

# Enabling Switches

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- New and updated product information
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## Enabling “Dead Man” Switches

### What is an enabling switch?

An enabling switch is a 3-position (OFF-ON-OFF) switch to allow a machine operation only when the switch is lightly pressed and held in the middle position (position 2). Because it disables machine operation when released (position 1) or further depressed (position 3) by a panicked operator, the safety of operators is ensured.

Because operators use pendants in hazardous environments performing teaching, system changeover, and maintenance of robots, they must have protection against unpredictable motion of robots, and therefore teach pendants are equipped with 3-position enabling switches.



Overview

X Series E-Stops

Door Interlock Switches

Enabling Switches

Barriers

AS-Interface Safety at Work

## Selection Guide

### Enabling Switches

Series Model	HE1B	HE2B	HE3B	HE5B	HE1G
Appearance					
Page	404	407	410	413	416
Description	Basic Switch	Redundant Basic Switch	16mm Panel Mount	16mm Round Enabling Switch	Grip Switch
Maximum Contacts	1NO	DPDT/DPDT, 2NC/DPDT, 4NC	DPDT	DPDT	DPDT, 1NC/DPDT, 2NC

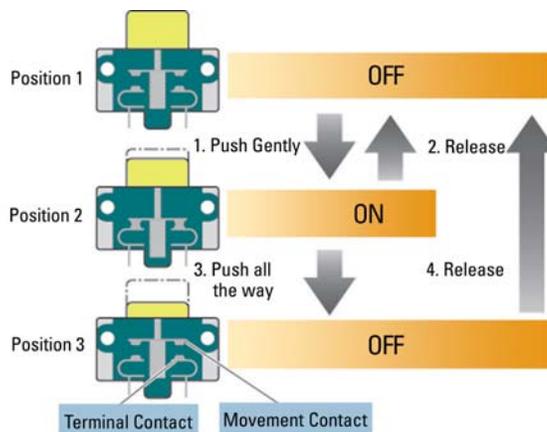
### Application Example



### HE1B Enabling Switch Movement

#### 3 Position Enabling Switch

- Position 1 - Normal position - Contact Open
- Position 2 - Push half way - Contact Closed
- Position 3 - Push all the way - Contact Open



When releasing switch from position 3 back to position 1, the switch will not enter the ON state.

## HE1B Series Basic Enabling Switch

**HE1B Key features include:**

- 3 position functionality (OFF – ON –OFF) as required for manual robotic control
- Ideally suited for use as enabling (aka “deadman”) switch on teach pendants
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Positive action contacts “On” (pos. 2) to “Off” (pos. 3) ensure no contact welding (per EN60947-5-1 / IEC60947-5-1)
- Contacts will not close when released from “Off” (pos. 3) to “Off” (pos. 1) (per IEC60204-1; 9.2.5.8)
- Small, lightweight and highly reliable


**Specifications**

<b>Conforming to Standards</b>	IEC60947-5-1, EN60947-5-1, JIS C8201-5-1, UL508, CSA C22.2 No 14
<b>Operating Temperature</b>	-25 to +60°C (no freezing)
<b>Operating Humidity</b>	45 to 85% RH maximum (no condensation)
<b>Storage Temperature</b>	-40 to +80°C (no freezing)
<b>Pollution Degree</b>	2
<b>Initial Contact Resistance</b>	50mΩ maximum
<b>Insulation Resistance</b>	100MΩ minimum
<b>Impulse Withstand Voltage</b>	2.5kV
<b>Operating Frequency</b>	1200 operations/hour
<b>Mechanical Life</b>	Position 1→2: 1,000,000 operations minimum Position 1→2→3→1: 100,000 operations minimum
<b>Electrical Life</b>	100,000 operations minimum at rated load
<b>Shock Resistance</b>	<b>Operating Extremes</b>
	<b>Damage Limits</b>
<b>Vibration Resistance</b>	<b>Operating Extremes</b>
	<b>Damage Limits</b>
<b>Terminal Shape</b>	Solder Terminal
<b>Recommended Wire</b>	0.5mm <sup>2</sup> maximum / 1 line (20AWG)
<b>Solder Heat Resistance</b>	260°C / 3 seconds maximum
<b>Terminal Pulling Strength</b>	20N minimum
<b>Recommended Screw Torque</b>	HE1B-M1: M3 screw / 0.5 to 0.8Nm
<b>Degree of Protection</b>	IP40 (IEC 60529) excluding terminal part
<b>Conditional Short-Circuit Current</b>	50A (250V)
<b>Recommended Short Circuit Protection</b>	250V, 10A fast blow fuse (IEC 60127-1)
<b>Weight</b>	Approx. 6g
<b>Circuit Opening Force</b>	30N minimum (position 2→3)
<b>Control Resistance (Operating)</b>	250N minimum

Part Numbers

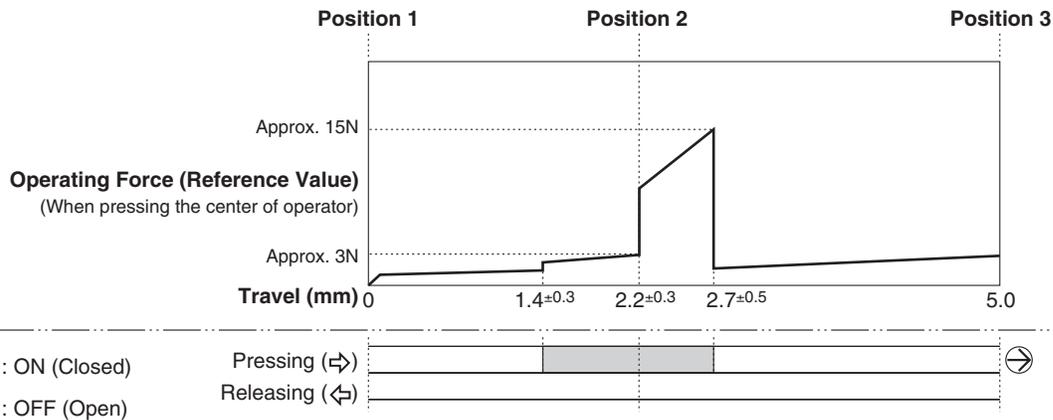
Item	Installation	Part Number
	Side	HE1B-M1
	Front	HE1B-M1N

Current Ratings

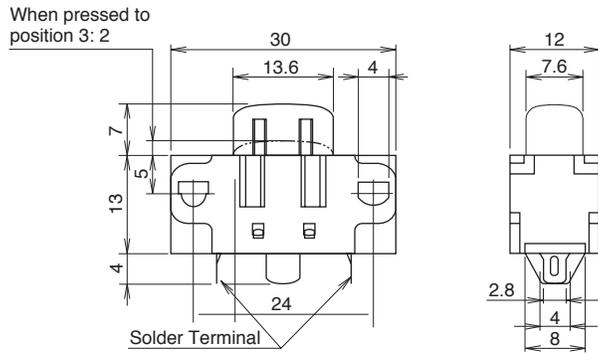
<b>Rated Insulation Voltage (Ui)</b>		AC / DC250V			
<b>Thermal Current (Ith)</b>		5A			
<b>Rated Operating Voltage (Ue)</b>		30V	125V	250V	
<b>Rated Operating Current (Ie)</b>	<b>AC 50/60Hz</b>	<b>Resistive Load (AC-12)</b>	–	3A	1.5A
		<b>Inductive Load (AC-15)</b>	–	1.5A	0.75A
	<b>DC</b>	<b>Resistive Load (DC-12)</b>	2A	0.4A	0.2A
		<b>Inductive Load (DC-13)</b>	1A	0.22A	0.1A
<b>Contact Structure</b>		SPST-NO three position (OFF-ON-OFF)			

 Minimum applicable load: AC/DC3V • 5mA (For reference only).

Operating Characteristics



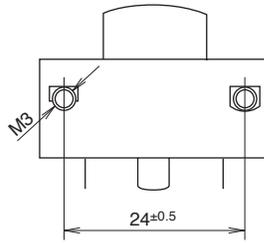
Dimensions (mm)



Installation Dimensions (mm)

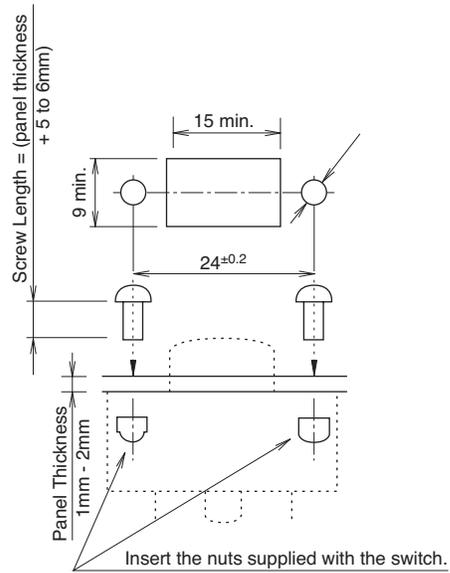
HE1B-M1 (Side Mounting)

- 1. M3 Screw (not provided)
- 2. Thread built in



HE1B-M1N (Front Mounting)

- 1. M3 Screw (not provided)
- 2. Locking nut (2 pcs) included



When using a panel thicker than 2mm, the button will be lower than the surface of the panel

## HE2B Series Redundant (Double) Basic Enabling Switch

### HE2B Key features include:

- 3 position functionality (OFF – ON –OFF) as required for manual robotic control
- Ideally suited for use as enabling (aka “deadman”) switch on teach pendants
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Snap acting contacts from Off→On (1→ 2)
- Positive action contacts from On→Off (2→ 3) ensure no contact welding (per EN60947-5-1 / IEC60947-5-1)
- Contacts will not re-close when released from Off→On (3→1) (per IEC60204-1; 9.2.5.8)
- Multiple contacts for enhanced reliability
- Monitoring contacts in addition to main load contacts
- Available with or without rubber cover (cover provides IP65 watertight seal)



### Specifications

<b>Conforming to Standards</b>	IEC60947-5-1, EN60947-5-1, JIS C8201-5-1, UL508, CSA C22.2 No 14
<b>Application Standards</b>	ISO12100/EN292, IEC60204-1/EN60204-1, ISO11161/prEN11161, ISO10218/EN775, ANSI/RIA R15.06
<b>Operating Temperature</b>	-25 to +60°C (no freezing)
<b>Operating Humidity</b>	45 to 85% RH (no condensation)
<b>Storage Temperature</b>	-40 to +80°C (no freezing)
<b>Pollution Degree</b>	2 (inside of panel/contact side) 3 (outside of panel/operating side)
<b>Contact Resistance</b>	50mΩ maximum
<b>Insulation Resistance</b>	Between live and dead metal parts: 100MΩ maximum Between positive and negative live parts: 100MΩ minimum
<b>Impulse Withstand Voltage</b>	2.5kV
<b>Operating Frequency</b>	1200 operations/hour
<b>Mechanical Life</b>	Position 1→2: 1,000,000 operations minimum Position 1→2→3→1: 100,000 operations minimum
<b>Electrical Life</b>	100,000 (at full rated load)
<b>Shock Resistance</b>	<b>Operating Extremes</b> 100m/s <sup>2</sup> (10 G) <b>Damage Limits</b> 1000m/s <sup>2</sup> (100 G)
<b>Vibration Resistance</b>	<b>Operating Extremes</b> 5 to 55Hz, amplitude 0.5mm minimum <b>Damage Limits</b> 16.7Hz, amplitude 1.5mm minimum
<b>Terminal</b>	0.110" quick connect / solder terminal
<b>Recommend Wire Size</b>	0.5mm <sup>2</sup> maximum / 1 line (20AWG)
<b>Solder Heat Resistance</b>	260°C / 3 seconds maximum
<b>Terminal Pulling Strength</b>	20N minimum
<b>Recommended Screw Torque</b>	0.5 to 0.8Nm
<b>Degree of Protection</b>	with rubber cover: IP65, without rubber cover: IP40 (IEC 60529),
<b>Conditional Short-Circuit Current</b>	50A (250V)
<b>Recommended Short Circuit Protection</b>	250V/10A fast blow fuse (IEC 60127-1)
<b>Weight</b>	Approx. 26g (without cover), 30g (with cover)
<b>Circuit Opening Force</b>	60N minimum (button return monitor & button push monitor)
<b>Actuating Force (Operating)</b>	500N minimum

### Ordering Information

**HE2B - M 2 0 0 P Y**

**3 Position Switch**  
2: 2 contacts (DPDT)

**Rubber Cover Color**  
None: without cover  
Y: Yellow  
B: Black

**Rubber Cover**  
None: without cover  
P: with cover

**Return Monitor Switch**  
0: None  
1: 1 contact  
2: 2 contacts

**Push Monitor Switch**  
0: None  
1: 1 contact  
2: 2 contacts

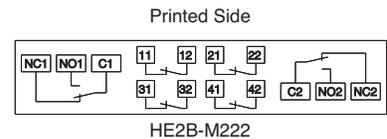
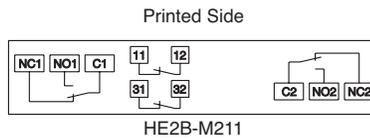
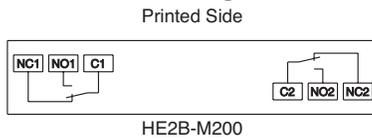
**Part Numbers**

Model		Number of Contacts			Part Number
		3 Position Switch	Push Monitor Switch	Return Monitor Switch	
	Without Rubber Cover	2	0	0	HE2B-M200
		2	1	1	HE2B-M211
		2	2	2	HE2B-M222
	Yellow	2	0	0	HE2B-M200PY
		2	1	1	HE2B-M211PY
		2	2	2	HE2B-M222PY
	Black	2	0	0	HE2B-M200PB
		2	1	1	HE2B-M211PB
		2	2	2	HE2B-M222PB

**Ratings**
**Contact Ratings**

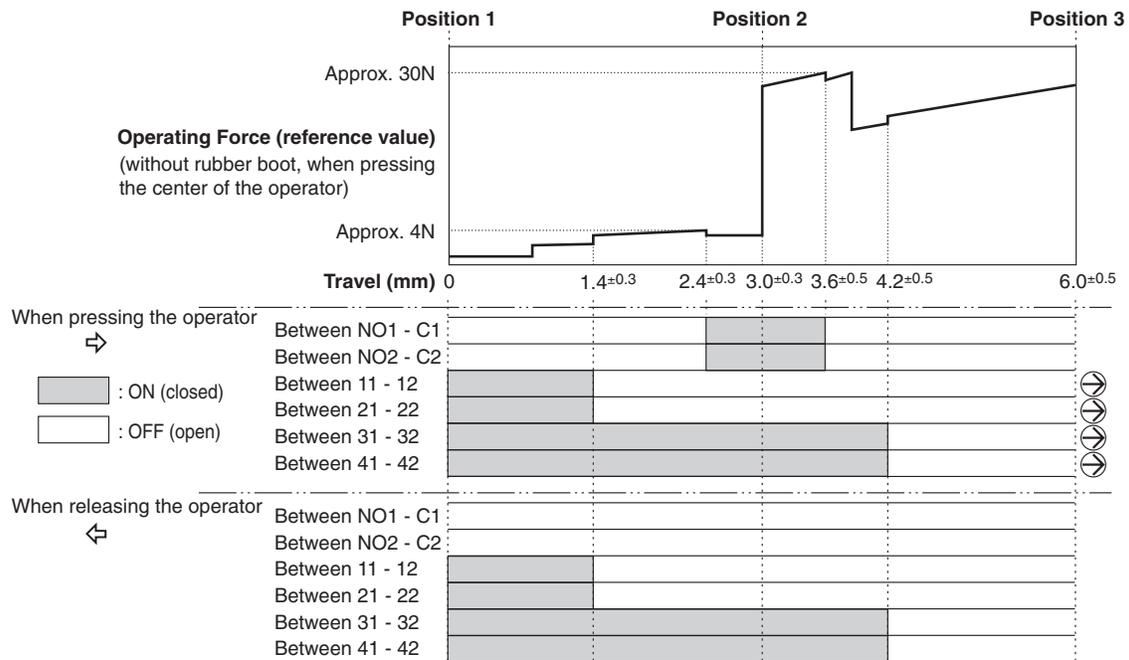
<b>Rated Insulation Voltage (Ui)</b>		250V				
<b>Thermal Current (Ith)</b>		3A				
<b>Rated Operating Voltage (Ue)</b>		30V	125V	250V		
<b>Rated Operating Current (Ie)</b>	<b>3 Position Switch</b>	<b>AC</b>	<b>Resistive Load (AC-12)</b>	–	1A	0.5A
			<b>Inductive Load (AC-15)</b>	–	0.7A	0.5A
		<b>DC</b>	<b>Resistive Load (DC-12)</b>	1A	0.2A	–
			<b>Inductive Load (DC-13)</b>	0.7A	0.1A	–
	<b>Push/return Monitor Switch (NC Contacts)</b>	<b>AC</b>	<b>Resistive Load (AC-12)</b>	–	2A	1A
			<b>Inductive Load (AC-15)</b>	–	1A	0.5A
		<b>DC</b>	<b>Resistive Load (DC-12)</b>	2A	0.4A	0.2A
			<b>Inductive Load (DC-13)</b>	1A	0.22A	0.1A
<b>Contact Structure</b>		3 Position Switch		2 contacts (DPDT)		
		Button Return Monitor Switch		0 to 2 contacts		
		Button Push Monitor Switch		0 to 2 contacts		

Minimum applicable load (reference) = AC/DC3V • 5mA (for reference only)

**Circuit Diagrams**
**Terminal Circuit Diagrams (bottom view)**


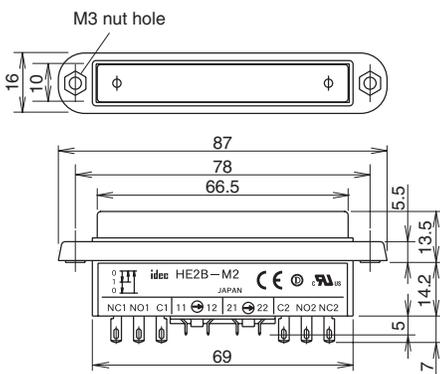
### Operating Characteristics

#### Operating Characteristics (without rubber cover/center of button being pushed)

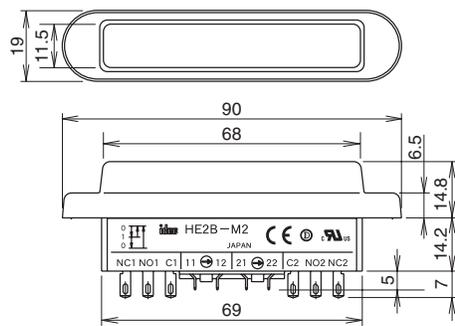


Using rubber cover will change the operating load because the operating temperature would increase

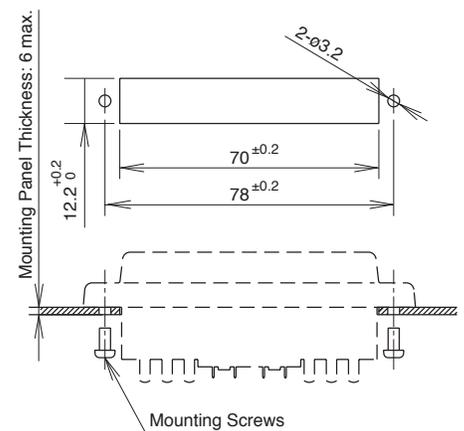
#### Dimensions (mm) Without Rubber Cover



#### With Rubber Cover



#### Mounting Hole Layout



#### Accessories

##### Replacement Rubber Cover

Appearance	Color	Part Number	Material
	Yellow	HE9Z-D2Y	Silicon Rubber
	Black	HE9Z-D2B	

## HE3B Series Pushbutton Enabling Switch

**HE3B Key features include:**

- 3 position functionality (OFF – ON – OFF) as required for manual robotic control
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Contacts will not re-close when released from Off→On (3→1) (per IEC60204-1; 9.2.5.8)
- Multiple contacts for enhanced reliability
- Snap acting contacts from position 1 to 2
- Available with or without rubber cover


**Specifications**

<b>Conforming to Standards</b>		IEC60947-5-1, EN60947-5-1, JIS C8201-5-1, UL508, CSA C22.2 No 14
<b>Application Standards</b>		ISO12100/EN292, IEC60204-1/EN60204-1, ISO11161/prEN11161, ISO10218/EN775, ANSI/RIA R15.06
<b>Operating Temperature</b>		-25 to +60°C (no freezing)
<b>Operating Humidity</b>		45 to 85% RH maximum (no condensation)
<b>Storage Temperature</b>		-40 to +80°C (no freezing)
<b>Pollution Degree</b>		3
<b>Contact Resistance</b>		50mΩ maximum
<b>Insulation Resistance</b>		Between live & dead metal parts: 100MΩ maximum
		Between positive & negative live parts: 100MΩ minimum
<b>Impulse Withstand Voltage</b>		1.5kV
<b>Operating Frequency</b>		1200 operations/hour
<b>Mechanical Life</b>		Position 1→2: 1,000,000 operations minimum
		Position 1→2→3→1: 100,000 operations minimum
<b>Electrical Life</b>		100,000 operations minimum at rated load
<b>Shock Resistance</b>	<b>Operating Extremes</b>	100m/s <sup>2</sup> (10 G)
	<b>Damage Limits</b>	1000m/s <sup>2</sup> (100 G)
<b>Vibration Resistance</b>	<b>Operating Extremes</b>	5 to 55Hz, amplitude 0.5mm minimum
	<b>Damage Limits</b>	16.7Hz, amplitude 1.5mm minimum
<b>Terminal</b>		0.110" quick connect / solder terminal
<b>Recommended Wire Size</b>		0.5mm <sup>2</sup> maximum / 1 line (20AWG)
<b>Solder Heat Resistance</b>		260°C / 3 seconds maximum
<b>Terminal Pulling Strength</b>		20N minimum
<b>Recommended Screw Torque</b>		0.68 to 0.88Nm
<b>Degree of Protection</b>		with rubber cover: IP65, without rubber cover: IP40 (IEC 60529)
<b>Conditional Short-Circuit Current</b>		50A (125V)
<b>Recommended Short Circuit Protection</b>		125V/10A fast blow fuse (IEC 60127-1)
<b>Weight</b>		without rubber cover - Approx. 14g with rubber cover - Approx. 18g
<b>Circuit Opening Force</b>		500N minimum

Part Numbers

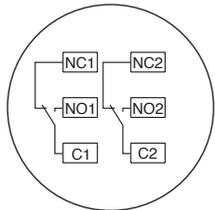
Model	Contact Arrangement	Part Numbers	
 Without Rubber Cover	DPDT	HE3B-M2	
 With Rubber Cover		Yellow	HE3B-M2PY
		Black	HE3B-M2PB

Contact Ratings

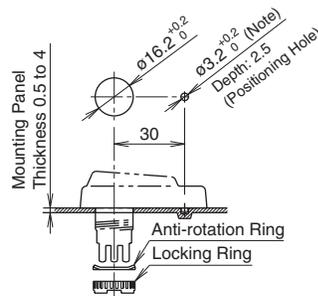
Rated Insulation Voltage (Ui)		125V	
Thermal Current (Ith)		3A	
Rated Operating Voltage (Ue)		30V	125V
Rated Operating Current (Ie)	AC	Resistive Load (AC-12)	1A
		Inductive Load (AC-15)	0.7A
	DC	Resistive Load (DC-12)	0.2A
		Inductive Load (DC-13)	0.1A
Contact Structure (3 Position Switch)		2 contacts (DPDT)	

Circuit Diagrams

Terminal Circuit Diagrams (bottom view)



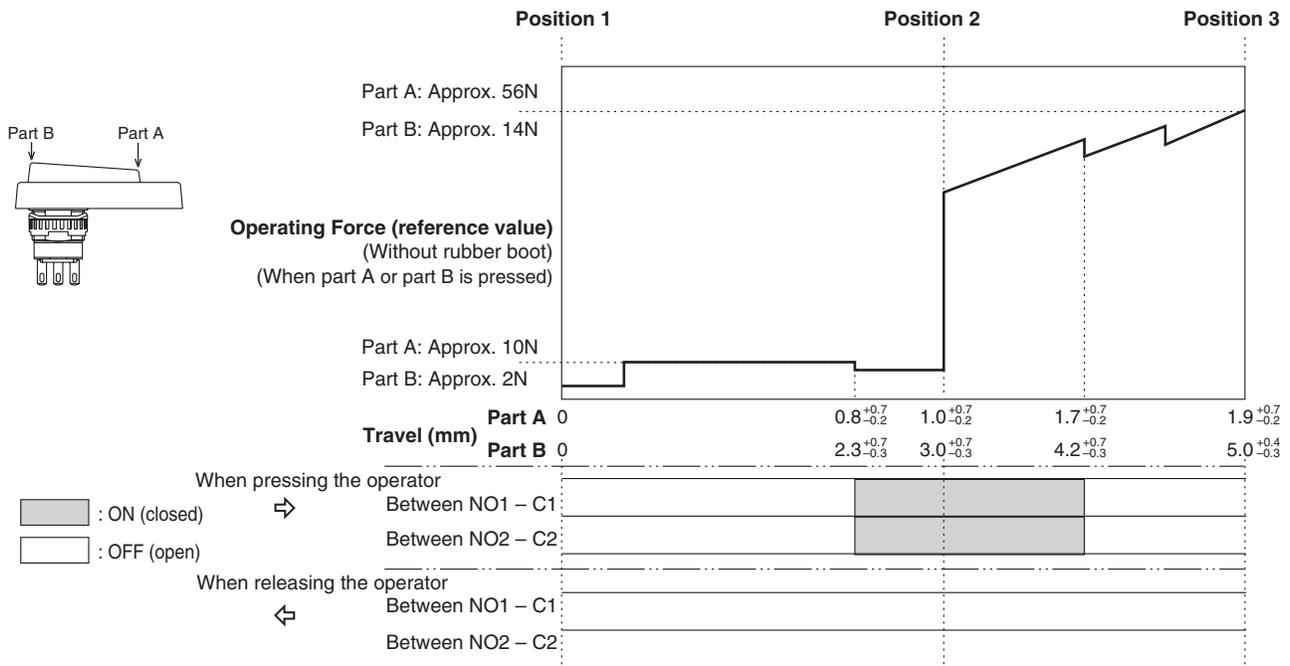
- 1. 3 position switch: 2 contacts, terminal no. = between NO1-C1, between NO2-C2
- 2. Use between NO-C for OFF→ On→ OFF 3 position switch (NC is not used).



- 1. Recommended Lock Nut Torque: 0.68 to 0.88Nm.
- 2. Use a lock nut tool to screw on the lock nut (see page 412).
- 3. To retain the switches waterproof performance, do not penetrate the rubber cover.
- 4. Remove the rubber cover projection if you do not want a positioning hole. (Do not penetrate the rubber cover).

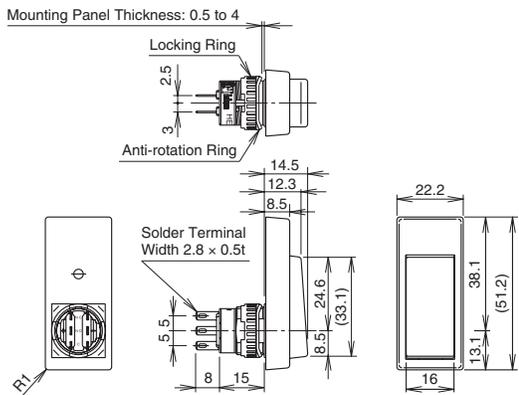
Operating Characteristics

Operating Characteristics (without rubber cover/pushing button part A and B)

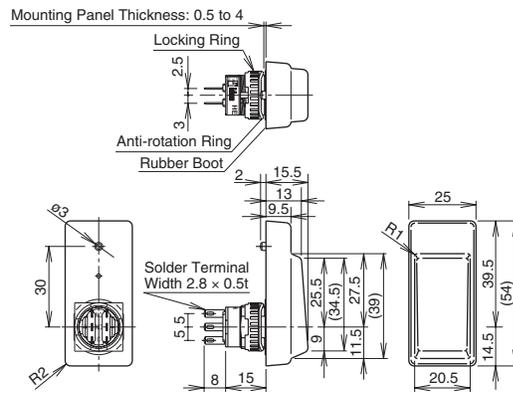


Notes:  
 • When rubber boot is used, operating force depends on the operating temperature.

Dimensions (mm)  
 Without Rubber Cover



With Rubber Cover



All dimensions in mm.

Accessories  
 Replacement Rubber Cover

Appearance	Color	Part Number	Material
	Yellow	HE9Z-D3Y	Silicon Rubber
	Black	HE9Z-D3B	

Lock Nut Tool

Appearance	Part Number	Material
	MT-001	Metal

## HE5B Series Pushbutton Enabling Switch

### HE5B Key features include:

- Ergonomically-designed OFF-ON-OFF 3-position operation
- Easy recognition of position 1 → 2 transition, made possible by snap action switch
- Sufficient load difference is provided for shifting from position 2 → 3
- Light force needed to maintain position 2, so that operators can easily use the enabling switch
- The switch does not turn ON when being released from position 3 (OFF when pressed) to position 1 (OFF when released) (IEC60204-1, 9.2.5.8)
- Two contacts are provided for safety
- IP65 (using the waterproof rubber cover)
- Mounts in a 16mm (5/8") round hole



### Specifications

<b>Conforming to Standards</b>	IEC60947-5-1, EN60947-5-1 (DEMKO approval), JIS C8201-5-1, UL508 (UL recognized), CSA C22.2, No. 14 (c-UL recognized)
<b>Application Standards</b>	ISO 12100/EN292, IEC60204-1/EN60204-1 ISO11161/prEN11161, ISO10218/EN775 ANSI/RIA R15.06, ANSI B11.19
<b>Operating Temperature</b>	Silicone rubber boot: -25 to 60°C (no freezing) NBR/PVC Polyblend rubber boot: -10 to 60°C (no freezing)
<b>Relative Humidity</b>	45 to 85% RH (no condensation)
<b>Storage Temperature</b>	-40 to +80°C (no freezing)
<b>Operating Environment</b>	Degree of pollution: 2 (panel inside/terminal side) Degree of pollution: 3 (panel outside/operator side)
<b>Contact Resistance</b>	50 mΩ maximum (initial value)
<b>Insulation Resistance (DC megger)</b>	Between live and dead metal parts: 100 MΩ minimum Between terminals of different pole: 100 MΩ minimum
<b>Impulse Withstand Voltage</b>	1.5 kV
<b>Operating Frequency</b>	1200 operations per hour
<b>Mechanical Life</b>	Position 1 → 2 → 1: 1,000,000 operations minimum Position 1 → 2 → 3 → 1: 100,000 operations minimum
<b>Electrical Life</b>	100,000 operations minimum
<b>Shock Resistance</b>	Operating extremes: 100 m/s <sup>2</sup> (10 G) Damage limits: 500 m/s <sup>2</sup> (50 G)
<b>Vibration Resistance</b>	Operating extremes: 5 to 55 Hz, amplitude 0.5 mm minimum Damage limits: 5 to 55 Hz, amplitude 0.5 mm minimum
<b>Terminal Style</b>	Solder Terminal
<b>Recommended Wire</b>	0.5 mm <sup>2</sup> maximum per line (20AWG)
<b>Solder Heat Resistance</b>	260°C, 3 seconds maximum
<b>Terminal Pulling Strength</b>	20 N minimum
<b>Recommended Tightening Torque of Locking Ring</b>	0.29 to 0.49 N·m
<b>Degree of Protection</b>	IP65
<b>Conditional Short-circuit Current</b>	50A (250V) (Use 250V/10A fast acting type fuse for short circuit protection.)
<b>Operator Strength</b>	250N minimum (when pressing the entire surface of the operator)
<b>Weight (approx.)</b>	9 g

**Part Numbers**

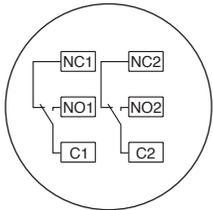
Model		Contact Arrangement	Color	Part Number
With Rubber Cover	Silicone Rubber	DPDT	Yellow	HE5B-M2PY
	NBR/PVC		Black	HE5B-M2PB
			Gray	HE5B-M2PN1

NBR/PVC cover comes in gray only.

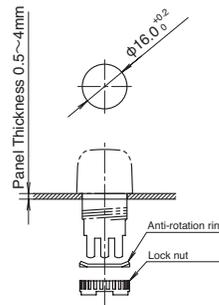
**Current Ratings**

<b>Rated Insulation Voltage (Ui)</b>		125V	
<b>Thermal Current (Ith)</b>		3A	
<b>Rated Operating Voltage (Ue)</b>		30V	125V
<b>Rated Operating Current (Ie)</b>	<b>AC</b>	<b>Resistive Load (AC-12)</b>	0.5A
		<b>Inductive Load (AC-15)</b>	0.3A
	<b>DC</b>	<b>Resistive Load (DC-12)</b>	1A
		<b>Inductive Load (DC-13)</b>	0.7A
<b>Contact Configuration (3 Position Switch)</b>		2 contacts (DPDT)	

Minimum applicable load (reference): 3V AC/DC, 5mA.

**Circuit Diagrams**
**Terminal Arrangement (Bottom View)**


- 
1. 3 position switch: 2 contacts, terminal no. = between NO1-C1, between NO2-C2
  2. Use between NO-C for OFF → On → OFF 3 position switch (NC is not used).

**Mounting Hole Layout**


- 
1. Recommended tightening torque for Locking Ring: 0.29 to 0.49 N·mm.
  2. Use a lock nut tool to screw on the lock nut (see page 415).



## HE1G Series Grip Style Enabling Switch

**HE5B Key features include:**

- 3 position functionality (Off – On – Off) as required for manual robotic control
- Ideally suited for use as an enabling (aka “deadman”) switch for robotic cells
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Contacts will not re-close when released from Off → On (3 → 1) (per IEC60204-1; 9.2.5.8)
- Optional E-Stop switch built in
- Connection for conduit and cable strain relief built in
- IP66 waterproof sealing
- Meets ANSI RIA 15.06 robotics standards
- Optional momentary pushbutton or E-Stop built in


**Specifications**

<b>Conforming to Standards</b>		IEC60947-5-1, EN60947-5-1, JIS C8201-5-1, UL508, CSA C22.2 No 14
<b>Applicable Standards</b>		ISO12100/EN292, IEC60204-1/EN60204-1, ISO11161/prEN11161, ISO10218/EN775, ANSI/RIA R15.06,
<b>Operating Temperature</b>		-25 to +60°C (no freezing)
<b>Operating Humidity</b>		45 to 85% RH maximum (no condensation)
<b>Storage Temperature</b>		-40 to +80°C (no freezing)
<b>Pollution Degree</b>		3
<b>Contact Resistance</b>		100mΩ maximum
<b>Insulation Resistance</b>		Between live & dead metal parts: 100MΩ maximum Between positive & negative live parts: 100MΩ minimum
<b>Impulse Withstand Voltage</b>		2.5kV
<b>Operating Frequency</b>		1200 operations/hour
<b>Mechanical Life</b>		Position 1 → 2 → 1: 1,000,000 operations minimum Position 1 → 2 → 3 → 1: 100,000 operations minimum
<b>Electrical Life</b>		100,000 minimum at rated load
<b>Shock Resistance</b>	<b>Operating Extremes</b>	100m/s <sup>2</sup> (10 G)
	<b>Damage Limits</b>	1000m/s <sup>2</sup> (100 G)
<b>Vibration Resistance</b>	<b>Operating Extremes</b>	5 to 55Hz, amplitude 0.5mm minimum
	<b>Damage Limits</b>	16.7Hz, amplitude 1.5mm minimum
<b>Recommend Wire Size</b>		0.14 to 1.5mm <sup>2</sup> (24AWG - 16AWG)
<b>Recommend Cable Size</b>		ø7 to 13mm
<b>Conduit Size</b>		M20
<b>Terminal Pulling Strength</b>		20N minimum
<b>Terminal Screw Torque</b>		0.5 to 0.6Nm
<b>Degree of Protection</b>		HE1G-21SM: IP66, HE1G-20MB: IP65 HE1G-20ME: IP65, HE1G-21SMB: IP65
<b>Conditional Short Circuit Current</b>		50A (250V)
<b>Recommended Short Circuit Protection</b>		250V/10A fast blow fuse (IEC 60127-1)
<b>Weight</b>		Approx. 250g (HE1G-20ME) Approx. 210g (HE1G-21SM)

Part Numbers

Part Numbers	3 Position Switch	Monitor Switch	Emergency Stop Pushbutton	Momentary Pushbutton
HE1G-21SM	2 Contacts	Yes (1NC)	No	No
HE1G-20ME	2 Contacts	No	Yes (2NC)	No
HE1G-21SMB	2 Contacts	Yes (1NC)	No	Yes (1NO)
HE1G-20MB	2 Contacts	No	No	Yes (2NO)

Ratings

Contact Ratings

<b>Rated Insulation Voltage (Ui)</b>		250V				
<b>Thermal Current (Ith)</b>		3A				
<b>Rated Operating Voltage (Ue)</b>		30V	125V	250V		
<b>Rated Operating Current (Ie)</b>	<b>3 Position Switch (Terminal No.1-2, 3-4)</b>	<b>AC</b>	<b>Resistive Load (AC-12)</b>	–	3A	0.5A
			<b>Inductive Load (AC-15)</b>	–	1.5A	0.5A
		<b>DC</b>	<b>Resistive Load (DC-12)</b>	2A	0.4A	–
			<b>Inductive Load (DC-13)</b>	1A	0.22A	–
	<b>Monitor Switch (Terminal No. 5-6 of HE1G-21SM)</b>	<b>AC</b>	<b>Resistive Load (AC-12)</b>	–	2A	1A
			<b>Inductive Load (AC-15)</b>	–	1A	0.5A
		<b>DC</b>	<b>Resistive Load (DC-12)</b>	2A	0.4A	0.2A
			<b>Inductive Load (DC-13)</b>	1A	0.22A	0.1A
	<b>Emergency Stop Pushbutton (Terminal No. 5-6, 7-8 of HE1G-20ME)</b>	<b>AC</b>	<b>Resistive Load (AC-12)</b>	–	–	–
			<b>Inductive Load (AC-15)</b>	–	–	0.5A
		<b>DC</b>	<b>Resistive Load (DC-12)</b>	–	–	–
			<b>Inductive Load (DC-13)</b>	–	–	0.1A
<b>Contact Structure</b>	3 Position Switch		2 Contacts			
	Monitor Switch		0 or 1 Contact			
	Emergency Stop Pushbutton		0 or 2 Contacts			
	Momentary Pushbutton		0 to 2 contacts			

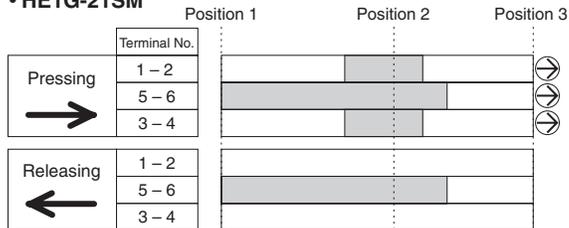


The minimum load (reference) = AC/DC3V • 5mA (for reference only).

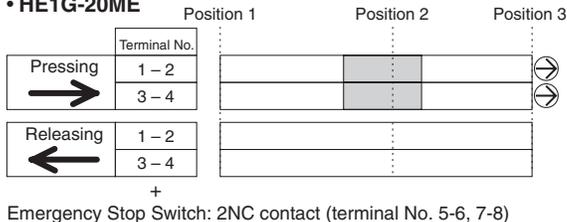
Operation Characteristics

Contact Movement

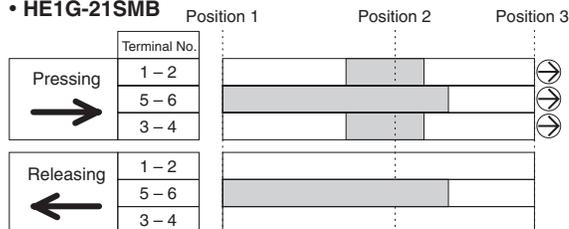
• HE1G-21SM



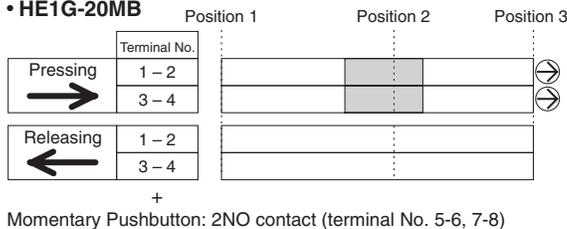
• HE1G-20ME



• HE1G-21SMB



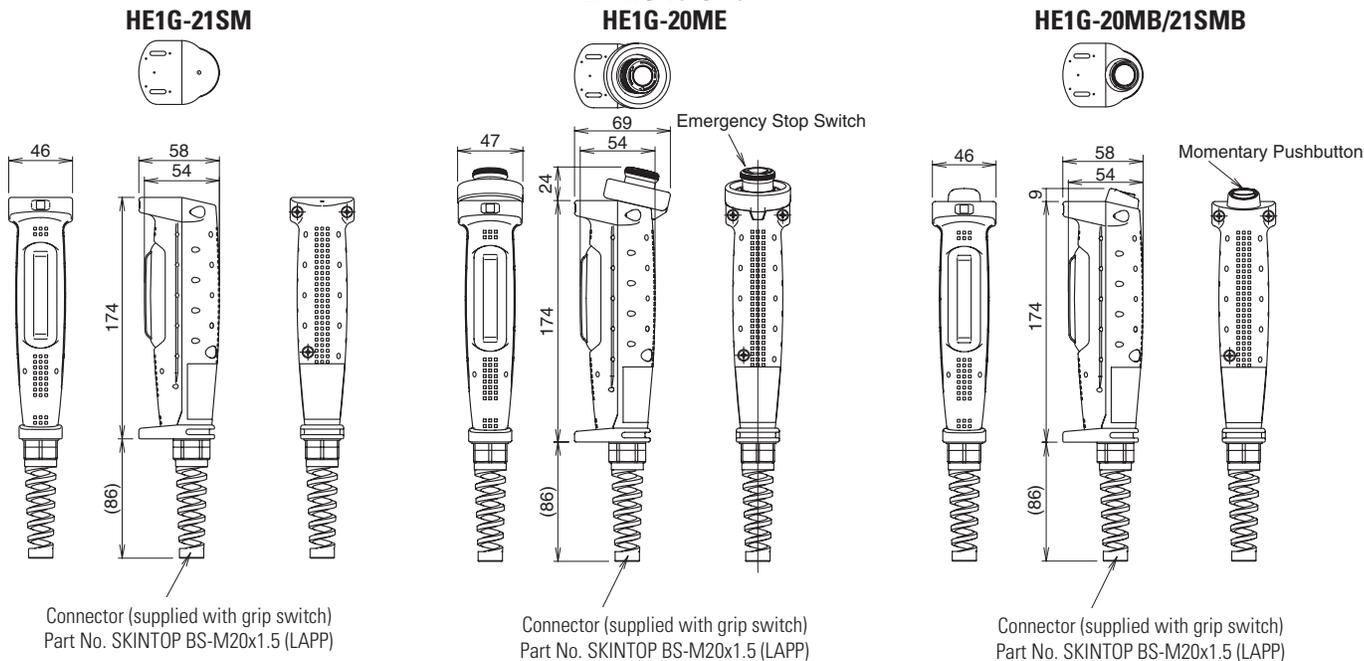
• HE1G-20MB



Legend: : contact ON (closed) : contact OFF (open)

- Terminals No. 1-2, 3-4, 5-6 will become positive action when moving from position 2 to 3.
- Use terminal contacts 1-2 and 3-4 for safest circuit.
- When the center of the button is pressed, the above operation characteristics occur.

Dimensions



Accessories

Mounting Plate (secures grip switch)

Replacement Rubber Cover

Appearance	Part Number	Material	Color
	HE9Z-GBK1	Silicon Rubber	Yellow

Appearance	Part Number	Material
	HE9Z-GH1	Metal

Overview

X Series E-Stops

Door Interlock Switches

Enabling Switches

Barriers

AS-Interface Safety at Work

## General Information

### Safety Precautions

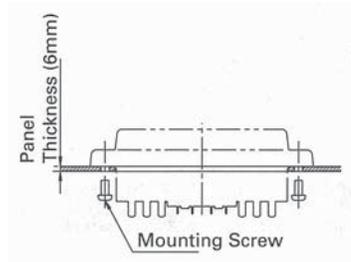
- In order to avoid electric shock or fire, turn power off before installation, removal, wire connection, maintenance or inspection of switch.
- Follow specification when installing. Improper electrical load may damage switch, cause electric shock, or fire.

- Use proper wire diameter to meet voltage and current requirements. Using improper wires or incomplete soldering may cause fire due to abnormal heat generation.

### Installation Precautions

#### HE2B

- M3 nut is inside the rubber cover.



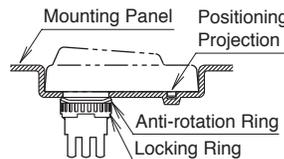
#### HE2B/HE3B

- A change in internal air pressure may cause the rubber boot to expand and shrink on an enabling switch that has the rubber boot sealed. This may affect the performance of the switch. Periodically check to ensure that the enabling switch is operating correctly.

- If the panel is not level when mounting an enabling switch, the waterproof feature cannot be guaranteed.

#### HE3B

- The rubber boot has a tab to be used for orientation. When making a positioning hole in a panel, do not make a hole in the rubber boot, or the waterproof feature cannot be guaranteed. When the positioning hole is not on the panel, remove the tab, but do not make a hole in the rubber boot.
- When tightening the locking ring, secure the flange to prevent the enabling switch from rotating. In applications where the enabling switch is to be rotated, mount the switch in a recess on the panel as shown.

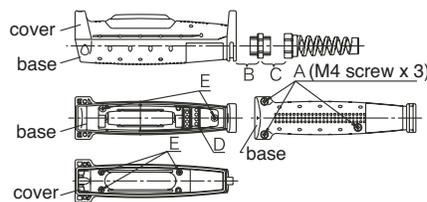


### Wiring Precautions

#### HE1B/HE2B/HE3B

- Applicable wire size is 0.5mm<sup>2</sup> (20AWG) (maximum) / 1 line.
- When soldering the terminal, solder at a temperature of 260°C within 3 seconds. Use non-corrosive liquid rosin as soldering flux.

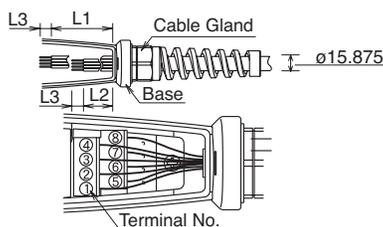
- Recommended Torque



#### HE1G

- Wire Stripping Information

Wire Length	Terminal Number 1-4	Terminal Number 5-8
L1, L2 (mm)	L1=40mm	L2=27mm
L3 (mm)	L3=6mm	



- Applicable Wire Size: 0.14 to 1.5mm<sup>2</sup> (24 - 16AWG, one wire per terminal)

### Use Precautions

#### HE2B/HE3B/HE1G

- To ensure the highest level of reliability connect both contacts to a monitoring device such as a safety relay.

#### HE1B/HE2B/HE3B

- When installing the enabling switch ensure that it cannot be accidentally activated. For example, a protrusion from a teaching pendant could cause the enabling switch to be activated by the weight of the teaching pendant.

	See Drawing Above	Recommended Torque
Rubber Boot & Base	A	1.2±0.1Nm
Connector & Grip Switch	B	4.0±0.3Nm
Connector	C	4.0±0.3Nm
Terminal Screw	D	0.5±0.6Nm
Do Not Remove	E	

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