PHOTOSENSOR with built-in amplifier **DA-S100R/200**

INSTRUCTION MANUAL

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- Thank you for using **TAKEX** products.
- Please read this manual carefully prior to sensor use.

FEATURES

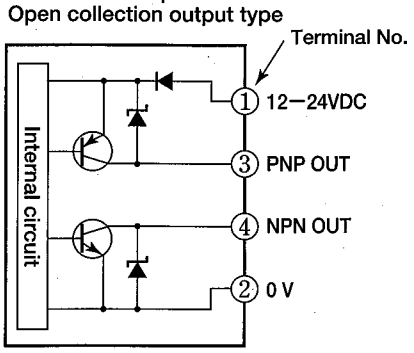
This is an Auto-teaching background suppression sensor.

SPECIFICATIONS

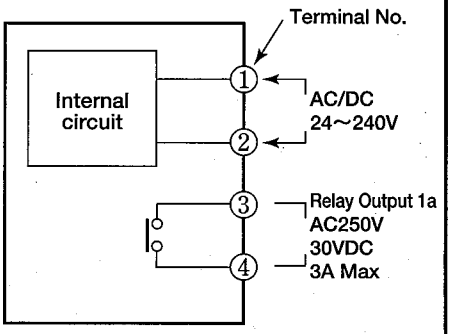
Type	Open collector type		Relay output type	
Model	DA-S100RTC	DA-S200TC	DA-S100RP	DA-S200P
Detection method	Background suppression			
Range	0.2−1m	0.2−2m	0.2−1m	0.2−2m
Adjustable range	0.4−1m	0.4−2m	0.4−1m	0.4−2m
Power supply	12 to 24VDC ±10%, Ripple 10%		AC/DC24 to 240V ±10%, 50/60Hz	
Current consumption	45mA Max.		2.5W Max.	
Output mode	NPN/PNP open collector output Rate : 100mA(30VDC) Max.		Relay output 1a Rate : 3A AC250V Max. : 3A 30VDC Max.	
Operating mode	Light-on / Dark-on selectable			
Time delay	On-delay / Off-delay selectable Time : 0 to 5 s			
Response time	5 ms Max.		20 ms Max.	
Hysteresis	10%			
LED wave length	650nm	880nm	650nm	880nm
Receiver diode	P S D			
Indicators	Operation : Orange LED Stability : Green LED Error : Red LED			
Material	Housing : Polycarbonate, Lens : Acrylic (DA-S100RTC, DA-S100RP) Polycarbonate (DA-S200TC, DA-S200P) Terminal cover : Polycarbonate, Bracket : SUS304			
Wiring	Terminal			
Weight	200g (Max.)			
Ambient light	10,000 lx or less (Sun light) 3,000 lx or less (Fluorescent light)			
Operating temp.	−25℃ to 55℃			
Humidity	35 to 85%RH			
Case protection	IP 67			
Vibration	10Hz−55Hz in 3 directions, 1.5mm amplitude			

OUTPUT CIRCUIT

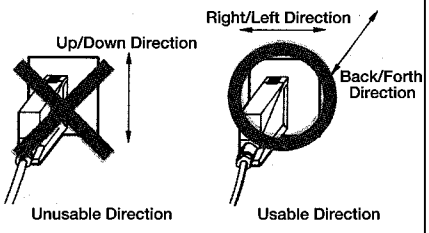
● **With built-in amplifier**
Open collection output type



● **With built-in power supply**
Relay output type



◆ Take care for the mounting direction of this sensor according to the movement direction of an object.

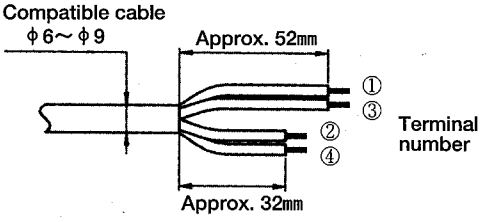


※ Unusable direction to use
Take care for the up/down direction as like above picture except for the detection range, because it's impossible direction to use.

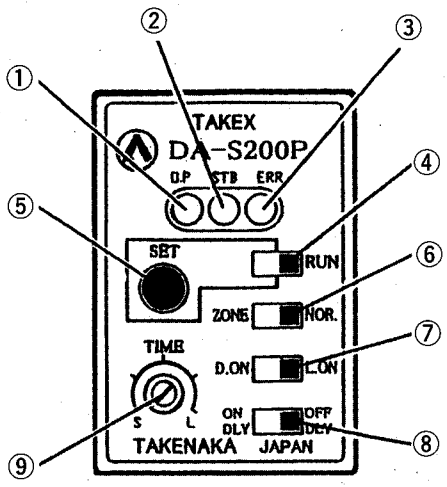
INSTALLATION

- Tightening torque should be 0.8N·m or less when unit case is installed.
- Securely tighten lead wire connected to terminals so as not to contact adjacent terminals. M3.5 is used for terminal screws.
- Do not fail to tighten screws on cover to attach body enclosure in order to prevent water from entering after terminal wiring is completed. Tightening torque should be 0.3N·m.
- Cable extension should be 100m Max. with using 0.3mm² or more cable.
- External dimension of compatible cable is 6mm to 9mm diameter. Use round sectional cable that has smooth external sheath.
- Use compatible screw diameter PF1/2(JIS B 0202)when conduit is used for wiring.

(Example of cable processing dimension)



PANEL DESCRIPTION



No.	Description
①	**<Operation indicator (O.P)>** Orange LED lights when the sensor unit is actuated.
②	**<Stability indicator (STB)>** Green LED lights when operation level comes in either of a stable in-light area (120% or more of operation threshold) or a stable light-interrupted area (80% or less of operation threshold). Stability indicator does not show an allowable distance, but shows operation level of in-light amounts or interrupted-light amounts. Note that the distance where the LED lights differs depending on a reflective rate of each detection object. The detection performance may be unstable under the status that Stability indicator goes off.
③	**<Error indicator (ERR)>** Red LED lights or flashes when some problem is caused on teaching procedure.
④	**<SET/RUN changeover switch>** Turning to 【SET】 enables teaching (setting of distance). Turning to 【RUN】 enables the sensor to start operating at the distance stored at 【SET】.
⑤	**<Set button switch>** Pushing Set button enables teaching of distance when the SET/RUN changeover switch is turned to 【SET】.
⑥	**<ZONE/NOR. changeover switch>** Turn to 【ZONE】, and the sensor can detect objects only in a distance between 2 preset points by teaching. Turn to 【NOR.】, and the sensor can detect objects only in a distance between a preset point by teaching and a sensor position.
⑦	**<D.ON/L.ON changeover switch>** Turning to 【D.ON】 enables Dark-on mode, in which the sensor is actuated outside of the detection range at ZONE mode or is actuated when light is interrupted at NOR. mode. Turning to 【L.ON】 enables Light-on mode, in which the sensor is actuated within the detection range at ZONE mode or is actuated when light is incoming at NOR. mode.
⑧	**<ON DLY/OFF DLY changeover switch>** Turning to 【ON DLY】 enables on-delay operation. Turning to 【OFF DLY】 enables off-delay operation.
⑨	**<Timer time adjustment VR (TIME)>** Timer time is adjustable 0 to 5 sec. Turn the VR to MIN.(S), and it comes to instant output operation without delay.

TEACHING VARIATY AND SELECTION

◎ When background (wall or conveyor belt) is placed within detecting range without detection objects.

(Normal mode teaching)

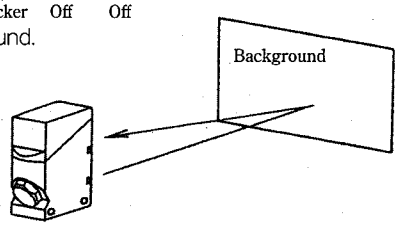
Application : Object detection on conveyor belt
Detecting objects in front of background

1) Turn ZONE/NOR. changeover switch to 【NOR.】. ZONE ■ NOR.

2) Turn SET/RUN changeover switch to 【SET】, and Operation indicator flashes orange. SET ■ RUN

O.P	STB	ERR
Flicker	Off	Off

3) Push SET button with background.



Stability indicator lights green with SET button depressed.

O.P	STB	ERR
Off	On	Off

Release SET button after the green LED lighted.
Note : Max. distance will be set (Max. distance teaching) by accident if the button continues to be depressed.
Operation indicator will flash orange with Stability indicator remain light green when SET button is released.

O.P	STB	ERR
Flicker	On	Off

Teaching (set up of distance) has been completed.

4) Turn SET/RUN changeover switch to 【RUN】. SET ■ RUN
The operation point has been set at approx. 20% ahead of background.
Select to set L.ON operation or D.ON operation.

◎ When a detection object is used without background

(Normal mode teaching)

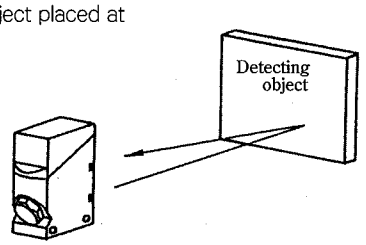
Application : Object detection on conveyor belt
Discriminating height of objects

1) Turn ZONE/NOR. changeover switch to 【NOR.】. ZONE ■ NOR.

2) Turn SET/RUN changeover switch to 【SET】, and Operation indicator flashes orange. SET ■ RUN

O.P	STB	ERR
Flicker	Off	Off

3) Push SET button twice with an object placed at an allowable set distance.



Stability indicator lights green with SET button depressed twice as well as depressed once.

O.P	STB	ERR
Off	On	Off

Release SET button after the green LED lighted.
Note : Max. distance will be set (Max. distance teaching) by accident if the button continues to be depressed.
Operation indicator will flash orange with Stability indicator remain light green when SET button is released.

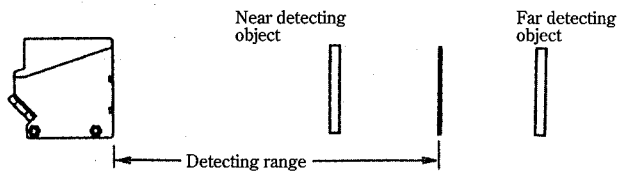
O.P	STB	ERR
Flicker	On	Off

Preset distance (teaching distance) has been stored with SET button depressed twice.

4) Turn SET/RUN changeover switch to 【RUN】. SET ■ RUN
The operation point has been set at ±5% of the object placed position.
Select to set L.ON operation or D.ON operation.

Note : When 3 times or more teaching is carried on, the last 2 times have priority of being set as preset distance (teaching distance).

The operating range is set at middle point between the 1st position and the 2nd position when the position with SET botton depressed initially differs from that depressed secondarily.



The detection range is the operation point through the sensor unit.

◎ When only an optional range is intentionally detected.
(Zone mode teaching)

Application : To make the area in sensor's neighborhood to be a non-detectable range
To specify an optional detection range

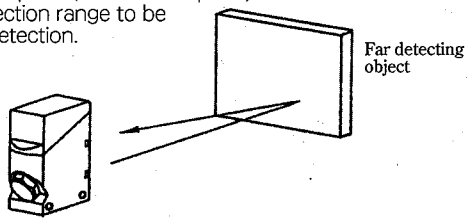
Note : The preset range to be intended for detection should be designed so that the near-distance point will be 80% or less on condition that the far-distance point is 100%.

1) Turn ZONE/NOR. changeover switch to 【ZONE】. ZONE■NOR.

2) Turn SET/RUN changeover switch to 【SET】, and Operation indicator flashes orange. SET■RUN

O.P	STB	ERR
Flicker	Off	Off

3) Push SET button with an object placed at one distance point (far-distance point) within the detection range to be intended for detection.



Stability indicator lights green with SET button depressed.

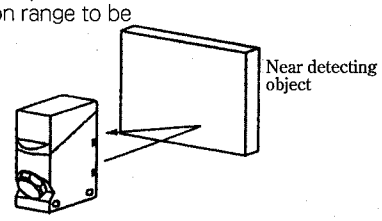
O.P	STB	ERR
Off	On	Off

Operation indicator will flash orange with Stability indicator remain light green when SET button is released.

One preset distance (teaching distance) has been stored.

O.P	STB	ERR
Flicker	On	Off

4) Push SET button with an object placed at the other distance point (near-distance point) within the detection range to be intended for detection.



Stability indicator only remains lighting green, while Operation indicator (orange LED) goes off when SET button is being depressed.

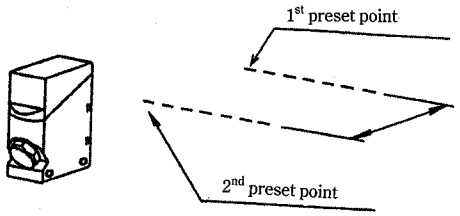
O.P	STB	ERR
Off	On	Off

Operation indicator will flash orange again with Stability indicator remain light green when SET button is released.

O.P	STB	ERR
Flicker	On	Off

The 2nd preset distance (teaching distance) has been stored.

5) Turn SET/RUN changeover switch to 【RUN】, and the range between the 1st preset point and the 2nd preset point will be set as a detectable range. SET■RUN



Select set L.ON operation or D.ON operation.
L.ON : Actuated within the detection range
D.ON : Actuated outside the detection range

Teaching can be carried beginning either from the near-distance side or from the far-distance side.
Note : When 3 times or more teaching is carried on, the last 2 times have priority of being set as preset distance (teaching distance).

Application : To detect objects at sensor's Max. distance without background and objects.

1) Turn ZONE/NOR. changeover switch to 【NOR.】. ZONE■NOR.

2) Turn SET/RUN changeover switch to 【SET】, and Operation indicator flashes orange. SET■RUN

3) Continue to push SET button for 3 sec. or more.

O.P	STB	ERR
Flicker	Off	Off

① Operation indicator (orange LED) will change to light when SET button remains depressed for approx. 1.5 sec.

O.P	STB	ERR
On	Off	Off

② Stability indicator (green LED) lights when SET button remains depressed for another approx. 1.5 sec. in sequence. After that, release SET button.

O.P	STB	ERR
Off	On	Off

③ The preset has been completed.

4) Turn SET/RUN changeover switch to 【RUN】. SET■RUN

Max. detection range has been set at around 2m for DA-S200P(TC) or around 1.2m for DA-S100P(TC). (When 300×300mm white drawing paper is used.)
Select set L.ON operation or D.ON operation.

TEACHING ERROR

Error indicator [ERR] will light red if any problem is caused in teaching process.

◎ **In case of Normal mode teaching**
Teaching error is caused when detection object is absent or when light amount is not sufficient.

Indicator status
When SET button is depressed ;
Operation indicator (orange LED) lights.
Error indicator (red LED) lights.

O.P	STB	ERR
On	Off	On

When SET button is released ;
Operation indicator (orange LED) flashes.
Error indicator (red LED) lights.

O.P	STB	ERR
Flicker	Off	On

Note : Max. distance will be set (Max. distance teaching) by accident if the button continues to be depressed.

Remedy
Conduct teaching (setting of distance) again after adjusting the distance between sensor unit and an object/background.

◎ **In case of Zone mode teaching**
Teaching error is caused when detection object is absent, when light amount is not sufficient or when the spacing between 2 distance points is short.

Indicator status
When SET button is depressed ;
Operation indicator (orange LED) lights.
Error indicator (red LED) lights.

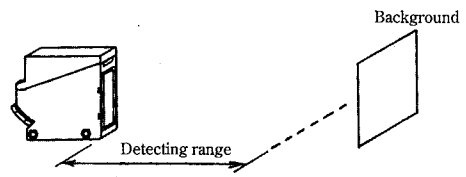
O.P	STB	ERR
On	Off	On

When SET button is released ;
Operation indicator (orange LED) flashes.
Error indicator (red LED) flashes.

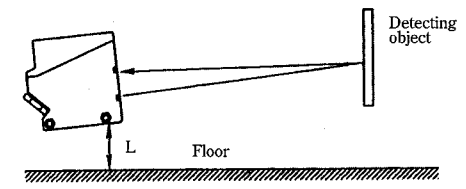
O.P	STB	ERR
Flicker	Off	Flicker

Remedy
Conduct teaching (setting of distance) again after adjusting the distance between sensor unit and an object or the spacing between 2 distance points.

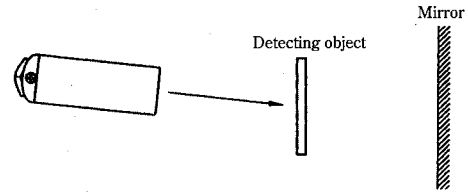
PRECAUTIONS



- The sensor may malfunction under the following figures.
  - * An object passes through outside the detection range when the sensor is set at Normal mode. In this case, install a background (wall, non-detectable object, etc.) outside the detection range to prevent the sensor from malfunctioning.
  - * A background (non-detectable object such as wall) is placed near by and outside the detection range when the sensor is set at Zone mode. The sensor may malfunction the moment an object passes through the closer side to the sensor unit and outside the detection range. In this case, remove the background or make use of on-delay timer.



- The sensor operation may be unstable when shining floor, a conveyor or etc. is placed under the sensor unit. In this case, tilt the sensor unit or keep longer distance between the sensor unit and those below.



- Note that there may be non-detectable status depending on angle variation of objects when mirror objects (stainless board or aluminum board) or the like (lustrous surface, etc.) are detected.
- Note that there may be malfunctioning depending on a little angle variation of background when the background (wall or non-detectable objects) is mirror-faced or lustrous. In this case, install the sensor unit with tilted and check operation with objects.

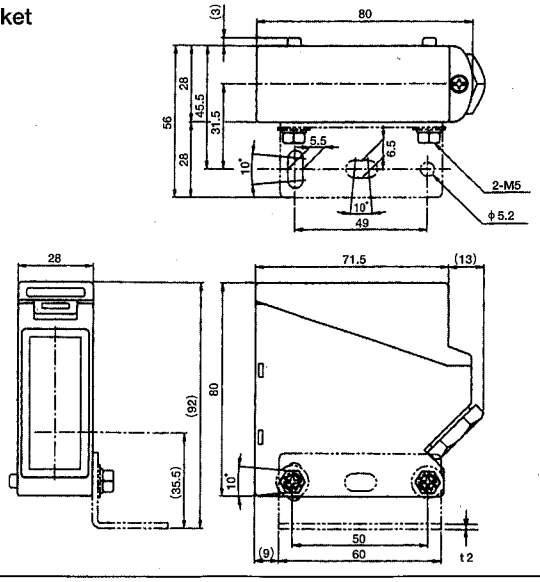
- Note that there may from a non-detectable zone at the closer side to the sensor unit depending on varieties of object.
- Install the sensor unit so that intense light (sunlight, fluorescent light, or incandescent light) should not come in sensor's detection range. (Avoid intense light entering the range.)

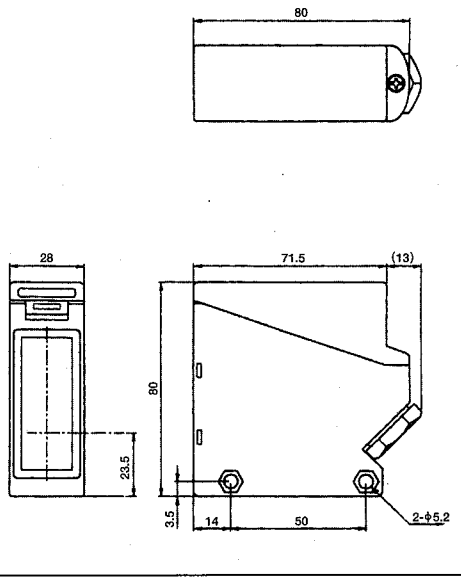
NOTES

- Power supply voltage should be within its specifications without exceeding the rated voltage.
- Check correct wiring before power is supplied as mis-wiring may cause burns or damage.
- Be sure to separately wire high-voltage line/power line and sensor line as wiring in the same conduit may cause damage or malfunction due to noise.
- Do not fail to ground Frame ground (FG) terminal and Ground (G) terminal when an ordinary switching regulator is used. If grounding is failed, switching noise may cause malfunction.
- Wait for warming up time (200ms.) just after power is supplied.
- Do not use unit under water or where watering is always carried through the unit is designed to be waterproof. Do not use unit where it is subject to corrosive gas, vibration/impact, or direct splash of oil/chemicals, which may cause malfunction.
- Periodically wipe off stains on lens with soft cloth. Stain on lens may cause malfunction.
- P type is a sensor with contact output. Pay your attention on life of relay contact.
  Mechanical life : 20,000,000 times or more (Frequency of open/closed :18,000 times/hour)
  Electrical life : 100,000 times or more (Frequency of open/closed :1,800 times/hour)
- Use power supply which is limited the current in accordance with the lead wire size of the sensor.

DIMENSIONS (in : mm)

with bracket





- This sensor is designed to detect an object ; it is not a safety device. TAKENAKA is not responsible for damage or losses caused by accident, calamity, acts of God, abuse, misuse abnormal usage, faulty installation or improper maintenance.
- Specifications and external dimensions described herein may be subject to change without notice, if necessary for the purpose of improvements.