Panasonic[®]

INSTRUCTION MANUAL

Safety Door Switch with Solenoid Interlock / Ultra-slim **SG-B1** Series



Thank you very much for purchasing Panasonic products. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

SAFETY PRECAUTIONS

In this operating instruction sheet, safety precautions are categorized to Warning and Caution:

⚠ WARNING

◎ (€ : 🖟 "

Warning notices are used to emphasize that improper operation may cause severe personal injury or death.

⚠ CAUTION

4 Type

d where inattention might cause personal injury or damage to

Type					
Model No.	Main contacts	Door monitor contacts	Lock monitor contacts	Locking principle	Cable length
SG-B1-MA-G1			1NC	Magnet lock	1m
SG-B1-MA-G5					5m
SG-B1-SA-G1			INC	Spring lock	1m
SG-B1-SA-G5		2NC		Spring lock	5m
SG-B1-MB-G1	INC I INC			Magnet lock	1m
SG-B1-MB-G5			1NO	Iviagrici lock	5m
SG-B1-SB-G1			INO	Spring lock	1m
SG-B1-SB-G5				Spring lock	5m

2 Specifications and Ratings

		<u> </u>							
Applicable	IEC6094	ISO14119, EN1088 IEC60947-5-1, EN60947-5-1 GS-ET-19, UL508, CSA C22.2 No.14							
	IEC60204-1, EN60204-1								
Applicable	Machinery Directive (2006/42/EC)								
			Low Voltage Directive (2014/35/EU)						
Operating Condition									
Condition	Operating Humidity	45 to 85%RH(no condensation)							
	Pollution degree	3(Inside							
D	Altitude	2000m n							
Rated Ins	ulation voltage <ui></ui>	300V(Do	or m	ock monitor circui onitor circuit) ground and LED		d circuit)			
Impulse w	ithstand voltage <uimp></uimp>	1.5kV(Ma 2.5kV(Do	ain,Lo	ock monitor circu nonitor circuit) en ground and LE	it)				
Thermal C	Current <ith></ith>	-25°C < 2.5A (<	Oper 2 cir	ating temperature rcuits)			-,		
		1.0A (1	pera circu	ting temperature uit)	< 50°C				
Contact	atinga	0.5A (>	2 cir	rcuits)	30V	125V	250		
Contact R < Ue, le >				Resistive load	30V		250		
00, 10		Main	AC	(40.40)	-	2A	-		
		Circuit, Look monitor		(AC-15) Resistive load	- 2A	1A 0.4A	-		
		circuit	DC	Inductive load	1A	0.22A	-		
				(DC-13) Resistive load	-	2.5A	1.5		
		Door monitor circuit	Inductive load (AC-15)	-	1.5A	0.75			
			Resistive load (DC-12)	2.5A	1.1A	0.55			
				Inductive load (DC-13)	2.3A	0.55A	0.27		
Class of F	rotection	Class II	(IEC	61140) *1					
Operating	Frequency	900 oper	ation	s/hour					
Operating	Speed	0.05 to 1							
B _{10d}			2,000,000 (EN ISO 13849-1)						
Applicable	Standards		1,000,000 operations minimum. (GS-ET-19)						
Electrical	Durability	100,000	1,000,000 operations minimum. (GS-ET-19) 100,000 operations minimum. (900 operations / hour,						
				v 2A, DC-12 125′	V 0.4A)				
		1,000,00	0 оре	erations minimum					
			(900 operations / hour,						
Actuator T	ensile Strength			m (GS-ET-19)*2	Load)				
	ening Travel	8 mm mi	nimu	m					
	ening Force	60 N mir	imun	n					
Contact R		300 mΩ	300 mΩ maximum (initial value, 1m cable)						
Degree of	Protection	IP67 (IE							
	uit Protective Device			OA fast acting type	e fuse				
Solenoid	Rated Operating Voltage			duty cycle					
/	Rated Current			noid 100mA, LED			lue)		
Indicator	Turn ON Voltage			x 85% maximun					
	Turn OFF Voltage		ltage	x 10% minimum	(at 20°C	;)			
	Light Source	LED							
	Illumination Color	Green							
	Rated Power Consumption	Approx.	2.7W						

Ratings approved by safety agencies

Main, Lock Monitor

AC-15: 1A, 125 V AC DC-13: 0.22A, 125 V DC / 30V DC, 1A

C-15: 0.75A, 240 V AC DC-13: 0.27A, 250 V DC / 30V DC, 2.3A

(2) UL, c-UL rating Main, Lock Mo

125 V AC, 1 A Pilot duty 125 V DC, 0.22 A Pilot duty / 30V DC, 1A Pilot duty

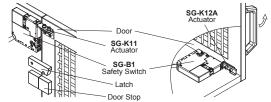
C300 Q300 240 V AC, 0.75 A Pilot duty 250 V DC, 0.27 A Pilot duty

- *1: Basic insulation of 2.5kV, 1.5kV impulse withstand voltage is ensured between different contact circuits and between contact circuits and LED or solenoid in the enclosure. When both SELV (safety extra low voltage) or PELV (protective extra low voltage) circuits and other circuits (such as 230V AC circuits) are used for the solenoid power and contact circuits at the same time, the SELV or PELV requirements are not met any more
- *2: The actuator locking strength is rated at 500N of static load. Do not apply a load higher than the rated value. When a higher load is expected to work on the actuator, provide an additional system consisting of another safety switch without lock (such as the SG-A1 safety switch) or a sensor to detect door opening and stop the machine.

3 Mounting Examples

 Install the interlock switch on the immovable machine or guard, and install the actuator on the movable door. Do not install both interlock switch and actuator on the movable door, otherwise failure will occur. See the figures below.

(Examples of Mounting on Sliding Doors) (Examples of Mounting on Hinged Doors)



4 Precautions for Operation

Regardless of door types, do not use the safety switch as a door stor

Install a mechanical door stop to the end of the door to protect the safety switch against excessive force. When a higher load works on the lock portion of the safety switch, the actuator may not unlock. Do not apply an excessive shock to the safety switch when opening or closing the door.

A shock to the safety switch exceeding 1,000m/s² may cause failure.

Regardless of door types, do not use the safety switch as a door lock. Install a separate lock as shown in " 3 Mounting Examples.".

Entry of foreign objects in the actuator entry slot may affect the mechanism of the switch
and cause a breakdown. If the operating atmosphere is contaminated, use a protective
cover to prevent the entry of foreign objects into the switch through the actuator entry slots.

cover to prevent the entry of foreign objects into the switch amough the accusator only soc.

• While the solenoid is energized, the switch temperature rises approximately 35°C above the ambient temperature (to approximately 85°C while the ambient temperature is 50°C). Keep hands off to prevent burns. If cables come into contact with the switch, use heat-resistant cables.

When the actuator is locked or unlocked, the NC lock monitor contacts and NO unlock monitor contacts cause bouncing. When designing a control circuit, take the bouncing into consideration (reference values: 20ms).

· Solenoid has polarity. Be sure to wire correctly and do not apply reverse voltage otherwise the solenoid will be damaged. Do not apply voltage that exceed the rated voltage, otherwise the solenoid will be burnt out.

Do not fasten or loosen the conduit at the bottom of the safety switch.

Conduit

 When wiring, make sure that liquid such as water and oil does not intrude from the end of the cable.

When bending the cable during wiring, secure the cable radius of 30 mm at the minimum. Do not apply an excessive

shock, such as tensile and compressing force, to the connection part of the cabel and switch. Use the proprietary actuators only. Other actuators will

cause damage to the switch. Ensure that the safety switch is installed on a flat

mounting surface, and provide sufficient strength to the mounting surface so that it will not be distorted during operation

Make sure that no foreign objects are caught between the safety switch and mounting surface. Uneven surface, distorted surface, or foreign objects may result in the malfund

№ WARNING

- Turn off the power to the safety switch before starting installation, removal, wiring, maintenance, and inspection on the safety switch. Failure to turn power off may cause Do not disassemble or modify the switch. Also do not attempt to disable the interlock switch function, otherwise a breakdown or an accident will result.

⚠ CAUTION

- Mount the actuator so that it will not hit the operator when the door is open, otherwise injur-
- Pay attention to the management of spare actuator. Safety function of door interlock switch will be lost in case the spare actuator is inserted into the interlock switch.

 Ensure that the actuator is firmly fastened to the door (welding, rivet, special screw) in the appropriate location, so that the actuator cannot be removed easily.
- Do not cut or remodel the actuator, otherwise failure will occur
- Performance Level according to EN ISO 13849-1 is reduced with series connected safety components due to decreased fault recognition.
 The overall concept of control system, into which the safety components has been integrated, must be validated in accordance with EN ISO 13849-2.
- Magnet lock type

 This safety switch is designed to lock the actuator while the solenoid is energized and the solenoid is ener release it when deenergized.

 • When the power to the solenoid is interrupted by accident, such as disconnection, the lock is
- released before a machine stops completely. Then, the worker may be exposed to hazards.

 This safety switch can be used only for limited applications which do not especially need

to be locked for safety.

For Manual Unlocking
• Spring lock type : The SG-B1 allows manual unlocking of the actuator to precheck proper door operation before wiring or turning power on, as well as for emergency use such as a power failure.

Magnet lock type: If the actuator is not unlocked although the solenoid is deenergized, the actuator can be unlocked manually



(UNLOCK)



Manual Unlocking Method When using the manual unlock key

To change the normal position to the manual unlocking position as shown above, turn the key fully (90 degrees) using the propietary key supplied with the switch. Using the switch with the key being not fully turned (less than 90 degrees) may cause damage to the switch or errors. (Note: When manually unlocked, the switch will keep the main circuit disconnected and the door unlocked.)

When unlocking by pushing the plate insaide the safety switch:

Remove the screw at the side of the safety switch and insert a small screwdriver.

Push the plate inside the safety switch toward the LED pilot light using a small screwdriver until the actuator is unlocked. See the figure on the right.

⚠ CAUTION

- Before manually unlocking the safety switch, make sure the machine has come to a complete stop. Manual unlocking during operation may unlock the switch before the machine stops, and the function of safety door switch with solenoid interlock is lost.

 While the solenoid is energized, do not unlock the actuator manually (magnet lock type).
- Do not apply excessive force (0.45 N m or more) to the manual unlock key. Otherwise
- The manual unlock switch will be damaged.

 Do not leave the manual unlock key attached to the switch during operation. This is dangerous because the switch can always be unlocked while the machine is in operation. Do not attach the key to the switch intentionally (the key is designed to fall off when the operator's hand is off the key).
- · Unlocking by pushing the plate inside the safety switch must be perfored in emergency only. After unlocking, make sure to tighten the M4 screw to the tightening torque of 0.3 to 0.5 N • m. Do not apply excessive force to the M4 screw. Otherwise the safety switch is damaged. Make sure that all screws are installed, otherwise the waterproof capability is lost.

5 Adjustments

Minimum Radius of Hinged Door

When using the safety switch for a hinged door, the minimum radius of the applicable door is shown in the following figures.

· When the center of the hinged door is on the extension line of the actuator mounting surface.

• When the center of the hinged door is on the extension line of the contact surface of actuator and safety switch.

		Minimum Radius						
	R1	R2	R3	R4				
SG-K12 / SG-K12A	230mm	230mm	160mm	160mm				
SG-K13 / SG-K14	70mm (Horizontal Swing)	70mm (Vertical Swing)	50mm (Horizontal Swing)	50mm (Vertical Swing)				

e values shown above are based on the condition that the actuatorers and exits the actuator entry slot smoothly when the door is closed or

opened.

Since there may be deviation or dislocation of the hinged door, make sure of correct operation in the actual application before installation.

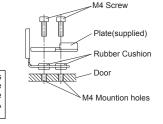
When inserting an actuator into the slot, make sure to arrange the h



Using two M4 screws and plate, fasten the actuator securely on the door. Plate has directionality. Do not lose the plate. The actuator may fall off from the door if there is no plate, and the actuator does not properly.

⚠ CAUTION

The tensile strength of the SG-K12 actuator is 100N. If an excessive tensile force is applied, the actuator may fall off the door. When a tensile force exceeding 100N is expected, use the SG-K12A actuator with a plate.



Installing the Safety Switch and Actuator

- When installing the actuator, position the actuator using the actuator stop (for positioning the entry slot center and
- mounting reference position).

 As shown on the right, the mounting reference position of the actuator when inserted in the safety switch is where the actuator stop touches the actuator.
- · Install a door stop as shown on the right to protect the safety switch and actuator against excessive force.
- Do not use the safety switch as a door stop, otherewise the safety switch will be ±1.0mm(*3)
- damaged. · After removing the actuator stop, ensure that the actuator is installed within the tolerances shown below.
- From the entry slot center of the safety switch (*3, 4): ±1.0mm
- The gap between the actuator shoulder and the safety switch surface (*5) SG-K11 / SG-K12 / SG-K13 / SG-K14 : 1.9mm or shorter
- To ensure correct operation, it is recommended to fasten the door using a latch to achieve the above tolerance values Perform operation test before starting operation in order to confirm the open/close

Safety Switch

Door Stop

Latch/

- operation of contacts and locking/unlocking operation. • When the actuator is pulled while locked in the safety switch, the actuator moves within
- SG-K11 / SG-K12 / SG-K13 / SG-K14 : 4.1mm maximum from the safety switch surface SG-K12A: 3.5mm maximum from the safety switch surface

The open/close status of the contacts are maintained within the range.

When a gap is caused because of actuator relocation, make sure that the gap does not

Recommended Screw Tightening Torque					
Name or Use	Screw Tightening Torque				
For mounting the safety switch (M4 screw) *6	1.0 to 1.5 N·m				
For mounting the actuator (M4 screw) *6	1.0 to 1.5 N·m				

⚠ CAUTION

lead to new risks.

6: The above recommended tightening torques of the mounting screws are the values confirmed with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not come loose after mounting. The Adjustable (vertical/horizontal) Actuator

- Using the angle adjustment screw (M3 hexagon socket set screw), the actuator angle car be adjusted up to 20° (refer to dimensions).
- The larger the actuator angle, the smaller the applicable radius of the door swing.

 After installing the actuator, open the door. Then adjust the actuator angle so that the actuator enters the entry slot of the safety switch properly.
- After adjusting the actuator angle, apply loctite or the like on the adjustment screw to prevent loosening. Use screw locking agent that is compatible with the base material. Base: PA66 (66 nylon) of glass reinforced grade Angle adjustment screws: stainless steel

6 Contact Operation and Wiring

Contact Cor	nfiguration and Operation				
Type	Contact Configuration	Contact Operation (reference)			
	Door Monitor Lock Monitor (+) (-) WH A2 A1 BK	0 (Actuator Mounting Reference Position) (Travel: mm) Approx.1.1 (Lock) Approx.4.7 Approx.5.0 Approx.27.4			
SG-B1-□A	Main Circuit: BU ⊕ 11 12 41 42 BU/WH Monitor Circuit: BN ⊕ 21 22 BN/WH Monitor Circuit: OG ⊕ 31 32 OG/WH Monitor Circuit: PK 51 52 PK/WH	11-42 21-22 31-32 51-52 Contact closed Contact open Contact operation is based on the condition that the actuator is inserted into the center of			
SG-B1-□B	Main Circuit: BU ⊕ 11 → 12 ← 41 → 42 BU/WH Monitor Circuit: BN ⊕ 21 → 22 BN/WH Monitor Circuit: OG ⊕ 31 → 33 OG/WH Monitor Circuit: PK 53 54 PK/WH	the safety switch slot. Contact operation shows the SG-K11, SG-K12, SG-K13, SG-K14 actuators. (For SG-K12A actuator, decreases 0.6mm to contact operations) Terminals 12-41 are connected together			
		(Actuator Completely Inserted) (Actuator Pulled Out) internally. Use terminals 11-42 for safety circuit inputs. Indicator turns on when solenoid is energized.			

Operation Cycle

· Spring Lock Type (SG-B1-S	□)			
Door States	Closed	Closed	Open	Closed
Door Manual Unlock Key	-	-	-	Turn the key to unlock position.
Main Circuit 11-42	Closed	Open	Open	Open
Door Monitor Circuit 21-22 31-32	Closed	Closed	Open	Closed
Lock Monitor Circuit 51-52	Closed	Open	Open	Open
Lock Monitor Circuit 53-54	Open	Closed	Closed	Closed
Solenoid Power A1-A2	Off	On	Off/On	Off
	Door is locked. The machine can be operated.	Door is unlocked. The machine can not be operated.	The machine can not be operated.	Door is unlocked. The machine can not be operated.

	be operated.	not be operated.		not be operated.			
Magnet Lock Type (SG-B1-M□)							
Door States	Closed	Closed	Open	Closed			
Door Manual Unlock Key	-	-	-	Turn the key to unlock position.			
Main Circuit 11-42	Closed	Open	Open	Open			
Door Monitor Circuit 21-22	Closed	Closed	Open	Closed			
31-32	Ciosea	Ciosea	Open	Cioseu			
Lock Monitor Circuit 51-52	Closed	Open	Open	Open			
Lock Monitor Circuit 53-54	Open	Closed	Closed	Closed			
Solenoid Power A1-A2	On	Off	Off/On *8	Off *7, 8			
	Door is locked. The machine can be operated.	Door is unlocked. The machine can not be operated.	The machine can not be operated.	Door is unlocked. The machine can not be operated.			

Cable specifications UL style 2464, 12c × No.22AWG, (80°C 300V)

Wires are identified by the color and white line printed on the wire

No.	Insulator Color	No.	Insulator Color	No.	Insulator Color
1	Blue / White	5	Orange / White	9	Pink / White
2	Gray	6	Gray / White	10	Brown / White
3	Pink	7	White	11	Brown
4	Orange	8	Black	12	Blue

Terminal number identification

 When wiring, the terminal number on each contact is identified by wire color. The following table shows the identification of terminal numbers. When wiring, cut unnecessary wires such as unused wires to avoid

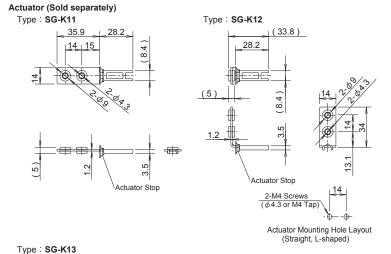
incorrect wiring.

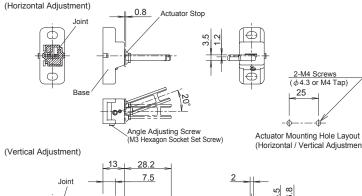
Circuit No.	Insulator Color	CITCUIT NO.	Insulator Color
11	Blue	31	Orange
42	Blue / White	32	Orange / White
21	Brown	51, 53	Pink
22	Brown/White	52, 54	Pink / White
		A1 (-)	Black
		A2 (+)	White

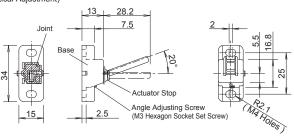
↑ CAUTION

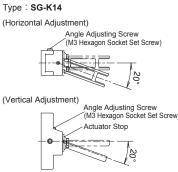
*7: Do not attempt manual unlocking when the solenoid is energized.
*8: Do not energize the solenoid for a long time while the door is open when the door is unlocked manually.

7 Dimensions and Mounting Mountiona Hole Layout imensions Straight Actuator when mounted on the front side) * Reversible Mounting Possible (SG-K11) LED 37 15 (12.6^{±1}) 46.1 20 to 22 28.5 _ I -shaped Actuator (SG-K12A)





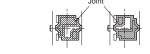




Note: SG-K13 and SG-K14 are different in the insertion direction of the metal $key(180^{\circ})$. * The direction of adjustable angle can be abanded (vertical or horizontal) by

be changed (vertical or horizontal) by changing the insertion direction of the joint (white plastic part). See the figures below.

Do not lose the joints. Actuators do not operate normally without a joint.



Dispose of the SG-B1 safety switch as an industrial waste

Winsbergring 15, 22525 Hamburg, Germany

8 Precaution for Disposal

9 Contact infomation for CE Panasonic Marketing Europe GmbH Panasonic Testing Center

Panasonic Industrial Devices SUNX Co., Ltd.

Overseas Sales Division (Head Office) 2431-1 Ushiyama-cho, Kasugai-shi, Aichi, 486-0901, Japan Phone: +81-568-33-7861 FAX: +81-568-33-8591

For sales network, please visit our website.

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Addition of Information to the Instruction Manual Due to an Update of ISO 14119:2013. One of the Applicable Standards

CIMJE-SGB1 No.0078-91V

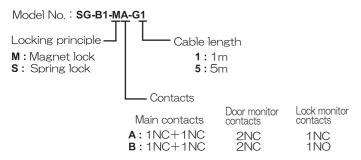
Thank you for purchasing a Panasonic product.

Information on the following items will be added to the Instruction Manual of the SG-B1 series due to an update of ISO 14119:2013. one of the applicable standards.

Before using the product, carefully read the attached Instruction Manual and this document for the correct and optimum use of the product. Kindly keep the Instruction Manual and this document in a convenient place for quick reference

1 Type

Added the following model name information.



Specifications and Ratings

- Added information on the type and coding level to "Specifications and Ratings".
- Deleted the information on the Low Voltage Directive from the "Applicable Directives" table cell under "Specifications and Ratings" because this product is included in the scope of the Machinery Directive.

Interlocking device Type /	Type 2 Interlocking device /
the level of coded	low level coded actuator (EN ISO / ISO 14119)
Applicable Directives	Machinery Directive (2006/42/EC)

Itemized Essentials of EU Declaration of Conformity

Manufacturer's Name: Panasonic Industrial Devices SUNX Co., Ltd.

Manufacturer's Address: 2431-1, Ushiyama-cho, Kasuqai, Aichi 486-0901, Japan EU Representative's Name: Panasonic Marketing Europe GmbH Panasonic Testing Center EU Representative's Address: Winsbergring 15, 22525 Hamburg, Germany

Product: Safety Door Switch with Solenoid Interlock

Model Name: SG-B1 Series Trade Name: Panasonic

Application of Council Directive:

- 2006/42/EC Machinery Directive - 2011/65/EU RoHS Directive

Applicable standards:

- EN 60947-5-1:2017
- GS-ET-19:2011
- EN IEC 63000:2018

Panasonic Corporation

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