Rectangular Standard Proximity Sensor

CSM_TL-N/TL-Q_DS_E_14_1

A Wealth of Models for All Types of Applications

- Easy installation, high-speed pulse generator, high-speed rotation control, and more.
- Direct mounted to metal (-N Models).
- A wealth of models ideal for limit control, counting control, and other applications (-N Models).



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Ordering Information

Sensors [Refer to *Dimensions* on page 10.] DC 2-Wire Models

				Model		
Appearance		Sensing di	stance	Operation mode		
				NO	NC	
	17 × 17	5 mm		TL-Q5MD1 2M *1 *2	TL-Q5MD2 2M *1	
Unshielded	25 × 25	7 mm		TL-N7MD1 2M *1	TL-N7MD2 2M *1	
	30 ×30	12 m	m	TL-N12MD1 2M *1	TL-N12MD2 2M *1	
	40 × 40		20 mm	TL-N20MD1 2M *1	TL-N20MD2 2M *1	

*1. Models with a different frequency are available to prevent mutual interference. The model numbers are TL-NIMDI5 and TL-Q5MDI5 (e.g., TL-N7MD15). *2. Models are also available with robotics (bend resistant) cables . Add "-R" to the model number. (e.g., TL-Q5MD1-R 2M)

DC 3-Wire and AC 2-Wire Models

						М	odel
Appea	Appearance		Sensing distance		Output configuration	Operation mode	
						NO	NC
	8 × 9	2 mm	I		DC 3-wire, NPN	TL-Q2MC1 2M	_
	17 × 17	5 0			DO 3-wile, Ni N	TL-Q5MC1 2M *1 *2	TL-Q5MC2 2M
	17 × 17	5 mm	1(1)		DC 3-wire, PNP	TL-Q5MB1 2M	_
	25 × 25	5 mm			DC 3-wire, NPN	TL-N5ME1 2M *1 *2	TL-N5ME2 2M *1
Unshielded			1(1)		AC 2-wire	TL-N5MY1 2M *1	TL-N5MY2 2M *1
	30 × 30	10			DC 3-wire, NPN	TL-N10ME1 2M *1 *2	TL-N10ME2 2M *1
			10 mm	nm	DC 3-wire, PNP	TL-N10MF1 2M *1	_
					AC 2-wire	TL-N10MY1 2M *1	TL-N10MY2 2M *1
	40 ~ 40			20 mm	DC 3-wire, NPN	TL-N20ME1 2M *1 *2	TL-N20ME2 2M *1
	40 × 40	20 mm	AC 2-wire	TL-N20MY1 2M *1	TL-N20MY2 2M *1		

*1. Models with a different frequency are available to prevent mutual interference. The model numbers are TL-DMD5 (e.g., TL-N5ME15).

*2. Models are also available with robotics (bend resistant) cables . Add "-R" to the model number. (e.g., TL-Q5MC1-R 2M)

Accessories (Order Separately)

Mounting Brackets A Mounting Bracket is provided with the Sensor depending on the model number. Check the column for the applicable Sensor. [Refer to Dimensions on page 11.]

Туре	Model	Applicable Sensors		
туре	Model	Provided with these Sensors	Order separately	
	Y92E-C5	TL-N5ME , TL-N7MD	TL-N5MY	
Mounting Brackets	Y92E-C10	TL-N10ME , TL-N12MD , TL-N10MF1	TL-N10MY	
	Y92E-C20	TL-N20ME , TL-N20MD	TL-N20MY	
Mounting Brackets for Conduits	Y92E-N5C15		TL-N5ME , TL-N5MY	
Mounting Brackets for Conduits	Y92E-N10C15		TL-N10ME , TL-N10MY	

Ratings and Specifications

DC 2-Wire Models

Item	Model	TL-Q5MD	TL-N7MD	TL-N12MD	TL-N20MD			
Sensing d	listance	5 mm ±10%	7 mm ±10%	12 mm ±10%	20 mm ±10%			
Set distan	nce	0 to 4 mm	0 to 5.6 mm	0 to 9.6 mm	0 to 16 mm			
Differentia	al travel	10% max. of sensing distance						
Detectable	e object	Ferrous metal (The sensing dista	nce decreases with non-ferrous me	etal. Refer to <i>Engineering Data</i> on p	bage 5.)			
Standard object	sensing	Iron, $18 \times 18 \times 1$ mm	Iron, $30 \times 30 \times 1 \text{ mm}$	Iron, $40 \times 40 \times 1 \text{ mm}$	Iron, $50 \times 50 \times 1 \text{ mm}$			
Response frequency		500 Hz			300 Hz			
Power sup (operating range)	pply voltage g voltage	12 to 24 VDC (10 to 30 VDC), rip	ple (p-p): 10% max.					
Leakage o	current	0.8 mA max.						
Control	Load current	3 to 100 mA						
output	Residual voltage	3.3 V max. (Load current: 100 m/	A, Cable length: 2 m)					
Indicators	5	D1 Models: Operation indicator (r D2 Models: Operation indicator (r						
Operation (with sens approachi	sing object	D1 Models: NO D2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 7 for details.						
Protection	n circuits	Load short-circuit protection, Surg	ge suppressor					
Ambient temperatu	ure range	Operating/Storage: -25 to 70°C (with no icing or condensation)					
Ambient humidity i	range	Operating/Storage: 35% to 95% ((with no condensation)					
Temperat	ure influence	$\pm 10\%$ max. of sensing distance a	t 23°C in the temperature range of	–25 to 70°C				
Voltage in	nfluence	$\pm 2.5\%$ max. of sensing distance a	at rated voltage in the rated voltage	±15% range				
Insulation	resistance	50 M Ω min. (at 500 VDC) betwee	en current-carrying parts and case					
Dielectric	strength	1,000 VAC for 1 min between cur	rrent-carrying parts and case					
Vibration resistance	e	Destruction: 10 to 55 Hz, 1.5-mm	double amplitude for 2 hours each	in X, Y, and Z directions				
Shock res	sistance	Destruction: 500 m/s ² 3 times each in X, Y, and Z directions	Destruction: 1,000 m/s ² 10 times	each in X, Y, and Z directions				
Degree of	protection	IEC 60529 IP67, in-house standa	irds: oil-resistant					
Connectio	on method	Pre-wired Models (Standard cable length: 2 m)						
Weight (p	acked state)	Approx. 85 g	Approx. 165 g	Approx. 235 g	Approx. 330 g			
	Case							
Materials	Sensing surface	Heat-resistant ABS						
Accessori	ies	Instruction manual	Mounting Bracket, Mounting phillips screws (M4 × 25), Instruction manual	Mounting Bracket, Mounting phillips screws (M4 × 30), Instruction manual	Mounting Bracket, Mounting phillips screws (M5 × 40), 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

Sensing distance Set distan						
		2 mm ±15%	5 mm ±10%			
	nce	0 to 1.5 mm	0 to 4 mm			
Differentia	al travel	10% max. of sensing distance				
Detectable	e object	Ferrous metal (The sensing distance decreases with non-fe	rrous metal. Refer to Engineering Data on page 6.)			
Standard sensing object		Iron, $8 \times 8 \times 1 \text{ mm}$	Iron, $15 \times 15 \times 1$ mm			
Response	e time		2 ms max.			
Response frequency		500) Hz			
Power sup age (opera age range)	ating volt-	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.				
Current consumpt	tion	15 mA max. at 24 VDC (no-load)	10 mA max. at 24 VDC			
	Load current	NPN open collector 100 mA max. at 30 VDC max.	TL-Q5MC : NPN open collector, 50 mA max. at 30 VDC max. TL-Q5MB : PNP open collector, 50 mA max. at 30 VDC max.			
	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)			
Indicators	\$	Detection indicator (red)	1			
Operation (with sens	n mode sing object	NO	B1/C1 Models: NO C2 Models: NC			
approachi		Refer to the timing charts under <i>DC 3-Wire Models</i> on page 7 for details.				
Protection circuits	n	Reverse polarity protection, Surge suppressor				
Ambient temperature range		Operating/Storage: $-10\ to\ 60^\circ C$ (with no icing or condensation)	Operating/Storage: -25 to 70°C (with no icing or condensation)			
Ambient humidity r	range	Operating/Storage: 35% to 95% (with no condensation)				
Temperatu influence	ure	$\pm 10\%$ max. of sensing distance at 23°C in the temperature range of -10 to $60^\circ C$	$\pm 20\%$ 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 rated vol	Itage ±10% range			
Insulation resistance		50 $M\Omega$ min. (at 500 VDC) between current-carrying parts and case	$5\text{M}\Omega$ min. (at 500 VDC) between current-carrying parts and case			
Dielectric	strength	1,000 VAC for 1 min between current-carrying parts and case	500 VAC, 50/60 Hz for 1 min between current-carrying parts and case			
Vibration resistance	e	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 ho	urs each in X, Y, and Z directions			
Shock res	sistance	Destruction: 1,000 m/s 2 10 times each in X, Y, and Z directions	Destruction: 200 m/s ² 10 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant	IEC IP67			
Connectio method	on	Pre-wired Models (Standard cable length: 2 m)				
Weight (packed st	tate)	Approx. 60 g	Approx. 90 g			
Materi-	Case					
als 🤅	Sensing surface	Heat-resistant ABS				
Accessori	ies	Instruction manual				

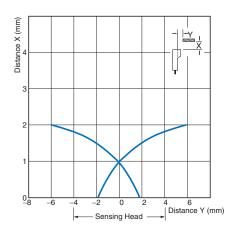
* The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

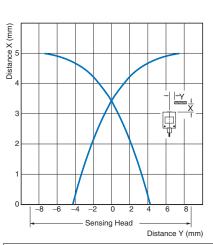
Item	Model	TL-N5ME , TL-N5MY	TL-N10ME□, TL-N10MY□, TL-N10MF1	TL-N20ME , TL-N20MY			
Sensing	distance	5 mm ±10%	10 mm ±10%	20 mm ±10%			
Set distance 0 to 4 mm		0 to 4 mm	0 to 8 mm	0 to 16 mm			
Differenti	ial travel	15% max. of sensing distance					
Detectable object Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to Engineering Data on				<i>Engineering Data</i> on pages 6 and 7.)			
Standard sensing o		Iron, $30 \times 30 \times 1$ mm	Iron, $40 \times 40 \times 1 \text{ mm}$	Iron, $50 \times 50 \times 1 \text{ mm}$			
Respons frequenc		E/F Models: 500 Hz Y Models: 10 Hz		E Models: 40 Hz Y Models: 10 Hz			
Power su voltage *2 (operatin range)		E/F Models: 12 to 24 VDC (10 to 30 VD Y Models: 100 to 220 VAC (90 to 250 V					
Current consump	otion	E/F Models: 8 mA max. at 12 VDC, 15	mA max. at 24 VDC				
Leakage	current	Y Models: Refer to Engineering Data or	n page 5.				
Control	Load current	E/F Models: 100 mA max. at 12 VDC, 2 Y Models: 10 to 200 mA	200 mA max. at 24 VDC				
output	Residual voltage	E/F Models: 1 V max. (load current: 200 Y Models: Refer to <i>Engineering Data</i> or					
Indicator	S	E/F Models: Detection indicator (red) Y Models: Operation indicator (red)					
Operation (with sen	sing ob-	sing ob- E2/Y2 Models: NC					
	on circuits	Refer to the timing charts under <i>I/O Circ</i> E Models: Reverse polarity protection, S Y Models: Surge suppressor	8 I 8				
Ambient temperat	ure range	Operating/Storage: -25 to 70°C (with no	o icing or condensation)				
Ambient humidity	range	Operating/Storage: 35% to 95% (with n	o condensation)				
Temperat influence		$\pm 10\%$ max. of sensing distance at 23°C	in the temperature range of -25 to 70°C	;			
Voltage in	nfluence		F/F Models: $\pm 2.5\%$ max. of sensing distance at rated voltage in rated voltage $\pm 10\%$ range ' Models: $\pm 1\%$ max. of sensing distance at rated voltage in rated voltage $\pm 10\%$ range				
Insulation resistanc		50 M Ω min. (at 500 VDC) between curr	ent-carrying parts and case				
Dielectric	c strength		min between current-carrying parts and in between current-carrying parts and ca				
Vibration resistanc		Destruction: 10 to 55 Hz, 1.5-mm doubl	e amplitude for 2 hours each in X, Y, and	d Z directions			
Shock re	sistance	Destruction: 500 m/s ² 10 times each in	X, Y, and Z directions				
Degree o protectio		IEC 60529 IP67, in-house standards: oi	I-resistant				
Connecti method	on	Pre-wired Models (Standard cable leng	th: 2 m)				
Weight (packed s	state)	Approx. 190 g	Approx. 240 g	Approx. 340 g			
Materi-	Case						
als	Sensing surface	Heat-resistant ABS					
Accessor	ries	E Models: Mounting Bracket, Mounting phillips screws (M4 × 25), Instruction manual Y Models: Instruction manual	E/F Models: Mounting Bracket, Mounting phillips screws (M4 × 30), Instruction manual Y Models: Instruction manual	E Models: Mounting Bracket, Mounting phillips screws (M5 × 40), Instruction manual Y Models: Instruction manual			

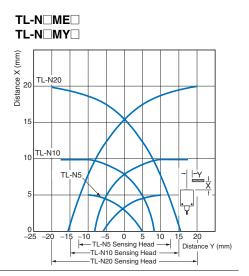
*1. The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.
*2. E Models (DC switching models): A full-wave rectification power supply of 24 VDC ±10% (average value) can be used.

Engineering Data (Reference Value)

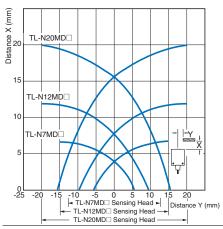
Sensing Area TL-Q2MC1





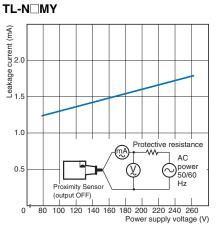






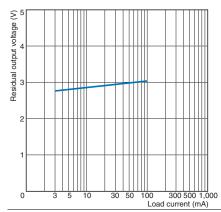
Leakage Current

TL-Q5M

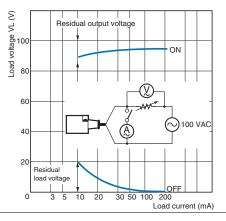


Residual Output Voltage

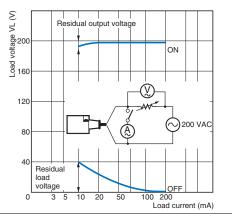
TL-N MD



TL-N MY at 100 VAC

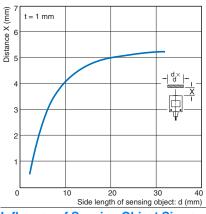


TL-N MY at 200 VAC

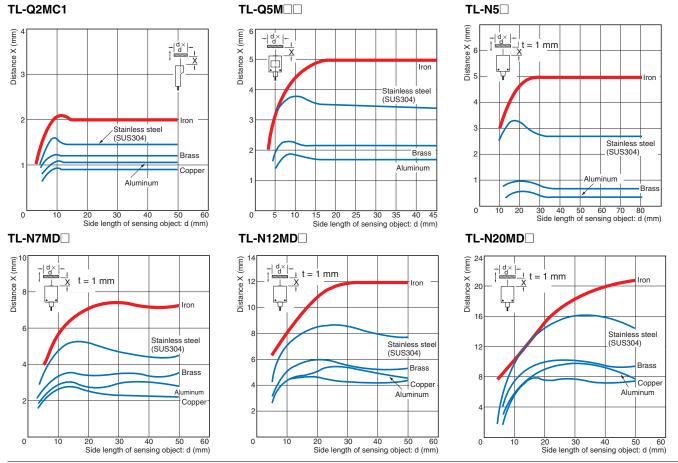


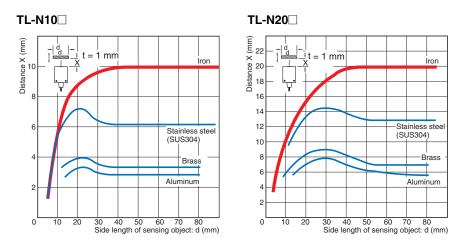
Sensing Object Size vs. Sensing Distance



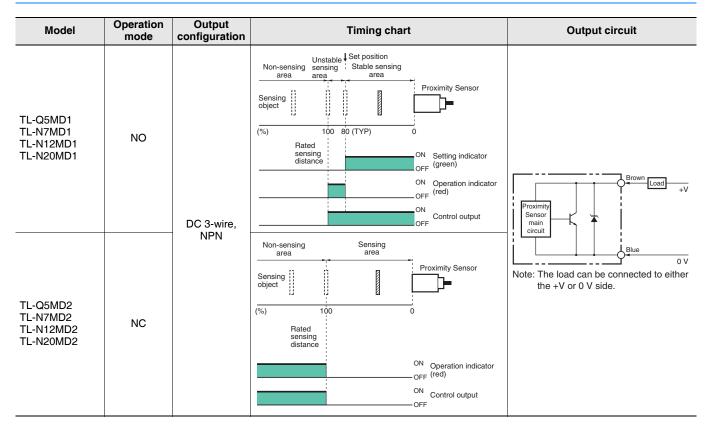


Influence of Sensing Object Size and Material





I/O Circuit Diagrams



Iron

Brass

TL-N/TL-Q

Model	Operation mode	Output configuration	Timing chart	Output circuit
TL-Q2MC1 TL-Q5MC1	NO	DC 3-wire, NPN	Sensing object Present Not present Output transistor (load) Detection indicator (red) Present ON OFF ON OFF ON OFF ON OFF ON OFF	Proximity Sensor main circuit
TL-Q5MC2	NC		Sensing object Present Not present Output transistor (load) OFF Detection indicator (red) OFF	* Load current: 100 mA max., TL-Q2MC1 Load current: 50 mA max., TL-Q5MC1
TL-Q5MB1	NO	DC 3-wire, PNP	Sensing object Present Not present Output transistor (load) OFF Detection indicator (red) OFF	Brown +V Black Black Output * Load * Load current: 50 mA max.
TL-N5ME1 TL-N10ME1 TL-N20ME1	NO	DC 3-wire,	Sensing object Present Not present Load (between brown and black leads) Operate Reset Output voltage (between black and blue leads) High Low Detection indicator (red) ON OFF	Proximity sensor main circuit 2.2Ω Output Tr
TL-N5ME2 TL-N10ME2 TL-N20ME2	NC	NPN	Sensing object Present Not present Not present Load (between brown and black leads) Operate Output voltage (between black and blue leads) High Low Low Detection indicator (red) OFF	*1. Load current: 200 mA max. *2. When a transistor is connected.
TL-N10MF1	NO	DC 3-wire, PNP	Sensing object Present Not present Load (between black and blue leads) Operate Reset Output voltage (between brown and black leads) High Low Detection indicator (red) ON OFF	Proximity Brown +V Proximity Black 2.2 Ω Black 2.7 Tr Black 2.7 Uutput 100 Ω Blue 0 V *1. Load current: 200 mA max. *2. When a transistor is connected.
TL-N5MY1 TL-N10MY1 TL-N20MY1	NO	AC 2-wire	Sensing object Present Not present Load Operate Reset Operation indicator (red) OFF	Proximity Sensor main
TL-N5MY2 TL-N10MY2 TL-N20MY2	NC		Sensing object Present Not present Load Operate Reset Operation indicator (red) ON OFF	Circuit Blue

Safety Precautions

Refer to Warranty and Limitations of Liability.

<u> WARNING</u>

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

- \bigcirc
- Do not short-circuit the load, otherwise the Sensor may be damaged.
- Do not supply power to the Sensor with no load, otherwise the Sensor may be damaged. Applicable Models: AC 2-Wire Models

Precautions for Correct Use

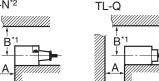
Do not use this product under ambient conditions that exceed the ratings.

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.

Rectangular Models TL-N*2

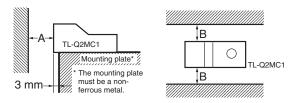


Influence of Surrounding Metal (Unit: mm)

Model Distan	ce A	B *1
TL-Q5MOO, TL-Q5MB1	20	20
TL-N7MD	40	35
TL-N12MD	50	40
TL-N20MD	70	60
TL-N5ME, TL-N5MY	20	23
TL-N10ME, TL-N10MF1, TL-N10MY	40	30
TL-N20ME , TL-N20MY	80	45

*1. The B dimension applies to the top, right-side, and left-side surfaces.

*2. The values for A or B for the TL-N apply when there is metal on only one side of the sensor. If there is metal on two or more sides of the sensor, the value must be multiplied by two or more.



Influence of Surrounding Metal (Unit: mm)

Model	Distance	Α	В
TL-Q2MC1		12	3

Mounting

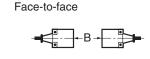
When tightening the mounting screws, do not exceed the torque in the following table.

Model	Torque			
TL-Q2MC1	0.59 N⋅m			
TL-Q5M	0.59 N·M			
TL-NOMO	0.9 to 1.5 N·m			

Mutual Interference

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

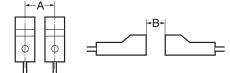
Parallel A –



Mutual Interference (Unit: mm)

Model Dista	ance	Α*	В*
TL-Q5MC, TL-Q5MB1		60 (17)	120 (60)
TL-Q5MD		60 (30)	120 (80)
TL-N7MD		100 (50)	120 (60)
TL-N12MD		120 (60)	200 (100)
TL-N20MD		200 (100)	300 (150)
TL-N5ME		80 (40)	80 (40)
TL-N5MY		80 (40)	90 (40)
TL-N10ME, TL-N10MF1, TL-N10M	ΛY□	120 (60)	120 (60)
TL-N20ME, TL-N20MY		200 (100)	120 (60)

* Values in parentheses apply to Sensors operating at different frequencies.



Mutual Interference (Unit: mm)

Model	Distance	Α*	В*
TL-Q2MC1		30 (8)	90 (45)

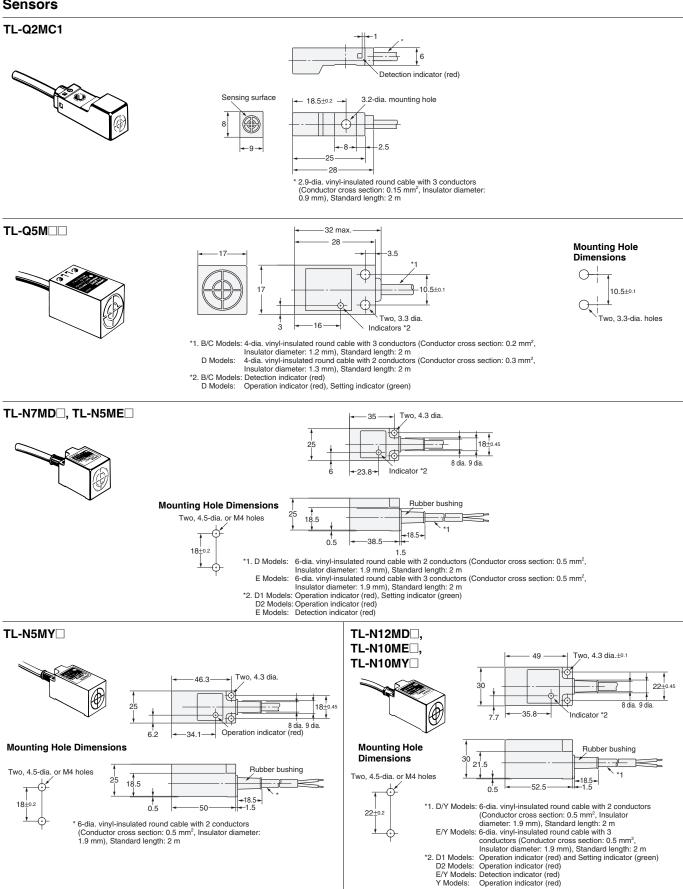
* Values in parentheses apply to Sensors operating at different frequencies.

TL-N/TL-Q

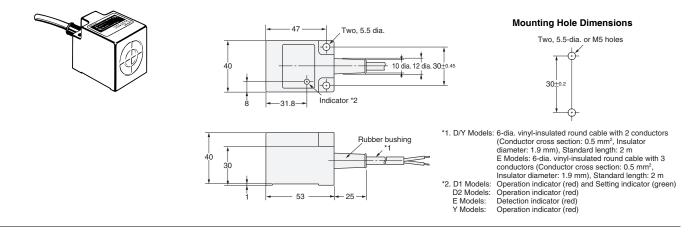
Dimensions

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

Sensors

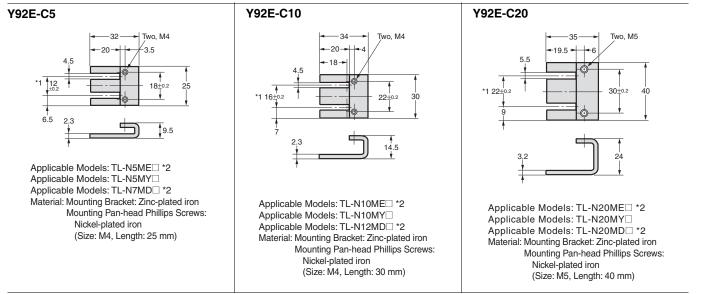


TL-N20MD, TL-N20ME, TL-N20MY



Accessories (Order Separately)

Mounting Bracket



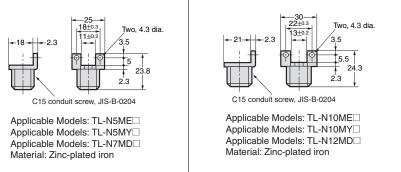
*1. These are the mounting dimensions of the base of the Mounting Bracket.

*2. Provided with the product.

Mounting Brackets for Wiring Conduit Use (Sold Separately)

Y92E-N5C15

Y92E-N10C15



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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(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

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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 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. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products.

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions. Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

In the interest of product improvement, specifications are subject to change without notice.

OMRON Corporation Industrial Automation Company