

**1 Switching to the Color Area Sensor Mode**  
Select "1" in CVS1 setting.  
(Procedure CVS2 manual page 48)  
Turn the power off and on.

**Tip**  
Select "0" in CVS1 setting to return to the pattern matching sensor mode.

Color area sensor mode (CVS1 setting: 1)      Pattern matching sensor mode (CVS1 setting: 0)

**2 Descriptions of LCD display**

**Standard screen**

**Captured image**  
Displays the image captured by the camera.

**Menu**  
Indicates the setting and editing menus.

**Screen display mode**  
Indicates the current screen mode.

**Area bar graph**  
Indicates the current area (Upper: Color 1, Lower: Color 2). The area range (from upper limit to lower limit) is colored in orange. It is logarithmic graph.

**Detection color**  
Left: Darkest color, Right: Brightest color (Upper: Color 1, Lower: Color 2).

**Bank number**  
Indicates the selected bank number (0 to 14).

**Output status and Sort number**  
Orange: Output On, Green: Output Off  
When sort function is activated, the sorted bank number is displayed.

**Monitor bank number**  
When sort function is activated, you can switch to another bank to monitor different color and area from the current bank (see page 12 in this manual).

**3 Setting Options**

Set value reference screen

**Color 1 area**  
Upper: Lower area limit  
Lower: Current area.  
Orange indicates that the current area is within the specified range, and Green indicates that the current area is out of the specified range.

**Color 2 area**  
Same as .

**Response time**  
Displays the response time from starting image capture to outputting by the unit of 0.1ms.

**Communication status**  
Indicates the transmitting/receiving status.  
S Readout command is correctly received and response is transmitted.  
C Set value access command is correctly received and response is transmitted.  
S Data or checksum error in readout command.  
C Data or checksum error in set value access command.  
7 Error command is received.

Function	Setting range (Initial value)	Description
Color 1 area lower limit <b>AREA LO1</b>	0 to 9999 (1)	Selects the lower limit of Color 1 detection area.
Color 2 area lower limit <b>AREA LO2</b>	0 to 9999 (0)	Selects the lower limit of Color 2 detection area.
Color 1 area upper limit <b>AREA HI1</b>	0 to 9999 (0)	Selects the upper limit of Color 1 detection area. The set value "0" corresponds to "9999."
Color 2 area upper limit <b>AREA HI2</b>	0 to 9999 (0)	Selects the upper limit of Color 2 detection area. The set value "0" corresponds to "9999."
Bank selection <b>BANK</b>	0 to 16 (16)	Selects the bank selecting option. 0~14: Selects the set bank. (Bank selection 2 input is the external teaching input) 15: Selects a bank by external input. (Bank selection 2 input is the external teaching input) 16: Selects a bank by external input. (Bank selection 2 input is available.)
Copy of bank settings <b>BANKCOPY</b>	0 to 14 (0)	Copies the set values and masking display of the current bank to the destination bank. During copying, capture and judgment is interrupted. When the power is turned off, the setting returns to "0".

\* The functions indicated in purple contain the set values for each bank.

Function	Setting range (Initial value)	Description
Color 1 margin <b>COLORM1</b>	0 to 25 (1)	Adjusts Color 1 margin percentage. Larger value means wider detection area.
Color 2 margin <b>COLORM2</b>	0 to 25 (1)	Adjusts Color 2 margin percentage. Larger value means wider detection area.
Communication setting <b>COMMUNIC</b>	0 to 5 (0)	Select Communication setting. 0: Off 1 to 5: On. Baud rates are 4800, 9600, 19200, 38400, 57600bps in order. Data length=8bit, no parity, stop bit=1bit. When the communication function is activated, external lighting and remote monitoring are deactivated.
Mode selection <b>CVS1</b>	0, 1 (0)	Selects CVS2 sensor mode. 0: Color area sensor 1: Pattern matching sensor After selecting, turn off and on to activate the setting.
Darkness correction rate <b>DARK CMP</b>	0 to 31 (27)	Selects the correction rate of color darkness. 0: Off 31: Max. (Amplifies black color and converts to other colors.) Select a larger value to detect slight difference in dark colors, and a smaller value to detect the difference between white, gray, and black.
Image sensor gain <b>IMG GAIN</b>	0 to 63 (0)	Controls the gain of image sensor. Selecting a larger value increases the screen brightness but also noise level. Select a larger value to shorten the

Function	Setting range (Initial value)	Description
Set value initialization <b>INITIALZ</b>	0 to 15 (0)	You can initialize the set values, masking and brightness irregularity correction data. Select 15, and turn the power on pressing and holding UP and DOWN. 10: Locks all of the values. 11: Unlocks all of the values.
LCD up/down reverse <b>LCD VIEW</b>	0, 1 (0)	0: Normal display 1: Reverses the LCD display vertically. Select 1 when installing the unit upside-down.
Lighting ON/OFF <b>LIGHT ON</b>	0, 1 (1)	0: Internal lighting OFF. (External lighting remains on.) 1: Internal lighting ON.
OFF delay time <b>OFFDELAY</b>	0 to 5000 (0)	Stops output when the area judgment result is over the set time (unit: ms) and also out of the specified range.
ON delay time <b>ONDELAY</b>	0 to 5000 (0)	Starts output when the area judgment result is over the set time (unit: ms) and also within the specified range.
One-shot output <b>ONESHOT</b>	0, 1 (0)	When set to 1, output starts by one-shot and remains on during OFF delay time. When OFF delay time is set at "0," output remains on continuously. Change the bank to stop output.
Area range <b>OUTSIDE</b>	0 to 3 (0)	Select the condition to start output. 0: Color 1 and 2 are within the area range. 1: Color 1 and 2 are out of the area range. 2: Color 1 or 2 is within the area range. 3: Color 1 or 2 is out of the area range.

Function	Setting range (Initial value)	Description
Resolution & Capture area <b>RESOLUTIN</b>	0 to 2 (0)	Select the number of pixels and capture area taken out from the image sensor. 0: High resolution (208 x 236) 1: High speed (104 x 236) 2: Narrow area (208 x 236, x2 zoom)
Screen size <b>SCREEN</b>	0 to 3 (0)	Select the screen size taken out from the image sensor. 0: 208 x 236 1: 160 x 236 2: 112 x 236 3: 64 x 236 With smaller number of pixels, the capture area becomes narrower and the response time becomes faster.
Shutter time <b>SHUTTER</b>	0 to 742 (100)	Select the shutter time (unit: ms). You cannot select the value larger than the image transfer time of the image sensor.
Sort bank number <b>SORTING</b>	0 to 14 (0)	Select the sort bank number. 0: Sorting Off 1 to 14: Sorts the bank numbers of set values. (Example) Current bank=5, Set value=2 Checks the colors and areas of the bank number 5, 6, and 7, and outputs the bank number that satisfies the output condition. DARK CMP, IMG GAIN, OUTSIDE, SHUTTER, TEMPCOMP are processed using the current bank values. Set the same values in all the sort banks before teaching. Output re/frence chart Page 9 in this manual

Function	Setting range (Initial value)	Description
Synchronization input <b>SYNCHRO</b>	0 to 4 (4)	Selects the synchronization input setting. When set to 0-3, the bank selection 3 input is assigned to the synchronization input. The capturing conditions are as follows. 0: While the synchronization input is Off 1: When the synchronization input is switched from On to Off 2: While the synchronization input is On 3: When the synchronization input is switched from Off to On 4: Captures images continuously
Teaching enable <b>TEACHEN</b>	0 to 2 (0)	Enables/disables teaching, masking, brightness irregularity correction, and PC communication. 0: Enables all of the functions. 1: Enables teaching (TEACH1, TEACH2) only. 2: Disables all of the functions.
Temperature compensation level <b>TEMPCOM</b>	0 to 50 (15)	Selects the temperature compensation level of the image sensor. Since the color set by teaching at low temperature may change at high temperature, this function compensates the color difference. The function is off when set at "0".
Color detection window <b>WINDOW</b>	0, 1 (0)	Specifies the position to display the color to teach when the external teaching is used. 1: Displays the color detection window in THRU screen (excluding the system menu).

**Note**  
The value settings and their lock information are shared in both of pattern matching and color area sensor modes. When the sensor mode is switched, the lower/upper area limit values, position axis, and rotation correction axis may become incorrect, or the locked items may be shifted. When this happens, perform the setting or teaching again (for each sensor mode).

**4 Reading Sort Number**

**Judgment Output and AUX output**

Three(3) sort numbers are read out using two(2) types of output. The outputs appear as follows starting the current number.

Bank No.	Control output (Black)	AUX output (Red/Black)
Current	ON	OFF
+ 1	OFF	ON
+ 2	ON	ON

The above combinations are repeated in order (for the subsequent bank numbers).

**Communication function**

RS232C communication is available by connecting the optional cable (CVS-C2C) to the external connector ( CVS manual page 7). This communication function allows reading up to fifteen(15) sort numbers. ("255" is returned when sorting is not activated.)

**Bank number readout protocol**

Command 53H	Data 49H	Checksum 63H	→ Received by CVS2
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Transmitted by CVS2	Response 06H	Sort number (Lower) 0 to 14, 255	Checksum SUM
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SUM = one's complement of (06H + Sort number Lower + Upper)

Received data error or checksum error	Response 15H	Data (Lower) 00H	Data (Upper) 00H	Checksum EAH
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**Note**  
The response may delay by 3 seconds or more during external teaching.

**5 Operation and Display**

The settings and procedures are basically common with CVS2 pattern matching sensor functions. Refer to CVS2 manual for operation examples.

- Changing set value CVS2 manual page 48
- Color detection by teaching CVS2 manual page 23
- Masking CVS2 manual page 29
- Brightness irregularity correction CVS2 manual page 46

**Standard Screen Operation**

**SET** Set value reference screen See page 13 in this manual.

**SET** Teaching menu See page 14 in this manual.

**SET** System menu See page 19 in this manual.

**Changing the Screen Display Mode**

**Color 1**  
Displays Color 1 only. All the other colors are displayed in purple.

**Color 2**  
Displays Color 2 only. All the other colors are displayed in purple.

**Color 1+2**  
Displays Color 1 and 2. All the other colors are displayed in purple.

**Through**  
Displays the captured image after color correction.

**Live**  
Displays the actual image before color correction.

**Changing the Monitor Bank Number**

When sort function is activated, you can select another bank within the sorted banks and monitor its color and area

**Monitoring Bank 0**  
Displays the color 1 and 2, and the area bar graph of Bank 0.

**Monitoring Bank 1**  
Displays the color 1 and 2, and the area bar graph of Bank 1.

**Monitoring the next bank**

Changing the screen from the standard screen to another one will return the monitor bank number to the current bank number.

**Set Value Reference/Change Screen**

**Standard screen**  
(See page 10 in this manual.)

**Set value reference screen**      **Set value change screen**

**SET** (3 sec. or more)

UP: Previous setting item  
DOWN: Next setting item  
EXIT: Returns to the standard screen

UP: Set value +1  
DOWN: Set value -1  
EXIT: Cancels the set values and returns to the set value reference screen  
SET (3 sec. or more): Saves the set values and returns to the set value reference screen

**Teaching Menu**

**Standard screen**  
(See page 10 in this manual.)

**SET** (3 sec. or more) **Color 1 teaching** (See page 15 in this manual.)  
**EXIT** (3 sec. or more) **Delete the Color 1 setting.** ("XX" appears. AREA LO1 and AREA HI1 turns to "0.")

**SET** (3 sec. or more) **Color 2 teaching** (See page 15 in this manual.)  
**EXIT** (3 sec. or more) **Delete the Color 2 setting.** ("XX" appears. AREA LO2 and AREA HI2 turns to "0.")

**SET** (3 sec. or more) **Masking** (See page 17 in this manual.)  
**EXIT** Returns to the standard screen.

**Color 1/Color2 Teaching**

**Teaching menu**  
(See page 14 in this manual.)

**SET** (3 sec. or more) Saves the teaching results (color, area, color margin percentage, darkness correction factor, shutter speed, captured image) and returns to the teaching menu.

**EXIT** (3 sec. or more) Cancels the teaching results and returns to the teaching menu.

**Color detection window**  
The detected color in the color detection window (Left: Darkest color, Right: Brightest color) \*When a bright color and black color are in the detection window, the sensor detects black color. This allows detection of printing letters.

**Current area**

UP: Performs the displayed option of the color selection menu.  
DOWN: Performs the displayed option of the color selection menu.

**SET** Selects the the color selection menu. (See page 16 in this manual.)  
**EXIT**

**VIE** Selects continuous capture or still image capture.

In Color 2 teaching, **TEACH 2** is displayed instead of **TEACH 1**. The other displays/settings are common with Color 1 teaching.

**Color Selection Menu**

**SET** (3 sec. or more) **Color detection window Up/Down**  
UP: Moves up the window.  
DOWN: Moves down the window.

**SET** (3 sec. or more) **Color detection window Right/Left**  
UP: Moves the window to right.  
DOWN: Moves the window to left.

**SET** (3 sec. or more) **Color detection window vertical magnification/reduction**  
UP: Magnifies the window vertically.  
DOWN: Reduces the window vertically.

**SET** (3 sec. or more) **Color detection window horizontal magnification/reduction**  
UP: Magnifies the window horizontally.  
DOWN: Reduces the window horizontally.

**SET** (3 sec. or more) **Color margin percentage adjustment**  
UP: Increases color margin percentage.  
DOWN: Reduces color margin percentage.

**SET** (3 sec. or more) **Darkness correction rate adjustment**  
UP: Increases darkness correction rate.  
DOWN: Reduces darkness correction rate.

**SET** (3 sec. or more) **Shutter time adjustment**  
UP: Increases shutter time.  
DOWN: Shortens shutter time.

**SET** (3 sec. or more) **Area upper/Lower limit**  
UP: Sets the current area to the upper limit.  
DOWN: Sets the current area to the lower limit. (Press again to return to the initial value.)

**SET** (3 sec. or more) **Teaching result saving**  
UP: Saves the result and exits.  
DOWN: Cancel the result and exits.

**Masking**

**Teaching menu**  
(See page 14 in this manual.)

**SET** (3 sec. or more) Saves the edited masking data and returns to the teaching menu.

**EXIT** (3 sec. or more) Cancels the edited masking data and returns to the teaching menu.

**Masking window**

UP: Performs the displayed option of the masking menu.  
DOWN: Performs the displayed option of the masking menu.

**SET** (3 sec. or more) Selects the the masking menu. (See page 18 in this manual.)  
**EXIT**

**Masking Menu**

**SET** (3 sec. or more) **Masking window Up/Down**  
UP: Moves up the window.  
DOWN: Moves down the window.

**SET** (3 sec. or more) **Masking window Right/Left**  
UP: Moves the window to right.  
DOWN: Moves the window to left.

**SET** (3 sec. or more) **Masking window vertical magnification/reduction**  
UP: Magnifies the window vertically.  
DOWN: Reduces the window vertically.

**SET** (3 sec. or more) **Masking window horizontal magnification/reduction**  
UP: Magnifies the window horizontally.  
DOWN: Reduces the window horizontally.

**SET** (3 sec. or more) **Color margin percentage adjustment**  
UP: Increases color margin percentage.  
DOWN: Reduces color margin percentage.

**SET** (3 sec. or more) **Mask add/delete within color detection range**  
UP: Masks the colors other than the detection color.  
DOWN: Deletes the colors other than the detection color.

**SET** (3 sec. or more) **Mask add/delete outside color detection range**  
UP: Masks the detection color area.  
DOWN: Deletes the detection color area.

**SET** (3 sec. or more) **Mask add/delete within masking window**  
UP: Masks the inside of window.  
DOWN: Deletes the inside of window.

**SET** (3 sec. or more) **Mask add/delete outside masking window**  
UP: Masks the outside of window.  
DOWN: Deletes the outside of window.

**SET** (3 sec. or more) **Masking result saving**  
UP: Saves the result and exits.  
DOWN: Cancel the result and exits.

**System Menu**

**Standard screen**  
(See page 10 in this manual.)

**SET** (3 sec. or more) **Brightness irregularity correction** (See page 20 in this manual.)

**SET** (3 sec. or more) **PC communication**  
Data saving and loading with PC

**SET** (3 sec. or more) **Holding captured image**  
Holds the image captured at the moment the output changes.

**EXIT** Returns to the standard screen.

**Brightness Irregularity Correction**

**System menu**  
(See page 19 in this manual.)

**SET** (3 sec. or more) Saves the brightness irregularity correction data and returns to the system menu.

**EXIT** (3 sec. or more) Initializes the brightness irregularity correction data and returns to the system menu.

**EXIT** Cancels the data and returns to the system menu.

**Shutter time adjustment**  
Displays the optimum shutter time (unit: 0.1ms).  
**Green**: The optimum value is fixed.  
**Red**: The optimum value is being calculated, or the shutter time has reached the upper limit value.

When using this function, capture the even, bright color (such as matte white paper). The shutter time of all the banks are overwritten at data saving.

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