

HE1G-L Grip Style Three-position Enabling Switches

The distinctive tactile feedback makes it easy to know the current position of the switch.
 Light operating force ideal for long-hour operation

- Ergonomically-designed OFF-ON-OFF operation.
- The switch does not turn ON when being released from position 3 (OFF when pressed) to position 1 (OFF when released) (IEC 60204-1, 9.2.5.8).
- Two contacts are provided so that even if one contact fails due to welding or short-circuit, the other contact can disable machine operation.
- Monitor switch is direct opening action.
- The distinctive tactile feedback when shifting to position 2 (enabling position) makes it easier to know where the enabling switch is currently positioned—position 1 (OFF), 2 (ON), or 3 (OFF).
- Lighter operating force on position 2 assures more comfortable, stress-free operation when operating long hours.
- Emergency stop switch and momentary pushbutton versions are available.
- Push-in terminal models can be selected.
- IP66 degree of protection (HE1G-L21SM)



HE1G-L

Package Quantity: 1

Contact Configuration			Rubber Boot	Wiring Style	Part No.
3-position Switch	Monitor Switch	Additional Pushbutton Switch			
2 contacts	With (1NC)	Without	Silicon Rubber / yellow (Note 1) NBR/PVC Polyblend / gray (Note 2)	Push-in terminal	HE1G-L21SM
		Momentary Pushbutton Switch (1NO: AB6M-M1PB)	Silicon Rubber / yellow NBR/PVC Polyblend / gray		HE1G-L21SM-1N HE1G-L21SMB HE1G-L21SMB-1N
	Without	Emergency Stop Switch (2NC: HA1E-V2S2R)	Silicon Rubber / yellow NBR/PVC Polyblend / gray		HE1G-L20ME HE1G-L20ME-1N
		Momentary Pushbutton Switch (2NO: AB6M-M2PB)	Silicon Rubber / yellow NBR/PVC Polyblend / gray		HE1G-L20MB HE1G-L20MB-1N

Note 1: Silicon rubber: Can be used in general factories. Remains flexible at cold temperatures. Suitable to applications in a wide operating temperature range.
 Note 2: NBR/PVC polyblend: Oil-proof. Suitable for environments subjected to machine oil and painting robot where silicon rubber cannot be used.

Contact Ratings

Rated Insulation Voltage (Ui)		250V (momentary pushbutton: 125V)					
Rated Thermal Current (Ith)		2.5A (Note)					
Rated Voltage (Ue)		30V	125V	250V			
Rated Current (Ie)	Grip Style Enabling Switch	3-position Switch (Terminal No.1-2/3-4)	AC	Resistive Load (AC-12)	—	1A	0.5A
			DC	Resistive Load (DC-12)	1A	0.2A	—
		Monitor Switch (HE1G-L21SM/ HE1G-L21SMB, Terminal No.5-6)	AC	Resistive Load (AC-12)	—	2.5A	1.5A
			DC	Resistive Load (DC-12)	2.5A	1.1A	0.55A
	Pushbutton	Emergency Stop Switch (HE1G-L20M, Terminal No. 5-6, 7-8)	AC	Resistive Load (AC-12)	—	2.5A	2.5A
			DC	Resistive Load (DC-12)	2A	0.44A	0.2A
		Momentary Pushbutton (HE1G-L20M, Terminal No.5-6,7-8) (HE1G-L21SM, Terminal No.7-8)	AC	Resistive Load (AC-12)	—	0.5A	—
			DC	Resistive Load (DC-12)	1A	0.2A	—

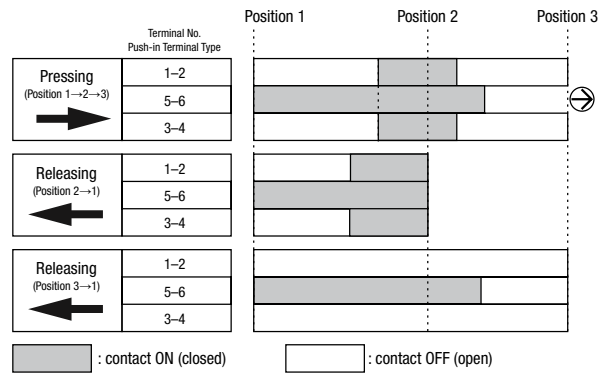
• Minimum applicable load (reference value): 3V AC/DC, 5 mA
 (Applicable range is subject to the operating conditions and load.)
 Note: Operating temp. 40 to up to +50°C (not included): 2A (4 circuits)
 50 to +60°C: 1.5A (3 or 4 circuits)

Specifications

Applicable Standards	IEC60947-5-1, EN60947-5-1 (TÜV approval) JIS C8201-5-1, IEC60947-5-8, EN60947-5-8 (TÜV approval) GS-ET-22 (TÜV approval) UL508 (UL listed) (screw terminal only) CSA C22.2 No. 14 (c-UL listed) (screw terminal only) GB/T14048.5 (CCC approval)
Applicable Standards for Use	ISO12100-1, -2/EN12100-1, -2 IEC60204-1/EN60204-1, ISO11161/prEN11161 ISO10218/EN775, ANSI/RIA R15.06 ANSI B11.19
Operating Temperature	Silicon rubber boot: -25 to 60°C (no freezing) NBR/PVC Polyblend rubber boot: -10 to 60°C (no freezing)
Relative Humidity	45 to 85% (no condensation)
Storage Temperature	-40 to +80°C (no freezing)
Pollution Degree	3
Contact Resistance	100 mΩ maximum (initial value)
Insulation Resistance	Between live and dead metal parts: 100 MΩ minimum (500V DC megger) Between terminals of different pole: 100 MΩ minimum (500V DC megger)
Impulse Withstand Voltage	Screw terminal: 2.5 kV (momentary pushbuttons: 1.5 kV) Internal connector: 1.5 kV
Electric Shock Protection Class	Class II (IEC 61140)
Operating Frequency	1,200 operations per hour
Mechanical Durability	Position 1 → 2 → 1: 1,000,000 operations minimum Position 1 → 2 → 3 → 1: 100,000 operations minimum
Electrical Durability	100,000 operations minimum (rated load) 1,000,000 operations minimum (24V AC/DC, 100 mA)
Shock Resistance	Operating extremes: 150 m/s ² Damage limits: 1,000 m/s ²
Vibration Resistance	Operating extremes: 5 to 55 Hz, amplitude 0.5 mm minimum Damage limits: 16.7 Hz, amplitude 1.5 mm minimum
Applicable Wire	Push-in terminal: 0.2 to 1.5 mm ² (AWG16 to 25)
Applicable Cable	Outside diameter ø7 to 13 mm
Conduit Port Size	M20 (cable gland is supplied with the grip style enabling switch)
Terminal Tensile Strength	20N minimum
Degree of Protection	HE1G-L21SM: IP66 (IEC 60529) HE1G-L20ME: IP65 (IEC 60529) HE1G-L20MB: IP65 (IEC 60529) HE1G-L21SMB: IP65 (IEC 60529)
Conditional Short-circuit Current	50A (250V) (Use 250V/10A fast-blow fuse for short circuit protection.)
Direct Opening Force	70N minimum (monitor switch)
Operator Strength	500N minimum (when pressing the entire button surface)
Weight (approx.)	HE1G-L21SM: 195g HE1G-L21SMB/L20MB: 205g HE1G-L20ME: 210g

Operating Characteristics

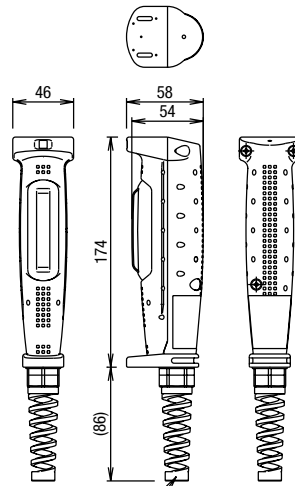
HE1G-L21SM, HE1G-L21SM-1N



- Terminals 1-2 and 3-4 are outputs of the 3-position enabling switch.
- Terminals 5-6/A3-B3 are outputs of the monitor switch.
- The above operation characteristics show when the center of the grip style enabling switch button is pressed. Because two contacts are designed to operate independently, pressing the edge of the button turns on one contact earlier than the other contact, causing a delay in operation. To avoid this, always press the center of the button.

Dimensions

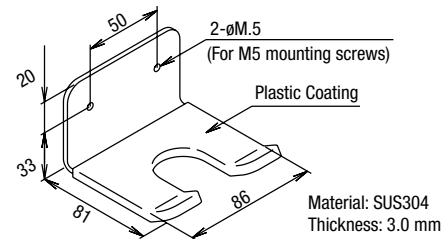
HE1G-L21SM, HE1G-L21SM-1N



Cable Gland (supplied with grip style enabling switch)
Part No.: SKINTOP BS-M20 x 1.5 (LAPP)

Accessory

Mounting Bracket HE9Z-GH1 (for hanging the switch)



Note: Available for HE1G/HE1G-L/HE9Z-GSH51 only.

- PEM
- Switches & Pilot Lights
- Control Boxes
- Emergency Stop Switches
- Enabling Switches
- Safety Products
- Explosion Proof
- Terminal Blocks
- Relays & Sockets
- Circuit Protectors
- Power Supplies
- LED Illumination
- Controllers
- Operator Interfaces
- Sensors
- AUTO-ID
- HE1B
- HE2B
- HE3B
- HE5B
- HE6B
- HE2G
- HE1G-L
- Actuator w/ Plastic Holder

HE1G-L Grip Style Three-position Enabling Switches

Safety Precautions

- The enabling switches have been designed for industrial purposes. Use for residential, commercial, or lighting purposes may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures. (IEC60947-1, Clause 5.3)
- Do not assemble or modify the enabling switches and do not disable the enabling function. Otherwise, failure of accidents may occur.
- When using the enabling switch in a safety related part of a control system, use the enabling switch properly in accordance with the safety standards and regulations of the actual machine, system, and application, of the country or region where the enabling switch is used. Also, perform a risk assessment before using the enabling switch.
- Do not hold the enabling switch to position 2 using tapes or strings. Otherwise the loss of enabling switch function may cause serious accidents.
- Do not use with the grip switch installed on a machine.
- Use wires of the proper size to meet voltage and current requirements.
- Do not apply excessive force to the enabling switch.
- Make sure that dust, water and oil do not enter the grip switch during wiring.
- Be sure to choose cables according to the operating environment.
- 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.

Instructions

Operating Instructions

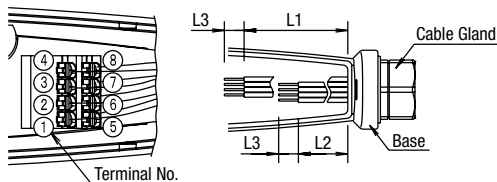
- This grip style three-position enabling switch is a device used for enabling a machine such as robots when teaching the machine in a hazardous area manually. Configure the enabling system so that the machine can operate when the switch is in position 2 and an separate start switch is required to initiate the system.
- To achieve a high level of safety, connect the two contacts of the 3-position switch to a disparity detection circuit (terminal No. N01-C1 and N02-C2) to a discrepancy detection circuit such as a safety relay module. (ISO13849-1/ EN954-1)
- 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 or NBR/PVC polyblend. The screw is made of iron. When cleaning the grip style three-position enabling switch, use a detergent compatible with the materials.
- The rubber boot may deteriorate depending on the operating environment and conditions. When the rubber boot is deformed or cracked, replace with new ones.

Wiring Instructions

Push-in Terminal Type

Wire Length inside the Grip Style Enabling Switch

	Terminal No. 1-4	Terminal No. 5-8
Wire stripping length L1, L2 (mm)	L1 = 35 mm	L2 = 30 mm
Wire stripping length L3 (mm)	L3 = 8 to 9 mm	



Applicable Wire Size

<Direct wiring>

0.2 to 1.5 mm² (one wire per terminal)

Note: When using stranded wire, make sure that adjoining terminals are not short-circuited by frayed wires. Also, do not solder the wires to avoid frayed wires.

<Ferrules>

Recommended ferrules (Phoenix Contact)

Part No.	Applicable Wire
S3TL-H025-12WJ	0.25mm ²
S3TL-H034-12WT	0.34mm ²
S3TL-H05-14WA	0.5mm ²
S3TL-H075-14WW	0.75mm ²

Crimping tool: PZ6 Roto L

Recommended Tightening Torque

Parts for Tightening		Torque
A	Rubber boot and the base (M4 screw × 3)	1.2 ± 0.1 N·m
B	Connector and grip style enabling switch	4.0 ± 0.3 N·m
C	Connector and connector	4.0 ± 0.3 N·m
D	Do not remove screws	—

The torque of screws B and C in the table above are values when the recommended connector is used. When using another connector, refer to the specifications of the connector used.

