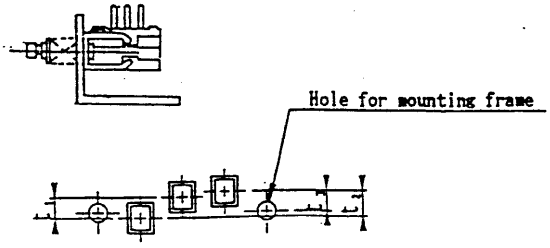
733-179

SPUJ-S-501	SPUJ PRODUCT SPECIFICATIONS	Ⓢ

1. General
 1.1 Application This specification is applied to low current circuit (Secondary circuit) push switch used for electronic equipment.
 1.2 Operating temperature range : -10 ~ 60℃
 1.3 Test conditions The standard test conditions shall be 5~35℃ in temperature, 45~85% RH and 86~106kPa {860~1060mbar} in atmospheric pressure. Should any doubt arise in judgement, tests shall be conducted at 20±2℃, 65±5% RH and 86~106kPa {860~1060mbar}.
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 30 V DC 0.1 A (Resistive load)
4. Electrical performance

	Items	Test conditions	Criterion
4.1	Contact resistance	Shall be measured at 1kHz±200Hz (20mV MAX, 50mA MAX) or 1A, 5V DC by voltage drop method.	20 mΩ MAX
4.2	Insulation resistance	Test voltage : 500 V DC, measured after 1 minute±5 seconds. Applied position : Between all terminals Between terminals and ground (frame)	100 MΩ MIN
4.3	Voltage proof	Test voltage : 500 V AC (50~60Hz, cut-off current 2 mA) Applied position : Between all terminals Between terminals and ground (frame)	No dielectric breakdown shall occur.
4.4	Capacitance	Shall be measured at 1MHz ± 10kHz Between all terminals Between terminals and ground (frame) Between all circuits	1.5 pF MAX
4.5	Changeover timing		As per individual product drawing.

5. Mechanical performance

	Items	Test conditions	Criterion
5.1	Operating force	A static load shall be applied to the tip of actuator in operating direction.	As per individual product drawing.
5.2	Terminal strength	A static load of 5 N {510 gf} shall be applied to the tip of terminal in a desired direction for 1 minute. The number of test 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.
5.3	Mounting strength of thread portion	Thread shall be mounted at 0.6 N·m {6.12 kgf·cm} by normal mounting method.	Shall be free from damage of thread portion. (Applied to frame with screw.)
5.4	Control strength 5.4.1 Control strength	(1) A static load of 50 N {5.1 kgf} shall be applied in the operating direction of actuator for 15 seconds. (2) A static load of 50 N {5.1 kgf} shall be applied in the pull direction of actuator for 15 seconds. (For construction with lock, the test shall be conducted at the condition of lock released.) (3) A static load of 10 N {102kgf} shall be applied to the vertical direction of operation at the tip of actuator for 15 seconds.	Shall be free from pronounced wobble and mechanical abnormalities.
	5.4.2 Lock holding strength of actuator (Applied to the switch with lock mechanism)	(1) A static load of 10 N {1.02 kgf} shall be applied in the pull direction at the condition of locking actuator.	Lock shall not be dislocated. Shall be free from pronounced wobble and abnormalities in operation.
5.5	Wobble of actuator	Run-out (P-P) shall be measured by applying a static load of 1N {102gf} in the vertical direction of operation at the tip of actuator.	P-P : 0.8 mm MAX (1.8 mm MAX, without frame.)
5.6	Rov of actuator (Applied to multipul-key push switch)	Switch shall be mounted as shown. Difference of sides shall be measured.  	Difference between actuators t_1 = Within 0.5 mm Maximum difference of actuator t_2 = Within 0.8 mm Difference between mounting hole and actuator t_3 = Within 0.5 mm

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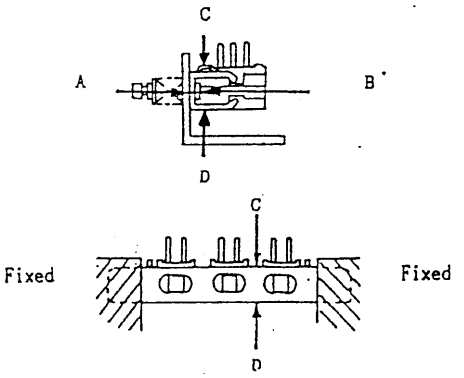
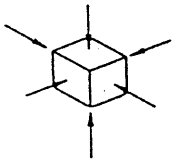
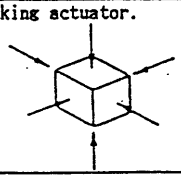
	Items	Test conditions	Criterion
5.7	Mounting frame strength (Applied to multi-pul-key push switch)	Both ends of mounting frame shall be secured. A static load of 30N {3.06kgf} shall be applied to the center of mounting frame in A, B, C and D directions each 15 seconds. 	Warp on mounting frame shall be 0.5mm max. Shall be free from abnormalities in operation.
5.8	Vibration	Switch shall be secured to a testing machine by a regular mounting device and method. (1) Vibration frequency range : 10~55Hz (2) Total amplitude : 1.5mm (3) Sweep ratio : 10-55-10(Hz) Approx. 1-minute (4) Method of changing the sweep vibration frequency : Logarithmic or linear (5) Direction of vibration : Three vertical directions including actuator. (6) Time : 2 hours each (6 hours in total)	Contact resistance (Item 4.1) : 20 mΩ MAX Insulation resistance (Item 4.2) : 100 MΩ MIN Voltage proof (Item 4.3) : Apply 500 V AC for 1 minute. No dielectric breakdown shall occur. Operating force (Item 5.1) : Within ±10/30 % of specified value. No abnormalities shall be recognized in appearance and construction.
5.9	Mechanical shock 5.9.1 Mechanical shock	Switch shall be measured after following test. (1) Mounting method : Normal mounting method (2) Acceleration : 490m/s² { 50G } (3) Duration : 11ms (4) Test direction : 6 directions (5) Number of shock : 3 times per direction (18 times in total) 	Contact resistance (Item 4.1) : 20 mΩ MAX Operating force (Item 5.1) Within ±10/30 % of specified value. Shall be free from mechanical abnormalities. (Dislocation of lock of actuator shall not be regarded as abnormalities.)
	5.9.2 Lock holding shock (Applied to the switch with lock mechanism.)	Switch shall be conducted at the condition of locking actuator. (1) Acceleration : 147m/s² {15G} (2) Duration : 11 ms (3) Test direction : 6 directions (4) Number of shock : 3 times per direction (18 times in total) 	Lock of actuator shall not be dislocated. Shall be free from abnormalities in operation.
5.10	Solderability	Switch shall be checked after following test. (1) Solder : H63A (JIS Z 3282) (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. (3) Soldering temperature : 230±5℃ Immersing time : 3±0.5 s Flux immersing time shall be 5~10 seconds in normal temperature. (4) Immersion depth : Immersion depth shall be at copper plating portion for P.C.B. terminal after mounting. Thickness of P.C. board : 1.6 mm	More than 90% of immersed part shall be covered with solder.
5.11	Soldering heat resistance	Switch shall be measured after following test. (1) Solder : H63A (JIS Z 3282) (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. (3) Temperature and immersing time Dip soldering: 260±5℃, 5±1 s Manual soldering: 300±10℃, 3 +1 0 s	No abnormalities shall be recognized in appearance. The electrical performance requirements specified in item 4 shall be satisfied.

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APPD. M. Enzo | CHKD. S. Sakakibara | DSGD. Jun. 30'93 H. Yamaguchi | TITLE | DRAWING NO. (2/5)

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	Items	Test conditions	Criterion
		(4) Immersion depth : Immersion depth shall be at copper plating portion for P.C.B. terminal after mounting. Thickness of P.C. board (Single sided copper clad P.C.B.) : 1.6mm	
5.12	Resistance to flux (Applied to the switch for P.C. board)	Switch shall be checked after following test. (1) Equipment : Auto-dip chamber (2) Solder : H63A (JIS Z 3282) (3) 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. (4) Temperature : 260±5℃ (5) Immersing time : 5±1 s (6) Immersion depth : Immersion depth shall be at copper plating portion for P.C.B. terminal after mounting. Thickness of P.C. board : 1.6 mm	Flux shall not be risen up to contact. Shall be free from abnormalities in operation.

6. Durability

	Items	Test conditions	Criterion
6.1	Operating life without load	Switch shall be operated 10,000 cycles at 15~20 cycles/minute without load.	Contact resistance (Item 4.1) : 40 mΩ MAX Insulation resistance (Item 4.2) : 10 MΩ MIN Voltage proof (Item 4.3) : Apply 500 V AC for 1 minute. No dielectric breakdown shall occur. Operating force (Item 5.1) : Within ±10/30 % of specified value. No abnormalities shall be recognized in appearance and construction.
6.2	Operating life with load	Switch shall be operated 10,000 cycles at 15~20 cycles/minute with 30 V DC 0.1 A. (Resistive load)	Contact resistance (Item 4.1) : 40 mΩ MAX Insulation resistance (Item 4.2) : 10 MΩ MIN. Voltage proof (Item 4.3) : Apply 500 V AC for 1 minute. No dielectric breakdown shall occur. Operating force (Item 5.1) : Within ±10/30 % of specified value. No abnormalities shall be recognized in appearance and construction.

7. Weather proof

	Items	Test conditions	Criterion
7.1	Cold proof	After testing at -20±2℃ for 96 hours, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and then measurement shall be made within 1 hour. Water drops shall be removed.	Contact resistance (Item 4.1) : 40 mΩ MAX Insulation resistance (Item 4.2) : 10 MΩ MIN Voltage proof (Item 4.3) : Apply 500 V AC for 1 minute. No dielectric breakdown shall occur. Operating force (Item 5.1) : Within ±10/30 % of specified value. No abnormalities shall be recognized in appearance and construction.
7.2	Dry heat	After testing at 85±2℃ for 96 hours, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and then measurement shall be made within 1 hour.	Contact resistance (Item 4.1) : 40 mΩ MAX Insulation resistance (Item 4.2) : 10 MΩ MIN Voltage proof (Item 4.3) : Apply 500 V AC for 1 minute. No dielectric breakdown shall occur. Operating force (Item 5.1) : Within ±10/30 % of specified value. No abnormalities shall be recognized in appearance and construction.

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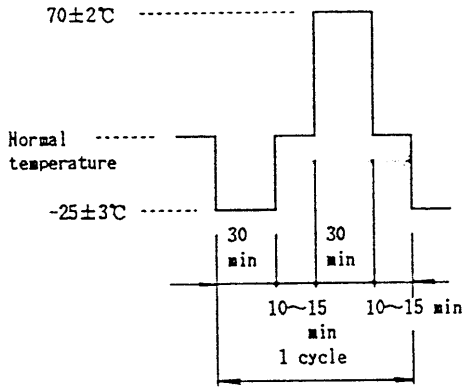
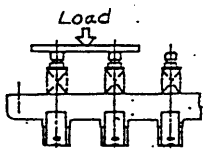
	Items	Test conditions	Criterion
7.3	Damp heat	After testing at 40±2℃ and 90~95%RH for 96 hours, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be removed.	Contact resistance (Item 4.1) : 40 mΩ MAX Insulation resistance (Item 4.2) : 10 MΩ MIN Voltage proof (Item 4.3) : Apply 500 V AC for 1 minute. No dielectric breakdown shall occur. Operating force (Item 5.1) : Within ±30 % of specified value. No abnormalities shall be recognized in appearance and construction.
7.4	Salt mist	Switch shall be checked after following test. (1) Temperature : 35±2℃ (2) Salt solution : 5±1% (Solids by weight) (3) Duration : 24±1 h After the test, salt deposit shall be removed in running water.	No remarkable corrosion shall be recognized in metal part.
7.5	Temperature cycling	After 5 cycles of following conditions, the switch shall be allowed to stand under normal temperature and humidity conditions for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be removed. 	Contact resistance (Item 4.1) : 40 mΩ MAX Insulation resistance (Item 4.2) : 10 MΩ MIN Voltage proof (Item 4.3) : Apply 500 V AC for 1 minute. No dielectric breakdown shall occur. Operating force (Item 5.1) : Within ±30 % of specified value. No abnormalities shall be recognized in appearance and construction.
7.6	Damp heat with load (Silver migration)	DC voltage 1.5 times as much as rated voltage shall be applied continuously between adjacent terminal at 60±2℃ and 90~95%RH. After 500 hours testing, switch shall be allowed to stand under normal temperature and humidity condition for 1 hour, and measurement shall be made within 1 hour after that. Water drops shall be removed.	Insulation resistance (50V DC) : 10 MΩ min. Voltage proof : Apply 100V AC for 1 minute. No dielectric breakdown shall occur.

8. Mechanical performance

	Items	Test conditions	Criterion
8.1	Preventive strength of simultaneous locking (Applied to the switch with simultaneous locking prevention cam.)	A load of 20N{2.04kgf} shall be applied between adjacent keys for 15 sec. as follows. 	2 keys shall not be locked at the same time.

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. The knob should be mounted or demounted after single-lock releasing.
   If attempted under single locked condition, the single-acting mechanism may be damaged.

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APPD.	CHKD.	DSGD.	TITLE
M. Kiso	S. Takahashi	Jun. 30'93 H. Yamaguchi	DRAWING NO. : (4/5)

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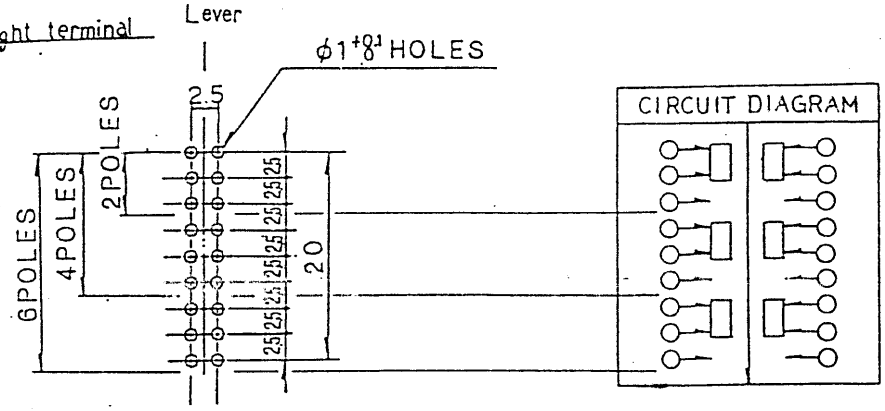
4.Flux flow

If too much fiux is applied to the PCB it may penetrate into the switch and inhibit subsequent operation.

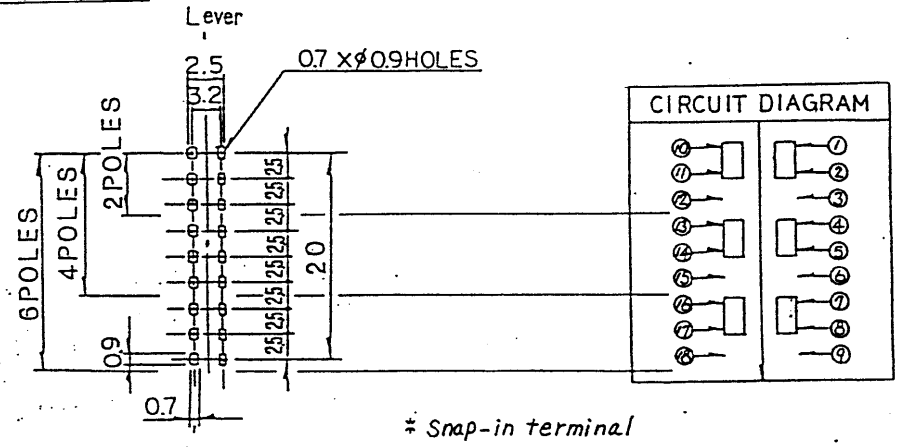
Flux may flow into the switch mount as indicated by ▨

Printed circuit board mounting hole diagram .
(±0.05 tolerance unless otherwise specified)

※Straight terminal



※Snap-in terminal



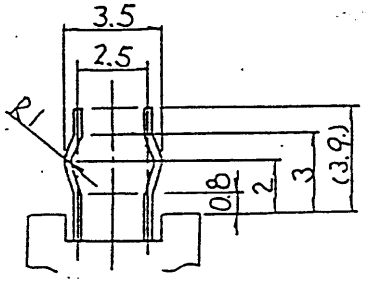
※ Snap-in terminal

2 POLES : TERMINAL NO. ① ② ③ ⑩ ⑪ ⑫

4 POLES : TERMINAL NO. ② ⑤ ⑪ ⑭

6 POLES : TERMINAL NO. ② ⑤ ⑧ ⑪ ⑭ ⑰

Snap-in terminal detail



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							M. K. Iwata	S. Takahashi	Jan, 30'93 H. Yamaguchi	
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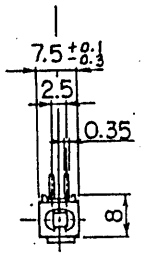
OR

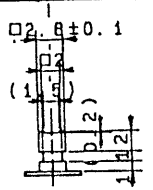
SPEC. LIST (仕様一覧)	LEVER NO.	1
	OPERATING FORCE (作動力) N{gf}	3±1 {306±102}
	CHANGEOVER TIMING (切換タイミング)	NS
	TERMINAL STYLE (端子形状)	ST

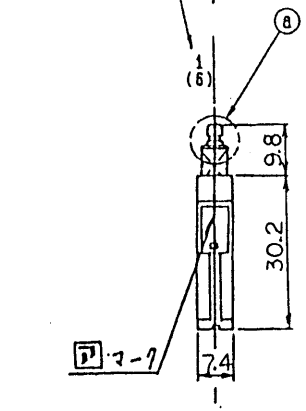
S : SHORTING(ショーティング)
NS: NON-SHORTING(ノンショーティング)
ST: STRAIGHT(ストレート)
SP: SNAP-IN(スナップイン)
DETAIL AS PER PRODUCT SPECIFICATIONS.
(詳細は製品仕様書による)

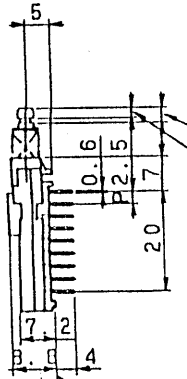
背景 BACK GROUND
△ 293JC017



ⓐDETAIL(詳細 X2/1)







	TRAVEL	TOTAL TRAVEL
LATCHING (セルフロック)	2	3

P.C BOARD MOUNTING FACE
(プリント基板取付面)

NOTES (注記) 1. PRODUCT SPECIFICATIONS No. SPUJ-S-501
(適用製品仕様書番号)

TOLERANCES UNLESS OTHERWISE SPEC.	
BASIC DIMENSIONS	TOLERANCES
UP TO 10	±0.3
ABOVE 10 TO 100	±0.5
ABOVE 100	±0.8
ANGULAR DIMENSIONS	±3°

ZONE	SYMB	DATE	APPD	CHKD	DSGD
	△1 INITIAL DESIGN	May. 20. '94 Apr. 14. '93	T.M H.K	H.K S.T	T.S H.Y

ALPS ELECTRIC CO., LTD.

APPD.	CHKD.	DSGD.
May. 20, '94 T. Maruyama	May. 20, '94 M. Kise	May 20. 94 T. Saitou

UNIT	SCALE	MODEL NO. (機種名)
mm	·/·	SPUJ19

TITLE: PRODUCT DRAWING(製品図)
DOCUMENT NO.: SPUJ19-6NW
FURUKAWA DIV.