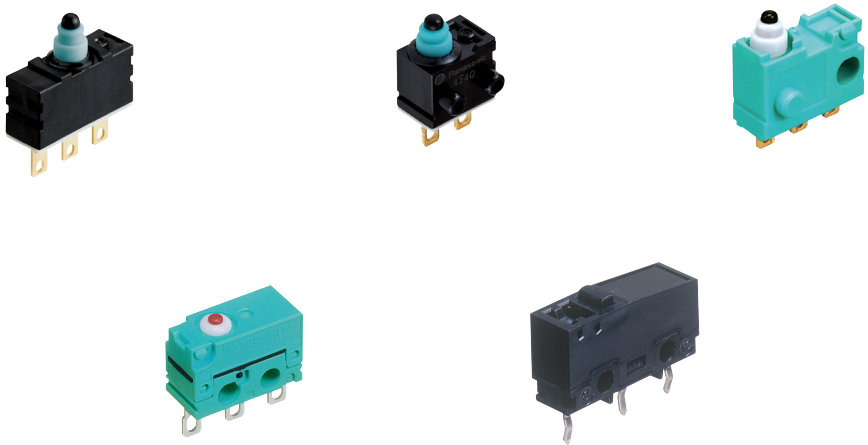
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INDUSTRY

Micro Switches

SELECTION GUIDE

IN Better Solution



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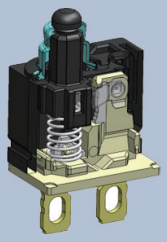
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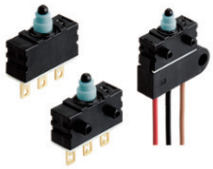
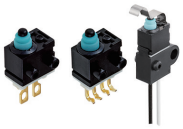
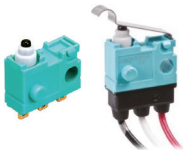
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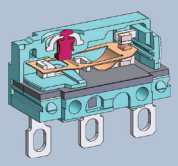
Micro Switches Product List

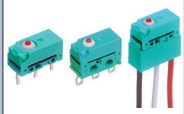
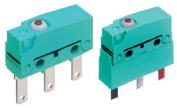
Sliding contact type



		Sealed type Turquoise stroke series						Non sealed
	Product name	ASQD 2 circuits detection switches			ASQM		ASQ	EQ
		Failure detection	2steps detection	Redundancy	Resistor installed	–	–	–
	IP	IP67						IP40
	Image							
Feature	Long stroke	●			●	●	●	●
	Silent operation	●			●	●	●	●
	Click feeling	–			–	–	–	–
	Failure detection	●			●	–	–	–
Applications	IT devices DC 5 V	●			●	●	●	●
	Automotive DC 12 V	●			●	●	●	●
	Home appliance DC 30 V	–			–	–	●	●
	AC 100 V	–			–	–	–	–
	AC 200 V or over	–			–	–	–	–

Snap action contact type



		Sealed type Turquoise series			Non sealed		
	Product name	ABJ	ABS	ABV	FS／FS-T	FS Contact gap 1 mm	FJ
	IP	IP67			IP40		
	Image						
Feature	Long stroke	–	–	–	–	–	–
	Silent operation	–	–	–	–	–	–
	Click feeling	●	●	●	●	●	●
	Failure detection	–	–	–	–	–	–
Applications	IT devices DC 5 V	●	●	●	●	–	●
	Automotive DC 12 V	●	●	●	●	–	●
	Home appliance DC 30 V	●	●	●	●	●	●
	AC 100 V	●	●	●	●	–	●
	AC 200 V or over	–	–	●	●	–	–

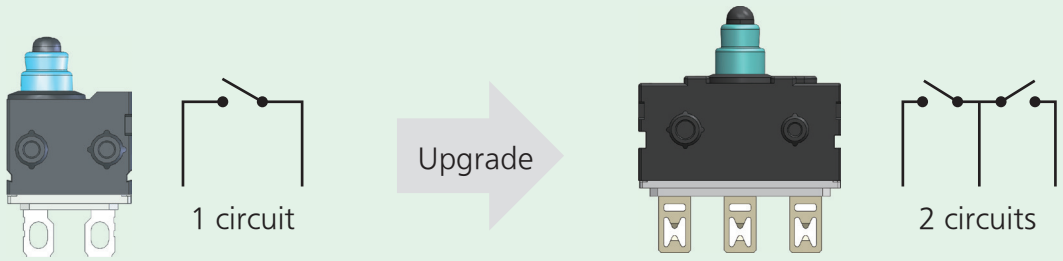
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Micro Switches Features

ASQD Turquoise stroke 2 circuits detection switches

Feature

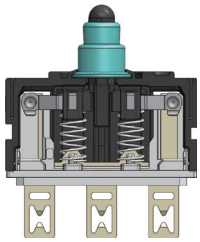
One switch has two sliding contact structures inside.
Just one switch can detect failures and 2steps movement and keep redundancy.



Product line-up

3 types contribute to Safety and Security, Work saving, Space saving and wire saving.

Failure detection type



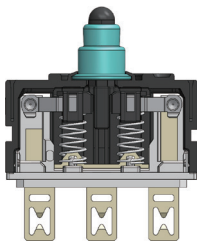
Feature

- Detectable of all electric open/short circuit
- Contributes to functional safety

Application

- Safety interlock for high voltage electric shock prevention
- Open/Close detection of autonomous vehicle's doors

2steps detection type



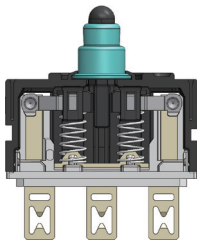
Feature

- Detectable of 2steps movement
- Saving of switch, wire, work and space

Application

- Engine start switch
- 1st step: Ready, 2nd step: Motor assist starts

Redundancy type



Feature

- Even if a failure happens on one circuit, other one can keep on working
- Contributes to functional safety

Application

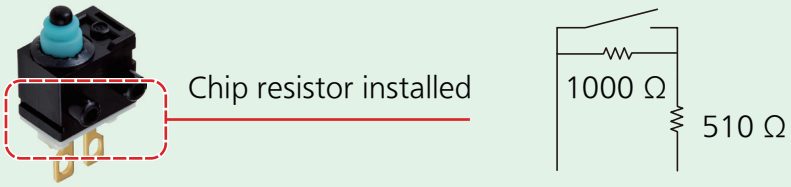
- For functions that cannot be stopped
- Safety function of automated machines

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ASQMR Resistor installed type

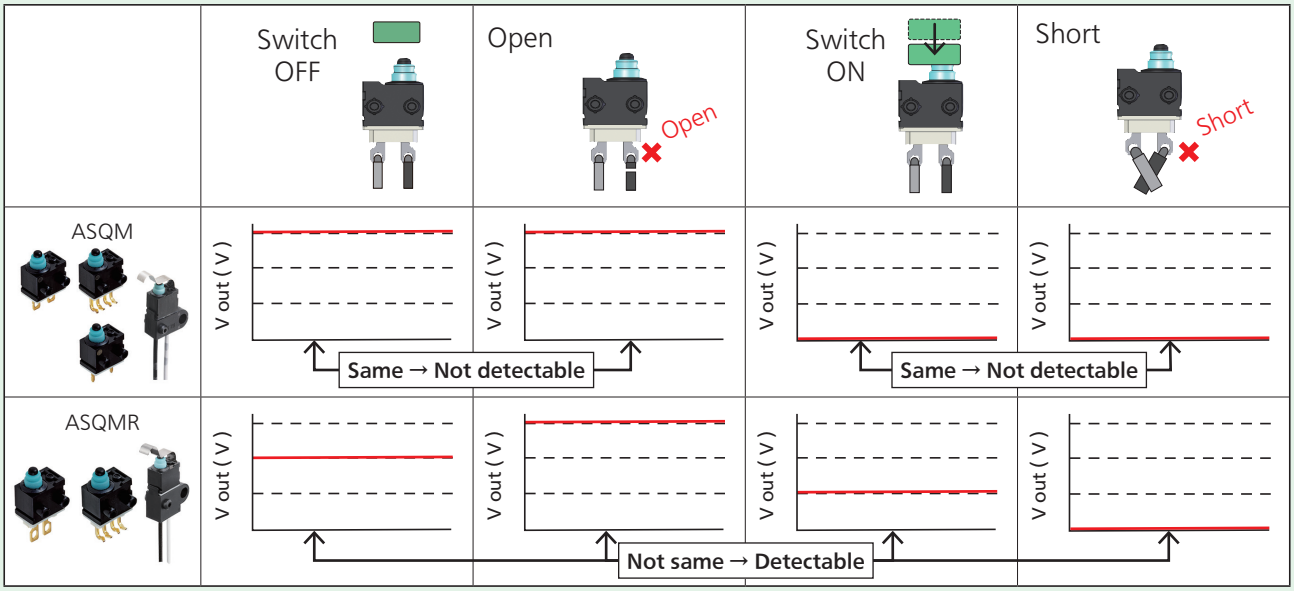
Feature

Chip resistors create variations in the output voltage,
making it possible to detect faults such as open and short circuits



Failure detection

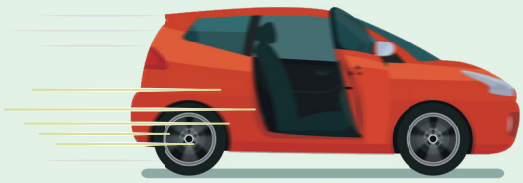
The four output voltages make it possible to detect ON, OFF, open, and short.



Application

Open/Close detection of autonomous vehicle's side doors
If a failure happened ···

ASQM



Not detect door open and Keep driving

Not safety

ASQMR



Detect door open and stop

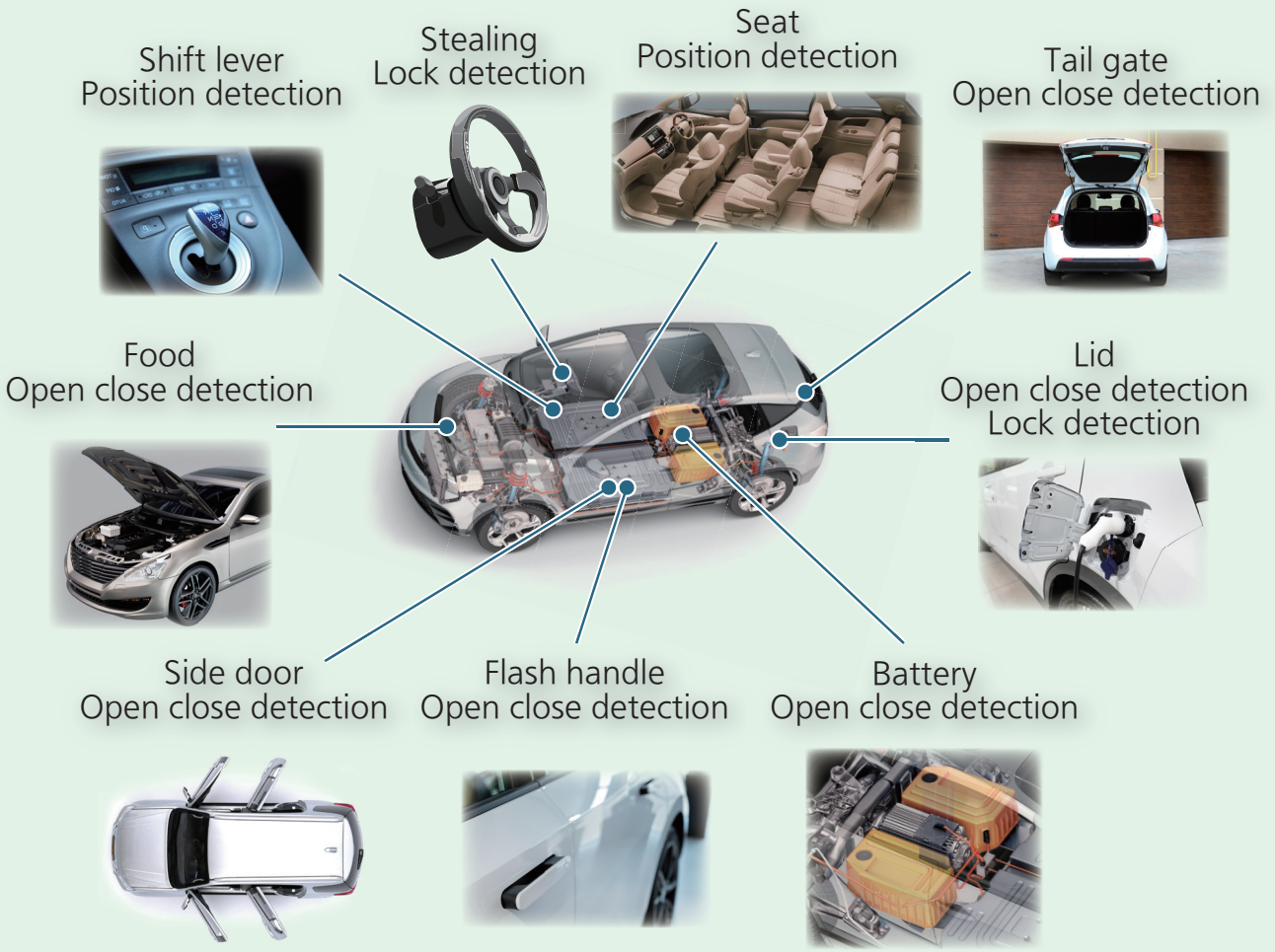
Safety

* If failures occur, normal switch cannot detect the opening or closing of the side door.
But ASQM, the side door status can be detected, allowing for safety measures to be taken.

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Micro Switches Applications

Automotive

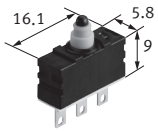
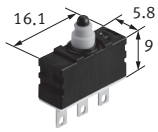
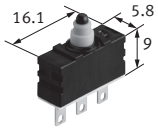
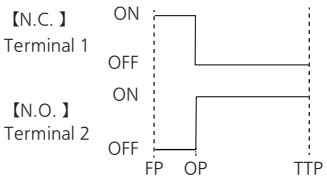
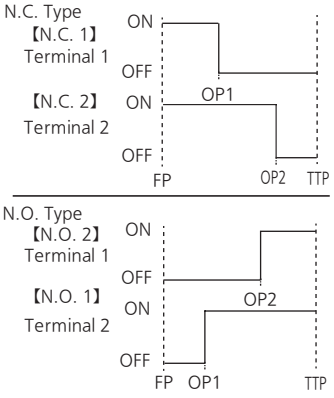
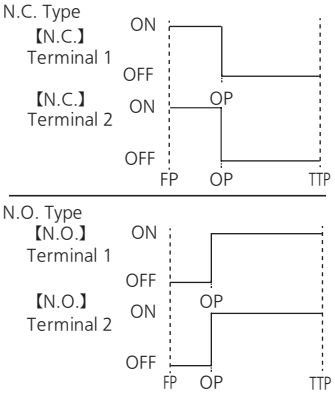


Other

	Infrastructures			Home appliances		
Safety						
	Robot	Agricultural machinery	AGV	Vacuum Cleaner	Washing machine	Vacuum Cleaner
Security						
	Smart meter	Security camera	Delivery Box	Electric door	Bicycle	Delivery Box

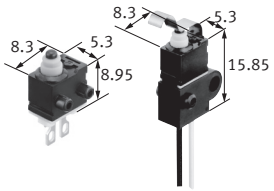
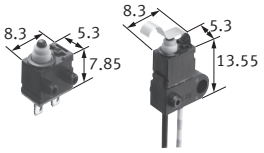
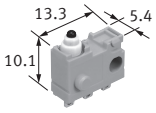
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Micro Switches Selector Chart

Category	Micro switches Sealed type *Sliding contact structure		
Size	–	–	–
Product name	Two circuits detection Switches Failure detection type	Two circuits detection Switches Two steps detection type	Two circuits detection Switches Redundancy type
Initial of part number	ASQD1	ASQD1	ASQD1
Configuration (Unit: mm)	 * Sliding contact structure	 * Sliding contact structure	 * Sliding contact structure
Features	• Detectable of all electric open / short circuit of wire lead • Detectable of all electric open / short of switch inside contact • Low level load only	• Just one switch can detect 2steps movement • Easy & simple mechanical design on your side • Saving of switch, actuator, wire and work compared to using 2 switches • Customization of switch on off operating position is available • Low level load only	• Even if a failure happens on one circuit, other one can keep on working • Just one switch can keep redundancy, no need 2 switches • Easy & simple mechanical design on your side • Saving of switch, actuator, wire and work compared to using 2 switches • Low level load only
Rating (Resistive load)	1 mA 5 V DC to 50 mA 16 V DC	1 mA 5 V DC to 50 mA 16 V DC	1 mA 5 V DC to 50 mA 16 V DC
Operating Force (OF) Max (Pin plunger type)	1.6 N	OF 1: 1.6 N OF 2: 2.6 N	1.6 N
Operating Chart			
Electrical switching life (Resistive load)	1 mA 5 V DC: Min. 3 × 10^5 50 mA 16 V DC: Min. 3 × 10^5	1 mA 5 V DC: Min. 3 × 10^5 50 mA 16 V DC: Min. 3 × 10^5	1 mA 5 V DC: Min. 3 × 10^5 50 mA 16 V DC: Min. 3 × 10^5
Mounting pitch	8.7 mm (Solder terminal type, Wire leads type)	8.7 mm (Solder terminal type, Wire leads type)	8.7 mm (Solder terminal type, Wire leads type)
Actuator style: Pin plunger	●	●	●
Actuator style: Hinge lever	–	–	–
Actuator style: Hinge lever	–	–	–
Actuator style: Hinge lever	–	–	–
Actuator style: Simulated roller lever	–	–	–
Actuator style: Hinge roller lever	–	–	–
Actuator style: leaf lever	–	–	–
Terminal style	• Solder terminal • Press fit terminal • Wire leads	• Solder terminal • Press fit terminal • Wire leads	• Solder terminal • Press fit terminal • Wire leads
Safety standard	–	–	–
Ingress protection	IP67 *except terminal	IP67 *except terminal	IP67 *except terminal
Unit weight (Approx.)	1.1 g (Terminal type)	1.1 g (Terminal type)	1.1 g (Terminal type)

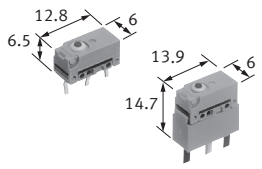
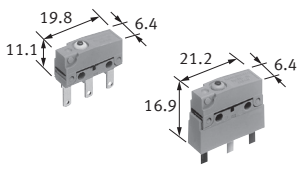
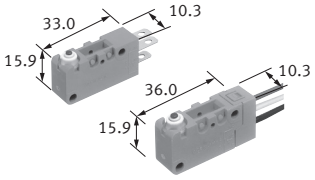
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Micro Switches Selector Chart

Category			Micro switches Sealed type *Sliding contact structure		
Size			–	–	–
Product name			Turquoise Stroke Mini Switch Resistor Installed Type (Au plating type)	Turquoise Stroke Mini Switches (Au plating type)	Turquoise Stroke Switches
Initial of part number			ASQMR2	ASQM2	ASQ
Configuration (Unit: mm)			 * Sliding contact structure	 * Sliding contact structure	 * Sliding contact structure
Features			• Chip resistors are installed inside • Detectable of all electric open / short circuit of wire lead • Compact size and long stroke • Silent operation with sliding contact • Support low-level loads	• Smallest stoke switch • 1 Form A or 1 Form B • Compact size and long stroke • Silent operation with sliding contact • Support low-level loads	• Compact size and long stroke • Silent operation with sliding contact • Support low-level loads
Rating (Resistive load)			• Rated power −40 ℃ ≦ T ≦ 70 ℃ 0.50 W 70 ℃ < T ≦ 75 ℃ 0.45 W 75 ℃ < T ≦ 85 ℃ 0.40 W (T: Environment temperature) • Voltage: 4.5 to 16 V DC • Minimum current: 1 mA	1 mA 5 V DC to 50 mA 16 V DC	1 mA 5 V DC to 100 mA 30 V DC
Operating Force (OF) Max (Pin plunger type)			1.2 N	1.2 N	1.5 N
Expected life	Mechanical (Pin plunger type)		–	–	–
	Electrical		Nominal rating load : Min. 2.0×10^5 Low-level rating load: Min. 3×10^5	Nominal rating load : Min. 1.5×10^5 Low-level rating load: Min. 3×10^5	1 mA DV 5 V: Min. 5×10^5 50 mA DC 16 V: Min. 5×10^5 100 mA DC 30 V: Min. 2×10^5
Mounting pitch			5.0 mm (Terminal type) 8.3 mm (Wire leads type)	5.0 mm (Terminal type) 8.3 mm (Wire leads type)	8.3 mm (M3)
Actuator style		Pin plunger	●	●	●
		Hinge lever	–	–	–
		Hinge lever	–	–	–
		Hinge lever	–	–	–
		Simulated roller lever	–	–	–
		Hinge roller lever	–	–	–
		leaf lever	●	●	● (leaf lever, Simulated roller lever)
Terminal style			• Solder terminal • Long fork terminal • Wire leads Bottom/Right-side/Left-side	• Slim terminal • Solder terminal • Long fork terminal • Short fork terminal • Wire leads Bottom/Bottom (Slim type) Right-side/Left-side	• Solder terminal • P/C board terminal or P/C angle terminal • Wire leads Bottom/Right-side/Left-side
Safety standard			–	–	–
Ingress protection			IP67 *except terminal	IP67 *except terminal	IP67 *except terminal
Unit weight (Approx.)			0.5 g (Terminal type)	0.5 g (Terminal type)	0.8 g (Terminal type)

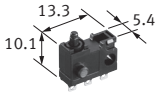
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Micro Switches Selector Chart

Category			Micro switches Sealed type		
Size			J	S	V
Product name			ABJ (BJ) Turquoise Switches	ABS (BS) Turquoise Switches	ABV (BV) Turquoise Switches
Initial of part number			ABJ	ABS	ABV
Configuration (Unit: mm)					
Features			• Snap action contact structure • IP67 level sealed with double molding elastomer • Low level load is available	• Snap action contact structure • IP67 level sealed with double molding elastomer • Low level load is available	• Snap action contact structure • IP67 level sealed with Integration of body and cover, and ultrasonic swaging on plunger • Max 5 A load as a rating
Rating (Resistive load)			<AgNi alloy contact> • 1.23 N type 1 A 125 V AC 1 A 30 V DC • 1.96 N type 2 A 125 V AC 2 A 30 V DC • 2.45 N type (Long stroke type) 1 A 125 V AC 1 A 30 V DC <AgNi alloy + Au-clad contact> • 1.23 N type • 1.96 N type • 2.45 N type (Long stroke type) 0.1 A 125 V AC 0.1 A 30 V DC ■ Minimum load for Au-clad contact 5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC	<AgNi alloy contact> 2 A 125 V AC 2 A 250 V AC 2 A 30 V DC 0.4 A 125 V DC <Double layer contact: CuNi alloy+Au-clad contact> 0.1 A 30 V DC <Triple layer contact: CuNi alloy + AgNi alloy + Au-clad contact> 0.1 A 125 V AC 0.1 A 250 V AC 0.1 A 30 V DC ■ Minimum load for Au-clad contact 5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC	<AgNi alloy contact> • 0.98 N Type: 3 A 250 V AC • 1.96 N Type: 5 A 250 V AC <AgNi alloy + Au-clad contact> • 0.98 N Type: 1 A 250 V AC • 1.96 N Type: 3 A 250 V AC ■ Minimum load for Au-clad contact 5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC
Operating Force (OF) Max (Pin plunger type)			1.23 N 1.96 N 2.45 N (Long stroke type)	0.98 N 1.47 N	0.98 N 1.96 N
Expected life	Mechanical (Pin plunger type)		Min. 10^5	Min. 5×10^6	Min. 5×10^6
	Electrical		AgNi alloy: Min. 3×10^4 Au-clad : Min. 10^5	AgNi alloy: Min. 5×10^4 Au-clad : Min. 2×10^5	Nominal rating load : Min. 10^5 Low-level rating load: Min. 10^6
Mounting pitch			6.5 mm (M1.2) 4.8 mm (M2.3) 13 mm (M3)	9.5 mm (M2.3)	10.3 × 22.2 mm (M3)
Actuator style		Pin plunger	●	●	●
		Hinge lever	–	●	–
		Hinge lever	●	●	●
		Hinge lever	–	●	–
		Simulated roller lever	●	●	●
		Hinge roller lever	●	●	● (Short roller lever, Roller lever)
		leaf lever	●	●	–
Terminal style			• Solder terminal • P/C board terminal • Wire leads Bottom/Right-side/Left-side	• Solder terminal • #110 quick-connect terminal • P/C board terminal or P/C angle terminal • Wire leads Bottom/Right-side/Left-side	• #187 quick-connect terminal • Wire leads
Safety standard			–	UL/C-UL ENEC/VDE *Terminal type	UL/C-UL ENEC/VDE
Ingress protection			IP67 *except terminal	IP67 *except terminal	IP67 *except terminal
Unit weight (Approx.)			0.5 g (Terminal type)	2 g (Terminal type)	7 g (Terminal type)

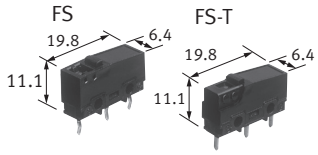
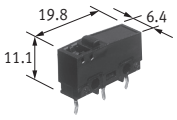
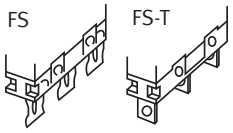
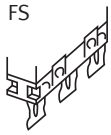
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Micro Switches Selector Chart

Category			Micro switches Non sealed type *Including Sliding contact structures	
Size			J	J
Product name			AEQ (EQ) Switches	AH1 (FJ) Switches
Initial of part number			AEQ1	AH1
Configuration (Unit: mm)			 * Sliding contact structure	
Features			• Compact size and long stroke • Silent operation with sliding contact • Support low-level loads	• 2.0 mm mounting hole type (with stand off) available General-purpose small screws can be used. • Soldering and flux-resistant construction • Flat terminal shape • Lineup includes 1 Form A and 1 Form B types
Rating (Resistive load)			0.1 mA 3 V DC to 100 mA 30 V DC	<AgNi alloy contact> • 0.74 N Type 1 A 125 V AC 1 A 30 V DC • 1.47N Type 3 A 125 V AC 2 A 30 V DC <AgNi alloy + Au-clad contact> 0.1 A 125 V AC 0.1 A 30 V DC ■ Low-level circuit type 5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC
Operating Force (OF) Max (Pin plunger type)			1.2 N	0.74 N 1.47 N
Expected life	Mechanical (Pin plunger type)		–	0.74N: Min. 10^6 1.47N: Min. 5×10^5
	Electrical		DC 3 V 0.1 mA: Min. 2×10^5 DC 30 V 100 mA: Min. 10^5	AgNi alloy contact: Min. 3×10^4 Au-clad contact : Min. 10^5
Mounting pitch			8.3 mm (M3)	9.5 mm (M2.3)
Actuator style		Pin plunger	●	●
		Hinge lever	–	–
		Hinge lever	–	●
		Hinge lever	–	–
		Simulated roller lever	–	●
		Hinge roller lever	–	–
		leaf lever	● (Leaf lever, Simulated leaf lever)	–
Terminal style			• Solder terminal • P/C board terminal	• Self-standing P/C board terminal • Straight P/C board terminal • Solder terminal • Right angle terminal • Left angle terminal
Safety standard			–	UL/C-UL
Ingress protection			IP40	IP40
Unit weight (Approx.)			0.8 g	0.5 g

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Micro Switches Selector Chart

Category			Micro switches Non sealed type	
Size			S	S
Product name			AV3/AVM3/AVT3/AVL3 (FS/FS-T) Switches	AV3 (FS) Switches Contact Gap 1 mm Type
Initial of part number			AV3, AVM3, AVT3, AVL3	AV3
Configuration (Unit: mm)				
Features			• Long life version available • Au-clad double layer contacts type for low-level circuit available	• S type and door inter-lock switches for secondary circuit of OA equipment • Contact gap of greater than 1mm PN: AV3***G* • Superior operating position precision
Rating (Resistive load)			<AgNi alloy contact> Standard version 3 A 250 V AC 3 A 30 V DC 0.4 A 125 V DC Long life version 5 A 250 V AC 5 A 30 V DC 0.4 A 125 V DC <Double layer contact: CuNi alloy + Au-clad contact> <Triple layer contact: CuNi alloy + AgNi alloy + Au-clad contact> 0.1 A 250 V AC (Triple layer contact) 0.1 A 30 V DC (Low-level circuit type) 1 to 100 mA, 5 to 30 V DC (Double layer contact) 1 to 100 mA 5 to 250 V AC (Triple layer contact) ■ Minimum load for Au-clad contact 5 mA 6 V DC 2 mA 12 V DC 1 mA 24 V DC	<AgNi alloy contact> 3 A 30 V DC
Operating Force (OF) Max (Pin plunger type)			<Standard version> 0.25 N (Au-clad contact only) 0.49 N 0.98 N <Long life version> 1.47 N	1.47 N
Expected life	Mechanical (Pin plunger type)		Standard version: Min. 5×10^5 Long life version: Min. 3×10^7	Min. 5×10^5
	Electrical		AgNi alloy contact: Min. 5×10^4 Au-clad contact : Min. 2×10^5	Min. 10^4
Mounting pitch			9.5 mm (M2.3)	9.5 mm (M2.3)
Actuator style		Pin plunger	●	●
		Hinge lever	●	●
		Hinge lever	●	●
		Hinge lever	●	●
		Simulated roller lever	●	●
		Hinge roller lever	●	●
		leaf lever	–	–
Terminal style			• Solder terminal • P/C board terminal • #110 quick-connect terminal  (AV3, AVM3) (AVT3, AVL3)	• Solder terminal • P/C board terminal • #110 quick-connect terminal 
Safety standard			UL/C-UL ENEC/VDE	UL/C-UL ENEC/VDE TÜV
Ingress protection			IP40	IP40
Unit weight (Approx.)			2 g	2 g

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