Enclosed Switch

ZC-□55

CSM_ZC-_55_DS_E_2_1

Small, High-precision Enclosed Switch

- Small, High-precision Enclosed Switches with Built-in Basic Switches for High Repeatability and Durability of 10 Million Operations Minimum.
- Same mounting pitch as Z Basic Switch.
- Requires less operating force than conventional limit switches.
- Lineup includes modes with operation indicators for easy maintenance and inspection.
- Approved by EN, UL, CSA, and CCC (Chinese standard). (Ask your OMRON representative for Information on approved models.)

Be sure to read *Safety Precautions* on page 7 and *Safety Precautions for All Limit Switches*.

Model Number Structure

Model Number Legend

ZC-□55
(1)

(1) Actuator

D: Plunger
Q: Panel mount plunger
Q22: Panel mount roller plunger
Q21: Panel mount crossroller plunger
N22: Sealed roller plunger
N21: Sealed crossroller plunger
W: Short hinge lever
W1: Hinge lever
W2: Short hinge roller lever
W21: Hinge roller lever
W3: One-way action short hinge roller lever
W31: One-way action hinge roller lever

Ordering Information

Actuator	Model	Approved Standards		
		UL	CSA	EN
Plunger	ZC-D55	●	●	●
Panel mount plunger	ZC-Q55	●	●	●
Panel mount roller plunger	ZC-Q2255	●	●	●
Panel mount crossroller plunger	ZC-Q2155	●	●	●
Sealed roller plunger	ZC-N2255	●	●	●
Sealed crossroller plunger	ZC-N2155	●	●	●
Short hinge lever	ZC-W55	●	●	●
Hinge lever	ZC-W155	●	●	●
Short hinge roller lever	ZC-W255	●	●	●
Hinge roller lever	ZC-W2155	●	●	●
One-way action short hinge roller lever	ZC-W355	●	●	●
One-way action hinge roller lever	ZC-W3155	●	●	●

Note: 1. Use molded terminal models when using the Switch under one of the following conditions: a) dusty, b) high amount of dripping oil, or c) high humidity.
2. Models are available with lead outlets in three positions: right-hand, left-hand, and underside.

Specifications

Approved Standards

Agency	Standard	File No.
UL*	UL508	E76675
TÜV Rheinland	EN60947-1, EN60947-5-1	J50041904
CCC(CQC)	GB14048.5	2003010303077620

Note: Ask your OMRON representative for information on approved models.
* UL certified for CSA C22.2 No. 14.

Ratings

Rated voltage	Non-inductive load (A)				Inductive load (A)			
	Resistive load		Lamp load		Inductive load		Motor load	
	NC	NO	NC	NO	NC	NO	NC	NO
125 VAC	10		3	1.5	10		5	2.5
250 VAC	10		2.5	1.25	10		3	1.5
8 VDC	10		3	1.5	6		5	2.5
14 VDC	10		3	1.5	6		5	2.5
30 VDC	6		3	1.5	5		5	2.5
125 VDC	0.5		0.4	0.4	0.05		0.05	0.05
250 VDC	0.25		0.2	0.2	0.03		0.03	0.03

Inrush current	NC	30 A max.
	NO	15 A max.

Note: 1. The above figures are for steady-state currents.
2. Inductive loads have a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).
3. Lamp load has an inrush current of 10 times the steady-state current.
4. Motor load has an inrush current of 6 times the steady-state current.
5. The above ratings were tested under the following conditions according.
(1) Ambient temperature:+20±2°C
(2) Ambient humidity: 65±5%RH
(3) Operating frequency:20 operations/min.

Approved Standard Ratings

UL/CSA

A300

Voltage	Carry current	Current (A)		Volt-amperes (VA)	
		Make	Break	Make	Break
120 VAC 240 VAC	10A	60 30	6 3	7,200	720

TÜVRheinland (EN60947-1, EN60947-5-1), CCC (GB14048.5)

Applicable category and ratings
AC-12 10 A/250 VAC

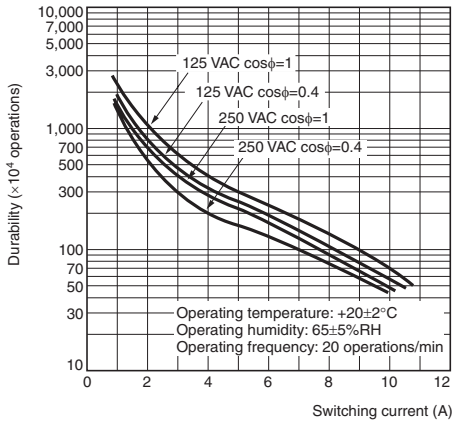
Characteristics

Degree of protections		IP67
Durability	Mechanical	10,000,000 operations min.
	Electrical	500,000 operations min.
Operating speed		0.05 mm/s to 0.5 m/s *1
Operating frequency	Mechanical	120 operations/min
	Electrical	20 operations/min
Insulation resistance		100 MΩ min. (at 500 VDC)
Contact resistance		15 mΩ max. (initial value for the built-in switch when tested alone)
Dielectric strength	Between non-continuous terminals	1,000 VAC, 50/60 Hz for 1 min
	Between each terminal and non-current-carrying metal parts	2,000 VAC, 50/60 Hz for 1 min
Rated insulation voltage (Ui)		1,000 VAC
Pollution degree (operating environment)		3 (IEC947-5-1)
Short-circuit protective device		10 A-fuse type gG (IEC 60269)
Protection against electric shock		Class II
Proof tracking index (PTI)		175
Switch category		D (IEC335)
Rated operating current (Ie)		10 A
Rated operating voltage (Ue)		250 VAC
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude *2
Shock resistance	Destruction	1,000 m/s² max.
	Malfunction	300 m/s² max. (in case of plunger model) *1 *2
Ambient operating temperature		−10°C to +80°C (with no icing)
Ambient operating humidity		35% to 95%RH
Weight		Approx. 92 g (in case of ZC-Q22(21)55)

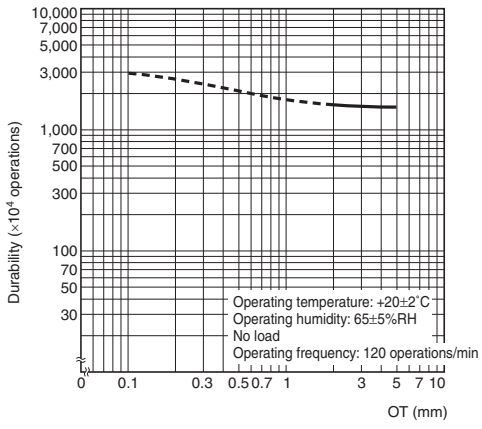
*1. Only for models with plungers. (Contact your OMRON representative for information on other models.)
*2. Less than 1 ms under a free state at the operating limits.

Engineering Data

Electrical Durability



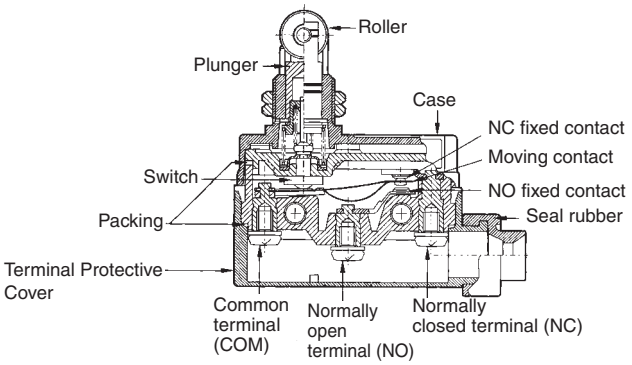
Mechanical Durability (for ZC-Q55)



Structure and Nomenclature

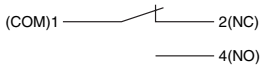
Structure

Changing the Terminal Protective Cover around allows the cable to be pulled out from either the right or the left.



Note: M4 binding head screws (with toothed washers) are used as the terminal screws.

Contact Form

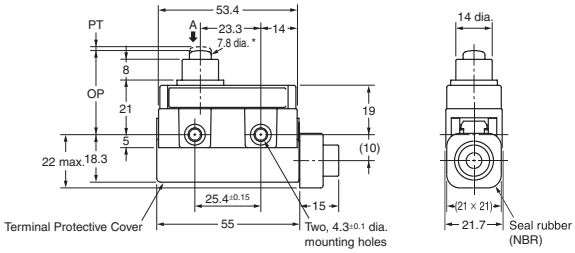


Dimensions and Operating Characteristics

(Unit: mm)

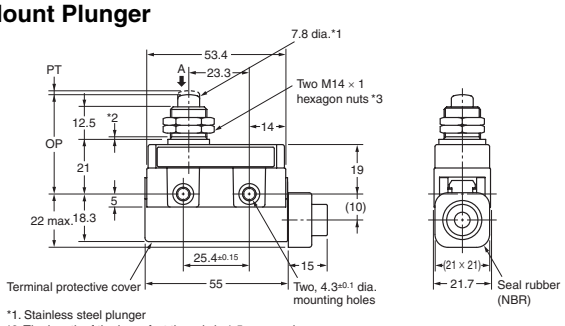
Plunger

ZC-D55



Panel Mount Plunger

ZC-Q55

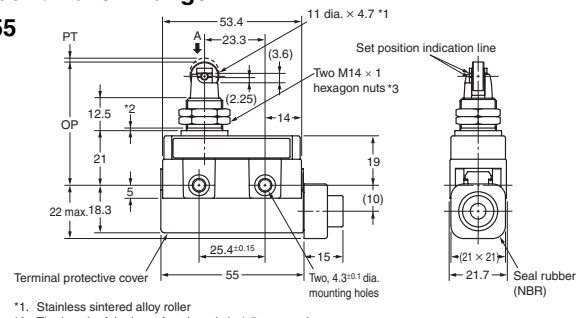


*1. Stainless steel plunger
*2. The length of the imperfect threads is 1.5 mm maximum.
*3. Thickness: 3 width: 17

Note: Do not use the M14 mounting screw and the case mounting hole at the same time.

Panel Mount Roller Plunger

ZC-Q2255

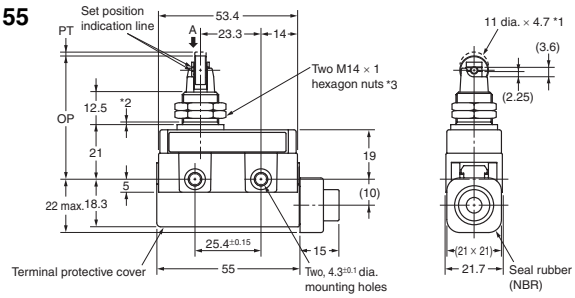


*1. Stainless sintered alloy roller
*2. The length of the imperfect threads is 1.5 mm maximum.
*3. Thickness: 3 width: 17

Note: Do not use the M14 mounting screw and the case mounting hole at the same time.

Panel Mount Crossroller Plunger

ZC-Q2155

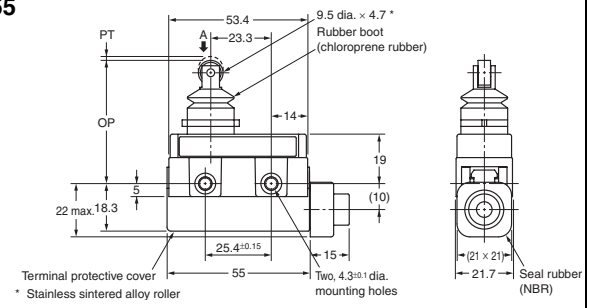


*1. Stainless sintered alloy roller
*2. The length of the imperfect threads is 1.5 mm maximum.
*3. Thickness: 3 width: 17

Note: Do not use the M14 mounting screw and the case mounting hole at the same time.

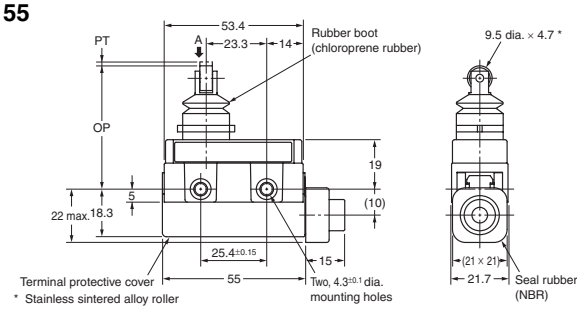
Sealed Roller Plunger

ZC-N2255



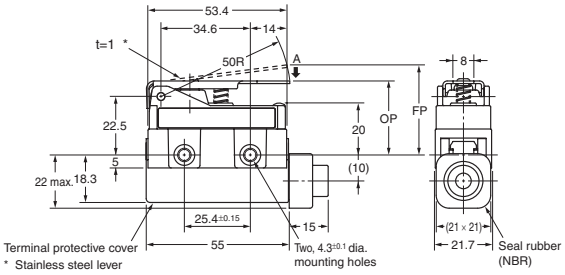
Sealed Crossroller Plunger

ZC-N2155

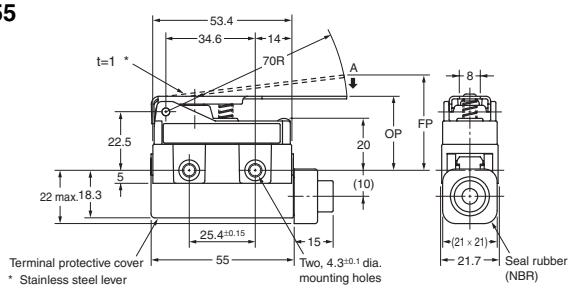


Note: 1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
2. Operating characteristics are for when the Switch is operated from direction A.

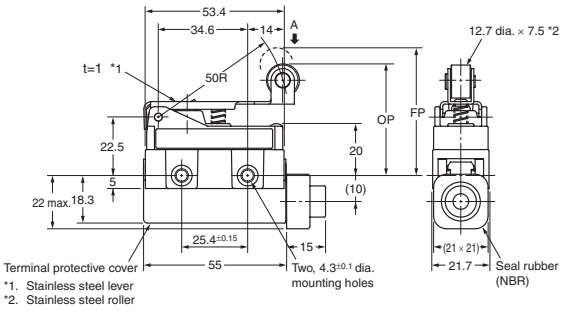
Short Hinge Roller Lever
ZC-W55



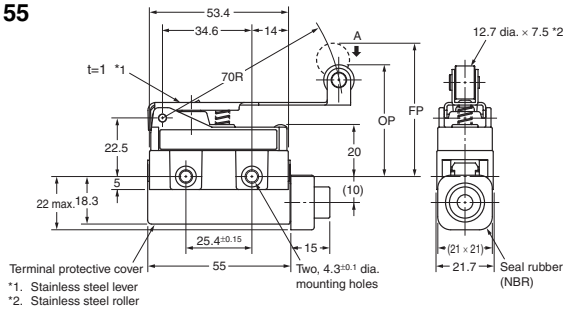
Hinge Lever
ZC-W155



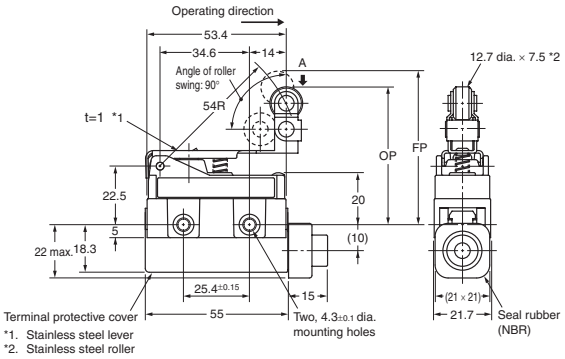
Short Hinge Roller Lever
ZC-W255



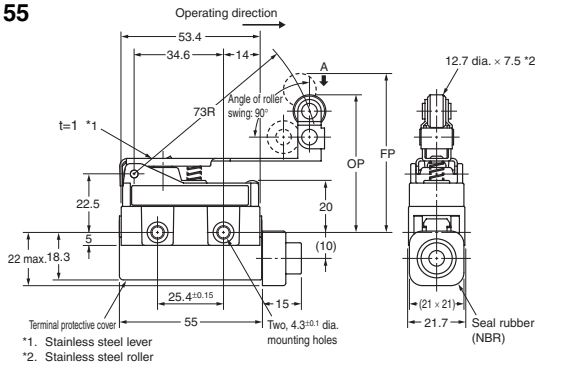
Hinge Roller Lever
ZC-W2155



One-way Action Short Hinge Roller Lever
ZC-W355



One-way Action Hinge Roller Lever
ZC-W3155



Note: 1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.
2. Operating characteristics are for when the Switch is operated from direction A.

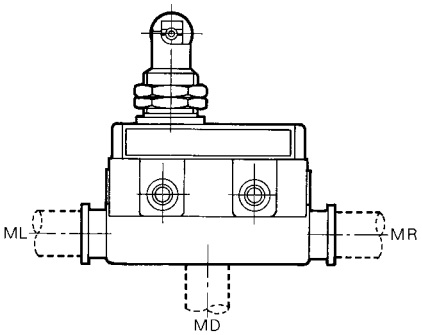
Operating Characteristics		Model	ZC-D55	ZC-Q55	ZC-Q2255	ZC-Q2155	ZC-N2255 *	ZC-N2155 *
Operating force	OF	max.	11.8 N	11.8 N	11.8 N	11.8 N	6.86 N	6.86 N
Release force	RF	min.	4.9 N	4.9 N	4.9 N	4.9 N	1.67 N	1.67 N
Pretravel	PT	max.	1.5 mm	1.5 mm	1.5 mm	1.5 mm	1.5 mm	1.5 mm
Overtravel	OT	min.	2.4 mm	3 mm	3 mm	3 mm	2.5 mm	2.5 mm
Movement Differential	MD	max.	0.2 mm	0.2 mm	0.2 mm	0.2 mm	0.2 mm	0.2 mm
Free Position	FP	max.	---	---	---	---	---	---
Operating Position	OP		32.4±0.8 mm	38.2±0.8 mm	47.4±0.8 mm	47.4±0.8 mm	47.4±0.8 mm	47.4±0.8 mm

* Make sure that the permissible OT position is not exceeded.

Operating Characteristics		Model	ZC-W55	ZC-W155	ZC-W255	ZC-W2155	ZC-W355	ZC-W3155
Operating force	OF	max.	3.92 N	2.75 N	3.92 N	2.75 N	3.92 N	2.75 N
Release force	RF	min.	0.78 N	0.59 N	0.78 N	0.59 N	0.78 N	0.59 N
Pretravel	PT	max.	---	---	---	---	---	---
Overtravel	OT	min.	6 mm	8.4 mm	6 mm	8.4 mm	6 mm	8.4 mm
Movement Differential	MD	max.	1 mm	1.4 mm	1 mm	1.4 mm	1 mm	1.4 mm
Free Position	FP	max.	34.7 mm	36.7 mm	49.2 mm	51.3 mm	59.2 mm	61.2 mm
Operating Position	OP		28.5±1.2 mm	28.5±1.2 mm	43±1.2 mm	43±1.2 mm	53±1.2 mm	53±1.2 mm

Molded Terminal Models (Not Approved by UL, CSA, or EN)

Use of the molded terminal model is recommended in locations subject to excessive dust, oil drips, or moisture.
All types of ZC Switches can be fabricated into a molded terminal version. In this case, the molded terminal model will have the same dimensions and operating characteristics as the basic model from which the molded terminal model is fabricated.



Suffix by Location of Lead Outlet

Location of lead output	Model (Suffix)
	COM, NC, NO
Right-hand	-MR
Left-hand	-ML
Underside	-MD

Note: The suffixes on the left can be added to the model numbers given on page 1 to specify molded terminals.

Lead Supplies

Leads Specification	Nominal cross-sectional area (mm^2)	External diameter (mm)	Terminal connections	Length (m)
V.C.T. (vinyl cabtire cable)	1.25	3 conductor: 10.5 dia.	Black: COM White: NO Red: NC	1, 3

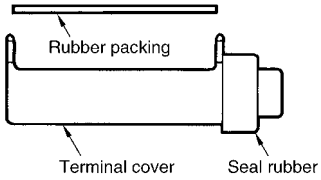
Note: When placing your order for the Switch, specify the required length of V.C.T. cable in addition to the model number of the Switch. Consult with your OMRON representative for other types of lead wires and for lead wires longer than 3 m.

How to Order

Example:
Standard type: ZC-Q2255
Location of lead output: Right side
Length of lead: 1 m (V.C.T. lead)
When placing your order for the above Switch, specify the model number as ZC-Q2255-MR VCT 1M.

Terminal Protective Cover, Seal Rubber, and Rubber Packing

(The Switch is equipped with these 3 items as a standard.)



- ZC Terminal Cover (Product code: ZC55-0002H)
- ZC Seal Rubber (Product code: SC-1404C)
- ZC Rubber Packing (Product code: ZC55-0003F)

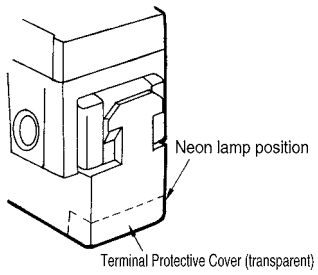
Operation Indicator-equipped Models (Not Approved by UL, CSA, or EN)

- All the models can be equipped upon request with a operation indicator to facilitate maintenance and inspection.
- Because the indicator is incorporated in the Terminal Protective Cover, the dimensions of the Limit Switch are not affected. In this model, the lead wire is to be connected to the screw terminal. (A connecting washer is provided on the tip of the lead wire). The lead wire can be connected to either the NC or NO terminal.
- Operating characteristics are the same as the standard model from which the operation indicator equipped model is fabricated.

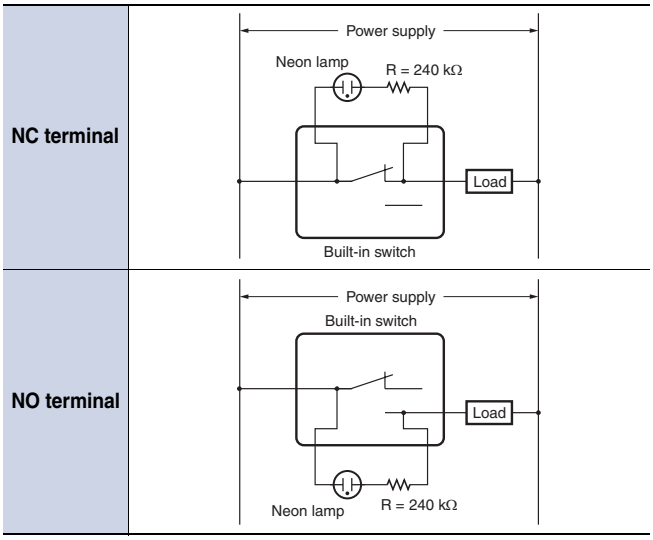
(For AC)

- The operating voltage range is from 90 to 250 VAC.
- The dimensions are the same as the standard type. The top of the Terminal Protective Cover is transparent to allow checking the operation easily.
- When placing your order for the indicator equipped, AC-operated model, add suffix "L" to the end of the model number.

Example:
Standard type: ZC-Q2255
Indicator equipped type: ZC-Q2255-L



Contact Circuit



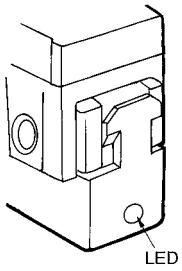
Note: If the wiring is as shown above, the operation of the respective parts will be as shown in the following table. The neon lamp is not wired when the Switch is delivered. Connect it as required.

Contact	Neon lamp	Load	Actuator
NC	ON	Does not operate	Operates
	OFF	Operates	Does not operate
NO	ON	Does not operate	Does not operate
	OFF	Operates	Operates

(For DC)

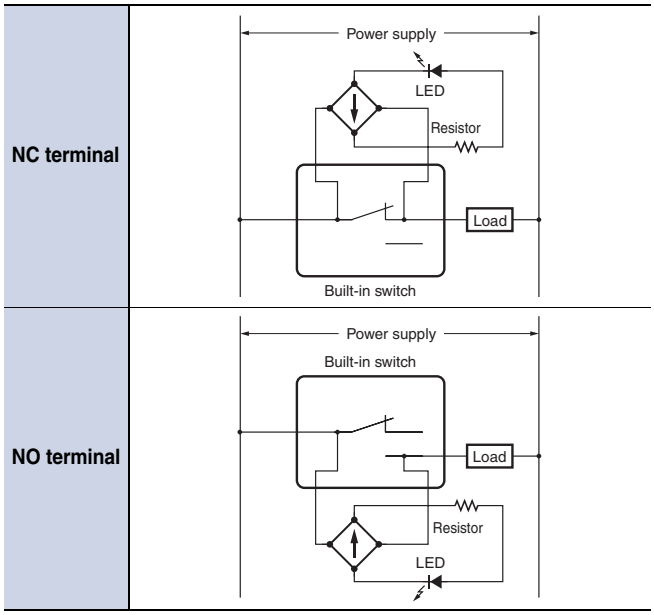
- The DC-operated is provided with an LED indicator.
- There is no protective structure.
- Since a rectifier stack is incorporated into the unit to permit reversing the polarity, this type can also operate on AC power source.
- The LED projects from the housing for easy visibility.
- When placing your order, add suffix "L2" or "L4" to the model number of the standard type.

Example:
Standard type: ZC-Q2255
Indicator equipped type: ZC-Q2255-L2



Model	Voltage rating (V)	Leakage current (mA)	Internal resistance (kΩ)
L2	12	Approx.2.4	4.3
L4	24	Approx.1.2	18

Contact Circuit



Note: If the wiring is as shown above, the operation of the respective parts will be as shown in the following table. The LED terminals are not wired when the Switch is delivered. Connect it as required.

Contact	LED	Load	Actuator
NC	ON	Does not operate	Operates
	OFF	Operates	Does not operate
NO	ON	Does not operate	Does not operate
	OFF	Operates	Operates

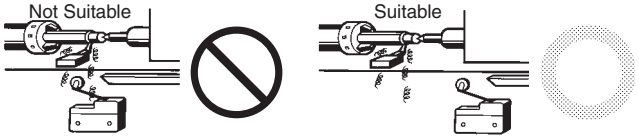
Safety Precautions

Refer to *Safety Precautions for All Limit Switches*.

Precautions for Correct Use

Operating Environment

- Seal material may deteriorate if a Switch is used outdoor or where subject to special cutting oils, solvents, or chemicals. Always appraise performance under actual application conditions and set suitable maintenance and replacement periods.
- Install Switches where they will not be directly subject to cutting chips, dust, or dirt. The Actuator and Switch must also be protected from the accumulation of cutting chips or sludge.



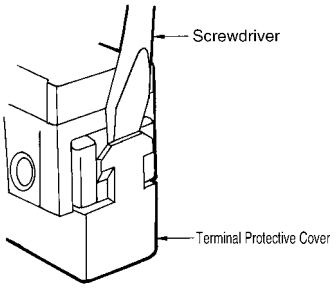
- Constantly subjecting a Switch to vibration or shock can result in wear, which can lead to contact interference with contacts, operation failure, reduced durability, and other problems. Excessive vibration or shock can lead to false contact operation or damage. Install Switches in locations not subject to shock and vibration and in orientations that will not produce resonance.
- The Switches have physical contacts. Using them in environments containing silicon gas will result in the formation of silicon oxide (SiO_2) due to arc energy. If silicon oxide accumulates on the contacts, contact interference can occur. If silicon oil, silicon filling agents, silicon cables, or other silicon products are present near the Switch, suppress arcing with contact protective circuits (surge killers) or remove the source of silicon gas.

Dog Angle

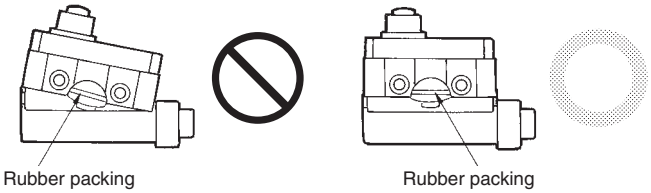
When operating the roller type, be sure to set the dog angle to less than 30° (even when operating at a low speed). Operating the model at a dog angle exceeding 30° will soon cause abrasion or damage. Do not apply a twisting force to the plunger. Set the OT to 70% to 100% of the specified value so that the actuator will not exceed the OT.

Handling

- When detaching the Terminal Protective Cover, insert a screwdriver and apply a force in the opening direction. Do not use excess force to remove the cover. Doing so may cause deformation in the fitting section and reduce the holding force.



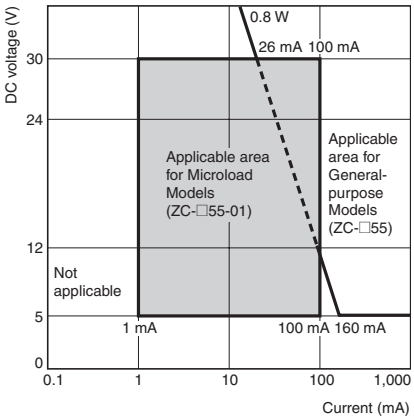
- When mounting the Terminal Protective Cover to the case, align the cover on the case and then press the cover down to mount it firmly. If the cover is pressed down in an inclined position, rubber packing will deform and thus affect the sealing capability.



- A 8.5-dia. to 10.5-dia. cable can be applied as seal rubber for the lead wire outlet. (Use two- or three-core cable of VCT1.25 mm^2.)
- Use weather-proof rubber (chloroprene rubber) as seal rubber for the ZC-N22(21)55.

Micro Load Models

Contact failure may occur is a General-purpose Switch is used to switch a microload circuit. Use Switches within the areas shown in the following chart. Even when using Microload Switches within the area shown below, contact wear will become more extreme with loads that generate surge current when switching and durability will be adversely affected. If necessary, insert a contact protective circuit. Microloads are indicated by N standard reference values. This value represents the failure rate at a 60% ($\lambda 60$) reliability level. (JIS C5003) The equation $\lambda 60 = 0.5 \times 10^{-6}$/operations indicates that a failure rate of 1/2,000,000 operations can be expected at a reliability level of 60%.

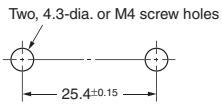


Model	ZC-□55-01	ZC-□55
Minimum applicable load	5 VDC 1mA	5 VDC 160mA

Mounting

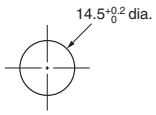
- When mounting the Switch with screws on a side surface, fasten the Switch with M4 screws and use washers, spring washers, etc., to ensure secure mounting.

Mounting Holes



- When mounting the Panel Mount-type Enclosed Switch (ZC-Q55, ZC-Q2255, or ZC-Q2155) with screws on a side surface, remove the hexagonal nuts from the actuator.

Mounting Holes



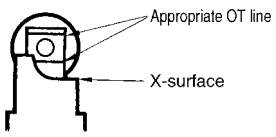
Appropriate Tightening Torque

A loose screw may result in a malfunction. Be sure to tighten each screw to the proper tightening torque as shown below.

No.	Type	Appropriate Tightening Torque
(1)	Terminal screw	0.78 to 1.18 N·m
(2)	Panel mounting screw	4.90 to 7.84 N·m
(3)	Side mounting screw	1.18 to 1.47 N·m

Operation

With the ZC-Q22(21)55, an appropriate OT line is marked on the plunger. Set the OT so that it is between the two X-surface lines.



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2008.11

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LifeElectronics
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