

MJE-SGB2 No.0078-96V

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.

# 1 SAFETY CAUTIONS (Always observe)

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

♠ WARNING Risk of death or serious injury.  $\underline{ \wedge} \ \textbf{CAUTION} \quad \text{Risk of minor injury or property damage}.$ 

## 2 TYPE

# Model No.: SG-B2-K2AD-L5

Key removal position

A : LOCK and UNLOCK

B : UNLOCK C: LOCK

None: Without rear manual unlock L: Push button Door monitor contacts/ Lock monitor contacts

-Cable length

-Rear unlock

**5**:5m

**3 SPECIFICATIONS AND RATINGS** 

| Appl  | icable Standards                       | Standards EN 60947-5-1:2017, GS-ET-19:2019  |                        |      |       |       |  |
|---|--|---|------------------------|------|-------|-------|--|
| Stan  | dards for Use                          | IEC 60204-1 / EN 60204-1, ISO 14119, EN ISO 14119,<br>IEC 60947-5-1, UL 508, CSA C22.2 No.14  |                        |      |       |       |  |
|   | locking device Type /<br>evel of coded |   |                        |      |       |       |  |
| Conformity Directive(s)   |  | Machinery Directive (2006/42/EC) , Supply of Machinery (Safety) Regulations (2008/1597)   |                        |      |       |       |  |
| <u>ş</u> 0  | perating Temperature                   | -25°C to +70°C (no freezing)  |                        |      |       |       |  |
| <u>გ</u> — '  | perating Humidity                      | 45% to 85%RH (no condensation)  |                        |      |       |       |  |
| St  | orage Temperature                      | -40°C to +80°C (no freezing)  |                        |      |       |       |  |
| Po  | ollution Degree                        | 3 (Inside 2)  |                        |      |       |       |  |
|   | titude                                 | 2000m maximum   |                        |      |       |       |  |
| _ <u></u>   | se Withstand Voltage (Uimp)            |   |                        |      |       |       |  |
|   | d Insulation voltage                   |   | (Note 1)               |      | -     |       |  |
| Thermal Current < Ith>  |  | 2.5A  |                        |      |       |       |  |
|   |  | -25°C < Operating temperature < 60°C : 2.5A<br>60°C < Operating temperature < 65°C : 1.5A<br>65°C < Operating temperature < 70°C : 1.0A |                        |      |       |       |  |
|   | tact Ratings                           |   |                        | 30V  | 125V  | 250V  |  |
| (Refe   | erence Values)                         | AC  | Resistive load (AC-12) | _    | 2.5A  | 1.5A  |  |
| <ue,< td=""><td>ie&gt;</td><td>AC</td><td>Inductive load (AC-15)</td><td>_</td><td>1.5A</td><td>0.75A</td></ue,<> | ie>                                    | AC  | Inductive load (AC-15) | _    | 1.5A  | 0.75A |  |
|   |  | DC  | Resistive load (DC-12) | 2.5A | 0.1A  | 0.55A |  |
|   |  | ВС  | Inductive load (DC-13) | 2.3A | 0.55A | 0.27A |  |
| Ope   | rating Frequency                       | 900 c   | perations/hour         |      |       |       |  |
| Ope   | rating Speed                           | 0.05n   | n/s to 1.0m/s          |      |       |       |  |
| B <sub>10d</sub>  |  | 2,000,000 (EN ISO 13849-1 Annex C Table C.1)  |                        |      |       |       |  |
| Mecl  | hanical Durability                     | 1,000,000 operations min. (GS-ET-19) the Rear Unlock Button: 3000 operations min. (Type SG-B2-□-L5)                                     |                        |      |       |       |  |
| Electrical Durability   |  | 100,000 operations min. (AC-12 250V+1A)<br>1,000,000 operations min. (AC/IDC 24V 100mA)<br>(900 operations / hour)                      |                        |      |       |       |  |
| Class   | s of Protection                        | Class II (IEC61140)(Note 2)   |                        |      |       |       |  |
| Actu  | ator Tensile                           | 1,400N min. (GS-ET-19)(Note 3)  |                        |      |       |       |  |
| Stre  | ngthwhen Locked                        | (500N min. : <b>SG-K24</b> actuator)  |                        |      |       |       |  |
| Direct Opening Travel   |  | 11mm min. (actuator: <b>SG-K21</b> )<br>12mm min. (for other actuators)   |                        |      |       |       |  |
| Direc   | ct Opening Force                       | 80N min.  |                        |      |       |       |  |
| Cont  | tact Resistance                        | 500 mΩmax. (initial value, 3m cable)  |                        |      |       |       |  |
| Degr  | ree of Protection                      | IP65 (IEC60529)   |                        |      |       |       |  |
| Shock Resistance  |  | Operating extremes: 100 m/s <sup>2</sup> , Damage limits: 1000 m/s <sup>2</sup>   |                        |      |       |       |  |
|   | ation Resistance                       | Operating extremes: 10 to 55 H, amplitude 0.35 mm minimum<br>Damage limits: 30 Hz, amplitude 1.5 mm minimum                             |                        |      |       |       |  |
| Short-circuit Protective Device   |  | Use 250V / 10A fast acting type fuse  |                        |      |       |       |  |
|   | Operating Specifications               | 2 Positions   |                        |      |       |       |  |
|   | Mechanical Durability                  | 100,000 operations min.   |                        |      |       |       |  |
| Key   | Key Operating Durability               | 10,000 operations min.  |                        |      |       |       |  |
| ¥   | Key Tensile Strength                   | 1.0N·m min.   |                        |      |       |       |  |
|   | Direct Opening Force                   | 0.6N·m min.   |                        |      |       |       |  |
|   | Direct Opening Degree                  | 60° n   | 60° min.               |      |       |       |  |

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. 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.

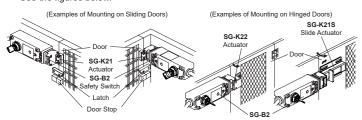
# Ratings approved by safety agencies

(1)  $T\ddot{U}V$  rating AC-15 250V/0.75A (2) UL, c-UL rating AC 125V/1.5A Pilot Duty DC-13 125V/0 22A DC 30V/2.3A Pilot Duty DC-13 30V/2.3A

# 4 MOUNTING EXAMPLES

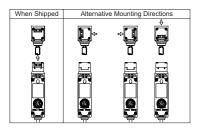
Install the interlock switch on the immovable machine or guard, and install the actuator on the movable door. Do not install both interlock switch and actuator on the movable door, otherwise failure will occur.

See the figures below.



## 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.



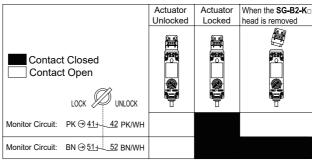
Mounting directions of the SG-B2 head When replacing the SG-B2 head, make sure that no foreign object enters into the safety switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the safety switch may malfunction. Don't remove the screws of head expect whe the mounting directions of head is changed.

**⚠ WARNING** 

Head removal detection function

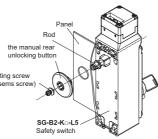
### (Type **SG-B2-K** □ )

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.



### (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 interlock switch, and fasten using the mounting screw. When installing on 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.



# **⚠** CAUTION

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

## **5** PRECAUTIONS FOR OPERATION

- For Mounting
   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 separate lock
- 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 slots.
- Do not fasten and loosen the conduit at the bottom of the safety
- · 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.

# **<u>ACAUTION</u>**

- 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
- Mount the actuator so that it will not hit the operator when the door is open, otherwise injury
- may be caused.

  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 caused. 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.

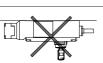
  Ensure that the actuator is firmly fastened to the door
- (welding, rivet, special screw) in the appropriate location, so that the actuator cannot be removed easily. Do not cut or remodel the actuator, otherwise failure will occur.
- If multiple safety components are wired in series, the Performance Level to EN ISO13849-1 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

# **<u>∧</u> 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 lectrical 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



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. 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.

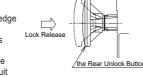


### (Type **SG-B2-K** □ **-L5**)

## •For the Rear Unlock Button

- The Rear Unlock Button is used for an emergence 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.

  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 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

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

### 6 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



# **⚠** CAUTION

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

SG-K24

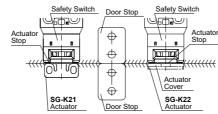
- Adjusting the Angle Adjustable (vertical/horizontal) Actuator
- Using the angle adjustment screw (M3 hexagon socket set screw), the actuator angle can be adjusted up to 20°(refer to dimensions).
   The larger the actuator angle, the smaller the applicable radius of the door swing. After
- installing 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 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

# Actuator Mounting Reference Position

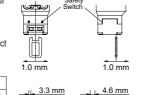
· As shown below, the mounting reference position of the actuator inserted into the safety switch is:

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



|         | (Actuator deviation) + (Door movement) |      |
|---------|--|------|
| SG-K21  | ≦ 3.3mm                                | -    |
| SG-K22  |  | [P   |
| SG-K21A | ≦ 4.6mm                                | 1    |
| SG-K22A |  | رك إ |
| SG-K24  | ≦ 4.6mm                                | `    |
|         |  |      |

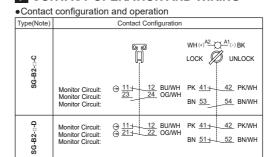
## Recommended Screw Tightening Torque

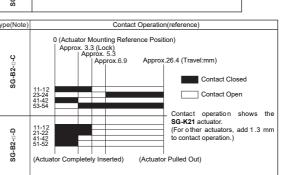
| Name or Use  | Recommended Screw Tightening Torque |  |
|--|-------------------------------------|--|
| For mounting the safety switch (M4 screw)(Note 1)            | 1.8N·m to 2.2N·m                    |  |
| For mounting the actuator                                    |                                     |  |
| (SG-K21:two M4 screws)(Note 1)                               | 1.8N·m to 2.2N·m                    |  |
| (SG-K22:two M4 Phillips screws)                              | 0.8N·m to 1.2N·m                    |  |
| (SG-K21A/SG-K22A:two M4 screws)(Note 1)(Note 2)              | 1.0N·m to 1.5N·m                    |  |
| (SG-K24:two M4 screws)(Note 1)                               | 1.0N·m to 1.5N·m                    |  |
| For mounting the SG-B2 head(M3)                              | 0.9N·m to 1.1N·m                    |  |
| For mounting the manual rear unlocking button(M3 sems screw) | 0.5N·m to 0.7N·m                    |  |

values confirmed with hex socket head bolts. When other 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.

Notes: 2) In the case of SG-K21A or SG-K22A, Using two M4 screws and two

# **7** CONTACT OPERATION AND WIRING





Note: ) The Actuator is inserted, and SG-B2 is Locked

# **⚠** 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)  $\odot$  and lock monitor circuits(41-42,51-52) in series.(GS-ET-19)

| <ul><li>Operation Cy</li></ul>      | /cle           |  |  |                                     |  |
|-------------------------------------|----------------|--|--|-------------------------------------|--|
| Door States                         |                | Closed   | Closed   | Open                                | Closed   |
| Main Circuit 11-42 21-52            |                | Closed   | Open   | Open                                | Open   |
| Monitor Circuit                     | 11-12<br>21-22 | Closed   | Closed   | Open                                | Closed   |
| Monitor Circuit                     | 23-24          | Open   | Open   | Closed                              | Open   |
| Monitor Circuit                     | 41-42<br>51-52 | Closed   | Open   | Open                                | Open   |
| Monitor Circuit                     | 53-54          | Open   | Closed   | Closed                              | Closed   |
| Key Position<br>/Rear Unlock Button |                | Lock Position<br>/Returned status                  | Unlock Position<br>/Returned status                      | Unlock Position<br>/Returned status | Lock Position<br>/When operating<br>the Button           |
|                                     |                | Door is locked.<br>The machine can<br>be operated. | Door is unlocked.<br>The machine can<br>not be operated. | The machine can not be operated.    | Door is unlocked.<br>The machine can<br>not be operated. |

Cable specifications UL style 2464 12c × No.22 AWG

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

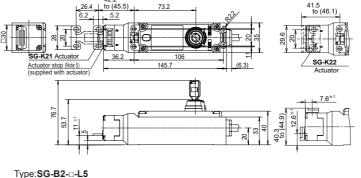
Do not use wire which is Black, White Gray, Gray / White.

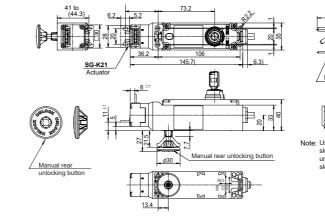
# Black Brown 8 Orange / White 9 Pink 10 Pink / White 5 Brown / White 11 Gray 6 Orange 12 Gray / White

- 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 wiring.

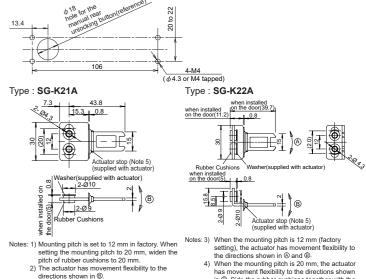
| Circuit No. | Insulator Color |
|-------------|-----------------|
| 11          | Blue            |
| 12          | Blue / White    |
| 21, 23      | Orange          |
| 22, 24      | Orange / White  |
| 51, 53      | Brown           |
| 52, 54      | Brown / White   |
| 41          | Pink            |
| 42          | Pink / White    |
|             |                 |

# 8 DIMENSIONS (mm)

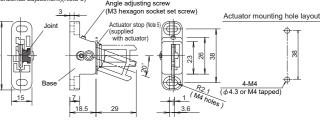


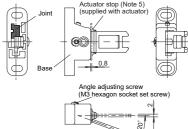


### Main body mounting hole layout



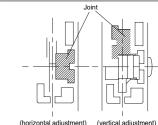
# Type: SG-K24





otes: 5) The actuator stop and The Stopper film ar used when adjusting the actuator pos Remove after the actuator position is

The direction of adjustable angle can be



# 9 PRECAUTION FOR DISPOSAL

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

# 10 CE MARKING DECLARATION OF CONFORMITY

# Itemized Essentials of EU Declaration of Conformity Manufacturer's Name: Panasonic Industrial Devices SUNX Co., Ltd.

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

Model Name: SG-B2 Series

Application of Council Directive: 2006/42/EC Machinery Directive 2011/65/EU RoHS Directive Applicable standards: EN 60947-5-1

# GS-ET-19 EN IEC 63000

# 11 UKCA MARKING DECLARATION OF CONFORMITY Itemized Essentials of UK Declaration of Conformity

Manufacturer's Name: Panasonic Industrial Devices SUNX Co., Ltd. Manufacturer's Address: 2431-1, Ushiyama-cho, Kasugai, Aichi 486-0901, Japan Authorized Representative: Panasonic Testing Centre on behalf of Panasonic UK Panasonic UK, a branch of Panasonic Marketing

Europe GmbH Maxis 2, Western Road, Bracknell, Berkshire, RG12 1RT Product Name: Safety Door Switch with Key

Trade Name: Panasonic Model Number: SG-B2 Series Statutory Instruments: 2008 No.1597 Supply of Machinery (Safety) Regulations

2008 2012 No.3032 RoHS Regulations 2012

Designated Standards: EN 60947-5-1 GS-ET-19 EN IEC 63000

# Panasonic Industry Co., Ltd. Panasonic Industrial Devices SUNX Co., Ltd.

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