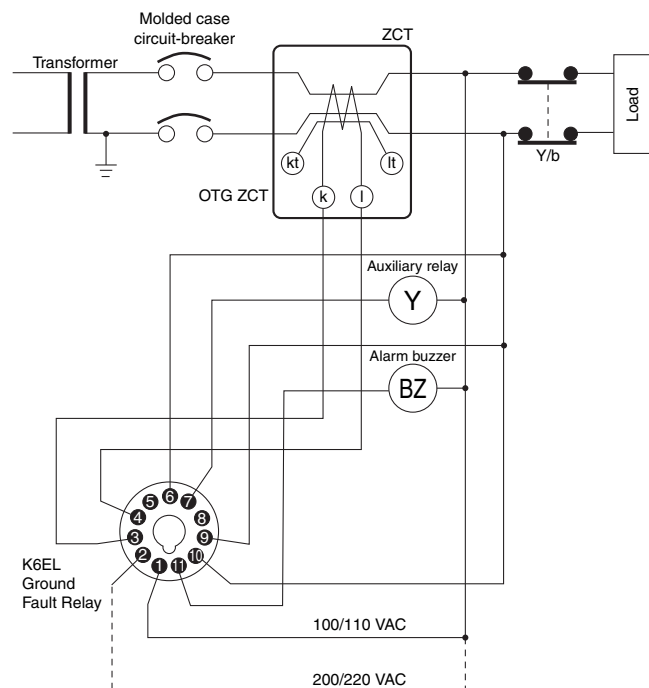


Ground Fault Relay with P2CF-11
(from Terminal Side)

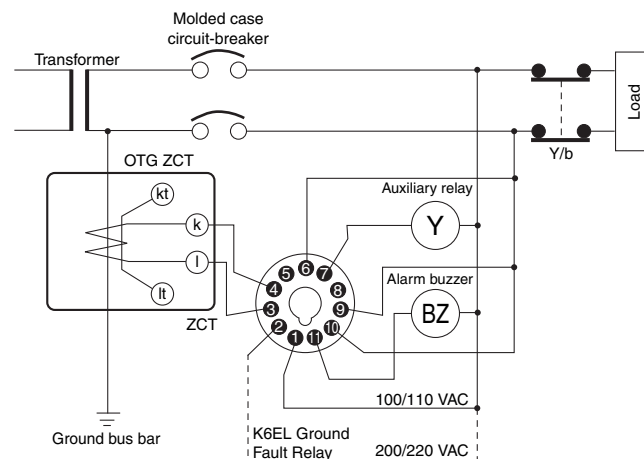


Connection Examples

Installation on the Electrical Path



Installation on a Ground Bus Bar



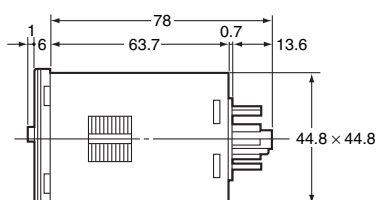
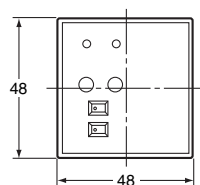
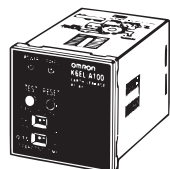
Do not, under any circumstances, connect the k and I lines to ground.

Note: When not using the kt and It terminals (test terminals), leave them unconnected. The Relay may not be able to attain its performance characteristics if used with the kt and It terminals connected.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

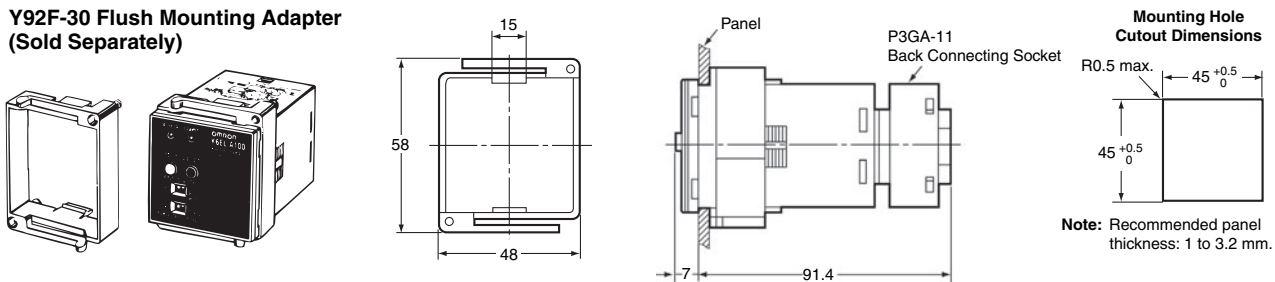
Ground Fault Relay



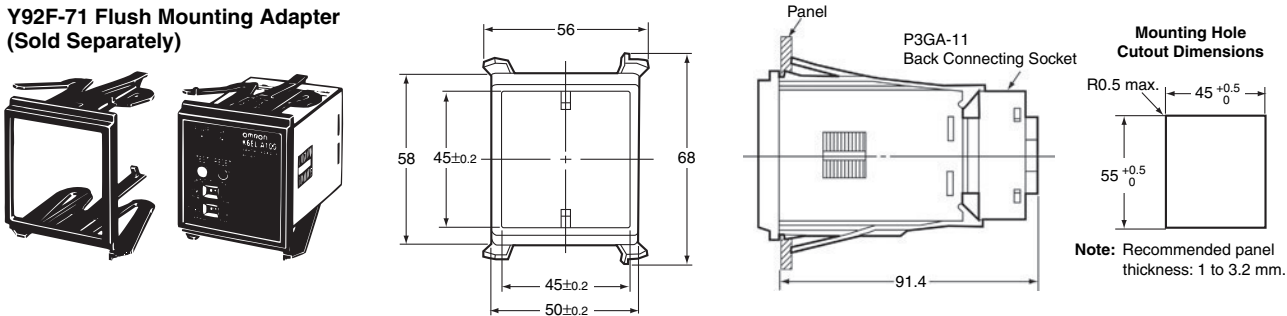
Applicable Connecting Sockets
P2CF-11 Front Connecting Socket
P3GA-11 Back Connecting Socket
PL11 Back Connecting Socket

Dimensions with Adapter Mounted

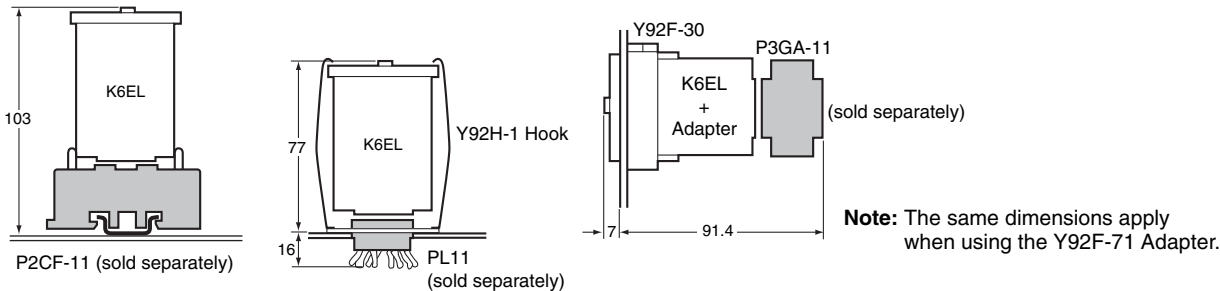
Y92F-30 Flush Mounting Adapter (Sold Separately)



Y92F-71 Flush Mounting Adapter (Sold Separately)

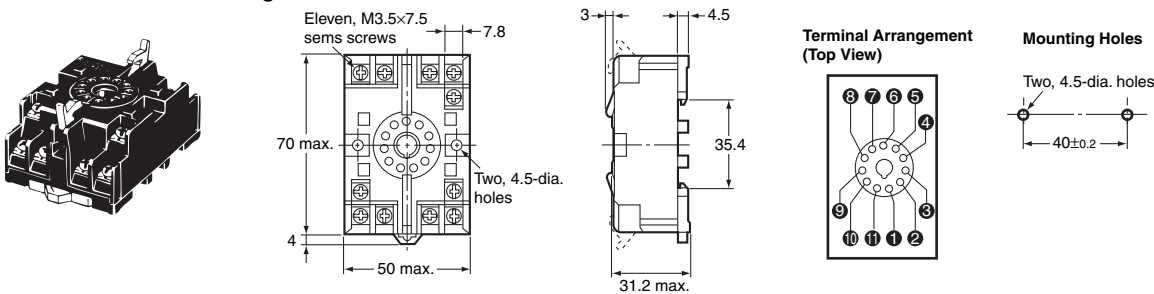


Dimensions for Socket Mounting

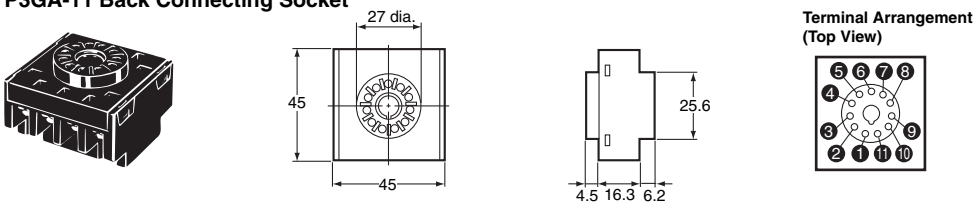


Connecting Sockets

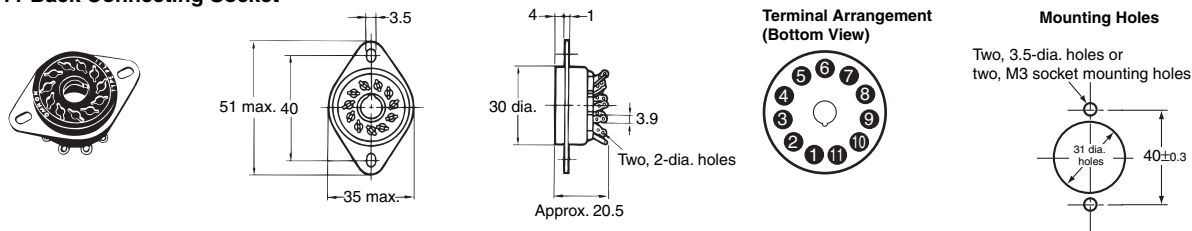
P2CF-11 Front Connecting Socket



P3GA-11 Back Connecting Socket



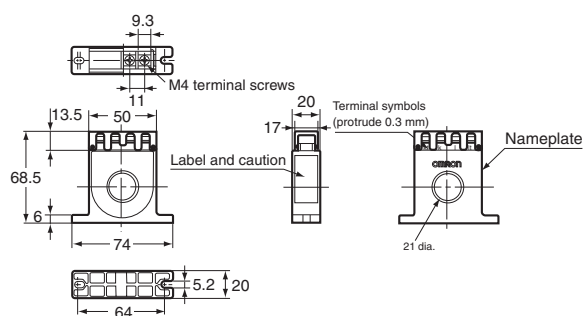
PL11 Back Connecting Socket



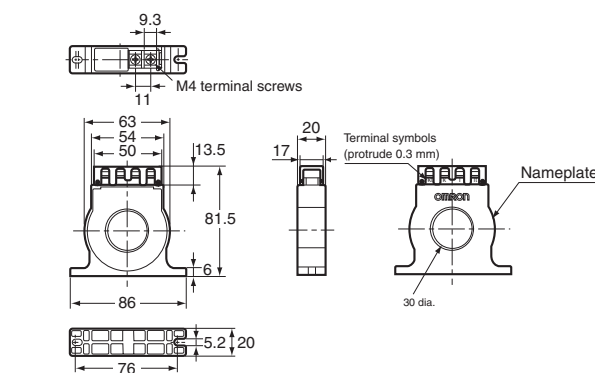
Front Cover

Model
Y92A-48B (Hard Cover)
Y92A-48D (Soft Cover)

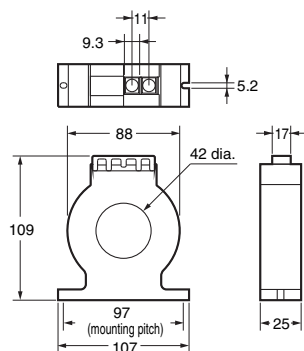
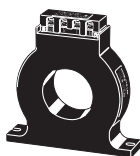
ZCT

Indoor Through-type Models
OTG-L21 (50 A)

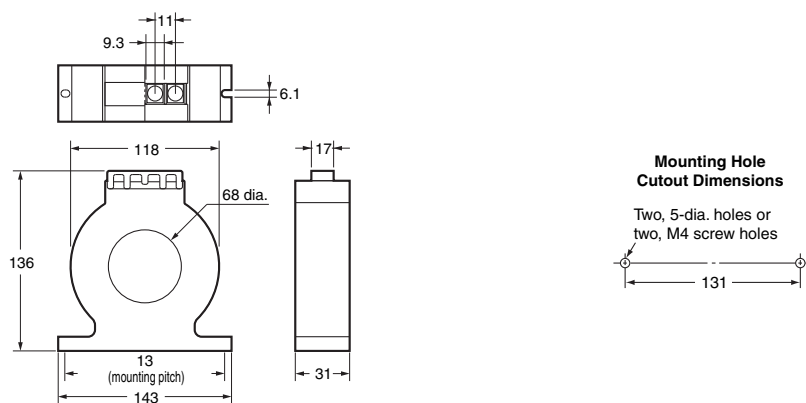
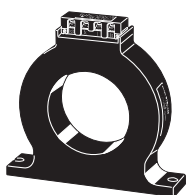
OTG-L30 (100 A)



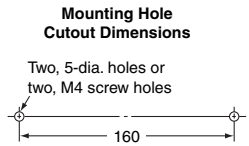
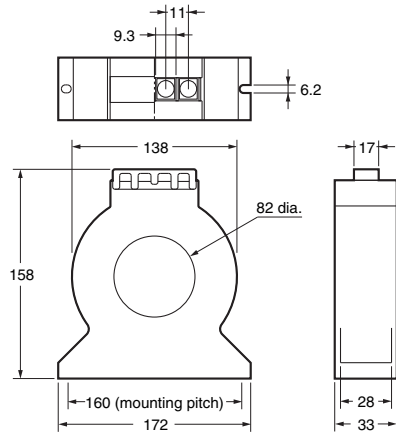
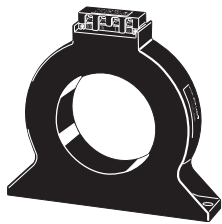
OTG-L42 (200 A)



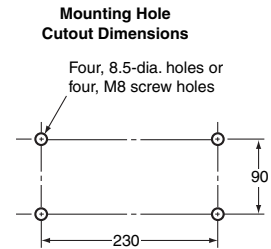
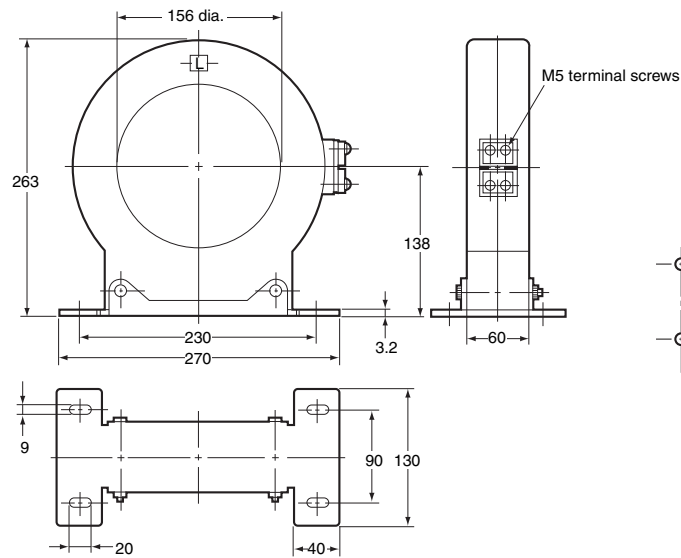
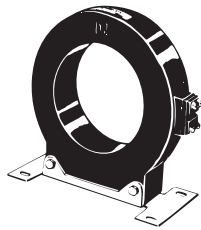
OTG-L68 (400 A)



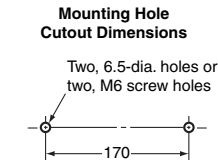
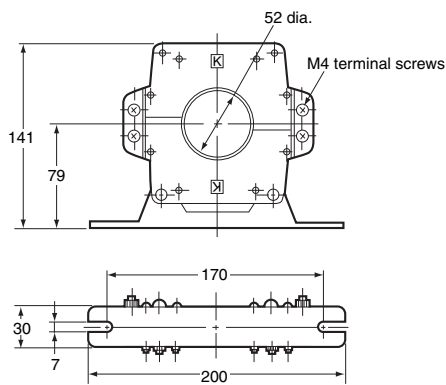
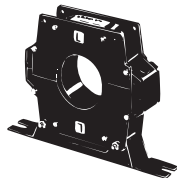
OTG-L82 (600 A)



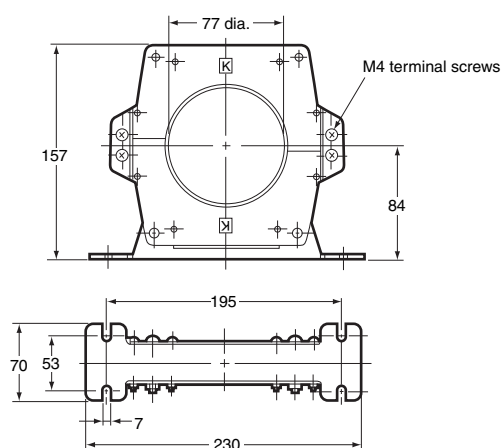
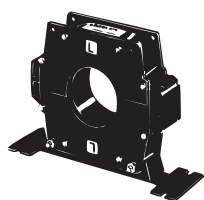
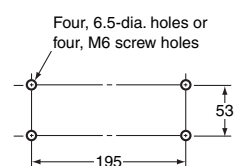
OTG-L156 (1,000 A)



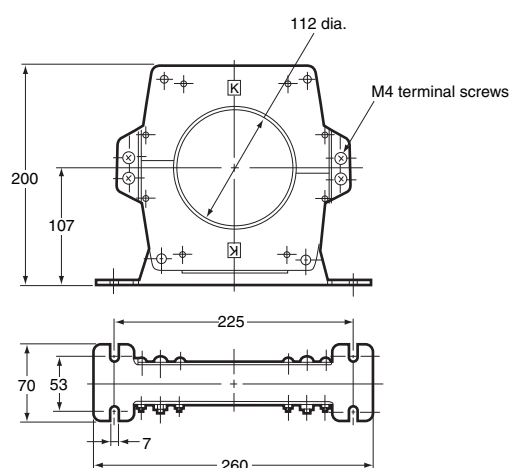
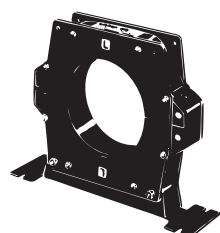
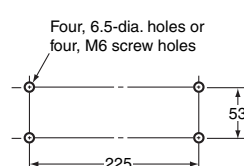
Indoor Separate-type Models
OTG-CN52 (200 A)



OTG-CN77 (400 A)

Mounting Hole
Cutout Dimensions

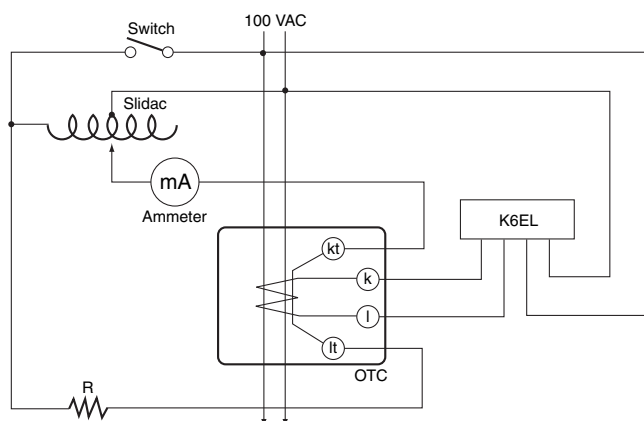
OTG-CN112 (600 A)

Mounting Hole
Cutout Dimensions

■ Maximum Wire Sizes for ZCTs

Model	Rated current	Wire/cable Through-hole diameter	600-V vinyl-insulated wire (IV)		Cable (VVR)	
			2-wire	3-wire	2-wire	3-wire
OTG-L21	50 A	21 dia.	22 mm ²	14 mm ²	8 mm ²	5.5 mm ²
OTG-L30	100 A	30 dia.	60 mm ²	38 mm ²	38 mm ²	38 mm ²
OTG-L42	200 A	42 dia.	100 mm ²	100 mm ²	100 mm ²	60 mm ²
OTG-L68	400 A	68 dia.	400 mm ²	325 mm ²	325 mm ²	250 mm ²
OTG-L82	600 A	82 dia.	500 mm ²	500 mm ²	400 mm ²	400 mm ²
OTG-L156	1,000 A	156 dia.	500 mm ²	500 mm ²	1,000 mm ²	1,000 mm ²
OTG-CN52	200 A	52 dia.	200 mm ²	200 mm ²	150 mm ²	100 mm ²
OTG-CN77	400 A	77 dia.	500 mm ²	400 mm ²	400 mm ²	325 mm ²
OTG-CN112	600 A	112 dia.	500 mm ²	500 mm ²	1,000 mm ²	1,000 mm ²

Test Circuit



200 mA: 500 Ω , 50 W
 500 mA: 200 Ω , 100 W
 1,000 mA: 100 Ω , 200 W

Select the resistance R shown in the test circuit diagram according to the K6EL's rated sensed current. Change the current using the slidac and ascertain the K6EL's operating value each time by reading the ammeter.

For example, R could take the values shown below:

30 mA: 3.3 k Ω , 6 W
 100 mA: 1 k Ω , 20 W

Safety Precautions

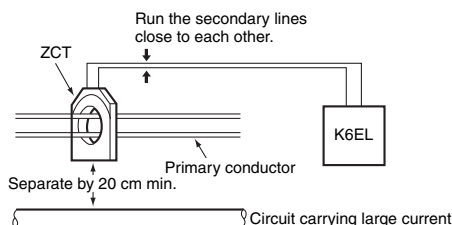
■ Correct Use

Installation and Wiring

- Do not, under any circumstances, connect the ZCT's output terminals k and l to ground. Doing so may result in damage to the Relay's internal circuits.
- Pass the primary conductor through the ZCT once.
- The Relay detects ground faults in internal wiring of devices due to insulation deterioration and so install the ZCT as close to the power supply side as possible.

ZCT Installation

- Install the ZCT at an outdoor cable inlet or on a ground bus bar at a location allowing easy inspection.
- When installing on the electrical path, use a ZCT with a value greater than the electrical path's rated current.
- If the secondary lines run in parallel to a circuit carrying a large current, either separate the lines as far as possible or use a shield line.



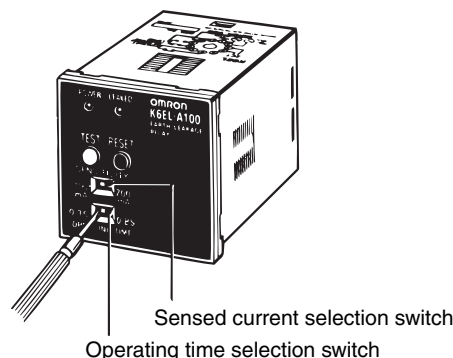
- When installing a separate-type ZCT with current flowing along the primary conductors, short the secondary terminals using clips or some other method.

Switching the Sensed Current

- With the K6EL-□100, 200, and 500 the sensed current can be switched using a flat-bladed screwdriver.
- The sensed current for the K6EL-30 is fixed and hence cannot be switched.

Switching the Operating Time

- With the K6EL-A100, A200, and A500, the operating time can be switched using a flat-bladed screwdriver.
- The operating time for the K6EL-30, 100, 200, and 500 is fixed and hence cannot be switched.



Testing

- If the ground fault indicator (red) lights when the Relay's test button is pressed, it means that the internal circuits are operating normally.
- To make an overall test, run a simulated ground fault current.

Resetting

- Once the relay models operate, it continues to operate until it is reset. Reset it either by pressing the reset button (black) or by turning the control power supply OFF and ON again.

Q&A

Q: How does the K6EL operate when used for inverter loads (e.g., inverter motors and inverter air conditioners)?

A: High-frequency noise may cause unnecessary operation.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

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

Terms and Conditions Agreement

Read and understand this catalog.

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

Warranties.

(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

(b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

Limitation on Liability; Etc.

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

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

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

Programmable Products.

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions.

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.