

OPT Series Transit Time Photoelectric Sensors

Rectangular Plastic Distance Sensors



OPT2010, OPT2015, OPT2019

- Diffuse and Retro-reflective (Transit time) laser distance measurement sensors
- Analog and switching outputs available
- Measured value independent of material, color, and brightness
- Class 1 and 2 lasers available (safety label included with Class 2 lasers)
- M12 and M8 quick-disconnect and pigtail versions; order cable separately
- Mounting hardware included



OPT Series Photoelectric Sensors Selection Chart											
Part Number	Price	Working Range m [ft]	Laser Class	Function	Measurement Rate	Resolution	Output State	Connection	Wiring Diagram	Dims (mm)	Drawing Link
Diffuse (Transit Time)											
OPT2010		0 - 3 [0 - 9.84]	1	Switching	1kHz	Hysteresis < 15mm	Complementary (N.O./N.C.) PNP	5-pin M12 quick-disconnect	1	50 x 50 x 50	PDF
OPT2011		0.05 - 3.05 [0.16 - 10.01]		Measuring / Switching	500/s [2ms]	1mm [0.04 in]	Analog 4-20 mA or 0-10 VDC	4-pin M12 quick-disconnect	2		PDF
OPT2012		0.2 - 6.2 [0.66 - 20.34]			1-100/s [10ms]	1-12 mm [0.04 - 0.47 in]		Switching PNP/NPN (N.O./N.C.)	8-pin M12 quick-disconnect	3	PDF
OPT2013		0.1 - 10.1 [0.33 - 33.14]	2						4-pin M12 quick-disconnect	4	55 x 81 x 30
OPT2014								3	PDF		
OPT2016		0 - 1 [0 - 3.28]	1				Complementary (N.O./N.C.) PNP	4-pin M8 quick-disconnect	5	22 x 32 x 12	PDF
OPT2017								4-pin M12 quick-disconnect, 200mm [7.87 in] cable			PDF
OPT2018								4-pin M8 quick-disconnect, 200mm [7.87 in] cable			PDF
OPT2019								Pigtail, 2m [6.5 ft] cable			PDF
OPT2170								0 - 3 [0 - 9.84]			1
OPT2171			2 mutually independent switching NPN	6	PDF						
OPT2172		0 - 1 [0 - 3.28]				Hysteresis < 20mm	2 mutually independent switching PNP	4-pin M8 quick-disconnect	7	22 x 32 x 12	PDF
OPT2173								4-pin M8 quick-disconnect, 200mm [7.87 in] cable			PDF
OPT2174											PDF
Retro-Reflective (Transit Time)											
OPT2015*		0.2 - 100.2 [0.66 - 328.74]	1	Measuring/ Switching	1-100/s [10ms]	4-20 mm [0.16 - 0.79 in]	Analog 4-20 mA or 0-10 VDC Switching PNP/NPN (N.O./N.C.)	8-pin M12 quick-disconnect	4	55 x 81 x 30	PDF

*Requires purchase of OPT2030 reflector (see Accessories). <50m sensing distance requires 1 reflector. 50-100m sensing distance requires 4 reflectors.

OPT Series Transit Time Photoelectric Sensors

Wiring Diagrams

Diagram 1

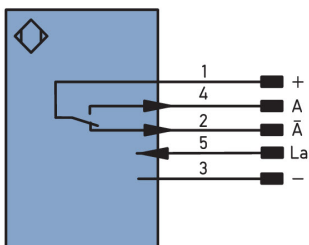


Diagram 2

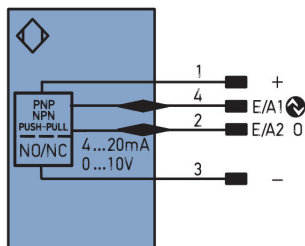


Diagram 3

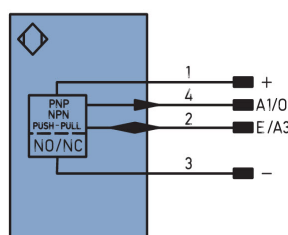


Diagram 4

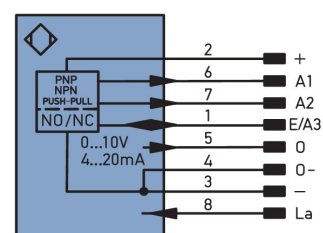


Diagram 5

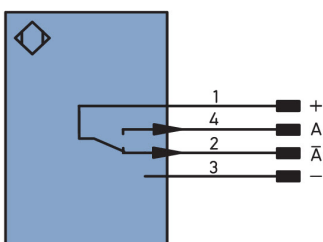


Diagram 6

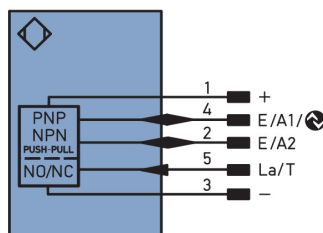
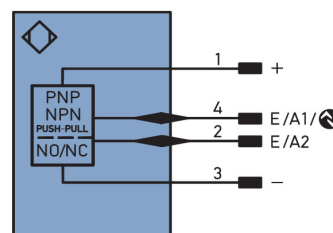


Diagram 7

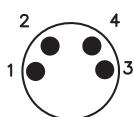


Legend

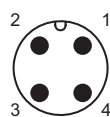
+	Supply Voltage +	PT	Platinum measuring resistor	EN _A R5422	Encoder A/ \bar{A} (TTL)
-	Supply Voltage 0 V	nc	not connected	EN _B R5422	Encoder B/ \bar{B} (TTL)
-	Supply Voltage (AC Voltage)	U	Test Input	EN _A	Encoder A
A	Switching Output (NO)	\bar{U}	Test Input inverted	EN _B	Encoder B
\bar{A}	Switching Output (NC)	W	Trigger Input	A _{MIN}	Digital output MIN
V	Contamination/Error Output (NO)	W-	Ground for the Trigger Input	A _{MAX}	Digital output MAX
\bar{V}	Contamination/Error Output (NC)	O	Analog Output	A _{OK}	Digital output OK
E	Input (analog or digital)	O-	Ground for the Analog Output	SY _{IN}	Synchronization In
T	Teach Input	BZ	Block Discharge	SY _{OUT}	Synchronization OUT
Z	Time Delay (activation)	AWV	Valve Output	O _{LT}	Brightness output
S	Shielding	a	Valve Control Output +	M	Maintenance
RxD	Interface Receive Path	b	Valve Control Output 0 V	rsv	reserved
TxD	Interface Send Path	SY	Synchronization	Wire Colors according to IEC 60757	
RDY	Ready	SY-	Ground for the Synchronization	BK	Black
GND	Ground	E+	Receiver-Line	BN	Brown
CL	Clock	S+	Emitter-Line	RD	Red
E/A	Output/Input programmable	\perp	Grounding	OG	Orange
	IO-Link	SnR	Switching Distance Reduction	YE	Yellow
PoE	Power over Ethernet	Rx+/-	Ethernet Receive Path	GN	Green
IN	Safety Input	Tx+/-	Ethernet Send Path	BU	Blue
OSSD	Safety Output	B _{us}	Interfaces-Bus A(+)/B(-)	VT	Violet
Signal	Signal Output	La	Emitted Light disengageable	GY	Grey
BL _D +/-	Ethernet Gigabit bidirect. data line (A-D)	Mag	Magnet activation	WH	White
EN _O R5422	Encoder 0-pulse 0- \bar{O} (TTL)	RES	Input confirmation	PK	Pink
		EDM	Contactors Monitoring	GN _{YE}	Green/Yellow

Connectors

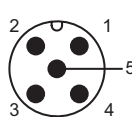
4-Pin M8 connector



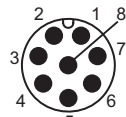
4-Pin M12 connector



5-Pin M12 connector



8-Pin M12 connector



Switching Element Function

	Through-Beam and Reflective Models	Diffuse Models
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

Note: Class 2 power source required

OPT Series Transit Time Photoelectric Sensors Specifications

OPT Series Transit Time Photoelectric Sensors Specifications										
Part Number	OPT2016	OPT2017	OPT2018	OPT2019	OPT2010	OPT2011	OPT2012	OPT2013	OPT2014	OPT2015
Type	Diffuse (Transit time)									*Retro-Reflective
Sensing distance – m [in]	1 [39.37]			3 [118.11]	3.05 [120.08]	6.2 [244.09]	10.1 [397.64]	100.2 [3944.90]		
Light spot diameter (at maximum range)	< 15mm			9mm		< 12mm	< 20mm		80mm @ 40m < 200mm @ 100m	
Laser class (EN 60825-1)	Class 1 Red Laser			Class 1 Red Laser			Class 2 Red Laser		Class 1 Red Laser	
Emission	680nm			660nm						
Sensitivity	Adjustable via Potentiometer			Adjustable via Teach						
Output type	PNP N.O./N.C.				Programmable: Analog 4-20 mA / 0-10 VDC, N.O./N.C. PNP/NPN					
Current output max load	N/A				500Ω					
Operating voltage	10-30 VDC				18-30 VDC					
No load supply current	< 30mA			< 50mA	< 70mA	< 100mA				
Operating (load) current	100mA			200mA	100mA	200mA				
Voltage drop	< 2.5 V (switching outputs)									
Measurement rate	N/A				500/s	1-100/s				
Switching frequency	1000Hz				250Hz	50Hz				
Linearity	< 2.5%			NA		0.2 %		0.05%		
Short-circuit protection	Yes									
Operating temperature	-40 to 50°C [-40 to 122°F]			-40 to 60°C [-40 to 140°F]	-4 to 50°C [-40 to 122°F]	-25 to 60°C [13 to 140°F]				
Protection degree (DIN 40050)	IP67			IP68						
LED indicators - switching status	Yellow				Screen Display					
LED indicators - power	Green				Screen Display					
Housing material	Polycarbonate									
Lens material	PMMA (Polymethyl methacrylate)									
Shock/vibration	Tested according to EN 60068-2-6 / EN 60068-2-27									
Tightening torque	0.5 N·m (mounting screws)									
Weight (cable/connector)	8g [0.28 oz]	22g [0.78 oz]	16g [0.56 oz]	48g [1.69 oz]	37g [1.31 oz]	43g [1.52 oz]	81g [2.86 oz]	82g [2.89 oz]	80g [2.82 oz]	82g [2.89 oz]
Connectors	4-pin M8	4-pin M12	4-pin M8	Pigtail	5-pin M12	4-pin M12		8-pin M12	4-pin M12	8-pin M12
Agency approvals	CE, cULUS, E189727, RoHs									

*Requires purchase of OPT2030 reflector (see Accessories). <50m sensing distance requires 1 reflector. 50-100m sensing distance requires 4 reflectors.

IMPORTANT NOTE

The Laser Classification Systems for the standards IEC (EN) 60825-1 defines the following safety classes:

Class 1

This class is eye-safe under all operating conditions.

Class 2

These are visible lasers. This class is safe for accidental viewing under all operating conditions. However, it may not be safe for a person who deliberately stares into the laser beam for longer than 0.25 seconds, by overcoming their natural aversion response to the very bright light.

OPT Series Transit Time Photoelectric Sensors Specifications

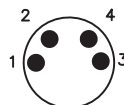
OPT2170 - OPT2174 sensors guarantee reliable switching performance: Whether there is a glossy object in the background or a reflective surface or even reflectors in the working area these high-performance distance sensors continue to perform. Black surfaces are reliably detected even in extremely inclined positions depending on the surface characteristics and the distance from an angle of up to 89°. The sensors do not interact with each other if they are located in very close proximity to each other or even directly opposite each other.

The Laser Classification Systems for the standards IEC (EN) 60825-1 defines the following safety classes: Class 1
This class is eye-safe under all operating conditions.

OPT Series Transit Time Photoelectric Sensors Specifications					
Part Number	OPT2170	OPT2171	OPT2172	OPT2173	OPT2174
Type	Diffuse (Transit time)				
Sensing distance – m [ft]	3 [9.84]		1 [3.28]		
Light spot diameter (at maximum range)	9mm		15mm		
Laser class (EN 60825-1)	Class 1 Red Laser				
Wavelength	660nm		680nm		
Sensitivity	Adjustable via Teach				
Output type	PNP N.O.	NPN N.O.	PNP N.O.		
Current output max load	200mA		100mA		
Operating voltage	10-30 VDC				
Current consumption	< 40mA		< 30mA		
# Switching outputs	2				
Voltage drop	< 2.5 V (switching outputs)				
Response time	1ms				
Switching frequency	500Hz				
Short-circuit protection	Yes				
Operating temperature	-40 to 60°C [-40 to 140°F]		-40 to 50°C [-40 to 122°F]		
Protection degree (DIN 40050)	IP68		IP67		
LED indicators - switching status	Yellow				
LED indicators - power	Green				
Housing material	Polycarbonate				
Lens material	PMMA (Polymethyl methacrylate)				
Shock/vibration	Tested according to EN 60068-2-6 / EN 60068-2-27				
Tightening torque	0.5 N·m (mounting screws)				
Weight (cable/connector)	8g [0.28 oz]	22g [0.78 oz]	16g [0.56 oz]	48g [1.69 oz]	82g [2.89 oz]
Connectors	5-pin M12		4-pin M12	4-pin M12 pigtail	4-pin M8 pigtail
IO Link	IO-Link V1.1				
Agency approvals	CE, cULUS, E189727, RoHs				

Connectors

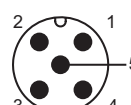
4-Pin M8 connector



4-Pin M12 connector



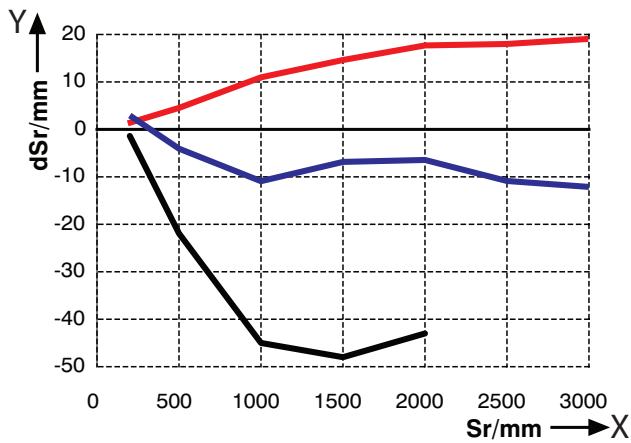
5-Pin M12 connector



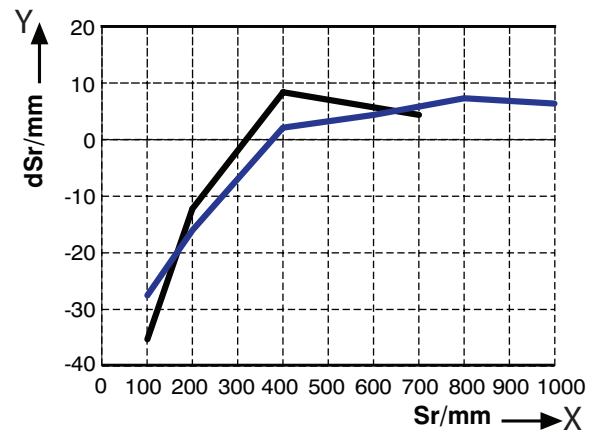
OPT Series Transit Time Photoelectric Sensors

Characteristic Curves

OPT2010



**OPT2016, OPT2017
OPT2018, OPT2019**



Sr = Switching Distance

dSr = Switching Distance Change

— black 6 % remission

— blue 18 % remission

— Brushed aluminum

X	Distance to target [mm]
Y	Minimum distance between object and background [mm]

Typical curves based on Kodak white (90% remission)

Accessories for OPT Series 32x12mm Photoelectric Sensors

Right-Angle Mounting Brackets

Mounting bracket, right angle, vertical adjustment. For use with OPT series 32x12mm photoelectric sensors.

Mounting Brackets for OPT 32x12mm Sensors					
Part Number	Price	Description	Qty	Drawing Link	Weight lb (g)
OPT2033		Wenglor mounting bracket, right-angle, vertical adjustment, nickel plated steel. For use with OPT series 32x12mm photoelectric sensors.	1	PDF	0.04 [16]



OPT2033

Right-angle Swivel Mounting Systems

Mounting bracket, right-angle swivel, 360 degree vertical and horizontal adjustment, aluminum, 12mm rod mount. For use with OPT series 32x12mm photoelectric sensors.

Accessories for 32x12mm Sensors						
Part Number	Price	Description	Mounting Head	Mounting Plate	Drawing Link	Weight lb (g)
OPT2120		Wenglor mounting bracket, right-angle swivel, 360 degree vertical and horizontal adjustment, aluminum, 12mm rod mount. For use with OPT series 32x12mm photoelectric sensors.	Aluminum	304 Stainless Steel	PDF	0.14 (63.50)
OPT2121		Wenglor mounting bracket, right-angle swivel, 360 degree vertical and horizontal adjustment, 304 stainless steel, 12mm rod mount. For use with OPT series 32x12mm photoelectric sensors.	304 Stainless Steel	304 Stainless Steel	PDF	0.27 (122.46)



OPT2121



OPT2120

Note: 304 Stainless steel mounting rods sold separately: OPT2109 (200mm length), OPT2110 (300mm length), and OPT2111 (500mm length).

Accessories for OPT2012 - OPT2015 Photoelectric Sensors

Right-angle Mounting Brackets

Mounting bracket, right angle, steel and nickel plated. For use with OPT2012- OPT2015 photoelectric sensors.

Accessories for OPT2012-OPT2015 Photoelectric Sensors				
Part Number	Price	Description	Drawing Link	Weight lb (g)
OPT2032		Mounting bracket, right-angle, nickel-plated brass. For use with OPT2012 - OPT2015 photoelectric sensors.	PDF	0.36 (163.29)



OPT2032

Right-angle Swivel Mounting Systems

Mounting bracket, right-angle swivel, 360 degree vertical and horizontal adjustment, 12mm rod mount. For use with OPT2012 - OPT2015 photoelectric sensors. Available in all stainless steel or with an aluminum head with a stainless steel mounting plate.

Accessories for OPT2012-OPT2015 Photoelectric Sensors						
Part Number	Price	Description	Mounting Head	Mounting Plate	Drawing Link	Weight lb (g)
OPT2126		Mounting bracket, right-angle swivel, 360 vertical and horizontal adjustment, aluminum, 12mm rod mount. For use with OPT2012 - OPT2015 photoelectric sensors.	Aluminum	304 Stainless Steel	PDF	0.23 (104.32)
OPT2127		Mounting bracket, right-angle swivel, 360 vertical and horizontal adjustment, 304 stainless steel, 12mm rod mount. For use with OPT2012 - OPT2015 photoelectric sensors.	304 Stainless Steel	304 Stainless Steel	PDF	0.36 (163.29)



OPT2126

OPT2127

Note: 304 Stainless steel mounting rods sold separately: OPT2109 (200mm length), OPT2110 (300mm length), and OPT2111 (500mm length).

Mounting Rods and Brackets

Mounting Rods

304 Stainless steel rods for mounting swivel brackets OPT2112 - OPT2127. Available in three lengths: 200mm, 300mm, and 500mm. 12mm diameter.

Mounting Rods for OPT2112-2127 Swivel Mounting Brackets				
Part Number	Price	Description	Drawing Link	Weight lb (g)
OPT2109		Wenglor mounting rod, 12mm diameter, 200mm length, 304 stainless steel.	PDF	0.41 (185.97)
OPT2110		Wenglor mounting rod, 12mm diameter, 300mm length, 304 stainless steel.	PDF	0.60 (272.16)
OPT2111		Wenglor mounting rod, 12mm diameter, 500mm length, 304 stainless steel.	PDF	0.98 (444.52)



Right-angle Mounting Bracket

Mounting bracket, right-angle, nickel-plated brass. For use with 12mm mounting rods OPT2109, OPT2110 & OPT2111.

Right-angle Mounting Brackets for 12mm Sensors				
Part Number	Price	Description	Drawing Link	Weight lb (g)
OPT2108		Wenglor mounting bracket, right-angle, nickel plated brass. For use with 12mm mounting rods OPT2109, OPT2110 & OPT2111.	PDF	0.07 (31.8)



Reflectors

Reflectors for Photoelectric Laser Sensors

Reflectors for OPT Series Photoelectric Sensors				
Part Number	Price	Description	Drawing Link	Weight lb (g)
OPT2030		Reflector, square, 100 x 100mm. For use with photoelectric laser sensors.	PDF	0.20 (90.71)
OPT2167		Wenglor reflector, rectangular, 61 x 51.5mm. For use with OPT2137 & OPT2138.	PDF	0.03 (13.60)

Note: OPT2015 requires purchase of OPT2030 reflector. <50m sensing distance requires 1 reflector. 50–100 m sensing distance requires 4 reflectors.



OPT2167



OPT2030