

# TL-N/TL-Q/TL-G

## 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).



Be sure to read *Safety Precautions* on page 9.

## Ordering Information

### Sensors

#### DC 2-Wire Models

Appearance	Sensing distance	Model		
		Operation mode		
		NO	NC	
Unshielded 	17 × 17	5 mm	TL-Q5MD1	TL-Q5MD2
	25 × 25	7 mm	TL-N7MD1	TL-N7MD2
	30 × 30	12 mm	TL-N12MD1	TL-N12MD2
	40 × 40	20 mm	TL-N20MD1	TL-N20MD2

Note: Models with a different frequency are available to prevent mutual interference. The model numbers are TL-N□MD□5 and TL-Q5MD□5 (e.g., TL-N7MD15).

#### DC 3-Wire and AC 2-Wire Models

Appearance	Sensing distance	Output configuration	Model		
			Operation mode		
			NO	NC	
Unshielded 	8 × 9	DC 3-wire, NPN	2 mm	TL-Q2MC1	—
			5 mm	TL-Q5MC1 *2	TL-Q5MC2
	25 × 25	DC 3-wire, NPN	5 mm	TL-N5ME1 *1 *2	TL-N5ME2 *1
			AC 2-wire	TL-N5MY1	TL-N5MY2
	30 × 30	DC 3-wire, NPN	10 mm	TL-N10ME1 *1 *2	TL-N10ME2 *1
			AC 2-wire	TL-N10MY1	TL-N10MY2
	40 × 40	DC 3-wire, NPN	20 mm	TL-N20ME1 *1 *2	TL-N20ME2
			AC 2-wire	TL-N20MY1	TL-N20MY2
	Grooved	7.5 mm	DC 3-wire, NPN	TL-G3D-3	—

Note: Models with a different frequency are available to prevent mutual interference. Models numbers for Sensors with different frequencies are TL-□□M□□5 (example: TL-N5ME15).

\*1. Models are also available with 5-m cables. Add the cable length to the model number (example: TL-N5ME1 5M).

\*2. Models with robotics cables are also available. Add -R to the end of the model number (example: TL-N5ME1-R).

## DC 3-Wire Models

Item	Model	TL-Q2MC1	TL-Q5MC□	TL-G3D-3
Sensing distance		2 mm ±15%	5 mm ±10%	7.5±0.5mm
Set distance		0 to 1.5 mm	0 to 4 mm	10 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 6.)		
Standard sensing object		Iron, 8 × 8 × 1 mm	Iron, 15 × 15 × 1 mm	Iron, 10 × 5 × 0.5mm
Response time		---	2 ms max.	1 ms max.
Response frequency *		500 Hz		
Power supply voltage (operating voltage range)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.		12 to 24 VDC, ripple (p-p): 5% max.
Current consumption		15 mA max. at 24 VDC (no-load)	10 mA max. at 24 VDC	2 mA max. at 24 VDC (no-load)
Control output	Load current	NPN open collector 100 mA max. at 30 VDC max.	NPN open collector 50 mA max. at 30 VDC max.	NPN transistor output 20 mA 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)		---
Operation mode (with sensing object approaching)		NO	C1 Models: NO C2 Models: NC	NO
		Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 7 for details.		
Protection circuits		Reverse polarity protection, Surge suppressor		Surge suppressor
Ambient temperature range		Operating/Storage: -10 to 60°C (with no icing or condensation)	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 -10 to 60°C	±20% max. of sensing distance at 23°C in the temperature range of -25 to 70°C	±10% max. of sensing distance at 23°C in the temperature range of -10 to 55°C
Voltage influence		±2.5% max. of sensing distance at rated voltage in rated voltage ±10% range		
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case	5 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	500 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: 1,000 m/s <sup>2</sup> 10 times each in X, Y, and Z directions	Destruction: 200 m/s <sup>2</sup> 10 times each in X, Y, and Z directions	
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant	IEC IP67	IEC IP66
Connection method		Pre-wired Models (Standard cable length: 2 m)		Pre-wired Models (Standard cable length: 1 m)
Weight (packed state)		Approx. 30 g	Approx. 60 g	Approx. 30 g
Materials	Case	Heat-resistant ABS		PPO
	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

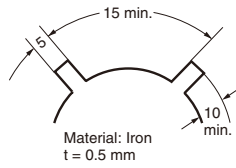
Operation mode	Model	Timing chart	Output circuit
NO	TL-Q2MC1 TL-Q5MC1	<p>Sensing object</p> <p>Present </p> <p>Not present </p> <p>Output transistor (load)</p> <p>ON </p> <p>OFF </p> <p>Detection indicator (red)</p> <p>ON </p> <p>OFF </p>	<p>* Load current: 100 mA max., TL-Q2MC1 Load current: 50 mA max., TL-Q5MC1</p>
NC	TL-Q5MC2	<p>Sensing object</p> <p>Present </p> <p>Not present </p> <p>Output transistor (load)</p> <p>ON </p> <p>OFF </p> <p>Detection indicator (red)</p> <p>ON </p> <p>OFF </p>	<p>* Load current: 100 mA max., TL-Q2MC1 Load current: 50 mA max., TL-Q5MC1</p>
NO	TL-N5ME1 TL-N10ME1 TL-N20ME1	<p>Sensing object</p> <p>Present </p> <p>Not present </p> <p>Load (between brown and black leads)</p> <p>Operate </p> <p>Reset </p> <p>Output voltage (between black and blue leads)</p> <p>High </p> <p>Low </p> <p>Detection indicator (red)</p> <p>ON </p> <p>OFF </p>	<p>*1. Load current: 200 mA max. *2. When a transistor is connected.</p>
NC	TL-N5ME2 TL-N10ME2 TL-N20ME2	<p>Sensing object</p> <p>Present </p> <p>Not present </p> <p>Load (between brown and black leads)</p> <p>Operate </p> <p>Reset </p> <p>Output voltage (between black and blue leads)</p> <p>High </p> <p>Low </p> <p>Detection indicator (red)</p> <p>ON </p> <p>OFF </p>	<p>*1. Load current: 200 mA max. *2. When a transistor is connected.</p>
Transistor output	TL-G3D-3	<p>Sensing object</p> <p>Present </p> <p>Not present </p> <p>Output transistor (load)</p> <p>ON </p> <p>OFF </p>	<p>* Load current: 20 mA max.</p>

## AC 2-Wire Models

Operation mode	Model	Timing chart	Output circuit
NO	TL-N5MY1 TL-N10MY1 TL-N20MY1	<p>Sensing object</p> <p>Present </p> <p>Not present </p> <p>Load</p> <p>Operate </p> <p>Reset </p> <p>Operation indicator (red)</p> <p>ON </p> <p>OFF </p>	
NC	TL-N5MY2 TL-N10MY2 TL-N20MY2	<p>Sensing object</p> <p>Present </p> <p>Not present </p> <p>Load</p> <p>Operate </p> <p>Reset </p> <p>Operation indicator (red)</p> <p>ON </p> <p>OFF </p>	

## Designing the Sensing Object for TL-G3D-3 Grooved Model

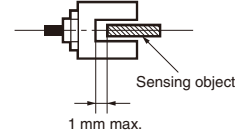
For high-speed response to a toothed metal plate, the sensing objects must be at least the size of the standard sensing object and there must be sufficient distance between sensing objects. The response frequency for a toothed wheel like the one shown at the right is 1 kHz min. The response frequency will be reduced if the wheel is smaller or the width of the teeth or the distance between the teeth is reduced.



### ● Adjustment

#### Sensing Object Passing Position for the TL-G3D-3 Grooved Model

The gap between the sensing object and the bottom of the groove must be 1 mm or less.



### ● Mounting

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

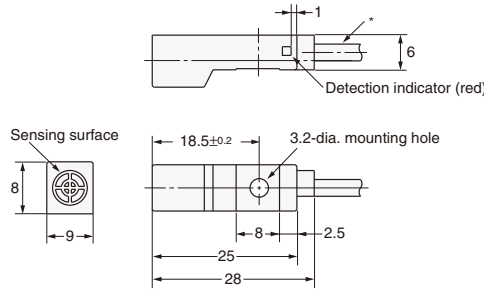
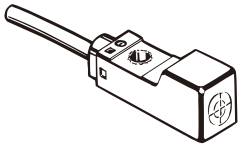
Model	Torque
TL-Q2MC1	0.59 N·m
TL-Q5M□□	
TL-N□M□□	0.9 to 1.5 N·m
TL-G3D-3	2 N·m

## Dimensions

(Unit: mm)

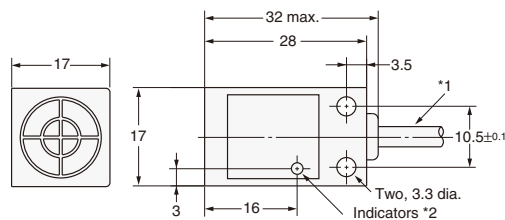
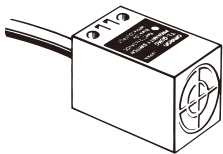
### Sensors

#### TL-Q2MC1

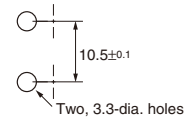


\* 2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 0.9 mm), Standard length: 2 m

#### TL-Q5M□□



#### Mounting Hole Dimensions



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