


## Standard Flat Sensors in Many Different Variations


- Only 6 mm thick yet provides a sensing distance of 3 mm (TL-W3MC1).
- Aluminum die-cast models also available.





 Be sure to read *Safety Precautions* on page 7.

## Ordering Information

### DC 2-Wire Models

Appearance	Sensing distance			Model	
				Operation mode	
				NO	NC
Unshielded 	5 mm			TL-W5MD1 *1	TL-W5MD2 *1

### DC 3-Wire Models

Appearance	Sensing distance			Output configuration	Model	
					Operation mode	
					NO	NC
Unshielded 	1.5 mm			DC 3-wire, NPN	TL-W1R5MC1 *1 *2	---
	3 mm				TL-W3MC1 *1 *2	TL-W3MC2
	5 mm				TL-W5MC1 *1 *2	TL-W5MC2
	20 mm				TL-W20ME1 *1	TL-W20ME2 *1
Shielded 	5 mm			DC 3-wire, NPN	TL-W5E1	TL-W5E2
				DC 3-wire, PNP	TL-W5F1	TL-W5F2

\*1. Models with a different frequency are also available to prevent mutual interference. The model numbers are TL-W□M□□5 (e.g., TL-W5MD15).

\*2. Models with robotics cables are also available. The model numbers are TL-W□MC1-R (e.g., TL-W1R5MC1-R).

## Ratings and Specifications

### DC 2-Wire Models

Item	Model	TL-W5MD□
Sensing distance		5 mm ±10%
Set distance		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 <i>Engineering Data</i> on page 5.)
Standard sensing object		Iron, 18 × 18 × 1 mm
Response frequency *		500 Hz
Power supply voltage (operating voltage range)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.
Leakage current		0.8 mA max.
Control output	Load current	3 to 100 mA
	Residual voltage	3.3 V max. (under load current of 100 mA with cable length of 2 m)
Indicators		D1 Models: Operation indicator (red), Setting indicator (green) D2 Models: Operation indicator (red)
Operation mode (with sensing object approaching)		D1 Models: NO Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 6 for details. D2 Models: NC
Protection circuits		Load short-circuit protection, 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)
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of -25 to 70°C
Voltage influence		±2.5% max. of sensing distance at rated voltage in the rated voltage ±15% range
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case
Dielectric strength		1,000 VAC 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 <sup>2</sup> 3 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. 45 g
Materials	Case	Heat-resistant ABS
	Sensing surface	
Accessories		Instruction manual

\* The response frequency is an average value.

Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

DC 3-Wire Models

Model		TL-W1R5MC1	TL-W3MC□	TL-W5MC□	TL-W5E1, TL-W5E2 TL-W5F1, TL-W5F2	TL-W20ME1 TL-W20ME2	
<b>Sensing distance</b>		1.5 mm ±10%	3 mm ±10%	5 mm ±10%	20 mm ±10%		
<b>Set distance</b>		0 to 1.2 mm	0 to 2.4 mm	0 to 4 mm	0 to 16 mm		
<b>Differential travel</b>		10% max. of sensing distance				1% to 15% of sensing distance	
<b>Detectable object</b>		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 5.)					
<b>Standard sensing object</b>		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 50 × 50 × 1 mm		
<b>Response frequency</b>		1 kHz min.	600 Hz min.	500 Hz min.	300 Hz min.	40 Hz min.	
<b>Power supply voltage (operating voltage range)</b>		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			12 to 24 VDC (10 to 30 VDC), ripple (p-p): 20% max.	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.	
<b>Current consumption</b>		15 mA max. at 24 VDC (no-load)		10 mA max.	15 mA max. at 24 VDC (no-load)	8 mA at 12 VDC, 15 mA at 24 VDC	
<b>Control output</b>	<b>Load current</b>	NPN open collector 100 mA max. at 30 VDC max.		NPN open collector 50 mA max. at 12 VDC (30 VDC max.) 100 mA max. at 24 VDC (30 VDC max.)	200 mA	100 mA max. at 12 VDC 200 mA max. at 24 VDC	
	<b>Residual voltage</b>	1 V max. (under load current of 100 mA with cable length of 2 m)		1 V max. (under load current of 50 mA with cable length of 2 m)	2 V max. (under load current of 200 mA with cable length of 2 m)	1 V max. (under load current of 200 mA with cable length of 2 m)	
<b>Indicators</b>		Detection indicator (red)					
<b>Operation mode (with sensing object approaching)</b>		NO	C1 Models: NO C2/B2 Models: NC		E1/F1 Models: NO E2/F2 Models: NC		
<b>Protection circuits</b>		Reverse polarity protection, Surge suppressor					
<b>Ambient temperature range</b>		Operating/Storage: -25 to 70°C (with no icing or condensation)					
<b>Ambient humidity range</b>		Operating/Storage: 35% to 95% (with no condensation)					
<b>Temperature influence</b>		±10% max. of sensing distance at 23°C in the temperature range of -25 to 70°C					
<b>Voltage influence</b>		±2.5% max. of sensing distance at rated voltage in the rated voltage ±10% range		±2.5% max. of sensing distance at rated voltage in the rated voltage ±20% range	±2.5% max. of sensing distance at rated voltage in the rated voltage ±10% range		
<b>Insulation resistance</b>		50 MΩ min. (at 500 VDC) between current-carrying parts and case					
<b>Dielectric strength</b>		1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case					
<b>Vibration resistance</b>		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
<b>Shock resistance</b>		Destruction: 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions				Destruction: 500 m/s <sup>2</sup> 10 times each in X, Y, and Z directions	
<b>Degree of protection</b>		IEC 60529 IP67, in-house standards: oil-resistant					
<b>Connection method</b>		Pre-wired Models (Standard cable length: 2 m)					
<b>Weight (packed state)</b>		Approx. 30 g		Approx. 45 g	Approx. 70 g	Approx. 180 g	
<b>Materials</b>	<b>Case</b>	Heat-resistant ABS			Aluminum die-cast		
	<b>Sensing surface</b>	Heat-resistant ABS					
<b>Accessories</b>		Mounting Bracket, Instruction manual		Instruction manual			

# I/O Circuit Diagrams

## DC 2-Wire Models

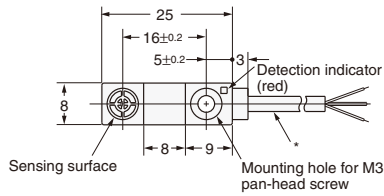
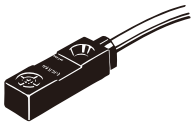
Operation mode	Model	Timing chart	Output circuit
NO	TL-W5MD1		<p>Note: The load can be connected to either the +V or 0 V side.</p>
NC	TL-W5MD2		

## DC 3-Wire Models

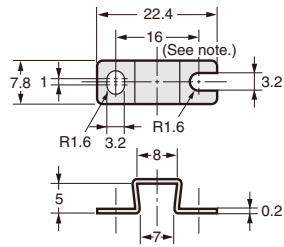
Operation mode	Model	Timing chart	Output circuit
NO	TL-W1R5MC1 TL-W3MC1 TL-W5MC1		
NC	TL-W3MC2 TL-W5MC2		<p>* Load current: 100 mA max.</p>
NO	TL-W5E1 TL-W20ME1		
NC	TL-W5E2 TL-W20ME2		<p>*1. Load current: 200 mA max. *2. When a transistor is connected.</p>
NO	TL-W5F1		
NC	TL-W5F2		<p>*1. Load current: 200 mA max. *2. When a transistor is connected.</p>

Dimensions

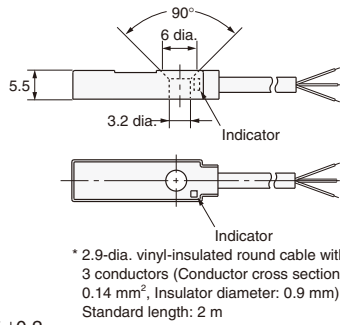
TL-W1R5MC1



Mounting Bracket (Attachment)

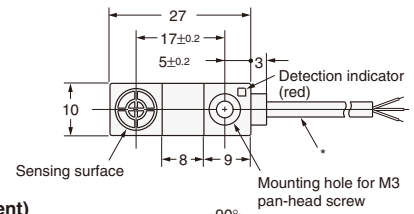
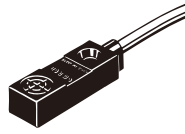


Note: Mounting hole dimension: 17 ±0.2.  
Material: Stainless steel (SUS304)

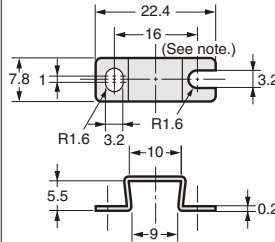


\* 2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm<sup>2</sup>, Insulator diameter: 0.9 mm), Standard length: 2 m

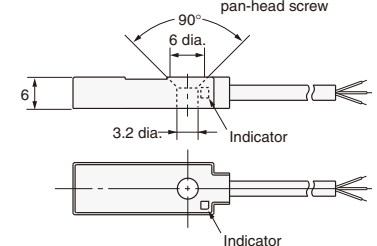
TL-W3MC□



Mounting Bracket (Attachment)



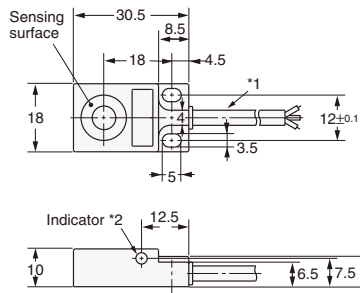
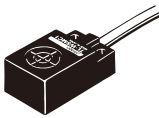
Note: Mounting hole dimension: 17 ±0.20.  
Material: Stainless steel (SUS304)



\* 2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm<sup>2</sup>, Insulator diameter: 0.9 mm), Standard length: 2 m

TL-W5MC□

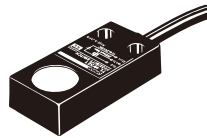
TL-W5MD□



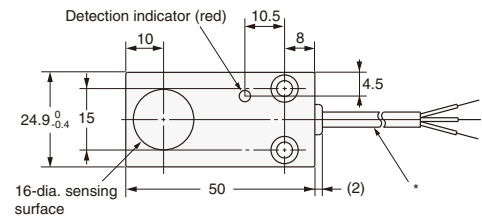
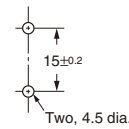
\*1. TL-W5MC1  
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm<sup>2</sup>, Insulator diameter: 1.2 mm), Standard length: 2 m  
TL-W5MD□  
4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm<sup>2</sup>, Insulation diameter: 1.3 mm), Standard length: 2 m  
\*2. C Models: Detection indicator (red), D Models: Operation indicator (red), Setting indicator (green)

TL-W5E□

TL-W5F□

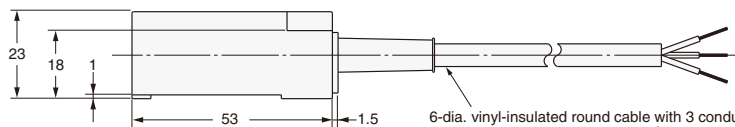
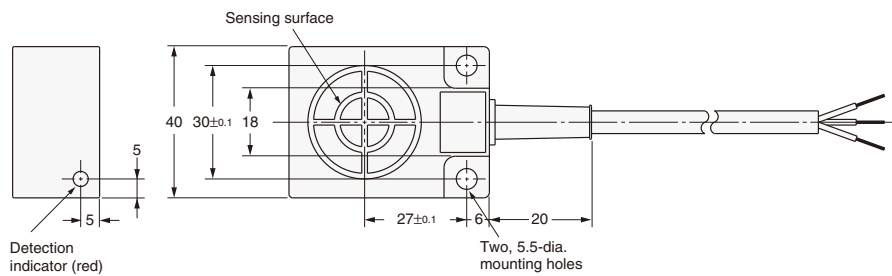
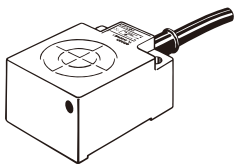


Mounting Hole Dimensions



\* 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm<sup>2</sup>, Insulator diameter: 1.2 mm), Standard length: 2 m

TL-W20ME□



6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m