



TOKYO SENSOR

**TAPE SWITCH®**

TOKYO SENSOR

**EDGE SWITCH**

TOKYO SENSOR

**BUMPER SWITCH®**

TOKYO SENSOR

**MAT SWITCH®**

TOKYO SENSOR

**Interface controller  
(CG1 series)**

# TOKYO SENSOR CO., LTD. Joins the IDEC Group

~ To Further Drive Enhancements to Safety and ANSHIN ~

Tokyo Sensor, one of the major Japanese manufacturers of contact sensors such as tape switches, is an IDEC Group as of July 2, 2018. In addition to tape switches whose lengths can be adjusted at will, Tokyo Sensor's advantages include the edge switch, a tape switch fitted with special housing to provide protection to objects to be detected; bumper switches for contact and collision detection characterized by cushioning; and mat switches that arrange sensors in a mat configuration. All these products are provided to customers who seek both safety and **ANSHIN (a sense of trust and assurance without any fear or stress)**.

The addition of Tokyo Sensor's products to switches and safety equipments that are IDEC's mainstays complements and augments solutions for safety and ANSHIN, enables even greater enhancement of IDEC's human-machine interface (HMI) business.

## PRODUCT INFORMATION



A free length tape switch that actuates when pressed at any point with a finger tip

**TOKYO SENSOR**  
**TAPE SWITCH®**



A tape switch combined with a dedicated jacket to provide protection for the sensing object

**TOKYO SENSOR**  
**EDGE SWITCH**



A switch with excellent cushioning characteristics for contact and impact detection

**TOKYO SENSOR**  
**BUMPER SWITCH®**



A surface sensor for detecting persons or objects within a certain area

**TOKYO SENSOR**  
**MAT SWITCH®**



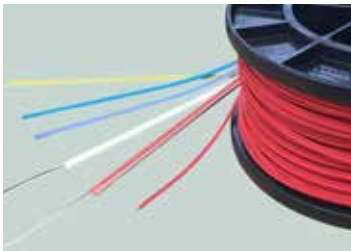




Can detect the on/off and wire-breaking status of tape switches, edge switches, bumper switches, or mat switches which are used in combination with this interface controller.

Employing a self-holding output system, the interface controller can detect instantaneous wire-breaks and switches and holds the output state. The interface controller can be installed on a DIN rail or secured on the attached plate with screws.

**TOKYO SENSOR**  
**Interface controller (CG1 series)**

# Tokyo Sensor, a Partner for Safety and Security

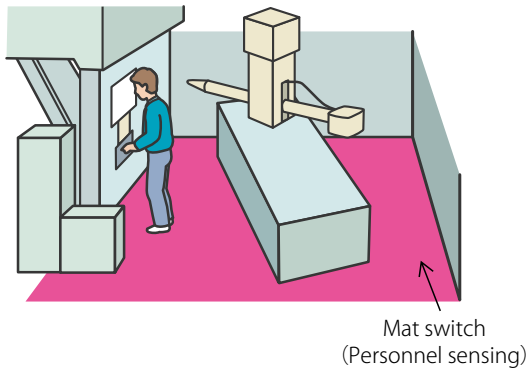
## Table of contents

3	Applications		
5	Tape switch		
		Structural Drawing / Operating principles / Applications	5
		Termination non-sensing section /Dedicated aluminum channel	6
		List of Tape switches / Electrical characteristics /	7
		Structure and operating characteristics /	
		Ambient environment and environmental performance	
		Actuating force measurement method / Temperature characteristics /	8
		Tape switch estimates and ordering information	
9	Edge switch		
		Structural Drawing / Actuating force measuring method / Applications	9
		Termination non-sensing section /	10
		Methods of drawing out the lead wires of an edge switch / Dedicated aluminum channel	
		List of Edge switches / Electrical characteristics /	11
		Ambient environment and environmental performance /	
		Edge switch estimates and ordering information	
		Actuating force measuring method(E21BK) /	12
		E22BK1/	13
14	Terminating-resistor-integrated pressure sensing switch products		
15	Bumper switch		
		Structural Drawing / Actuating force measurement method /	15
		Ratings / Applications	
		Semi-custom bumper switch / Shape and structure / Specifications /	16
		Bumper switch estimates and ordering information	
17	Mat Switch		
		Structural Drawing / Enlarged view of the cross section area /	17
		Actuating force measurement method / Ratings /	
		Specifications / Applications	
		Mat switch (standard product)/ Mat switch dimensions /	18
		Estimates and ordering information	
		Mat switch (custom product)/ List of Upper rubber /	19
		Mat switch estimates and ordering information	
		Lead wires / Ramp frame	20
21	Interface Controllers (CG1 Series)		
		Product appearance / Names of the parts	21
		List of specifications / Internal equivalent circuit and wiring examples /	22
		Output contact operations and LED indicators	
		Use and Wiring Examples (Tape switch, Edge switch, and Bumper switch)	23
		Use and Wiring Examples (Mat switch)	24
		Other Wiring Examples	25
26	Product Approvals Every Customer Must Make When Ordering/Using Our Products		
27	Cautions for Use		

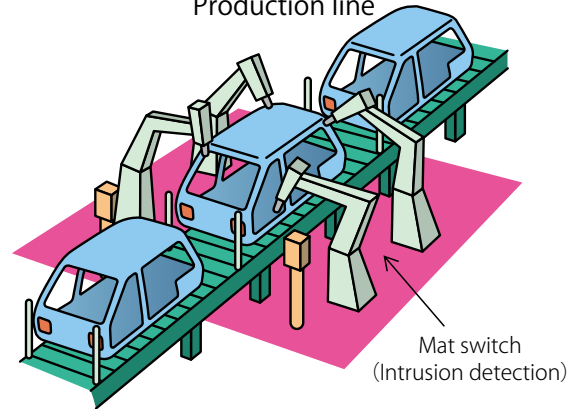
# Applications

## Production facilities

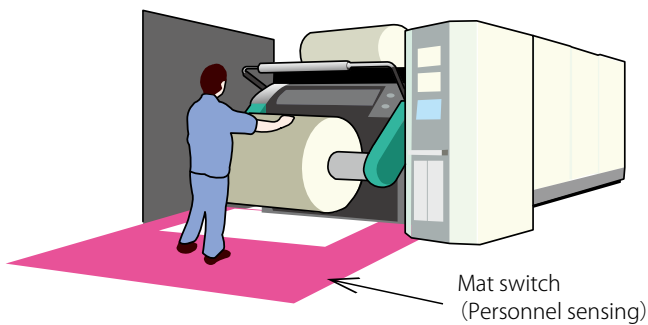
Around robots



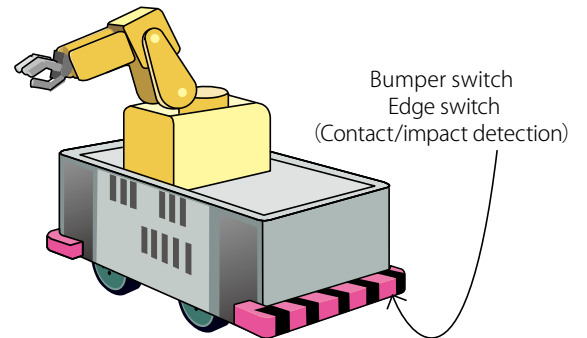
Production line



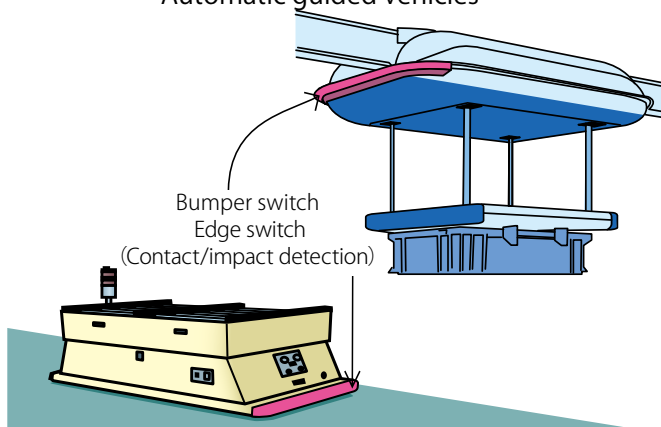
Periphery of a rotary press



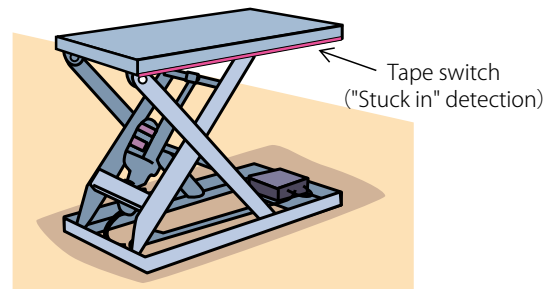
Mobile robot



Automatic guided vehicles

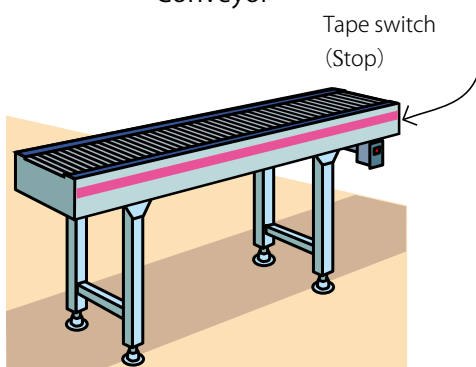


Lifter

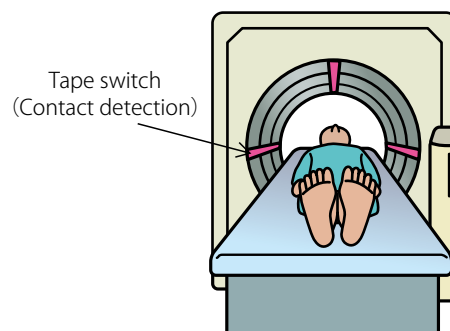


## Medical equipment, nursing care products

Conveyor

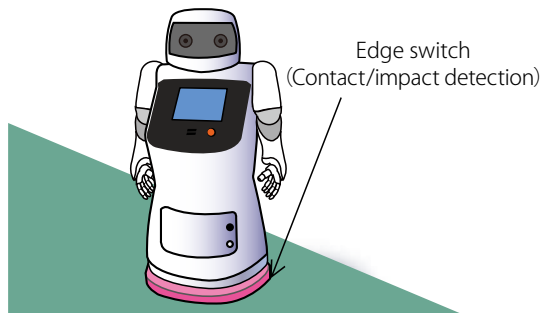


CT scanner

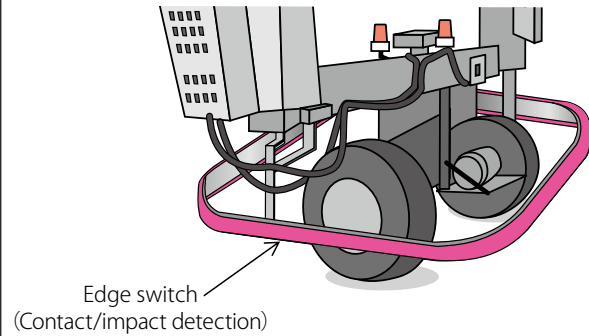


## Public transportation and traffic systems

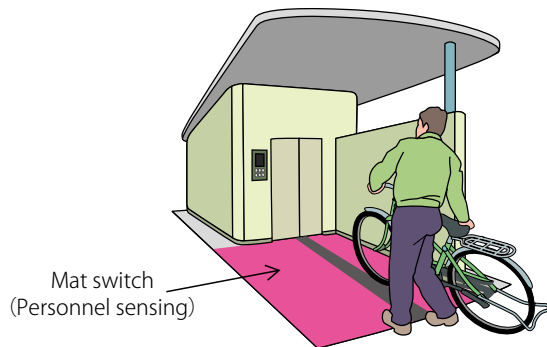
Mobile Service Robot



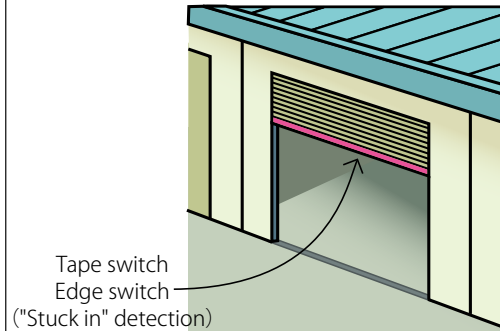
Tire guard for an air bridge



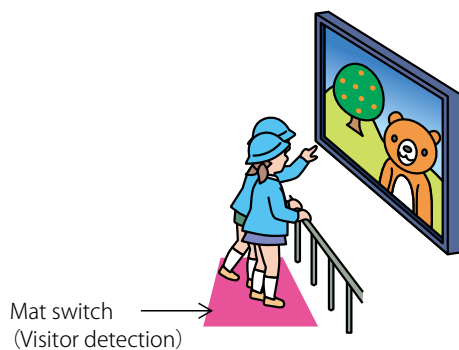
Automatic bicycle parking lot



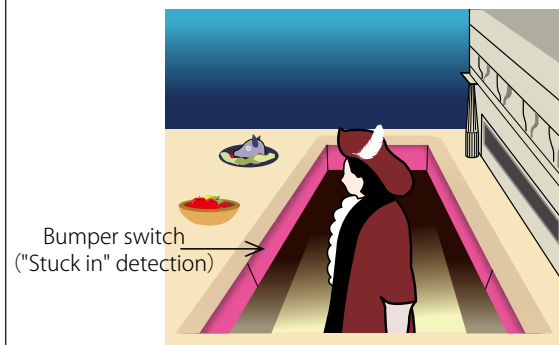
Shutter



Theme park, museum

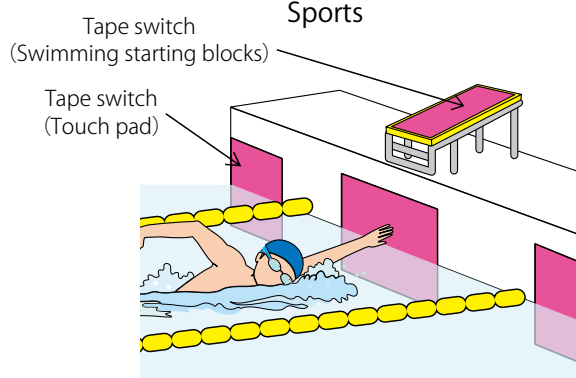


Stage set

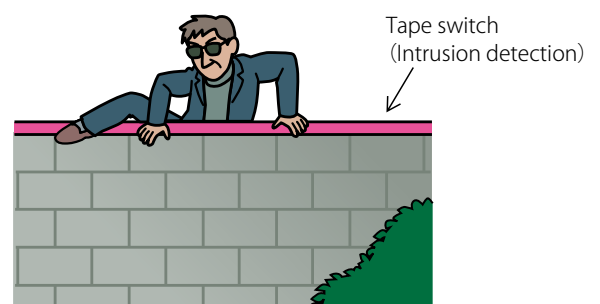


## Others

Sports



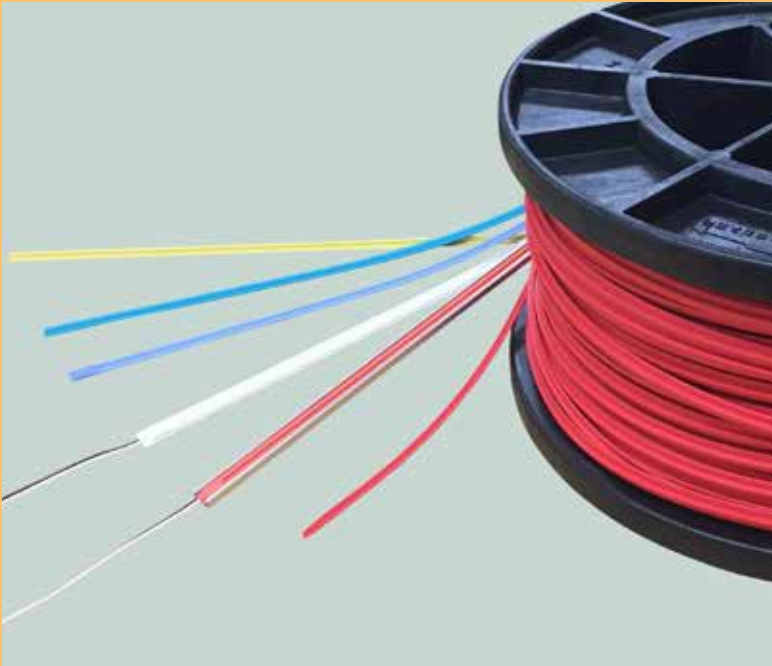
Security





# TAPE SWITCH®

Free length tape switches developed by Tokyo Sensor

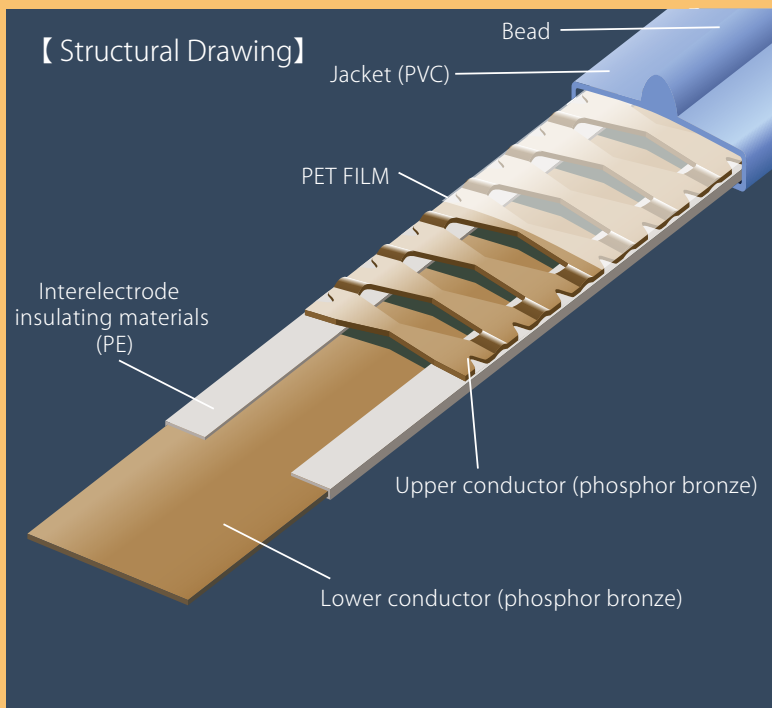


Thin free length tape switches.

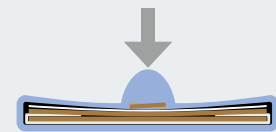
Serve as switches when pressed at any point on their bead.

They can serve as security switches for stop applications such as "stuck in" detection, contact detection, and intrusion detection.

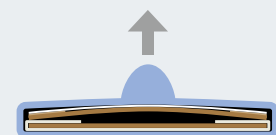
- The customer can select the most appropriate type of tape switch according to the intended use and sensing object.
- 4-wire and terminating-register-integrated tape switches can be used for wire-breaking detection when combined with an interface controller (page 21).



## 【 Operating principles 】



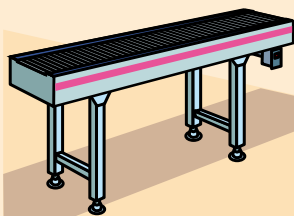
The bead at the center portion of the tape is depressed by a load, so that the upper conductor makes contact with the lower conductor, causing the circuit to turn on.



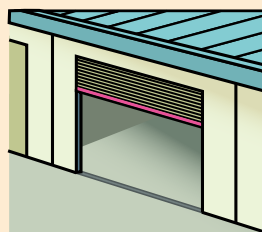
When the load is removed, the upper conductor is restored in the original position, so that the circuit turns off.

## 【 Applications 】 (See pages 3 and 4 for details.)

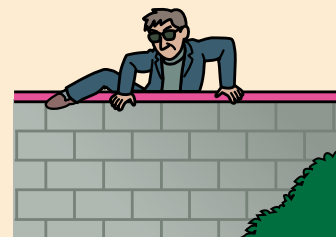
Conveyor  
(Stop)



Shutter  
("Stuck in" detection)



Security  
(Intrusion detection)



# Appropriate and Effective Termination Treatment for Utilizing the Full Potential of Tape Switch

We changed some specific material in compliance with the updated RoHS2 directive, so we also changed the type number. Please see "Type number Chart" in page 8.

See page 23 for wiring examples and equivalent circuit and page 14 for a detailed description of the lead wire types.

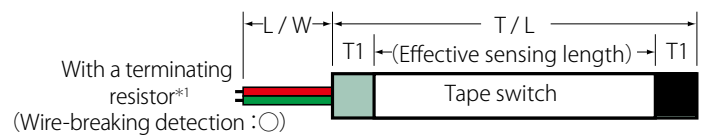
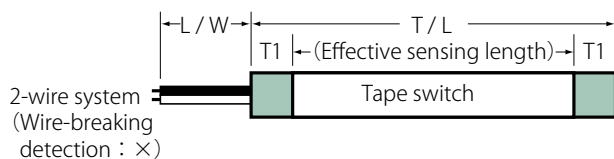
## ■ Termination non-sensing section

**All tape switches are manufactured to the customer-designated dimensions.**

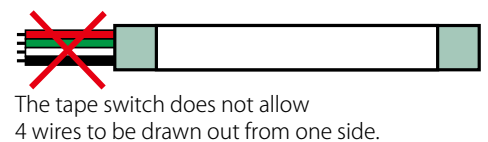
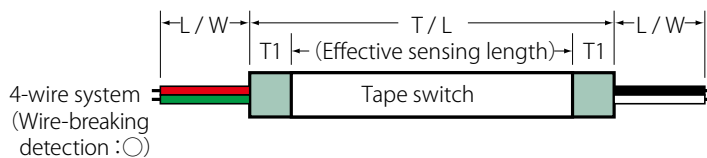
**Notice the length of the non-sensing section of the terminations.**

Welding is applied to the terminations of the tape switch.

Non-sensing section (T1)



\* 1 For a terminating-register-integrated tape switch, the termination side of the switch jacket is colored black.

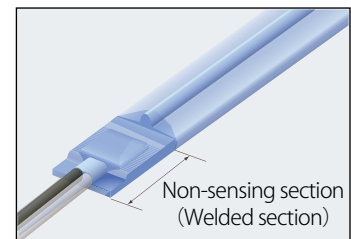


Length of the non-sensing section (T1)

Standard type : 20mm  
Wide type (T20RE • T20WH) : 20mm  
Wide type (The others) : 25mm

T/L (tolerance)

1,000 mm or less : +0 / -5mm  
Over 1,000 mm : +0 / -0.5%

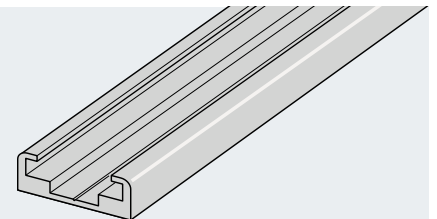


## Dedicated aluminum channel (optional)

Use a channel to mount the tape switch.

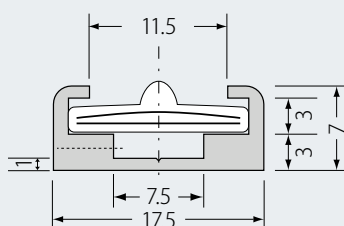
This not only fixes the switch firmly but also protects the switch and stabilizes its performance.

※Coefficient of thermal expansion of the aluminum channel :  $23.8 \times 10^{-6}/K$

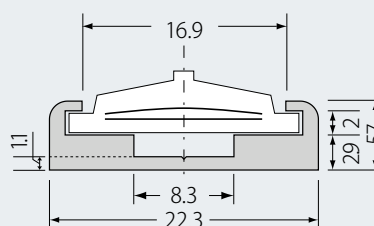


Aluminum channel for tape switches (3,000 mm maximum)

Standard type AC-175 weight 140g/m



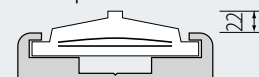
Wide type AC-223 weight 160g/m



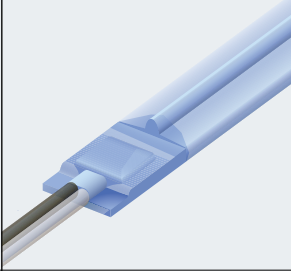
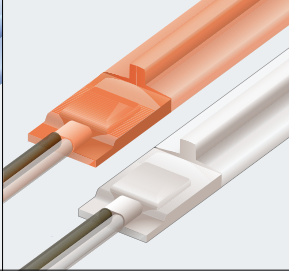
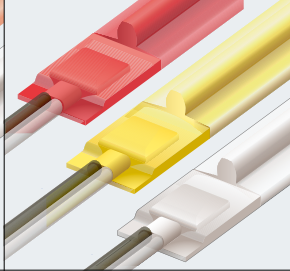
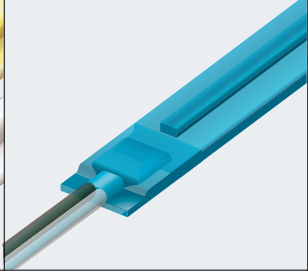
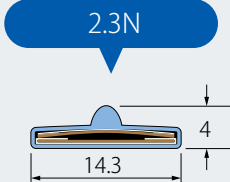
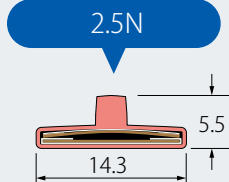
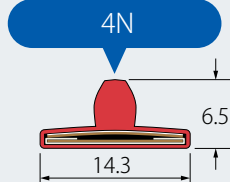
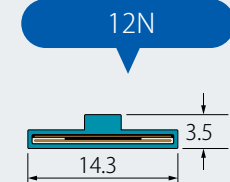
Amount of protrusion of the bead from the channel jacket (mm)

T01BL*2	: ±0.0mm	T02RE • T02WH	: +1.5mm
T03WH • T03RE • T03YE	: +2.5mm	T04BL*2	: -0.5mm
T07WH	: +2.0mm	T06YE	: +1.75mm
T05GY	: +2.2mm	T20RE • T20WH	: +5.0mm

Example : T05GY



\* 2 The T01BL and T04BL may not detect some sensing objects since the height of their channel jacket is greater than that of the bead.

Type	Standard type (tape width : 14.3mm)			
Type number (color)	T01BL1 (light blue)	T02RE1 (pastel red) T02WH1 (white)	T03RE1 (red) T03YE1 (pastel yellow) T03WH1 (white)	T04BL1 (blue)
Applications	<ul style="list-style-type: none"> <li>● Start/stop of machine</li> <li>● Contact detection</li> </ul>	<ul style="list-style-type: none"> <li>● Contact detection</li> <li>● "Stuck in" detection of a door</li> </ul>	<ul style="list-style-type: none"> <li>● Contact detection</li> <li>● "Stuck in" detection of a door</li> </ul>	<ul style="list-style-type: none"> <li>● Impact detection</li> <li>● Heavy load detection</li> </ul>
Appearance				
Actuating force* <sup>1</sup> , Cross sectional view, shape* <sup>2</sup> (Dimensions in mm)				
Maximum length	20,000mm	20,000mm	20,000mm	1,900mm
Weight	Approx. 70g/m	Approx. 70g/m	Approx. 80g/m	Approx. 70g/m
Minimum curvature	Radius 150mm or longer			Dissallowed
Operating temperature range* <sup>3</sup>	0 to 50°C			
Storage temperature range	0 to 60°C			
Storage humidity range	55%RH or less (before welding the end), 90%RH or less (after welding the end)			
Applicable aluminum channel	AC-175 (standard type only, optional)			

\* 1 Standard value at normal temperature \* 2 Typical value for the shape \* 3 noncondensation

#### ■ Electrical characteristics\*<sup>4</sup>

Rated voltage : AC/DC 5 to 24V  
 Rated current : 0.01 to 0.3A (resistive load)  
 Interelectrode withstand voltage : DC250V, 1 minute  
 Interelectrode insulating resistance : 100MΩ or higher (DC250V)  
 Resistance at normal temperature : 0.6Ω/m (0.2Ω/m for the T04BL, 0.4Ω/m for the T05GY)

\* 4 Terminating-register-integrated tape switches are excluded. For terminating-register-integrated tape switches, contact our sales representative serving your locality.

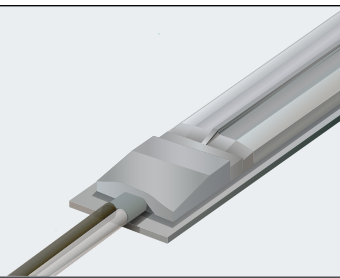
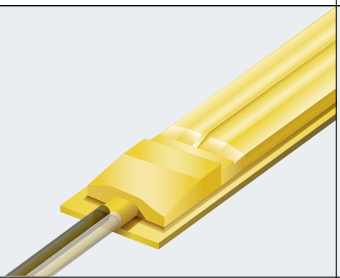
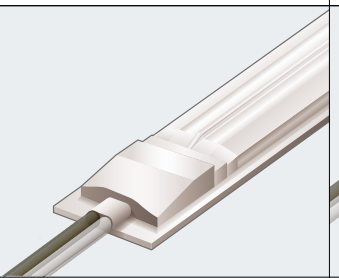
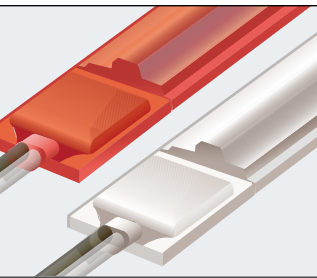
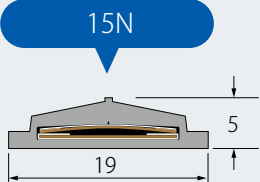
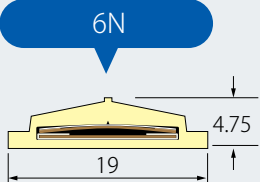
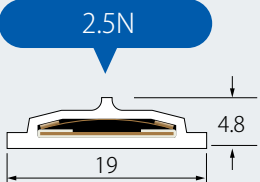
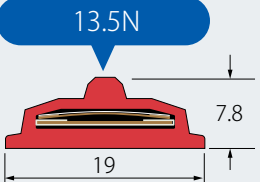
#### ■ Structure and operating characteristics

Jacket material : PVC (soft)  
 Electrode material : phosphor bronze (coefficient of thermal expansion:  $18 \times 10^{-6}/K$ )  
 Withstand load : 2kN/cm<sup>2</sup> (1 minute)  
 Durability : 3 million operations or more (DC24V 0.3A, resistive load)

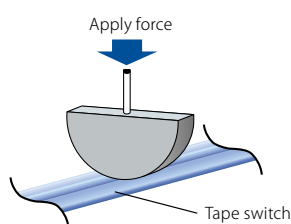
#### ■ Ambient environment and environmental performance

Oil resistant (class JIS1, JIS3) : Poor  
 Organic solvent resistance : Poor  
 Waterproof specifications (optional) : JIS C 0920: 2003 protection class 7



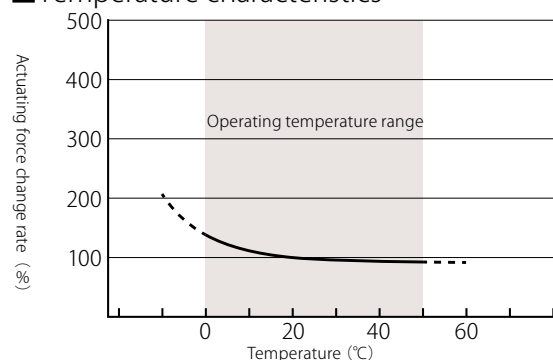
Wide type (tape width: 19 mm)			
T05GY1 (gray)	T06YE1 (pastel yellow)	T07WH1 (white)	T20RE1 (red) T20WH1 (white)
●Personal Sensing	●Seating and light tread force detection ●Start/stop of a game	●Contact detection ●"Stuck in" detection of a door	●Start/stop of machine ●"Stuck in" detection of a door
			
			
20,000mm	20,000mm	20,000mm	20,000mm
Approx. 110g/m	Approx. 100g/m	Approx. 90g/m	Approx. 120g/m
Radius 150mm or longer			
0 to 50°C			
0 to 60°C			
55%RH or less (before welding the end), 90%RH or less (after welding the end)			
AC-223 (wide type only, optional)			

## ■Actuating force measurement method



Using a 10 mm x 32 mm dia. probe, apply force to the center of the bead, perpendicular to the tape switch. Using a test circuit for the voltage drop method (JISC5445), measure the load value while causing a 10 mA current to flow in an electrode contact mode.

## ■Temperature characteristics



As the ambient temperature decreases, the sensitivity goes low due to the hardening of the jacket material (PVC).

## Tape switch estimates and ordering information (Dimensions in mm)

T01BL1 - 500 - 5 - 2      T01BL1 - 500 - 5 - 5 - 4

- ① Type    ② T/L: total switch length (5mm increments as standard)  
 ③ L/W: lead wire length  
 (100mm increments as standard, standard length: 500mm)  
 4-wire is for each length. The example above: 5 (=500mm)  
 ④ 2 (2-wire : standard) / 4 (4-wire) / R (2-wire terminating resistor integrated)

Contact the sales representative serving your locality for non-standard sizes of ② and ③ lead wire type, waterproof specifications, and other options. When placing an order for a tape switch channel (optional), specify its type and length.

## Type number Chart

Standard type		Wide type	
Current	Former	Current	Former
T01BL1	LS-023	T05GY1	LA-150G
T02RE1	LM-025	T06YE1	LB-060
T02WH1	LM-025W	T07WH1	LC-025
T03RE1	LH-040R	T20RE1	T20RE0
T03YE1	LH-040Y	T20WH1	T20WH0
T03WH1	LH-040		
T04BL1	LP-120		

# EDGE SWITCH

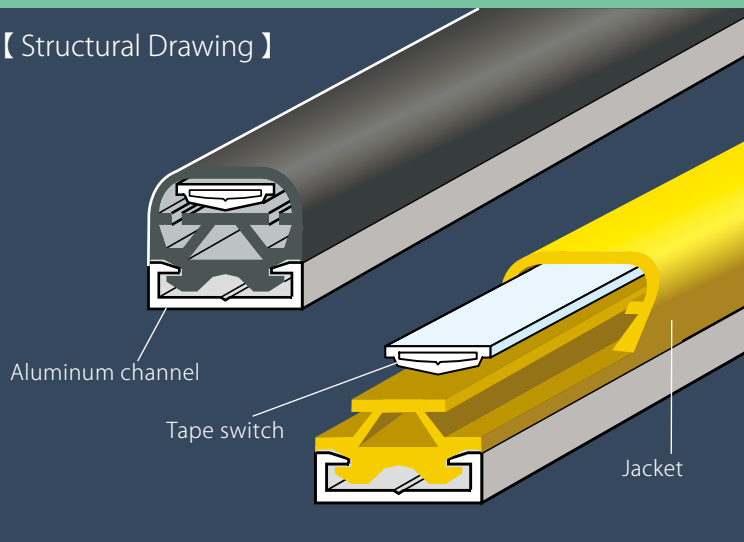
Contact detection type switches provided with cushioning characteristics which prevent damage to the contacted object.



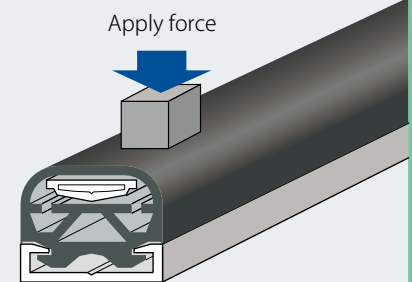
Provisions for protecting the sensing object are implemented by covering a tape switch with a dedicated jacket. This also minimizes the damage to the tape switch itself, so that the durability of the edge switch is greatly enhanced.

- Selectable from 8 types which differ in structure and size.
- Easy installation using an aluminum channel.
- 4-wire tape switches and terminating-register-integrated tape switches can be combined with an interface controller (page 21) to provide wire-breaking detection capability.

## 【 Structural Drawing 】



## 【 Actuating force measuring method\*1 】

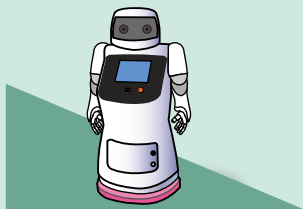


Using a 10 mm x 10 mm (planar) probe, apply force to the test switch, perpendicular to the top surface of the jacket and measure the load value at which the switch turns on.

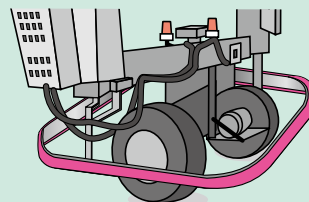
\*1 See page 12 in the case of E21BK-E22BK.

## 【 Applications 】 (See pages 3 and 4 for details.)

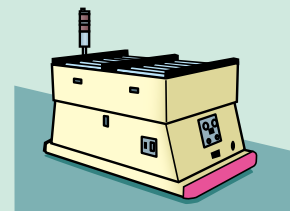
Mobile Service Robot  
(Contact/impact detection)



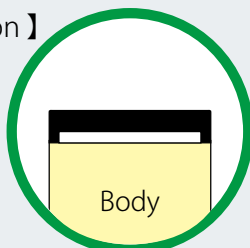
Tire guard for an air bridge  
(Contact/impact detection)



Automatic guided vehicle  
(Contact/impact detection)



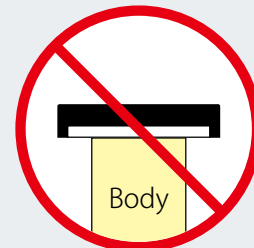
## 【 Installation 】



Installed on whole the body



Installed apart from the body



Length of the switch > Length of the body surface

Make sure that the base surface of the switch is supported by the full length of the body. Otherwise, the switch may be damaged after contact.

# Appropriate and Effective Terminal Treatment for Utilizing the Full Potential of Edge Switch

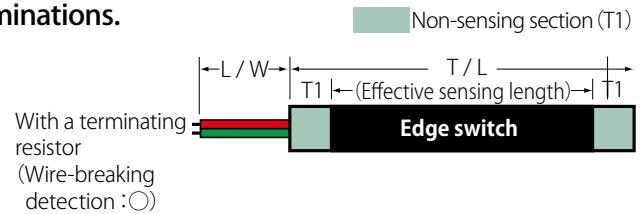
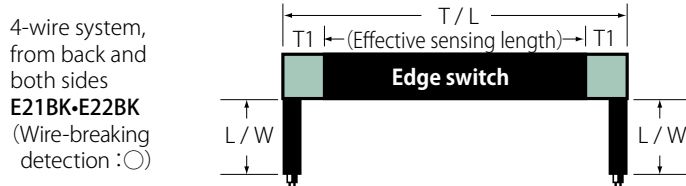
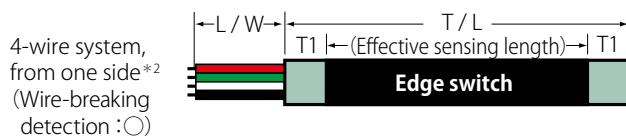
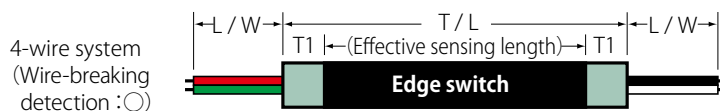
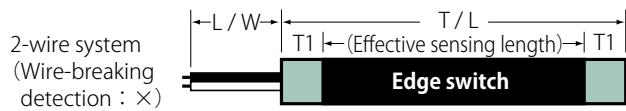
See page 23 for wiring examples and equivalent circuit and page 14 for a detailed description of the lead wire types.

We changed some specific material in compliance with the updated RoHS2 directive, so we also changed the type number. Please see "Type number Chart" in page 11.

## Termination non-sensing section

All edge switches are manufactured to the customer-designated dimensions.

Notice the length of the non-sensing section of the terminations.



Length of non-sensing section (T1)

E01BK•E02YE	: 30mm
E05BK•E06BK•E06RE	: 25mm
E20BK•E21BK•E22BK	: 0mm*3

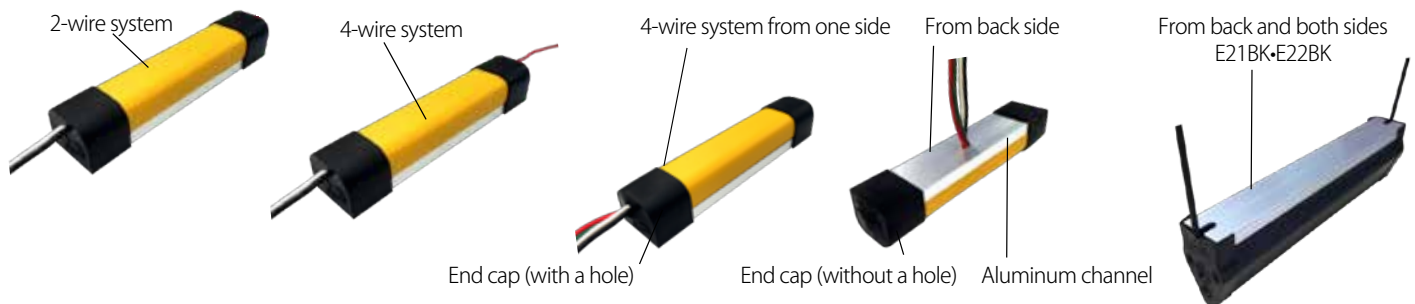
\*3 Sensing Condition: Using the probe, apply force to the test switch, perpendicular to the top surface of the jacket.

E20BK: 10×10mm  
E21BK•E22BK: φ80mm

T/L tolerance

1,000 mm or less	: +0 / -5mm
Over 1,000 mm	: +0 / -0.5%

## Methods of drawing out the lead wires of an edge switch



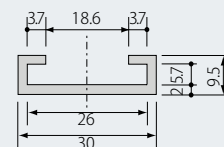
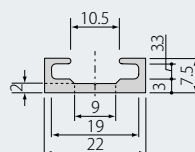
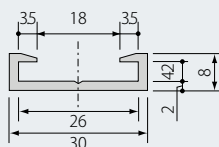
## Dedicated aluminum channel (attached to the main body)

Coefficient of thermal expansion of the aluminum channel :  $23.8 \times 10^{-6}/K$

For E01BK•E02YE•E05BK : AC-300

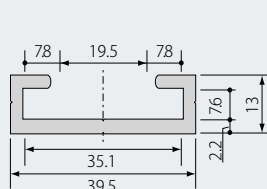
For E06BK•E06RE : AC-220

For E20BK : AC-302

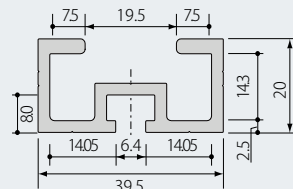


For E21BK•E22BK : AC-395 or AC-400 (with Mounting screw)

AC-395

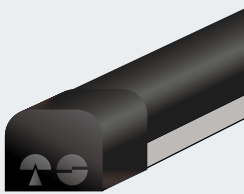
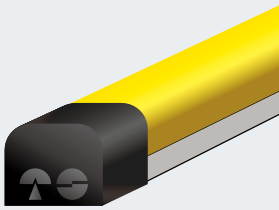
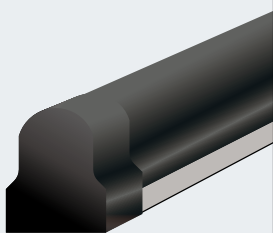
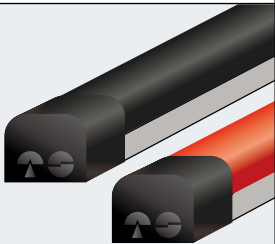
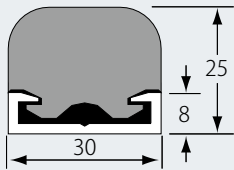
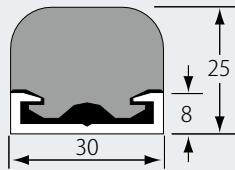
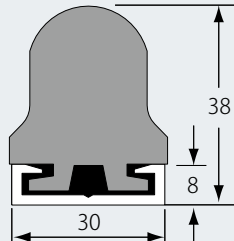
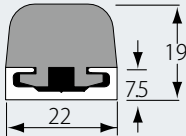


AC-400



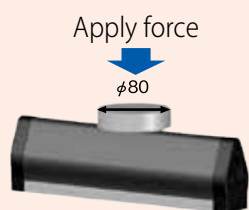
Total AC-400 length and number of screws (Dimensions in mm)

Total length (L dimension)	Number of screws	Mounting screw for AC-400
200 ~ 400	2	M6 SUS Effective sensing length $l=17, 22, 27\text{mm}$
401 ~ 800	3	
801 ~ 1,200	4	
1,201 ~ 1,600	5	
1,601 ~ 2,000	6	

Type number	E01BK1	E02YE1	E05BK1	E06BK1 • E06RE1
Applications	● "Stuck in" detection of a door   ● Vehicle collision detection ● Contact detection of an automated guided vehicle			
Appearance				
Actuating force* <sup>1</sup> Cross sectional view, shape* <sup>2</sup> (Dimensions in mm)	10N 	10N 	12N 	15N 
Maximum length	7,000mm	7,000mm	3,000mm	10,000mm
Weight	Approx. 600g/m	Approx. 600g/m	Approx. 690g/m	Approx. 500g/m
Jacket material	EPDM	PVC	EPDM	PVC
Operating temperature range* <sup>3</sup>	0 to 50°C			0 to 50°C
Storage temperature range	0 to 60°C			0 to 60°C
Storage humidity range	90%RH or lower			90%RH or lower
Applicable alu. channel	AC-300			AC-220
Maximum alu. channel length	3,000mm			3,000mm

\*1 Standard value at normal temperature \*2 Typical value for the shape \*3 Noncondensation

**\*4 ■ Actuating force measuring method (E21BK•E22BK)**



Actuating force: Less than 150N

**【Reference】**

Actuating force measuring method for Bumper Switch (P.13)



Characteristic Value in normal temperature : Approx. 60N

**■ Electrical characteristics\*<sup>5</sup>**

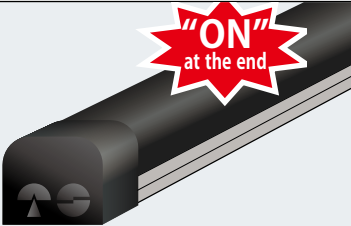

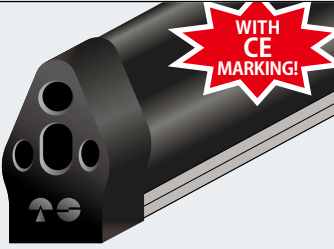
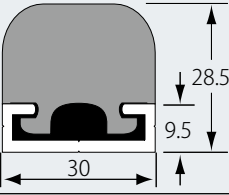
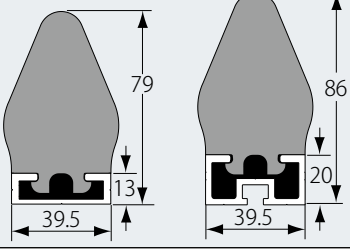
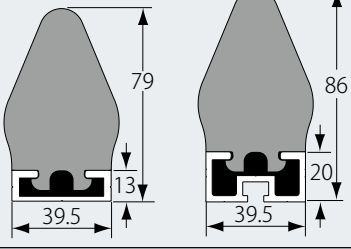
Rated voltage : AC/DC 5 to 24V  
 Rated current : 0.01 to 0.3A (Resistive load)  
 Interelectrode withstand voltage : DC250V, 1 minute  
 Interelectrode insulating resistance : 100MΩ or higher (DC250V)  
 Resistance at normal temperature : 0.6Ω/m

\*5 Terminating-register-integrated tape switches are excluded.  
For terminating-register-integrated tape switches, contact the sales representative serving your locality.

**■ Ambient environment and environmental performance**

Oil resistant : Poor  
 Organic solvent resistance : Poor  
 Waterproof specifications : JIS C 0920:2003 protection class 7 (optional)\*<sup>6</sup>

\*6 Waterproofness is guaranteed by the tape switch incorporated in the edge switch.

E20BK1	E21BK1	E22BK1
● "Stuck in" detection ● Collision detection ● Contact detection	● Contact detection ● Collision detection	● Vehicle passing detection
		
20N 	See below.*4 AC-395 AC-400 	See below.*4 AC-395 AC-400 
7,000mm	2,000mm	2,000mm
Approx. 600g/m	AC395: Approx. 2,000g/m AC-400: Approx. 2,100g/m	AC395: Approx. 2,000g/m AC-400: Approx. 2,100g/m
EPDM	EPDM	EPDM
-20 to 50°C	-10 to 50°C	-10 to 50°C
-20 to 60°C	-10 to 60°C	-10 to 60°C
90%RH or lower	90%RH or lower	90%RH or lower
AC-302	AC-395 or AC-400	AC-395 or AC-400
3,000mm	2,000mm	2,000mm

## Edge switch estimates and ordering information (Dimensions in mm)

E01BK1 - 1000 - 5 - 2  
 ① ② ③ ④

E01BK1 - 1000 - 5 - 5 - 4  
 ① ② ③ ③ ④

E01BK1 - 1000 - 5 - 5 - AC395 - 22  
 ① ② ③ ③ ⑤ ⑥

### Type number Chart

Current	Former
E01BK1	EDB-10 (black)
E02YE1	EDB-10 (yellow)
E05BK1	EHR
E06BK1	ESU (black)
E06RE1	ESU (red)
E20BK1	E20BK0
E21BK1	E21BK0

- ①Type ②T/L: total switch length (5mm increments as standard)  
 ③L/W: lead wire length (100mm increments as standard, standard length: 500mm )  
 4-wire is the length of each of left and right. The example above: 5 (=500mm)  
 ④2 (2-wire : standard) / 21 (2-wire from back side at the center) / 4 (4-wire) /  
 41 (4-wire from one side) / 42 (4-wire from back side at the center) / R (2-wire terminating resistor integrated)  
 ●When placing an order for E21BK•E22BK, specify ⑤ and ⑥.  
 ⑤Applicable aluminum channel (AC-395 or AC-400)  
 ⑥Effective mounting screw length for AC-400 : Selectable from 17, 22, and 27mm (M6)

Contact the sales representative serving you locality for non-standard sizes of ② and ③, lead wire type, waterproof specifications, additional aluminum channel treatment, and using E21BK installed vertically.

# Large Edge Switch E22BK1

We have obtained the CE marking for our straight-type large edge switch without non-sensing areas on the edges combined with IDEC's safety relay module (HR1S-AK)



## Large edge switch type number: E22BK1



### Standard information

- EN ISO 13856-2 ISO 13849-1 Product certified by TUV Nord (category 3, PLd)

### E22BK1 characteristics

- Sensing section extends to the edges
- Responds to loads from upward and downward diagonal directions
- Usable in low-temperature environments down to -10° C
- Choose from two aluminum channels (AC-395, AC-400) to suit the mounting method
  - The AC-395 allows stud mounting
  - The AC-400 allows for free on-site adjustment of the screw position (with the use of a bolt rail)
- Large overstroke (sinking load) with a depth of 80 mm (87 mm for the AC-400)

### E22BK1 specifications

- Compatible with 4-wire
- Other specifications are the same as E21BK1 (refer to page 11, 12)

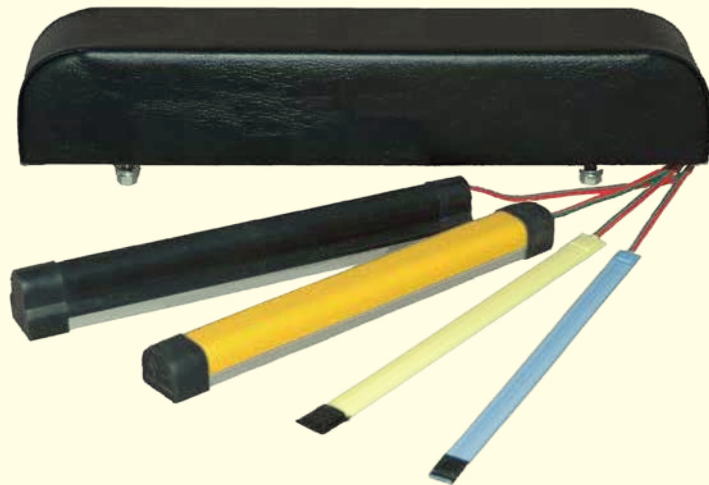
### Application

- Contact detection, collision detection, "stuck in" detection



Wire-breaking detectable 2-wire system dispensing with return wiring

# Terminating-resistor-integrated pressure sensing switch products



## Applicable products

Tape switch (page 5), edge switch (page 9), Bumper switch (page 15)

## Features

- Wire-breaking detection is possible in 2-wire configuration.  
(Can be combined with a CG1 series interface controller (page 21).)
- Use of the terminating-resistor-integrated pressure sensing switch at the terminal of coupled pressure sensing switch products dispenses with long return wiring.
- No changes need be made to the external shape and detectable range of a pressure sensing switch by implementing the terminating-resistor-integrated pressure sensing switch at the terminal of that pressure sensing switch product. Replacement of existing products is also possible.
- Waterproof type is optional.

## ■ Differences among the 2-wire, 4-wire, and terminating-resistor-integrated switches

2-wire type : Generally, only the switching function is used (wire-breaking detection is impossible).

4-wire type : Used in applications where two or more switches are to be put together.

Can be combined with a CG1 series device for wire-breaking detection.

Terminating resistor integrated type : Wire-breaking detection is possible by combining the switch with a CG1 series device in 2-wire configuration.

**Lead wires** Other lead wire types are also available. Contact the sales representative serving your locality.

Product type	Wiring system	Wire type	Standard length	Standard color	Wire-breaking detection
Tape switch Edge switch	2-wire system	VFF (vinyl sheathed flat type cable) 0.5mm <sup>2</sup> *1	500mm	Black-white	×
	4-wire system			Red-green/Black-white*2	○
	Terminating resistor integrated			Red-green	○
Bumper switch	4-wire system	VFF (vinyl sheathed flat type cable) 0.3mm <sup>2</sup>	500mm	Red-black×2	○
Mat switch	4-wire system	SVCTF (Soft vinyl cabtyre round cord) 0.75mm <sup>2</sup>	1,500mm	Red-green/Black-white	○

\* 1 The Lead Wires of E21BK•E22BK is SVCTF 0.3mm<sup>2</sup> 2 cores×2.

\* 2 The Lead Wires color of E21BK•E22BK is black-white.

# BUMPER SWITCH®

Contact detection capability and high shock cushioning characteristics

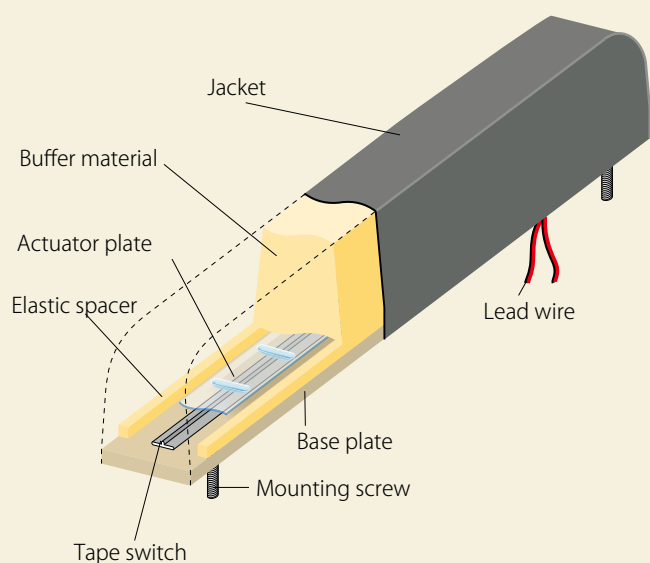


A contact/collision detecting switch with excellent cushioning characteristics.

Customer requirements such as size and mounting shape can be accommodated with flexibility.

- Custom manufacturing is possible according to the mounting shape and use environment requirements.
- Buffer material with excellent cushioning characteristics
- Can be combined with an interface controller (page 21) for wire-breaking detection.

## 【Structural Drawing】

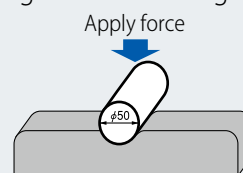


## ■Rating

Rated voltage *1	:AC/DC, 5 to 24V
Rated current *1	:0.01 to 0.3A (resistive load)
Interelectrode insulating resistance*1	:10MΩ or higher (DC250V)
Interelectrode withstand voltage*1	:DC250V, 1 minute
Recommended temperature range	:0 to 50°C

\*1 Terminating-register-integrated tape switches (2 wires) are excluded. For terminating-register-integrated tape switches (2 wires) contact our sales representative serving your locality.

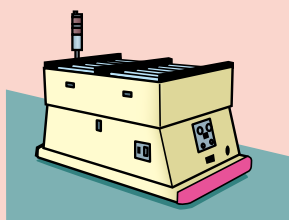
## 【Actuating force measuring method\*2】



\*2 Actuating force and stroke is not controlled.

## 【Application】(See page 3 and 4 for details.)

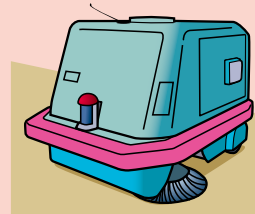
Automatic guided vehicles  
(Contact/collision detection)



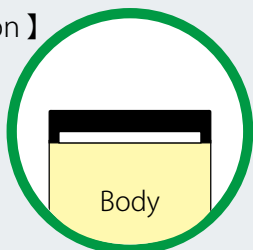
Stage set  
(Suck-in detection)



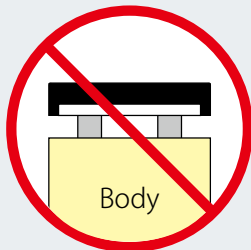
Cleaning robot  
(Contact/collision detection)



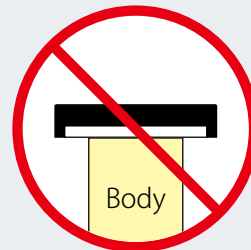
## 【Installation】



Installed on whole the body



Installed apart from the body

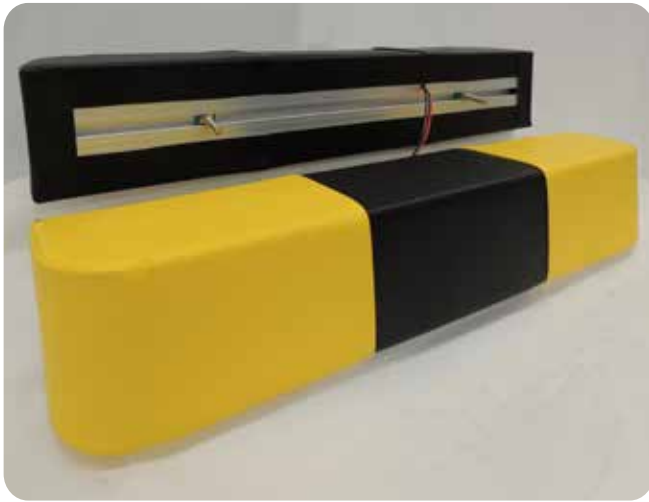


Length of the switch > Length of the body surface

Make sure that the base surface of the switch is supported by the full length of the body. Otherwise, the switch may be damaged after contact.

See page 23 for wiring examples and equivalent circuit.

## Semi-custom bumper switch (SC series)



A tape switch integrated contact/collision detection switch with outstanding reliability and cushioning characteristics. Quick delivery is also possible.

- Employment of a bolt rail system permits on-site setup of the screw position (dispensing with the need to set up the screw position at the time of order).
- An aluminum extrusion material employed as the base material for increased strength and precision.
- Black and/or yellow single or two-color jacket.
- The available sizes

SC-50(H・D: 50 mm each): Length 350 to 3,600mm

SC-100(H・D: 100 mm each): Length 450 to 3,600mm

### ■ Shape and structure

#### SC-50

Height×depth×length (mm) 50×50×Designated length (350~3,600)  
 Weight Approx. 1,100g/m  
 Mounting screw M6 SUS  
 (length selectable) (Effective sensing length=21, 26, 31 mm)  
 Pretravel (φ 50 cylinder)\*<sup>3</sup> Approx. 9mm  
 Overtravel\*<sup>3</sup> Approx. 14mm (250N)  
 Approx. 16mm (400N)

#### SC-100

Height×depth×length (mm) 100×100×Designated length (450~3,600)  
 Weight Approx. 2,000g/m  
 Mounting screw M8 SUS  
 (length selectable) (Effective sensing length=26, 31, 36 mm)  
 Pretravel (φ 50 cylinder)\*<sup>3</sup> Approx. 15mm  
 Overtravel\*<sup>3</sup> Approx. 55mm (250N)  
 Approx. 60mm (400N)

### ■ Specification and Rating\*<sup>4</sup>

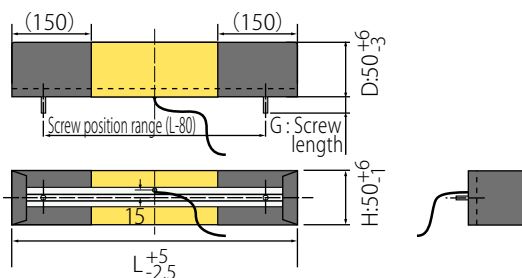
Jacket (sewn) Artificial leather (3 sheets stitched together)  
 Jacket color 2-color combination selectable (black/yellow)  
 Buffer material Urethane foam  
 Base plate Aluminum extrusion material  
 Lead wires 4-wire system (VFF 0.3 mm<sup>2</sup> red/black×2)  
 Length: Customer specified (standard: 500 mm)  
 Actuating force\*<sup>3</sup> Approx. 40N

\*<sup>3</sup> Characteristic Value in normal temperature

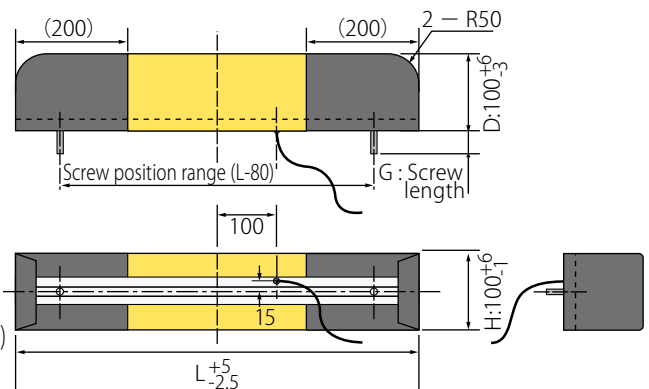
\*<sup>4</sup> Not applicable special support such as Drip-proof, Outdoor and Clean room

### 【 Reference Drawing 】

#### SC-50



#### SC-100



### Semi-custom bumper switch estimates and ordering information

(Dimensions in mm)

SC-100 - 900 - 5 - BYB - 31

① ② ③ ④ ⑤

① Type ② L: Total length (10mm increments as standard)

③ L/W: lead wire length (100mm increments as standard, standard length: 500mm)

The example above: 5 (=500mm)

④ Color: BBB, BYB, YBY, YYY (see the table on the right)

⑤ Effective mounting screw length (G)

SC-50: Selectable from 21, 26, and 31 mm (M6).

SC-100: Selectable from 26, 31, and 36 mm (M8).

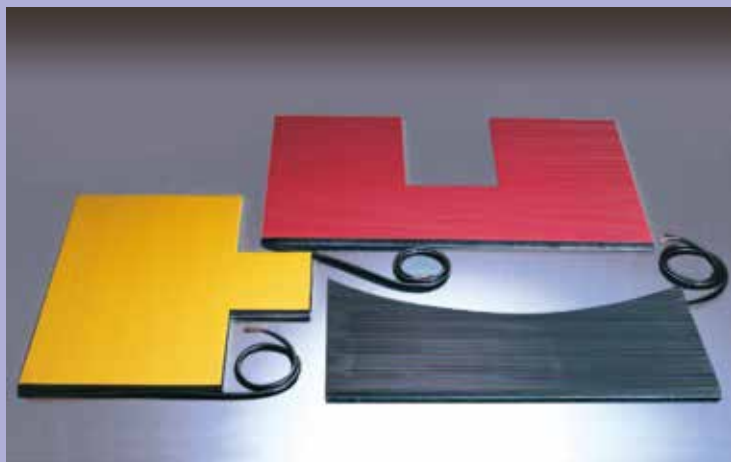
Color combination	Symbol
Black-Black-Black	BBB
Black-Yellow-Black	BYB
Yellow-Black-Yellow	YBY
Yellow-Yellow-Yellow	YYY

### Quantity of a standard instaration of screws

Length (SC-50)	Quantity	Length (SC-100)	Quantity
350~450	2	450~800	2
460~800	3	810~1,200	3
810~1,200	4	1,210~1,600	4
1,210~1,600	5	1,610~2,000	5
1,610~2,000	6	2,010~2,400	6
2,010~2,400	7	2,410~2,800	7
2,410~2,800	8	2,810~3,200	8
2,810~3,200	9	3,210~3,600	9
3,210~3,600	10		

# MAT SWITCH®

Mat switches with excellent reliability and durability covering a wide range of models from standard to custom products



Protects human life from hazards and demonstrates its power in promoting factory automation.

Provides a remarkable service in a wide variety of locations such as a plant where machines and robots are actively operated. The customer can select the most appropriate type of mat switch from a variety of products from standard to custom according to the intended application.

- Employment of a simple structure tape switch further enhances product quality, performance, and stability.
- Can be combined with an interface controller (page 21) for wire-breaking detection.
- Excellent shock resistance and durability
- High-quality oil resistant or non-oil resistant rubber selectable.
- Can accommodate with precision to orders that specify custom dimensions or shape.

## ■ Ratings

Rated voltage*1	:AC/DC 5 to 24V
Rated current*1	:0.01 to 0.3A (resistive load)
Interelectrode insulating resistance*1	:10MΩ or higher (DC250V)
Interelectrode withstand voltage*1	:DC250V, 1 minute
Recommended temperature range	:−10 to 50°C
Storage temperature	:−10 to 60°C
Storage humidity	:90%RH or less

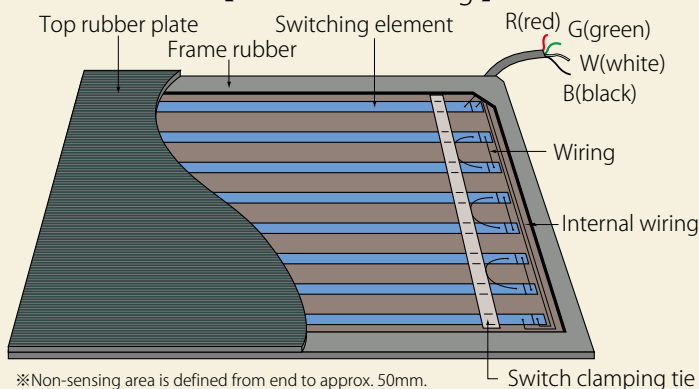
\*1 Terminating-register-integrated tape switches are excluded. For terminating-register-integrated tape switches, contact our sales representative serving your locality.

## ■ Specifications

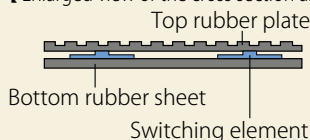
Actuating force	:Approx. 80N (φ80 mm)
Withstand load	:2kN (φ80mm, 1 minute)
Durability	:1 million operations
Lead wire	:SVCTF (black), 4 conductors, 0.75mm <sup>2</sup>
Lead wire length	:1,500mm
Lead wire outlet	:Upper right (R type) (standard) Upper left (L type) Lead wires from both sides (W type) coupling mat

\*3 Durability tests are conducted in a vertical load testing machine using a testing probe of φ80 (test load: 1 kN).  
Does not apply to diagonal forces (for possible passing detection).

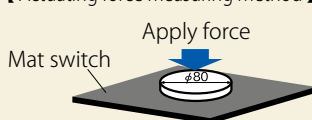
### 【Structural Drawing】



### 【Enlarged view of the cross section area】

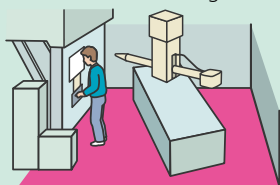


### 【Actuating force measuring method】

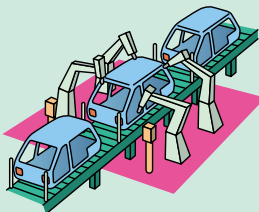


### 【Applications】(See pages 3 and 4 for details.)

Around robots  
(Personnel sensing)



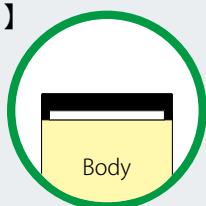
Production line  
(Intrusion detection)



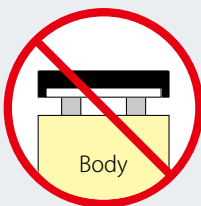
Periphery of a rotary press  
(Personnel sensing)



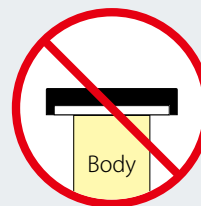
### 【Installation】



Installed on whole the body



Installed apart from the body



Length of the switch > Length of the body surface

Make sure that the base surface of the switch is supported by the full length of the body. Otherwise, the switch may be damaged after contact.

See page 24 for wiring examples and equivalent circuit.

### Mat switch (standard product)



A standard mat switch that can be used in plants where press machine, industrial robots, and automated machines are in use.

- Adopts a wire-breaking detection compatible 4-wire output system and uses oil resistant rubber.
- A block pattern is used on the surface of the MS-754R and MS-1074R and a ribbed rubber on the surface of the MS-1054R.
- The edge section are tapered for stumble prevention. (Applicable products: MS-754R, MS-1074R)
- Use the ramp frame AE-25 (optional) to secure the mat.

## 【 Mat switch dimensions 】

### MS-754R, MS-1074R

Top rubber plate: block pattern

MS-754R size: 500×700×13mm weight: 5kg

MS-1074R size: 700×1,000×12mm weight: 8kg



### MS-1054R

Top rubber plate: ribbed rubber

size: 500×1,000×10mm weight: 5.8kg



Precaution: Install and use the product on a flat, smooth surface.

Use of the product in an uneven surface may cause switch malfunctions or failures.

## Standard mat switch estimates and ordering information

MS-1074   R  
①                      ②

①Product name    ②Lead wire outlet

(R: Standard, lead wires drawn from top right, L: Lead wires drawn from top left, W: Lead wires from both sides)

If a mat securing ramp frame (AE-25: optional) is desired, specify it when placing an order.










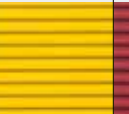

Mat switch (custom product)



Upper rubber

Custom unique finishing made possibly through a flexible combination of size, sensitivity, and material quality, selected according to the customer's intended use.

- Oil resistant (JIS class 1 and class 3 are not liquid immersible), non-oil resistant, thin, and thick types available for use in suitable applications
- For customer-desired dimensions and shape
- The available options are listed below.
  - Waterproofing  
(Except types of mat whose lead wires are drawn out of the back side. Use of the mat in a puddle or any location where it is always exposed to water is not allowed.)
  - Lead wire length, direction in which lead wires are drawn
  - Stumble prevention treatment
  - Ramp frame

Type	Standard		Optional						
Oil resistant	Oil resistant /non-oil resistant	Non-oil resistant	Oil resistant /non-oil resistant	Oil resistant		Non-oil resistant			
Top rubber sample									
Color	Black	Gray	Black	Orange	Black	Black	Green	Yellow	Red
Design	Ribbed		Striped pattern	Floral pattern	Flat	Flat	Ribbed		
size (minimum)*1・2・3	300×300		300×300	300×300	300×300	300×300	300×300		
size (maximum)*1・2	1,200×3,000		1,000×3,000	1,000×2,000	1,200×3,000	1,000×3,000	1,200×3,000		
Thickness*1	10・14		11・15	11・15	9・15	9・15	10・14		

\*1 All units in mm \*2 The size tolerances are +0 mm to -5 mm for all sides.

\*3 Contact the sales representative serving your locality for products of 300 mm or less.

## Custom mat switch estimates and ordering information (Dimensions in mm)

800 - 1200 - 10 - A - 15 R1

① ② ③ ④ ⑤ ⑥

800 - 1200 - 10 - A - 15 R1 - 10 L1

① ② ③ ④ ⑤ ⑥ ⑤ ⑥

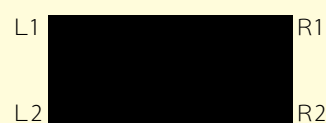
### ④ Material and Upper rubber

A	Oil resistant • Black Ribbed
B	Non-oil resistant • Black Ribbed
C	Non-oil resistant • Gray Ribbed
D	Oil resistant • Black Striped pattern
E	Non-oil resistant • Black Striped pattern
F	Oil resistant • Orange Floral pattern

G	Oil resistant • Black flat
H	Non-oil resistant • Black flat
I	Non-oil resistant • Green Ribbed
J	Non-oil resistant • Yellow Ribbed
K	Non-oil resistant • Red Ribbed

- ① Vertical dimension : Short side regarded as vertical side (10mm increments as standard)
- ② Horizontal dimension : Long side regarded as horizontal size (10mm increments as standard)
- ③ Thickness : See above. 10 mm and 14 mm are basic thicknesses.
- ④ Material and Upper rubber : See upper right
- ⑤ Lead wire length : Standard length is 1,500 mm (100mm increments as standard)  
The example above: 15 (=1500mm), 10 (=1000mm)
- ⑥ Lead wire outlet : See right

### ⑥ Lead wire outlet



The 4-wire system is standard for the lead wires (may be combined with a CG1 series interface controller (page 21) for wire-breaking detection). Contact the sales representative serving your locality for the other optional specifications (stumble prevention, heavy object support).



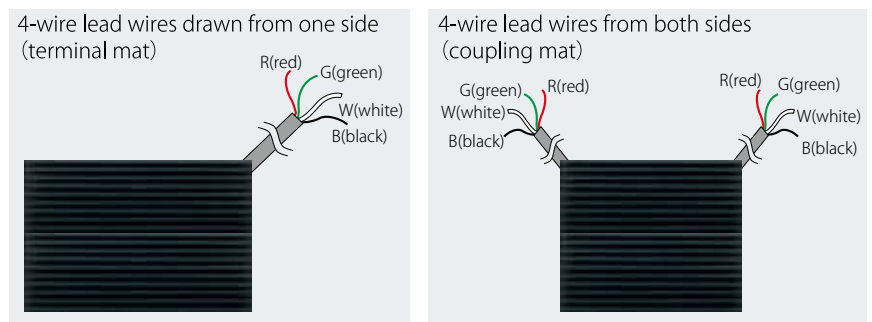
## Lead wires (See page 24 for wiring examples.)

Lead wires are available in 4-wire, which is further divided into those which are drawn from one side for terminating switches and those which are drawn from both sides for interconnecting switches.

Wiring system		Wire type	Thickness	Number of wires
4-wire	Lead wires drawn from one side	SVCTF (black) 4 conductors	0.75mm <sup>2</sup>	1
	Lead wires drawn from both sides			2

### ● 4-wire system (standard)

Each lead wire is a round shaped 4-conductor (red / green / white / black) cord and allows for wire-breaking detection when the mats and interface controller (page 21) are interconnected with wires of the same colors.



## Ramp frame AE-35 / AE-25 (optional)

2 types of aluminum ramp frames\*<sup>4</sup> are available for use according to the thickness of the mat to be used.

\*<sup>4</sup> The size after the installation of ramp frames = the shorter or longer side of Mat switch + 70mm each

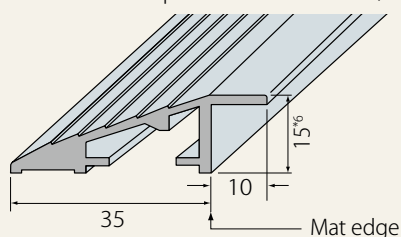
Applications: For securing the mat or for stumble prevention\*<sup>5</sup>

\*<sup>5</sup> The sides processed for stumble prevention (taped) cannot be used as their height does not match the height of the mat.

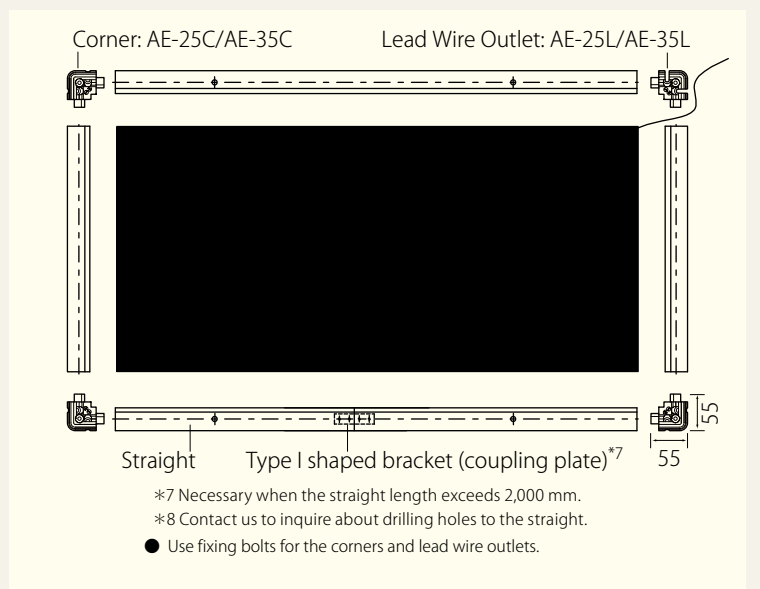
AE-35: (Compatible with the mats of 14 mm or 15 mm thick)

AE-25: (Compatible with mats having a thickness of 9 mm to 11 mm and standard products (page 18))

Dimensions of ramp frame cross section (mm)



\*<sup>6</sup> The AE-25 is available in versions with a height of 12 mm only.



# Interface Controllers (CG1 Series)

For improved reliability



The CG1 series interface controllers can detect on/off and wire-breaking states when used in conjunction with tape switches (page 5), edge switches (page 9), bumper switches (page 15), or mat switches (page 17).

● The following two functions are selectable:

Self-holding function: The output state is switched upon detection of a contact between switch contacts.

(Direct output function is also selectable)

Wire break detecting function: The output state is switched upon detection of wire break, even though instant wire break.

(Applicable for 4-wire system switches and terminating-register-integrated switches only)

Direct output function: The output state is switched only when a contact between switch contacts is detected (connecting the DM pin to the ground pin).

● There are two output functions. The output is generated from a relay contact.

Main output: The output state is switched upon detection of a contact between switch contacts or a wire break.

(c contact: NO/NC terminal display is the status "Power off time")

Wire-breaking detection output: Detecting wire-breaking and switching output from on to off status.

(b contact: Self-holding function only)



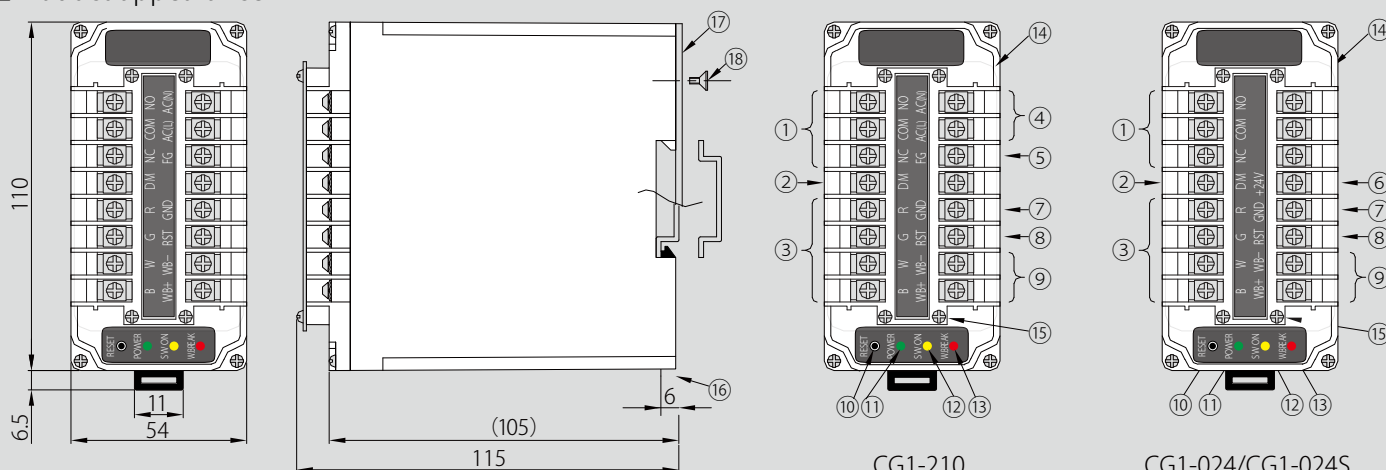
**Caution**



Do not use the interface controller using the logic which will switch the target device into the active mode when a contact operation is detected.

Failure to observe this caution may place the device into the active mode at wire-breaking or controller power loss time, thus jeopardizing its safety.

## Product appearance



CG1-210

CG1-024/CG1-024S

## Names of the parts

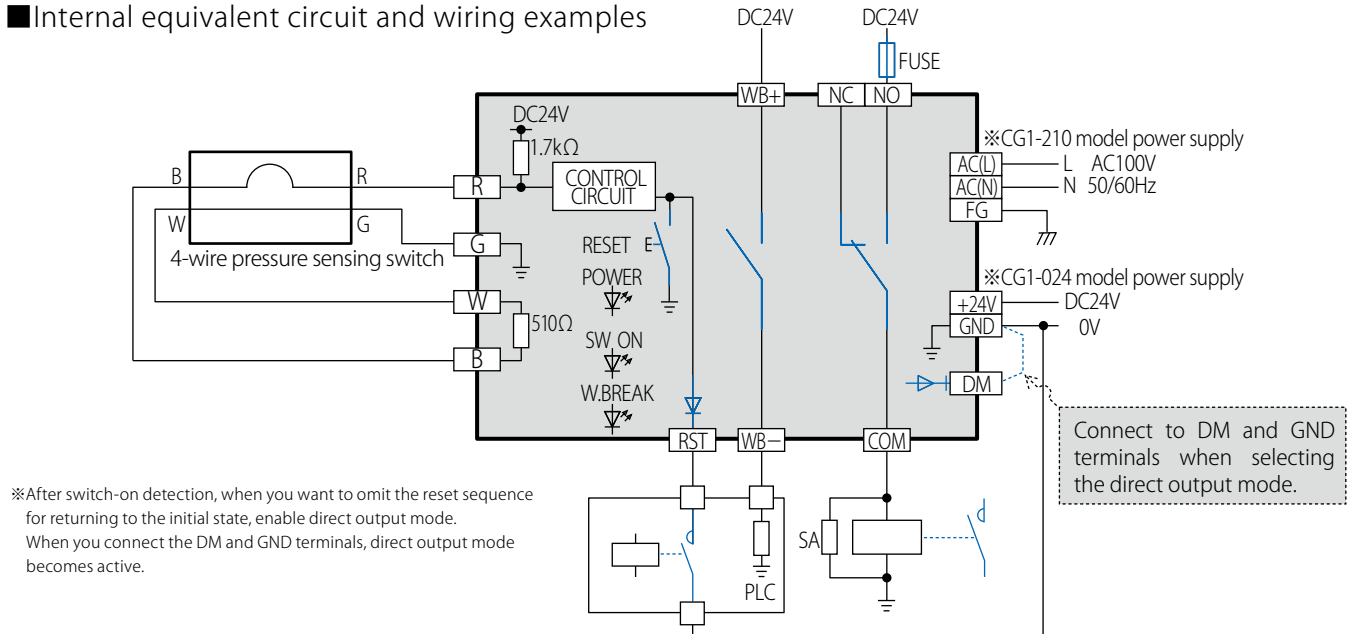
Number	Name/Explanation	Main body name	Number	Name/Explanation	Main body name
1	Main output terminal (c contact)	NO, COM, NC	10	Reset switch	RESET
2	Direct output mode select terminal	DM	11	Power LED (green)	POWER
3	Pressure sensing switch input terminal	R, G, W, B	12	Switch contact detection LED (orange)	SW ON
4	AC power input terminal (CG1-210 only)	AC(N), AC(L)	13	Wire-breaking detection LED (red)	W.BREAK
5	Ground terminal (CG1-210 only)	FG	14	Clear cover (terminal protection cover)	
6	DC power input terminal (CG1-024/CG1-024S only)	+24V	15	M3 tapping pan head machine screw (4 screws for mounting the clear cover)	
7	GND terminal	GND	16	DIN rail clamping lever	
8	Reset terminal (for external control)	RST	17	Base fixture (t = 1.0)	
9	Wire-breaking detection output terminal (a contact)	WB-, WB+	18	M3 tapping countersunk head machine screw (4 screws for mounting the base fixture)	

## ■ List of specifications

Specifications	CG1-210	CG1-024	CG1-024S
Supply voltage	AC100 to 240V±10% 50/60Hz	DC24V±10%	
Power consumption	5.5VA maximum	2.0W maximum	
Switch detection	AC5 to 250V:0.01 to 4A, DC5 to 30V:0.01 to 4A		DC5 to 30V: 1 to 50mA
Output terminal (c contact)	(Resistive load)		(Resistive load)
Wire-breaking detection	DC5 to 30V: 0.1 mA to 30 mA (Resistive load)		
Output terminal (a contact)			
External dimensions	54(W) ×110(H)× 115(D)mm		
Weight*	Approx. 280g	Approx. 240g	
Terminating resistor (resistive load)	510Ω		
Ambient temperature	-10 to +50℃ (Must not be subjected to freezing and condensation)		
Protection class	I P 2 0 (IEC60529)		
Applied standard	European low voltage directive EN60947-1, EN60947-5-1		—
	European EMC directive EN55011, EN61000-4-2,3,4,5,6,11		
	RoHS directive compliant		

\*Weight does not include that of the base fixture (flat mounting plate).

## ■ Internal equivalent circuit and wiring examples



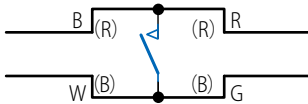
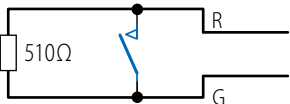
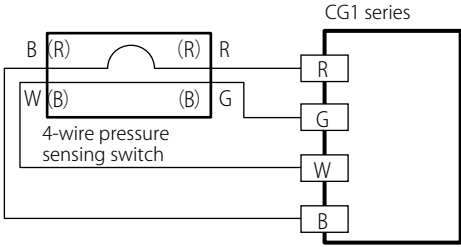
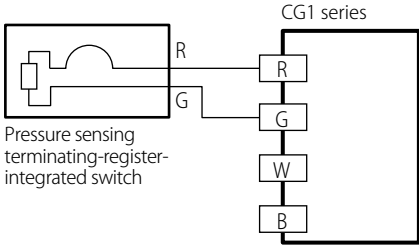
## ■ Output contact operations and LED indicators

Transition state	Switch contact detection output contact	Wire-breaking detection output contact	LED indicator	Operating state
1. Power off time			POWER ○ SW ON ○ W.BREAK ○	Stopped
2. After power on			POWER ● SW ON ● W.BREAK ●	Stopped
3. Initial state* (After reset sequence)			POWER ● SW ON ○ W.BREAK ○	Ready for operation
4. Switch-on detection* (Subsequently, the output state is held even when the switch is turned off and released after the reset sequence)			POWER ● SW ON ● W.BREAK ○	Stopped
5. Switch wire-breaking detection* (Subsequently, the output state is held even when the switch is turned off and released after the reset sequence)			POWER ● SW ON ● W.BREAK ●	Stopped

\*When in direct output mode, the initial state is reactivated when turned off.

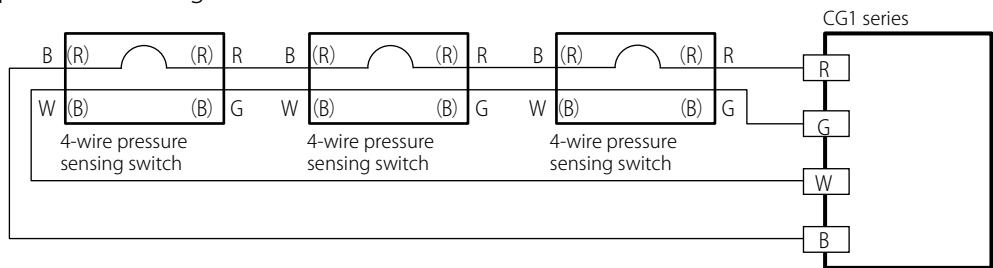
# Use and Wiring Examples of the Tokyo Sensor's Pressure Sensing Switching Products

■ Examples of connecting the lead wires of switch products to a CG1 interface controller and equivalent circuits

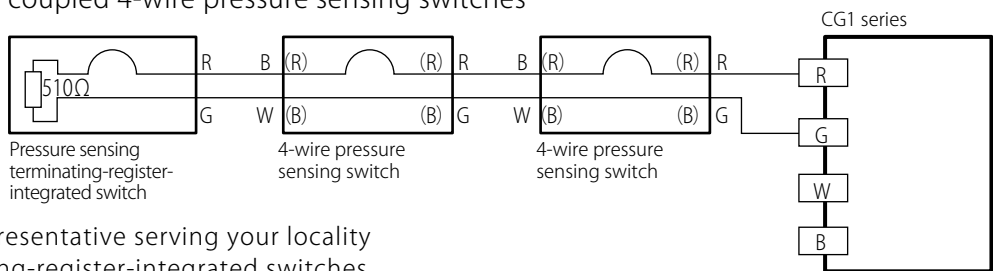
Switch type	4-wire system			Terminating-resistor-integrated switch		
	Lead wire		CG1 terminal	Lead wire		CG1 terminal
	Wire type	Wire color		Wire type	Wire color	
Tape switch (page 5)	VFF	Red (R) Green (G)	R G	VFF	Red (R) Green (G)	R G
	VFF	Black (B) White (W)	B W			
Edge switch (page 9)	VFF	Red (R) Green (G)	R G	VFF	Red (R) Green (G)	R G
	VFF	Black (B) White (W)	B W			
Bumper switch (page 13)	VFF	Red (R) Black (B)	R G	VFF	Red (R) Green (G)	R G
	VFF	Red (R) Black (B)	B W	※Contact the sales representative serving your locality for bumper terminating-register-integrated switches.		
Switch equivalent circuit						
Wiring diagram						

■ Examples of coupling pressure sensing switches  
(Applicable products: tape switch, edge switch, and bumper switch)

(1)Coupling 4-wire pressure sensing switches



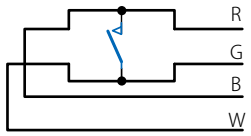
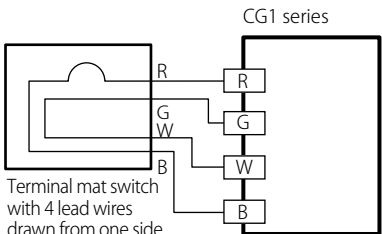
(2)Using a pressure sensing terminating-resistor-integrated switch at the end of the coupled 4-wire pressure sensing switches



※Contact the sales representative serving your locality for bumper terminating-resistor-integrated switches.

## ■ Examples of connecting the lead wires of switch products to a CG1 interface controller and equivalent circuits

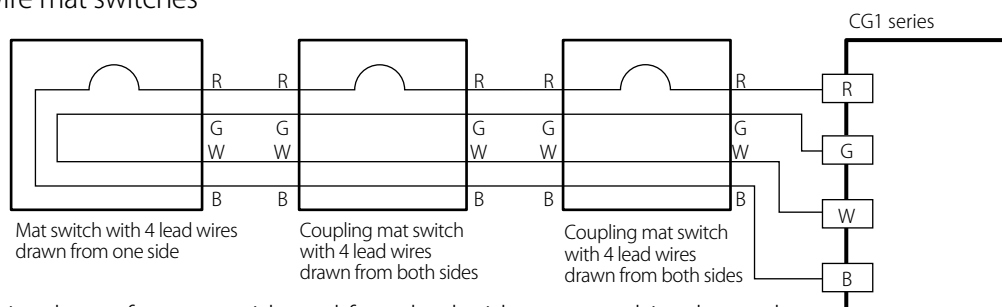
### Terminal mat product

Switch type	4-wire system with lead wires drawn from one side		
	Lead wire		CG1 terminal
	Wire type	Wire color	
Mat Switch (page 17)	SVCTF (Black, 4 conductors)	Red (R)	R
		Green (G)	G
		Black (B)	B
		White (W)	W
Switch equivalent circuit			
Wiring diagram			

### Coupling mat products

Switch type	4-wire system with lead wires drawn from both sides			
	Lead wire		Lead wire	
	Wire type	Wire color	Wire type	Wire color
Mat Switch	SVCTF (Black, 4 conductors)	Red (R)	SVCTF (Black, 4 conductors)	Red (R)
		Green (G)		Green (G)
		Black (B)		Black (B)
		White (W)		White (W)
Switch equivalent circuit				
Wiring diagram				

### ■ Example of coupling 4-wire mat switches



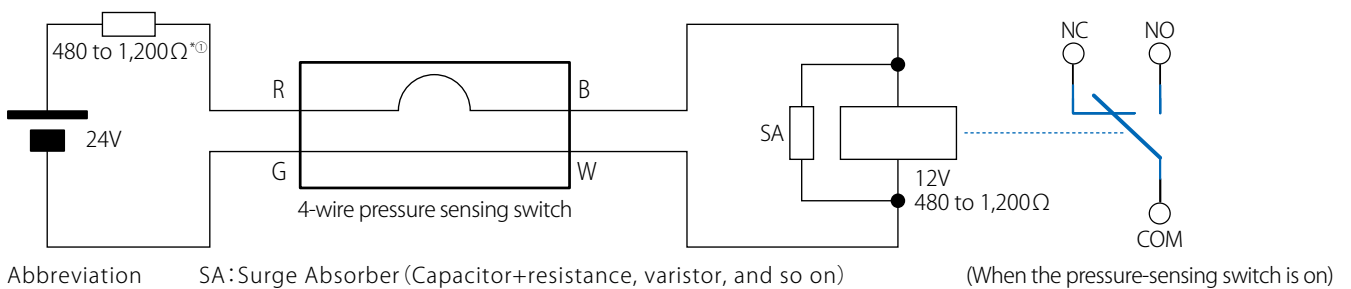
- Mat switches with 4 lead wire drawn from one side and from both sides are combined together.

## ■ Miscellaneous configuration examples (DC24V applied)

### ⚠ Safety Precautions

- ❗ The following circuits are examples. If these example are adapted, risk assesment must be completed.
- ❗ Before using any of these examples, make sure that you understand the safety and general precautions described in the instruction manual of the relay, and that you adequately check the operation.
- ❗ For the power supply, use CLASS II equipment for over-voltage protection and over-current protection.
- ❗ In (1) below, the used resistance consumes maximum power in a switch-on state (four times the power at switch-off).  
For the nominal power of the resistance, consider the ambient temperature and the heat radiation in the environment, and select equipment with values that provide sufficient margin.
- ❗ When placing the resistance, take heat-radiation precautions suitable for the power consumption, by maintaining space and airflow that allows the heat to radiate naturally.  
If the power consumption is high, take protective measures to ensure that people and cables or other nearby objects do not touch the resistance.  
If you use a resistance that does not provide sufficient margin for the nominal power, the generated heat may not only melt the soldering or damage the electrical resistor itself, but also cause burns and injuries to human bodies and ignite surrounding objects upon contact.

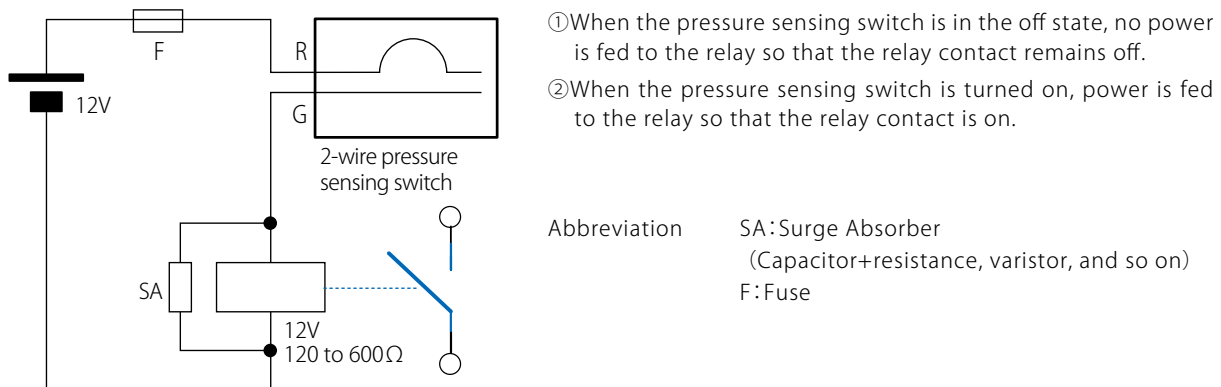
#### (1) 4-wire pressure sensing switch product



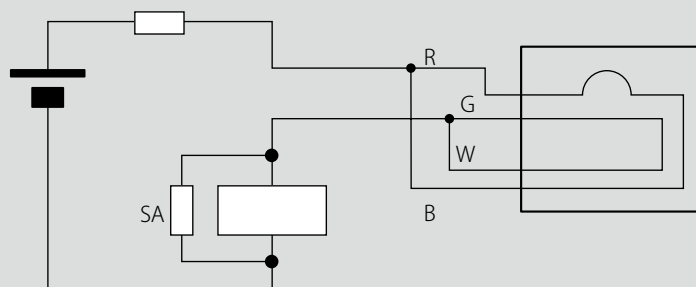
- ① The resistance of the protective resistor to be used on the power supply side should be as close to the resistance value of the relay as possible.
- ② Since the supply voltage is divided by the resistor and the relay, the voltage across the relay turns to be 12V which is half the supply voltage of 24V.
- ③ When the pressure sensing switch is in the off state, power is fed to the relay so that the relay contact is held on the NO (Normally Open) side.
- ④ When the pressure sensing switch turned on, no power is fed to the relay so that the relay contact is returned to the NC (Normally Close) side.
- ⑤ Similarly, the relay contact is returned to the NC side in the event of a power failure or wire break.

※ The figure above is a wiring diagram and does not show operation.

#### (2) 2-wire pressure sensing switch product



※ When using a 4-wire mat switch as a 2-wire switch, short between R and B and between G and W.





# Product Approvals Every Customer Must Make When Ordering/Using Our Products

Thank you for using Tokyo Sensor Co., Ltd. products (hereafter simply called our products).

This document describes the consent matters every customer must make when ordering the products mentioned herein.

The following applies unless special matters or contracts are specifically noted otherwise.

## 1 Product Warranty

### 1.1 Warranty Period

The warranty period of our products is one (1) year after delivery.

For paid repair service on products, the warranty period is six (6) months after delivery.

### 1.2 Warranty Coverage

Any defects detected in our products under our responsibility during the above warranty period will be repaired, replaced or substituted for an equivalent product at the discretion of Tokyo Sensor free of charge. However, this warranty does not cover any of the following conditions:

- ① Faults and/or damage due to misuse, improper repair and/or tampering by the customer.  
(Failure to observe the operating conditions, environments, and precautions specified in the instruction manual)
- ② Faults and/or damage due to improper transfer, storage, installation, management, or maintenance after purchase of the product.
- ③ Faults and/or damage due to earthquake, lightning, fire, flood, other natural disaster or the use of an abnormal source voltage or a non-manufacturer-specified power source (voltage/frequency).
- ④ The fault is attributed to a product other than our products.
- ⑤ The product is used in a way other than what it was originally intended.
- ⑥ Faults and/or damage due to installation on a vehicle or ship without prior consultation.
- ⑦ The fault and/or damage was unforeseeable with the scientific/technical level at the time of product shipment.

## 2 Limitations of Liability

The warranty described herein covers a single product unit and Tokyo Sensor Co. Ltd. is not liable in any way for any damage suffered by the customer which is incurred due to a failure of these products.

## 3 Confirmation of Compatibility Conditions

- 3.1 When using our product in combination with other product(s), the customer must do so upon confirming the specifications, laws and regulations that must be complied with. In addition, the customer must confirm the compatibility of the devices, machines and system in use.

### 3.2 Usage Precautions

Do not use the products in controlled areas of nuclear facilities (radiation controlled areas and contamination controlled areas).

When using the products in the ways listed below, contact and consult with Tokyo Sensor Co., Ltd. in advance and check the detailed specifications by referring to the manuals and specifications documents.

- ① Using the products under any conditions or in environments other than those described in the manuals and/or specification documents
- ② Using the products in special circumstances
  - (a) Using the products outdoors or in an environment that may incur potential chemical contamination or electric interference
  - (b) Atomic energy control equipment, aerospace systems, submersible equipment, incineration facilities, electrothermal equipment, trains/airplanes, vehicle equipment, disaster prevention equipment, medical equipment, entertainment devices
  - (c) Systems, machines, and equipment that may endanger human life or property
  - (d) Facilities that require high reliability such as gas, water and power supply systems, and equipment used for 24-hour continuous operation systems
  - (e) Facilities in compliance with the regulations of public bodies, administrations, or individual industries
  - (f) Facilities that require the high level of safety to accommodate (a)-(e) as prescribed above

We make continuous efforts to improve the quality and reliability of our products. However, there is always the possibility that parts and machines may malfunction. When using these products in ways that may result in serious harm to human life, body, or property, make sure in advance that the design is fool-proof and fail-safe to avoid any such damage and that proper wiring and installation are performed for the intended use of these products.

## 4 Cautions on Long-term Use

The product life varies greatly depending on the frequency at which and the environment in which the products are used.

These products should not be used in excess of 7 years unless specifically noted otherwise in the specifications or manuals.

## 5 Changes to Product Specifications

The specifications of these products are subject to change without notice for reasons such as the needs for improvement, market demands and/or problems in our supply chain.

## 6 Discontinuation of Product and Parts Supply

Manufacturing of these products may be discontinued without notice due to possible problems in our supply chain.

Spare parts will be kept in stock for 5 years in principle after the discontinuation of manufacturing.

However, parts may not be supplied due to unavoidable reasons even within this period.

Repairs may not be available due to reasons such as unavailability of parts.

## 7 About the Manuals

- ① Read the manual included with the product to achieve a thorough understanding of its contents before using the product.
- ② Keep the manual in a safe place so that it can be readily referred to at any time as necessary.
- ③ Follow the instructions and precautions described in the manuals.

## 8 Export Control


When exporting "our products" and/or its technical materials, observe the laws and regulations of Japan and relevant countries regarding security import/export control.

"Our products" or technical materials may not be provided if the customers violate these laws and regulations.



# Cautions for Use


## Safety Precautions

※This section explains the severity of safety hazards and physical damage that might arise if the customer uses our products in the wrong way ignoring the precautions and warnings covered here.

 <b>Cautions</b>	<b>A column identified by this sign indicates a hazardous situation that is likely to result in death or a situation that is likely to cause serious injury or severe physical damage unless it is avoided.</b>
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※The types of precautions to be observed are classified by the following pictorial safety symbols:

	<b>This symbol illustrates a "prohibited activity" that must not be taken.</b>
	<b>This symbol illustrates an "instruction" that must always be observed.</b>

 <b>Cautions</b>	
<ol style="list-style-type: none"> <li>Pressure sensing switch products</li> <li>Controller products</li> </ol>	<ul style="list-style-type: none"> <li>• The pressure sensing switch is broken and its switching capability is likely to be hindered. When using a pressure sensing switch product, select and make a system design of an appropriate type while giving due consideration to the operating speed and weight of the sensing object.</li> <li>• The pressure sensing switch is broken and its switching function is likely to be hindered. No pressure sensing switch must be used under any load that goes beyond the valid rated value range of its contacts. Failure to observe this caution will not only results in performance impairments such as poor insulation, contact welding, and poor contact but also is likely to lead to breakage or burnout.*</li> <li>• The device may be activated to perform an unexpected operation when a wire break or power loss occurs. Do not use the controller in the logic in which the controlled device is placed in the activated mode on a detection by a pressure sensing switch.</li> <li>• It is likely that an electrical shock, malfunction, breakage, or burnout is caused by an insulation breakdown.* Never use the controller for loads that exceed the rated contact value of the output contacts.</li> </ul> <p>* If the controller is used with a voltage and/or current that are smaller than the minimum rated values, the contact resistance may be increased due to the influences of the oxide layer which is formed over the contacts, resulting in contact failures.</p>

## Operating Precautions

- Before using our product, carefully read and fully understand the general and safety precautions described in our product brochures and instruction manuals. Failure to observe the precautions and directions described on them may not only impair the designed performance of the product but also result in human injury or physical damage to the product depending on the hazardous circumstance that occurred.
- The package is intended for transportation purposes. After the product arrives at your site, unpack the package immediately and place the product flat. Keeping the product packaged may not only impair the intended performance but also lead to product deformation or breakage. If packaging for storage purposes is desired, contact our sales representative serving your locality.
- Avoid dropping, bumping against an object, bending, or straining the product. Otherwise, occurrences of surface defects such as cuts and tears or deformation might not only impair the intended performance of the product but also cause product malfunction or breakage.
- Never use a product that is subjected to drilling or other modification or a product that has cuts or dents on its outer surface. Failure to observe this caution may not only impair the intended performance of the product but also cause malfunctions or breakage.
- Install any pressure sensing switch product on a flat surface except in special cases (e.g., for handling options). Installing on a rough surface may not only impair the intended performance of the product but also cause malfunction or breakage.
- It is recommended to secure the product using a dedicated channel or joint frame. For the other securing methods, contact us as they would likely to shorten the life expectancy of the product.
- Make sure that the wires are never laid in parallel with the power lines or any cables in a power electrics system. Surge and noise components from the power lines or cables in the power electrics system would cause product malfunction.
- Do not keep any pressure sensing switch product under heavy load for an extended period. Otherwise, its switching mechanism might be subjected to deformation, causing a switching response delay or other performance impairment or causing malfunction.
- Prevent any organic solvent such as thinner and gasoline from adhering to the product. Adherence of a solvent might result in deterioration or deformation of product parts, causing not only the impairment of intended performance but also product malfunction and failure.
- The optional waterproof feature of a pressure sensing switch product conforms to protection class 7 of JIS C0920:2003. The switch cannot be used in a water-submerged state; make sure that the installation site has good drainage. Also protect the junction portion of the lead wires from the splash of water. The water permeated from the tip of a lead wire might enter into the switch interior, causing poor insulation, malfunction, or poor connection.
- Use and store your product within the specified ambient temperature and humidity ranges. Use or storage of a product beyond the specified ranges may not only impair the intended performance of the product but also cause deformation or breakage.
- Make periodical checks of your product according to the use condition of the product. The checks should be conducted by an authorized operator who has good technical knowledge while paying adequate attention to safety.
- When a product anomaly such as operation failure is detected, stop using the product immediately and inspect it. If the anomaly persists, stop using the product and call us for help.
- Disposal of a product should be carried out as waste disposal.







# IDEC CORPORATION

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