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

Sensors [Refer to Dimensions on page 8.]

DC 2-Wire Models

				Model			
Appearance	Sensing distance			Operation mode			
			NO		NC		
Unshielded	5 n	nm		TL-W5MD1 2M	*1 *2	TL-W5MD2 2M *2	

DC 3-Wire Models

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

^{*1.} Models with a different frequency are also available to prevent mutual interference. The model numbers are TL-W\(\sum M \subseteq 5\) (e.g., TL-W5MD15). *2. Models with robotics cables are also available. The model numbers are TL-W\(\sum MC1-R\) (e.g., TL-W1R5MC1-R).

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Ratings and Specifications

DC 2-Wire Models

Item Model		TL-W5MD□			
Sensing distan	се	5 mm ±10%			
Set distance		0 to 4 mm			
Differential trav	/el	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 sensi	ing object	Iron, 18 × 18 × 1 mm			
Response freque	uency *1	500 Hz			
Power supply voltage (operating voltage)	voltage age range)	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			
Leakage currer	nt	0.8 mA max.			
	current	3 to 100 mA			
trol output Residu	ual 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 mod object approac	e (with sensing hing)	D1 Models: NO D2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 6 for details.			
Protection circ	uits	Load short-circuit protection, Surge suppressor			
Ambient tempe	erature range	Operating/Storage: -25 to 70°C (with no icing or condensation) *2			
Ambient humid	lity range	Operating/Storage: 35% to 95% (with no condensation)			
Temperature in	fluence	±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C			
Voltage influen	ice	$\pm 2.5\%$ max. of sensing distance at rated voltage in the rated voltage $\pm 15\%$ range			
Insulation resis	stance	$50~\text{M}\Omega$ min. (at 500 VDC) between current-carrying parts and case			
Dielectric stren	ıgth	1,000 VAC for 1 min between current-carrying parts and case			
Vibration resist	tance	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 3 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant *2			
Connection method		Pre-wired Models (Standard cable length: 2 m)			
Weight (packed	d state)	Approx. 45 g			
Materials	Case	Heat-resistant ABS			
atoriuio	Sensing surface	Tour Tourism 7 IDO			
Accessories		Instruction manual			

^{*1.} 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.

*2. For environments that require oil resistance, the upper limit of the ambient operating temperature range is 40°C.

DC 3-Wire Models

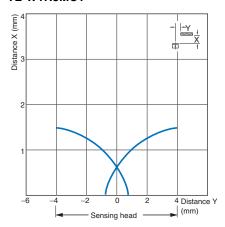
Model Item		TL-W1R5MC1	TL-W3MC□	TL-W5MC□	TL-W5E1, TL-W5E2 TL-W5F1, TL-W5F2	TL-W20ME1 TL-W20ME2		
Sensing distance		1.5 mm ±10%	3 mm ±10%	5 mm ±10%		20 mm ±10%		
Set distance		0 to 1.2 mm	0 to 2.4 mm	0 to 4 mm		0 to 16 mm		
Differential travel		10% max. of sensing distance 1% to 15% of sensing distance						
Detectabl	e object	Ferrous metal (The se	etal (The sensing distance decreases with non-ferrous metal. Refer to Engineering Data on page 5.)					
Standard object		Iron, $8 \times 8 \times 1$ mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm		Iron, 50 × 50 × 1 mm		
Response frequency	1	1 kHz min.	600 Hz min.	500 Hz min.	300 Hz min.	40 Hz min.		
Power sup age (operage age range	ating volt-	12 to 24 VDC (10 to 3	0 VDC), ripple (p-p): 10	0% 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.		
Current consumpt	tion	15 mA max. at 24 VD	C (no-load)	10 mA max.	15 mA max. at 24 VDC (no-load)	8 mA at 12 VDC, 15 mA at 24 VDC		
Load current Control output		NPN open collector 100 mA max. at 30 VI	DC 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		
	Residual voltage	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 ca- ble length of 2 m		
Indicators	3	Detection indicator (re	ed)	L		I		
Operation mode (with sensing ob-		N(C)			E1/F1 Models: NO E2/F2 Models: NC			
ject approaching)		Refer to the timing charts under I/O Circuit Diagrams on page 6 for details.						
Protection circuits		Reverse polarity 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)						
Temperat influence	ure	±10% max. of sensing	distance at 23°C in the		–25 to 70°C			
Voltage influence		$\pm 2.5\%$ max. of sensing distance at rated voltage in the rated voltage $\pm 10\%$ range $\pm 2.5\%$ max. of sensing distance at rated voltage in the rated voltage in the rated voltage $\pm 2.5\%$ max. of sensing distance at rated voltage in the rated voltage $\pm 2.5\%$ max. of sensing distance at rated voltage $\pm 2.5\%$ max. of sensing distance at rated voltage $\pm 2.5\%$ max. of sensing distance at rated voltage in the rated voltage $\pm 2.5\%$ max. of sensing distance at rated voltage in the rated voltage $\pm 2.5\%$ max. of sensing distance at rated voltage $\pm 2.5\%$ max.			at rated voltage in			
Insulation resistance	е	50 M Ω min. (at 500 VDC) between current-carrying parts and case						
Dielectric	strength	1,000 VAC, 50/60 Hz	for 1 minute between c	urrent-carrying parts ar	nd case			
Vibration resistance		Destruction: 10 to 55	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/s² 3 times each in X, Y, and Z directions 500 m/s² 10 times each in X				times each in X, Y, and Z direc-		
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant *						
Connection method		Pre-wired Models (Sta	andard cable length: 2 r	m)				
Weight (packed state)		Approx. 30 g		Approx. 45 g	Approx. 70 g	Approx. 180 g		
Materi-	Case	Heat-resistant ABS			Aluminum die-cast	Heat-resistant ABS		
als	Sensing surface	Heat-resistant ABS						
Accessor	ies	Mounting Bracket, Ins	truction manual	Instruction manual				

 $^{^\}star \, \text{For environments that require oil resistance, the upper limit of the ambient operating temperature range is } \, 40^\circ \text{C}.$

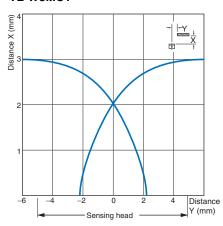
Engineering Data (Typical)

Sensing Area

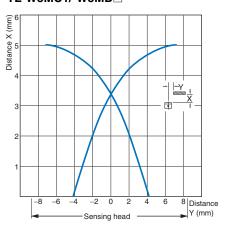
TL-W1R5MC1



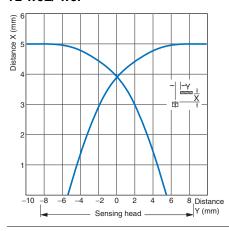
TL-W3MC1



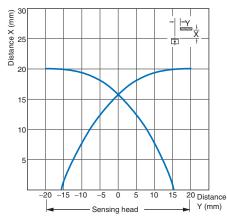
TL-W5MC1/-W5MD



TL-W5E/-W5F

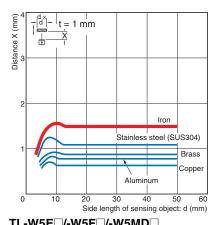


TL-W20□

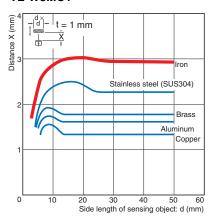


Influence of Sensing Object Size and Material

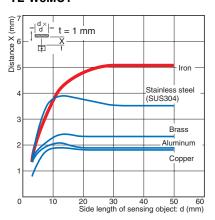
TL-W1R5MC1



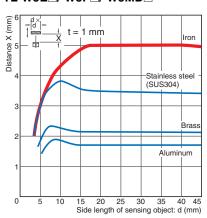
TL-W3MC1



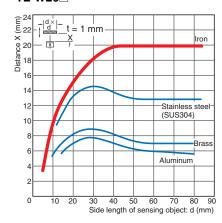
TL-W5MC1



TL-W5E /-W5F /-W5MD



TL-W20□

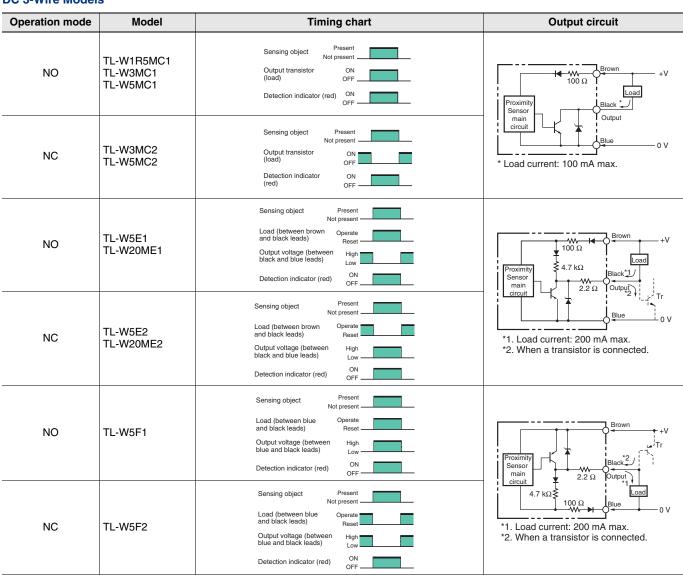


I/O Circuit Diagrams

DC 2-Wire Models

Operation mode	Model	Timing chart	Output circuit
NO	TL-W5MD1	Non-sensing area Sensing object Sensing object Sensing object Non-sensing area Sensing object Sensing object ON OFF Setting indicator (green) ON OFF OPERATION OFF Control output	Proximity Sensor main circuit
NC	TL-W5MD2	Non-sensing area Sensing area Sensing area Proximity Sensor Sensing object (%) 100 Rated sensing distance ON OFF OPERATION OPERATION Indicator (red) ON OFF Control output	Note: The load can be connected to either the +V or 0 V side.

DC 3-Wire Models



Safety Precautions

Refer to Warranty and Limitations of Liability.



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

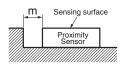
Do not use this product under ambient conditions that exceed the ratings.

Design

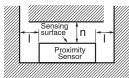
Influence of Surrounding Metal

When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.

Metal on a Single Side (Not Exceeding the Height of the Sensor Surface)



Metals on Both Sides and in Front of the Sensor

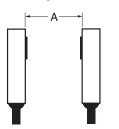


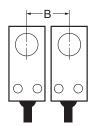
Influence of Surrounding Metal (Unit: mm)

Model Distance	I	m	n
TL-W1R5MC1	2		8
TL-W3MC	3	0	12
TL-W5MD□	5	0	20
TL-W5MC1] 3		20
TL-W20ME□	25	16	100
TL-W5E□/-W5F□	0	0	20

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	Α	В	
TL-W1R5MC1	75 (50)	25 (8)	
TL-W3MC□	90 (60)	30 (10)	
TL-W5MD□	120 (80)	60 (30)	
TL-W5MC1	120 (80)		
TL-W20ME	200 (100)	200 (100)	
TL-W5E□/-W5F□	50	35	

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

Mounting

- Use M3 flat-head screws to mount the TL-W1R5MC1 and TL-W3MC1.
- Do not exceed the torque in the following table when tightening the resin cover screws.

Model	Torque
TL-W1R5MC1	
TL-W3MC	0.98 N⋅m
TL-W5MD	
TL-W20M□	1.5 N⋅m

Adjustment

Turning ON the Power

An error pulse will occur (approximately 1 ms) if adjustments are made when turning ON the power or making AND connections.

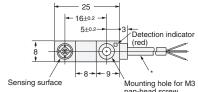
Applicable e-CON Connector Models and Manufacturers

The companies and model number of e-CON connections that can be used with Sensor cables are listed in the following table. Confirm applicability when purchasing e-CON connectors for connection to Pre-wired Sensors.

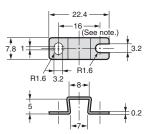
	• •	•	•	Ū	
Model					Tyco Electronics AMP K.K.
TL-W1R5□/-W3□					1-1473562-4 (red)

TL-W1R5MC1





Mounting Bracket (Attachment)



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

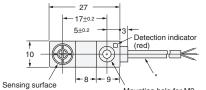
Mounting hole for M3 pan-head screw 6 dia. 5.5 3.2 dia.-

Indicator 2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm², Insulator diameter: 0.9 mm), Standard length: 2 m

Indicator

TL-W3MC





Mounting Bracket (Attachment) 7.8 1 R1.6 **-**10-

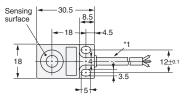
Note: Mounting hole dimension: 17 \pm 0.20. Material: Stainless steel (SUS304)

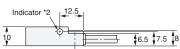
Mounting hole for M3 pan-head screw 6 dia 3.2 dia: Indicator Indicator

* 2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm², Insulator diameter: 0.9 mm), Standard length: 2 m

TL-W5MC TL-W5MD



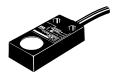




- *1. TL-W5MC1
 - 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm², Insulator diameter: 1.2 mm), Standard length: 2 m TL-W5MD
 - 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulation diameter: 1.3 mm), Standard length: 2 m
- *2. C Models: Detection indicator (red)

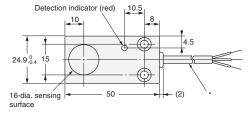
 D Models: Operation indicator (red) Setting indicator (green)

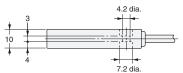
TL-W5E TL-W5F



Mounting Hole Dimensions



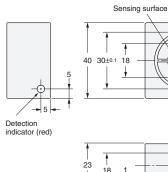


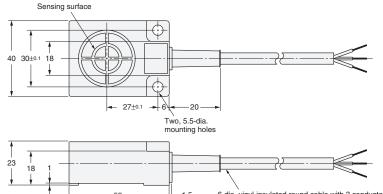


* 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm², Insulator diameter: 1.2 mm), Standard length: 2 m

TL-W20ME







6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard length: 2 m

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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Disclaimers

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2010.10

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