

INSTRUCTION SHEET

HE1G Grip Switch

(Original Instructions)



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 NOTE

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-21SM-1N | | Rubber boot Material/ Color | |
|-----------------------|-----------------------------|--------------------------------|-------------|
| Contact Configuration | | blank : Silicon rubber/ Yellow | |
| | | -1N : NBR/PVC Polyblend/ Gray | |
| 21SM | 3-Position Enabling Switch | 2 contacts | 1NC contact |
| 20ME | Push monitor switch | 2 contacts | None |
| 21SMB | Emergency stop switch | 2 contacts | 1NC contact |
| 20MB | Momentary pushbutton switch | 2 contacts | None |

*Additional switch of HE1G-20ME 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 C8201-5-1, GS-ET-22, UL508, CSA C22.2 No.14, IEC60947-5-8, EN60947-5-8 | | | | | |
| Standards for Use | ISO12100/EN292, IEC60204-1/EN60204-1, ISO11161/prEN11161, ISO10218/EN775, ANSI/RIA R15.06 | | | | | |
| Applicable Directives | Low Voltage Directive (2006/95/EC), Machinery Directive (2006/42/EC) | | | | | |
| 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 (Except additional pushbutton switch) | | | | | |
| Rated Insulation Voltage | 250V (Additional push button switch:125V) | | | | | |
| Thermal Current <th> | 3A | | | | | |
| Contact Ratings (Reference Values) <Ue, Ie> | Grip Switch | 3-position switch (terminal No.1-2 and 3-4) | AC Resistive load(AC-12) | — | 3A | 1.5A |
| | | | Inductive load(AC-15) | — | 1.5A | 0.75A |
| | | | DC Resistive load(DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive load(DC-13) | 1A | 0.22A | 0.1A |
| | | Push monitor switch (terminal No.5-6 on HE1G-21SM and HE1G-21SMB) | AC Resistive load(AC-12) | — | 2A | 1A |
| | | | Inductive load(AC-15) | — | 1A | 0.5A |
| | | Emergency stop switch (terminal No.5-6 and 7-8 HE1G-20ME) | DC Resistive load(DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive load(DC-13) | 1A | 0.22A | 0.1A |
| | | Momentary pushbutton switch (terminal No.5-6 and 7-8 HE1G-21SMB, HE1G-21SMB, terminal No.5-6 and 7-8 HE1G-20MB) | AC Resistive load(AC-12) | — | 0.5A | — |
| | | | Inductive load(AC-15) | — | 0.3A | — |
| | | | DC Resistive load(DC-12) | 1A | 0.2A | — |
| | | | Inductive load(DC-13) | 0.7A | 0.1A | — |
| Electric Shock Protection Class | Class II (IEC61140) | | | | | |
| Operation Frequency | 1200 operations/hour | | | | | |
| B10s | 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) (1200 operations / hour) | | | | | |
| Vibration Resistance | Operating Extremes | 150m/s ² | | | | |
| | Damage Limits | 1000m/s ² | | | | |
| Shock 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-21SM | | | | |
| | IP65 | HE1G-20ME/ 21SMB/ 20MB | | | | |
| Conditional short-circuit Current | 50A (250V) | | | | | |
| Short-Circuit Protective Device | 250V AC, 10A Fuse (IEC60127-1) | | | | | |
| Direct Opening Force | 90 N minimum (Grip Switch) | | | | | |
| Direct Opening Travel | 4.7 mm minimum (Push monitor Switch) | | | | | |
| Actuator Strength | 500 N minimum (Grip Switch) | | | | | |
| Weight | Approx. 210g (at HE1G-21SM) Approx. 250g (at HE1G-20ME) Approx. 220g (at HE1G-20MB) | | | | | |

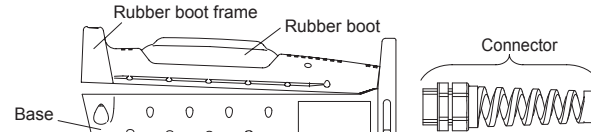
•Ratings approved by safety agencies

| | | | |
|---------------|--|-------------------|--|
| (1)TÜV Rating | 3-position switch AC-15 250V/0.75A DC-13 125V/0.22A Monitor switch AC-15 250V/0.75A DC-13 30V/2.3A | (2)UL/c-UL Rating | AC 250V/0.75A Pilot Duty DC 125V/0.22A 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. |

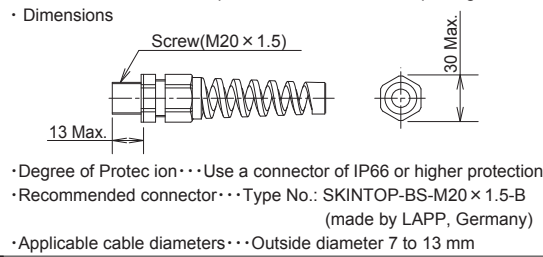
3 Unpacking

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 switch (consisting of a base and a rubber boot frame)
- A connector (applicable cable diameter: φ7 to 13mm)
- An instruction sheet



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



4 Notes for Operation

- This grip 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 3-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 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.

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

WARNING

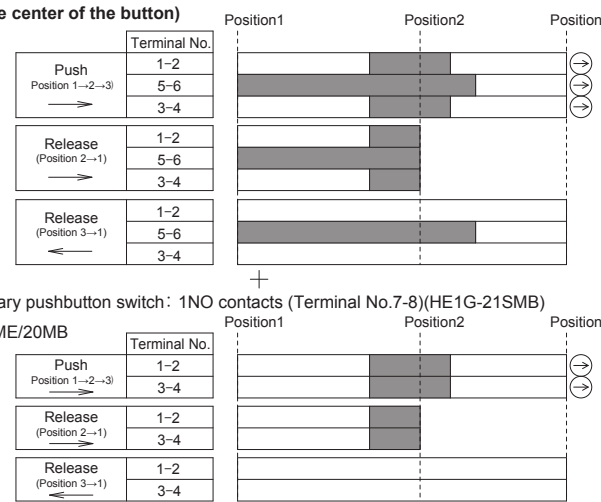
- Use proper size wires to meet voltage and current requirements. Tighten the terminal screws to a recommended tightening torque. Loose terminal screws will cause unexpected heating and fire hazard during operation.
- Do not apply an excessive shock to the switch.
- Wire the switch correctly after reading 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 circumstances.
- The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO 13849-2.

CAUTION

- Turn off the power to the grip 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 Grip 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 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)



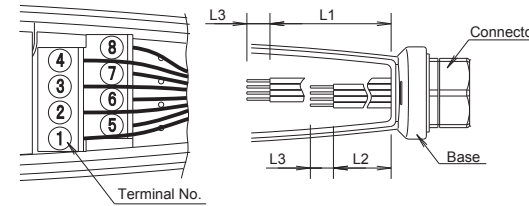
Momentary pushbutton switch: 1NO contacts (Terminal No.7-8)(HE1G-21SMB)
• HE1G-20ME/20MB
Emergency stop pushbutton switch: 2NC contacts (Terminal No.5-6 and 7-8)(HE1G-20ME)
Momentary pushbutton switch: 2NO contacts (Terminal No.5-6 and 7-8)(HE1G-20MB)

CAUTION

- 3-position switch (terminal No.1-2, 3-4) and push monitor switch (terminal No.5-6 of HE1G-21SM/-21SMB) will be positive opening circuit (⊖) when the switch operates from position 2 to 3.
- Use contacts of terminal Nos.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 3-position switches inside earlier than the other, and may cause a delay in the operation of the grip switch.

Wire Length inside the grip switch

| Wire Length L1, L2 (mm) | 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 Grip 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.

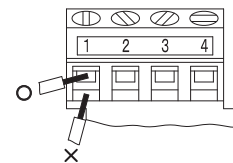
Ferrules

Recommended ferrules (Phoenix Contact)

| Type No. | Applicable Wire |
|------------|----------------------------|
| A 0.5-8WH | 0.34 to 0.5mm ² |
| A 0.75-8GY | 0.5 to 0.75mm ² |
| A11.0-8RD | 0.75 to 1.0mm ² |
| A11.5-8BK | 1.0 to 1.5mm ² |

Crimping Tool: CRIMPFIX UD6

Wiring Instruction

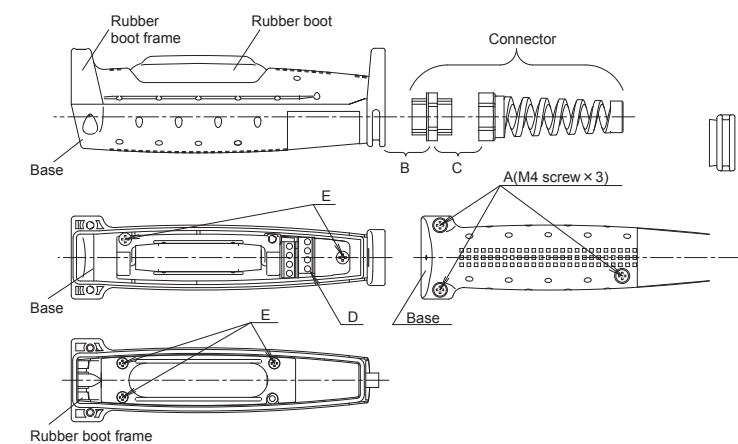


- When wiring terminals 1 to 4, make sure to insert wires into the correct openings, as the wire marked with O in the figure on the left. If wired into the wrong openings, as the wire marked with X, electrical connection is not ensured, because the wires cannot be clamped tightly.

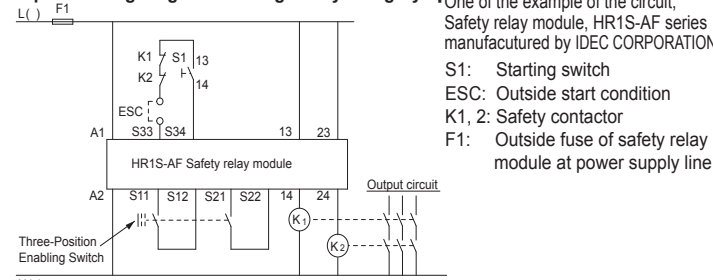
Recommended screw tightening torque

| | Screw position | Screw tightening torque |
|---|----------------|-------------------------|
| For mounting rubber boot frame on the base (M4 screw × 3) | A | 1.2±0.1N·m |
| Connector to Grip Switch | B | 4.0±0.3N·m |
| Connector to Connector | C | 4.0±0.3N·m |
| Terminal Screw (M3 × 8) | D | 0.5 to 0.6N·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.

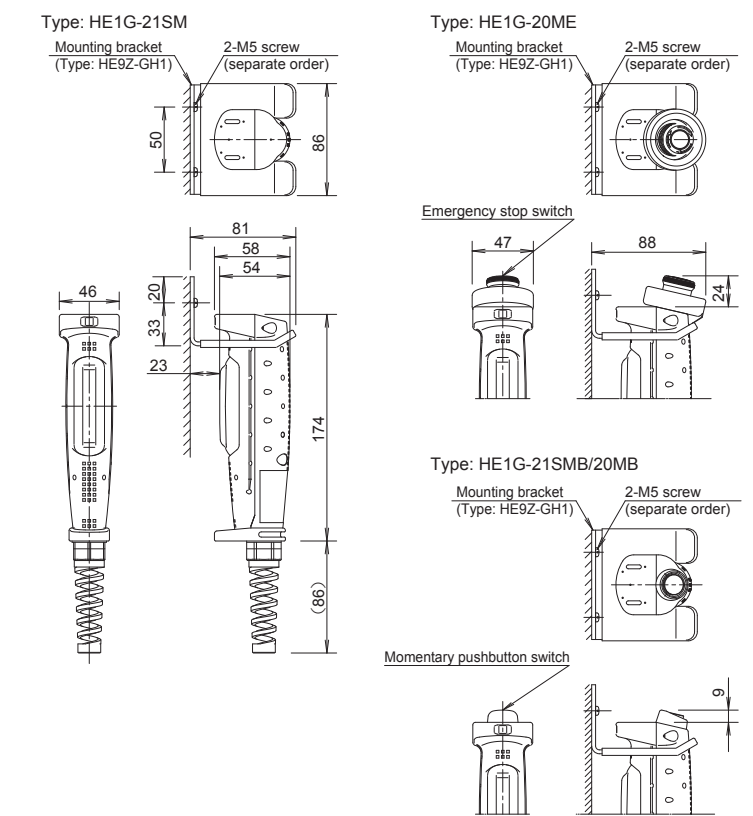


Example of wiring diagram realizing Safety Category 4

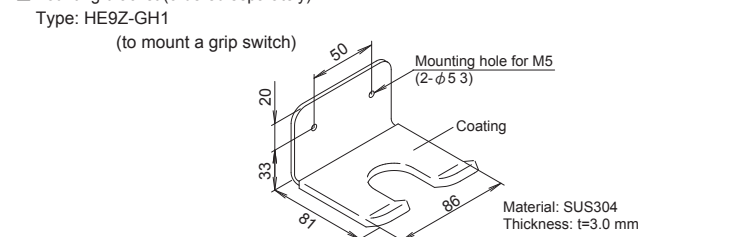


Note: Use the monitoring device(Safety relay module) provided the capability to detect a cross short circuit.
The insulation of the cable has to withstand environmental influences.
If a control device other than the one shown in the draft is used, the used control device has to be equipped with a cross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

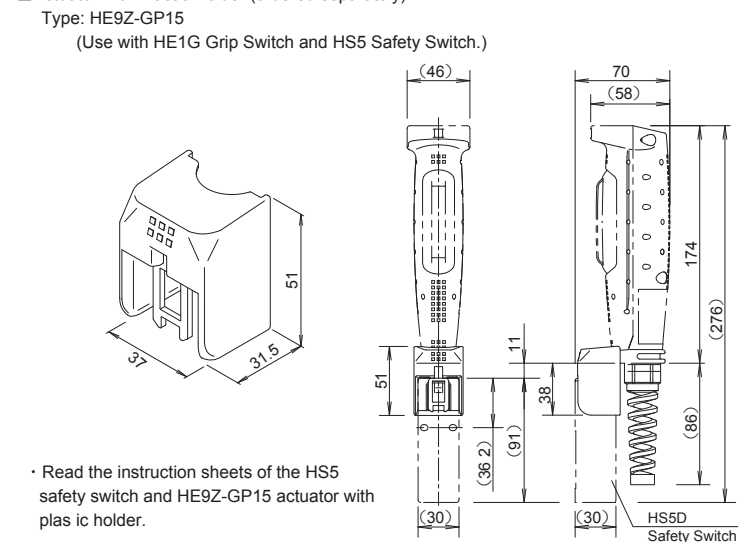
6 Dimensions



Mounting bracket (ordered separately)



Actuator with Plastic Holder (ordered separately)



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

7 Precaution for Disposal

Dispose of HE1G Grip Switch as an industrial waste.

Manufacturer: IDEC CORP.
2-6-64 Nishimiyahara Yodogawa-ku, Osaka 532-0004, Japan
EU Authorized Representative: IDEC Elektrotechnik GmbH
Wendenstrasse 331, D-20537 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 Switch Model No: HE1G 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 (2006/95/EC) Machinery Directive (2006/42/EC)
Applicable Standard(s): EN60947-5-1, GS-ET-22

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