



INSTRUCTION SHEET

Grip Style
Three-Position Enabling Switch
HE1G-L Series



* In order to verify if the product you are interested in is certified with the S mark, please check the following section on our website: *List of type numbers certified with the S mark*

Confirm that the delivered product is what you have ordered. Read this instruction sheet to make sure of correct operation. Make sure that the instruction sheet is kept by the end user.

SAFETY PRECAUTIONS

In this operation instruction sheet, safety precautions are categorized in order of importance 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

HE1G-L21SM-1N

Rubber boot Material / Color
blank : Silicon rubber / Yellow
-1N : NBR / PVC Polyblend / Gray

Contact Configuration

	Three-Position Switch	Push monitor switch	Additional switch
21SM	2 poles	1NC contact	
20ME	2 poles	None	Emergency stop switch* : 2NC
21SMB	2 poles	1NC contact	Momentary pushbutton switch : 1NO
20MB	2 poles	None	Momentary pushbutton switch : 2NO

* Additional switch of HE1G-L20ME has evaluated for emergency stop device on the basis of EN60947-5-5.

2 Specifications and Ratings

Applicable Standards	IEC60947-5-1, EN60947-5-1, JIS C 8201-5-1, GS-ET-22, UL508, CSA C22.2 No.14, IEC60947-5-8, EN60947-5-8, GB14048.5						
Standards for Use	ISO12100/EN ISO12100, IEC60204-1/ EN60204-1, 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 Machinery Directive						
Operating Condition	Operating Temperature	-25 to +60°C (no freezing) for silicon rubber boot -10 to +60°C (no freezing) for NBR/PVC polyblend rubber boot					
	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 pushbutton switch : 1.5kV)						
Rated Insulation Voltage (Ui)	250V (Additional push button switch : 125V)						
Thermal Current (Ith)	2.5A *						
Contact Ratings (Reference Values) (Ue, Ie)	Grip Style Three-Position Enabling Switch	Three-Position switch (terminal No.1-2 and 3-4)	AC	Resistive load (AC-12)	-	1A	0.5A
			DC	Resistive load (DC-12)	1A	0.2A	-
		Push monitor switch (terminal No.5-6 on HE1G-L21SM and HE1G-L21SMB)	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.5-6 and 7-8 HE1G-L20ME)	AC	Resistive load (AC-12)	-	-	-
			DC	Resistive load (DC-12)	-	-	-
	Momentary pushbutton switch (terminal No.7-8 HE1G-L21SMB, terminal No.5-6 and 7-8 HE1G-L20MB)	AC	Resistive load (AC-12)	-	0.5A	-	
		DC	Resistive load (DC-12)	1A	0.2A	-	
	Electric Shock Protection Class	Class II (IEC61140)					
	Operation Frequency	1200 operations/hour					
	B10d	100,000 (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 ²
	Damage Limits 1000m/s ²
Free Fall	1.0 m 1 time (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 HE1G-L21SM
	IP65 HE1G-L20ME / L21SMB / L20MB
Conditional short-circuit Current	50A (250V)
Short-Circuit Protective Device	250V AC, 10A Fuse (IEC60127-1)
Direct Opening Force	70 N minimum (Push monitor Switch)
Direct Opening Travel	4.7 mm minimum (Push monitor Switch)
Actuator Strength	500N minimum (Grip Style Three-Position Enabling Switch)
Weight(Approx.)	200g (HE1G-L21SM), 240g (HE1G-L20ME), 210g (HE1G-L20MB / 21SMB)

* 40 °C ≤ Operating temperature < 50 °C 2A (≥ 4 Circuits)
50 °C ≤ Operating temperature ≤ 60 °C 1.5A (≥ 3 Circuits)

Ratings approved by safety agencies

- TÜV Rating**
 - Three-position enabling switch AC-15 250V/0.5A DC-13 125V/0.1A
DC-13 30V/0.7A
 - Monitor switch AC-15 250V/0.75A DC-13 125V/0.22A
DC-13 30V/2.3A
- UL, c-UL Rating**
 - Three-position enabling switch AC 250V/0.5A Pilot Duty DC 125V/0.1A Pilot Duty
DC 30V/0.7A Pilot Duty
 - Monitor switch AC 250V/0.75A Pilot Duty
 - Ambient Temperature +40°C
 - Environmental Rating Type 4X, Indoor Use Only.
 - Not evaluated for emergency stop applications.
 - This device has only been investigated for shock and fire to UL508.
- CCC Rating**
 - Three-position enabling switch AC-15 250V/0.5A DC-13 30V/0.7A
 - Monitor switch AC-15 250V/0.75A DC-13 30V/2.3A
 - Emergency stop pushbutton switch AC-15 250V/0.5A DC-13 250V/0.1A
 - Momentary pushbutton switch AC-12 125V/0.5A DC-12 30V/1.0A
- KOSHA Rating**
 - Three-position enabling switch AC-15 250V/0.5A DC-13 30V/0.7A
 - Monitor switch AC-15 250V/0.75A DC-13 30V/2.3A

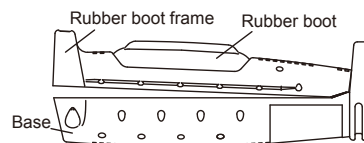
3 Unpacking

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

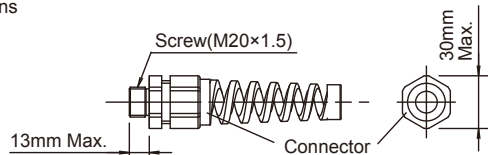
- A grip style three-position enabling switch (consisting of a base and a rubber boot frame)
- A connector (applicable cable diameter: Φ7 to 13mm)
- An instruction sheet

Note : Use the connector with the specification below when replacing.

(a connector included with grip style three-position enabling switch.)



- Dimensions



- Degree of Protection : Use a connector of IP66 or higher protection.
- Recommended connector : Type No.: SKINTOP-BS-M20x1.5-B (made by LAPP, Germany)
- Applicable cable diameters : Outside diameter 7 to 13 mm

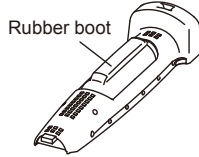
4 Precautions for Operation

- This grip style three-position enabling switch 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 three-position switch (terminal No.1-2 and 3-4) 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 PA66 (66nylon). 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. Immediately replace the deformed or cracked rubber boot with new ones.

Replacement Rubber boot frame (separate order)

Type	Rubber boot Material	Rubber boot Color
HE9Z-GBK1	Silicon rubber	Yellow
HE9Z-GBK1-1N	NBR/PVC Polyblend	Gray



WARNING

- Turn off the power to the grip style three-position enabling switch 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 style three-position enabling switch function, otherwise a breakdown or an accident will result.
- When using the HE1G-L Grip Style Three-Position Enabling Switch 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 style three-position enabling 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 style three-position enabling switch at the machine is inadmissible.

CAUTION

- Use proper size wires to meet voltage and current requirements. Tighten the terminal screws to a recommended tightening torque. Loose terminal screws will cause unexpected heating and fire hazard during operation.
- Do not apply an excessive shock to the grip style three-position enabling switch.
- Wire the switch correctly after reading a catalog or this instruction sheet.
- When wiring, prevent dust, water, or oil from entering the grip style three-position enabling 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 circumstances.
- The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO 13849-2.

5 Wiring

Operating Characteristics (Pressing the center of the button)

■ : ON (Contact close) □ : OFF (Contact open)

HE1G-L21SM / L21SMB

	Terminal No.	Position1	Position2	Position3
Push (Position1→2→3)	1-2	ON	ON	ON
	5-6	ON	ON	ON
	3-4	ON	ON	ON
Release (Position2→1)	1-2	OFF	OFF	OFF
	5-6	OFF	OFF	OFF
	3-4	OFF	OFF	OFF
Release (Position3→1)	1-2	OFF	OFF	OFF
	5-6	OFF	OFF	OFF
	3-4	OFF	OFF	OFF

Momentary pushbutton switch : 1NO contacts (Terminal No.7-8) (HE1G-L21SMB)

HE1G-L20ME/L20MB

	Terminal No.	Position1	Position2	Position3
Push (Position1→2→3)	1-2	ON	ON	ON
	3-4	ON	ON	ON
Release (Position2→1)	1-2	OFF	OFF	OFF
	3-4	OFF	OFF	OFF
Release (Position3→1)	1-2	OFF	OFF	OFF
	3-4	OFF	OFF	OFF

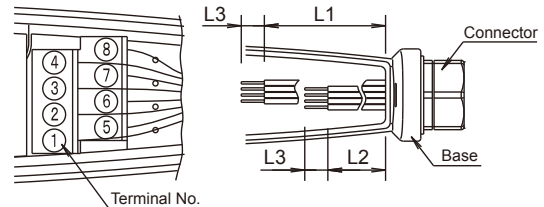
Emergency stop pushbutton switch : 2NC contacts (Terminal No.5-6 and 7-8) (HE1G-L20ME)
Momentary pushbutton switch : 2NO contacts (Terminal No.5-6 and 7-8) (HE1G-L20MB)

CAUTION

- Push monitor switch (terminal No.5-6 of HE1G-L21SM/L21SMB) will be positive opening circuit (⊕) when the switch operates from position 2 to 3.
- Use contacts of terminal No.1-2 and 3-4 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 three-position switches inside earlier than the other, and may cause a delay in the operation of the grip style three-position enabling switch.

Wire Length inside the Grip Style Three-Position Enabling Switch

	Terminal No.1 to 4	Terminal No.5 to 8
Wire Length L1, L2 (mm)	L1 = 40mm	L2 = 27mm
Wire stripping Length L3 (mm)	L3 = 6mm	



Applicable Wire Size in Terminal

- Direct wiring : 0.14 to 1.5 mm² × 1pc
- Wire HE1G-L grip style three-position enabling switch according to IEC60204-1

Note : When using a stranded wire, make sure that adjoining terminals are not short-circuited with protruding core wires. Also, do not solder the core wires to avoid protruding wires. Use copper Wire 60/75 degree C only. (UL508)

The wiring has to be installed according to GS-ET-22, 4.2.6.

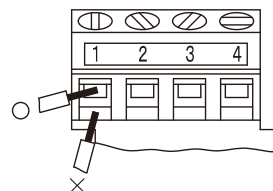
Ferrules

Recommended ferrules (Phoenix Contact)

Type No.	Applicable Wire
AI0 5-8WH	0.34 to 0.5mm ²
AI0.75-8GY	0.5 to 0.75mm ²
AI1 0-8RD	0.75 to 1.0mm ²
AI1 5-8BK	1.0 to 1.5mm ²

Crimping Tool : CRIMPFOX UD6

Wiring Instruction

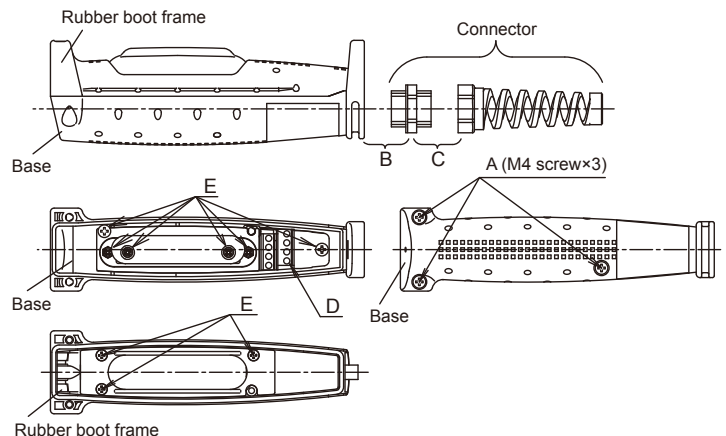


When wiring terminals 1 to 4, make sure to insert wires into the correct openings, as the wire marked with ○ in the figure on the left. If wired into the wrong openings, as the wire marked with ×, electrical connection is not ensured, because the wires cannot be clamped tightly.

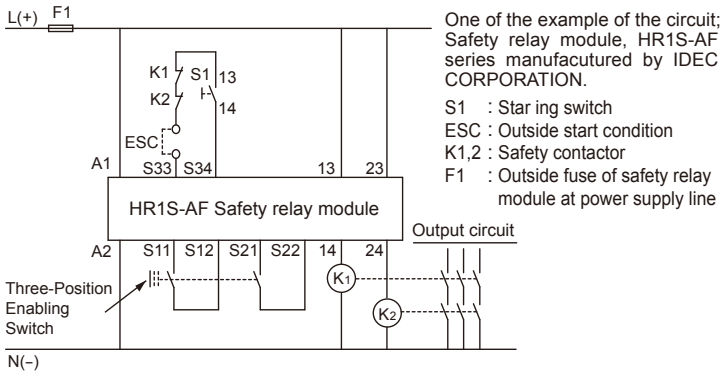
Recommended screw tightening torque

	Screw position	Screw tightening torque
For mounting rubber boot frame on the base (M4 screw×3)	A	1.1 to 1.3 N·m
Connector to Grip Style Three-Position Enabling Switch	B	3.7 to 4.3 N·m
Connector to Connector	C	3.7 to 4.3 N·m
Terminal Screw (M3×8)	D	0.5 to 0.6 N·m
Do not remove screws	E	-

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



Example of wiring Diagram realizing Safety Category4

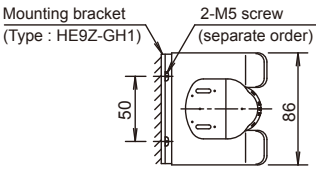


One of the example of the circuit; Safety relay module, HR1S-AF series manufactured by IDEC CORPORATION.
 S1 : Starting switch
 ESC : Outside start condition
 K1,2 : Safety contactor
 F1 : Outside fuse of safety relay module at power supply line

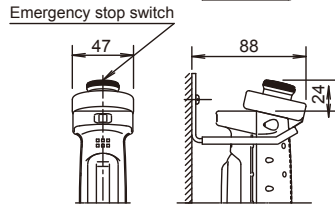
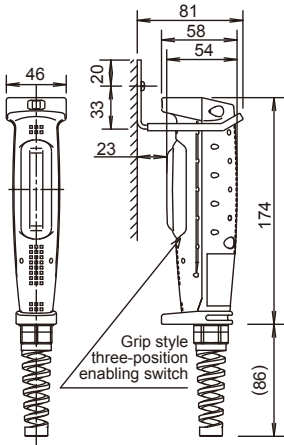
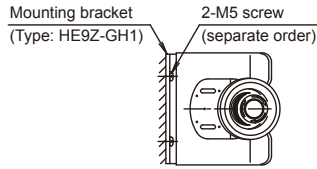
Note : Use the monitoring device(Safety relay module) provided the capability to detect a cross short circuit. The insulation of the cable has to withstand environmental influences. If a control device other than the one shown in the draft is used, the used control device has to be equipped with a cross short circuit monitor.

6 Dimensions (mm)

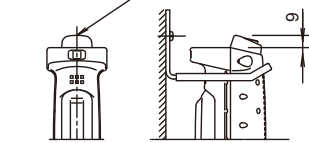
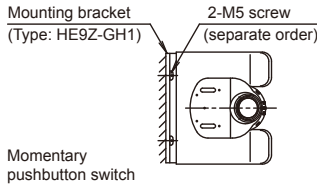
Type : HE1G-L21SM



Type : HE1G-L20ME

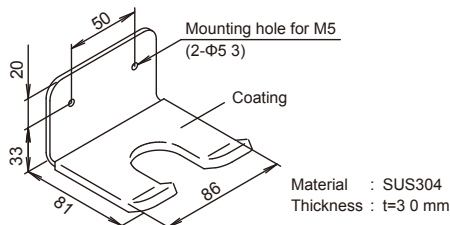


Type : HE1G-L21SMB / L20MB



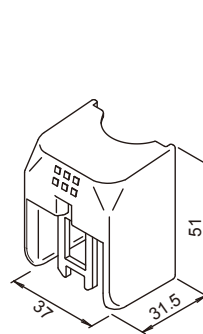
Mounting bracket (separate order)

Type : HE9Z-GH1
(to mount a grip style three-position enabling switch)

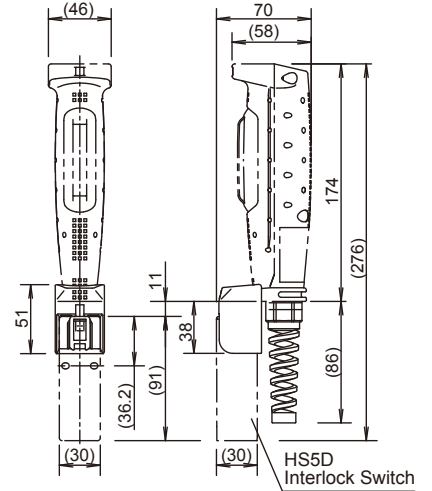


Actuator with Plastic Holder (separate order)

Type : HE9Z-GP15
(Use with HE1G-L Grip Style Three-Position Enabling Switch and HS5 Interlock Switch.)



Read the instruction sheets of the HS5 interlock switch and HE9Z-GP15 actuator with plastic holder.



7 Precaution for Disposal

Dispose of HE1G-L Grip Style Three-position Enabling Switch as an industrial waste.

IDEC CORPORATION

<http://www.idec.com>

Manufacturer: IDEC CORP.
2-6-64 Nishimiyahara Yodogawa-ku, Osaka 532-0004, Japan

EU Authorized Representative: IDEC Elektrotechnik GmbH
Hesestuecken 8, D-22453 Hamburg, Germany

DECLARATION OF CONFORMITY

We, IDEC CORPORATION 2-6-64, Nishimiyahara Yodogawa-ku, Osaka 532-0004, Japan declare under our sole responsibility that the product:

Description: Grip Style Three-Position Enabling Switch
Model No: HE1G-L

to which this declaration relates is in conformity with the EC Directive on the following standard(s) or other normative document(s). In case of alteration of the product, not agreed upon by us, this declaration will lose its validity.

Applicable EC Directive : Low Voltage Directive (2014/35/EU)
Machinery Directive (2006/42/EC)
Applicable Standard(s) : EN60947-5-1, GS-ET-22