

# SPVQ3 Water-proof Type

Long travel type applicable to oblique pressing without an actuator



Detector

Slide

Push

Rotary

Power

Dual-in-line Package Type

General-purpose Type

Water-proof Type

Fast Switching Type



## Typical Specifications

| Items  |              | Specifications                            |  |
|--|--------------|---|--|
|  |              | Normal type                               | Longlife type  |
| Rating (max.)/(min.)<br>(Resistive load)               |              | 0.1A 12V DC<br>50μA 5V DC                 | 0.3A 16V DC<br>1mA 5V DC                                     |
| Contact resistance<br>(Initial / After operating life) |              | 500mΩ max. / 1Ω max.                      |  |
| Operating force  |              | Push type 1±0.5N<br>Actuator type 3N max. |  |
| Operating life   | Without load | 300,000cycles                             | 1,200,000cycles  |
|  | With load    | 300,000cycles<br>(0.1A 12V DC)            | 1,200,000cycles (0.1A 16V DC)<br>300,000cycles (0.3A 16V DC) |
| Poles  |              | 1   |  |
| Changeover timing                                      |              | Non shorting                              |  |

## Product Line

| Operating life        | Positions   | Operating part shape | Terminal type          | Product No. (Main body form) |                        |                       |                   |                   | Minimum order unit (pcs) |             | Packing specification type | Drawing No. |   |   |
|-----------------------|-------------|----------------------|------------------------|------------------------------|------------------------|-----------------------|-------------------|-------------------|--------------------------|-------------|----------------------------|-------------|---|---|
|                       |             |                      |                        | Normal                       | Boss - right side      | Boss - left side      | Boss - both sides | With a screw hole | Japan                    | Export      |                            |             |   |   |
| 300,000 cycles        | 2           | Push                 | For PC board           | SPVQ380400                   | SPVQ380300             | SPVQ380201            | SPVQ380100        | —                 | 1,300                    | 5,200       | A                          | 1           |   |   |
|                       |             |                      | For Lead               | —                            | SPVQ380700             | SPVQ380600            | SPVQ380500        | —                 |                          |             |                            | 2           |   |   |
|                       |             |                      | Right angle            | —                            | SPVQ380900             | —                     | —                 | —                 |                          |             |                            | 3           |   |   |
|                       |             |                      | Left angle             | —                            | —                      | SPVQ380800            | —                 | —                 |                          |             |                            | 4           |   |   |
|                       |             |                      | With wire (Downwards)  | —                            | —                      | —                     | —                 | SPVQ361000*       | 400                      | 1,600       | B                          | 5           |   |   |
|                       |             |                      |                        | SPVQ361100*                  | SPVQ361200*            | SPVQ361300*           | —                 | 6                 |                          |             |                            |             |   |   |
|                       | 1           | Push                 | With wire (Right side) | —                            | —                      | —                     | —                 | SPVQ361400*       | 400                      | 1,600       | B                          | 7           |   |   |
|                       |             |                      |                        | SPVQ361500*                  | SPVQ361600*            | SPVQ361700*           | —                 | 8                 |                          |             |                            |             |   |   |
|                       |             |                      |                        | With wire (Left side)        | —                      | SPVQ361800*           | SPVQ361900*       | SPVQ362000*       |                          |             |                            | —           | 9 |   |
|                       | 2           | Actuator A           | Push                   | For PC board                 | SPVQ370400             | SPVQ370300            | SPVQ370200        | SPVQ370100        | —                        | 1,300       | 5,200                      | A           | 1 |   |
|                       |             |                      |                        | For Lead                     | —                      | SPVQ370700            | SPVQ370600        | SPVQ370500        | —                        |             |                            |             | 2 |   |
|                       |             |                      |                        | Right angle                  | —                      | SPVQ370900            | —                 | —                 | —                        |             |                            |             | 3 |   |
|                       |             |                      |                        | Left angle                   | —                      | —                     | SPVQ370800        | —                 | —                        |             |                            |             | 4 |   |
|                       |             |                      |                        | With wire (Downwards)        | —                      | —                     | —                 | —                 | SPVQ350100*              | 180         | 720                        | D           | 5 |   |
|                       |             |                      |                        |                              | SPVQ350200*            | SPVQ350300*           | SPVQ350400*       | —                 | 6                        |             |                            |             |   |   |
|                       |             | 1                    | Actuator A             | Push                         | With wire (Right side) | —                     | SPVQ350600*       | SPVQ350700*       | SPVQ350800*              | —           | 168                        | 672         | C | 8 |
|                       |             |                      |                        |                              |                        | With wire (Left side) | —                 | SPVQ350900*       | SPVQ351000*              | SPVQ351100* |                            |             |   | — |
|                       |             | 2                    | Actuator B             | Push                         | For PC board           | SPVQ371300            | SPVQ371200        | SPVQ371100        | SPVQ371000               | —           | 1,300                      | 5,200       | A | 1 |
| For Lead              |             |                      |                        |                              | —                      | SPVQ371600            | SPVQ371500        | SPVQ371400        | —                        | 2           |                            |             |   |   |
| Right angle           |             |                      |                        |                              | —                      | SPVQ371800            | —                 | —                 | —                        | 3           |                            |             |   |   |
| Left angle            |             |                      |                        |                              | —                      | —                     | SPVQ371700        | —                 | —                        | 4           |                            |             |   |   |
| With wire (Downwards) | —           |                      |                        |                              | —                      | —                     | —                 | SPVQ351200*       | 180                      | 720         | D                          | 5           |   |   |
|                       | SPVQ351300* |                      |                        |                              | SPVQ351400*            | SPVQ351500*           | —                 | 6                 |                          |             |                            |             |   |   |
| 1                     | Actuator B  |                      | Push                   | With wire (Right side)       | —                      | SPVQ351700*           | SPVQ351800*       | SPVQ351900*       | —                        | 168         | 672                        | C           | 8 |   |
|                       |             |                      |                        |                              | With wire (Left side)  | —                     | SPVQ352000*       | SPVQ352100*       | SPVQ352200*              |             |                            |             | — | 9 |

Product Line

| Operating life        | Positions | Operating part shape | Terminal type          | Product No. (Main body form) |                   |                  |                   |                   | Minimum order unit (pcs) |        | Packing specification type | Drawing No. |   |
|-----------------------|-----------|----------------------|------------------------|------------------------------|-------------------|------------------|-------------------|-------------------|--------------------------|--------|----------------------------|-------------|---|
|                       |           |                      |                        | Normal                       | Boss - right side | Boss - left side | Boss - both sides | With a screw hole | Japan                    | Export |                            |             |   |
| 1,200,000 cycles      | 2         | Push                 | For PC board           | SPVQ340400                   | SPVQ340300        | SPVQ340200       | SPVQ340100        | —                 | 1,300                    | 5,200  | A                          | 1           |   |
|                       |           |                      | For Lead               | —                            | SPVQ340700        | SPVQ340600       | SPVQ340500        | —                 |                          |        |                            | 2           |   |
|                       |           |                      | Right angle            | —                            | SPVQ340900        | —                | —                 | —                 |                          |        |                            | 3           |   |
|                       |           |                      | Left angle             | —                            | —                 | SPVQ340800       | —                 | —                 |                          |        |                            | 4           |   |
|                       |           |                      | With wire (Downwards)  | —                            | —                 | —                | —                 | SPVQ320100*       | 400                      | 1,600  | B                          | 5           |   |
|                       |           |                      |                        | SPVQ320200*                  | SPVQ320300*       | SPVQ320400*      | —                 | 6                 |                          |        |                            |             |   |
|                       | 1         |                      |                        | With wire (Right side)       | —                 | —                | —                 | —                 | SPVQ320500*              | 168    | 672                        | C           | 7 |
|                       |           |                      |                        |                              | SPVQ320600*       | SPVQ320700*      | SPVQ320800*       | —                 | 8                        |        |                            |             |   |
|                       |           |                      |                        |                              | SPVQ320900*       | SPVQ321000*      | SPVQ321100*       | —                 | 9                        |        |                            |             |   |
|                       | 2         | Actuator A           | For PC board           | SPVQ330400                   | SPVQ330300        | SPVQ330200       | SPVQ330100        | —                 | 1,300                    | 5,200  | A                          | 1           |   |
|                       |           |                      | For Lead               | —                            | SPVQ330700        | SPVQ330600       | SPVQ330500        | —                 |                          |        |                            | 2           |   |
|                       |           |                      | Right angle            | —                            | SPVQ330900        | —                | —                 | —                 |                          |        |                            | 3           |   |
|                       |           |                      | Left angle             | —                            | —                 | SPVQ330800       | —                 | —                 |                          |        |                            | 4           |   |
|                       |           |                      | With wire (Downwards)  | —                            | —                 | —                | —                 | SPVQ310100*       | 180                      | 720    | D                          | 5           |   |
|                       |           |                      |                        | SPVQ310200*                  | SPVQ310300*       | SPVQ310400*      | —                 | 6                 |                          |        |                            |             |   |
|                       | 1         |                      |                        | With wire (Right side)       | —                 | SPVQ310600*      | SPVQ310700*       | SPVQ310800*       | —                        | 168    | 672                        | C           | 8 |
|                       |           |                      |                        |                              | SPVQ310900*       | SPVQ311000*      | SPVQ311100*       | —                 | 9                        |        |                            |             |   |
|                       | 2         | Actuator B           | For PC board           | SPVQ331300                   | SPVQ331200        | SPVQ331100       | SPVQ331000        | —                 | 1,300                    | 5,200  | A                          | 1           |   |
| For Lead              |           |                      | —                      | SPVQ331600                   | SPVQ331500        | SPVQ331400       | —                 | 2                 |                          |        |                            |             |   |
| Right angle           |           |                      | —                      | SPVQ331800                   | —                 | —                | —                 | 3                 |                          |        |                            |             |   |
| Left angle            |           |                      | —                      | —                            | SPVQ331700        | —                | —                 | 4                 |                          |        |                            |             |   |
| With wire (Downwards) |           |                      | —                      | —                            | —                 | —                | SPVQ311200*       | 180               | 720                      | D      | 5                          |             |   |
|                       |           |                      | SPVQ311300*            | SPVQ311400*                  | SPVQ311500*       | —                | 6                 |                   |                          |        |                            |             |   |
| 1                     |           |                      | With wire (Right side) | —                            | SPVQ311700*       | SPVQ311800*      | SPVQ311900*       | —                 | 168                      | 672    | C                          | 8           |   |
|                       |           |                      |                        | SPVQ312000*                  | SPVQ312100*       | SPVQ312200*      | —                 | 9                 |                          |        |                            |             |   |

Notes

- ※ Products with a wire will be supplied as follows.
  - Unless specified, the length of the lead wire is 250mm. Color is either red, black or yellow. Please consult us for length modification.
  - Unless circuit is specified, wired (downward) types will apply three wires.
  - Please specify circuits (N.O. or N.C.) for wired (side) types. Unless specified, the circuit will apply N.O.
  - Product with wire will be build-to-order.
- This unit cannot be used in water (IP67 rating, except for terminal).

Packing Specifications

Tray

| Product No. | Number of packages (pcs.) |                        | Export package measurements (mm) |
|-------------|---------------------------|------------------------|----------------------------------|
|             | 1 case /Japan             | 1 case /export packing |                                  |
| <b>A</b>    | 1,300                     | 5,200                  | 540×360×290                      |

Bulk

| Product No. | Number of packages (pcs.) |                        | Export package measurements (mm) |
|-------------|---------------------------|------------------------|----------------------------------|
|             | 1 case /Japan             | 1 case /export packing |                                  |
| <b>B</b>    | 400                       | 1,600                  | 555×375×223                      |
| <b>C</b>    | 168                       | 672                    |                                  |
| <b>D</b>    | 180                       | 720                    | 540×360×270                      |

Detector  
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Dual-in-line Package Type  
General-purpose Type  
Water-proof Type  
Fast Switching Type

# SPVQ3 Water-proof Type

## Dimensions

Unit:mm

| No. | Style  |
|-----|--|
| 1   | <p>Terminal No.③-① ON starting point<br/>Terminal No.③-② OFF starting point<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>PC board mounting face<br/>Terminal No.①<br/>Terminal No.②<br/>Terminal No.③<br/>0.9<br/>2.3<br/>5<br/>5<br/>13<br/>4<br/>4.35<br/>3.3<br/>6.1<br/>(6.4)<br/>8.4<br/>8.7<br/>9.1<br/>5.8<br/>0.5</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.<br/>※ Refer to page 54 "Main Body Configurations" for boss positions.</p>      |
| 2   | <p>Terminal No.③-① ON starting point<br/>Terminal No.③-② OFF starting point<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>Terminal No.①<br/>Terminal No.②<br/>Terminal No.③<br/>7.45<br/>4.35<br/>1.5<br/>1.2<br/>2.2<br/>2.3<br/>4.35<br/>4.35<br/>13<br/>4<br/>4.35<br/>6.1<br/>(6.4)<br/>8.4<br/>8.7<br/>9.1<br/>5.8<br/>0.5</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.<br/>※ Refer to page 54 "Main Body Configurations" for boss positions.</p> |
| 3   | <p>Terminal No.③-① ON starting point<br/>Terminal No.③-② OFF starting point<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>Terminal No.①<br/>Terminal No.②<br/>Terminal No.③<br/>0.9<br/>2.3<br/>5<br/>5<br/>13<br/>4<br/>4.15<br/>6.1<br/>(6.4)<br/>8.4<br/>8.7<br/>9.1<br/>5.8<br/>6<br/>0.5<br/>(2.6)<br/>PC board mounting face</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.</p>  |
| 4   | <p>Terminal No.③-① ON starting point<br/>Terminal No.③-② OFF starting point<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>Terminal No.①<br/>Terminal No.②<br/>Terminal No.③<br/>0.9<br/>2.3<br/>5<br/>5<br/>13<br/>4<br/>4.15<br/>6.1<br/>(6.4)<br/>8.4<br/>8.7<br/>9.1<br/>5.8<br/>6<br/>0.5<br/>(2.6)<br/>PC board mounting face</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.</p>  |

Dimensions

Unit:mm

| No. | Style   |
|-----|---|
| 5   |  <p>Terminal No.③-① ON starting point<br/>Terminal No.③-② OFF starting point<br/>Hole (for M3)<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>Terminal No.③<br/>Terminal No.②<br/>Terminal No.①<br/>Wire</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.</p>  |
| 6   |  <p>Terminal No.③-① ON starting point<br/>Terminal No.③-② OFF starting point<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>Terminal No.③<br/>Terminal No.②<br/>Terminal No.①<br/>Wire</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.<br/>※ Refer to page 54 "Main Body Configurations" for boss positions.</p> |
| 7   |  <p>Terminal No.③<br/>Terminal No.① or ②<br/>Terminal No.③-① ON starting point<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>Hole (for M3)<br/>Wire</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.</p>  |
| 8   |  <p>Terminal No.③<br/>Terminal No.① or ②<br/>Terminal No.③-① ON starting point<br/>Free position<br/>Operating force measurement position<br/>Total travel position<br/>Wire</p> <p>※ Refer to page 54 "Actuator Configurations" for operating part shape.<br/>※ Refer to page 54 "Main Body Configurations" for boss positions.</p>  |

Detector  
Slide  
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Dual-in-line Package Type  
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# SPVQ3 Water-proof Type

Detector

Slide

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Dual-in-line Package Type

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## Dimensions

Unit:mm



## Actuator Configurations

Unit:mm



## Main Body Configurations

Unit:mm



## Circuit Diagram



# Detector Switches

## List of Varieties

| Series                         |  | Water-proof Type  |   |  |   |   |
|--------------------------------|--|---|---|--|---|---|
|                                |  | SPVQ1   | SPVQ3   | SPVQ4H   | SPVQ6   | SPVQ7   |
| Photo                          |  |  |  |  |  |  |
| Operation type                 |  | One-way<br>Two-way  | Two-way   |  | One-way<br>Two-way  | Two-way   |
| Dimensions (mm)                | W  | 13.3  | 13  | 19   | 13.3  | 14.7  |
|                                | D  | 5.8   |   | 6  | 5.3   | 5.4   |
|                                | H  | 8   | 8.35  | 11.9   | 7   | 6.7   |
| Operating temperature range    |  | -40°C to +85°C  |   |  |   |   |
| Automotive use                 |  | ●   | ●   | ●  | ●   | ●   |
| Life cycle (availability)      |  |  |  |   |  |  |
| Poles / Positions              |  | 1/2   | 1/1<br>1/2  |  | 1/2   | 1/1<br>1/2  |
| Rating (max.) (Resistive load) |  | 0.1A 12V DC   | 0.1A 12V DC or<br>0.3A 16V DC   | 0.1A 12V DC  |   |   |
| Rating (min.) (Resistive load) |  | 50μA 3V DC  | 50μA 5V DC or<br>1mA 5V DC  | 1mA 5V DC  | 50μA 5V DC  |   |
| Durability                     | Operating life without load                                | 300,000cycles<br>1Ω max.  | 300,000cycles or<br>1,200,000cycles<br>1Ω max.                                    | 300,000cycles<br>1Ω max.   |   |   |
|                                | Operating life with load<br>Rating (max.) (Resistive load) | 300,000cycles<br>1Ω max.  | 300,000cycles<br>or 1,200,000cycles<br>1Ω max.                                    | 300,000cycles<br>1Ω max.   |   |   |
| Electrical performance         | Initial contact resistance                                 | 500mΩ max.  |   |  |   |   |
|                                | Insulation resistance                                      | 100MΩ min. 500V DC  |   |  |   |   |
|                                | Voltage proof  | 500V AC for 1minute   |   |  |   |   |
| Mechanical performance         | Terminal strength  | 3N for 1minute (with terminal)<br>Wire strength 30N for 1minute (with wire)       |   | Wire strength<br>30N for 1 minute  | 3N for 1minute  |   |
|                                | Actuator strength  | 20N   |   |  |   |   |
| Environmental performance      | Cold   | -40°C 500h  |   |  |   |   |
|                                | Dry heat   | 85°C 500h   |   |  |   |   |
|                                | Damp heat  | 60°C, 90 to 95% RH 500h   |   |  |   |   |
| Operation force                |  | 2N max.<br>5.9N max.  | 1±0.5N<br>3N max.   | 3N max.  | 1±0.5N<br>3N max.   | 1±0.5N  |
| Page                           |  | 46  | 50  | 55   | 56  | 59  |

|  |    |
|--|----|
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### Note

- Indicates applicability to all products in the series.

# Detector Switches Soldering Conditions

## Example of Reflow Soldering Condition

1. Heating method: Double heating method with infrared heater.
2. Temperature measurement: Thermocouple  $\phi 0.1$  to  $0.2$  CA (K) or CC (T) at soldering portion (copper foil surface). A heat resisting tape should be used for fixed measurement.
3. Temperature profile



| Series (Reflow type) | A (°C) 3s max. | B (°C) | C (s) | D (°C) | E (°C) | F (s) |    |
|----------------------|----------------|--------|-------|--------|--------|-------|----|
| <b>SPPB</b>          | 250            | 230    | 40    | 180    | 150    | 120   |    |
| <b>SPPW8</b>         |                |        | 35    |        |        |       |    |
| <b>SPVE</b>          | 260            |        | 40    |        |        |       | 40 |
| <b>SPVL</b>          |                |        |       |        |        |       |    |
| <b>SPVM</b>          |                |        |       |        |        |       |    |
| <b>SPVN</b>          |                |        |       |        |        |       |    |
| <b>SPVR</b>          |                |        |       |        |        |       |    |
| <b>SPVS</b>          |                |        |       |        |        |       |    |
| <b>SPVT</b>          |                |        |       |        |        |       |    |
| <b>SSCM</b>          |                |        |       |        |        |       |    |
| <b>SSCQ</b>          |                |        |       |        |        |       |    |
| <b>SPVQC, SPVQE</b>  | 250            |        |       |        |        |       |    |

### Notes

1. The condition mentioned above is the temperature on the mounting surface of a PC board. There are cases where the PC board's temperature greatly differs from that of the switch, surface depending on the PC board's material, size, thickness, etc. The above-stated conditions shall also apply to switch surface temperatures.
2. Soldering conditions differ depending on reflow soldering machines. Prior verification of soldering condition is highly recommended.

### Reference for Hand Soldering

| Series   | Soldering temperature | Soldering time |
|--|-----------------------|----------------|
| <b>SPVS, SPVN, SPVT, SPVM, SPVR, SPVE, SPPW8, SSCQ, SSCM, SPVL, SSCT, SPVQC, SPVQE</b> | 350±5°C               | 3s max.        |
| <b>SPVQ1, SPVQ3, SPVQ6, SPVQ7, SPVQ8, SPVQ9, SSCN, SPVQA</b>                           | 300±10°C              | 3 + 1 / 0s     |
| <b>SPPB (Reflow)</b>   | 300±5°C               | 5s max.        |
| <b>SSCF, SPPB (For Lead, Dip)</b>  | 350±10°C              | 3 + 1 / 0s     |

### Reference for Dip Soldering

(For PC board terminal types)

| Series   | Items                  |                 | Dip soldering         |                       |
|--|------------------------|-----------------|-----------------------|-----------------------|
|  | Preheating temperature | Preheating time | Soldering temperature | Duration of immersion |
| <b>SSCT, SPVQ1, SPVQ3, SPVQ6, SPVQ7, SPVQ8, SPVQ9, SPVQA</b> | 100±10°C               | 60s max.        | 260±5°C               | 5±1s                  |
| <b>SPPW8, SPPB</b>   | 100 °C max.            | 60s max.        | 255±5°C               | 5±1s                  |
| <b>SSCF</b>  | —                      |                 | 260±5°C               | 5±1s                  |