CVS2

Pattern Matching Sensor — **Color area sensor functions Operating Manual**

This manual describes the color area sensor functions available with CVS2 pattern matching sensor.
Refer to the CVS2 operation manual for the common descriptions with pattern matching sensor functions.

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)

1

2 Descriptions of LCD display

Main menu

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.
(When sort function is activated)

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).

2

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.
Readout command is correctly received and response is transmitted
Set value access command is correctly received and response is transmitted
Data or checksum error in readout command.
Data or checksum error in set value access command.
Error command is received.

3

3 Setting Options

Function LCD display	Setting range (Initial value)	Description
Color 1 area lower limit AREA LO1	0 to 9999 (1)	Selects the lower limit of Color 1 detection area.
Color 2 area lower limit AREA LO2	0 to 9999 (0)	Selects the lower limit of Color 2 detection area.
Color 1 area upper limit AREA HI1	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 AREA HI2	0 to 9999 (0)	Selects the upper limit of Color 2 detection area. The set value "0" corresponds to "9999".
Bank selection BANK	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 fixed.)
Copy of bank settings BANKCOPY	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.

4

Function LCD display	Setting range (Initial value)	Description
Color 1 margin percentage COLOR%1	0 to 25 (1)	Adjusts Color 1 margin percentage. Larger mean means wider detection area.
Color 2 margin percentage COLOR%2	0 to 25 (1)	Adjusts Color 2 margin percentage. Larger means wider detection area.
Communication setting COMMUNIC	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 CVS1	0, 1 (0)	Selects CVS2 sensor mode. 0: Pattern matching sensor 1: Color area sensor After selecting, turn off and on to activate the setting.
Darkness correction rate DARK CMP	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 IMG GAIN	0 to 63	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 shutter speed.

5

Function LCD display	Setting range (Initial value)	Description
Set value initialization INITIALZ	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 LCD VIEW	0, 1 (0)	0: Normal display 1: Reverses the LCD display vertically. Select 1 when installing the unit upside-down.
Lighting ON/OFF LIGHT ON	0, 1 (1)	0: Internal lighting OFF. (External lighting remains on.) 1: Internal lighting ON.
OFF delay time OFFDELAY	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 ON DELAY	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 ONESHOT	0 to 5000 (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 OUTSIDE	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.

6

Function LCD display	Setting range (Initial value)	Description
Resolution & Capture area RESOLUTN	0 to 2 (0)	Selects the number of pixels and capture area taken out from the image sensor. 0: High resolution (208× 236) 1: High speed (104× 236) 2: Narrow area (208× 236, x2 zoom)
Screen size SCREEN	0 to 3 (0)	Select the screen size taken out from the image sensor. 0: 208× 236 1: 160× 236 2: 112× 236 3: 64× 236 With smaller number of pixels, the capture becomes narrower and the response time becomes faster.
Shutter time SHUTTER	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 SORTING	0 to 14 (0)	Select the sort bank number. 0: Sorting Off 1 to 14: Sorts the bank numbers of set value+1. Ex) 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 reference chart　Page 9 in this manual

7

Function LCD display	Setting range (Initial value)	Description
Synchronization input SYNCHRON	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 the bank selection is switched from On to Off 1: When the synchronization input is On the bank selection is switched from On to Off 3: When the synchronization input is switched from Off to On 4: Captures images continuously
Teaching enable TEACHENA	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 TEMPCOMP	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 WINDOW	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).

8

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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)

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 connecter (　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

Transmitted by CVS2	→ Response 00H	Sort number (Lower, Upper) 0 to 14, 255	0, 255	Checksum SUM

SUM= one's complement of (00H + Sort number Lower + Upper)

Received data error or checksum error

Response	Data (Lower)	Data (Upper)	Checksum
00H	00H	00H	EAH

Note
The response may delay by 3 seconds or more during external teaching.

9

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

Main Menu Operation

Set value reference screen
See page 13 in this manual.

Teaching menu
See page 14 in this manual.

System menu
See page 19 in this manual.

10

Changing the Screen Display Mode

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

Through
Displays the captured image after color correction.

Live
Displays the actual image before color correction.

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.

11

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

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

Monitoring the next bank

Monitoring the further next bank

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

12

Set Value Reference/Change Screen

Main menu
(See page 10 in this manual.)

Set value reference screen　Set value change screen

UP Previous setting item
DOWN Next setting item
EXIT Returns to the Main menu

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

13

Teaching Menu

Main menu
(See page 10 in this manual.)

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

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

SET Masking (See page 17 in this manual.)

EXIT Returns to the Main menu

14

Color 1/Color2 Teaching

Teaching menu
(See page 14 in this manual.)

SET (3sec 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 (3sec or more) Cancel 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 / DOWN Performs the displayed option of the color selection menu.

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

VIEW Selects continuous capture or still image capture.

In Color 2 teaching, TEACH2 is displayed instead of TEACH1. The other displays/settings are common with Color 1 teaching

15

Color Selection Menu

Color detection window Up/Down
UP Moves up the window.
DOWN Moves down the window.

Color detection window Right/Left
UP Moves the window to right.
DOWN Moves the window to left.

Color detection window vertical magnification/reduction
UP Magnifies the window vertically.
DOWN Reduces the window vertically.

Color detection window horizontal magnification/reduction
UP Magnifies the window horizontally.
DOWN Reduces the window horizontally.

Color margin percentage adjustment
UP Increases color margin percentage.
DOWN Reduces color margin percentage.

Darkness correction rate adjustment
UP Increases darkness correction rate.
DOWN Reduces darkness correction rate.

Shutter time adjustment
UP Increases shutter time.
DOWN Shortens shutter time.

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.)

Teaching result saving
UP Saves the result and exits.
DOWN Cancel the result and exits.

16

Masking

Teaching menu
(See page 14 in this manual.)

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

Masking window

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

SET / EXIT Selects the the masking menu. (See page 18 in this manual.)

17

Masking Menu

Masking window Up/Down
UP Moves up the window.
DOWN Moves the window down.

Masking window Right/Left
UP Moves the window to right.
DOWN Moves the window to left.

Masking window vertical magnification/reduction
UP Magnifies the window vertically.
DOWN Reduces the window vertically.

Masking window horizontal magnification/reduction
UP Magnifies the window horizontally.
DOWN Reduces the window horizontally.

Color margin percentage adjustment
UP Increases color margin percentage.
DOWN Reduces color margin percentage.

Mask add/delete within color detection window
UP Masks the colors other than the detection color.
DOWN Deletes the colors other than the detection color.

Mask add/delete outside color detection range
UP Masks the detection color area.
DOWN Deletes the detection color area.

Mask add/delete within masking window
UP Masks the inside of window.
DOWN Deletes the inside of window.

Mask add/delete outside masking window
UP Masks the outside of window.
DOWN Deletes the outside of window.

Masking result saving
UP Saves the result and exits.
DOWN Cancel the result and exits.

18

System Menu

Main menu
(See page 10 in this manual.)

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

PC communication
Data saving and loading with PC

Holding captured image
Holds the image captured at the moment the output changes.

Output changes

EXIT Returns to the Main menu

19

Brightness Irregularity Correction

System menu
(See page 19 in this manual.)

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

Displays the optimum shutter time (unit: 0.1ms).
Green: The optimum value is fixed.
Red: The optimum value is being calculated, and 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.

20