

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

n this operating instruction sheet, safety precautions are categorized to Caution

## 

ution notices are used where inattention might cause personal injury or damage to equipment.

## **↑** WARNING

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

1	Туре
Mc	ndel No

Model No.	Key removal position	Door monitor contacts	Lock monitor contacts	Rear unlock	Cable length
SG-B2-K2AC-5	LOCK and UNLOCK		1NO + 1NC	Without rear	5m
SG-B2-K2BC-5	UNLOCK	1NO + 1NC			
SG-B2-K2CC-5	LOCK	]			
SG-B2-K2AD-5	LOCK and UNLOCK		2NC	manual unlock	
SG-B2-K2BD-5	UNLOCK	2NC			
SG-B2-K2CD-5	LOCK	1			
SG-B2-K2AD-L5	LOCK and UNLOCK				
SG-B2-K2BD-L5	UNLOCK	2NC	2NC Pu	Push button	
SG-B2-K2CD-L5	LOCK	1			

2	2 Specifications and Ratings						
Ap	pplicable Standards	IEC GS	ISO14119, EN1088 IEC60947-5-1, EN60947-5-1 GS-ET-19, UL508, CSA C22.2 No.14				
	Standards for Use		C60204-1/EN60204-1				
Ap	oplicable Directives		v Voltage Directive (2014/35 chinery Directive (2006/42/E				
<u>6</u>	Operating Temperature	-25	to +70°C (no freezing)				
ä	Operating Humidity	45 to 85%RH (no condensation)					
ဗ္ဓ	Storage Temperature	-40	to +80°C (no freezing)				
Operating Condition	Pollution Degree	3 (1	nside2)				
g	Altitude	200	0m maximum				
Im	pulse withstand voltage (Uimp)	2.5	kV				
Ra	ated Insulation voltage (Ui)	250	V *2				
	ermal Current < Ith>	2.5	A				
		60°0	°C < Operating temperature < C < Operating temperature < C < Operating temperature <	< 65°C: 1.5A < 70°C: 1.0A			
Co	ontact Ratings			30V	125V	250V	
(R	eference Values)	AC	Resistive load (AC12)	-	2.5A	1.5A	
< (	< Ue, le >		Inductive load (AC15)	-	1.5A	0.75A	
			Resistive load (DC12)	2.5A	1.1A	0.55A	
			Inductive load (DC13) 2.3A 0.55A 0.27A				
Op	Operating Frequency 900 operations/hour						
Operating Speed 0.05 to 1.0 m/s		5 to 1.0 m/s					
B <sub>10d</sub>		2,000,000 (EN ISO 13849-1 Annex C Table C.1)					
Mechanical durability 1,000,000 operations min. (GS-ET-19) the Rear Unlock Button: 3000 operations min. (Type <b>SG</b> -		G-B2-□-L5)					
Ele	ectrical Durability	100,000 operations min. (AC-12 250V+1A) 1,000,000 operations min. (AC/DC 24V 100mA) (900 operations / hour)					
Class of Protection		Class II (IEC61140) *3					
Actuator Tensile Strength		1,400N min. (GS-ET-19)*4					
when Locked		(500N min. : SG-K24 actuator)					
Direct Opening Travel 11 mm min. (actuator: <b>SG-K21</b> ) 12 mm min. (for other actuators)							
Direct Opening Force 80N min.							
Contact Resistance 500 m Ω max. (initial value, 3m cable)							
Degree of Protection IP65 (IEC60529)							
Shock Resistance Op		Ор	Operating extremes: 100 m/s², Damage limits: 1000 m/s²				
Vil	bration Resistance		erating extremes: 10 to 55 H			ninimum	
Sh	ort-circuit Protective Device						
	Operating Specifications	2 P	ositions				
	Mechanical Durability	100	0,000 operations min.				
	Man On and the Dough life 100 000						

Key Operating Durability

Key Tensile Strength

Direct Opening Force

Direct Opening Degree

10,000 operations min.

1.0N • m min.

0.6N • m min.

0.60 • min. \*2: Ratings approved by UL,c-UL:125V

Key Operating 
Key Tensile Strength

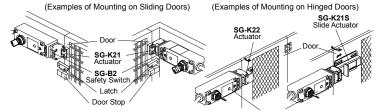
- \*3: Basic insulation of 2.5kV impulse withstand voltage is ensured between different contact circuits and between contact circuits and LED or solenoid in the enclosure. When both SELV (safety extra low voltage) or PELV (protective extra low voltage) circuits and other circuits (such as 230V AC circuits) are used for the solenoid power and contact circuits at the same time, the SELV or PELV requirements are not met any more.
- \*4: The actuator locking strength is rated at 1400N 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 or a sensor to detect door opening and stop the machine.

#### Ratings approved by safety agencies

(1)TÜV rating AC-15 250V/0.75A DC-13 125V/0.22A DC-13 30V/2.3A (2)UL , c-UL rating AC 125V/1.5A Pilot Duty DC 30V/2.3A Pilot Duty

#### 3 Mounting Examples

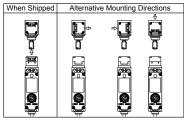
Install the interlock switch on the immovable machine or guard, and install the actuator on the movable door. Do not install both interlock switch and actuator on the movable door, otherwise failure will occur.



The SG-B2 Head

• Changing the Mounting Directions of the SG-B2 Head.

The head of the SG-B2 can be mounted in four directions by removing the four screws from the corners of the SG-B2 head.



#### **↑** WARNING

Mounting Directions of the SG-B2 Head

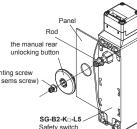
When replacing the SG-B2 head, make sure that no foreign object enters into the safety switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the safety switch may malfunction.

Don't remove the screws of head expect when the mouting directions of head is changed.

(Type SG-B2-K=)
When the key is operated, the operation of the monitor circuit (41-42) and monitor circuits (51-52) are the same. However, when the head is removed, disparity is detected (41-42 : OFF, 51-52: ON). The disparity of the contacts detects the removal of the head.

	Actuator Unlocked	Actuator Locked	When the SG-B2-K□ head is removed
Contact Closed Contact Open	Uniocked The Control of the Control		Treat is removed
Monitor Circuit: PK ⊕ 41+ 42 PK/WH			
Monitor Circuit: BN ⊕ 51 52 BN/WH			

(Type SG-B2-K□-L5)
■Installing the manual rear unlocking button
• After installing the interlock switch on the panel, put the manual rear unlocking button (supplied ) on the rod on the back of the interloc k switch, and fasten using the mounting screw. When installin g or the aluminum frame of the thickness of 6mm or more, use the rear unlocking button for frame kit (MS-SG-23 / MS-SG-22) sold separately



After installing the manual rear unlocking button, apply Loctite to the screw so that the screw does not become loose. The base is made of glass-reinforced PA66 (66 nylon). The mounting screw is iron. Take the compatibility of plastic material and Loctite into consideration.

#### 4 Precautions for Operation

- Do not apply an excessive shock to the safety switch when opening or closing the door.
   A shock to the safety switch exceeding 1,000 m/s² may cause failure.
   Regardless of door types, do not use the safety switch as a door lock. Install a sepatate
- lock as shown in 3.

  Do not open the lid of the switch. Loosening the screws may cause damage to the switch.

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

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

  When bending the cable during wiring, secure the cable radius of 30 mm at the minimum.
- Use the dedicated actuators only. Other actuators will cause damage to the switch

#### **⚠** CAUTION

- Regardless of door types, do not use the safety switch as a door stop.

  Install a mechanical door stop to the end of the door to protect the safety switch against
- excessive force.

  Mount the actuator so that it will not hit the operator when the door is open, otherwise injury may
- be cvaused. 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 electrical shocks or fire
- hazard.

  Mount the actuator so that it will not hit the operator when the door is open, otherwise injury may
- be cvaused. 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
- Ensure that the actuator is firmly fastened to the door (welding, fivet, 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.
   If multiple safety components are wired in series, the Performance Level to EN ISO 13849-1 will be reduced due to the restricted error detection under certain circumstance.
   The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO 13849-2.

## **↑** 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 electrical shocks or fire hazard. 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.

## Do not mount the interlock switch facing down as shown in the figure on the right. The key may fall due to vibration.

- Rey
   Be sure to take the following precautions. Otherwise, failure or damage may occur.
   When using the key, insert the key all the way.
   Do not apply a rotative force when inserting or removing the key. Also, do not pull the key during operation.
- the key. Also, do not pull the key during operation. Otherwise failure or damage may occur.

  Other than the standard key, there are 15 key variations. Be sure to use a key and cylinder with the same number.

  Do not apply excessive force to the key. Otherwise failure or damage may occur.

  With the key in the UNLOCK position, do not turn the key to the LOCK position with the actuator removed (door open). Otherwise failure or damage may occur.

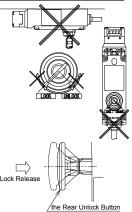
#### (Type SG-B2-K□-L5)

#### For the Rear Unlock Button

- The Rear Unlock Button is used for an emergency escape when the worker is confined in the safety
- hedge (the dangerous area).

  The lock is released when the Rear Unlock Button is pressed, and the door can be opened.
- pressed, and the door can be opened.

  To return to locked status, pull back the button. While the Rear Unlock Button is depressed, the main circuit remains open and the door is unlocked.



#### **↑** CAUTION

- Install the SG-B2 to ensure that a worker can operate the Rear Unlock Button from inside the safety hedge (the dangerous area). It is dangerous to install the SG-B2 in the position where the Rear Unlock Button can be operated from outside the the safety hedge (the
- dangerous area), because it is possible to unlock while the machine is operating.

  Use hand to press the button, and do not use a tool. Do not apply excessive force to the Rear Unlock Button

## ■SG-K21A / SG-K22A

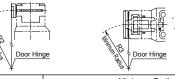
- SG-R21A / SG-R22A
  When there is a displacement of safety switch and actuator, the actuator may hit the entry slot of safety switch hardly, thus damaging the entry slot and actuator. The rubber cushions on the actuator prevent the actuator from damaging the entry slit by absorbing the shock with movement flexibility. Do not, however, exert excessive shocks, otherwise the failure of safety switch may be caused.
   The rubber cushions may deteriorate depending on the operating environment and conditions.
- conditions.

  Immediately replace the deformed or cracked rubber cushions with new ones.

## 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 When the center of the hinged door is on sion line of the contact surface of mounting surfase actuator and safety switch



Mounting centers:20 mm 310 mm 260 mm 170 mm 140 mm	Minimum Radius					
SG-K22A         Mounting centers:12 mm         230 mm         260 mm         120 mm         140 mm           Mounting centers:20 mm         310 mm         70 mm         70 mm         50 mm         50 mm			R1	R2	R3	R4
Mounting centers:20 mm   310 mm   260 mm   170 mm   140 mm	SG-K22		230 mm	260 mm	170 mm	190 mm
	SG-K22A	Mounting centers:12 mm	230 mm	260 mm	120 mm	140 mm
		Mounting centers:20 mm	310 mm	200 111111	170 mm	140 111111
(vertical Swing) (vertical Swing) (vertical Swing)	SG-K24					

#### **⚠** CAUTION

Door Hinge

The values shown above are based on the condition that the actuator enters 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.

#### (Type SG-K24)

SG-B2-□-D

Operation Cycle

21-52 Monitor Circuit 11-12

Monitor Circuit 23-24

Monitor Circuit 41-42

Monitor Circuit 53-54

Key Position /Rear Unlock Button

11-42

21-22

Door States Main Circuit

- (Type SG-K24)

  ◆Adjusting the Angle Adjustable (vertical/horizontal) Actuator

   Using the angle adjustment screw (M3 hexagon socket set screw), the actuator angle can 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 locitie or the like on the adjustment screw to prevent loosening.

UNLOCK D LOCK

BN 53 54 BN/M

BN 51 52 BN/W

Open

Closed

Open

Onen

Closed

nck Positio

Open

Open

Open

Closed

Open

Closed

lock Positi

The Actuator is inserted, and SG-B2 is locked

Closed

Closed

Open

Closed

Open

ock Position

- prevent loosening.

   Use screw locking agent that is compatible with the base material.

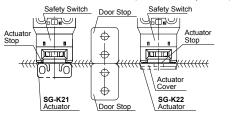
  Base: PA66 (66 nylon) of glass reinforced grade

  Angle adjustment screws: stainless steel

6 Contact Operation and Wiring ●Contact Configuration and Operation

 Actuator Mounting Reference Position
 As shown below, the mounting reference position of the actuator inserted into the safety The actuator and actuator cover touches the actuator stop placed on the safety switch

lightly.
(After mounting the actuator, remove the actuator stop from the safety switch.)



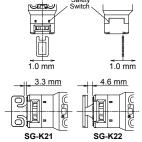
Actuator Mounting Tolerance

Mounting tolerance of the actuator is 1.0 mm in the four lateral directions.

When closing the door, the actuator is inserted and locked within a certain distance from the reference position. After the actuator has been locked, the contact operation is not affected by the actuator movement in the locked state.

movement in the locked state.				
	(Actuator deviation) + (Door movement)			
SG-K21	≦ 3.3mm			
SG-K22				
SG-K21A	≦ 4.6mm			
SG-K22A				
SG-K24	≦ 4.6mm			

●Recommended Screw Tightening Torque



Name or Use	Screw Tightening Torque
For mounting the safety switch (M4 screw) *5	1.8 to 2.2 N·m
For mounting the actuator	
(SG-K21: two M4 screws) *5	1.8 to 2.2 N·m
(SG-K22: two M4 Phillips screws)	0.8 to 1.2 N·m
(SG-K21A / SG-K22A: two M4 screws) *5,6	1.0 to 1.5 N·m
(SG-K24: two M4 screws) *5	1.0 to 1.5 N·m
For mounting the SG-B2 head (M3)	0.9 to 1.1 N·m
For mounting the manual rear unlocking button (M3 sems screw)	0.5 to 0.7 N·m

## **↑** CAUTION

Contact Closed

Contact Open

**∴** CAUTION

When using the outputs from the SG-B2 safety switch as inputs to safety circuits, connect the door monitor circuits (11-12, 21-22) ⊕ and lock monitor circuits(41-42, 51-52) in series. (GS-ET-19)

SG-K21 actuator.

Contact Operation(reference

0 (Actuator Mounting Reference Position)

Closed

Open

Closed

Open

Open

Closed

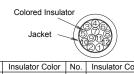
Lock Position

the Button

- The above recommended tightening torques of the mounting screws are the values confirmed with hex socket head bolts.
- Wash washers, fasten the actuator securely on the door.

- cifications UL style 2464 (80°C 300V) Cable specification
- Wires are identified by the color and white line printed on
- the wire.

  Do not use wire which is Black, White, Gray, Gray



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

## ●Terminal Number Identification • When wiring, the terminal number on each contact is

- identified by wire color.

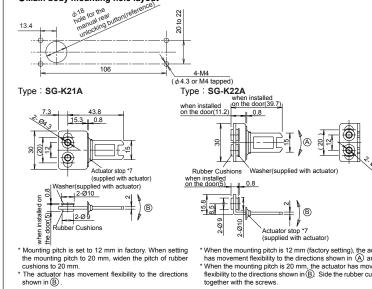
  The following shows the identification of terminal number When wiring, cut unnecessary wires such as dummy insulator (white) and/or unused wires to avoid incorrect

l.	
Circuit No.	Insulator Color
1	Blue
12	Blue / White
21, 23	Orange
22, 24	Orange / White
51, 53	Brown
52, 54	Brown / White
41	Pink
42	Pink / White

# 7 Dimensions and Mounting (mm) SG-K21 Actuator -hiator stop '7 -with actuar Type : SG-B2-□-L5 ●Main body me

41 to (44.3)

6.2 \_\_ 5.2



Angle adjusting screw
(M3 hexagon socket set screw)

Actuator mounting hole layout

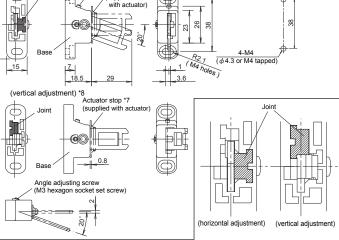
36.2

41.5 to (46.1)

SG-K22

Slot plug

## Type: SG-K24



- \*7 The actuator stop and The Stopper film are used when adjusting the actuator position.
- Remove after the actuator position is determined. \*8 The direction of adjustable angle can be changed (vertical or horizontal) by changing the insertion direction of the joint (white plastic part).

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

#### 8 Precaution for Disposal

Dispose of the SG-B2 safety switch as an industrial waste

#### 9 Contact infomation for CE

Panasonic Marketing Europe GmbH Panasonic Testing Center Winsbergring 15, 22525 Hamburg, Germany

## Panasonic Industrial Devices SUNX Co., Ltd.

#### http://panasonic.net/id/pidsx/global

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#### **Panasonic**

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

CIMJE-SGB2 No.0078-92V

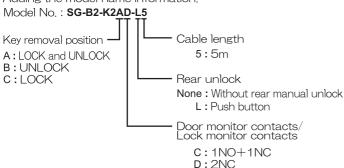
Thank you for purchasing a Panasonic product,

Information on the following items will be added to the Instruction Manual of the SG-B2 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

· Adding the model name information.



#### 2 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 / the level of coded	Type 2 Interlocking device / 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, Ushiyadina Europa Chible Panasonic Testina Contor

**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 Key

Model Name: SG-B2 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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