

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. **Manually** keep this manual in a convenient place for quick reference. English is original instructions.

**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.  
**⚠ CAUTION** Risk of minor injury or property damage.

**2 TYPE**

Model No. : **SG-C1-21-EMK**

3 position switch  
**21** : Equipped

Emergency stop switch  
**None** : —  
**E** : Equipped

Indicator  
**None** : —  
**G** : Equipped

Key selector switch  
**None** : —  
**K** : Equipped

Momentary pushbutton switch  
**None** : —  
**M** : Equipped  
**MM** : Equipped(2pcs.)

**3 SPECIFICATIONS AND RATINGS**

|   |  |  |  |
|---|--|--|--|
| Applicable Standards                                | EN 60947-5-1: 2017, EN IEC 60947-5-8: 2021, GS-ET-22: 2016   |  |  |
| Standards for Use                                   | ISO 12100 / EN ISO 12100, IEC 60204-1 / EN 60204-1, ISO 11161 / EN ISO 11161, ISO 10218-1 / EN ISO 10218-1, ANSI / RIA / ISO 10218-1, ANSI / RIA R15.06, ANSI B11.19, ISO 13849-1 / EN ISO 13849-1, JIS C8201-5-1, UL 508, CSA C22.2 No.14 |  |  |
| Conforming Standards                                | Machinery Directive (2006/42/EC), Supply of Machinery (Safety) Regulations (2008/1597)   |  |  |
| Operating Temperature                               | -25°C to +60°C (no freezing)   |  |  |
| Operating Humidity                                  | 45% to 85%RH (no condensation)   |  |  |
| Storage Temperature                                 | -40°C to +80°C (no freezing)   |  |  |
| Pollution Degree                                    | 3 (inside housing 2)   |  |  |
| Altitude  | 2000m maximum  |  |  |
| Impulse Withstand Voltage (Uimp)                    | 2.5 kV (additional momentary pushbutton switch, key selector switch: 1.5kV)  |  |  |
| Rated Insulation voltage                            | 250V(Additional momentary pushbutton switch and Key selector switch:125V/30V(With Pilot Light))  |  |  |
| Thermal Current <Ith>                               | 3A (Emergency stop switch: 5A)   |  |  |
| Contact Ratings (Reference Values) <Ue, Ie>(Note 1) | Grip Switch  | 3 position enabling switch (terminal No. NO1-C1 and NO2-C2)                      | AC<br>Resistive load (AC-12) — 1A 0.5A<br>Inductive load (AC-15) — 0.7A 0.5A<br>DC<br>Resistive load (DC-12) 1A 0.2A —<br>Inductive load (DC-13) 0.7A 0.1A —               |
|   |  | Push monitor switch, Release monitor switch (terminal No.31-32)                  | AC<br>Resistive load (AC-12) — 2.5A 1.5A<br>Inductive load (AC-15) — 1.5A 0.75A<br>DC<br>Resistive load (DC-12) 2.5A 1.1A 0.55A<br>Inductive load (DC-13) 2.3A 0.55A 0.27A |
|   |  | Emergency stop switch (terminal No. 1-2 and 1-2)                                 | AC<br>Resistive load (AC-12) — 5A 3A<br>Inductive load (AC-15) — 3A 1.5A<br>DC<br>Resistive load (DC-12) 2A 0.4A 0.2A<br>Inductive load (DC-13) 1A 0.22A 0.1A              |
|   |  | Momentary pushbutton switch, Key selector switch (terminal No.C1-NC1, No.C2-NC2) | AC<br>Resistive load (AC-12) — 0.5A —<br>Inductive load (AC-15) — 0.3A —<br>DC<br>Resistive load (DC-12) 1A 0.2A —<br>Inductive load (DC-13) 0.7A 0.1A —                   |
| Electric Shock Protection Class                     | Class II (IEC61140) □, Class III (With Pilot Light)  |  |  |
| Operation Frequency                                 | 1200 operations/hour   |  |  |
| B <sub>op</sub>                                     | 2,000,000 (EN ISO 13849-1 Annex C Table C.1)   |  |  |
| Mechanical Durability                               | Position 1→2⇒1 : 1,000,000 operations min<br>Position 1→2⇒3⇒1 : 100,000 operations min   |  |  |
| Electrical Durability                               | 100,000 operations min. (Rated operating load)<br>1,000,000 operations min. (AC/DC 24V 100mA)  |  |  |
| Shock Resistance                                    | Operating Extremes   | 150m/s <sup>2</sup>  |  |
|   | Damage Limits  | 1000m/s <sup>2</sup>   |  |
| Free Fall   | 1.0m 1time (Based on IEC60068-2-32)  |  |  |
| Vibration Resistance                                | Operating Extremes   | 5Hz to 55Hz, half amplitude 0.5mm  |  |
|   | Damage Limits  | 16.7Hz, half amplitude 1.5 mm  |  |
| Degree of Protection                                | IP66/67  | Without Additional switch and Pilot light  |  |
|   | IP65   | With Additional switch and/or Pilot light  |  |
| Conditional short-circuit Current                   | 50A (250V)   |  |  |
| Short-Circuit Protective Device                     | 250V AC, 10A Fuse (IEC60127-1)   |  |  |
| Direct Opening Force                                | 60N minimum (Push monitor Switch)  |  |  |
| Direct Opening Travel                               | 4.7mm minimum (Push monitor Switch)  |  |  |
| Actuator Strength                                   | 500N minimum (Grip Switch)   |  |  |
| Weight (Approx.)                                    | SG-C1-21 (140g) / SG-C1-21-MM (155g) / SG-C1-21-E (150g) / SG-C1-21-EMM (165g) / SG-C1-21-EMK (170g) / SG-C1-21-EG (155g)  |  |  |
| Pilot Light   | Rated Operating Voltage  | 24V DC ±10%  |  |
|   | Rated Current  | 15mA   |  |
|   | Light Source   | LED  |  |
|   | Illumination Color   | *: None (Green), R (Red), Y (Yellow), A (Amber), W (White)                       |  |

Note: 1) As for the type with Pilot Light, Ue(Contact Ratings) of all switches is only less than 30V DC, and connect all switches to SELV(safety extra low voltage) or PELV(protective extra low voltage) circuit.

Ratings approved by safety agencies

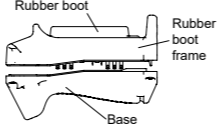
|                   |   |  |
|-------------------|---|--|
| (1)TÜV Rating     | Without Pilot Light Type<br>3 position enabling switch                | AC-15 0.5A/250V<br>DC-13 0.1A/125V<br>DC-13 0.7A/30V<br>DC-13 0.22A/125V<br>DC-13 2.3A/30V |
|                   | Monitor switch  | AC-15 0.75A/250V<br>DC-13 2.3A/30V   |
|                   | With Pilot Light Type<br>3 position enabling switch<br>Monitor switch | DC-13 0.7A/30V<br>DC-13 2.3A/30V   |
| (2)UL,c-UL Rating | 3 position enabling switch  | AC 0.5A/250V Pilot Duty<br>DC 0.1A/125V Pilot Duty<br>DC 0.7A/30V Pilot Duty               |
|                   | Monitor switch  | AC 0.75A/250V Pilot Duty   |
|                   | Emergency stop switch   | AC 1.5A/250V Pilot Duty<br>DC 1A/30V Pilot Duty  |
|                   | Momentary pushbutton switch/Key selector switch                       | AC 0.5A/125V Resistive<br>DC 1A/30V Resistive<br>DC 15mA/24V                               |
|                   | Pilot Light   | DC 15mA/24V  |

•Ambient Temperature 40°C  
 •Environmental Rating Type 4X Indoor Use Only  
 (This device must be used with cable suitable for wet locations, when using as UL/c-UL recognized component.Extra care shall be taken to make sure that the mating components of the housing are suitably aligned in order to maintain the Type 4X Indoor Use Only rating.)  
 •This device has only been investigated for shock and fire to UL508.  
 •This device is not intended for connection to rigid metallic conduit.

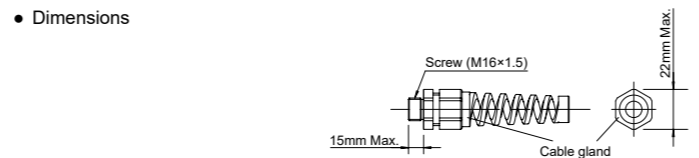
**4 UNPACKING**

Check if the product is what you have ordered and there are no lacks of parts or damages by a transport accident, before use.

- A grip style 3 position enabling switch (consisting of a base and a rubber boot frame)
- A connector (applicable cable diameter: ø4.5 to 10 mm)
- An instruction sheet
- Key (with key selector switch)



Note: Use the connector with the specification below when replacing. (a connector included with grip style 3 position enabling switch.)



- Degree of Protection ··· Use a cable gland of IP67 or higher protection.
- Recommended connector ··· Type No.: SKINTOP-BS-M16×1.5-B (made by LAPP, Germany)
- Applicable cable diameters ··· Outside diameter 4.5 to 10 mm

**5 NOTES FOR OPERATION**

- **SG-C1-21** series is a device used for enabling a machine (robot, etc.) when teaching the machine in a hazardous area manually. Configure the enabling system so that the machine can operate when the switch is in position 2 and an additional "start" is pushed to initiate the operation.
- In order to ensure safety of the control system, connect each pair of the contacts of the 3 position enabling switch (terminal No.NO1-C1 and NO2-C2) to a discrepancy detection circuit such as a safety relay module. (ISO13849-1)
- The base and the plastic part of rubber boot frame are made of glass-reinforced ABS/PBT.
- The rubber boot is made of silicone rubber. The screw is made of iron.
- When cleaning the **SG-C1-21** series, use a detergent compatible with the materials.
- Do not press the rubber boot with excessive pressure to an inappropriate direction.
- As for momentary pushbutton switch and key selector switch of additional control unit, do not connect NO and NC contacts of a micro switch to different voltages or different power sources to prevent a dead short-circuit.
- Do not operate key selector switch of additional control unit without completely insertion of the key.
- The rubber boot may deteriorate depending on the operating environment and conditions.

**⚠ CAUTION**

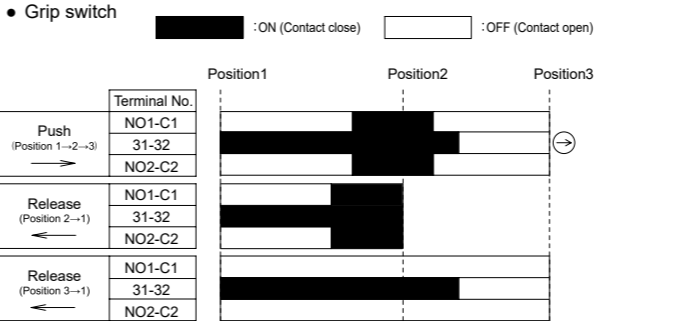
- Use proper size wires to meet voltage and current requirements.
- Do not apply an excessive shock to the **SG-C1-21** series.
- Wire the switch correctly after reading a catalog or this instruction sheet.
- When wiring, prevent dust, water, or oil from entering the grip switch.
- If used in wet locations, this device must be used with cable suitable for wet locations.
- 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 **SG-C1-21** series before starting installation, removal, wiring, maintenance, and inspection. 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 grip switch function, otherwise a breakdown or an accident will result.
- When using the **SG-C1-21** series for safety-related equipment in a control system, refer to the safety standards and regulations in each country and region depending on the application purpose of the actual machines and installations to make sure of correct operation. Also, perform risk assessment to make sure of safety before starting operation.
- Do not tie the grip switch around the button with a tape or string to keep the switch in position 2. Otherwise the original function of the switch is not utilized, posing a great risk of danger.
- Please note that permanent installation of the grip switch at the machine is inadmissible.

**6 WIRING**

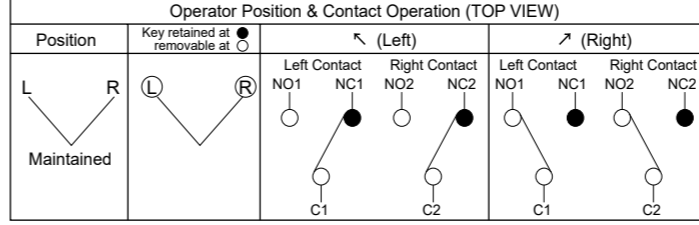
Operating characteristics (Pressing the center of the button)



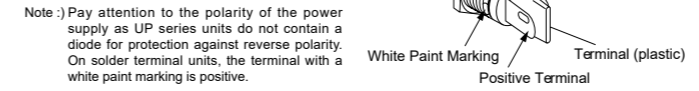
- 3 Position Enabling Switch: 2 contacts··· Terminal No. : between NO1 and C1 between NO2 and C2
- Push monitor Switch: 0 to 1 contact··· Terminal No. : between 31 and 32 (**SG-C1-21**)

Note: ) Push monitor switch (terminal No.31-32) will be positive opening circuit (⊕) when the switch operates from position 2 to 3. Use contacts of terminal No.NO1-C1 and NO2-C2 for the output of enabling system. The above operating characteristics illustrate the performance when the center of the rubber boot is pressed. Pressing the edge activates one of the two 3 position enabling switches inside earlier than the other, and may cause a delay in the operation of the **SG-C1-21** series.

- Key selector switch

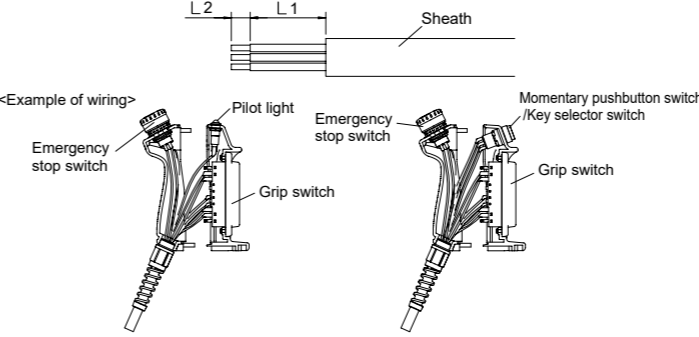


- Pilot light



Wire length inside the grip style three-position enabling switch

|                               | Grip switch |    |    |    |     |    | Momentary pushbutton switch/ Key selector switch |    |    | Emergency stop switch |     | Pilot Light |
|-------------------------------|-------------|----|----|----|-----|----|--|----|----|-----------------------|-----|-------------|
|                               | NO1         | C1 | 31 | 32 | NO2 | C1 | C  | NO | NC | 1                     | 2   | + -         |
| Wire Length L1 (mm)           | 40          | 45 | 50 | 60 | 85  | 80 | 120  |    |    | 110                   | 115 | 115         |
| Wire stripping Length L2 (mm) | L2=5mm      |    |    |    |     |    |  |    |    |                       |     |             |



Applicable wire size in terminal

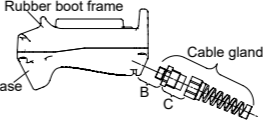
- Direct wiring: Max 0.5mm<sup>2</sup> (AWG 20)  
 Wire SG-C1-21 series according to IEC60204-1

Wiring Instruction

- Solder the terminal at 310 to 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu type is recommended when using lead-free solder.
- When soldering, do not touch the control unit with the soldering iron. Also ensure that no tensile force is applied to the terminal. Do not bend the terminal or apply excessive force to the terminal.
- Use non-corrosive rosin flux.
- Because the terminal spacing is narrow, use protective tubes or heat shrinkable tubes to avoid burning of wire coating or short circuit.
- When using a stranded wire, make sure that adjoining terminals are not short-circuited with protruding core wires.
- Use copper Wire 60/75 degree C only. (UL508)
- The wiring has to be installed according to GS-ET-22:2016, 4.2.6.

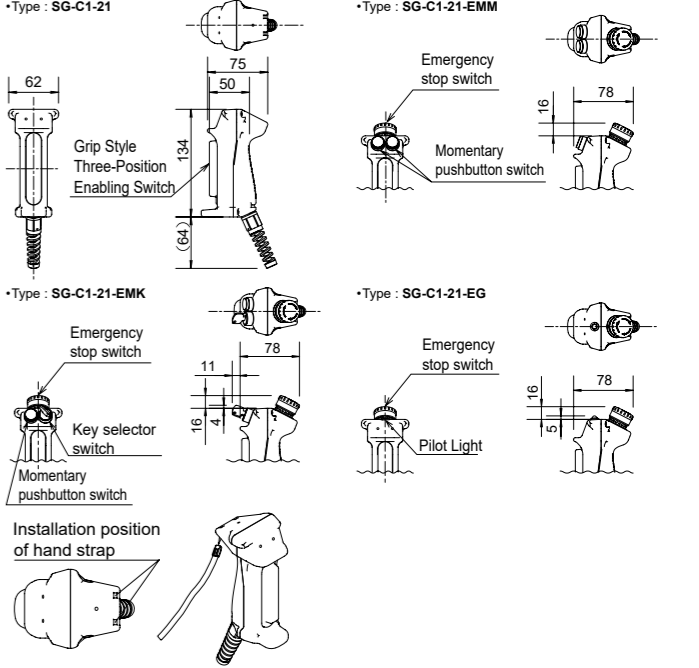
Recommended screw tightening torque

|   | Screw position | Recommended screw tightening torque |
|---|----------------|-------------------------------------|
| For mounting rubber boot frame on the base (M4 screw×4) | A              | 1.1 to 1.3N·m                       |
| Cable gland to Grip switch                              | B              | 2.7 to 3.3N·m                       |
| Cable gland to Cable gland                              | C              | 2.7 to 3.3N·m                       |



The torques of screws B and C in the table above are values when the connector described in (3) is used. When using a cable gland other than the recommended cable gland in (3), refer to the specification of the cable gland to be used.

**7 DIMENSIONS (mm)**



Note: ) When installing **SG-C1-21** series on the walls, attach hand strap to **SG-C1-21** series and hang on a hook.

**8 PRECAUTION FOR DISPOSAL**

Dispose of SG-C1-21 series as an industrial waste.

**9 CE MARKING DECLARATION OF CONFORMITY**

**Itemized Essentials of EU Declaration of Conformity**

**Manufacturer's Name:** Panasonic Industry Co., Ltd.  
**Manufacturer's Address:** 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
**EU Representative's Name:** Panasonic Marketing Europe GmbH Panasonic Testing Centre  
**EU Representative's Address:** Winsbergiring 15, 22525 Hamburg, Germany  
**Product:** Enabling Grip Switch  
**Model Name:** SG-C1 Series  
**Trade Name:** Panasonic  
**Application of Council Directive:** 2006/42/EC Machinery Directive  
 2011/65/EU RoHS Directive  
**Applicable standards:** EN 60947-5-1 EN IEC 60947-5-8  
 GS-ET-22 EN IEC 63000

**10 UKCA MARKING DECLARATION OF CONFORMITY**

**Itemized Essentials of UK Declaration of Conformity**

**Manufacturer's Name:** Panasonic Industry Co., Ltd.  
**Manufacturer's Address:** 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
**Product Name:** Enabling Grip Switch  
**Trade Name:** Panasonic  
**Model Number:** SG-C1 Series  
**Statutory Instruments:** 2008 No.1597 Supply of Machinery (Safety) Regulations 2008  
 2012 No.3032 RoHS Regulations 2012  
**Designated Standards:** EN 60947-5-1 EN IEC 60947-5-8  
 GS-ET-22 EN IEC 63000

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