

## General-purpose Enclosed Switches with High Breaking Capacity and High Durability

- Z General-purpose Basic Switches are built into ZE, ZV, and ZV2 Switches. They provided high durability and high breaking capacity.
- X Basic Switches with magnetic blowout are built into XE, XV, and XV2 Switches. DC models have also been added to the series.
- Three mounting methods (side, base, and diagonal side) and many types of actuator are available.
- Terminals face the front when the cover is removed for easy connection.
- Switches with ground terminals have CE marking.
- Approved by UL, CSA, and CCC (Chinese standard). (Ask your OMRON representative for information on approved models.)



Be sure to read *Safety Precautions* on page 8 to 9 and *Safety Precautions for All Limit Switches*.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

## Model Number Structure

**Model Number Legend** (Not all combinations are possible. Ask your OMRON representative for details.)

□□-□-2□  
(1)(2) (3) (4)

### (1) Built-in Switch

Z : SPDT (AC)  
X : SPDT (DC)

### (2) Mounting Direction

E : Side mounting  
V : Base mounting  
V2 : Diagonal side mounting

### (3) Actuator

Q : Plunger	(3) Actuator
Q22 : Roller plunger	
Q21 : Crossroller plunger	
QA2 : Roller arm lever	
QA277 : One-way action roller arm lever	(4) Conduit/Ground Terminal *
N : Sealed plunger	
N22 : Sealed roller plunger (ZE, ZV, ZV2 only)	
N21 : Sealed crossroller plunger (ZE, ZV, ZV2 only)	
NA2 : Sealed roller arm lever	
NA277 : Sealed one-way action roller arm lever	

### (4) Conduit/Ground Terminal \*

None : G 1/2/without ground terminal	(4) Conduit/Ground Terminal *
G1 : G 1/2/with ground terminal	
G : Pg13.5/with ground terminal	
SG1 : 1/2-14NPSM/with ground terminal	
YG1 : M20/with ground terminal	
S : 1/2-14NPSM/without ground terminal	
Y : M20/without ground terminal	

\* Consult with your OMRON representative concerning availability, pricing, and delivery of conduit sizes and ground terminal specifications other than those on standard models.

## Ordering Information

Actuator			Mounting		Side mounting		Base mounting		Diagonal side mounting			
					Model	Approved standards		Model	Approved standards			
						UL	CSA		UL	CSA		
General purpose	Plunger		AC	ZE-Q-2	●	●	ZV-Q-2	●	●	ZV2-Q-2	●	●
			DC	XE-Q-2			XV-Q-2			XV2-Q-2		
	Roller plunger		AC	ZE-Q22-2	●	●	ZV-Q22-2	●	●	ZV2-Q22-2	●	●
			DC	XE-Q22-2			XV-Q22-2			XV2-Q22-2		
	Crossroller plunger		AC	ZE-Q21-2	●	●	ZV-Q21-2	●	●	ZV2-Q21-2	●	●
			DC	XE-Q21-2			XV-Q21-2			—		
	Roller arm lever		AC	ZE-QA2-2	●	●	ZV-QA2-2	●	●	ZV2-QA2-2	●	●
			DC	XE-QA2-2			XV-QA2-2			XV2-QA2-2		
	One-way action roller arm lever		AC	ZE-QA277-2	●	●	—			ZV2-QA277-2	●	●
			DC	XE-QA277-2			—			—		
Sealed (Booted)	Sealed plunger		AC	ZE-N-2	●	●	ZV-N-2	●	●	ZV2-N-2	●	●
			DC	XE-N-2			XV-N-2			XV2-N-2		
	Sealed roller plunger		AC	ZE-N22-2	●	●	ZV-N22-2	●	●	ZV2-N22-2	●	●
			DC	XE-N22-2			XV-N22-2			XV2-N22-2		
	Sealed crossroller plunger		AC	ZE-N21-2	●	●	ZV-N21-2	●	●	ZV2-N21-2	●	●
			DC	XE-N21-2			XV-N21-2			XV2-N21-2		
	Sealed roller arm lever		AC	ZE-NA2-2	●	●	ZV-NA2-2	●	●	ZV2-NA2-2	●	●
			DC	XE-NA2-2			XV-NA2-2			XV2-NA2-2		
	One-way action sealed roller arm lever		AC	ZE-NA277-2	●	●	ZV-NA277-2	●	●	ZV2-NA277-2	●	●
			DC	XE-NA277-2			—			XV2-NA277-2		

Note: 1. The diagonal side mounting model feature improved sealing property, improved mounting strength through use of M5 screws, increased stability in seating with large mounting width (31 x 75 mm) and permit coupling of a number of Switch units.

2. Ask your OMRON representative for information on models with ground terminals.

## Specifications

### Approved Standards

Agency	Standard	File No.
UL	UL508	E76675
CSA	CSA C22.2 No.14	LR45746
CCC (CQC)	GB/T14048.5	Contact your OMRON representative for details.

Note: 1. Models XE, XV, and XV2 are not approved by UL, CSA, and CCC.

2. Ask your OMRON representative for information on approved models.

## Ratings

Model	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
ZE-□	125 VAC	15	3	1.5		15		5	2.5
	250 VAC	15	2.5	1.25		15		3	1.5
	480 VAC	10	1.5	0.75		6		1.5	0.75
ZV-□	125 VDC	0.5		0.5		0.05		0.05	
	250 VDC	0.25		0.25		0.03		0.03	
XE-□	8 VDC	10		3	1.5	10	10	5	2.5
	14 VDC	10		3	1.5	10	10	5	2.5
	30 VDC	10		3	1.5	10	10	5	2.5
	125 VDC	10		3	1.5	7.5	6	2	2.5
	250 VDC	3		1.5	0.75	2	1.5	2	1.5
XV-□	8 VDC	10		3	1.5	10	10	5	2.5
	14 VDC	10		3	1.5	10	10	5	2.5
XV2-□	8 VDC	10		3	1.5	7.5	6	2	2.5
	14 VDC	10		3	1.5	7.5	6	2	2.5

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

Note: 1. The above figures are for standard 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.

## Approved Standard Ratings

UL/CSA

Model	Rated voltage	Current	Horsepower
ZE	125 VAC	15 A	1/8HP
	250 VAC	15 A	1/4HP
	480 VAC	15 A	
	125 VDC	0.5 A	---
	250 VDC	0.25 A	

## CCC (GB/T14048.5)

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

## Characteristics

Degree of protection		IP65 (EN60947-5-1)*1
Durability *2	Mechanical	Z□: 10,000,000 operations min. X□: 1,000,000 operations min.
	Electrical	Z□: 500,000 operations min., for 15 A, 250 VAC resistive load X□: 100,000 operations min., for 10 A, 125 VDC resistive load
Operating speed		Plunger type: 0.01 mm/s to 0.5 m/s Lever type: 0.02 mm/s to 0.5 m/s
Operating frequency	Mechanical	120 operations/min
	Electrical	20 operations/min
Rated frequency		50/60 Hz
Insulation resistance		100 MΩ min. (at 500 VDC)
Contact resistance		15 mΩ max. (initial value)
Terminal temperature rise		50°C max.
Dielectric strength	Between terminals of the same polarity	1,000 VAC, 50/60 Hz for 1 min
	Between current-carrying metal part and ground	Z□: 2,000 VAC, 50/60 Hz for 1 min X□: 1,500 VAC, 50/60 Hz for 1 min
	Between each terminal and non-current-carrying metal part	Z□: 2,000 VAC, 50/60 Hz for 1 min X□: 1,500 VAC, 50/60 Hz for 1 min
Vibration resistance	Malfunction	10 to 55 Hz, 1.5-mm double amplitude*3
Shock resistance *3	Destruction	1,000 m/s <sup>2</sup> max.
	Malfunction	100 m/s <sup>2</sup> max.*4 50 m/s <sup>2</sup> max.*5
Ambient operating temperature		-10°C to +80°C (with no icing)
Ambient operating humidity		General-purpose type: 35% to 85%RH Sealed type: 35% to 95%RH
Weight		Approx. 260 to 280 g

Note: The above figures are initial values.

\*1. IP65 for □-N models and IP60 for □-Q models. The degree of protection is tested using the method specified by the standard (EN60947-5-1). Confirm that sealing properties are sufficient for the operating conditions and environment beforehand.

\*2. The values are calculated at an operating temperature of +5°C to +35°C, and an operating humidity of 40% to 70%RH. Contact your OMRON sales representative for more detailed information on other operating environments.

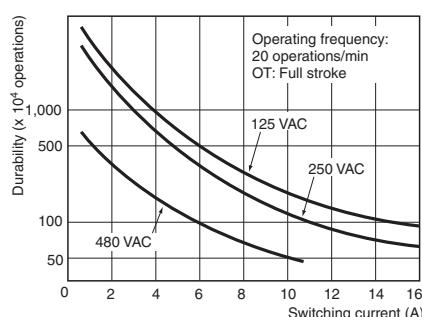
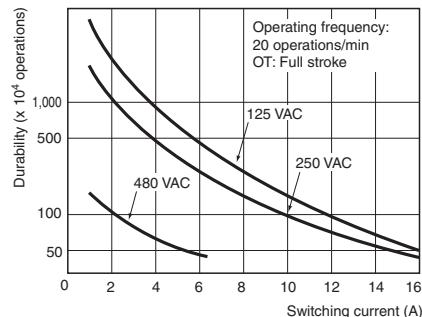
\*3. At the operation limit positions.

\*4. Only for plunger, sealed plunger, roller arm lever, and sealed roller arm lever.

\*5. Only for crossroller plunger, sealed crossroller plunger, roller plunger, and sealed roller plunger.

## Engineering Data

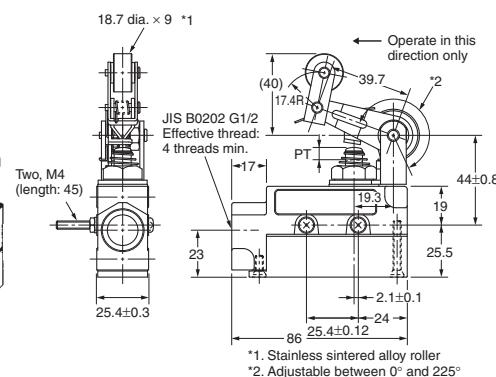
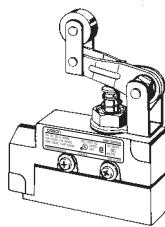
## Electrical Durability

ZE ( $\cos\phi = 1$ )ZE ( $\cos\phi = 0.4$ )



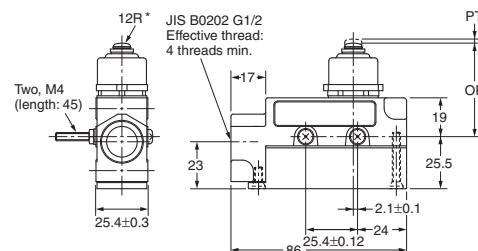
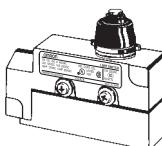
## One-way Action Roller Arm Lever

ZE-QA277-2  
XE-QA277-2



## Sealed Plunger

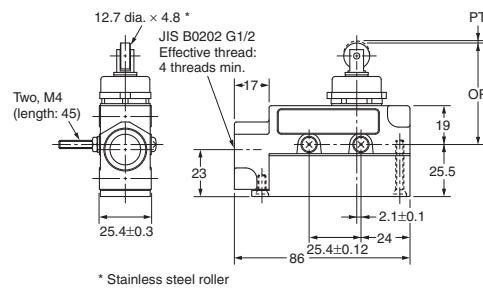
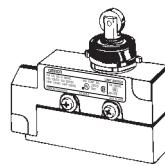
ZE-N-2  
XE-N-2



\* Stainless steel plunger

## Sealed Roller Plunger

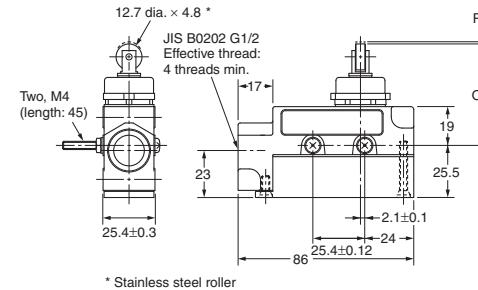
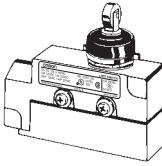
ZE-N22-2



\* Stainless steel roller

## Sealed Crossroller Plunger

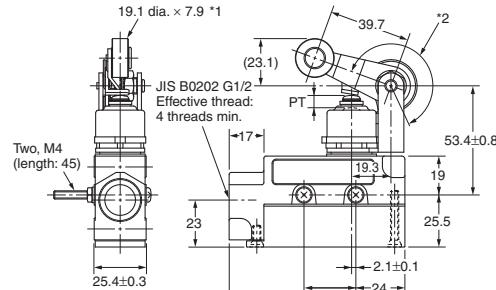
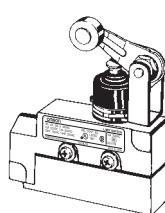
ZE-N21-2



\* Stainless steel roller

## Sealed Roller Arm Lever

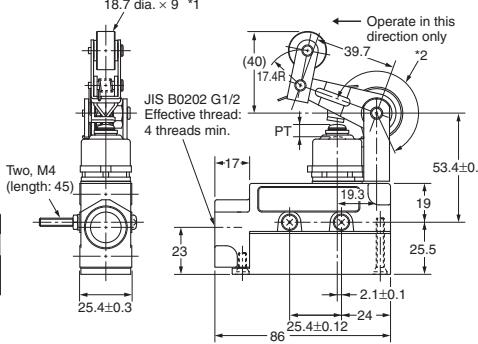
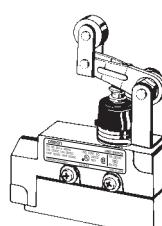
ZE-NA2-2  
XE-NA2-2



\*1. Stainless sintered alloy roller  
\*2. Adjustable between 0° and 225°

## One-way Action Sealed Roller Arm Lever

ZE-NA277-2  
XE-NA277-2



\*1. Stainless steel roller  
\*2. Adjustable between 0° and 225°

Note: 1. Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

2. The diagrams shown the Switches with two, M4 screws (length: 45) attached. (The screws are provided.)

	ZE-QA277-2	XE-QA277-2	ZE-N-2	XE-N-2	ZE-N22-2
OF max.	5.59 N	6.47 N	7.85 N	10.20 N	4.90 N
RF min.	1.67 N	1.67 N	2.35 N	2.35 N	0.98 N
PT max.	4 mm	6 mm	2 mm	3 mm	1 mm
OT min.	6 mm	5.5 mm	5 mm	4 mm	3.5 mm
MD max.	0.4 mm	0.72 mm	0.1 mm	0.47 mm	0.12 mm
OP	---		45.8±0.8 mm	49.7±0.8 mm	

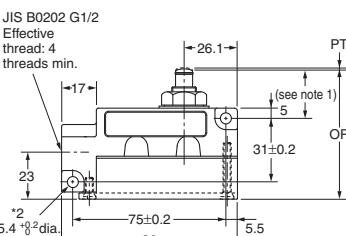
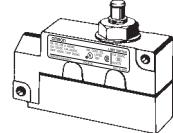
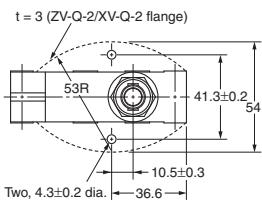
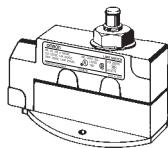
	ZE-N21-2	ZE-NA2-2	XE-NA2-2	ZE-NA277-2	XE-NA277-2
OF max.	4.90 N	6.28 N	7.26 N	6.28 N	7.26 N
RF min.	0.98 N	2.26 N	2.26 N	2.26 N	2.26 N
PT max.	1 mm	5 mm	6 mm	5 mm	6 mm
OT min.	3.5 mm	6 mm	5.5 mm	6 mm	5.5 mm
MD max.	0.12 mm	0.4 mm	0.72 mm	0.4 mm	0.72 mm
OP	49.7±0.8 mm	---		---	

**Base Mounting/Diagonal Side Mounting Models**

The diagrams show the base-mounted model (ZV-□ or XV-□) on top and the diagonal side-mounted model (ZV2-□ or XV2-□) on bottom. The flange on base-mounted models is shown with dotted lines.

**Plunger**

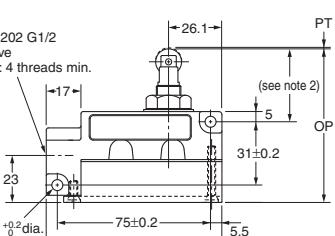
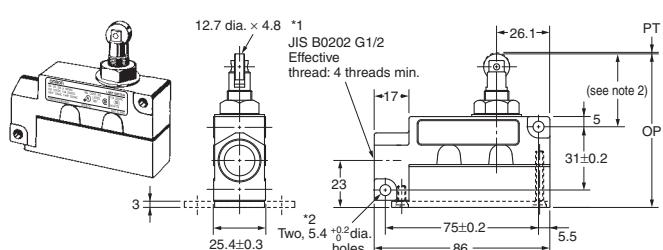
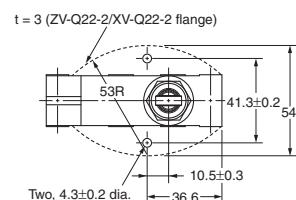
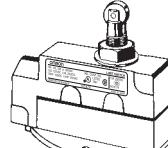
**ZV(2)-Q-2**  
**XV(2)-Q-2**



\*1. Stainless steel plunger  
\*2. Only the ZV2-Q-2 and XV2-Q-2 incorporate mounting holes.

**Roller Plunger**

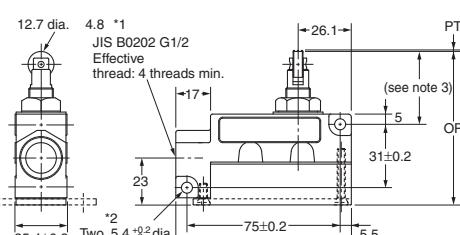
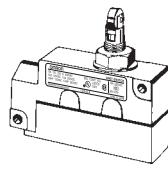
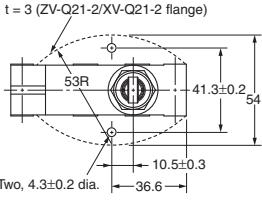
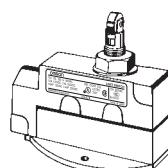
**ZV(2)-Q22-2**  
**XV(2)-Q22-2**



\*1. Stainless steel roller  
\*2. Only the ZV2-Q22-2 and XV2-Q22-2 incorporate mounting holes.

**Crossroller Plunger**

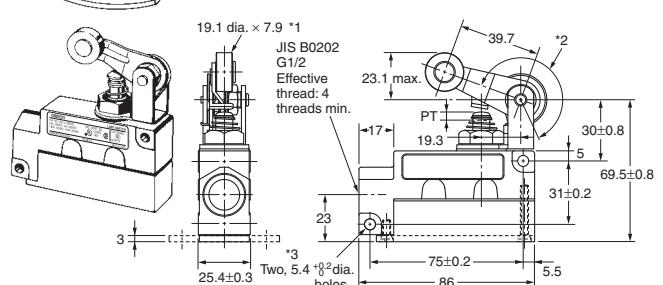
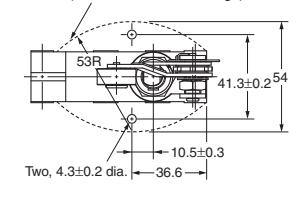
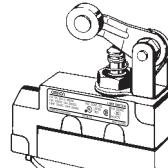
**ZV(2)-Q21-2**  
**XV-Q21-2**



\*1. Stainless steel roller  
\*2. Only the ZV2-Q21-2 incorporate mounting holes.

**Roller Arm Lever**

**ZV(2)-QA2-2**  
**XV(2)-QA2-2**



\*1. Stainless sintered roller  
\*2. Adjustment between 0° to 225°.  
\*3. Only the ZV2-QA2-2 and XV2-QA2-2 incorporate mounting holes.

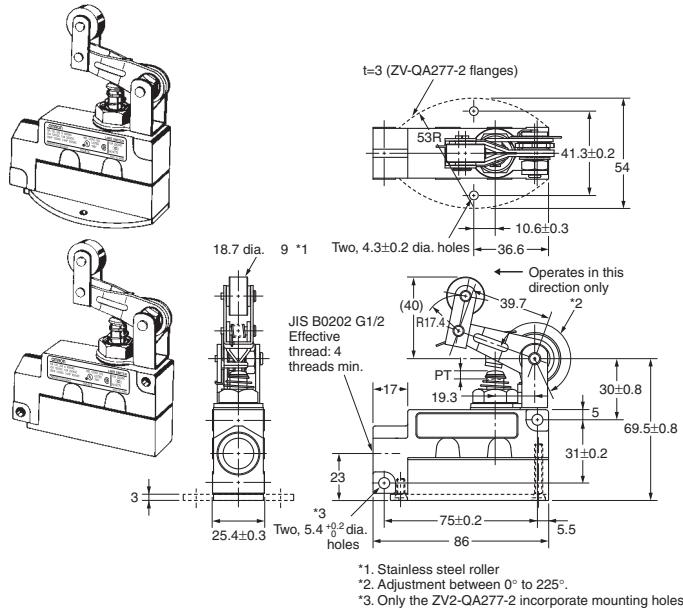
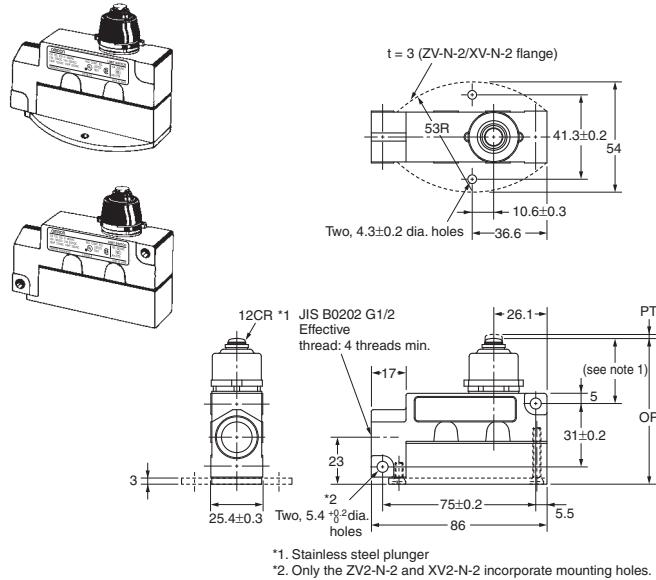
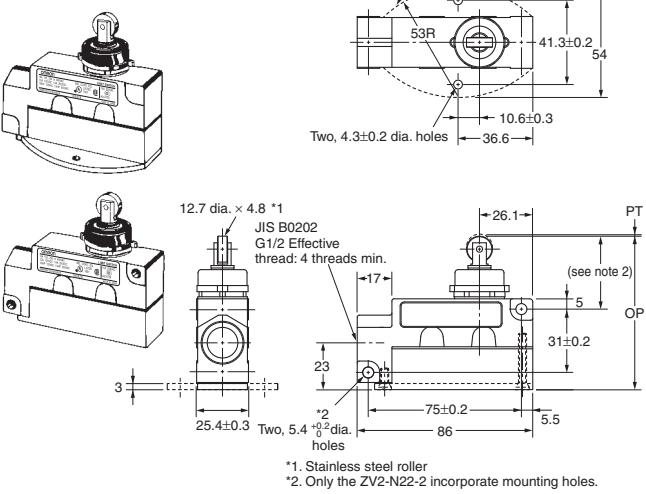
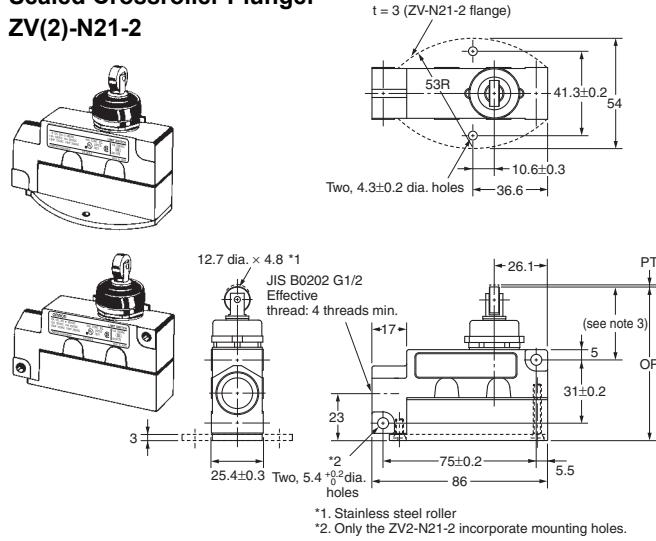
Note: Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

	<b>ZV-Q-2</b> <b>ZV2-Q-2</b>	<b>XV-Q-2</b> <b>XV2-Q-2</b>	<b>ZV-Q22-2</b> <b>ZV2-Q22-2</b>	<b>XV-Q22-2</b> <b>XV2-Q22-2</b>	<b>ZV-Q21-2</b> <b>ZV2-Q21-2</b>	<b>XV-Q21-2</b>	<b>ZV-QA2-2</b> <b>ZV2-QA2-2</b>	<b>XV-QA2-2</b> <b>XV2-QA2-2</b>
<b>OF</b>	2.45 to 3.43 N 1.12 N	5.00 N max. 1.12 N	2.45 to 3.43 N 1.12 N	5.00 N max. 1.12 N	2.45 to 3.43 N 1.12 N	5.00 N max. 1.12 N	5.59 N max. 1.67 N	6.47 N max. 1.67 N
<b>RF min.</b>	0.4 mm	0.9 mm	0.5 mm	0.9 mm	0.5 mm	0.9 mm	4 mm	6 mm
<b>PT max.</b>	5.5 mm	5.5 mm	3.6 mm	3.6 mm	3.6 mm	3.6 mm	6 mm	5.5 mm
<b>OT min.</b>	0.05 mm	0.47 mm	0.05 mm	0.47 mm	0.05 mm	0.47 mm	0.4 mm	0.72 mm
<b>OP</b>	$63.7 \pm 0.8$ mm (see note 1) (ZV-Q-2, XV-Q-2)		$75.2 \pm 0.8$ mm (see note 2) (ZV-Q22-2, XV-Q21-2)		$75.2 \pm 0.8$ mm (see note 3) (ZV-Q22-2, XV-Q21-2)		---	

Note: 1. OP for ZV2-Q-2 and XV2-Q-2 is  $24.2 \pm 0.8$  mm.

2. OP for ZV2-Q22-2 and XV2-Q22-2 is  $35.7 \pm 1$  mm.

3. OP for ZV2-Q21-2 is  $35.7 \pm 0.8$  mm.

**One-way Action Roller Arm Lever**  
**ZV2-QA277-2**

**Sealed Plunger**  
**ZV(2)-N-2**  
**XV(2)-N-2**

**Sealed Roller Plunger**  
**ZV(2)-N22-2**

**Sealed Crossroller Plunger**  
**ZV(2)-N21-2**


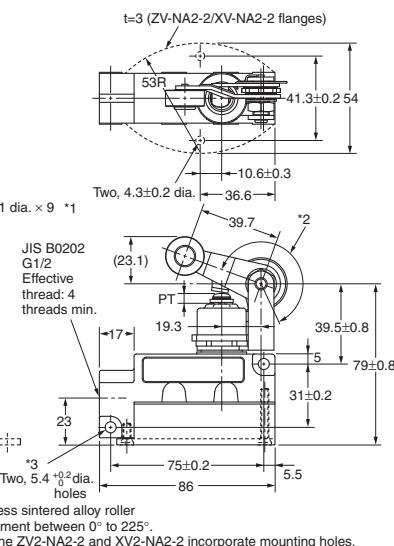
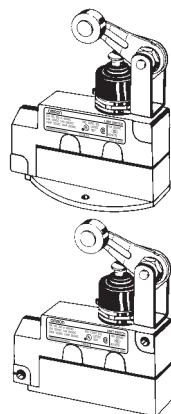
Note: Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

	<b>ZV2-QA277-2</b>	<b>ZV-N-2 ZV2-N-2</b>	<b>XV-N-2 XV2-N-2</b>	<b>ZV-N22-2 ZV2-N22-2</b>	<b>ZV-N21-2 ZV2-N21-2</b>
<b>OF max.</b>	5.59 N	7.85 N	10.20 N	4.90 N	4.90 N
<b>RF min.</b>	1.67 N	2.35 N	2.35 N	0.98 N	0.98 N
<b>PT max.</b>	4 mm	2 mm	3 mm	1 mm	1 mm
<b>OT min.</b>	6 mm	5 mm	4 mm	3.5 mm	3.5 mm
<b>MD max.</b>	0.4 mm	0.1 mm	0.47 mm	0.12 mm	0.12 mm
<b>OP</b>	---	$71.4 \pm 0.8$ mm (see note 1) (ZV-N-2, XV-N-2)		$75.2 \pm 0.8$ mm (see note 2) (ZV-N22-2)	$75.2 \pm 0.8$ mm (see note 3) (ZV-N21-2)

Note: 1. OP for ZV2-N-2 and XV2-N-2 is  $31.9 \pm 0.8$  mm.

2. OP for ZV2-N22-2 is  $35.7 \pm 0.8$  mm.

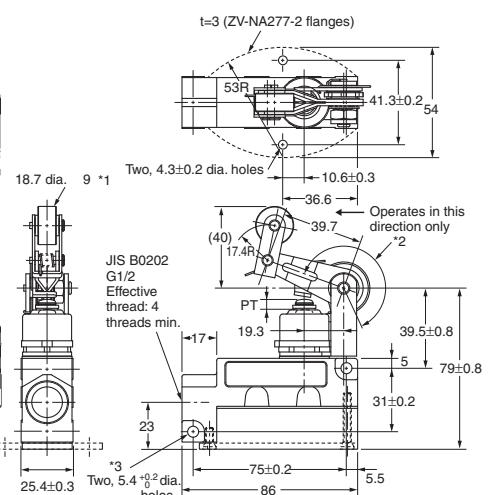
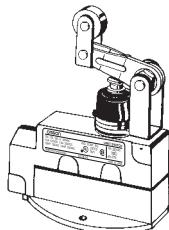
3. OP for ZV2-N21-2 is  $35.7 \pm 0.8$  mm.

**Sealed Roller Arm Lever**ZV(2)-NA2-2  
XV(2)-NA2-2

\*1. Stainless sintered alloy roller

\*2. Adjustment between 0° to 225°.

\*3. Only the ZV2-NA2-2 and XV2-NA2-2 incorporate mounting holes.

**One-way Action Sealed Roller Arm Lever**ZV(2)-NA277-2  
XV2-NA277-2

\*1. Stainless steel roller

\*2. Adjustment between 0° to 225°.

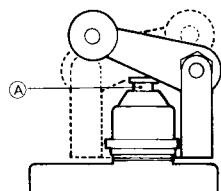
\*3. Only the ZV2-NA277-2 and XV2-NA277-2 incorporate mounting holes.

Note: Unless otherwise specified, a tolerance of  $\pm 0.4$  mm applies to all dimensions.

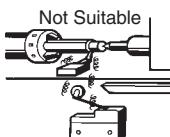
	ZV-NA2-2 ZV2-NA2-2	XV-NA2-2 XV2-NA2-2	ZV-NA277-2 ZV2-NA277-2	XV2-NA277-2
OF max.	6.28 N	7.26 N	6.28 N	7.26 N
RF min.	2.26 N	2.26 N	2.26 N	2.26 N
PT max.	5 mm	6 mm	5 mm	6 mm
OT min.	6 mm	5.5 mm	6 mm	5.5 mm
MD max.	0.4 mm	0.72 mm	0.4 mm	0.72 mm

**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.
- Be sure to protect part A with grease in order to maintain the mechanical durability and performance of the Limit Switch. The use of molybdenum disulfide grease is recommended.



- 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.

## Mounting

- With the Roller Lever-type Enclosed Switches, the roller arm has been temporarily tightened prior to shipment, so that its position may be adjusted later. When mounting the Switch, be sure to retighten the roller arm so as to prevent it from becoming loose during operation.
- To adequately maintain the seals at the mounting screw section on the side of the Enclosed Switch, insert each O-ring correctly and secure it with the lock nut.
- To provide the Switch with improved sealing property, use of the SC Connector is recommended. Refer to *Limit Switch Connectors* for details on SC Connectors.
- When routing wires into the conduit opening, be sure that cuttings and other foreign matter do not enter the Switch.

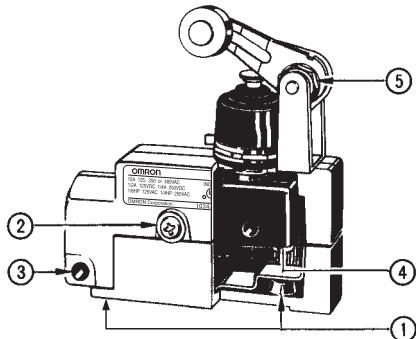
## Appropriate Tightening Torque

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	Cover mounting screw	1.18 to 1.37 N·m
2	Switch mounting screw*1	1.18 to 1.37 N·m
3	Switch mounting screw*2	4.90 to 5.88 N·m
4	Switch terminal screw (M4 screws)	0.78 to 1.18 N·m
5	Roller arm mounting nut	4.90 to 5.88 N·m

\*1. This torque range applies to side mounting or bottom mounting. (M4 screws)

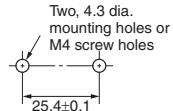
\*2. This torque range applies to diagonal side mounting. (M5 Allen-head bolt)



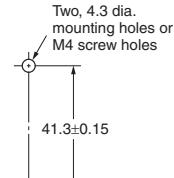
## Mounting

### Mounting Holes

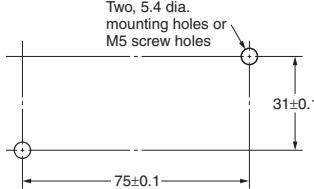
#### Side Mounting



#### Bottom Mounting



#### Side Diagonal Mounting

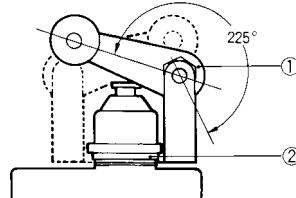


## Operation

- Operating method, shape of cam or dog, operating frequency, and the overtravel (OT) have significant effect on the service life and precision of the Limit Switch. Make sure that the shape of the cam is smooth enough.
- Check that OT has a sufficient margin. The actual OT should be rated OT x 0.7 to 1.

## Roller Arm Position Adjustment

- When loosening the nut, take care to prevent any foreign matter from entering.
- For adjustment, prepare for the following spanner.
  - The roller arm can be set freely within a range of 225° after loosening the nut.  
Spanner specification: Jaw size 13 mm with a thickness of 3.2 mm or less.
  - The roller arm mounting bracket can be set in any direction after loosening the nut.  
Spanner specification: Jaw size 23 mm with a thickness of 3.2 mm or less.



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