Miniature Basic Switch with Low Operating Force and High Contact reliability

- ROHS Compliant.
- Wide variation extends from micro load to 5A switching current, with shapes identical to those of the V-series Miniature Basic Switch.
- A unique internal mechanism enables high contact strength with low operating force. Can be used for detecting lightweight objects.

Ordering Information

■ Model Number Legend

VX-□□-□□□

1 2 3 4 5

1. **Ratings**
   - 5: 5A at 250VAC
   - 01: 0.1A at 30VDC
2. **Actuator**
   - None: Pin plunger
   - 1: Short hinge lever
   - 2: Hinge lever
   - 3: Long hinge lever
   - 4: Simulated roller lever
   - 5: Short hinge roller lever
   - 6: Hinge roller lever
3. **Contact Form**
   - 1: SPDT
   - 2: SPST-NC
   - 3: SPST-NO
4. **Terminal Specifications**
   - A: Solder terminal
   - C2: Quick-connect terminal (#187)
5. **Operating Force max.**
   - 2: OF 0.25 N {25 gf}
   - 3: OF 0.49 N {50 gf}

   Note: These values are for the pin plunger model.

■ List of Models

Actuator	Terminals (see note)	OF max.	Model	
			5 A	0.1 A
Pin plunger 	A	0.25 N {25 gf}	VX-5-1A2	VX-01-1A2
		0.49 N {50 gf}	VX-5-1A3	VX-01-1A3
	C2	0.25 N {25 gf}	VX-5-1C22	VX-01-1C22
		0.49 N {50 gf}	VX-5-1C23	VX-01-1C23
Short hinge lever 	A	0.49 N {50 gf}	VX-51-1A3	VX-011-1A3
	C2	0.49 N {50 gf}	VX-51-1C23	VX-011-1C23
Hinge Lever 	A	0.29 N {30 gf}	VX-52-1A3	VX-012-1A3
	C2	0.29 N {30 gf}	VX-52-1C23	VX-012-1C23
Long hinge lever 	A	0.20 N {20 gf}	VX-53-1A3	VX-013-1A3
	C2	0.20 N {20 gf}	VX-53-1C23	VX-013-1C23
Simulated roller lever 	A	0.29 N {30 gf}	VX-54-1A3	VX-014-1A3
	C2	0.29 N {30 gf}	VX-54-1C23	VX-014-1C23
Short hinge roller lever 	A	0.59 N {60 gf}	VX-55-1A3	VX-015-1A3
	C2	0.59 N {60 gf}	VX-55-1C23	VX-015-1C23
Hinge roller lever 	A	0.29 N {30 gf}	VX-56-1A3	VX-016-1A3
	C2	0.29 N {30 gf}	VX-56-1C23	VX-016-1C23

Note: 1. SPST models are also available, but not listed in the above table.

2. Terminals A: Solder/Quick-connect terminals (#187)
C2: Quick-connect terminals (#187)

Specifications

■ Ratings

Model	Rated Load	Resistive Load
VX-5	250VAC	5A
VX-01	125VAC	0.1A
	30VDC	0.1A

Note. The ratings values apply under the following test conditions:
Ambient temperature: 20±2°C
Ambient humidity: 65±5%
Operating frequency: 30 operations/min

Switching Capacity per Load (Reference Values)

Rated current	Rated voltage	Non-inductive load				Inductive load	
		Resistive load		Lamp load			
		NC	NO	NC	NO	NC	NO
VX-5	125 VAC	5 A		0.5 A		4 A	
	8 VDC	5 A		3 A		4 A	
	30 VDC	5 A		3 A		4 A	
	125 VDC	0.4 A		0.1 A		0.4 A	
	250 VDC	0.3 A		0,05 A		0.2 A	
VX-01	125 VAC	0.1 A		—		—	
	8 VDC	0.1 A		—		—	
	30 VDC	0.1 A					

Note: 1. Inductive load has a power factor of 0.4 min. (AC) and a time constant of 7 ms max. (DC).

2. Lamp load has an inrush current of 10 times the steady-state current.

■ Characteristics

Item	VX-5	VX-01
Operating speed	0.1 mm to 1 m/s (at pin plunger models)	
Operating frequency	Mechanical: 600 operations/min Electrical: 30 operations/min	
Insulation resistance	100 MΩ min. (at 500 VDC)	
Contact resistance	30 mΩ max. (initial value)	50 mΩ max. (initial value)
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min between terminals of same polarity 1,500 VAC, 50/60 Hz for 1 min between current-carrying metal parts and ground (see note 1) 1,500 VAC, 50/60 Hz for 1 min between each terminal and non-current-carrying metal parts	
Vibration resistance (see note 2)	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude	
Shock resistance (see note 2)	Destruction: 400 m/s^2 {approx. 40G} max. Malfunction: 100 m/s^2 {approx. 10G} max.	
Life expectancy	Mechanical: 50,000,000 operations min. (Refer to the following *Engineering Data*.) Electrical: 500,000 operations min. (Refer to the following *Engineering Data*.)	Mechanical: 10,000,000 operations min. (Refer to the following *Engineering Data*.) Electrical: 1,000,000 operations min. (Refer to the following *Engineering Data*.)
Degree of protection	IEC IP40	
Degree of protection against electric shock	Class I	
Proof tracking index (PTI)	175	
Ambient temperature	Operating: −25°C to 80°C (at ambient humidity) (with no icing)	
Ambient humidity	Operating: 85% max. (for 5°C to 35°C)	
Weight	Approx. 6.2 g (pin plunger models)	

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

2. The value for dielectric strength shown is for models with a Separator.

3. For the pin plunger models, the above values apply for use at both the free position and total travel position. For the lever models, they apply at the total travel position. Contact opening or closing time is within 1ms.

■ Approved Standards

UL1054 (File No. E41515)
CSA C22.2 No.55 (File No. LR21642)

Rated voltage	VX-5	VX-01
125 VAC 250 VAC	5 A 5 A	0.1 A —
30 VDC	—	0.1 A

EN 61058-1(File No. 124761, VDE approval)

Rated voltage	VX-5	VX-01
125 VAC	5 A	0.1 A
250 VAC	5 A	—

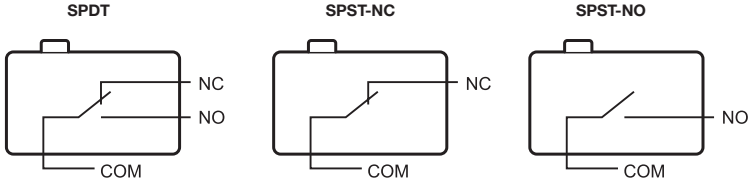
Note: Testing conditions: 50,000 operations, T105 (0°C to 105°C)

■ Contact Specifications

Item		VX-5 models	VX-01 models
Contact	Specification	Rivet	Crossbar
	Material	Silver alloy	Gold alloy
	Gap (standard value)	0.5 mm	
Inrush current	NC	15 A max.	—
	NO	—	—
Minimum applicable load (see note)		160mA at 5VDC	1mA at 5VDC

Note. For more information on the minimum applicable load - refer to 'Using Micro Loads' at the end of this datasheet.

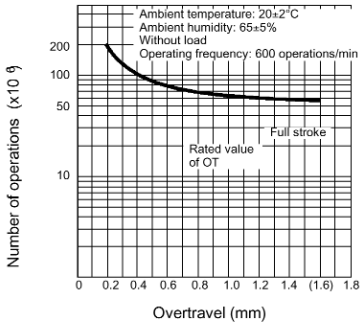
■ Contact Form



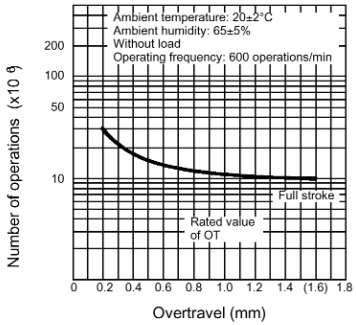
Engineering Data

Mechanical Life Expectancy (Pin Plunger)

VX-5

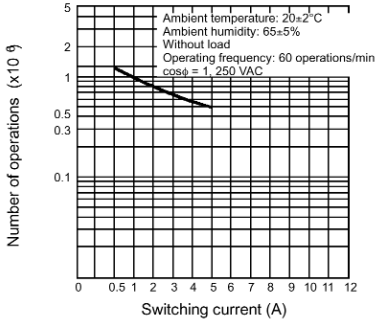


VX-01

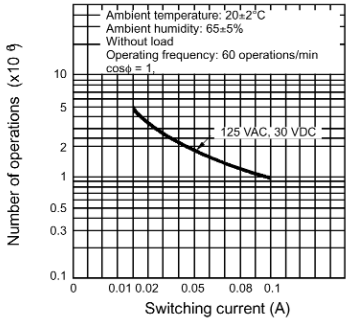


Electrical Life Expectancy

VX-5

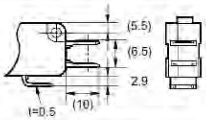
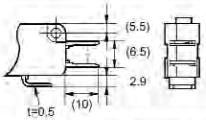
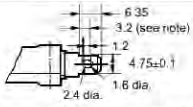
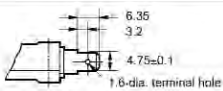


VX-01



Dimensions

■ Terminals

Terminal	Solder (A) Terminal	Quick-connect terminal (#187) (C2 terminal)
COM terminal position is bottom.	 Three, solder/quick-connect terminals (#187)	 Three, quick-connect terminals (#187)
Terminal dimension	 **Note:** The length to the center of the 1.6-dia. holes.	

Note: The above is for the SPDT contact specifications.

■ Dimensions and Operating Characteristics

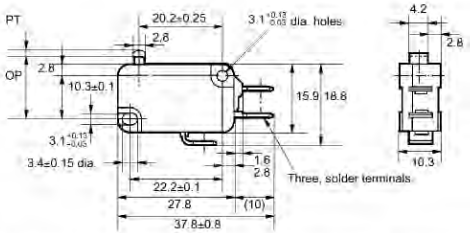
Note: 1. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

2. The following illustrations and drawings are for solder terminals (Terminal A). Illustrations for Terminal C2 are omitted. For details, refer to *Terminals*.

3. The □ in the model number is for the terminal code.
A: Solder terminal (A)
C2: Quick-connect terminal (#187)

Pin Plunger

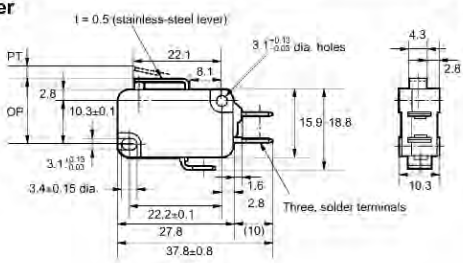
VX-5-1□2
VX-5-1□3
VX-01-1□2
VX-01-1□3



Model	VX-5-1□2	VX-5-1□3	VX-01-1□2	VX-01-1□3
OF max.	0.25 N {25 gf}	0.49 N {50 gf}	0.25 N {25 gf}	0.49 N {50 gf}
RF min.	0.03 N {3 gf}	0.05 N {5 gf}	0.03 N {3 gf}	0.05 N {5 gf}
PT max.	1.2 mm	1.2 mm	1.2 mm	1.2 mm
OT min.	1.0 mm	1.0 mm	1.0 mm	1.0 mm
MD max.	0.3 mm	0.3 mm	0.3 mm	0.3 mm
OP	14.7±0.4 mm	14.7±0.4 mm	14.7±0.4 mm	14.7±0.4 mm

Short Hinge Lever

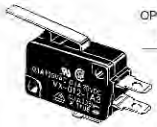
VX-51-1□3
VX-011-1□3

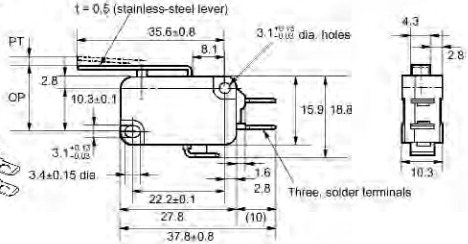


Model	VX-51-1□3	VX-011-1□3
OF max.	0.49 N {50 gf}	0.49 N {50 gf}
RF min.	0.04 N {4 gf}	0.04 N {4 gf}
PT max.	1.6 mm	
OT min.	0.8 mm	
MD max.	0.5 mm	
OP	15.2±0.5 mm	

Hinge Lever

VX-52-1□3
VX-012-1□3

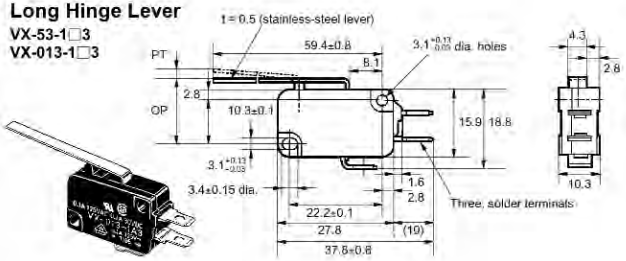




Model	VX-52-1□3	VX-012-1□3
OF max.	0.29 N {30 gf}	0.29 N {30 gf}
RF min.	---	---
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	0.8 mm	
OP	15.2±1.2 mm	15.2±1.2 mm

Long Hinge Lever

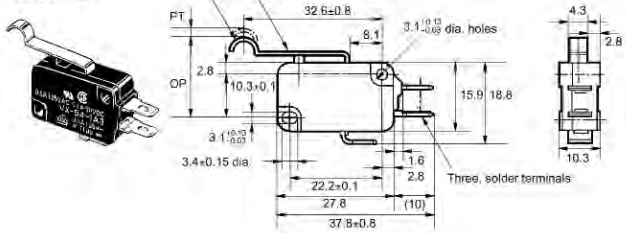
VX-53-1□3
VX-013-1□3



Model	VX-53-1□3	VX-013-1□3
OF max.	0.20 N {20 gf}	0.20 N {20 gf}
RF min.	---	---
PT max.	9.0 mm	
OT min.	3.2 mm	
MD max.	2.0 mm	
OP	15.2±2.6 mm	

Simulated Roller Lever

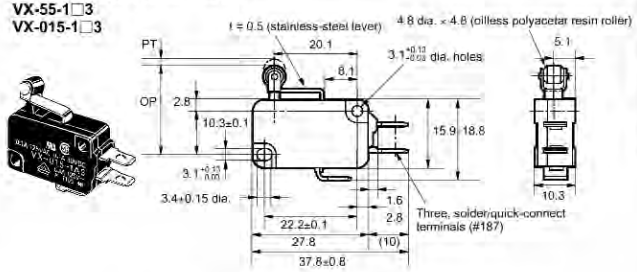
VX-54-1□3
VX-014-1□3



Model	VX-54-1□3	VX-014-1□3
OF max.	0.29 N {30 gf}	0.29 N {30 gf}
RF min.	0.02 N {2 gf}	0.02 N {2 gf}
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	0.8 mm	
OP	18.7±1.2 mm	

Short Hinge Roller Lever

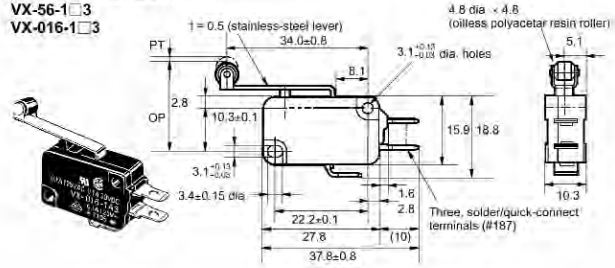
VX-55-1□3
VX-015-1□3



Model	VX-55-1□3	VX-015-1□3
OF max.	0.59 N {60 gf}	0.59 N {60 gf}
RF min.	0.04 N {4 gf}	0.04 N {4 gf}
PT max.	1.6 mm	
OT min.	0.8 mm	
MD max.	0.5 mm	
OP	20.7±0.6 mm	

Hinge Roller Lever

VX-56-1□3
VX-016-1□3

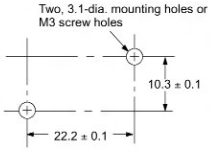


Model	VX-56-1□3	VX-016-1□3
OF max.	0.29 N {30 gf}	0.29 N {30 gf}
RF min.	---	---
PT max.	4.0 mm	
OT min.	1.6 mm	
MD max.	1.5 mm	
OP	20.7±1.2 mm	

Precautions

■ Mounting Dimensions

Use two M3 mounting screws with spring washers to mount the switch. Tighten the screws to a torque of 0.39 to 0.59 N • m {4 to 6 kgf • cm}.



■ Correct Use

Handling

Be careful not to drop the Switch. doing so may cause damage to the switch's internal components because it is designed for a small load.

Mounting Direction

For a Switch with an actuator, mount the Switch in a direction where the actuator weight will not be applied to the Switch.
Since the Switch is designed for a small load, its resetting force is small. Therefore, resetting failure may occure if unnecessary load is applied to the Switch.

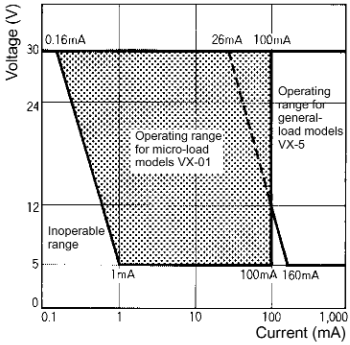
Using Micro Loads

Using a model for ordinary loads to open or close the contact of a miroload circuit may result in faulty contact. Use models that operate in the following range. However, even when using micro load models within the operating range shown below, if inrush current occurs when the contact is opened or closed, it may increase contact wear and so decrease durability. Therefore, insert a contact protection circuit where necessary.

The minimum applicable load is the N-level refreence value. This value indicates the malfunction reference level for the reliability level of 60% (λ60). The equation, λ60 = 0.5 x 10-6/operations indicates that the estimated malfunction rate is less than 1/2,000,000 operations with a reliability level of 60%.

■ Using Micro Loads

Use the Switch in the following operating range.



Model	VX-01	VX-5
Minimum applicable load	1 mA at 5 VDC	160 mA at 5 VDC

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

CAT. No. B039-E2-02-X