Compact Proximity Sensor

TL-M

CSM_TL-M_DS_E_3_1

As Easy To Install as a Microswitch

• A compact Proximity Sensor with the feel of a microswitch.

CE

⚠ Be sure to read *Safety Precautions* on page 4.

Ordering Information

Appearance	Sensing distance	Output specifications	Model	
			Operation mode	
			NO	NC
Microswitch type 	2 mm	DC 3-wire, NPN voltage output	**TL-M2ME1 2M**	**TL-M2ME2 2M**
		AC 2 wire	**TL-M2MY1 2M**	---
	5 mm	DC 3-wire, NPN voltage output	**TL-M5ME1 2M**	**TL-M5ME2 2M**
		AC 2 wire	**TL-M5MY1 2M**	---

Note: Models with different frequencies are also available. The model numbers are TL-M□M□□5 (e.g., TL-M2ME15).

Ratings and Specifications

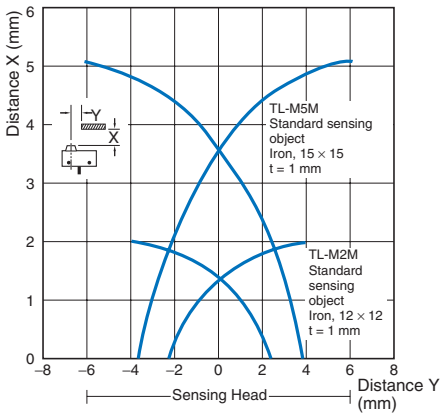
Item	Model	TL-M2ME1, TL-M2ME2, TL-M2MY1	TL-M5ME1, TL-M5ME2, TL-M5MY1
Sensing distance		2 mm ±10%	5 mm ±10%
Set distance		0 to 1.6 mm	0 to 4 mm
Differential travel		10% max. of sensing distance	
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 2.)	
Standard sensing object		Iron, 15 × 15 × 1 mm	
Response frequency		E Models: 500 Hz, Y Models: 20 Hz	E Models: 250 Hz, Y Models: 20 Hz
Power supply voltage (operating voltage range)		E Models: 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 20% max. Y Models: 100 to 220 VAC (90 to 250 VAC), 50/60 Hz	
Current consumption		E Models: 15 mA max. at 24 VDC (no-load)	
Leakage current		Y Models: 2.5 mA max. at 200 VAC	
Control output	**Load current**	E Models: 100 mA max. at 12 VDC, 200 mA max. at 24 VDC Y Models: 10 to 200 mA	
	Residual voltage	E Models: 1 V max. Y Models: Refer to *Residual Output Voltage* under *Engineering Data* on page *3*.	
Indicators		E Models: Detection indicator (red) Y Models: Operation indicator (red)	
Operation mode (with sensing object approaching)		E1/Y1 Models: NO E2 Models: NC Refer to the timing charts under *I/O Circuit Diagrams* on page 3 for details.	
Protection circuits		E Models: Reverse polarity protection, Surge suppressor Y Models: Surge suppressor	
Ambient temperature range		Operating/Storage: –25 to 70°C (with no icing or condensation)	
Ambient humidity range		Operating/Storage: 35% to 95% (with no condensation)	

Item	Model	TL-M2ME1, TL-M2ME2, TL-M2MY1	TL-M5ME1, TL-M5ME2, TL-M5MY1
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C	
Voltage influence		E Models: ±2.5% max. of sensing distance at rated voltage in the rated voltage ±15% range Y Models: ±1% max. of sensing distance at rated voltage in the rated voltage ±10% range	
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case	
Dielectric strength		E Models: 500 VAC, 50/60 Hz for 1 min between current-carrying parts and case Y Models: 2,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case	
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions	
Shock resistance		Destruction: 500 m/s^2 10 times each in X, Y, and Z directions	
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant	
Connection method		Pre-wired Models (Standard cable length: 2 m)	
Weight (packed state)		Approx. 75 g	
Materials	Case	Heat-resistant ABS	
	Sensing surface		
Accessories		Instruction manual	

Engineering Data (Typical)

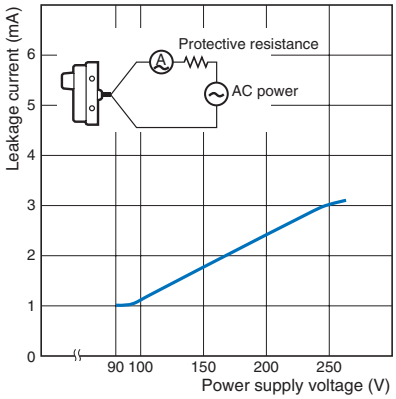
Sensing Area

TL-M2□/M5□



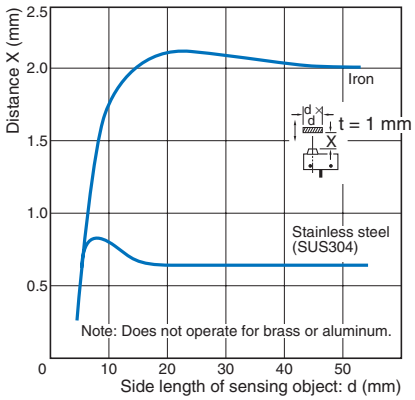
Leakage Current

TL-M□MY1

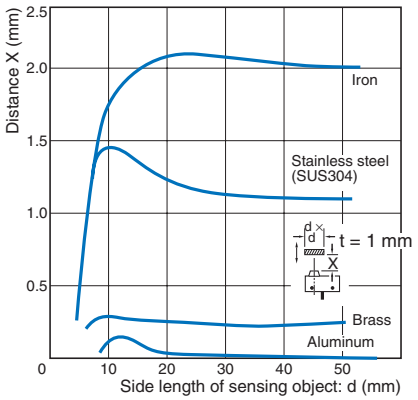


Influence of Sensing Object Size and Material

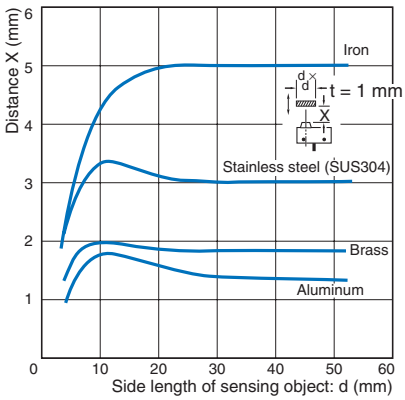
TL-M2ME



TL-M2MY1

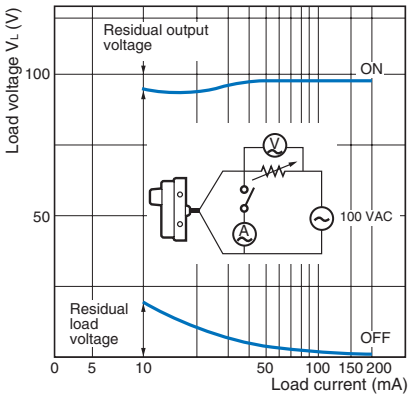


TL-M5M

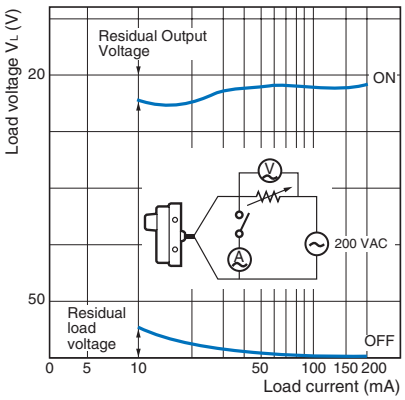


Residual Output Voltage

TL-M□MY1 at 100 VAC

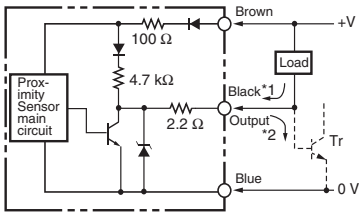


TL-M□MY1 at 200 VAC



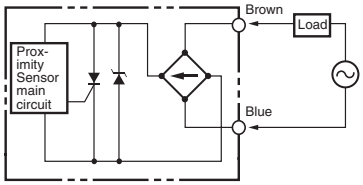
I/O Circuit Diagrams

DC 3-Wire Models

Operation mode	Output specifications	Model	Timing chart	Output circuit
NO	NPN	TL-M2ME1 TL-M5ME1	Sensing object: Present / None Load (between brown and black leads): Operate / Reset Output voltage (between black and blue leads): High / Low Detection indicator (red): ON / OFF	
NC		TL-M2ME2 TL-M5ME2	Sensing object: Present / None Load (between brown and black leads): Operate / Reset Output voltage (between black and blue leads): High / Low Detection indicator (Red): ON / OFF	

*1. 200 mA max. (load current).
*2. When a transistor is connected.

AC 2-Wire Models

Operation mode	Model	Timing chart	Output circuit
NO	TL-M2MY1 TL-M5MY1	Sensing object: Present / None Load: Operate / Reset Operation indicator (Red): ON / OFF	

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

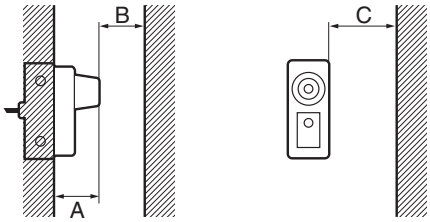
Precautions for Correct Use

Do not use this product under ambient conditions that exceed the ratings.

● Design

Influence of Surrounding Metal

When installing Sensors on metal surfaces or near metal, ensure that the minimum distances given in the following table are maintained.



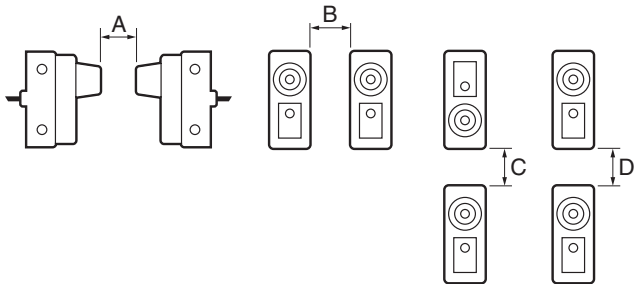
Note: For direct mounting, the distance "C" will equal 0 only in the shaded section of the above left-side section.

Influence of Surrounding Metal (Unit: mm)

Model / Distance	A	B	C
TL-M2M	12	10	15
TL-M5M	18	25	30

Mutual Interference

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.



Mutual Interference (Unit: mm)

Model / Distance	A	B	C	D
TL-M2M	60 (30)	40 (0)	30 (0)	10 (0)
TL-M5M	120 (60)	80 (40)	70 (30)	50 (10)

Note: Values in parentheses apply to Sensors operating at different frequencies.

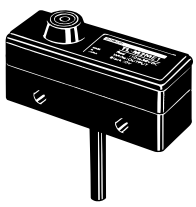
● Mounting

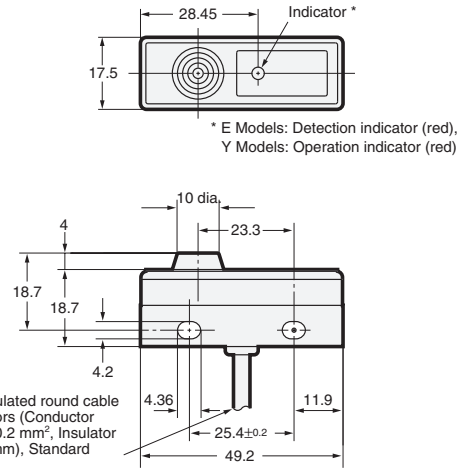
The maximum tightening torque that should be applied to the mounting screws is 0.98 N·m.

Dimensions

(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

TL-M2M

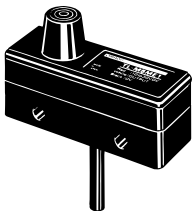


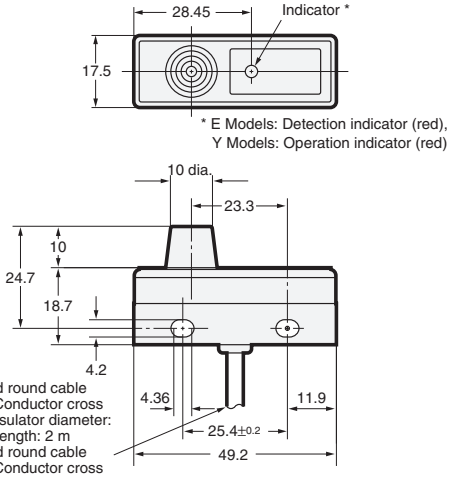


* E Models: Detection indicator (red), Y Models: Operation indicator (red)

E Models: 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm², Insulator diameter: 1.2 mm), Standard length: 2 m
Y Models: 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m

TL-M5M





* E Models: Detection indicator (red), Y Models: Operation indicator (red)

E Models: 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm², Insulator diameter: 1.2 mm), Standard length: 2 m
Y Models: 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m