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 r	nm		TL-W5MD1 2M	*1 *2	TL-W5MD2 2M *2

DC 3-Wire Models

		Output configuration	Model			
Appearance	Sensing distance		Operation mode			
			NO	NC		
Unshielded	1.5 mm		TL-W1R5MC1 2M *1			
	3 mm	DC 3-wire, NPN	TL-W3MC1 2M *1 *2	TL-W3MC2 2M *1 *2		
	5 mm	- DC 5-wile, INFIN	TL-W5MC1 2M *1 *2	TL-W5MC2 2M		
	20 mm		TL-W20ME1 2M *1	TL-W20ME2 2M *1		
Shielded		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).

OMRON

Ratings and Specifications

DC 2-Wire Models

Item Model		TL-W5MD□			
Sensing distant	ce	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	ng object	Iron, 18 × 18 × 1 mm			
Response frequ	uency *1	500 Hz			
Power supply v (operating volta	roltage age range)	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			
Leakage curren	it	0.8 mA max.			
	urrent	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 mode object approach		D1 Models: NO D2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 6 for details.			
Protection circuits		Load short-circuit protection, Surge suppressor			
Ambient tempe	rature range	Operating/Storage: -25 to 70°C (with no icing or condensation) *2			
Ambient humid	ity 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	ce	$\pm 2.5\%$ max. of sensing distance at rated voltage in the rated voltage $\pm 15\%$ range			
Insulation resis	tance	50 M Ω min. (at 500 VDC) between current-carrying parts and case			
Dielectric stren	gth	1,000 VAC for 1 min between current-carrying parts and case			
Vibration resist	ance	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	l state)	Approx. 45 g			
Materials	Case	Heat-resistant ABS			
	Sensing surface	Hour foolstafit 7.00			
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

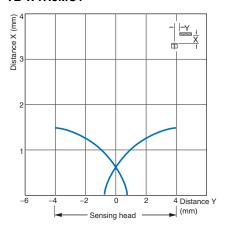
Item	Model	TL-W1R5MC1	TL-W3MC□	TL-W5MC□	TL-W5E1, TL-W5E2 TL-W5F1, TL-W5F2	TL-W20ME1 TL-W20ME2		
Sensing distance		1.5 mm ±10%	3 mm ±10%	5 mm ±10%		20 mm ±10%		
Set distance		0 to 1.2 mm	0 to 2.4 mm	0 to 4 mm		0 to 16 mm		
Differential travel		J	10% max. of sensing distance 1% to 15% of sensing distance					
Detectabl	e object	Ferrous metal (The se	ensing distance decreas	ses with non-ferrous me	etal. Refer to <i>Engineering Data</i> 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.		
age range	ating volt-	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.		
Current consump	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 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		
	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		Detection indicator (re	ed)					
Operation mode (with sensing ob-		I N(C)			E1/F1 Models: NO E2/F2 Models: NC			
ject approaching)		Refer to the timing charts under <i>I/O Circuit Diagrams</i> 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)						
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of –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 the rated voltage $\pm 2.5\%$ max. of sensing distance 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	е	Destruction: 10 to 55	Hz, 1.5-mm double amp	olitude 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				times each in X, Y, and Z direc-		
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. 30 g		Approx. 45 g	Approx. 70 g	Approx. 180 g		
Materi-	Case	Heat-resistant ABS	ant ABS Aluminum die-cast			Heat-resistant ABS		
als	Sensing surface	Heat-resistant ABS						
Accessor	ies	Mounting Bracket, Ins	truction manual	Instruction manual				

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

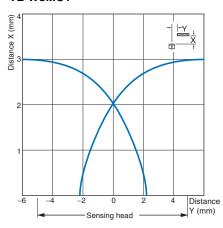
Engineering Data (Typical)

Sensing Area

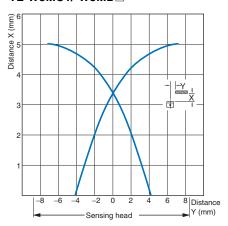
TL-W1R5MC1



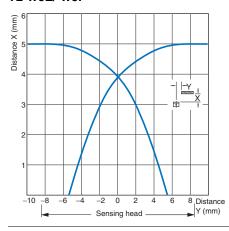
TL-W3MC1



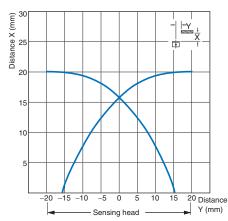
TL-W5MC1/-W5MD



TL-W5E/-W5F

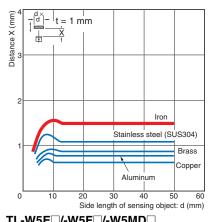


TL-W20□

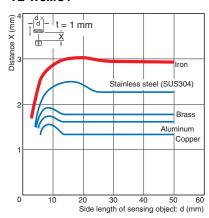


Influence of Sensing Object Size and Material

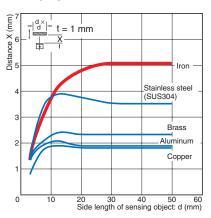
TL-W1R5MC1



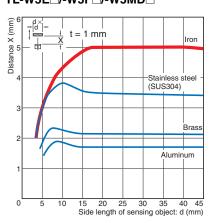
TL-W3MC1



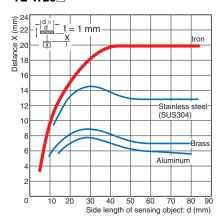
TL-W5MC1



TL-W5E /-W5F /-W5MD



TL-W20□

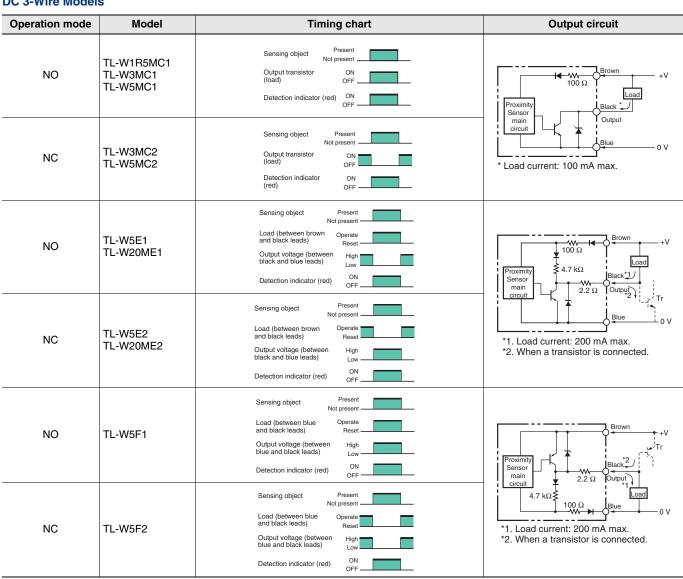


I/O Circuit Diagrams

DC 2-Wire Models

Operation mode	Model	Timing chart	Output circuit	
NO	TL-W5MD1	Non-sensing area Unstable Set position Stable sensing Stable sensing Area Proximity Sensor Sensing object 100 80 (TYP) 0 0 0 0 Rated Sensing 0 0 0 0 Gef Setting indicator (green) 0 0 0 OFF Control output 0 0	Proximity Sensor main circuit	
NC	TL-W5MD2	Non-sensing area Sensing area Sensing area Sensing area Proximity Sensor ON OFF OPF 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

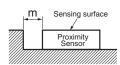
Do not use this product under ambient conditions that exceed the ratings.

Design

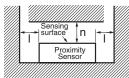
Influence of Surrounding Metal

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

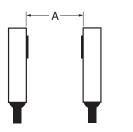


Influence of Surrounding Metal (Unit: mm)

Model Distance	l	m	n
TL-W1R5MC1	2		8
TL-W3MC□	3	0	12
TL-W5MD□	5	0	20
TL-W5MC1			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 (00)	00 (00)	
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

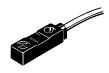
An error pulse will occur (approximately 1 ms) if adjustments are made when turning ON the power or making AND connections.

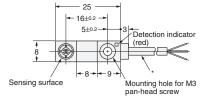
Applicable e-CON Connector Models and Manufacturers

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.

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

TL-W1R5MC1





6 dia.

Indicator

Indicator

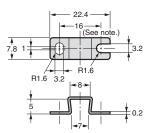
2.9-dia. vinyl-insulated round cable with

3 conductors (Conductor cross section: 0.14 mm², Insulator diameter: 0.9 mm),

3.2 dia.-

Standard length: 2 m

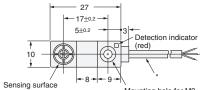
Mounting Bracket (Attachment)



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

TL-W3MC□





7.8 1 - R1.6 3.2 - R1.6 3.2

Note: Mounting hole dimension: 17 ±0.20.

Material: Stainless steel (SUS304)

Mounting hole for M3 pan-head screw

90°
6 dia.

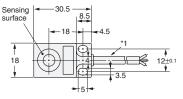
1ndicator

* 2.9-dia. vinyl-insulated round cable with

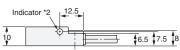
* 2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm², Insulator diameter: 0.9 mm), Standard length: 2 m

TL-W5MC TL-W5MD





5.5



*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

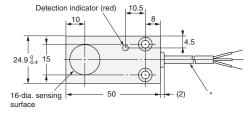
*2. C Models: Detection indicator (red)
D Models: Operation indicator (red),
Setting indicator (green)

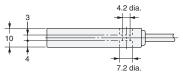
TL-W5E□ TL-W5F□



Mounting Hole Dimensions



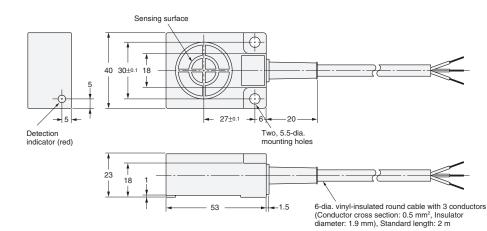




* 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm², Insulator diameter: 1.2 mm), Standard length: 2 m

TL-W20ME





8

Terms and Conditions of Sale

- Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms. Prices: Payment Terms. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.

- and (ii) Buyer has no past due amounts.

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- Orders. Omron will accept no order less than \$200 net billing.

 Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
- Taxes. All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.

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- - except in "break down" situations.
 b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall
 - constitute delivery to Buyer; c. All sales and shipments of Products shall be FOB shipping point (unless oth-
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 d. Delivery and shipping dates are estimates only; and
 e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.

 12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products. portation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
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Certain Precautions on Specifications and Use

- Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request. Omron will provide application of use of the Product. At Buyer's lequest, omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:

 (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.

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