Standard (thin shape) Inductive Proximity Sensor

TL-T

- Thin shape for space saving surface mounting
- Direct side wall mounting for bracket-less installation

Ordering Information

DC 3-wire Models

Installation	Sensing distance	Connection	Output configuration	Operation mode NO	Operation mode NC
Shielded	2.0 mm	Pre-wired	NPN	TL-T2E1-E	TL-T2E2-E
			PNP	TL-T2F1-E	TL-T2F2-E
		M8 Connector (3-pin)	NPN	TL-T2E1-M5-E	TL-T2E2-M5-E
			PNP	TL-T2F1-M5-E	TL-T2F2-M5-E
Non-Shielded	4.0 mm	Pre-wired	NPN	TL-T4ME1-E	TL-T4ME2-E
			PNP	TL-T4MF1-E	TL-T4MF2-E
		M8 Connector (3-pin)	NPN	TL-T4ME1-M5-E	TL-T4ME2-M5-E
			PNP	TL-T4MF1-M5-E	TL-T4MF2-M5-E

DC 4-wire Models (NO + NC)

Installation	Sensing distance	Connection	Output configuration	Operation mode antivalent (NO + NC)
Shielded	2.0 mm	Pre-wired	NPN	TL-T2E3-E
			PNP	TL-T2F3-E
Non-Shielded	4.0 mm	Pre-wired	NPN	TL-T4ME3-E
			PNP	TL-T4MF3-E

Model Number Legend

TL-T □ □ □ □ - □□ - □ □

1 2 3 4 5 6 7 8 9

Example: TL-T2F1-E 2M — Square housing (40x12x26 mm), Sn=2 mm, shielded, PNP-NO, made by OMG, pre-wired PVC cable (3x0,25 mm²) 2 m

TL-T4MF1-M5-E — Square housing (40x12x26 mm), Sn=4 mm, not shielded, PNP-NO, M8 (3-pole) connector, made by OMG

1. **Basic name**
   TL
2. **Housing & shape material**
   Square plastic 40 x 12 x 26 mm
3. **Sensing distance**
   2: 2mm
   4: 4mm
4. **Shield**
   Blank: Shielded
   M: Non-shielded
5. **Power source & output**
   E: NPN voltage output
   F: PNP voltage output
6. **Operation mode**
   1: Normally open (NO)
   2: Normally closed (NC)
   3: Antivalent (NO + NC)
7. **Kind of connection**
   Blank: Pre-wired, PVC dia 4mm
   WA: Pre-wired, PUR/PVC dia 4mm
   WR: Robot cable, PVC dia 4mm
   M5: M8 connector (3-pole)
   M1J: M12 connector (4-pole) with pig-tail cable (PVC)
   M3J: M8 connector (4-pole) with pig-tail cable (PVC)
   M5J: M8 connector (3-pole) with pig-tail cable (PVC)
8. **Production site**
   E: European Union
9. **Cable length**
   Blank: Connector type
   Numeral: Cable type

Specifications

DC 3-wire and DC 4-wire Models

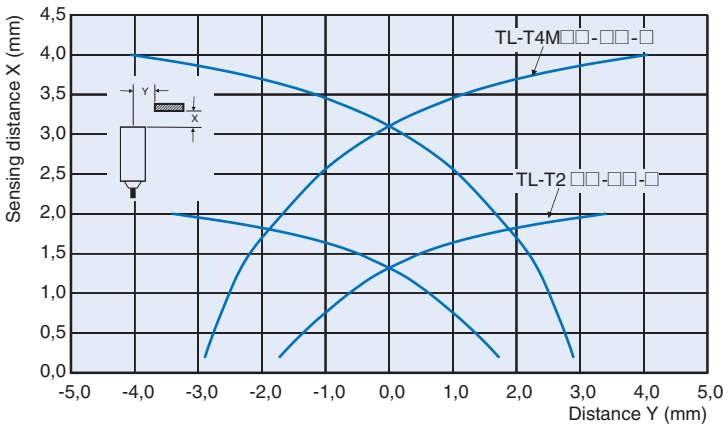
Type / Item		Shielded	Non-shielded
		TL-T2E1-□□-E TL-T2F1-□□-E TL-T2E2-□□-E TL-T2F2-□□-E TL-T2E3-E TL-T2F3-E	TL-T4ME1-□□-E TL-T4MF1-□□-E TL-T4ME2-□□-E TL-T4MF2-□□-E TL-T4ME3-E TL-T4MF3-E
Sensing distance		2 mm ±10%	4 mm ±10%
Setting distance		0 to 1.6 mm	0 to 3.2 mm
Differential travel		15% max. of sensing distance	
Target		Ferrous metal (The sensing distance decreases with non-ferrous metal)	
Standard target		12 x 12 x 1 mm	12 x 12 x 1 mm
Response frequency (See note 1.)		3000 Hz	1500 Hz
Rated power supply voltage (operating voltage range)		24 VDC. Ripple (p-p): 10% max. (10 to 35 VDC)	
Current consumption		DC 3-wire: ≤15 mA at 24 VDC DC 4-wire: ≤15 mA at 24 VDC	
Output type		TL-T□□E models: NPN voltage output TL-T□□F models: NPN voltage output	
Control output	Load current	300 mA max. each output	
	Residual voltage	≤2.0 VDC	
	Leakage current	DC 3-wire: <0,5 mA DC 4-wire: <1 mA each output	
Indicator		Output indicator (Yellow LED)	
Operation mode (with sensing object approaching)		TL-T□□E1/F1 models: NO TL-T□□E2/F2 models: NC TL-T□□E3/F3 models: NO + NC For details, refer to *Timing Charts*.	
Protection circuits		Output reverse polarity protection, Power source circuit reverse polarity protection, Surge suppressor, Short-circuit protection	
Ambient air temperature		Operating/Storage: –25°C to 70°C	
Temperature influence		≤±10% max. of Sn at 23°C in temperature range of –25°C to 70°C	
Humidity		35% to 95% RH	
Voltage influence		±1% max. of sensing distance in the rated voltage range ±15%	
Insulation resistance		>10 MΩ between current-carrying parts and case	
Dielectric strength		1000 VAC at 50/60 Hz between current-carrying parts and case	
Vibration resistance		0 to 55 Hz with 30 min. dwell time at resonance frequency or 55 Hz each in X, Y, and Z directions 55 to 2000 Hz, 150 m/s^2, double amplitude for 2 hours each in X, Y, and Z directions	
Shock resistance		300 m/s^2 6 times each in X, Y, and Z directions	
Degree of protection		in accordance with IEC 60529: Pre-wired models: IP67 M8 connector models: IP65	
Product standard		EN60947-5-2	
Connection method	Pre-wired (See note 2)	2m cable, 3x 0,25 mm^2 for DC 3-wire models 4x 0,25 mm^2 for DC 4-wire models	
	Connector	M8 connector	
Weight (packaged)	Pre-wired model	Approx. 70 g	
	M8 connector models	Approx. 20 g	
Material	Case	PBT	
	Cable	PVC	

Note: 1. The response frequency is an average value. Measurement conditions are as follows: standard target, a distance of twice the standard target distance between targets, and a setting distance of half the sensing distance
2. PUR Cable and other legth request

Engineering Data

Operating Range (Typical)

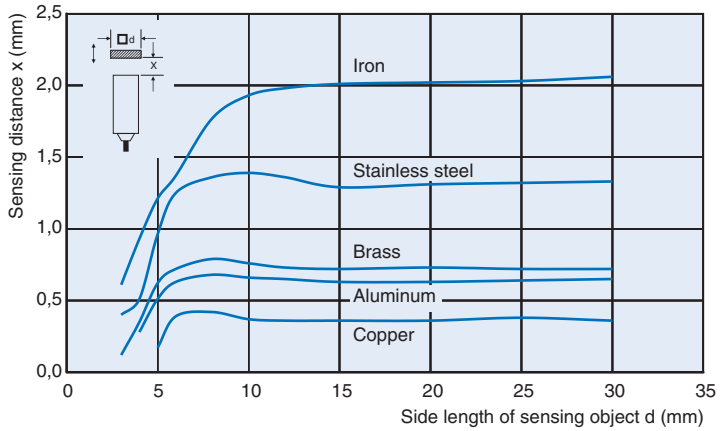
Shielded and non-shielded models



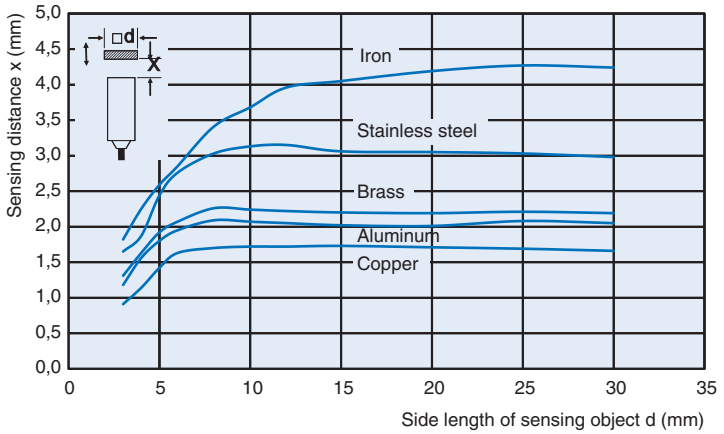
Influence of Sensing Object Size and Material

Shielded models

TL-T2□□-□□-□

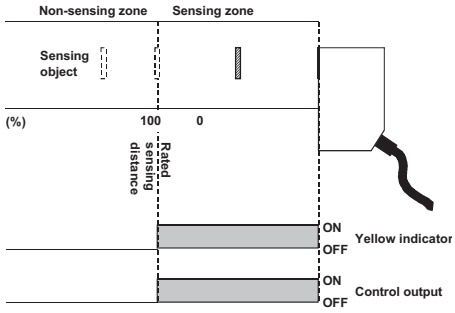
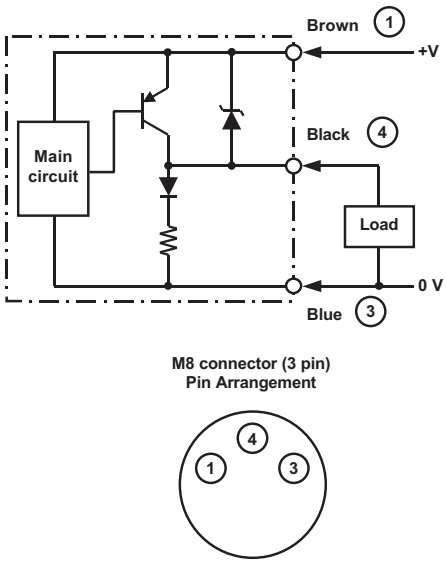
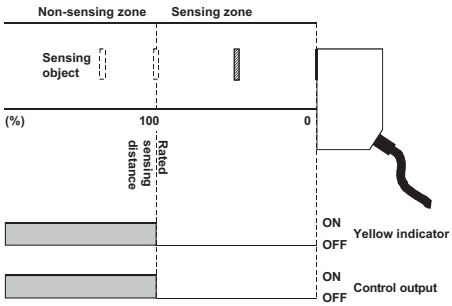
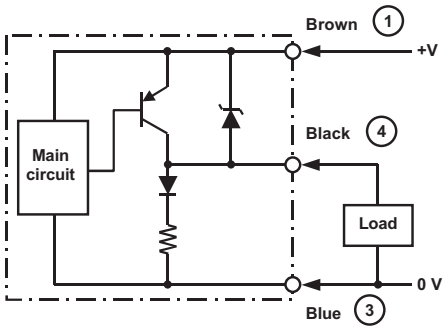
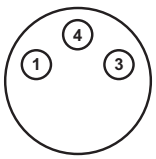
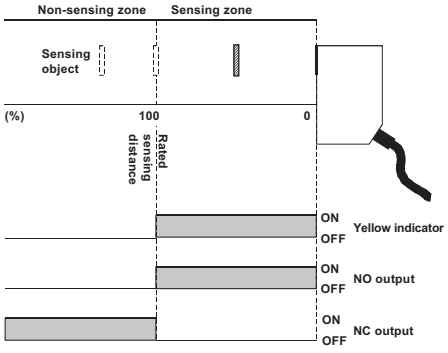
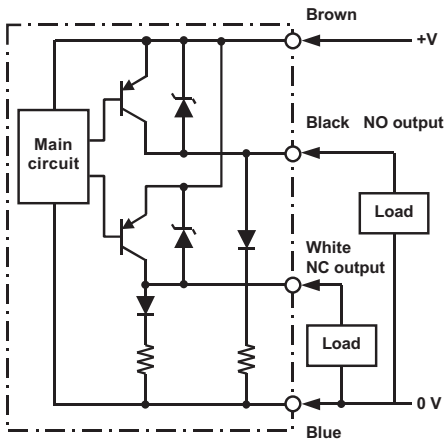


Non-shielded models

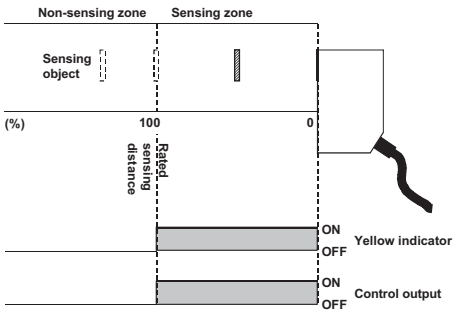
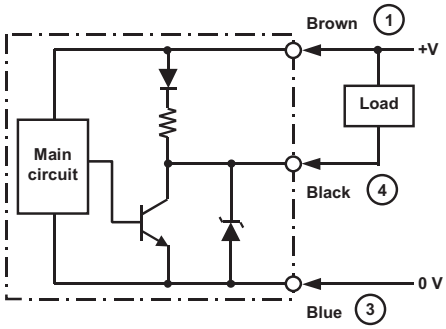
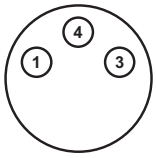
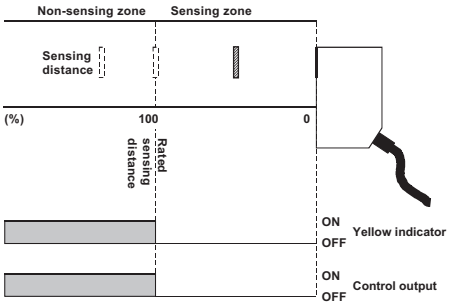
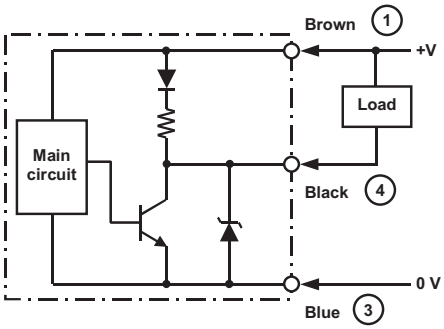
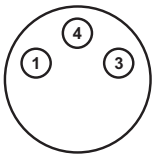
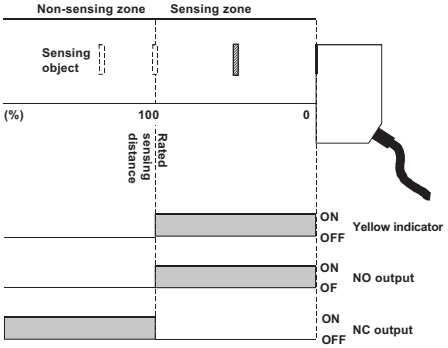
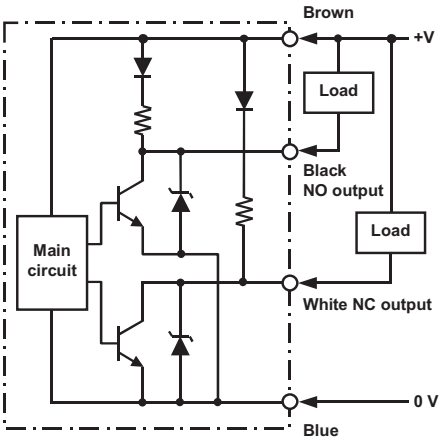


Operation

PNP Output

Operation mode	Model	Timing chart	Output circuit
NO	**TL-T□-F1-□-□**		 M8 connector (3 pin) Pin Arrangement
NC	**TL-T□-F2-□-□**		 M8 connector (3 pin) Pin Arrangement 
NO+NC	**TL-T□-F3-□-□**		

NPN Output

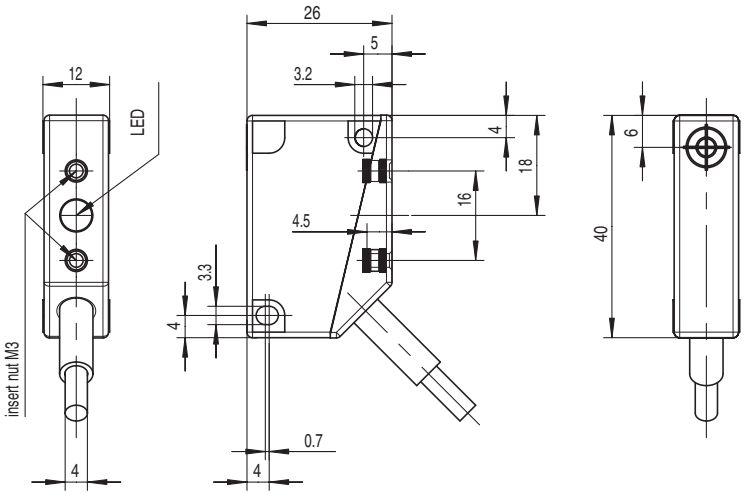
Operation mode	Model	Timing chart	Output circuit
NO	**TL-T□-E1-□-□**		 M8 connector (3 pin) Pin Arrangement 
NC	**TL-T□-E2-□-□**		 M8 connector (3 pin) Pin Arrangement 
NO+NC	**TL-T□-E3-□-□**		

Dimensions

Note: All units are in millimeters unless otherwise stated

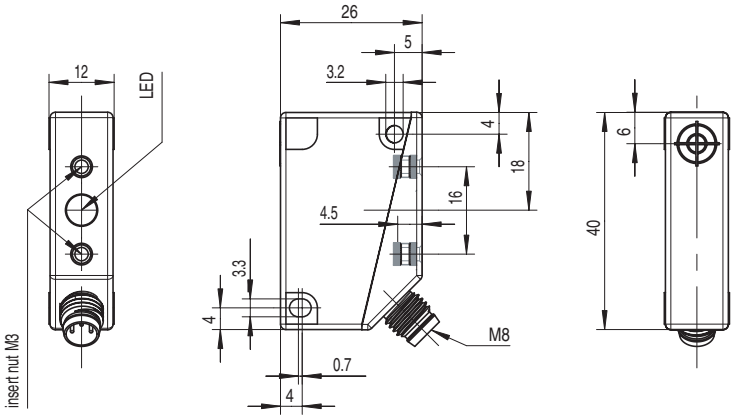
Pre-wired Models (shielded and non-shielded)

TL-T2□□-E 2M and TL-T4M□□-E 2M



M8 Connector Models (shielded and non-shielded)

TL-T2□□-M5-E and TL-T4M□□-M5-E



Precautions

Safety Precautions

Power Supply

Do not impose an excessive voltage on the TL-T, otherwise it may be damaged. Do not impose AC current (100 to 240 VAC) on any DC model, otherwise it may be damaged.

Load Short-circuit

Do not short-circuit the load, or the TL-T may be damaged.

The TL-T's short-circuit protection function will be valid if the polarity of the supply voltage imposed is correct and within the rated voltage range.

Wiring

Be sure to wire the TL-T and load correctly, otherwise it may be damaged.

Do not expose the product to flammable or explosive gases.

Do not disassemble, repair, or modify the product.

Correct Use

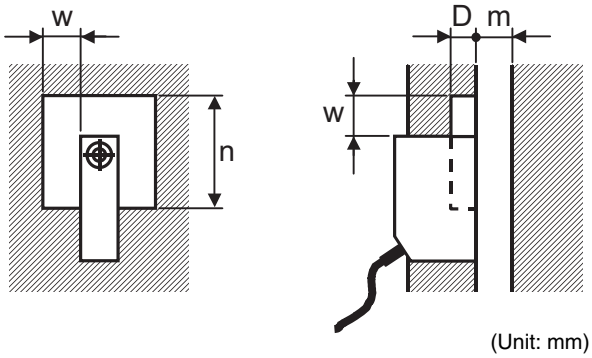
Designing

Power Reset Time

The Proximity Sensor is ready to operate within 100 ms after power is supplied. If power supplies are connected to the Proximity Sensor and load respectively, be sure to supply power to the Proximity Sensor before supplying power to the load.

Effects of Surrounding Metal

When mounting the TL-T within a metal panel, ensure that the clearances given in the following table are maintained.



(Unit: mm)

Type	Dimension	Minimum value
Shielded	w	0
	n	-
	D	0
	m	6
Non-shielded	w	12
	n	36
	D	8
	m	12

Power OFF

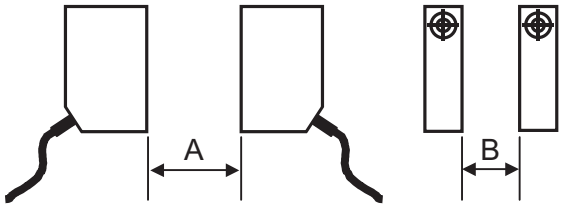
The Proximity Sensor may output a pulse signal when it is turned OFF. Therefore, it is recommended that the load be turned OFF before turning OFF the Proximity Sensor.

Power Supply Transformer

When using a DC power supply, make sure that the DC power supply has an insulated transformer. Do not use a DC power supply with an auto-transformer.

Mutual Interference

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



(Unit: mm)

Type	Dimension	Minimum value
Shielded	A	30
	B	10
Non-shielded	A	40
	B	20

Wiring

High-tension Lines

Wiring through Metal Conduit**:**
If there is a power or high-tension line near the cable of the Proximity Sensor, wire the cable through an independent metal conduit to prevent against Proximity Sensor damage or malfunctioning.

Cable Extension

Standard cable length is less than 200 m.

The tractive force is 50 N.

Mounting

The Proximity Sensor must not be subjected to excessive shock with a hammer when it is installed, otherwise the Proximity Sensor may be damaged or lose its water-resistivity.

Do not tighten the screw with excessive force. A washer must be used with the screw.

Maintenance and Inspection

Periodically perform the following checks to ensure stable operation of the Proximity Sensor over a long period of time.

1. Check for mounting position, dislocation, looseness, or distortion of the Proximity Sensor and sensing objects.
2. Check for loose wiring and connections, improper contacts, and line breakage.
3. Check for attachment or accumulation of metal powder or dust.
4. Check for abnormal temperature conditions and other environmental conditions.
5. Check for proper lighting of indicators (for models with a set indicator.)

Never disassemble or repair the Sensor.

Environment

Water Resistivity

The Proximity Sensors are tested intensively on water resistance, but in order to ensure maximum performance and life expectancy avoid immersion in water and provide protection from rain or snow.

Operating Environment

Ensure storage and operation of the Proximity Sensor within the given specifications.

Inrush Current

A load that has a large inrush current (e.g., a lamp or motor) will damage the Proximity Sensor, in which case connect the load to the Proximity Sensor through a relay.

<SUITABILITY FOR USE>

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

<CHANGE IN SPECIFICATIONS>

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E38E-EN-01

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