

SRBQ-S-501

SRBQ PRODUCT SPECIFICATIONS

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## 1. General

1.1 Application This specification is applied to low current circuit (Secondary circuit) rotary switch used for electronic equipment.

1.2 Operating temperature range :  $-10 \sim 60^{\circ}\text{C}$   $\Delta$  1.2.2 Storage temperature range :  $-10 \sim 60^{\circ}\text{C}$  (unrestrained) or  $-20 \sim 85^{\circ}\text{C}$  (soak)1.3 Test conditions The standard test conditions shall be  $5 \sim 35^{\circ}\text{C}$  in temperature, 45~85% RH and  $86 \sim 106\text{kPa}$  ( $660 \sim 1060\text{mbar}$ ) in atmospheric pressure. Should any doubt arise in judgement, tests shall be conducted at  $20 \pm 2^{\circ}\text{C}$ ,  $65 \pm 5\%$  RH and  $86 \sim 106\text{kPa}$  ( $660 \sim 1060\text{mbar}$ ).

## 2. Appearance, construction and dimensions

2.1 Appearance Switch shall have good finishing, and shall have no rust, crack or plating failures.

2.2 Construction and dimensions Per individual product drawing

2.3 Markings Per individual product drawing

3. Rating  $0.1\text{ V DC}$   $16\text{ A}$  (Resistive load)

## 4. Electrical performance

| Items                     | Test conditions                                                                                                                                                                | Criterion                            |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 4.1 Contact resistance    | Shall be measured at $1\text{kHz} \pm 200\text{Hz}$ ( $20\text{mV MAX}$ , $50\text{mA MAX}$ ) or $1\text{A}$ , $5\text{V DC}$ by voltage drop method.                          | $50\text{ m}\Omega\text{ MAX}$       |
| 4.2 Insulation resistance | Test voltage : $100\text{ V DC}$ , measured after 1 minute $\pm 5$ seconds.<br>Applied position : Between all terminals<br>Between terminals and ground (frame)                | $100\text{ M}\Omega\text{ MIN.}$     |
| 4.3 Voltage proof         | Test voltage : $100\text{ V AC}$ ( $50 \sim 60\text{Hz}$ , cut-off current $2\text{ mA}$ )<br>Applied position : Between all terminals<br>Between terminals and ground (frame) | No dielectric breakdown shall occur. |
| 4.4 Capacitance           | Shall be measured at $1\text{MHz} \pm 10\text{kHz}$<br>Between all terminals<br>Between terminals and ground (frame)<br>Between all circuits                                   | $\text{PF MAX}$                      |
| 4.5 Changeover timing     |                                                                                                                                                                                | As per individual product drawing.   |

## 5. Mechanical performance

| Items                                                          | Test conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Criterion                                                                                                                                                                                                                                                                                                                                                        |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------|-------------------------------|------------------|------------------------------|-----------------------------------------------------------------------------|---------|-----------------------------------|---------|
| 5.1 Operating torque                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | As per individual product drawing.                                                                                                                                                                                                                                                                                                                               |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| 5.2 Changeover angle                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | As per individual product drawing.                                                                                                                                                                                                                                                                                                                               |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| 5.3 Terminal strength                                          | A static load of <u>5 N (510 gf)</u> $\Delta$ shall be applied to the tip of terminal in a desired direction for one minute. The number of tests shall be once per terminal.                                                                                                                                                                                                                                                                                                                                      | Shall be free from terminal looseness, and damage and breakage of terminal holding portion. Terminals may be bent after test, electrical performance requirement specified in item 4 shall be satisfied.                                                                                                                                                         |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| 5.4 Mounting strength<br>(Applied to center nut mounting type) | Switch shall be mounted at <u>N·m ( kgf·cm)</u> by normal mounting method.                                                                                                                                                                                                                                                                                                                                                                                                                                        | Shall be free from damage of bushing thread portion. There shall be no abnormalities in axis rotation and caulking portion.                                                                                                                                                                                                                                      |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| 5.5 Control strength                                           | A static load of <u>20 N (204 kgf)</u> $\Delta$ shall be applied in the push and pull directions of the shaft for 15 seconds.<br><i>The static load shall be applied to the shaft tip in the vertical direction of shaft for 15 seconds as follows</i> <table><tr><th>Shaft tip height from mounting surface (mm)</th><th>Load</th></tr><tr><td>Less than 10</td><td><u>10 N (102 gf)</u> <math>\Delta</math></td></tr><tr><td>Not less than 10</td><td><u>5 N (510 gf)</u> <math>\Delta</math></td></tr></table> | Shaft tip height from mounting surface (mm)                                                                                                                                                                                                                                                                                                                      | Load                                   | Less than 10  | <u>10 N (102 gf)</u> $\Delta$ | Not less than 10 | <u>5 N (510 gf)</u> $\Delta$ | Shall be free from pronounced wobble, bending and mechanical abnormalities. |         |                                   |         |
| Shaft tip height from mounting surface (mm)                    | Load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                  |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| Less than 10                                                   | <u>10 N (102 gf)</u> $\Delta$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                  |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| Not less than 10                                               | <u>5 N (510 gf)</u> $\Delta$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                  |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| 5.6 Wobble of actuator                                         | Run-out (P-P) shall be measured by applying a static load of 1N (102gf) to the shaft.                                                                                                                                                                                                                                                                                                                                                                                                                             | <table><tr><th>Shaft tip height from mounting surface</th><th>Run-out (P-P)</th><th rowspan="4">Unit : mm</th></tr><tr><td>Less than 5</td><td>0.5 MAX</td></tr><tr><td>Not less than 5 and less than 10</td><td>0.9 MAX</td></tr><tr><td>Not less than 10 and less than 15</td><td>1.2 MAX</td></tr></table>                                                    | Shaft tip height from mounting surface | Run-out (P-P) | Unit : mm                     | Less than 5      | 0.5 MAX                      | Not less than 5 and less than 10                                            | 0.9 MAX | Not less than 10 and less than 15 | 1.2 MAX |
| Shaft tip height from mounting surface                         | Run-out (P-P)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Unit : mm                                                                                                                                                                                                                                                                                                                                                        |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| Less than 5                                                    | 0.5 MAX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                  |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| Not less than 5 and less than 10                               | 0.9 MAX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                  |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| Not less than 10 and less than 15                              | 1.2 MAX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                  |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |
| 5.7 Vibration                                                  | Switch shall be secured to a testing machine by a regular mounting device and method.<br>(1) Vibration frequency range : 10~55Hz<br>(2) Total amplitude : 1.5mm<br>(3) Sweep ratio : 10-55-10(Hz) Approx. 1 minute<br>(4) Method of changing the sweep vibration frequency : Logarithmic or linear<br>(5) Direction of vibration : Three vertical directions including actuator.<br>(6) Time : 2 hours each (6 hours in total)                                                                                    | Contact resistance (Item 4.1) :<br><u>100</u> mΩ MAX<br>Insulation resistance (Item 4.2) :<br><u>100</u> MΩ MIN<br>Voltage proof (Item 4.3) :<br>Apply <u>100</u> V AC for 1 minute.<br>No dielectric breakdown shall occur.<br>Operating torque (Item 5.1) :<br>Within specified value.<br>No abnormalities shall be recognized in appearance and construction. |                                        |               |                               |                  |                              |                                                                             |         |                                   |         |

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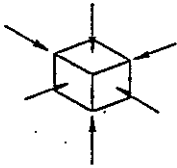
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| SRBQ-S-501       |                             | SRBQ PRODUCT SPECIFICATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |         |              |             |                                                                                                                                                                                                                                                                                                                                                                                  |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
|------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|--------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|---------------|--------|-----|------------------|--------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--|
| Items            |                             | Test conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |         |              |             | Criterion                                                                                                                                                                                                                                                                                                                                                                        |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| 5.8              | Mechanical shock            | Switch shall be measured after following test.<br>(1) Mounting method : Normal mounting method<br>(2) Acceleration : 490m/s <sup>2</sup> <del>(=500)</del><br>(3) Duration : 11ms<br>(4) Test direction : 6 directions<br><br>(5) Number of shock : 3 times per direction<br>(18 times in total)                                                                                                                                                                                                                                                                                                                                                                                                               |      |         |              |             |  Contact resistance (Item 4.1) :<br><u>100</u> mΩ MAX<br>Operating torque (Item 5.1) :<br>Within specified value.<br>Shall be free from mechanical abnormalities.                                                                                                                              |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| 5.9              | Solderability               | Switch shall be checked after following test.<br>(1) Solder : H63A (JIS Z 3282)<br>(2) Flux : Rosin flux (JIS K 5902) having a nominal composition of 25% solids by weight of water white rosin in methyl alcohol (JIS K 1501)solution.<br>(3) Soldering temperature : 230±5℃<br>Immersing time : 3±0.5 s<br>Flux immersing time shall be 5~10 seconds in normal temperature.<br>(4) Immersion depth : Immersion depth shall be at copper plating portion for P.C.B. terminal after mounting.<br>Thickness of P.C. board : 1.6 mm                                                                                                                                                                              |      |         |              |             | More than 75% of immersed part shall be covered with solder. If frame is made of tin plate, cutting section shall not be applied.                                                                                                                                                                                                                                                |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| 5.10             | Soldering heat resistance   | Switch shall be measured after following test.<br>(1) Solder : H63A (JIS Z 3282)<br>(2) Flux : Rosin flux (JIS K 5902) having a nominal composition of 10% solids by weight of water white rosin in methyl alcohol (JIS K 1501)solution.<br>(3) Temperature and immersing time <table border="1"> <tr> <th></th><th>Temperature (℃)</th><th>Time (s)</th></tr> <tr> <td>Dip soldering</td><td>260± 5</td><td>5±1</td></tr> <tr> <td>Manual soldering</td><td>350±10</td><td>3<sup>+1</sup><sub>0</sub></td></tr> </table><br>(4) Immersion depth : Immersion depth shall be at copper plating portion for P.C.B. terminal after mounting.<br>Thickness of P.C. board (Single sided copper clad P.C.B.) : 1.6mm |      |         |              |             |                                                                                                                                                                                                                                                                                                                                                                                  | Temperature (℃) | Time (s) | Dip soldering | 260± 5 | 5±1 | Manual soldering | 350±10 | 3 <sup>+1</sup> <sub>0</sub> | No abnormalities shall be recognized in appearance. The electrical performance requirements specified in item 4 shall be satisfied. |  |
|                  | Temperature (℃)             | Time (s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |         |              |             |                                                                                                                                                                                                                                                                                                                                                                                  |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| Dip soldering    | 260± 5                      | 5±1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |         |              |             |                                                                                                                                                                                                                                                                                                                                                                                  |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| Manual soldering | 350±10                      | 3 <sup>+1</sup> <sub>0</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |         |              |             |                                                                                                                                                                                                                                                                                                                                                                                  |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| 6. Durability    |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |         |              |             |                                                                                                                                                                                                                                                                                                                                                                                  |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| Items            |                             | Test conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |         |              |             | Criterion                                                                                                                                                                                                                                                                                                                                                                        |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| 6.1              | Operating life without load | 10,000 cycles of operation shall be performed continuously at a rate of 1~1.2πrad/s without load.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |         |              |             | Contact resistance (Item 4.1) :<br><u>100</u> mΩ MAX<br>Insulation resistance (Item 4.2) :<br><u>100</u> MΩ MIN<br>Voltage proof (Item 4.3) :<br>Apply <u>100</u> V AC for 1 minute.<br>No dielectric breakdown shall occur.<br>Operating torque (Item 5.1) :<br>Within <u>±30</u> % of specified value.<br>No abnormalities shall be recognized in appearance and construction. |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| 6.2              | Operating life with load    | 10,000 cycles of operation shall be performed continuously at a rate of 1~1.2πrad/s with load of <u>0.1</u> A, <u>16</u> V DC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |         |              |             | Contact resistance (Item 4.1) :<br><u>100</u> mΩ MAX<br>Insulation resistance (Item 4.2) :<br><u>100</u> MΩ MIN<br>Voltage proof (Item 4.3) :<br>Apply <u>100</u> V AC for 1 minute.<br>No dielectric breakdown shall occur.<br>Operating torque (Item 5.1) :<br>Within <u>±30</u> % of specified value.<br>No abnormalities shall be recognized in appearance and construction. |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
|                  |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |         |              |             |                                                                                                                                                                                                                                                                                                                                                                                  |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
|                  |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      | APPD.   | CHKD.        | DSGD.       | TITLE                                                                                                                                                                                                                                                                                                                                                                            |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
|                  |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      | M. Kiso | S. Takahashi | Jun. 22 '93 | DRAWING NO.                                                                                                                                                                                                                                                                                                                                                                      |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |
| PAGE             | SYMB                        | DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | APPD | CHKD    | DSGD         | (2/4)       |                                                                                                                                                                                                                                                                                                                                                                                  |                 |          |               |        |     |                  |        |                              |                                                                                                                                     |  |

| Items |
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### Test conditions

| <u>Criterion</u>                                                          |
|---------------------------------------------------------------------------|
| 1. The student can identify the main idea or central theme of a text.     |
| 2. The student can summarize the key points of a text in their own words. |
| 3. The student can analyze the author's purpose and audience.             |
| 4. The student can evaluate the credibility and bias of a source.         |
| 5. The student can synthesize information from multiple sources.          |
| 6. The student can apply critical thinking skills to solve problems.      |
| 7. The student can communicate effectively in writing and speaking.       |
| 8. The student can demonstrate cultural awareness and respect.            |
| 9. The student can show initiative and self-direction in learning.        |
| 10. The student can work collaboratively with others.                     |

Figure 1 is a temperature profile graph. The y-axis represents temperature in degrees Celsius (°C), with labels for  $70 \pm 2^\circ\text{C}$  and Normal temperature  $-25 \pm 3^\circ\text{C}$ . The x-axis represents time, with labels for 30 min, 10~15 min, and 1 cycle. The profile shows a temperature rise from normal to  $70 \pm 2^\circ\text{C}$ , a 30 min hold, and a return to normal temperature, with heating and cooling rates of 10~15 min.

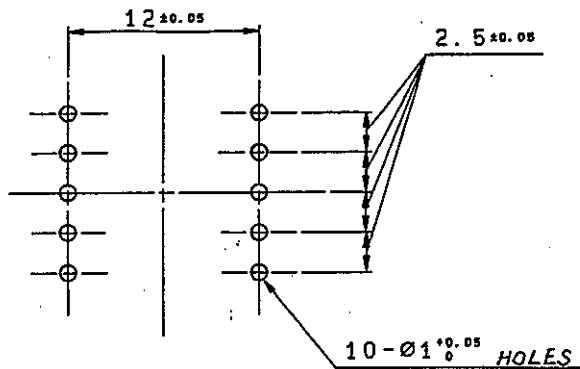
 ALPS ELECTRIC CO., LTD.

SRBQ-S-501

SRBQ PRODUCT SPECIFICATIONS

## Precaution in use

1. Note that if the load is applied to the terminals during soldering they might suffer deformation and defects in electrical performance.
2. Use of water-soluble soldering flux shall be avoided because it may cause corrosion of the switch.
3. Reference dimensions of mounting holes.



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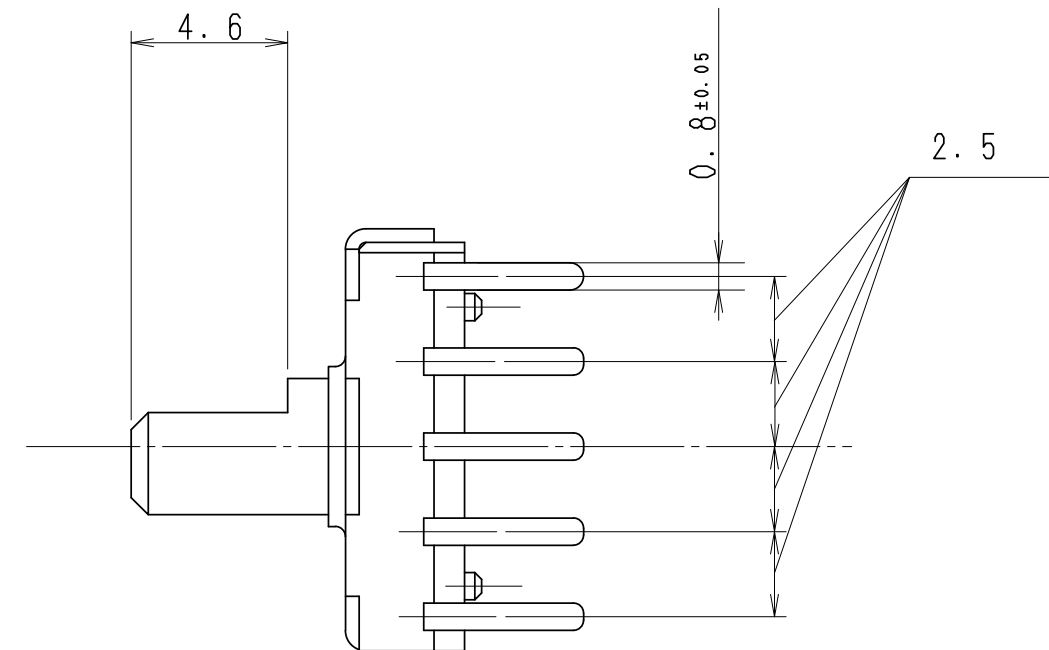
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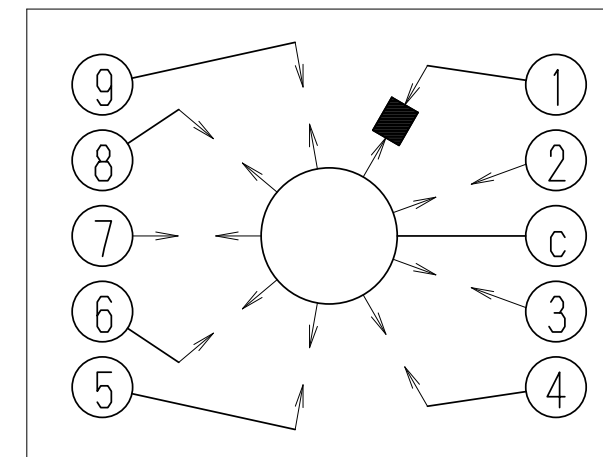
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