

Color Area Sensor
CVS1-easy
Instruction manual

OPTEX
FA

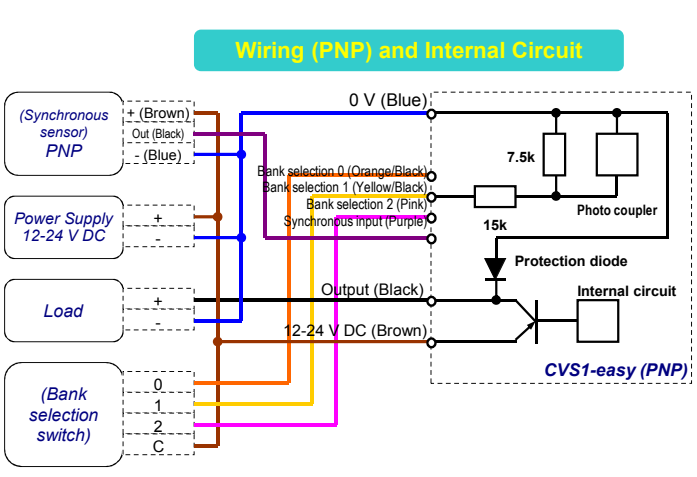
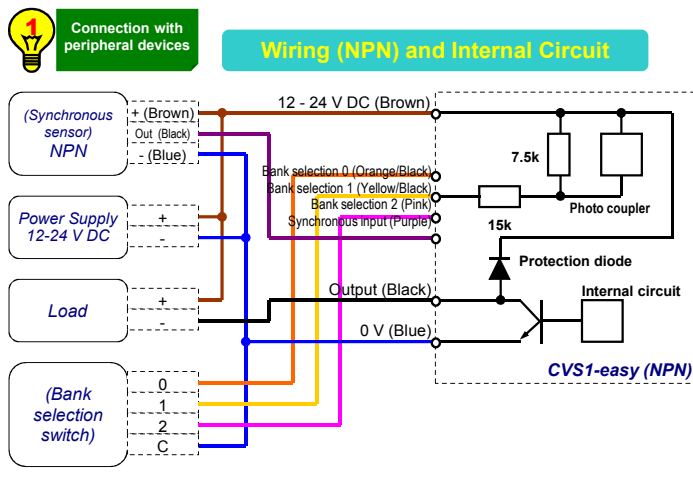
- Thank you for purchasing the color area sensor CVS1-easy series.
- Read this manual carefully to ensure correct use.
- After reading this manual, keep it handy for future reference.
- This product cannot be used as a safety device to protect human body.
- The warranty period of the product is one year from purchase. However, any malfunction due to natural disaster, improper conversion or maintenance shall be excluded from the warranty scope.

Before using for the first time

- 1 Connection with peripheral devices**: Descriptions on connection of main power and synchronous sensor, and installation
- 2 Changing set value**: Change the setting value according to the application. Proceed to teaching when changing is not necessary.
- 3 How to change set value**: Descriptions how to change the setting value
- 4 Performing teaching**: Descriptions how to perform teaching

At Test Maintenance

- 5 Color range adjustment**: Operation when making fine adjustment after teaching
- 6 Adjustment of area threshold level**: Descriptions how to select screen display
- 7 Screen display selection**: Descriptions how to select screen display
- 8 Data**: Basic data of CVS1-easy series



Cable Function and Bank Number

Line color	Signal	Bank No.							
Brown	12-24V DC	0	1	2	3	4	5	6	7
Blue	0 V	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Orange/Black	Bank selection 0 input	OFF	OFF	ON	ON	OFF	OFF	ON	ON
Yellow/Black	Bank selection 1 input	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Pink	Bank selection 2 input	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Purple	Synchronous input								
Black	Output								

Legend:
OFF: NPN: OPEN or connect with the brown line.
ON: PNP: OPEN or connect with the blue line.
NPN: connect with the blue line.
PNP: connect with the brown line.

To avoid the regular reflection of the built-in light, install the sensor at the angle (5 to 45°) with the object.

2 Changing set value

- Initializing the set value**: Set the set value INITIAL to YES. All the set values are initialized.
- When using the synchronous sensor**: Turn ON the set value SYNCHRO. Shoot once at the rising when the synchronous sensor turns ON.
- How to output at Oneshot every turning on of synchronous sensor**: Set the set value ONESHOT to ON. Set the set value OFF DLY to the desired time for outputting (e.g.: 50). The synchronous input turns ON. After the processing time, the output turns ON only for the 50 ms (example).
- How to turn on the output when the color of the object is not detected.**: Set the set value OUTSIDE to HIGH. The output turns ON when the area of the registered color is at the threshold level or less.
- When detecting the slight color difference**: Set the set value RESOLUT to HIGH. Turning RESOLUT to HIGH doubles the response time. When RESOLUT is at LOW, the area of the registered color may decrease due to temperature changes.
- How to remove the output chattering (when not using the synchronous sensor)**: Increase the set value OFF DLY. (e.g.: 20 or more). The output keeps turning ON ignoring the judgment OFF of less than 20 ms (example). Increase the set value ON DLY. (e.g.: 20 or more). The output keeps turning OFF ignoring the judgment ON of less than 20 ms (example).

3 How to change set value

Hold down the both down buttons on the sides for 3 seconds simultaneously to select the set value screen.
Press the set button. The set value is displayed in red.
Set to the desired set value and press the set button. The set value is written.
Press the up button to display EXIT in the set value table.
Pressing the set button with EXIT displayed terminates the set value screen.

Press the down button to move down the (next) setting item.
Press the up button to move up the (previous) setting item.
Press the down button to decrease the set value (to 132).
Press the up button to increase the set value (to 134).
Hold down the button to increase/decrease the set value continuously.

4 Performing teaching

Hold down the set button for 3 seconds to switch to the teaching screen.
Press the set button to analyze existing colors on the shooting screen and display the list.
At this time, the optimal shutter time is automatically set. Shutter time is not changed, and uses the setting value of BRIGHT when the setting value of AUTOBRT is NO.
The registered color is displayed. The range of the detection color is from the left to the right.
The area threshold level is set to 50% of taught-in color automatically.

How to "Window Teach"
Use if the target color is not appeared on the list.

Press the down button to widen the shooting range. (Zoom out)
Press the up button to narrow the shooting range. (Zoom in)
Only the selected color is displayed.
Press the color range button on the left to move to the color on the left.
Press the area button on the right to move to the color on the right.
Appears the window that detects color when the up arrow is at the very right.
Move the object or sensor to put in the window into the target color.
If only the target color appears, press the set button to complete.

Color range adjustment

Colors other than registered colors are displayed in black. The set value of color range flashes in red.

Press the color range up/down button once to proceed the color range adjustment.

Set to the desired set value and press the set button. The set value is written.

Upon completion, the screen returns to the original display mode and the color of the set value returns to blue green.

Once

Once

To distinguish from similar colors, reduce the value. Note that the result is easily affected by the temperature change at the reduced value.

Press the color range down button to narrow the color detection range.

Press the color range up button to widen the color detection range.

Widening the range of color detection allows stable detection. Adjust not to detect the color other than that of desired objects.

Adjustment of area threshold level

The area threshold level flashes in red.

Press the area up/down button once to proceed the area threshold level adjustment.

Set to the desired set value and press the set button. The set value is written.

Upon completion, the area threshold level is displayed in white.

Once

Once

The output turns on when the current area is at the area threshold level or more. The area hysteresis is 5% of the lower limit.

The maximum value of area is 9999. When the whole screen is filled with a registered colors, the current area is 9999.

Press the area down button to reduce the area threshold level.

Press the area up button to increase the area threshold level.

Screen display selection

Only the registered color is displayed.

Press the Set/View button once to switch the screen display mode.

Once

DATA

Relationship Between Setting Value and Response Time

Value of ZOOM	Response time when RESOULT = LOW	Response time when RESOULT = HIGH	Value of ZOOM	Response time when RESOULT = LOW	Response time when RESOULT = HIGH
0	11.0	21.9	10	5.6	11.0
1	10.5	20.8	11	5.0	9.9
2	9.9	19.7	12	5.0	8.8
3	9.4	18.6	13	5.0	7.7
4	8.8	17.5	14	5.0	6.6
5	8.3	16.5	15	5.0	5.6
6	7.7	15.4	16	5.0	5.0
7	7.2	14.3	17	5.0	5.0
8	6.6	13.2	18	5.0	5.0
9	6.1	12.1	19	5.0	5.0

Unit: ms

When **SYNCHRO** = ON, the time from entering of the synchronous input to production of the output is twice as long as the time on the table.

The shutter time is automatically controlled to the response time or less.

Table of Setting Value

Function	Setting range (Default)	Description
Automatic brightness adjustment AUTOBRT	NO, YES (YES)	Specify the automatic-brightness adjustment function when teaching. YES : Adjusts optimum brightness automatically. NO : Uses the setting value of BRIGHT . (Specify before teaching)
Brightness BRIGHT	0 to 255 (100)	Specifies the brightness of the screen (shutter time). The optimal value is set at teaching. The shutter time is calculated with "the setting value x 54.5 μs."
Initializing setting value INITIAL	NO, YES (NO)	Initializes all the set values in writing with the set value set to "YES."
Light control LIGHT	OFF, ON (OFF)	Switches to the built-in light source. Select ON to turn on, and select OFF to turn off the light. Set to OFF when using external light source, or detecting an illuminant.
Off delay OFF DLY	0 to 5000 (0)	Sets the Off delay time of output. When set to one shot (ONESHOT = ON), the oneshot output time is selected. (Unit: ms)
On delay ON DLY	0 to 5000 (0)	Sets the On delay time of output. (Unit: ms)
One shot ONESHOT	OFF, ON (OFF)	Switches to the oneshot output. The time to be turned ON is specified at the set value of OFF DLY .
Output reverse OUTSIDE	LOW, HIGH (LOW)	Switches the relationship between the area and the output. LOW : The output turns on when the current area is at the area threshold level or more. HIGH : The output turns on when the current area is at less than the area threshold level.
Resolution RESOULT	LOW, HIGH (LOW)	Specifies the resolution of shooting screen. LOW : Reduces the horizontal direction of screen to the half resolution and cuts the response time to half. HIGH : Shoots at a high resolution. To be used to judge the slight color difference.
Synchronous input SYNCHRO	OFF, ON (OFF)	OFF : Shoots continuously. ON : Shoots once at the rising of synchronous input line (purple).

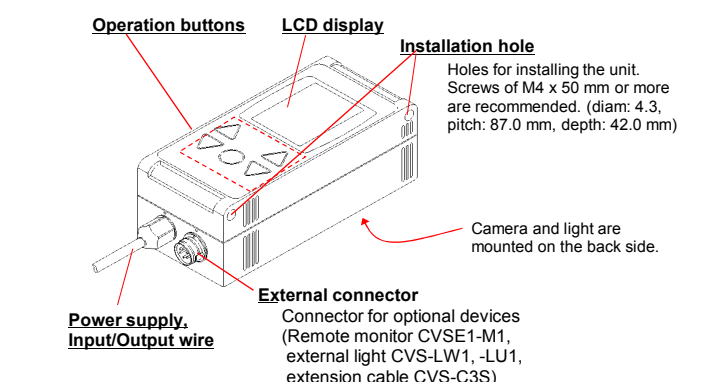
LCD Disp. is displayed in yellow: the setting item is common to all banks.
LCD Disp. is displayed in purple: the setting item switches to the specific value of each bank.

When switching to the specific resolution or zoom of each bank, the image sensor may take approx. 2 seconds to become stable. Set to the same resolution or zoom when using and continuously switching more than one bank.

Specification

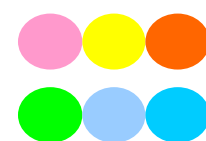
Model	CVS1easy-N10 CVS1easy-P10	CVS1easy-N20 CVS1easy-P20	CVS1easy-N21 CVS1easy-P21	CVS1easy-N40 CVS1easy-P40
Angle of view	10°	20°	31°	40°
Shooting distance	210 to 270 mm	90 to 150 mm	31 to 39 mm	50 to 100 mm
Shooting range (± 10%)	40 x 50 to 55 x 65 mm	40 x 50 to 65 x 75 mm	17 x 20 mm	50 x 65 to 100 x 115 mm
Light source	White LED			
Light brightness	Approx. 77 cd	Approx. 38 cd	Approx. 21cd	
Image sensor	330000 pixel CMOS Color image sensor			
Supply voltage	12 to 24 V DC ± 10 %			
Power consumption	Max. 120 mA / 24 V DC			
Resolution	5 x 12 to 200 x 240			
Lamp duration	Approx. 50000 hrs (In normal temperature and humidity, Brightness level down by 1/2 of the initial level)			
Response time	11ms (Factory setting), 5.0 ms (Min.), 22 ms (Max.)			
Output signal	NPN/PNP open collector output 1 point, max. 100 mA Residual voltage 1.0 V or less			
Input signal	Bank selection 3 points, Synchronous 1 point			
Entry constant	12 ms (max): Bank selection 48 μs (turn ON), 450 μs (turn OFF): Synchronous			
Temperature/humidity	Operating: 0 to 40° C (No condensation), 35 to 85% /RH Storage: -20 to 70° C, 25 to 95% /RH			
Vibration/shock resistance	10 to 55Hz Amplitude 1.5 mm, 500 m/s ² (10 times)			
Material	ABS / Acryl / Polycarbonate			
Protection structure	IP67			
Weight	Approx. 180 g			

Names and Functions of Parts

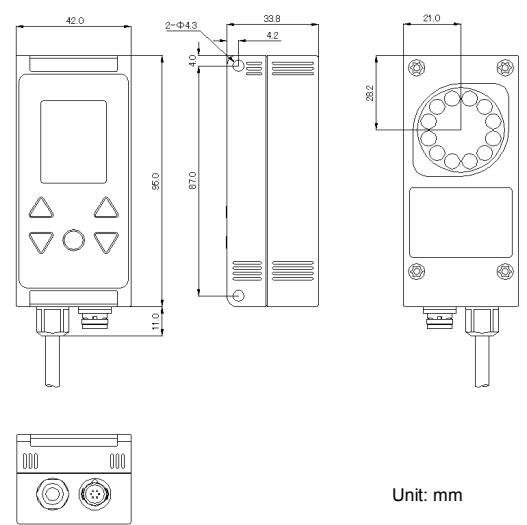


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Dimensional Outline



Screen Display and Operation

