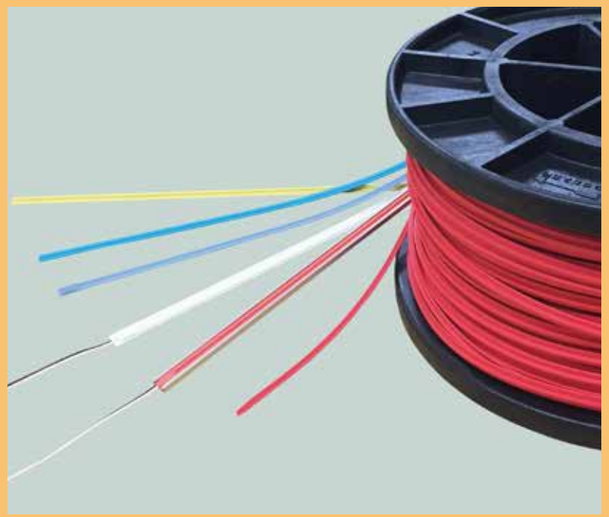
TOKYO SENSOR

TAPE SWITCH®

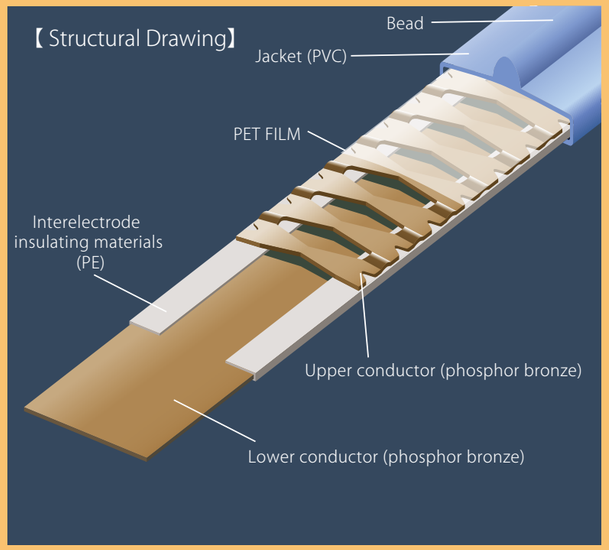
Free length tape switches developed by Tokyo Sensor



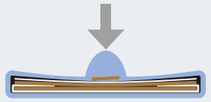
Thin free length tape switches.
Serve as switches when pressed at any point on their bead.
They can serve as security switches for emergency stop applications such as "stuck in" detection, contact detection, and intrusion detection.

- 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).

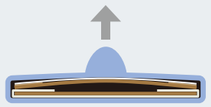
【Structural Drawing】



【Operating principles】



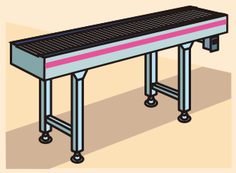
The bead at the center portion of the tape is depressed by a load, so that the upper conductor makes contact with the lower conductor, causing the circuit to turn on.



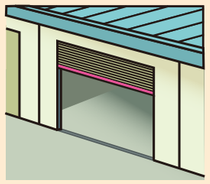
When the load is removed, the upper conductor is restored in the original position, so that the circuit turns off.

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

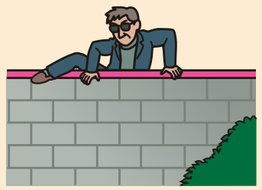
Conveyor
(Emergency stop)



Shutter
("Stuck in" detection)



Security
(Intrusion detection)



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

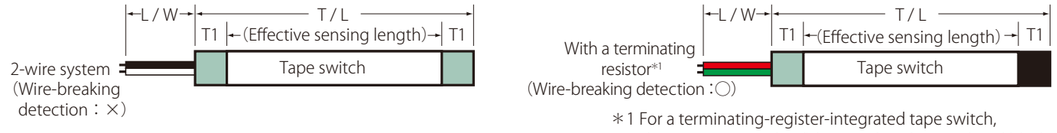
We changed some specific material in compliance with the updated RoHS2 directive, so we also changed the type number. Please see "Type number Chart" in page 8.

See page 23 for wiring examples and equivalent circuit and page 26 for a detailed description of the lead wire types.

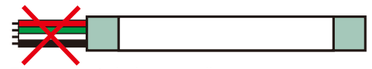
■Termination non-sensing section

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.



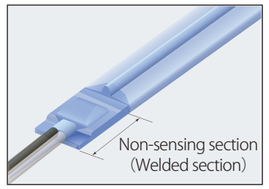
The tape switch does not allow 4 wires to be drawn out from one side.

Length of the non-sensing section (T1)

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

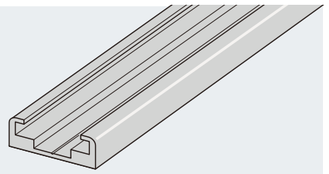
T/L (tolerance)

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



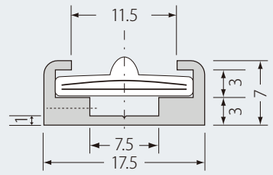
Dedicated aluminum channel (optional)

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 : 23.8×10^{-6}/K

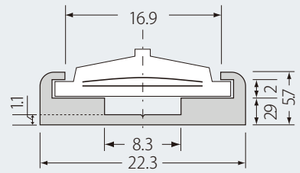


Aluminum channel for tape switches (3,000 mm maximum)

Standard type AC-175 weight 140g/m



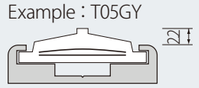
Wide type AC-223 weight 160g/m



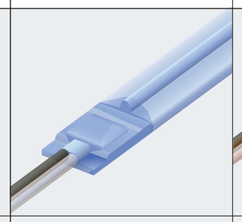
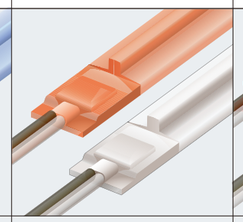
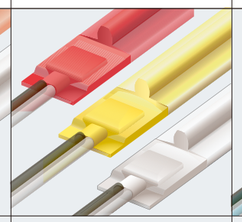
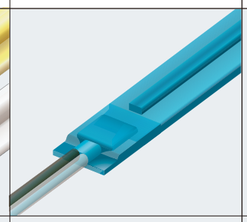
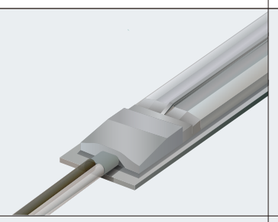
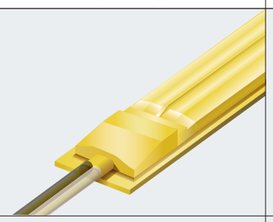
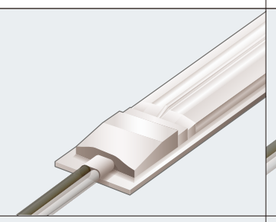
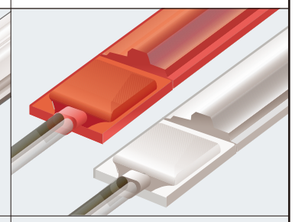
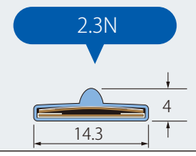
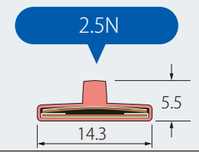
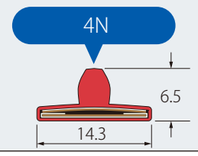
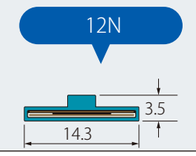
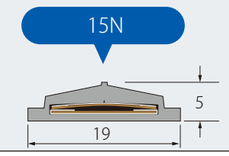
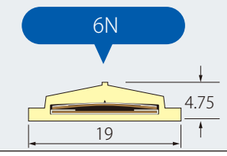
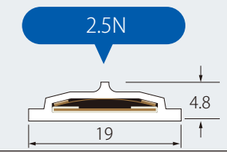
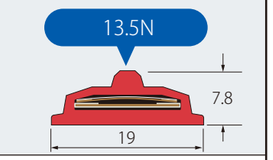
Amount of protrusion of the bead from the channel jacket (mm)

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)				Wide type (tape width: 19 mm)			
Type number (color)	T01BL1 (light blue)	T02RE1 (pastel red) T02WH1 (white)	T03RE1 (red) T03YE1 (pastel yellow) T03WH1 (white)	T04BL1 (blue)	T05GY1 (gray)	T06YE1 (pastel yellow)	T07WH1 (white)	T20RE1 (red) T20WH1 (white)
Applications	●Start/stop of machine ●Contact detection	●Contact detection ●"Stuck in" detection of a door	●Contact detection ●"Stuck in" detection of a door	●Impact detection ●Heavy load detection	●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
Appearance								
Actuating force*1, Cross sectional view, shape*2 (Dimensions in mm)								
Maximum length	—	—	—	1,900mm	—	—	—	—
Weight	Approx. 70g/m	Approx. 70g/m	Approx. 80g/m	Approx. 70g/m	Approx. 110g/m	Approx. 100g/m	Approx. 90g/m	Approx. 120g/m
Minimum curvature	Radius 150mm or longer			Dissallowed	Radius 150mm or longer			
Operating temperature range*3	0 to 50℃				0 to 50℃ (noncondensation)			
Storage temperature range	0 to 60℃				0 to 60℃			
Storage humidity range	55%RH or less (before welding the end), 90%RH or less (after welding the end)				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)				AC-223 (wide type only, optional)			

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

■Electrical characteristics*4

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.

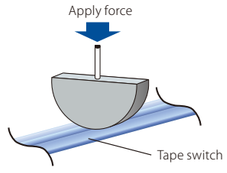
■Structure and operating characteristics

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

■Ambient environment and environmental performance

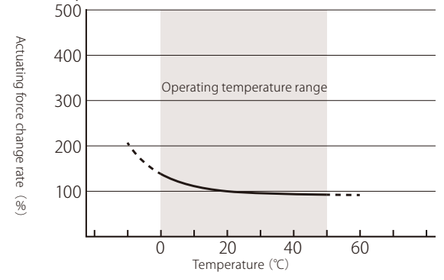
Oil resistant (class JIS1, JIS3)	:Poor
Organic solvent resistance	:Poor
Waterproof specifications (optional)	:JIS C 0920: 2003 protection class 7

■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 (①) T/L800 (②) L/W500 (③) 2-wire (④)

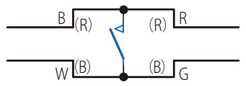
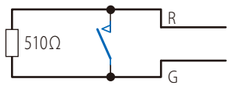
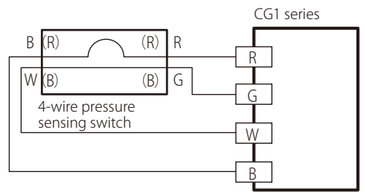
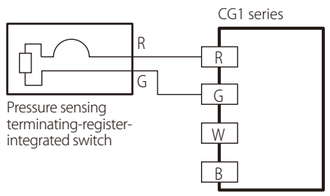
① Type ② T/L (total switch length)
③ L/W (lead wire length: 500 standard)
④ 2-wire (standard)/4-wire/terminating resistor integrated
Contact the sales representative serving your locality for lead wire type, waterproof specifications, and other options.
When placing an order for a tape switch channel (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		

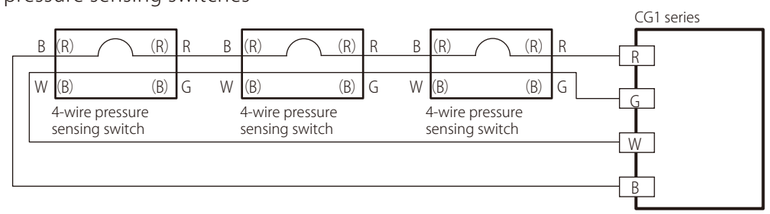
Use and Wiring Examples of the Tokyo Sensor's Pressure Sensing Switching Products

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

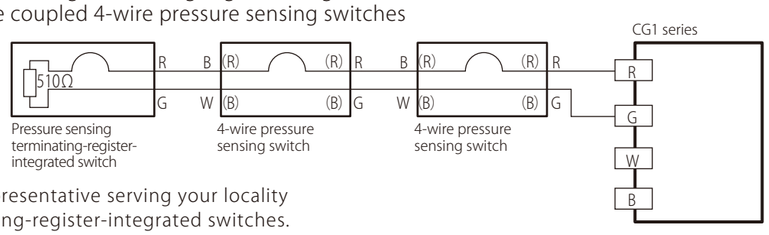
Switch type	4-wire system			Terminating-resistor-integrated switch		
	Lead wire		CG1 terminal	Lead wire		CG1 terminal
	Wire type	Wire color		Wire type	Wire color	
Tape switch (page 5)	VFF	Red（R）	R	VFF	Red（R）	R
		Green（G）	G		Green（G）	G
	VFF	Black（B）	B			
		White（W）	W			
Edge switch (page 9)	VFF	Red（R）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



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

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 13), Mat switch (page 17)

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) 0.5mm²	500mm	Same color as switch jacket	
	4-wire system			Red-green/Black-white	×
	Terminating resistor integrated			Red-green	○
Bumper switch	4-wire system	VFF (vinyl sheathed flat type cable) 0.3mm²	500mm	Red-black×2	○
Mat switch	4-wire system	SVCTF (Soft vinyl cabtyre round cord) 0.75mm²	1,500mm	Red-green/Black-white	○

＊1 The Lead Wires of EH-02 is VFF 0.3mm², and The Lead Wires of E21BK0 is SVCTF 0.3mm² 2 cores×2.
＊2 The standard color of the lead wires in the 2-wire T20RE0, T20WH0, EH-02 and E20BK is black-white, and 2-wire edge switches is the same as that of the built-in switch jacket
＊3 The Lead Wires color of E21BK0 is black-white.