

Enabling Grip Switch **SG-C1 Series**

MJE-SGC1 No.0054-18V



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**

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

**1 Type**

Model No.	3 position switch	Additional switch			
		Emergency stop switch	Momentary pushbutton switch	Key selector switch	Indicator
SG-C1-21	Equipped	-	-	-	-
SG-C1-21-E		-	-	-	-
SG-C1-21-EG		Equipped	-	-	Equipped
SG-C1-21-EMK		Equipped	Equipped	Equipped	-
SG-C1-21-EMM		Equipped	Equipped (2 pcs.)	-	-
SG-C1-21-MM	-	-	-	-	

**2 Specifications and Ratings**

Applicable Standards	IEC60947-5-1, EN60947-5-1, JIS C8201-5-1 GS-ET-22, UL508, CSA C22.2 No.14						
Standards for Use	ISO12100/EN ISO12100, IEC60204-1/EN 60204-1, ISO11161/EN ISO11161, ISO10218-1/EN ISO10218-1, ANSI/RIA/ISO10218-1, ANSI/RIA R15.06, ANSI B11.19, ISO13849-1/EN ISO13849-1						
Applicable Directives	Low Voltage Directive (2014/35/EU) Machinery Directive (2006/42/EC)						
Operating Condition	Operating Temperature	-25 to +60°C (no freezing)					
	Operating Humidity	45 to 85%RH (no condensation)					
	Storage Temperature	-40 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 > *1	Grip Switch	3 position enabling switch (terminal No. NO1-C1 and NO2-C2)	AC	Resistive load (AC-12)	-	1A	0.5A
			DC	Resistive load (DC-12)	1A	0.2A	-
		Push monitor switch, Release monitor switch (terminal No.31-32)	AC	Resistive load (AC-12)	-	2.5A	1.5A
			DC	Resistive load (DC-12)	2.5A	1.1A	0.55A
		Emergency stop switch (terminal No. 1-2 and 1-2)	AC	Resistive load (AC-12)	-	5A	3A
			DC	Resistive load (DC-12)	2A	0.4A	0.2A
	Momentary pushbutton switch, Key selector switch (terminal No. C1 NO1, NC1, No. C2 NO2, NC2)	AC	Resistive load (AC-12)	-	0.5A	-	
		DC	Resistive load (DC-12)	1A	0.2A	-	
	Electric Shock Protection Class	Class II (IEC61140) □, Class III (With Pilot Light)					
	Operation Frequency	1200 operations/hour					
	B10d	2,000,000 (EN ISO 13849-1 Annex C Table C.1)					
	Mechanical Durability	Position 1⇒2⇒1: 1,000,000 operations min					
Position 1⇒2⇒3⇒1: 100,000 operations min							
Electrical Durability	100,000 operations min. (Rated operating load)						
	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	1.0 m 1time (Based on IEC60068-2-32)						
Vibration Resistance	Operating Extremes	5 to 55 Hz, half amplitude 0.5 mm					
	Damage Limits	16.7 Hz, 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, 10 A Fuse (IEC60127-1)						
Direct Opening Force	60 N minimum (Push monitor Switch)						
Direct Opening Travel	4.7 mm minimum (Push monitor Switch)						
Actuator Strength	500 N 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)					

\*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

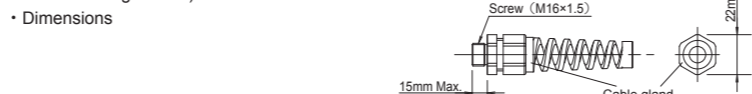
(1)TUV Rating	Without Pilot Light Type	3 position enabling switch	AC-15 0.5A/250V	DC-13 0.1A/125V DC-13 0.7A/30V
(2)UL, c-UL Rating	Without Pilot Light Type	Monitor switch	AC-15 0.75A/250V	DC-13 0.22A/125V DC-13 2.3A/30V
		With Pilot Light Type	DC-13 0.7A/30V	DC-13 2.3A/30V
(2)UL, c-UL Rating	With Pilot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

**3 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: φ4.5 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.)



- Dimensions
- 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

**4 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 microswitch 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**

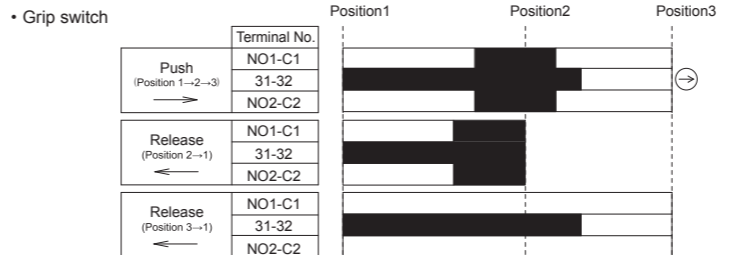
- Use proper size wires to meet voltage and current requirements.
- Do not apply an excessive shock to the SG-C1-21 series.
- Wire the switch correctly after reading a catalog or this instruction sheet.
- When wiring, prevent dust, water, or oil from entering the grip switch.
- If used in wet locations, 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.

**5 Wiring**

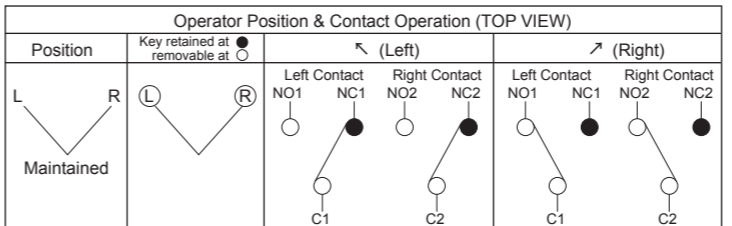
Operating Characteristics (Pressing the center of the button) : ON (Contact close) : OFF (Contact open)



- Grip switch
- 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.

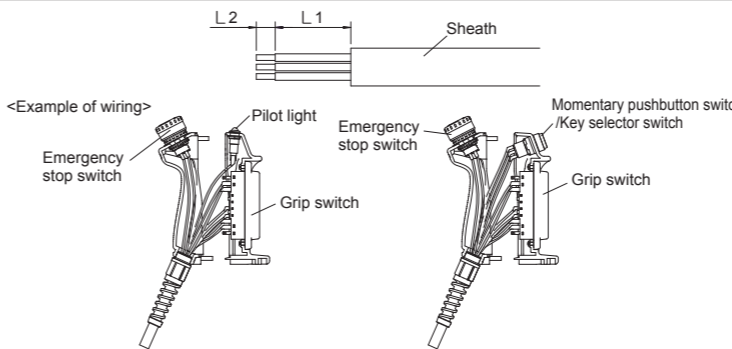
- Key selector switch



- Pilot light
- Note: Pay attention to the polarity of the power supply as UP series units do not contain a diode for protection against reverse polarity. On solder terminal units, the terminal with a white paint marking is positive.

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	NO	NC	1	2	+	-
Wire Length L1 (mm)	40	45	50	60	85	80	120	110	115	
Wire stripping Length L2 (mm)	L2=5mm									



Applicable Wire Size in Terminal

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

Wiring Instruction

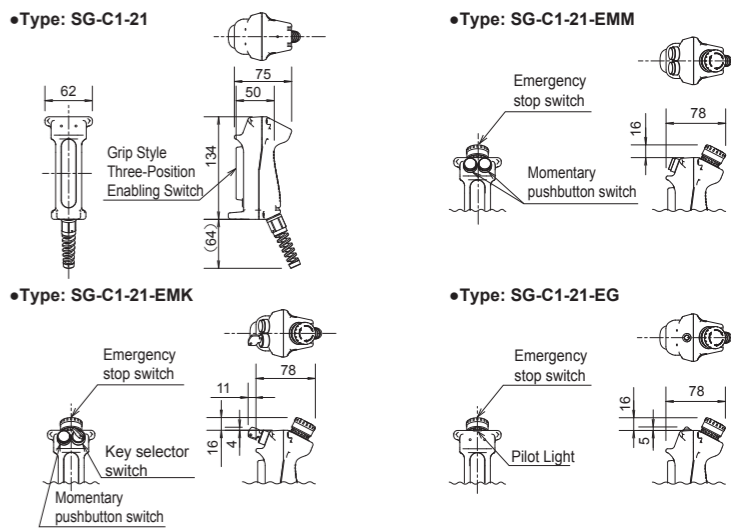
- Solder the terminal at 310 to 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu type is recommended when using leadfree solder.
- When soldering, do not touch the control unit with the soldering iron. Also ensure that no tensile force is applied to the terminal. Do not bend the terminal or 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, 4.2.6.

Recommended screw tightening torque

	Screw position	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.

**6 Dimensions (mm)**



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

**7 Precaution for Disposal**

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

**8 Contact information for CE**

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