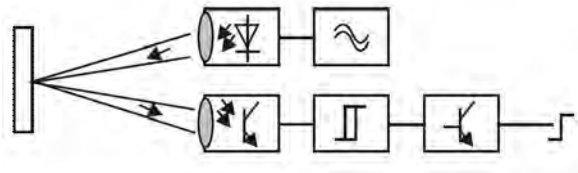
GENERAL INFORMATION FOR PHOTOELECTRIC SENSORS

What Are Photoelectric Sensors?

Photoelectric Sensors as "artificial eyes" are fundamental to the automation technology. They are used where a reliable and non-contact detection of the exact position of objects is required. The material of the object to be detected is of no importance. Compared to inductive sensors,photoelectric sensors have a much higher sensing zone.TEHORN provides many varieties of Sensor, including diffuse-reflective, through-beam, retro-reflective, and distance-settable Sensors, as well as Sensors with either built-in or separate amplifiers, etc.

Photoelectric Sensors detect objects, changes in surface conditions, and other items through a variety of optical properties. A Photoelectric Sensor consists primarily of an Emitter for emitting light and a Receiver for receiving light. When emitted light is interrupted or reflected by the sensing object, it changes the amount of light that arrives at the Receiver. The Receiver detects this change and converts it to an electrical output. The light source for the majority of Photoelectric Sensors is infrared or visible light (generally red, or green/blue for identifying colors).



Features

(1) Long Sensing Distance

A Through-beam Sensor, for example, can detect objects more than 10 m away. This is impossible with magnetic, ultrasonic, or other sensing methods.

(2) Virtually No Sensing Object Restrictions

These Sensors operate on the principle that an object interrupts or reflects light, so they are not limited like proximity sensors to detecting metal objects. This means they can be used to detect virtually any object, including glass, plastic, wood, and liquid.

(3) Fast Response Time

The response time is extremely fast because light travels at high speed and the sensor performs no mechanical operations because all circuits are comprised of electronic components.

(4) High Resolution

The incredibly high resolution achieved with these Sensors derives from advanced design technologies that yielded a very small spot beam and a unique optical system for receiving light. These developments enable detecting very small objects, as well as precise position detection.

(5) Non-contact Sensing

There is little chance of damaging sensing objects or Sensors because objects can be detected without physical contact. This ensures years of sensor service.

(6) Color Identification

The rate at which an object reflects or absorbs light depends on both the wavelength of the emitted light and the color of the object. This property can be used to detect colors.

(7) Easy Adjustment

Positioning the beam on an object is simple with models that emit visible light because the beam is visible.

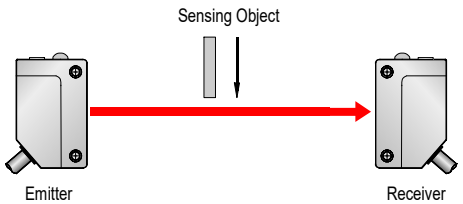
Classification

1) Through-beam Sensors

The Emitter and Receiver are installed opposite each other to enable the light from the Emitter to enter the Receiver. When a sensing object passing between the Emitter and Receiver interrupts the emitted light, it reduces the amount of light that enters the Receiver. This reduction in light intensity is used to detect an object.

Features

- Stable operation and long sensing distances ranging from several centimeters to several tens of meters.
- Sensing position unaffected by changes in the sensing object path.
- Operation not greatly affected by sensing object gloss, color, or inclination.

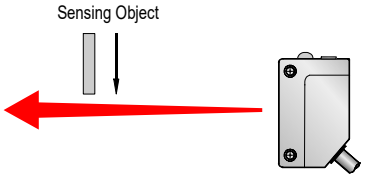


2) Diffuse-reflective Sensors

The Emitter and Receiver are installed in the same housing and light normally does not return to the Receiver. When light from the Emitter strikes the sensing object, the object reflects the light and it enters the Receiver where the intensity of light is increased. This increase in light intensity is used to detect the object.

Features

- Sensing distance ranging from several centimeters to several meters.
- Easy mounting adjustment.
- The intensity of reflected light and operating stability vary with the conditions (e.g., color and smoothness) on the surface of the sensing object.



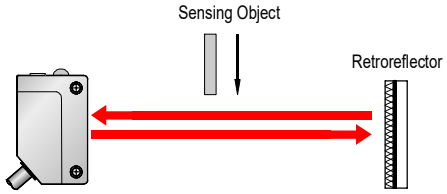
GENERAL INFORMATION FOR PHOTOELECTRIC SENSORS

3) Retro-reflective Sensors

The Emitter and Receiver are installed in the same housing and light from the Emitter is normally reflected back to the Receiver by a Reflector installed on the opposite side. When the sensing object interrupts the light, it reduces the amount of light received. This reduction in light intensity is used to detect the object.

Features

- Sensing distance ranges from several centimeters to several meters.
- Simple wiring and optical axis adjustment (labor saving).
- Operation not greatly affected by the color or angle of sensing objects.
- Light passes through the sensing object twice, making these Sensors suitable for sensing transparent objects.
- Sensing objects with a mirrored finish may not be detected because the amount of light reflected back to the Receiver from such shiny surfaces makes it appear as though no sensing object is present. This problem can be overcome using the MSR function.

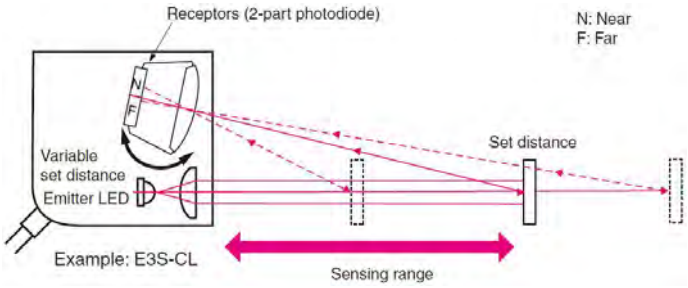


4) Distance-settable Sensors

The Receiver in the Sensor is either a 2-part photodiode or a position detector. The light reflected from the sensing object is concentrated on the Receiver.Sensing is based on the principle of triangulation, which states that where the beam is concentrated depends on the distance to the sensing object. The following shows a detection system that uses a 2-part photodiode. The end of thephotodiode nearest the case is called the N (near) end and the other end is called the F (far) end. When a sensing object reaches the preset position, the reflected light is concentrated midway between the N end and the F end and the photodiodes at both ends receive an equal amount of light. If the sensing object is closer to the sensor, then the reflected light is concentrated at the N end. Conversely, the reflected light is concentrated at the F end when the sensing object is located farther than the preset distance. The sensor calculates the difference between the light intensity at the N end and F end to determine the position of the sensing object.

Features of Distance-settable Sensors

- Operation not greatly affected by sensing object surface conditions or color.
- Operation not greatly affected by the background.



Background Suppression(BGS) and Foreground Suppression(FGS)

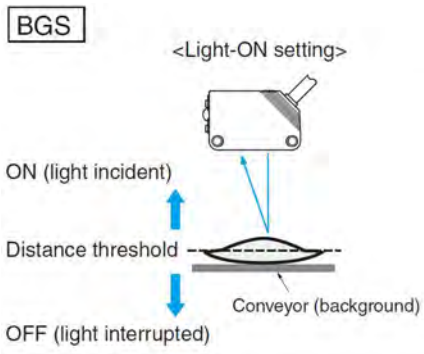
The BGS function prevents any background object (i.e., the conveyor) beyond the set distance from being detected. The FGS function prevents objects closer than the set distance or objects that reflect less than a specified amount of light to the Receiver from being detected. Objects that reflect less than a specified amount of light are as follows:

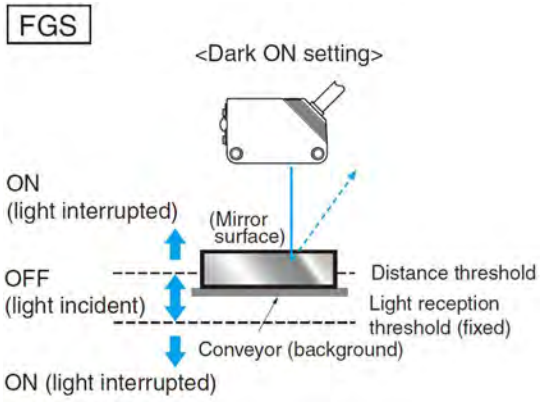
(1) Objects with extremely low reflectance and objects that are darker than black paper.
(2) Objects like mirrors that return virtually all light back to the Emitter.
(3) Uneven, glossy surfaces that reflect a lot of light but disperse the light in random directions.

Reflected light may return to the Receiver momentarily for item (3) due to sensing object movement. In that case, an OFF delay timer or some other means may need to be employed to prevent chattering.

Features of Distance-settable Sensors

- Small differences in height can be detected (BGS and FGS).
- The effects of sensing object color are minimized (BGS and FGS).
- The effects of background objects are minimized (BGS).
- Sensing object irregularities may affect operation (BGS and FGS).





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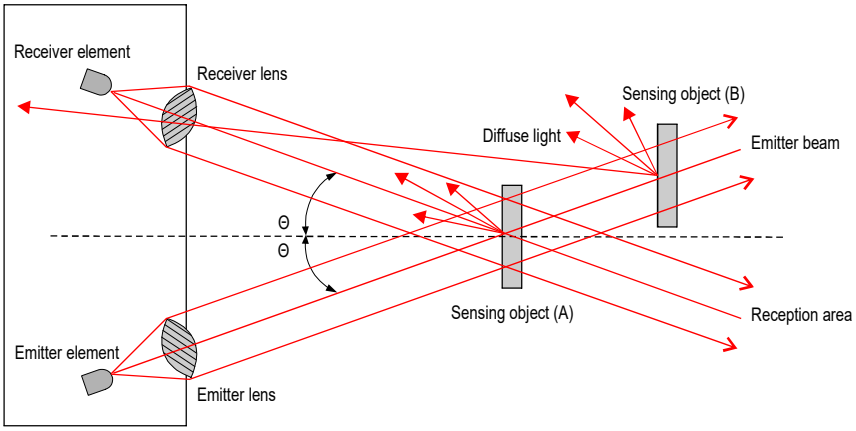
3) **Limited-reflective Sensors**

In the same way as for Diffuse-reflective Sensors, Limited-reflective Sensors receive light reflected from the sensing object to detect it. The Emitter and Receiver are installed to receive only regular-reflection light, so only objects that are a specific distance (area where light emission and reception overlap) from the Sensor can be detected. In the figure on the right, the sensing object at (A) can be detected while the object at (B) cannot.

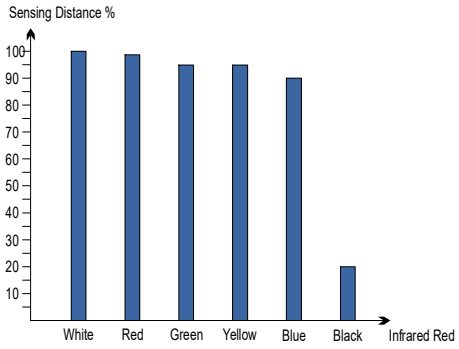
Features

- Small differences in height can be detected.
- The distance from the Sensor can be limited to detect only objects in a specific area.
- Operation is not greatly affected by sensing object colors.
- Operation is greatly affected by the glossiness or inclination of the sensing object.



Explanation of Terms

Switching distance for diffuse reflective sensors
Detecting distance for optical photoelectric sensors varies according to the material to sense. The parameters that influence the maximum capacity of the sensor are mainly the color and the brightness or roughness of the surface to be detected. Data below are approximate value and are the result of lab tests with mat paper targets 10x10cm wide of the following colors.

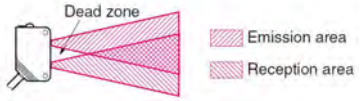


Switching distance for Retro-reflective sensor and Thrugh-beam sensor
It is the maximum distance between photocell and reflector or between emitter and receiver.

Nominal switching distance(Sn) according to EN 60947-5-2
It is the conventional value of operating distance for photoelectric switches. It does not take into account either manufacturing tolerance(+/-10%) or variations due to external conditions such as voltage and temperature.

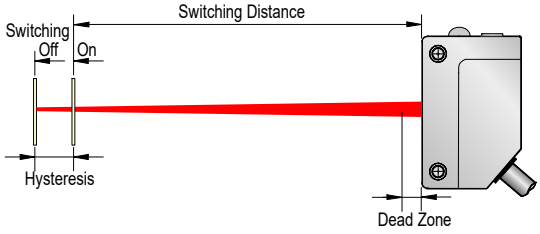
Usable operating distance(Su) according to En 60947-5-2
It is the assured operating distance within the specified voltage, function and temperature intervals; it is included between 81% and 121% of the nominal switching distance Sn(0.81Sn ≤ Su ≤ 1.21Sn) for photoelectric switches.

Example for Diffuse-reflective Sensor



Assured operating distance (Sa) according to En 60947-5-2
It is the distance at which the photoelectric switches works safely in all the temperature and voltage intervals as specified for the same sensor. The assured operating distance is included between 0 and 0.81 of Sn only in the case of photoelectric switches without blind zone and referring to specific targets.

Dead Zone
It is the area between the “photoelectric switches active face” and the minimum switching distance, within which an object can not be detected.



Hysteresis
It is the maximum distance between the detected and non detected points. These points are obtained by moving the object towards or away from the photocell axis. Data are expressed in percentage to the value of the sensing distance.

GENERAL INFORMATION FOR PHOTOELECTRIC SENSORS

Electrical Parameters

Nominal Voltage: It is indicates the maximum and minimum values within which sensors work correctly.

Residual Ripple: The maximum admissible ripple of the DC supply voltage shown as percentage to its medium value.

Max. Output Current: It shows maximum output current a sensor can cope with when voltage is at maximum nominal value.

Voltage Drop: Voltage drop on switching circuit when output transistor is conducting.

Start Up Delay: Time interval between sensor supply connection and active output.
This time interval is to avoid the switch output being in an undefined state when the systerm is switched on.

Absorption: This in the consumption of the photocell referred to the maximum limits of the nominal voltage and without load.

Polarity Inversion Protection: Available in EC supplied type, it prevents the sensor from being damage when supply cables are incorrectly connected.

Short Circuit Protection: A protection in case of short circuit or overload to avoid inner circuit damage. Once the short circuit is eliminated the photocell resets.

Sensitivity Adjustment: A part of a photoelectric switch used to set the operating distance within the sensing distance.
This adjustment is usually done by a potentiometer or by Teach-in.

Output for PNP Mode: Output in solid state with PNP transistor; when it is activated, it supplies a positive voltage whose reading is near the supply positive pole(+).

Output for PNP Mode: Output in solid state with NPN transistor; when it is activated, it supplies a negative voltage whose reading is near the supply negative pole(-).

Output for Light On(L.O.) Mode: It shows for the photoelectric sensor the case of reception of direct or reflected light.

Output for Light On(L.O.) Mode: It shows for the photoelectric sensor the case of failure in receiving the direct or reflected light.

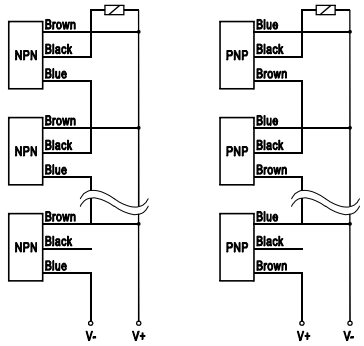
Output for Relay N.O. Mode: Open contact when the photoelectric sensor is in “normal” condition, that is to say not activated.

Output for Relay N.C. Mode: Closed contact when the photoelectric sensor is in “normal” condition, that is to say not activated.

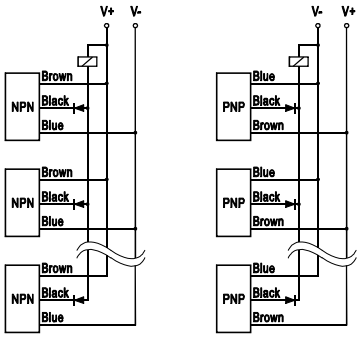
Connection for Photoelectric Sensors

Connection In Series(AND) with PNP Output or NPN Output
Connected in this way sensors activated one output when activated simultaneously. When using this type of connection keep into account as follows:

1) Drop of Voltage for each sensor(<1.5V);
2) The Maximum load current of the sensor used together within the absorption of each sensor(<30mA);
3) The maximum number of sensors connectable in series is 3.

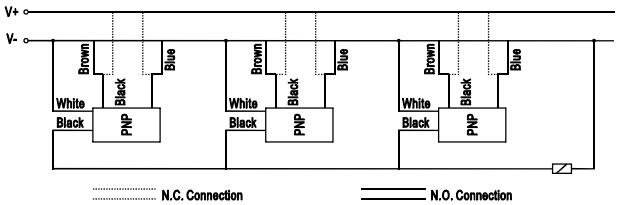


Connection In Parallel Series(OR) with PNP Output or NPN Output
Connected in this way sensors can activate the common output indipendently, when activated. When omitting the diodes indicated in the diagram, use sensors with the final stage which has an open collector(NO).

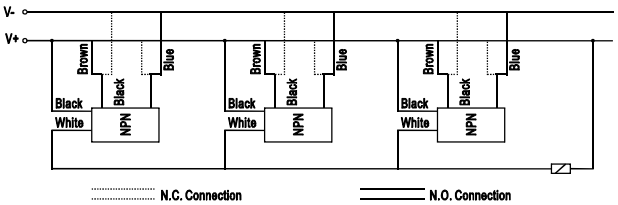


Connection In Parallel Series(OR) with Programmable Output
When connected in this way sensors can activate the common output indipendently, when energize. Thanks to the really low leakage current, there is no actual limitation in the number of sensor that can be connected in parallel, providing that the minimum current of load accumulated is mA.

PNP Configuration



NPN Configuration



SELECTION GUIDE FOR PHOTOELECTRIC SENSORS

P B D A 020 A

Type
P: Photoelectric Proximity Sensors
B: Laser Proximity Sensors

Mounting
A: M8 Steel with Thread Body
B: M12 Brass with Thread Body
C: M12 PBT Resin with Thread Body
D: M18 Brass with Thread Body
E: M18 PBT Resin with Thread Body
F: M30 Brass with Thread Body
G: M30 PBT Resin with Thread Body
H: Square 31 PBT Resin Body
K: Square 50 PBT Resin Body
M: Square 80 ABS Resin Body

Sensing Mode
C: Through-beam Mode
D: Diffuse Mode
B: Diffuse with Background Suppression Mode
X: Limit Area Detection with Diffused Beam
Y: Limit Area Detection with Spot Beam
R: Retro-reflective Mode
F: Retro-reflective With Polarizing Filter
T: Retro-reflective For Transparent

Output Function
A: PNP-NO(L.O.)
B: PNP-NC(D.O.)
C: NPN-NO(L.O.)
D: NPN-NC(D.O.)
E: PNP-NO+NC(L.O.+ D.O.)
F: NPN-NO+NC(L.O.+ D.O.)
G: PNP-NO or NC(L.O.or D.O.)
H: NPN-NO or NC(L.O.or D.O.)
K: DC Emitter
L: AC Emitter
P: AC-NO MOSFET Output
Q: AC-NC MOSFET Output
X: AC/DC Emitter
Y: AC/DC Relay Output
T: PNP/NPN-NO/NC Output
R: DC Relay Output

Sensing Distance
008: 80mm
015: 150mm
020: 200mm
150: 1.5m
200: 2m
10M: 10m
M10: 100m
M15: 150m

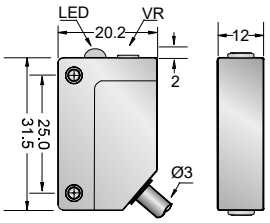
Connection
A: Standard 2m PVC Cable
B: Customized PVC Cable
C: Standard 2m PUR Cable
D: Customized PUR Cable
G: 4 Pin M8 Pico-style Connector
H: 4 Pin M12 Euro-style Connector
X: Pigtail with 4 Pin M8 Pico-style Connector
Y: Pigtail with 5 Pin M12 Euro-style Connector
T: Terminal with PG Connector

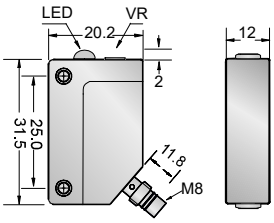
NOTE: Not all model combinations are possible. If you need assistance, please contact our technical department.

Features

- 31.5x20.2x12mm dimension
- Through-beam sensing mode
  Diffuse sensing mode
  Retro-reflective mode
- ABS plastic housing
- Built-in electric protection
- NPN or PNP function
- N.O. + N.C. Output
- Cable version
  M8 connector

CE





(Unit: mm)

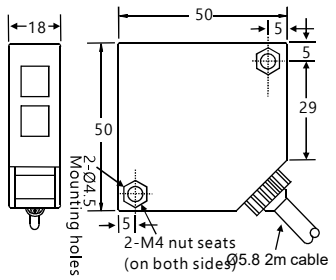
Through-beam Mode	Switching Distance (Sn: mm)		5m	10mm		
	Sensing Object		/	/		
	2m Cable	Emitter	PHCK500A	PHCK10MA		
		PNP-NO + NC	PHCE500A	PHCE10MA		
		NPN-NO + NC	PHCF500A	PHCF10MA		
	M8 Connector	Emitter	PHCK500G	PHCK10MG		
		PNP-NO + NC	PHCE500G	PHCE10MG		
		NPN-NO + NC	PHCF500G	PHCF10MG		
Diffuse	Switching Distance (Sn: mm)		110mm	350mm	800mm	
	Sensing Object		10x10cm white paper	10x10cm white paper	20x20cm white paper	
	2m Cable	PNP-NO + NC	PHDE011A	PHDE035A	PHDE080A	
		NPN-NO + NC	PHDF011A	PHDF035A	PHDF080A	
	M8 Connector	PNP-NO + NC	PHDE011G	PHDE035G	PHDE080G	
		NPN-NO + NC	PHDF011G	PHDF035G	PHDF080G	
Retro-Reflective	Switching Distance (Sn: mm)		0.1 ... 4m			
	Sensing Object		D51 mirror			
	2m Cable	PNP-NO + NC	PHRE400A			
		NPN-NO + NC	PHRF400A			
	M8 Connector	PNP-NO + NC	PHRE400G			
		NPN-NO + NC	PHRF400G			

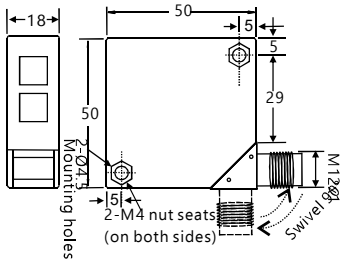
Type	PH31(31.5x20.2x12mm)
Nominal Voltage	10-30VDC
Rated Voltage	24VDC
Rated Insulation Voltage	75VDC
Residual Ripple	<10%
Tolerance	<10%Sn
Hysteresis	<10%
Emission	Infrared(880nm)
Switching Output	PNP or NPN
Switching Function	NO+NC
Max. Output Current	100mA
Absorption at 30VDC	<35mA
Start-up Delay	<300ms
Switching Frequency	<500Hz
Voltage Drop	<2.0V
Output Indicator	Yellow LED Output indicator, Green LED Power indicator
Sensitivity Adjustment	Trimmer 1 tum
Time Regulation	/
Response Time	1ms
Shock Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes
Ambient Humidity	35 to 85% RH
Temperature Limit	-25°C~+55°C
Light Immunity	>10.000Lux
Protection Degree	IP65
EMC	IEC 6094752 Part 7.4.1 and Part 7.4.2
Shock / Vibration	RFI>3V/m / EFT>1KV / ESD>4KV(contact)
Housing Material	ABS
Sensing Surface Material	PMMA
Sensing Object	See above
Connection	2m PVC Cable(Ø3 4x0.25) / M8 Connector(4 Pin, Pico style)
Weight	Approx. 42g/35g

Features

- 50x50x18mm dimension
- Through-beam sensing mode
  Diffuse sensing mode
  Retro-reflective mode
- PBT Resin housing
- Built-in electric protection
- NPN,PNP,N.O.,N.C. integrated
- Cable version
  M12 connector

CE





(Unit: mm)

Through-beam	Switching Distance (Sn: mm)		20m	40m		
	Sensing Object		/	/		
	2m Cable	Emitter	PKCK20MA	PKCK40MA		
		Receiver	PKCT20MA	PKCT40MA		
			Note: NPN,PNP,Light On,Dark On all integrated in one single sensor			
	M12 Connector	Emitter	PKCK20MH	PKCK40MH		
		Receiver	PKCT20MH	PKCT40MH		
			Note: NPN,PNP,Light On,Dark On all integrated in one single sensor			

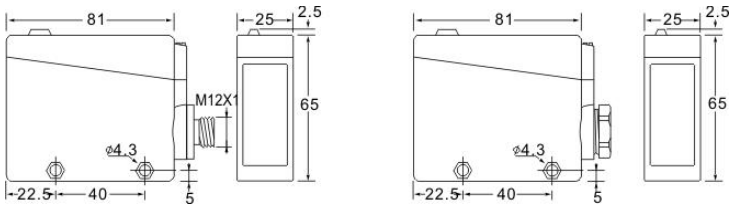
Diffuse	Switching Distance (Sn: mm)	0.1m ... 0.4m	0.2m ... 1m	0.2m ... 1.8m	0.3m ... 2m
	Sensing Object	10x10cm white paper	20x20cm white paper	20x20cm white paper	20x20cm white paper
	2m Cable	PKDT040A	PKDT100A	PKDT180A	PKDT200A
		Note: NPN,PNP,Light On,Dark On all integrated in one single sensor			
	M12 Connector	PKDT040H	PKDT100H	PKDT180H	PKDT200H
		Note: NPN,PNP,Light On,Dark On all integrated in one single sensor			

Retro-Reflective	Switching Distance (Sn: mm)	10m			
	Sensing Object	D83 mirror			
	2m Cable	PKRT10MA			
		Note: NPN,PNP,Light On,Dark On all integrated in one single sensor			
	M12 Connector	PKRT10MH			
		Note: NPN,PNP,Light On,Dark On all integrated in one single sensor			

Type	PK50(50x50x18mm)
Nominal Voltage	10-30VDC
Rated Voltage	24VDC
Rated Insulation Voltage	75VDC
Residual Ripple	<10%
Tolerance	<10%Sn
Hysteresis	<10%
Emission	Infrared(880nm)
Switching Output	PNP or NPN(programmable)
Switching Function	NO,NC(programmable)
Max. Output Current	200mA
Absorption at 30VDC	<40mA
Start-up Delay	<300ms
Switching Frequency	<200Hz
Voltage Drop	<2.5V
Output Indicator	Yellow LED Output indicator, Green LED Power indicator
Sensitivity Adjustment	Trimmer 1 tum
Time Regulation	/
Response Time	1ms
Shock Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes
Ambient Humidity	35 to 85% RH
Temperature Limit	-25°C~+55°C
Light Immunity	>10.000Lux
Protection Degree	IP65
EMC	IEC 6094752 Part 7.4.1 and Part 7.4.2
Shock / Vibration	RFI>3V/m / EFT>1KV / ESD>4KV(contact)
Housing Material	PBT Resin
Sensing Surface Material	PMMA
Sensing Object	See above
Connection	2m PVC Cable(Ø5.8 4x0.25) / M12 Connector(4 Pin, Euro style)
Weight	Approx. 160g/85g

Features

- 81x65x25mm dimension
- Through-beam sensing mode
  Diffuse sensing mode
  Retro-reflective mode
  Polarized reflective mode
- PBT Resin housing
- Built-in electric protection
- NPN,PNP,N.O.,N.C. integrated
- M12 Connector
  PG Terminal



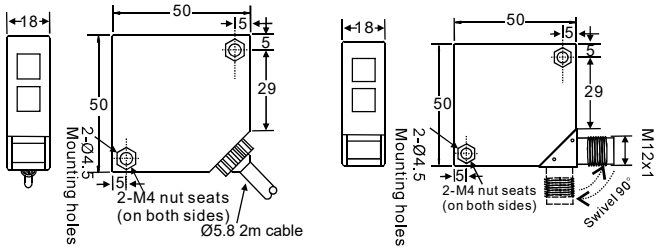
(Unit: mm)

Through-beam	Switching Distance (Sn: mm)		25m	50m		
	Sensing Object		/	/		
	PG Terminal	Emitter	PMCK25MT	PMCK50MT		
		Receiver	PMCT25MT	PMCT50MT		
	M12 Connector	Emitter	PMCK25MH	PMCK50MH		
		Receiver	PMCT25MH	PMCT50MH		
Diffuse	Switching Distance (Sn: mm)		0.25m ... 1.0m	0.3m ... 1.8m		
	Sensing Object		10x10cm white paper	20x20cm white paper		
	PG Terminal		PMDT100T	PMDT180T		
	M12 Connector		PMDT100H	PMDT180H		
Retro-Reflective	Switching Distance (Sn: mm)		15m			
	Sensing Object		D83 mirror			
	PG Terminal		PMRT15MT			
	M12 Connector		PMRT15MH			
Polarized Retro-Reflective	Switching Distance (Sn: mm)		9m			
	Sensing Object		D83 mirror			
	PG Terminal		PMFT900T			
	M12 Connector		PMFT900H			

Type	PM80(81x65x25mm)
Nominal Voltage	10-30VDC
Rated Voltage	24VDC
Rated Insulation Voltage	75VDC
Residual Ripple	<10%
Tolerance	<10%Sn
Hysteresis	<10%
Emission	880nm Infrared, 660nm Red(Polarized Retro-reflective mode)
Switching Output	PNP or NPN(programmable)
Switching Function	NO,NC(programmable)
Max. Output Current	200mA
Absorption at 30VDC	<40mA
Start-up Delay	<300ms
Switching Frequency	<200Hz
Voltage Drop	<2.5V
Output Indicator	Yellow LED Output indicator, Green LED Power indicator
Sensitivity Adjustment	Trimmer 1 tum
Time Regulation	0.1-7s ±2s
Response Time	2.5ms
Shock Circuit Protection	Yes
Overload Protection	Yes
Reverse Polarity Protection	Yes
Ambient Humidity	35 to 85% RH
Temperature Limit	-10°C~+60°C
Light Immunity	>10.000Lux
Protection Degree	IP65
EMC	IEC 6094752 Part 7.4.1 and Part 7.4.2
Shock / Vibration	RFI>3V/m / EFT>1KV / ESD>4KV(contact)
Housing Material	ABS
Sensing Surface Material	PMMA
Sensing Object	See above
Connection	PG Terminal / M12 Connector(4 Pin, Euro style)
Weight	Approx. 110g

Features:

- 50x50x18mm dimension
- Through-beam sensing mode
  Diffuse sensing mode
  Retro-reflective mode
- PBT Resin housing
- 12-240VDC/24-240VAC Voltage
- Relay Output
- Cable version
  M12 connector



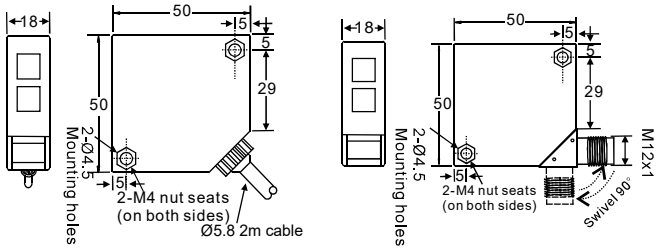
(Unit: mm)

Through-beam	Switching Distance (Sn: mm)		20m	40mm		
	Sensing Object		/	/		
	2m Cable	Emitter	PKCX20MA	PKCX40MA		
		Receiver	PKCY20MA	PKCY40MA		
	M12 Connector	Emitter	PKCX20MH	PKCX40MH		
		Receiver	PKCY20MH	PKCY40MH		
Diffuse	Switching Distance (Sn: mm)		0.1m ... 0.4m	0.2m ... 1m	0.2m ... 1.8m	0.3m ... 2m
	Sensing Object		10x10cm white paper	20x20cm white paper	20x20cm white paper	20x20cm white paper
	2m Cable		PKDY040A	PKDY100A	PKDY180A	PKDY200A
	M12 Connector		PKDY040H	PKDY100H	PKDY180H	PKDY200H
Retro-Reflective	Switching Distance (Sn: mm)		10m			
	Sensing Object		D83 mirror			
	2m Cable		PKRY10MA			
	M12 Connector		PKRY10MH			

Type	PK50(50x50x18mm)
Nominal Voltage	12-24VDC / 24-240VAC
Rated Voltage	110VAC
Rated Insulation Voltage	250VAC
Residual Ripple	<10%
Tolerance	<10%Sn
Hysteresis	<10%
Emission	Infrared(880nm)
Switching Output	Relay
Switching Function	NO or NC selectable via control wire
Max. Output Current	3A/30VAC,1A/220VAC
Absorption at 30VDC	<2.5VA
Start-up Delay	<300ms
Switching Frequency	<10Hz
Voltage Drop	<2.0V
Output Indicator	Yellow LED Output indicator, Green LED Power indicator
Sensitivity Adjustment	Trimmer 1 tum
Time Regulation	/
Response Time	20ms
Shock Circuit Protection	No
Overload Protection	No
Reverse Polarity Protection	No
Ambient Humidity	35 to 85% RH
Temperature Limit	-25℃~+55℃
Light Immunity	>10.000Lux
Protection Degree	IP65
EMC	IEC 6094752 Part 7.4.1 and Part 7.4.2
Shock / Vibration	RFI>3V/m / EFT>1KV / ESD>4KV(contact)
Housing Material	PBT Resin
Sensing Surface Material	PMMA
Sensing Object	See above
Connection	2m PVC Cable(Ø5.8 5x0.25) / M12 Connector(4 Pin, Euro style)
Weight	Approx. 160g/85g

Features:

- 50x50x18mm dimension
- Through-beam sensing mode
  Diffuse sensing mode
  Retro-reflective mode
- PBT Resin housing
- 12-240VDC/24-240VAC Voltage
- Relay Output
- Cable version
  M12 connector



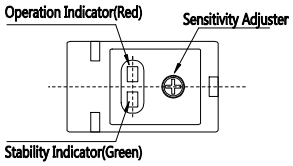
(Unit: mm)

Through-beam	Switching Distance (Sn: mm)		20m	40mm		
	Sensing Object		/	/		
	2m Cable	Emitter	PKCX20MA	PKCX40MA		
		Receiver	PKCY20MA	PKCY40MA		
	M12 Connector	Emitter	PKCX20MH	PKCX40MH		
		Receiver	PKCY20MH	PKCY40MH		
Diffuse	Switching Distance (Sn: mm)		0.1m ... 0.4m	0.2m ... 1m	0.2m ... 1.8m	0.3m ... 2m
	Sensing Object		10x10cm white paper	20x20cm white paper	20x20cm white paper	20x20cm white paper
	2m Cable		PKDY040A	PKDY100A	PKDY180A	PKDY200A
	M12 Connector		PKDY040H	PKDY100H	PKDY180H	PKDY200H
Retro-Reflective	Switching Distance (Sn: mm)		10m			
	Sensing Object		D83 mirror			
	2m Cable		PKRY10MA			
	M12 Connector		PKRY10MH			

Type	PK50(50x50x18mm)
Nominal Voltage	12-24VDC / 24-240VAC
Rated Voltage	110VAC
Rated Insulation Voltage	250VAC
Residual Ripple	<10%
Tolerance	<10%Sn
Hysteresis	<10%
Emission	Infrared(880nm)
Switching Output	Relay
Switching Function	NO or NC selectable via control wire
Max. Output Current	3A/30VAC,1A/220VAC
Absorption at 30VDC	<2.5VA
Start-up Delay	<300ms
Switching Frequency	<10Hz
Voltage Drop	<2.0V
Output Indicator	Yellow LED Output indicator, Green LED Power indicator
Sensitivity Adjustment	Trimmer 1 tum
Time Regulation	/
Response Time	20ms
Shock Circuit Protection	No
Overload Protection	No
Reverse Polarity Protection	No
Ambient Humidity	35 to 85% RH
Temperature Limit	-25℃~+55℃
Light Immunity	>10.000Lux
Protection Degree	IP65
EMC	IEC 6094752 Part 7.4.1 and Part 7.4.2
Shock / Vibration	RFI>3V/m / EFT>1KV / ESD>4KV(contact)
Housing Material	PBT Resin
Sensing Surface Material	PMMA
Sensing Object	See above
Connection	2m PVC Cable(Ø5.8 5x0.25) / M12 Connector(4 Pin, Euro style)
Weight	Approx. 160g/85g

TERMINAL CONNECTIONS FOR PHOTOELECTRIC SENSORS

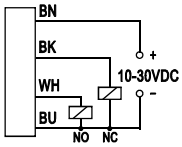
PH31 Series Photoelectric Sensors Sensitivity Adjustment



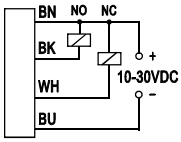
- Note: The trimmer just needs one turen.
  1) Sensitivity Increase:
     Screw the trimmer towards right towards position "+"
  2) Sensitivity Decrease:
     Screw the trimmer towards left towards position "-"

PH31 Series Photoelectric Sensors Wiring Diagram

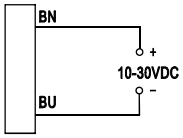
B1 PNP-NO & NC



B2 NPN-NO & NC



B3 Emitter(DC)



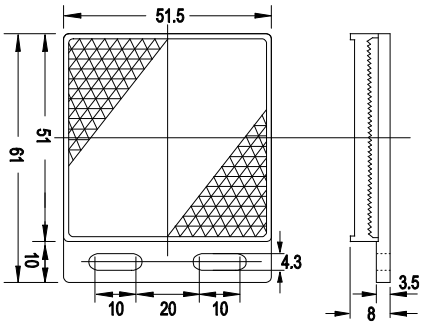
B4 Connection With Connector(DC)

M8 connector face view

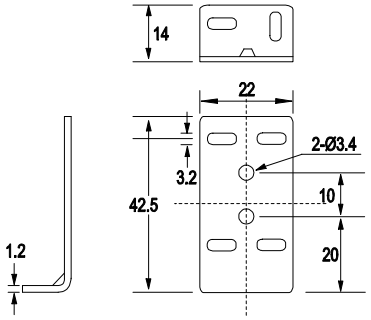
Output	Contact Numbers			
	1	2	3	4
PNP-NO & NC	+	NC	-	NO
NPN-NO & NC	+	NC	-	NO
Emitter	+		-	

PH31 Series Photoelectric Sensors Accessories

- D51 Reflectors

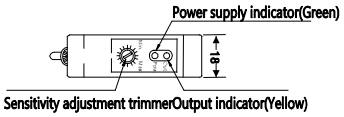


- Brackets



TERMINAL CONNECTIONS FOR PHOTOELECTRIC SENSORS

PK50 Series Photoelectric Sensors Sensitivity Adjustment

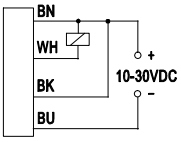


- Note: The trimmer just needs one turen.
  1) Sensitivity Increase:
     Screw the trimmer towards right towards position "+"
  2) Sensitivity Decrease:
     Screw the trimmer towards left towards position "-"

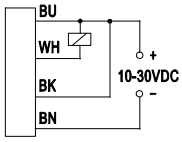
PK50 Series Photoelectric Sensors Wiring Diagram

C1 Wiring Diagram(DC)

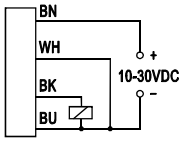
- NPN-NO



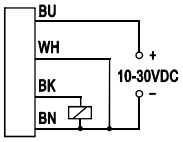
- NPN-NC



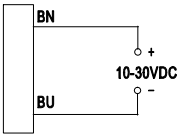
- PNP-NO



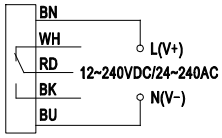
- PNP-NC



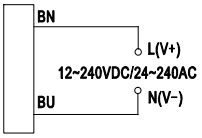
C2 Emitter(DC)



C4 AC/DC

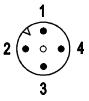


C5 Emitter(AC/DC)



C3 Connection With Connector(DC)

- M12 Euro-style Connector



Connector face view

Output	Contact Numbers			
	1	2	3	4
NPN-NO	+	NO	-	+
NPN-NC	-	NC	+	+
PNP-NO	+	-	-	NO
PNP-NC	-	-	+	NC
Emitter	+		-	

C6 Connection With Connector(AC/DC)

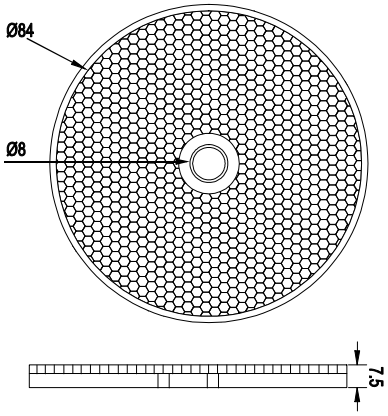
- M12 Euro-style Connector

Connector face view

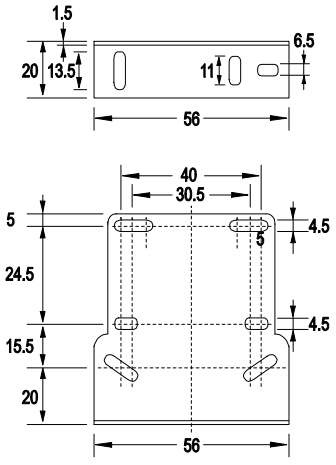
Output	Contact Numbers			
	1	2	3	4
Relay	L(+)	Com	N(-)	NO
Emitter	L(+)		N(-)	
Wire Colors	BN	WH	BU	BK

PK50 Series Photoelectric Sensors Accessories

- D83 Reflectors



- Brackets

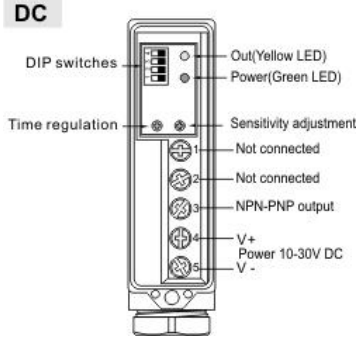


TERMINAL CONNECTIONS FOR PHOTOELECTRIC SENSORS

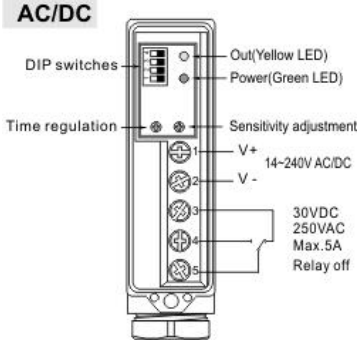
PM80 Series Photoelectric Sensors Connection Diagram

PG Terminal

DC

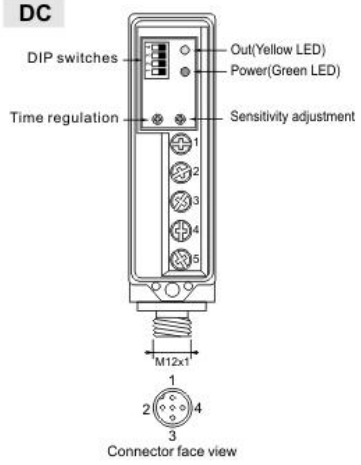


AC/DC



4 Poles M12 Connector

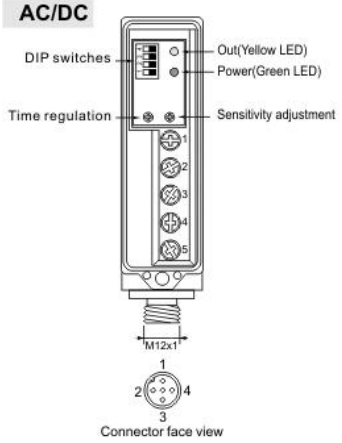
DC



Contacts configuration

Available	Contacts numbers			
	1	2	3	4
(NO + NC)	V+		V-	NO/NC

AC/DC



Contacts configuration

Output	Contacts numbers			
	1	2	3	4
Relay	V+	Com	V-	NO
Emitter	V+		V-	
Wire colors	Brown	White	Blue	Black

PM80 Series Photoelectric Sensors Accessaries