

# CVSE1-RA Series

CVSE1- □ 10-RA CVSE1- □ 20-RA CVSE1- □ 21-RA CVSE1- □ 40-RA

## Instruction manual

- Thank you for purchasing this product. Before using this product, confirm that the product you have received is the product that you requested.
- Read this instruction manual thoroughly before use, and keep it in a safe location.



Indicates a possible hazard that may result in death, serious injury, WARNINGS or serious property damage if the product is used without observing the stated instructions.



## Warning

- This product is not explosion-proof and should not be used around flammable or explosive gases or liquids.
- Doing so may cause injury, fire, or electric shock.
- This product cannot be used as protective equipment for the purpose of protecting the human body.



## Caution

- It is dangerous to wire or attach/remove the connector while the power is on. Make sure to turn off the power before operation.
- Installing in the following locations may result in malfunction:
  1. Dusty or steamy locations.
  2. Locations where corrosive gas is generated.
  3. Locations with direct exposure to water or oil splashes.
  4. Locations where heavy vibrations or impacts may occur.
- The product is not designed for outdoor use.
- Do not wire with high voltage cables or power lines. Doing so may cause malfunction or damage by induction.
- Detection characteristics may vary depending on the state of the target object and variations among individual products.
- Do not use the product in water.
- Do not disassemble, repair, or modify this product. Doing so may cause injury, fire, or electric shock.
- Operate within the rated ranges.

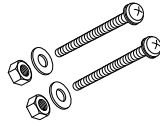
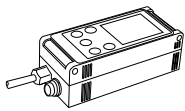


For China RoHS, please refer to [http://www.optex-fa.com/rohs\\_cn/](http://www.optex-fa.com/rohs_cn/).

## Included accessories

Please confirm following accessories are included in the box.

- CVSE1- □□□ -RA
- This instruction manual
- Mounting screws (M4 x 50), 2 pcs. (including washers and nuts)



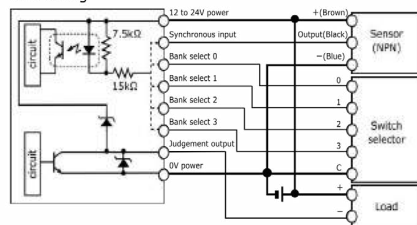
## I/O circuit diagram

- Brown: 12 to 24V power
- Orange/Black: Bank select 0
- Yellow/Black: Bank select 1
- Pink: Bank select 2
- Red/Black: Bank select 3
- Purple: Synchronous input
- Black: Judgement output
- Blue: 0V power

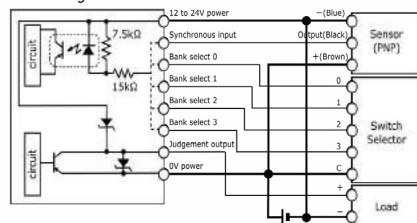
### Bank select

| Bank No. | 3   | 2   | 1   | 0   |
|----------|-----|-----|-----|-----|
| No.0     | OFF | OFF | OFF | OFF |
| No.1     | OFF | OFF | OFF | ON  |
| No.2     | OFF | OFF | ON  | OFF |
| No.3     | OFF | OFF | ON  | ON  |
| No.4     | OFF | ON  | OFF | OFF |
| No.5     | OFF | ON  | OFF | ON  |
| No.6     | OFF | ON  | ON  | OFF |
| No.7     | OFF | ON  | ON  | ON  |
| No.8     | ON  | OFF | OFF | OFF |
| No.9     | ON  | OFF | OFF | ON  |
| No.10    | ON  | OFF | ON  | OFF |
| No.11    | ON  | OFF | ON  | ON  |
| No.12    | ON  | ON  | OFF | OFF |
| No.13    | ON  | ON  | OFF | ON  |
| No.14    | ON  | ON  | ON  | OFF |
| No.15    | ON  | ON  | ON  | ON  |

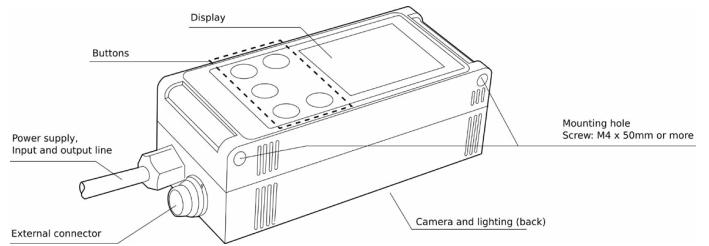
### NPN wiring



### PNP wiring

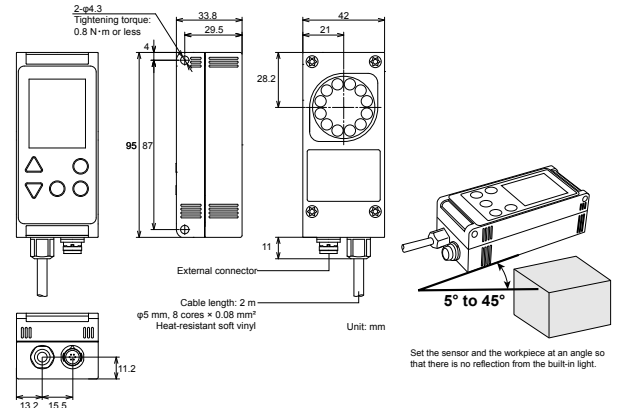


## Specifications



| Model                                         | CVSE1-N10-RA<br>CVSE1-P10-RA                                                                                   | CVSE1-N20-RA<br>CVSE1-P20-RA | CVSE1-N21-RA<br>CVSE1-P21-RA | CVSE1-N40-RA<br>CVSE1-P40-RA |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------|------------------------------|
| Detection angle                               | 10°                                                                                                            | 20°                          |                              | 40°                          |
| Working distance                              | 210 to 270 mm                                                                                                  | 90 to 150 mm                 | 31 to 39 mm                  | 50 to 100 mm                 |
| Field of view( ± 10%)                         | 40 x 50 to<br>55 x 65 mm                                                                                       | 40 x 50 to<br>65 x 75 mm     | 17 x 20 mm                   | 46 x 55 to<br>82 x 98 mm     |
| Light source                                  | White LED, 12 pcs built-in                                                                                     |                              |                              |                              |
| Supply Voltage                                | 12 to 24V DC ± 10%                                                                                             |                              |                              |                              |
| Power consumption                             | Max. 140mA / 24V DC                                                                                            |                              |                              |                              |
| Resolution                                    | 5 x 12 to 200 x 240                                                                                            |                              |                              |                              |
| LED light duration                            | Approx. 50000 hours (In normal temperature and humidity.<br>Brightness level down by 1/2 of the initial level) |                              |                              |                              |
| Response time                                 | 2.9ms to 27.7ms. Factory setting:16.7ms                                                                        |                              |                              |                              |
| Output signal                                 | NPN or PNP open collector output x 1,<br>Max. 100mA, residual voltage 1.0V or less                             |                              |                              |                              |
| Input                                         | Bank selection x 4, Synchronous input x 1                                                                      |                              |                              |                              |
| Operating temperature<br>/ Operating humidity | 0°C to 40°C / 35% ~ 85%RH                                                                                      |                              |                              |                              |
| Storage temperature<br>/ humidity             | -20 ~ +70°C / 35% ~ 95%RH                                                                                      |                              |                              |                              |
| Vibration                                     | 10 ~ 55Hz, Amplitude 1.5mm                                                                                     |                              |                              |                              |
| Shock resistance                              | 50G (500m/s <sup>2</sup> )                                                                                     |                              |                              |                              |
| Material                                      | Housing : ABS ;<br>Emitter and receiver: Acryl                                                                 |                              | Emitter and receiver: PC     |                              |
| Protection structure                          | IP67                                                                                                           |                              |                              |                              |
| Applicable regulations                        | EMC (2014/30/EU); RoHS (2011/65/EU, MIIT Order No.32)                                                          |                              |                              |                              |
| Applicable standards                          | EN 61000-6-2, EN61000-6-4                                                                                      |                              |                              |                              |
| Weight                                        | Approx. 200g                                                                                                   |                              |                              |                              |

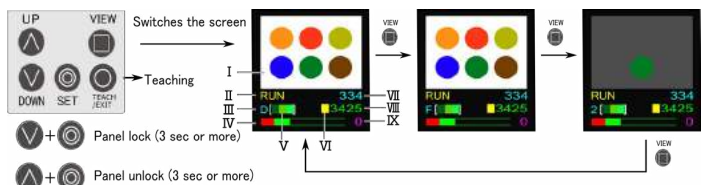
## Dimensions



## Options

| Category             | Model    | Description                                                                                                                                 |
|----------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Remote monitor       | CVS-M1-R | Monitor unit for use with the CVS series. This allows results to be checked away from workpiece and can be set up similar to the main unit. |
| D-sub cable          | CVS-C2C  | D-sub cable connects the CVS series to PC.                                                                                                  |
| Extension cable (3m) | CVS-C3S  | This cable extends the dedicated cable or the remote monitor cable. Up to 4 extension cables can be used (up to 15m).                       |

## Screen description



| No. | Name | Description     |
|-----|------|-----------------|
| I   | View | Captured image. |

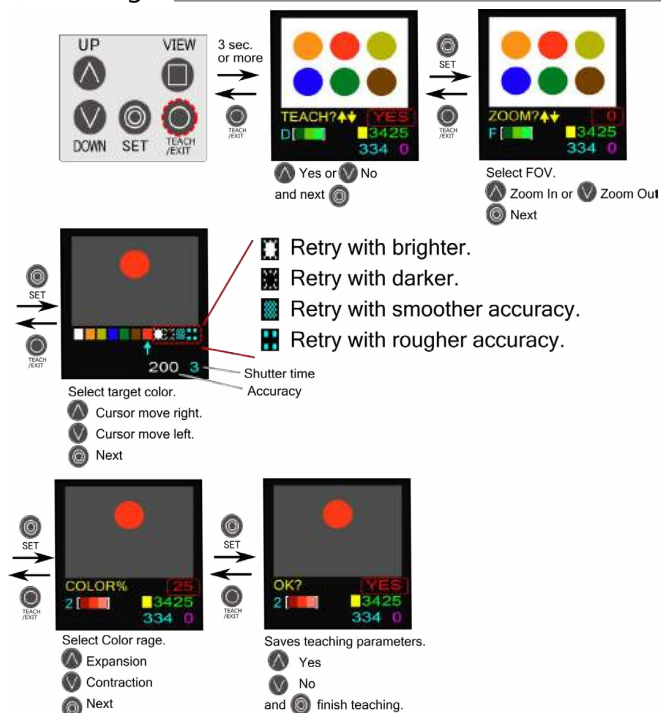
|      |                |                                                                                                                                               |
|------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| II   | Mode           | RUN: Sensor running. Others: Teaching or setting parameter                                                                                    |
| III  | Screen mode    | Screen display mode.<br>D: displays the captured image.<br>F: displays the image after correction process.<br>2: displays the detected image. |
| IV   | Area bar graph | Displays the Area in the bar graph. <b>Red</b> : Out of range, <b>Green</b> : Within range.                                                   |
| V    | Target colors  | To detect colors at image. Left is darkest color and middle is middle tone, right is brightest color.                                         |
| VI   | Output signal  | Output status <b>■</b> : ON <b>■</b> : OFF                                                                                                    |
| VII  | Response time  | Time from snapshot to output signal. per 0.1ms                                                                                                |
| VIII | Area           | Area of detected colors.<br><b>Red</b> : Out of range, <b>Green</b> : Within range.                                                           |
| IX   | Bank No.       | Current bank number.                                                                                                                          |

## Setting language

It turned on while pressing **A** button, will be Japanese.

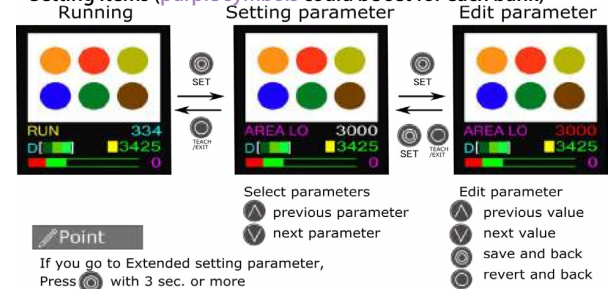
It turned on while pressing **V** button, will be English.

## Teaching



## Setting parameter

### ● Setting items (purple symbols could be set for each bank)



| Name              | Symbol  | Range (Default)  | Description                                                                                                                                                           |
|-------------------|---------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Area lower limit  | AREA LO | 0 to 9999 (5000) | Lower limit value for the detection area. If detected area value is lower than this value, output signal is off.                                                      |
| Color margin      | COLOR%  | 0 to 127 (20)    | Adjustments range of target color.<br>* Set a lower value to detect subtle color differences. (5 to 20)<br>* Set a higher value to increase stability. (20 or higher) |
| Shutter time      | BRIGHT  | 0 to 255 (100)   | Shutter time (value x 54.5us). It is automatically adjusted in teaching.                                                                                              |
| Zoom              | ZOOM    | 0 to 19 (0)      | Zoom in center area.                                                                                                                                                  |
| Area higher limit | AREA HI | 0 to 9999 (9999) | Higher limit value for the detection area. If detected area value is higher than this value, output signal is off.                                                    |

### ● Extended setting items (purple symbols could be set for each bank)

| Name                     | Symbol   | Range (Default)                      | Description                                                                                                                                                                                                                                                                  |
|--------------------------|----------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Color filter             | COLRFIL  | FIX / FLOW (FIX)                     | FIX: Corrects the brightness with RGB ratio per pixel. It is resistant to shadows and uneven illumination, but not suitable for achromatic (black and white) use.<br>FLOW: Corrects the brightness with right end pixel. It is suitable for detection of low contrast image. |
| Bank copy                | BNKCOPY  | 0 to 15 (0)                          | Copies the current bank parameters to the specified bank.                                                                                                                                                                                                                    |
| Baud rate                | BAUD     | 9600 /14K4 /57K6 /115K (115K)        | RS232-C(in External connector) baud rate.<br>9600 : 9.6kbps<br>14K4 : 14.4kbps<br>57K6 : 57.6kbps<br>115K : 115.2kbps                                                                                                                                                        |
| LED luminance difference | LED PAN  | 0 to 100 (50)                        | Adjusts the percentage of brightness of the top and bottom of built-in lights.<br>0: lights on only the top of built-in light.<br>50: light on both the top and bottom of built-in light.<br>100: light on only the bottom of built-in light.                                |
| LED brightness           | LED BRI  | 0 to 255 (170)                       | Adjusts brightness of built-in light.<br>0: lights off. 255: lights on.                                                                                                                                                                                                      |
| Language                 | LANGUAGE | ニホン /ENG (ニホン)                       | Select language.<br>ニホン : Japanese, ENG: English                                                                                                                                                                                                                             |
| Synchronous input        | SYNCHRO  | LOW / DOWN / HIGH / UP / CONT (CONT) | Specify trigger input mode and timing.<br>LOW: Low level trigger<br>DOWN : Falling edge trigger<br>HIGH: High level trigger<br>UP: Rising edge trigger<br>CONT: Always snapshot                                                                                              |
| Synchronous input delay  | SYNCDLY  | 0 to 255 (0)                         | Adds delay to Synchronous input signal. The time unit, refer to DLYUNIT.                                                                                                                                                                                                     |
| Delay unit               | DLYUNIT  | 0 to 2 (0)                           | Delay unit of the synchronous input signal.<br>0: 64 $\mu$ s 1: 1ms 2: 10ms.                                                                                                                                                                                                 |
| Resolution               | RESOLUT  | NORM / H-SP (NORM)                   | NORM: High resolution mode. It used for detection of subtle color differences and fine print.<br>H-SP: High speed mode. It used for getting quick response.                                                                                                                  |
| Judgement output spec.   | OUTSIDE  | IN / OUT (IN)                        | Conditions to turn on the judgement output.<br>IN: When the detection area is in the range of AREA LO and AREA HI.<br>OUT: When the detection area is out the range of AREA LO and AREA HI.                                                                                  |
| One shot output          | ONESHOT  | OFF / ON (OFF)                       | OFF: Judgement output is level output.<br>ON: Judgement output i delayed by ON DLY.                                                                                                                                                                                          |
| On delay time            | ON DLY   | 0 to 5000 (0)                        | Turns on the judgement output to this value after the elapse of processing. Unit is ms.                                                                                                                                                                                      |
| Off delay time           | OFF DLY  | 0 to 5000 (0)                        | If ONESHOT is OFF, it turns off the judgement output to this value after the elapse of processing.<br>If ONESHOT is ON, it turns on the judgement output only this value. Unit is ms.                                                                                        |
| Light ON/OFF             | LIGHT    | OFF / ON (ON)                        | Turns on/off the built-in lights.                                                                                                                                                                                                                                            |
| LCD vertical flip        | LCDVIEW  | NORM / REVS (NORM)                   | NORM: Normal orientation.<br>REVS: Upside-down dispaly.                                                                                                                                                                                                                      |
| Darkness correction      | KIL BLK  | 0 to 31 (27)                         | Corrects brightness variation. 0: weak to 31: strong.<br>e.g. 0 to 10: lighting check, 10 to 20: color less, 24 to 28: standard, 29 to 31: low contrast.                                                                                                                     |
| Initialization           | INITIAL  | BANK / ALL                           | BANK: Initializes current bank parameters.<br>ALL: Initializes all parameters.                                                                                                                                                                                               |
| Input time constant      | IN FILT  | 160U /2.5M /5MS /7.5M /10MS (10MS)   | The input time constant (noise removal time) for bank switching.<br>160U: 160 $\mu$ s 2.5M: 2.5ms<br>5MS: 5ms 7.5M: 7.5ms<br>10MS: 10ms                                                                                                                                      |
| Bank selection           | BANK     | 0 ~ 15 /BKIN (BKIN)                  | 0 to 15: Set the specified bank.<br>BKIN: Specified by bank switching inputs.                                                                                                                                                                                                |

### ● Relationship between response time and parameters (per ms)

| ZOOM | RESOLUT=H-SP | RESOLUT=NORM | ZOOM | RESOLUT=H-SP | RESOLUT=NORM |
|------|--------------|--------------|------|--------------|--------------|
| 0    | 16.7         | 27.7         | 10   | 9.4          | 16.9         |
| 1    | 15.9         | 26.7         | 11   | 8.7          | 15.8         |
| 2    | 15.1         | 26.1         | 12   | 7.9          | 14.7         |
| 3    | 14.5         | 24.6         | 13   | 7.2          | 13.6         |
| 4    | 13.8         | 23.4         | 14   | 6.5          | 12.5         |
| 5    | 13.0         | 22.3         | 15   | 5.8          | 11.4         |
| 6    | 12.3         | 21.2         | 16   | 5.0          | 10.4         |
| 7    | 11.6         | 20.2         | 17   | 4.3          | 9.2          |
| 8    | 10.9         | 19.0         | 18   | 3.6          | 8.1          |
| 9    | 10.2         | 17.9         | 19   | 2.9          | 7.1          |

\* In the case of SYNCRO=HIGH and BRIGHT=100

- All specifications may be changed without notice.

- For more information, questions and comments regarding products, please contact us below.

Manufactured and sold by :

**OPTEX FA CO.,LTD.**

91 Chudoji-Awata-cho Shimogyo-ku Kyoto 600-8815 JAPAN  
TEL : +81-(0)75-325-2920  
FAX: +81-(0)75-325-2921  
Website : <http://www.optex-fa.com>