Vision Sensor

CVS 2

CVS 3

CVS 4

CVS 1

Cost Effective Vision Sensors and LED lighting for machine vision

CE

Multi Camera Vision Sensor MVS Series

MVS-PM Color pattern matching camera unit

It can detect color and shape of target object.

Application examples：
- Inspection of electronic parts
- Inspection of position of parts for automobile
- Checking existence of some material by its color

Direction of electronic parts

MVS-EM Measu rement camera unit

It can measure distance between edges on the objects.

Application examples：
- Measuring diameter of parts for automobile
- Counting edges on the surface of parts
- Measuring pitch of lead frame for electronic parts

Positioning of printed circuit board

MVS-OCR Color OCR camera unit

It can inspect Date, Time and Text.

Application examples：
- Inspection of shelf life on the label
- Inspection of lot number on the label
- Inspection of type mark on the parts for automobile

Shelf life of confection

MVS-DN-E Controller
Controller has Touchscreen for easy operation.

The controller supports up to 3 cameras
You can connect 3 different cameras to controller

All in one Vision Sensor CVS Series

Lens, Image sensor, LED lighting, LCD display and vision processor are in one body.

All in one structurs

LCD display

Processor

Lighting

Lens Image sensor

CVS1easy-R, CVS1-R

Color area Detection

Checking existence of printing on the box

CVS2-R

Shape/Color area Detection

Checking multiple colors on the box

CVS3-R

Edge detection

Checking overlapping of the label

CVS4-R

OCR

Checking shelf life on the packaging film

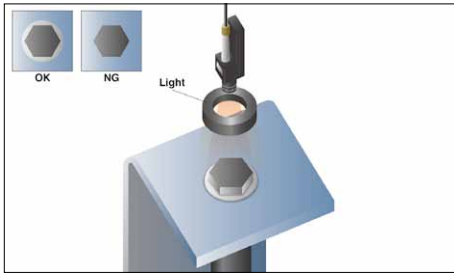# MVS SERIES APPLICATION

MVS Series

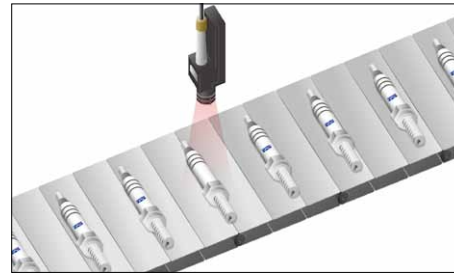CVS Series

MVS Series
APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

1. Detecting presence of metal washer

MVS-PM
-Detect its area by color

MVS-EM
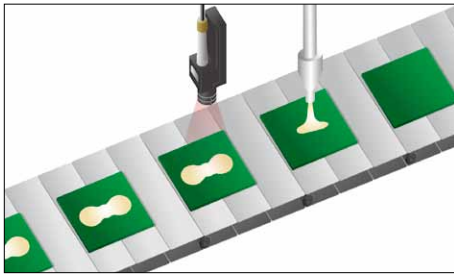-Measure the diameter of the washer

2. Checking engine spark plugs

MVS-PM
-Contour matching

MVS-EM
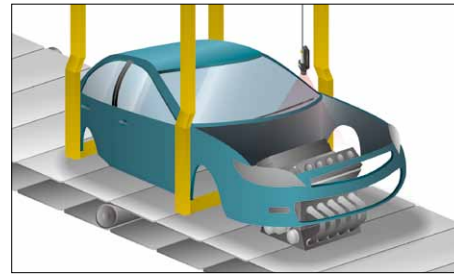-Measure its character

MVS-OCR
-Check the part number

3. Checking amount of paint or glue applied

MVS-PM
-Check its area by color
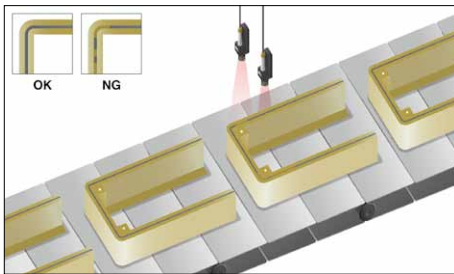
MVS-EM
-Measure its size in X/Y

4. Checking engine position

MVS-PM
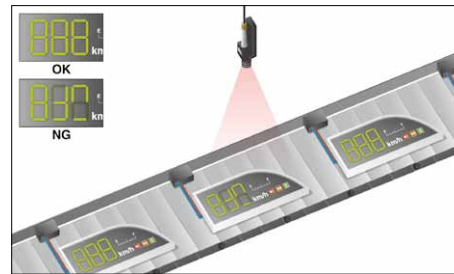-Check position by pattern matching

MVS-EM
-Measure the distance of body - engine

5. Check bead of sealing rubber for continuity

MVS-PM
-Check color area of the rubber

6. Checking display of vehicle speed panel

MVS-PM
-Check color area in each part
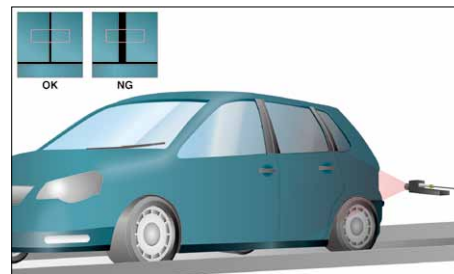-It can check up to 16 parts utilizing 16 inspection windows

7. Checking shape of O ring

MVS-PM
-Check shape by contour

MVS-EM
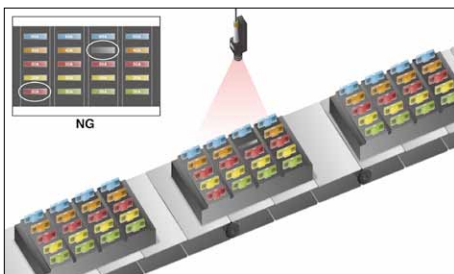-Measure the diameter

8. Checking gap between doors

MVS-PM
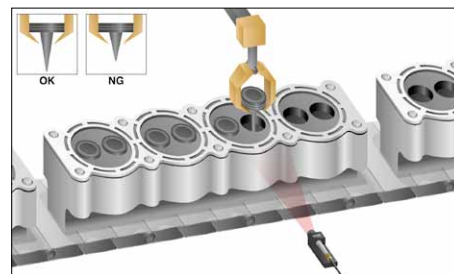-Check area of the gap

MVS-EM
-Measure the gap

9. Verifying fuse position and type in fuse panel

MVS-PM
-Check color of fuse and position
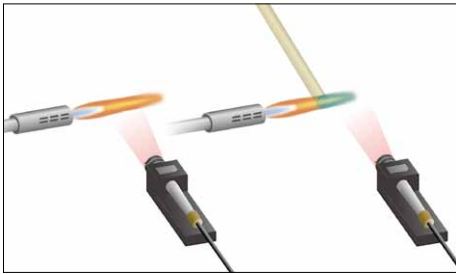-Lighting to be mounted from side to reduce surface reflection

10. Checking shape of piston valve
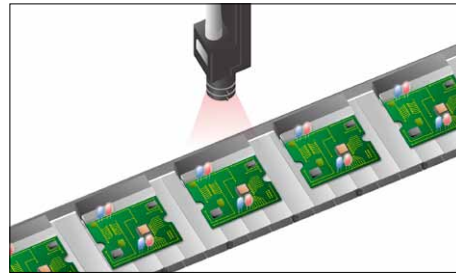
MVS-PM
-Check the shape by pattern matching

MVS-EM
-Measure the dimensions

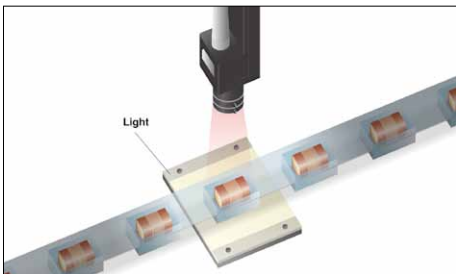## 11. Check flame to ensure the presence of material

MVS-PM
-Check color area of flame

12. Check LED color and parts position

MVS-PM
-Check parts position and area by color

13. Check direction of parts in emboss taping

Light

MVS-PM
-Check the direction by color pattern matching

14. Measuring pitch of lead frame
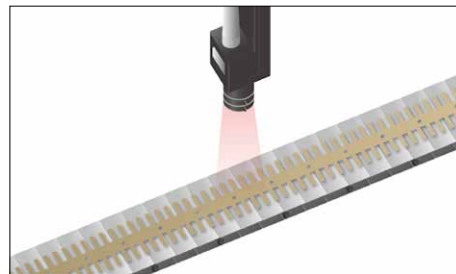
MVS-EM
-Measure the pitch in Max., Min. and Mean

15. Checking the color of paint on parts
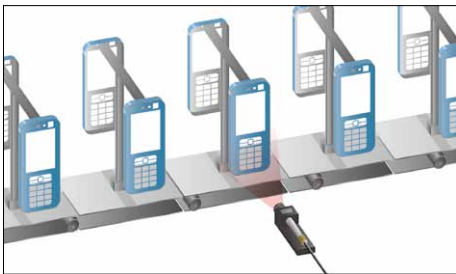
MVS-PM
-Check for correct color accuracy and application

16. Check presence of parts in tooling machine
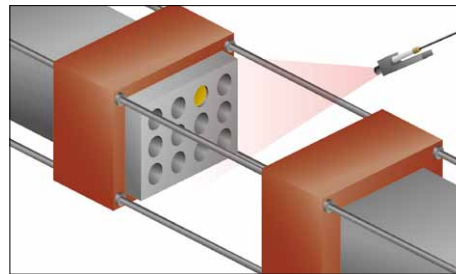
MVS-PM
-Check the presence of parts by color pattern matching

17. Checking existence of paste on PWB

OK

NG
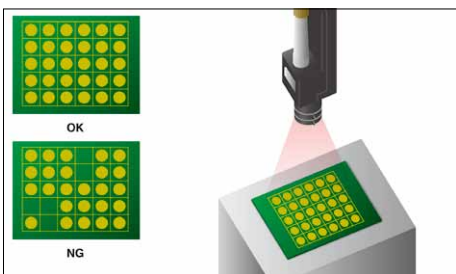
MVS-PM
-Check existence of the paste by pattern matching

18. Checking surface condition of chip parts

OK   NG
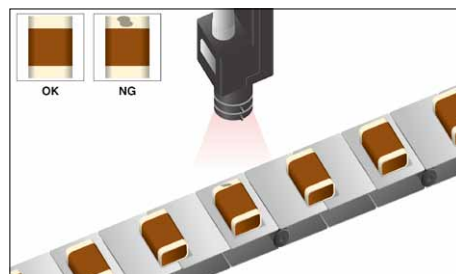
MVS-PM
-Check stain area on the surface of the chip parts

19. Detecting misalignment of material in tooling machine

OK

NG
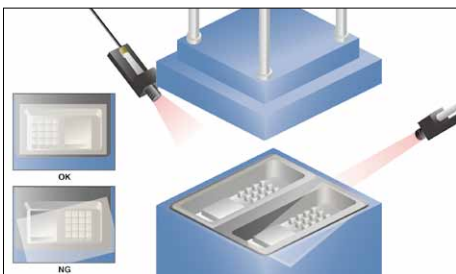
MVS-PM
-Check material contour

MVS-EM
-Measure object position from edge

20. Checking shape of emboss taping

OK   NG

Light
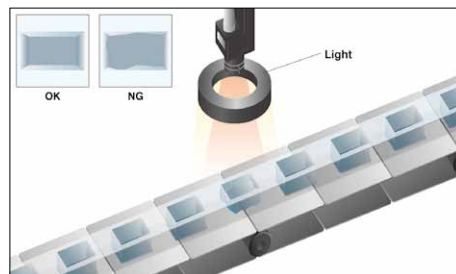
MVS-PM
-Check its shape by contour or full color

MVS Series

CVS Series

MVS Series APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

21. Checking lead pitch of parts
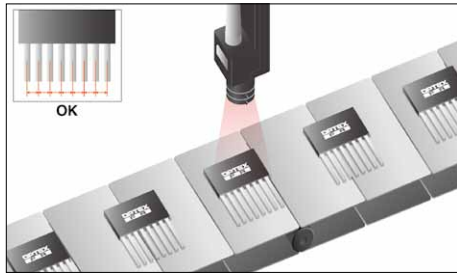
MVS-EM
-Measure pitch of multiple leads in max., min. and mean.

22. Check printing on transistors
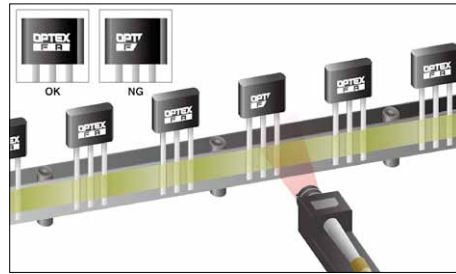
MVS-OCR
-Check the characters printed on transistors

23. Check the marking on chip parts
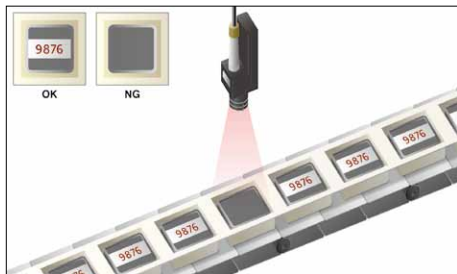
MVS-PM
-Check existence of mark

MVS-OCR
-Check the characters printed on the chip

24. Checking position of orientation flat
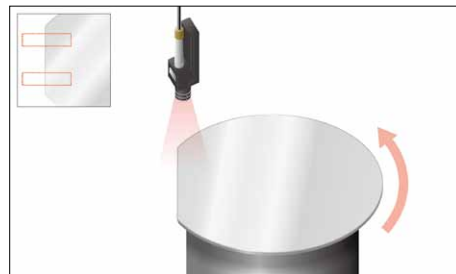
MVS-PM
-Check the area

MVS-EM
-Check the distance between edges

25. Checking existence of solder balls
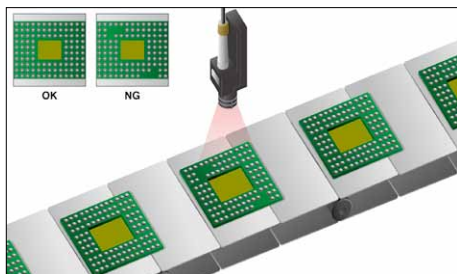
MVS-PM
-Check color area of the solder balls by utilizing multiple inspection windows (max. 16)

26. Checking position of wafer on handling machine

MVS-PM
-Check its position in the inspection window

MVS-EM
-Check the distance between edges

27. Checking wafer position in FOUP

MVS-PM
-Check wafer position by color area utilizing multiple inspection windows (max.16)

MVS-EM
-Check distance between wafers

28. Checking position of reference mark on PWB glass
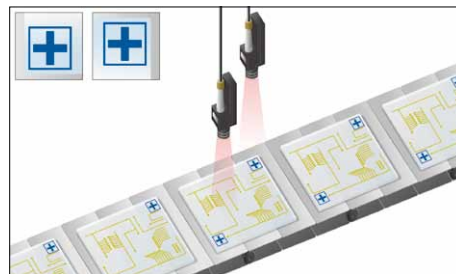
MVS-PM
-Check its position by pattern matching

MVS-EM
-Measure distance between edges

29. Checking condition of vacuum collet tip
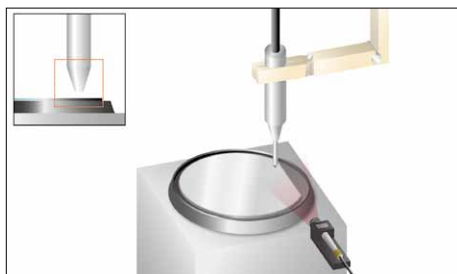
MVS-PM
-Check the shape by pattern matching

30. Checking segments of LCD display
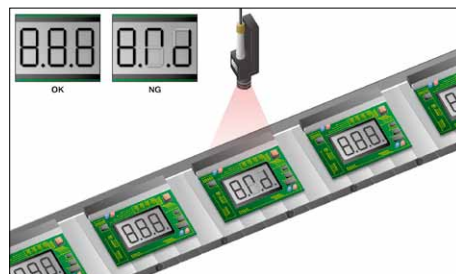
MVS-PM
-Check its condition by contour matching

31. Checking shape of rubber ring
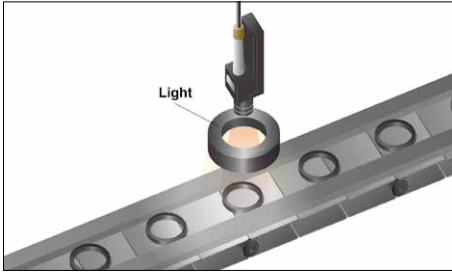
MVS-PM
-Check its shape by pattern matching

MVS-EM
-Measure distance between two outermost and innermost edges

32. Check for the presence of parts and correct order on PWB
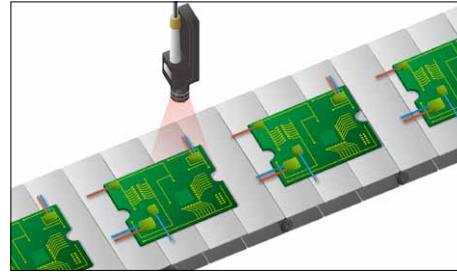
MVS-PM
-Check color area utilizing multiple inspection windows (max. 16)

33. Checking lid alignment
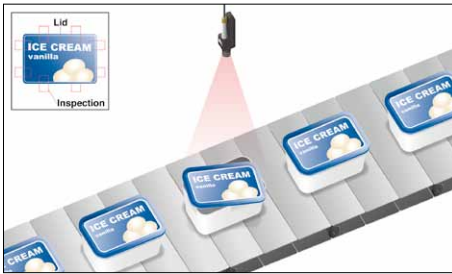
MVS-PM
-Multiple points on the lid are checked to determine alignment

34. Checking shape and printing on milk package
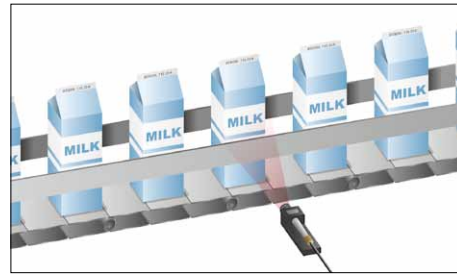
MVS-PM
-Check the shape by its contour or other pattern matching

MVS-OCR
-Check for printing on the package

35. Checking shape of plastic bottles
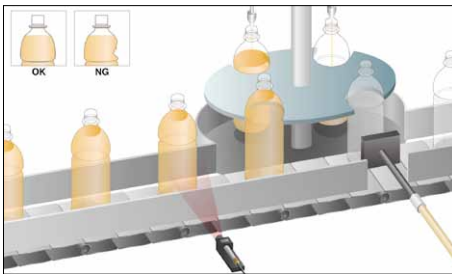
MVS-PM
-Check the shape by contour

36. Checking for label on plastic bottle
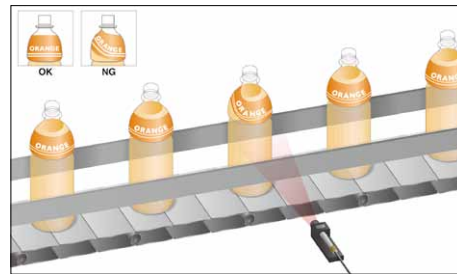
MVS-PM
-Check its position and type by color pattern matching

MVS-OCR
-Check characters printed on label

37. Checking number and type of bottles
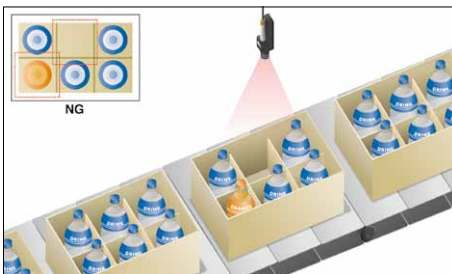
MVS-PM
-Check for presence of each bottle by color pattern matching

38. Checking position and type of pills in dispenser
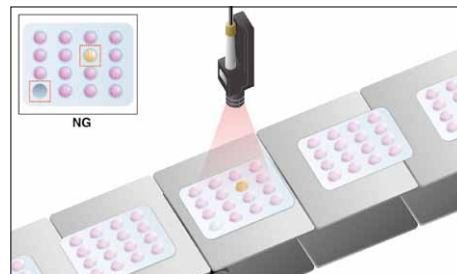
MVS-PM
-Check position and type by color pattern matching

39. Checking level of liquid in bottle
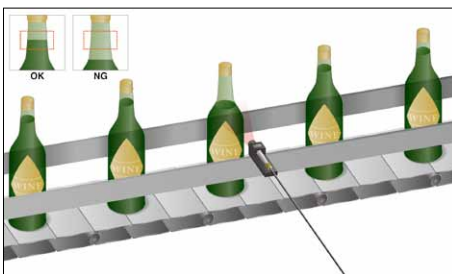
MVS-PM
-Check color area of the liquid in the bottle

MVS-EM
-Measure position of liquid surface in the bottle

40. Checking level of liquid in tube
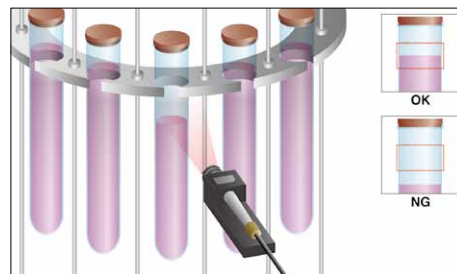
MVS-PM
-Check color area of the liquid in the tube

MVS-EM
-Measure position of liquid surface in the tube

MVS Series

CVS Series

MVS Series
APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

41. Checking characters printed on pouch

MVS-OCR
-Check characters on the pouch

42. Detecting condiments in instant food package
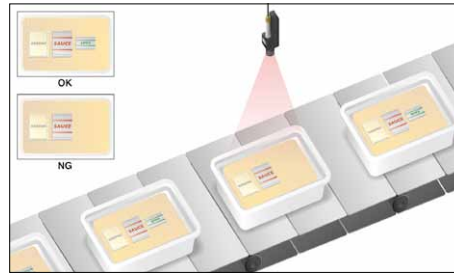
MVS-PM
-Check color area of each condiment

43. Checking characters printed on yogurt lid
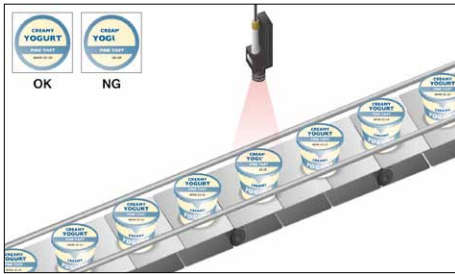
MVS-PM
-Check characters on the lid by color pattern matching

MVS-OCR
-Check characters on the lid

44. Checking existence of blob or stain on a bottle cap
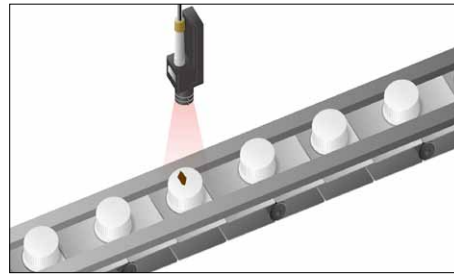
MVS-PM
-Check surface condition by stain area and color area

45. Checking presence of label attached for ad campaign
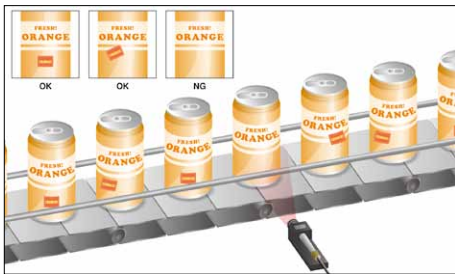
MVS-PM
-Check its position by color pattern matching

46. Checking for characters printed on package
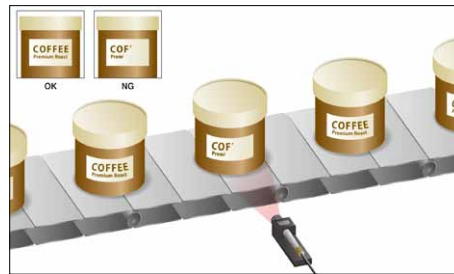
MVS-PM
-Check character by color pattern matching

MVS-OCR
-Check character on the package

47. Detecting defects on bottle
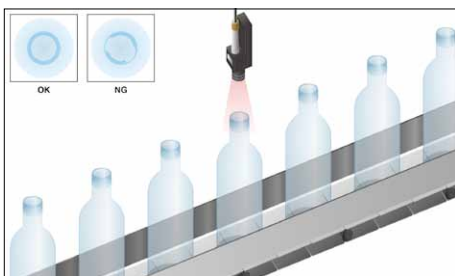
MVS-PM
-Detect defects by checking the contour

48. Checking position of heat sealing on pillow packaging
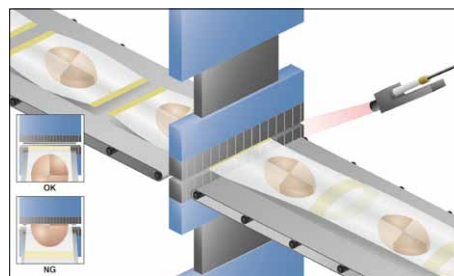
MVS-PM
-Check the position of heat sealing area by color pattern matching

49. Detecting lid position on the bottle

MVS-PM
-Check its position by color pattern matching

50. Checking for correct order in Calendar sorting

MVS-PM
-Check pattern by unique characteristics of each sheet

MVS-OCR
- Check printed characters

51. Checking presence and position of packing tape
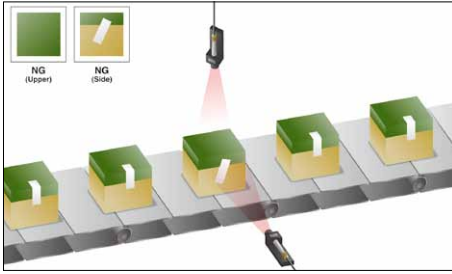
MVS-PM
-Check the position by color pattern matching

52. Sorting objects by shape
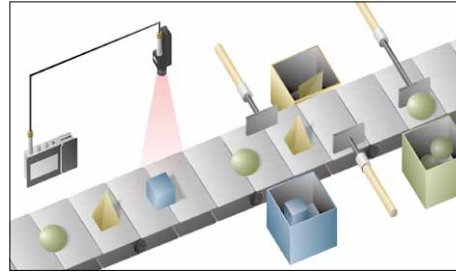
MVS-PM
-Check and sort objects by shape

53. Checking position of printing material
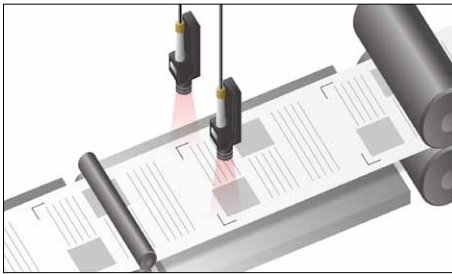
MVS-PM
-Check deviation of the mark from original position

MVS-EM
-Measure position of the mark

54. Measure width of sheet material
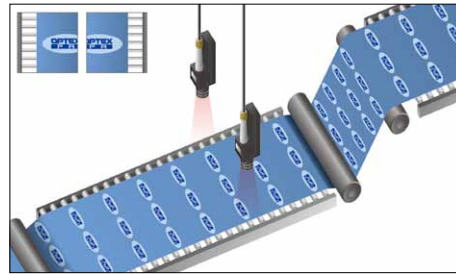
MVS-PM
-Check deviation of the edge from original position

MVS-EM
-Measure position of the edge

55. Measuring dimension of object
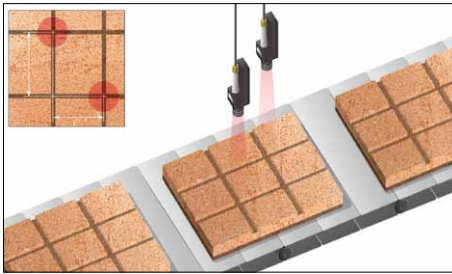
MVS-PM
-Measure distance between two edges

56. Measuring thickness of object
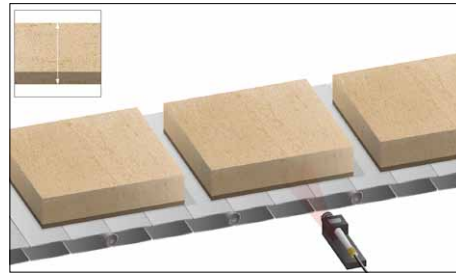
MVS-EM
-Measure distance between two edges

57. Checking size of rubber bank

MVS-PM
-Check area of the rubber

MVS-EM
-Measure distance between two edges of rubber

58. Checking shape and surface condition of plastic parts
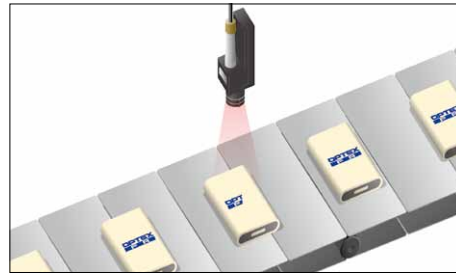
MVS-PM
-Check the shape by contour and check the surface condition by stain area and color area

PM MVS-PM

Color pattern matching camera unit

Using advanced technology, it is possible to inspect objects fast and reliably.
Objects can be inspected for Color, Color and Shape, Blob/Stain, Contour, Differentiation of picture, etc.
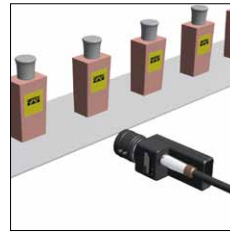
Direction of electronic parts   Quality of labeling   Page order of print
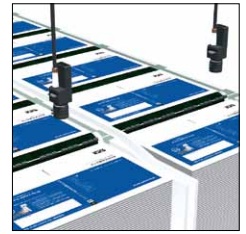
EM MVS-EM

Measurement camera unit

Reliable measurement of length and/or edge count.
Measure the distance between edges, measure the pitch of pins, count edges, etc.
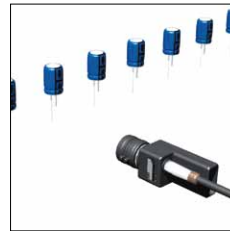
Positioning of printed circuit board   Shape of condenser   Shape of parts for automobile

OCR MVS-OCR

Color OCR camera unit

Inspection of Date, Time and Text.
Verification of Expiration date, Time stamp, Lot number or Text.
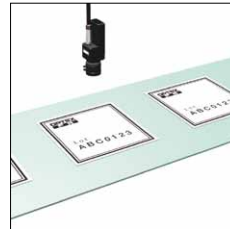
Shelf life of confection   Lot number of labels   Type mark of parts for automobile
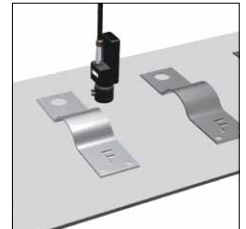
MVS-DN-E
Controller

Connect up to three cameras.
Touchscreen operation.
USB and RS232 interface.
10 key data entry.
Onboard Lighting control.

Backlit buttons show which are active to assist in Setup and Adjustment.
Help functions can be accessed at any time by pressing the "?" button

Advanced Technology
High speed vision processing and cost savings

PM EM OCR

Original LSI with CPU integrated
ECO-Engine: OPTimum CPU Ver.5

The MVS features an Optex original design LSI with CPU integrated, we were able to integrate the vision process engine into the camera unit. This solution provides high speed image processing and accurate inspection for a variety of applications. Each camera processes the image internally and transmits the result to the controller.

PM EM OCR

No change in response speed when operating multiple cameras
Three Cameras inspect independently

We utilized a new technology in the MVS that features low heat generation and low power dissipation. This concept was originally developed for the CVS series as an all-in-one design, the same technique was carried over to the MVS.
There is no change in the response time when multiple cameras are used. The all-in-one design allows the camera to operate independent from the controller.

MVS system

Double shield twisted pair cable for 16Mbps digital data communication

EXT.I/O(50P)

430k pixels color CCD

RS-232C   USB1.1   Power
Judge output x 3
Trigger input x 3

PM EM OCR

Integrated system technology
High Performance, Easy Installation and Low Cost

The controller has a built-in touchscreen interface, full color display and ten-key input panel. A power supply for control of the external lighting is also integrated into the controller. Simply connect the cameras and lights to the controller. There is no need for a console, external monitor or a separate power supply for lighting.

Camera   Controller

PM EM OCR

Support is available from LED lighting to training

Lighting is the single most important factor to capturing a good quality image for inspection. Optex FA offers a complete selection of lighting options. We can provide customer support for the selection of lighting, lenses, and training.

MVS ADVANCED TECHNOLOGY

MVS Series

CVS Series

MVS Series
APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

PM **EM** Up to 16 inspections can be done at the same time with one Camera
16 Inspection windows are available for each Camera

Each Camera can have a maximum of 16 inspection windows in one Bank of memory. Each inspection window can be set to inspect a different feature based on 6 inspection functions. The inspection judgment output for each inspection window can be output through the 50 pin I/O connector.
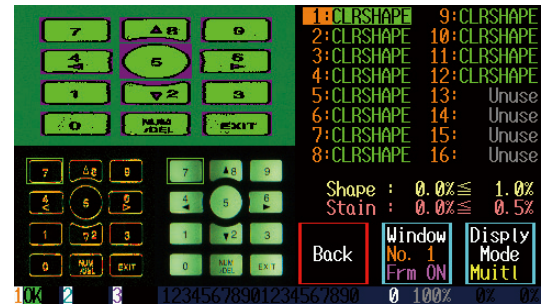
OCR Up to 4 inspection windows

The parameters for each inspection window can be individually set.
Up to 2 Forms of each Date and Time are available for one window and up to 4 Forms of strings are available(max. total of 4 Forms).
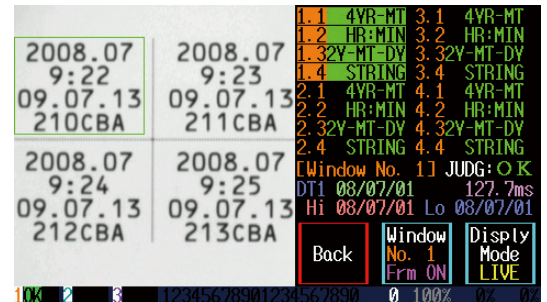
PM **EM** **OCR** Quick change over
32 Banks are available for one Camera

You can remotely select the bank to use by using a controller, PLC or the RS-232C I/F. The setup parameters for each bank are stored in memory and can be recalled when the product is run again.

PM **EM** **OCR** Lighting control without the need of a separate power supply
Controller has LED lighting control built in

Support for a total of three LED lights(12VDC, 24W total)is available.
The output connector for the power source is a quick connect/disconnect type.
The intensity level for each light can be adjusted separately.

For stable inspection and better process yield
5 functions are available

Continuous capture

When the camera checks the image it will automatically check up to 5(EM) or 6 images(PM/OCR), looking for a good reading. This insures stable operation if the trigger is not stable or the position of the object changes slightly. If the result is found to be OK the inspection will stop prior to reaching the maximum number of inspections.

PM EM

Trigger

ON

OFF

Inspection

NG   NG   NG   OK

ON

1   2   3   4

OFF

OCR

Trigger

ON

OFF

Process

NG   NG   OK

Store into memory   Inspection

1 2 3 4 5 6   1   2   3
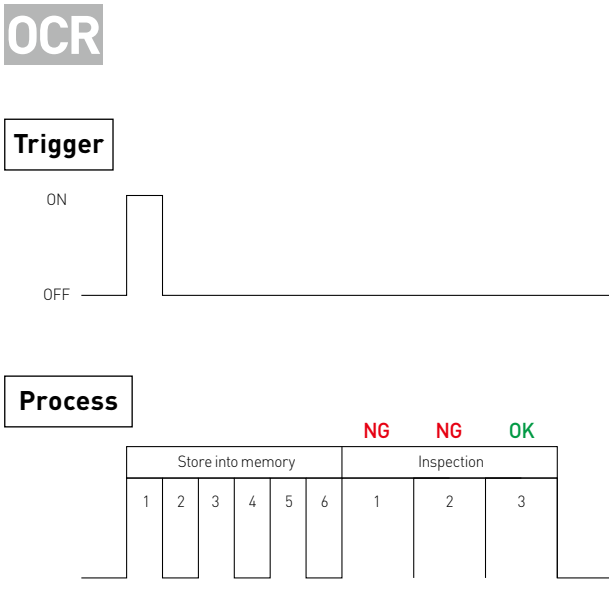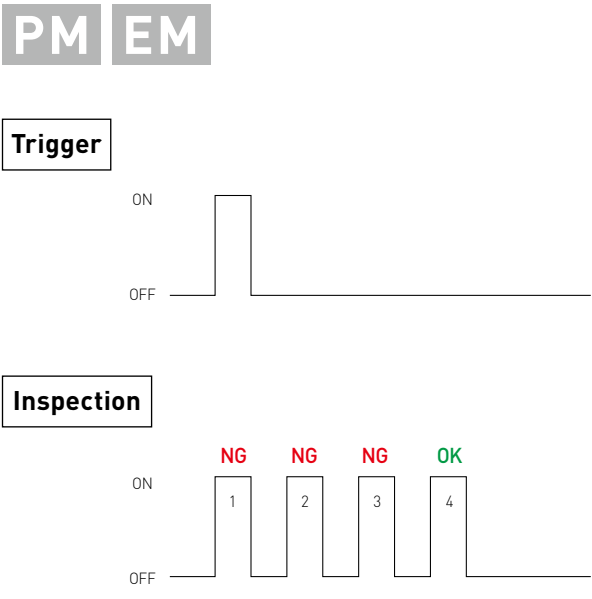
PM EM OCR Variable shutter speed

When the camera is checking image using the Continuous Capture feature the shutter speed will automatically be adjusted up to +36% ~ -24%. This compensates for changes in the lighting.

PM EM OCR Search function

The images is searched not only in the X and Y direction but it also can be rotated up to +/- 180 degrees (PM/OCR) or +/- 45 degrees(EM). This is useful when the position or orientation of the object changes.

PM Scaling up/down

When the camera is checking the image using the Continuous Capture feature the image will automatically be scaled Up/Down by up to +/-6%. This compensates for changes in the distance between the camera and object.

MVS Series

CVS Series

MVS Series APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

`PM` `OCR` ## Dark Compensation

For reliable inspection of color, the hue of each pixel is calculated. This function insures that captured images are stable even with variations in lighting or when the distance to the target changes.

When the light is from the top

The MVS calculates the hue of each pixel so it can get a homogenous color for each pixel. Regular vision sensors simply adjust the brightness so the upper part is brighter than the lower part.

MVS series	regular vision sensor

light

Original   Modified

When a bright ambient light is present

The MVS can get a homogenous color for each pixel even if the object has an area which is brighter due to external ambient light.

MVS series	regular vision sensor

Original   Modified
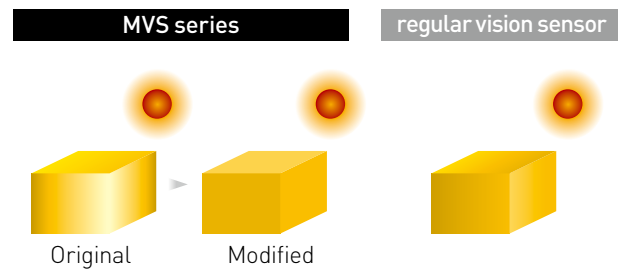
When the distance varies

The Dark Compensation function is effective when the object distance varies and its brightness changes.

MVS series	regular vision sensor

Original   Modified   Available when specify
the point to adjust

When the object is glossy

The Dark Compensation function helps to reduce bright spots on glossy surfaces.

MVS series	regular vision sensor

Original   Modified
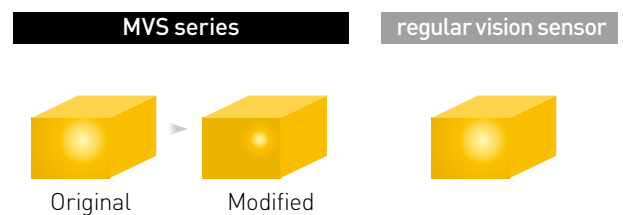
Simply follow the explanation on the display
Fast and easy "SETUP Menu"

Concept : No operating manual required

Setup

button leads you to the SETUP menu where each step is clearly described.

Following is example of MVS-PM SETUP Menu

Backlit buttons show which are active to assist in Setup and adjustment. Help functions can be accessed at any time by pressing the "?" button.

1. Touch[Setup]button

2. Select"Bank"and"Trigger mode"

3. Adjust shutter speed

4. Adjust brightness and direction of the image

5. Storing captured image

6. Select Color mode or Black and White mode

7. Determine search area and its function

8. Setup inspection windows
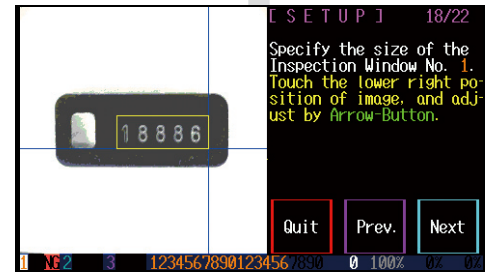
9. Setup inspection function

Select function from
Stain/Color Area/Full Color/Differential/Contour/Color Shape
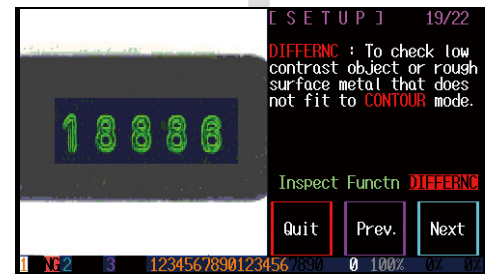
10. Touch[Finish]to exit setup menu

MVS Series

CVS Series

MVS Series
APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

Inspection for Color, Flaw, Blob, Shape, etc.
6 inspection modes are available

Stain

The camera compares the differential ratio of the stored master image with the differential result of the target image to determine the Stain value.
When this value exceeds the upper limit or is less than the lower limit, it is defined as NG.
This is used to detect the presence of stain (flaws) on the surface of metal objects or defects in plastic materials.

OK(label present)
processed

NG(no label)
processed

Differential   Original   Differential   Original
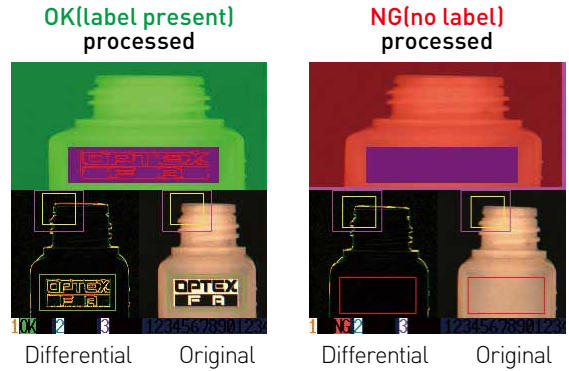
Contour

The camera compares the contour of the stored differential master image with the contour of the target object. It counts the number of pixels that do not match the Target contour to determine the Contour value (Lack of pixels). It counts the number of pixels outside of the Target contour area (background) which have the selected color to determine the Stain value.
If either value exceeds the threshold, it is defined as NG. This function is used when the contrast of the target object is high and inspecting the contour produces a more accurate result.

OK(correct direction)
processed

NG(rotated)
processed

Differential   Original   Differential   Original
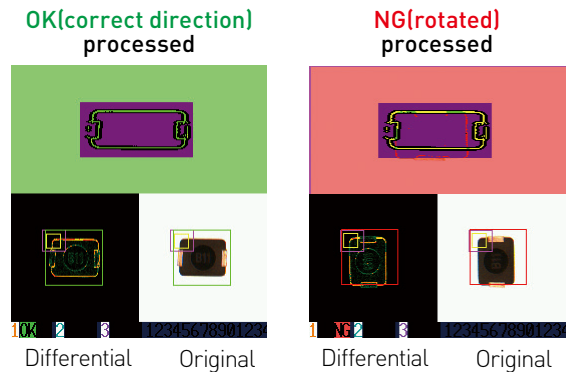
Differential

The camera compares the stored differential master image with the target object. If the difference exceeds the threshold it is defined as NG.
This function is used to inspect metal parts with uneven lighting. It is not good for detecting color or its depth.

OK(part present)
processed

NG(no parts)
processed

Differential   Original   Differential   Original
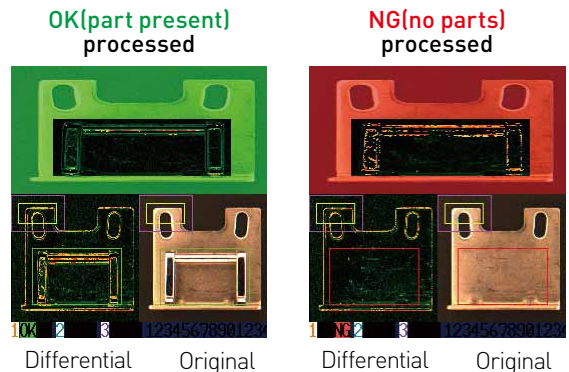
Color Shape

The camera inspects the shape of the area that contains the selected color.

It counts the number of pixels that have a different color in this area to determine the Contour value (Lack of pixels). It counts the number of pixels outside of the area (background) which have the selected color to determine the Stain value.

If either value exceeds the threshold, it is defined as NG. This is used when the target color is close to the background and is difficult to inspect by its contour or differential image. This is not good for checking black and white objects.

OK(matches)
processed

NG(corner missing)
processed

Differential   Original   Differential   Original
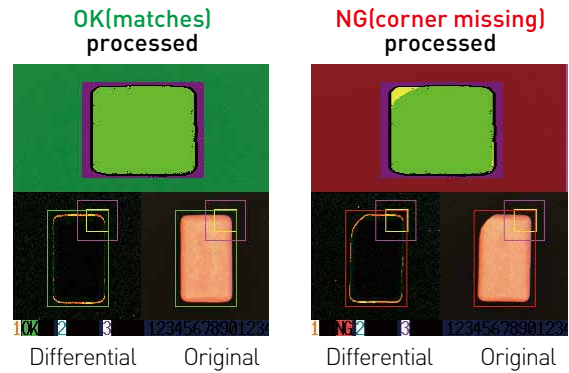
Color Area

The camera calculates the ratio of the number of pixels that have the selected color to all the pixels in the inspection window. When it exceeds the upper limit or is less than the lower limit, it is defined as NG.

This is used to detect color differences, especially when the color is not stable and that there is no need to detect object shape.

OK(all lights on)
processed

NG(light missing)
processed

Differential   Original   Differential   Original
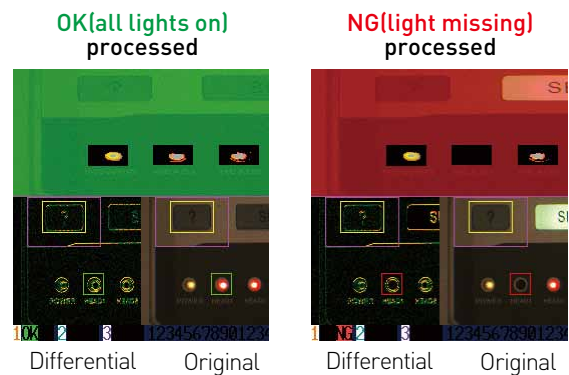
Full Color

The camera will compare the difference between the full color image of the target and the stored image.

If the sum of the difference exceeds the threshold value it is defined as NG.

This is used to inspect color and depth of pictures and prints under stable lighting.

OK(correct direction)
processed

NG(rotated)
processed

Differential   Original   Differential   Original
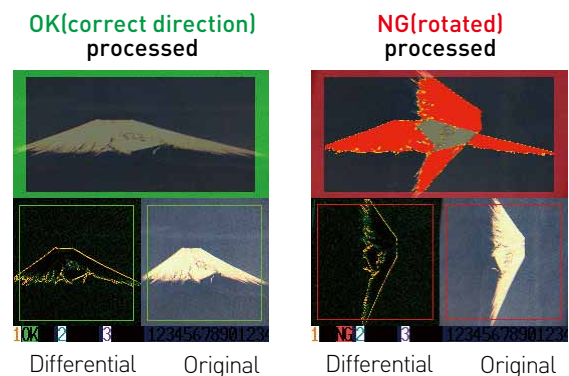
Measurement of Inner / Outer Dimension, Edge position, Counting edges, etc.

6 inspection modes are available

Outer Dimension

The camera measures the distance between the two outermost edges.
Choose between the longest, shortest or the mean value in the selected inspection window.

processed

Differential   Original
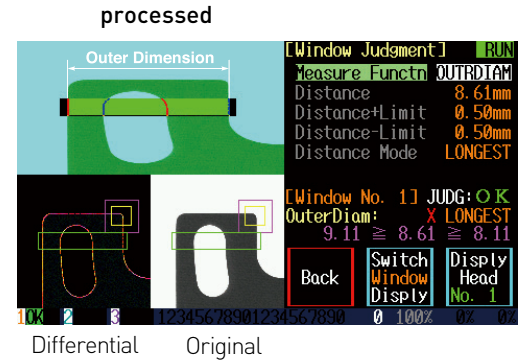
Inner Dimension

The camera measures the distance between the two innermost edges.
Choose between the longest, shortest or the mean value in the selected inspection window.

processed

Differential   Original
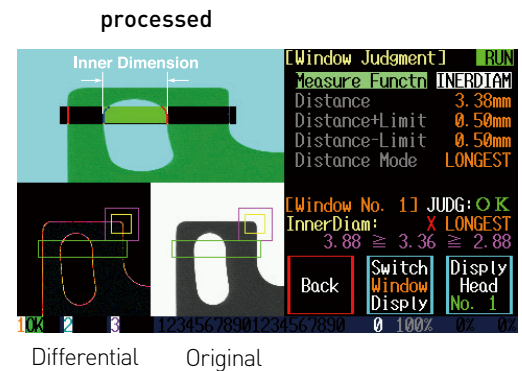
Position

Measures the distance between two edges in two different inspection windows. This function is useful for detecting the displacement of edges. Choose between the longest, shortest or the mean value in the selected inspection window.

processed

Differential   Original

MVS Series

CVS Series

MVS Series APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS
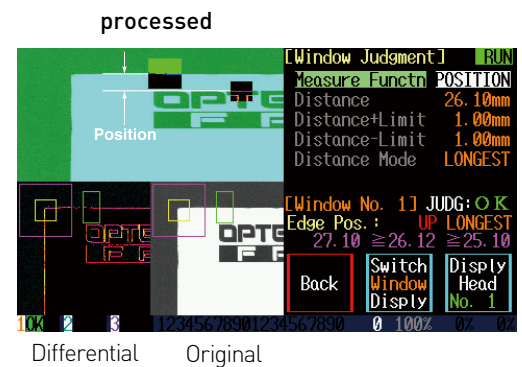
Number of Edges

The camera counts the number of edges in the inspection window. Choose the edges to count based on the transition of light to dark, dark to light or all of the edges.
In the processed image, a red line means a light to dark transition and a blue line means dark to light.

processed

Differential   Original
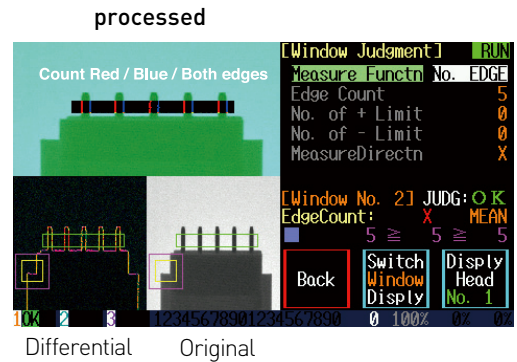
Multiple Edges

The camera measures the distance between edges in the inspection window. Choose the edges of a light part (blue line to red line) or a dark part (red line to blue line).
It judges by longest limit, shortest limit or the mean value.

processed

Differential   Original
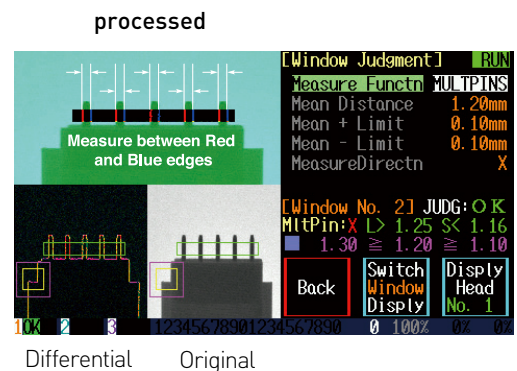
Center Pitch

The camera measures the pitch between the centers of the edges in the selected inspection window.
It judges by longest limit, shortest limit or the mean value.

processed

Differential   Original

MVS Series

CVS Series

MVS Series APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS
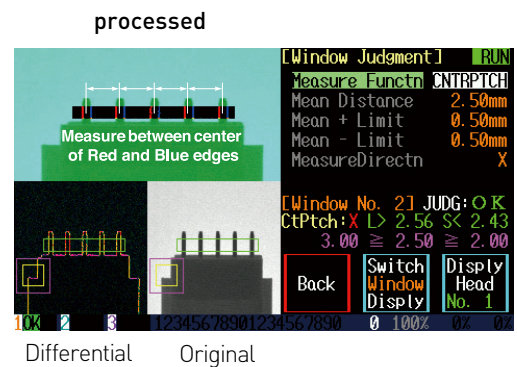
Optical Character Recognition
Recognizes Alphabetic, Numeric and Special Characters

Standard dictionary characters intergrated

0 ~ 9 A ~ Z . / :

User defined characters can be loaded

! # $ % & ( ) * + - ; < = > ? @ [ ] ^ _ ` a~z ~

All the characters are correct : OK
One character is not correct : NG

Correct print:OK
09.07.13

Wrong print:NG
08.07.13

Lack:NG
09.0 .13

No print:NG

Error level can be set

Correct print:OK
Shelf life 0 9 . 0 7 . 1 3   OPEN ▶

Slight lack:OK
Shelf life 0 9 . 0 7 . 1 3   OPEN ▶

Big lack:NG
Shelf life 0 9 . 0 7 . 1 3   OPEN ▶
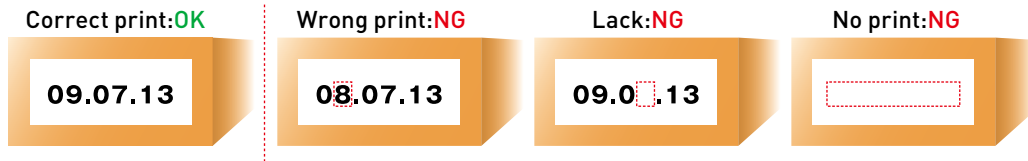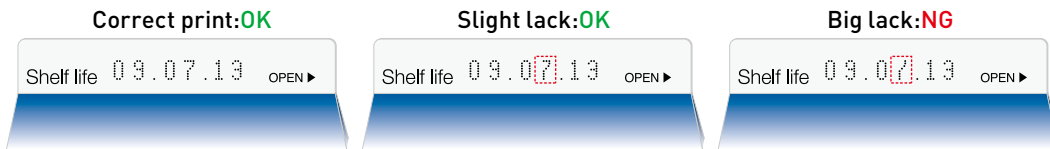
Recognizes various printer fonts

2009.02.08
M V S
Thermal printer

2009.04 BBD
Hot printer

R A 0 2
0 9 0 4 1 2
Ink jet printer

2009. 03
Laser maker
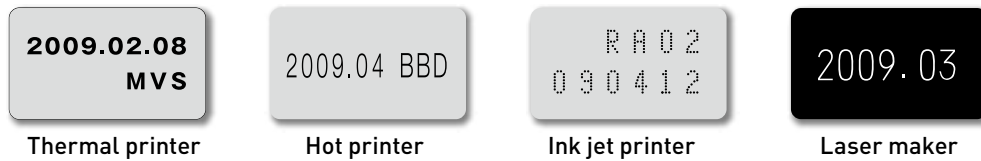
Change the image direction

The image direction for each bank can be set. This makes it possible to read reverse printed characters such as printing on the opposite side of a transparent sheet.

Vertical
2008. 05. 25

rotate

flip

Reverse
2008. 05. 25

Correct
2008. 05. 25
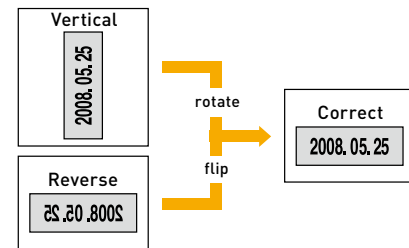
Recognize connected characters

Characters that are connected can be separated by adjusting the character width.

"0"and"0" are connected
2009.05.30

Separate
2009.05.30
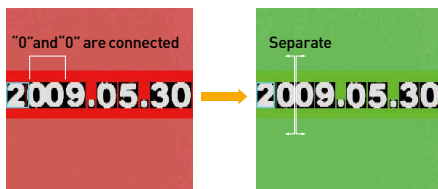
Built-in Calendar

The date and time are automatically updated.
The tolerance of the date and time transition timing can be set.

Tolerance per character

The tolerance for each character can be set (ex. the numbers "6" an "8" are very close in shape and need to be checked closely).

OCR regardless of color

The MVS-OCR is able to detect characters regardless of the color of the background.
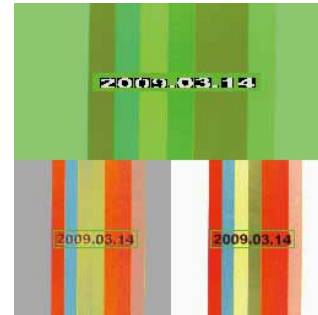
Search function

The MVS-OCR is able to search in both the X and Y directions, it also can do a rotational search of +/- 0~180 degrees.
Fullcolor pattern matching and matching of extracted character modes are available.
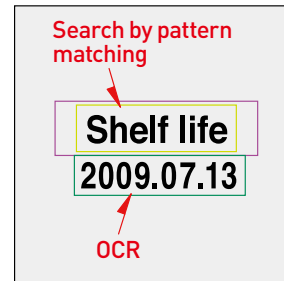
User defined characters

The MVS-OCR can recognize lower case letters and special symbols defined by the user dictionary.
For example it can be used to distinguish between "H" and "M" when the font that is used makes these letters hard to distinguish.
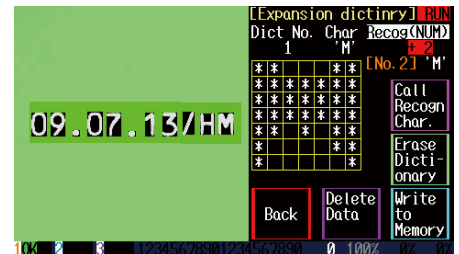
Code recognition

It can recognize Code of Month/Date/Hour/Minute.
Example: "CAO H" → "March 15th, 7 O'clock"

Conversion list example   Youcan modify on the controller.

TROUBLESHOOTING ASSISTANCE

MVS Series

CVS Series

MVS Series APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

Useful support functions aid in operation
5 support functions

Trouble Shoot

`Troubl Shoot-ing` button leads you to the Trouble Shooting menu. From this menu, you are able to view what corrections need to be done.
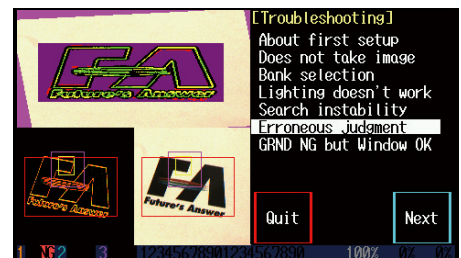
Help function

`?` button on the ten-key panel shows what the parameter means and what adjustments can be done.

Auto Threshold setting

Sample a good object to reset the threshold value. The level of accuracy can be selected from the sampled data.
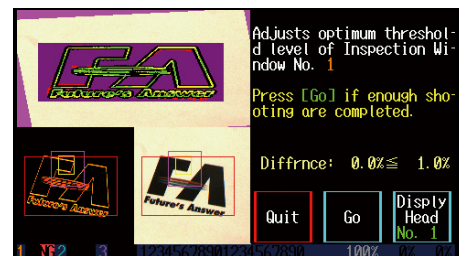
Offline analyzer

`OffLne Analy-zer` button leads you into offline analyzer menu. You can load the NG image and investigate why the image was NG, you can also try changing parameters with the NG image to correct the problem.
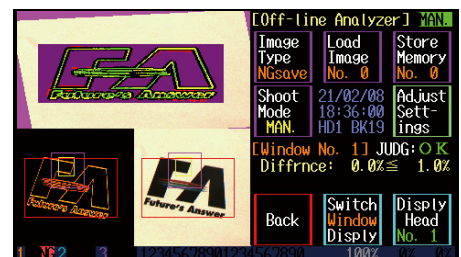
Storing NG images

The controller stores up to 63 NG images in memory (after the 63rd image the controller will re-start at beginning overwriting the oldest images). You can also download the images into a PC and use these for troubleshooting or e-mail to Optex-FA tech support.
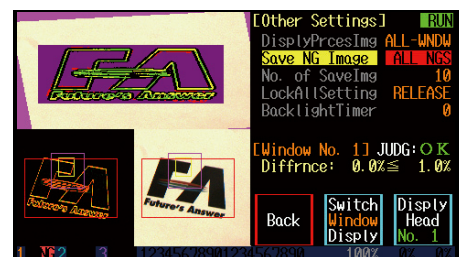
Camera unit

Model No. : MVS-PM/MVS-EM/MVS-OCR
Image sensor : CCD(color)
Capture mode : Color/Monochrome

＊lens is not included
Please order separately

Controller

Model No. : MVS-DN-E
Camera No : Max 3
I / F : Touch panel display,
Ten-key
Ethernet

＊PNP output type is MVS-DP-E

CCTV Lens (C mount)

Model No. : FASV-03514
Focal Length : 3.5mm
F No. : F1.4
Filter size : –

Model No. : FASV-F0814
Focal Length : 8mm
F No. : F1.3
Filter size : M27 P0.5

Model No. : FASV-F1214
Focal Length : 12mm
F No. : F1.4
Filter size : M27 P0.5

Model No. : FASV-F1614
Focal Length : 16mm
F No. : F1.4
Filter size : M27 P0.5

Model No. : FASV-F2516
Focal Length : 25mm
F No. : F1.4
Filter size : M27 P0.5

Model No. : FASV-F5020
Focal Length : 50mm
F No. : F1.8
Filter size : M30.5 P0.5

Camera cable

MVS-C2S : 2M Cable
MVS-C5S : 5M Cable
MVS-C5E : 5M Extension Cable
MVS-C5SR : 5M Robotic Cable
MVS-C5ER : 5M Extension Robotic Cable
MVS-C5W : 5M Cable with wiring for light
(need MVS-LC05)

External light

Model No. : OPR-S55-28W
Method : Direct ring
Spec : White LED/
DC12V, 5.1W
Cable : 500mm

Polarizing filter

Model No. : FASV-PL270-RS
size : M27 P0.5

Model No. : FASV-PL305-RS
size : M30.5 P0.5

IR cut filters

Model No. : FASV-IR270
size : M27 P0.5

Model No. : FASV-IR305
size : M30.5 P0.5

Filters for light

PL-OPR-S55-28 : Polarizing filter for
OPR-S55-28
DF80-OPR-S55-28 : Diffuse filter (80%) for
OPR-S55-28

Light holder

OPAU-150A : Mounting bracket accessory
for use with OPR-S55-28W

Cable for light

MVS-LC05 : Controller to lighting connection
cable, 500mm length

OP-CB1-2 : 2m Extension cable for light
OP-CB1-3 : 3m Extension cable for light
OP-CB1-5 : 5m Extension cable for light

Extension ring set

Model No. : FASV-EXR-LT2
5 piece set

0.5mm 1mm 5mm 10mm 20mm

I/O Connector cable

MVS-C3I0 : 3m IEEE1284 half pitch 50p

Mounting bracket for light

BKT-MVS-OPR : Mounting bracket for OPR-S55-28W

Touch panel protective sheet

MVS-TP

MVS Series

CVS Series

MVS Series
APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

Camera unit

Model No. : MVS-PM / MVS-EM / MVS-OCR

Power indicator
Communication indicator
ø24 U1 P0.794
Connector
CS Mount
Mounting bracket
M4 Depth:5mm
2-ø4.0
2-R1.5
ø4
4-R2.7   ø1/4-20UNC   2-R1.5
R3
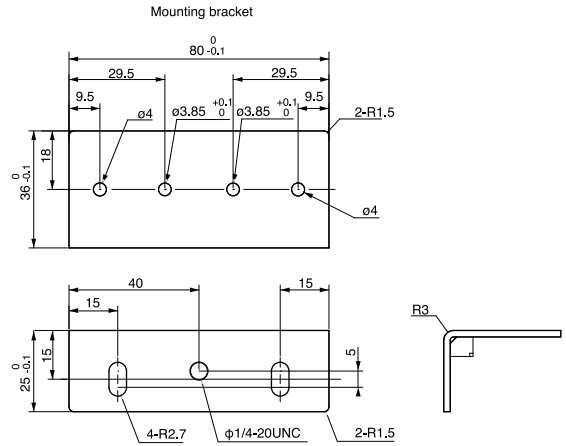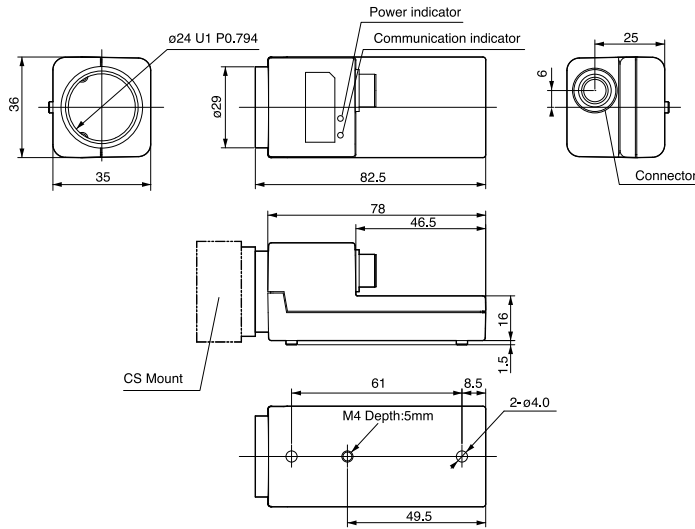
Controller

Model No. : MVS-DN-E
Panel mount adaptor installation
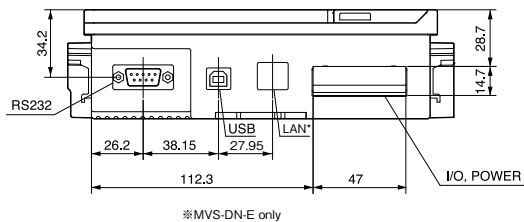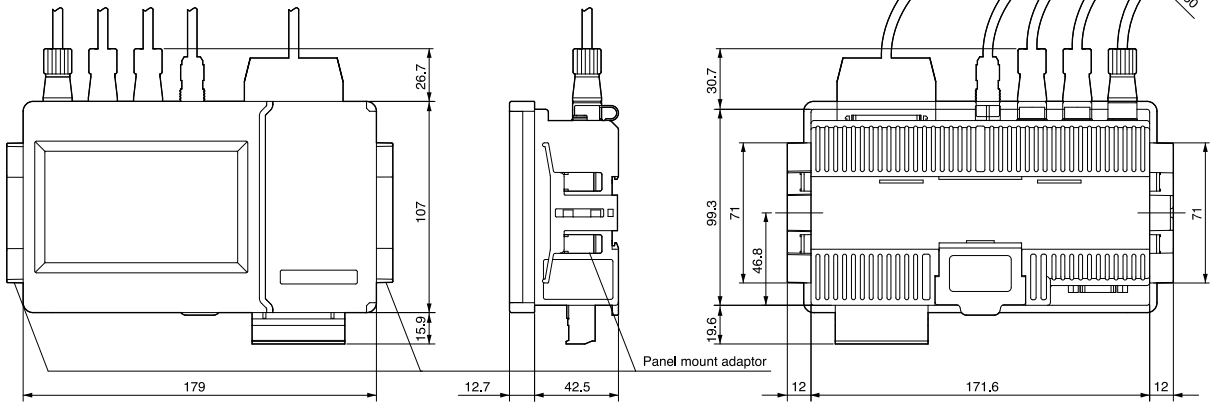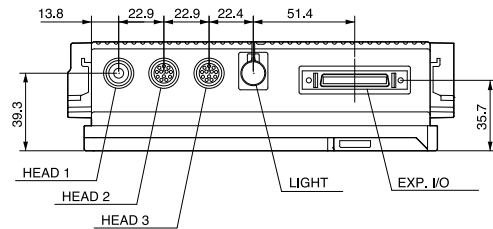
HEAD 1
HEAD 2
HEAD 3
LIGHT
EXP. I/O
Panel mount adaptor
RS232
USB   LAN*
I/O, POWER
※MVS-DN-E only
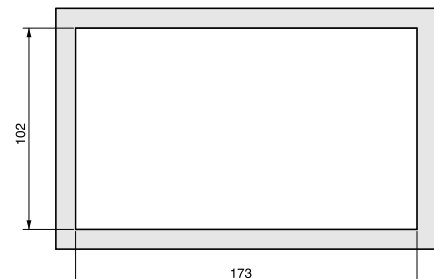
Recommended opening for mounting

Lens

Model No. : FASV-03514
Focal Length : 3.5mm
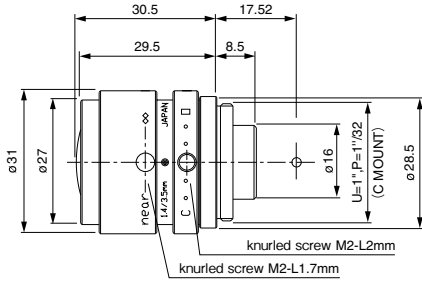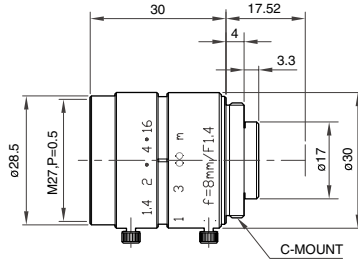
knurled screw M2-L2mm
knurled screw M2-L1.7mm

Model No. : FASV-F0814
Focal Length : 8mm

C-MOUNT

Model No. : FASV-F1214
Focal Length : 12mm

C-MOUNT

Model No. : FASV-F1614
Focal Length : 16mm

C-MOUNT

Model No. : FASV-F2516
Focal Length : 25mm

C-MOUNT

Model No. : FASV-F5020
Focal Length : 50mm

C-MOUNT
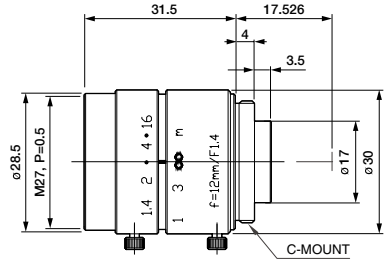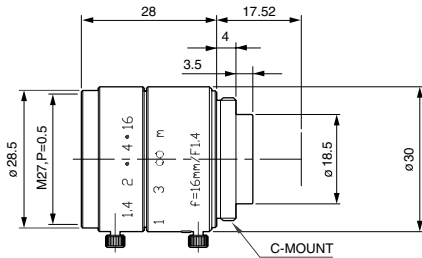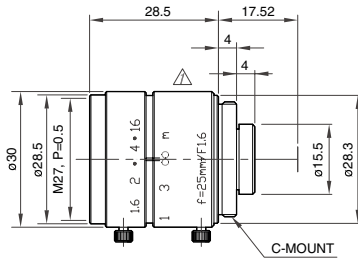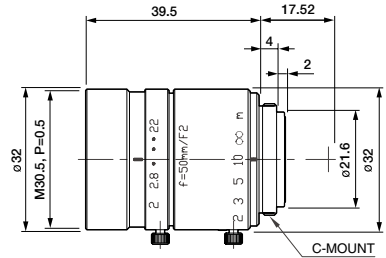
Extension ring set

Model No. : FASV-EXR-LT2

0.5mm - 1.0mm   5mm - 20mm

M25.4 P=1"/32(C MOUNT)
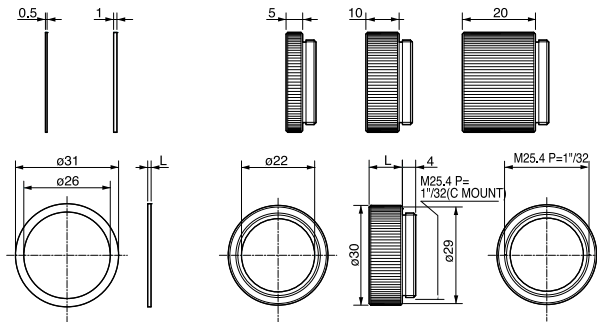
Polarizing filter

Model No. : FASV-PL270-RS
(A) size   : M27 P0.5

Model No. : FASV-PL305-RS
(A) size   : M30.5 P0.5
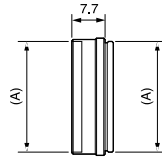
IR cut filters

Model No. : FASV-IR270
(A) size   : M27 P0.5

Model No. : FASV-IR305
(A) size   : M30.5 P0.5

External light

Model No. : OPR-S55-28W

4-M3 depth:5
PCD40
3-M1.6 depth:3
PCD51.8
L=500
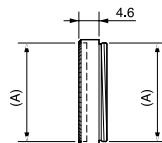
Model No. : DF80-OPR-S55-28
Diffusing plate

3- ø1.8
ø2.4 countersink
mat surface
smooth surface
t=2.0

Model No. : PL-OPR-S55-28
Cover plate
t=1.8

Polarizing filter
t=0.2

3- ø1.8
ø2.4 countersink

Polarizing Direction
3- ø1.8
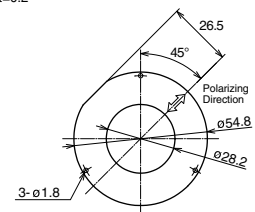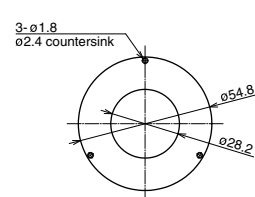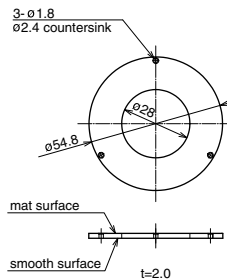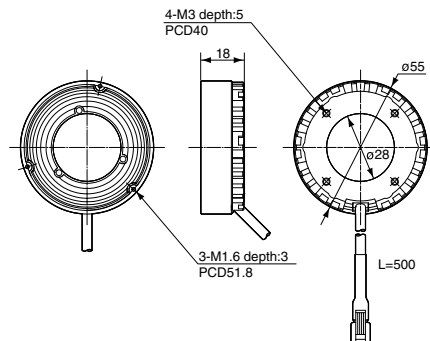
MVS Series

CVS Series

MVS Series APPLICATION

MVS-PM/EM

MVS-OCR

OPTIONS

Model	MVS-PM MVS-EM Common Specifications
Supply Voltage	DC 6V ±10% (From Controller)
Power consumption	Max. 100mA / 24V DC (in Controller)
Image sensor	430000 Pixel 1/3" CCD Color Image Sensor
Resolution	512 X 512 (512 X 256 by interlace processing)
Pixel size	H: 6.5 X V: 6.3μm (512 X 512 =→ 3.33 X 3.23 mm)
Lens type	CS mount (C mount adapter is included)
Communication I/F	LVDS (100Mbps) dedicated to Controller (Max. 10m)
Indicator	LED (Power, Status)
Operating Temp., Humid.	0~50℃, 35~85%/RH (Non Condensing)
Storage Temp., Humid	-20~70℃, 25~95%/RH (Non Condensing)
Vibration, Shock	Vibration : 10~ 55Hz /1.5mm, Shock : 15G
Conformity	CE (EN55011 Class-A, EN61000-4-2~6), RoHS
Material	Aluminum
Protection Category	IP50
Weight	Approx. 90g
Accessories	C mount adapter, mounting bracket

Model	MVS-PM Specifications
Image processing function	- Rotation Search up to +/- 180 degree - 16 Inspection Window - Judgment of Contour and Background, Color Normalized Correlation, Differential Normalized Correlation, Color Shape, Color Area, Stain - Variable shutter speed with continuous capture (up to 6 times) - Automatic Color/Black&White changeover - External Teaching (Auto-Shutter/Threshold/Color Extracting)

Model	MVS-EM Specifications
Measurement function	- Rotation Search up to +/- 45 degree - 16 Inspection Window - Measuring Outer/Inner size, Counting number of Edges, Measuring position of Edge, Measuring Edge to Edge, Measuring pitch of Edges - Variable shutter speed with continuous capture (up to 5 times) - Black&White capturing - External Teaching (Auto-Shutter/Threshold/Auto function selection)

Model	MVS-OCR Specifications
Supply Voltage	DC 6V ±10% (From Controller)
Power consumption	Max. 100mA / 24V DC (in Controller)
Image sensor	430000 Pixel 1/3" CCD Color Image Sensor
Resolution	512 X 512 (512 X 256 by interlace processing)
Pixel size	H: 6.5 X V: 6.3μm (512 X 512 =→ 3.33 X 3.23 mm)
Lens type	CS mount (C mount adapter is included)
Communication I/F	LVDS (100Mbps) dedicated to Controller (Max. 10m)
Indicator	LED (Power, Status)
Response time	Approx. 45ms
Operating Temp., Humid.	0~50℃, 35~85%/RH (Non Condensing)
Storage Temp., Humid	-20~70℃, 25~95%/RH (Non Condensing)
Vibration, Shock	Vibration : 10~ 55Hz /1.5mm, Shock : 15G
Conformity	CE (EN55011 Class-A, EN61000-4-2~6), RoHS
Material	Aluminum
Protection Category	IP50
Weight	Approx. 90g
Accessories	C mount adapter, mounting bracket
Image processing function	- Rotation Search up to +/- 180 degree - 4 Inspection Window - Up to 6 lines and up to 60 characters per one inspection window. - Up to 2 DATE and 2 TIME and 4 strings (total 4) - Maximum of 250 user defined characters - Available Date/Time code recognition: Month: 1 character, Date: 2 char., Hour: 1 char., Minutes: 1 char. - Variable shutter speed with continuous capturing (up to 6 times) - Automatic Color/Black&White changeover - External Teaching (Auto-Shutter/Threshold/Color Extracting)

Model	MVS-DN/DP/DN-E/DP-E
Supply Voltage	DC 24V ±10% (DC 12V is possible without external Light)
Power consumption	Controller : Max. 80mA / 24V DC, With external light : max 1.5A (150% of Light power consumption)+ Power consumption of all camera heads
Number of camera	Max. 3 heads
Output	NPN/PNP open collector Residual voltage is less 1.0V, OK, NG : 1 each for every camera head (Total: 6) max. 100mA, Auxiliary output : Total 20, max. 50mA
Input	Synchronous: 3, Auxiliary: 10
I/O connector	Power/OK/NG/Synchronous : Terminal block 12P, Expansive I/O : IEEE1284 half pitch connector 50P
External Light out	12V PWM control (87kHz, 256steps) Out: 3, Total 24W
Communication I/F	USB1.1 (max 12Mbps) : USB standard connector, RS232 (max 500kbps) : D-Sub 9P, RJ45 (8P8C) : Ethernet (10BaseT/100BaseTX) MVS-DN-E / DP-E only
Display, Control device	4.3" wide TFT LCD, Touchscreen, Panel SW, Indicator : Power, Camera No.LED
Timer accuracy	-45sec. ~ +1min. 15sec. Per Month (Typical)
Timer backup battery	primary cell : 5 year with power off (Typical), secondary super capacitor : 7.8 year (Typical with 3 days backup)
Operating Temp., Humid.	0~50℃, 35~85%/RH (Non Condensing)
Storage Temp., Humid	-20~70℃, 25~95%/RH (Non Condensing)
Vibration, Shock	Vibration : 10~ 55Hz /1.5mm, Shock : 10G
Approvals	CE (EN55011 Class-A, EN61000-4-2~6), RoHS
Material	polycarbonate
Protection	IP20
Weight	Approx. 570g
Attachment	Panel mount bracket

WORKING DISTANCE vs. FIELD OF VIEW

Camera Working Distance L (mm)
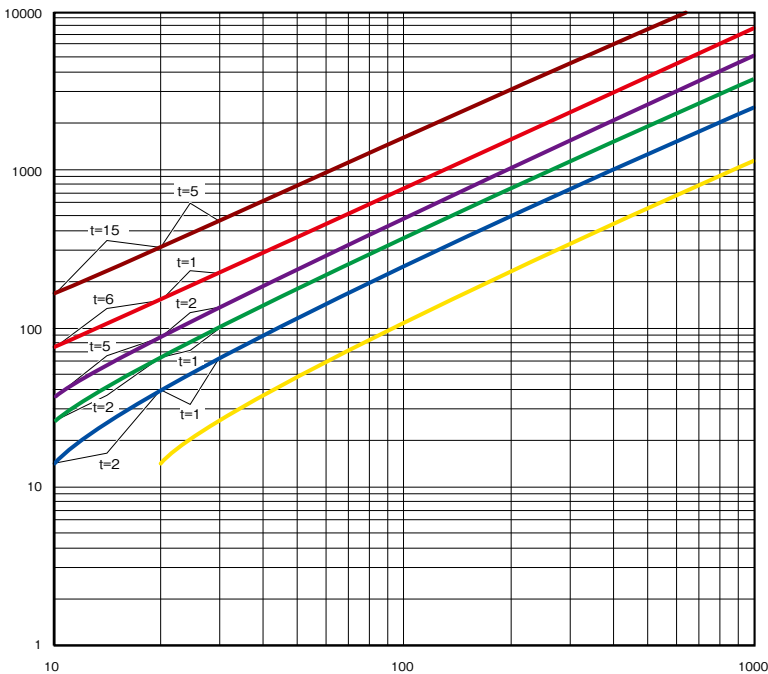
Field of View A (mm)

¨t=¨ indicates thickness of Extension ring to use (mm)

Lens
- FASV-03514
- FASV-F0814
- FASV-F1214
- FASV-F1614
- FASV-F2516
- FASV-F5020

How to utilize the graph

1. Determine Working distance (L) and Field of view (A).
2. Choose the appropriate lens and extension ring according to the graph.
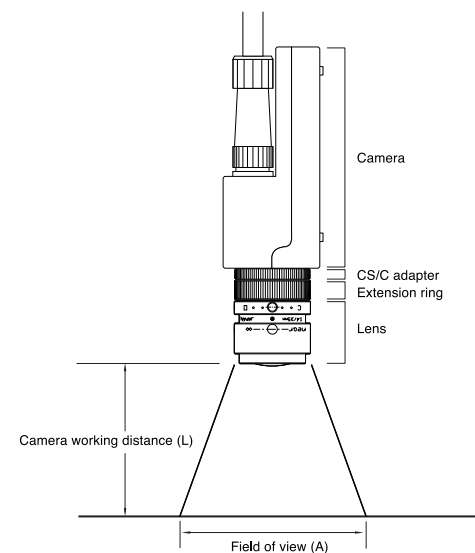
CVS SERIES APPLICATION

1. Checking existence of printing on the box
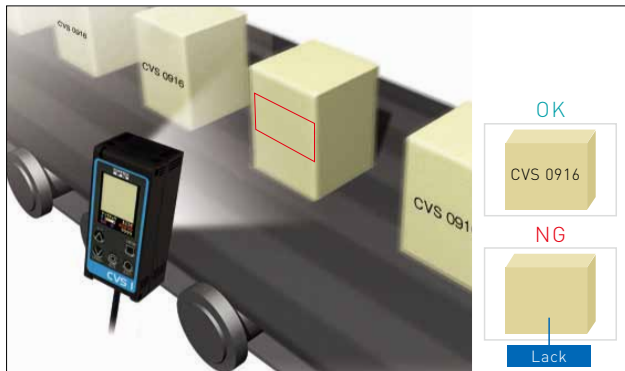
CVS1-R
Set the extracted color from the printing and check its area in the field of view

2. Checking the lid of instant foods

CVS2-R
Check the color and shape by its pattern matching function

3. Checking existence of cutting tape on the film

CVS1easy-R
Set the extracted color from the cutting tape and check its area in the field of view

4. Checking multiple colors on the box

CVS2-R
Check existence of multiple color on the box registering multiple colors as reference

5. Checking existence of seasoning bag

CVS1-R
Set the extracted color from the seasoning bag and check its area in the field of view

6. Checking shelf life on the packaging film

CVS4-R
Check the date of shelf life on packaging film. It has calendar function so checking overnight is available

7. Checking existence of label on package

CVS1-R
Set the major color on the label and check its area in the field of view

8. Checking existence of label on bottle

CVS1-R + CVS-LU1
Check the color of fluorescent illuminated by UV light utilizing CVS-LU1

9. Checking shelf life on the milk package

CVS4-R
Check the date of shelf life on milk package. It has calendar function so checking overnight is available

10. Checking expiration date on the package

CVS4-R
Check the expiration date on the package. It can just check number of character as well

11. Checking existence of description of pills

CVS1-R
Set the color area of description of pills in the field of view

12. Checking overlapping of the label

CVS3-R
Check the overlapping label by its edge detection function

13. Checking marking on electric components

OK

OPTEX
0123456789
ABCDEFGHIJ

Mark exists

NG

No mark

CVS1-R
Set the color of the marking and check its area in the field of view. Narrow angle view version can zoom up small area.

14. Checking ON/OFF of LED on PWB

OK

Masking area

NG

No light

CVS2-R
Check the color and position of LED by its color pattern matching function

15. Checking order of the color of wires

OK

Masking area example

NG

Wrong order of color

CVS2-R
Check the color and position of wires by its color pattern matching function

16. Checking existence of bad marking on parts

OK

NG

Bad marking

CVS2-R
Check color of the parts and color of bad marking on the parts to detect existence of bad parts

17. Checking existence of wafer

OK

Water exist

NG

No wafer
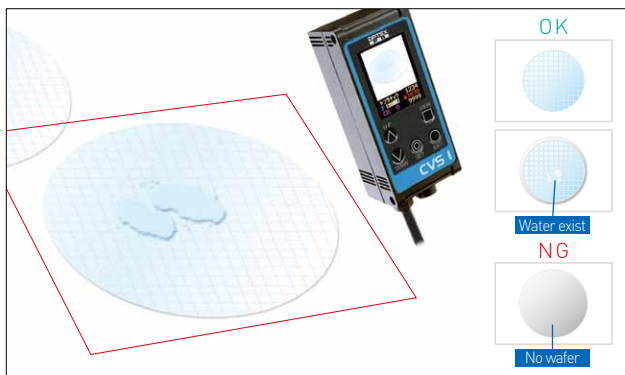
CVS1-R
Set the color of the wafer as its reference and detect existence of the wafer even there are some water on it

18. Checking direction of the parts

OK

NG

Opposite direction

CVS3-R
Check the edge of the marking on the IC package and detect direction of it

19. Checking position of welded part

CVS2-R

Set the color of the pipe and welded part and detect welded part stably by its pattern matching function

20. Checking shape of assembled parts

CVS3-R

Check the shape of the assembled parts by edge detecting function utilizing back lighting

21. Checking direction of the parts on conveyor

CVS2-R

Check the color and position of the surface pattern by its color pattern matching function

22. Checking size of the nut

CVS3-R

Check size of the nut by edge detecting function

23. Checking characters on metal parts

CVS4-R

Check the characters engraved on the metal parts by its OCR function

24. Checking existence of lot number on the spark plugs

CVS1-R

Check the color area of the printed characters on the spark plugs

MVS Series

CVS Series

CVS Series
APPLICATION

CVS1easy-R

CVS1-R

CVS2-R

CVS3-R

CVS4-R

OPTIONS

CVS1easy-R SERIES

Simple & Easy setup
Color area sensor

- All in one color vision sensor
- Color resolution : 15,000 colors
- Stable color detection by calculating hue of each pixel

Wide range line-up

CVS1easy-N20-R Standard type
CVS1easy-N10-R Long range type
CVS1easy-N40-R Macro view type
CVS1easy-N21-R Narrow view type

Three-Step-Teaching

Teaching is easily done by three steps even in 30 seconds just like a color sensor.

Step1 Get into teaching mode

Step2 Set field of view

Chose the number to zoom in and zoom out

Step3 Set color

Chose the color from the list shown. You can also use teaching window on the view

All in one

The sensor has a built-in Camera, LED Lighting, Display monitor and Controller. This structure enables water resistance IP67.

Camera   Monitor

Lighting   Controller
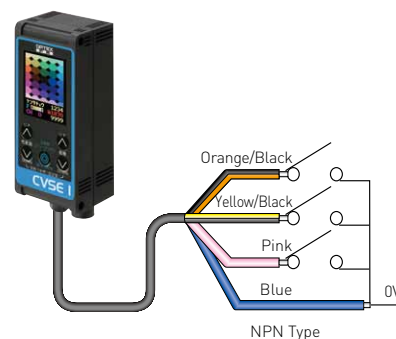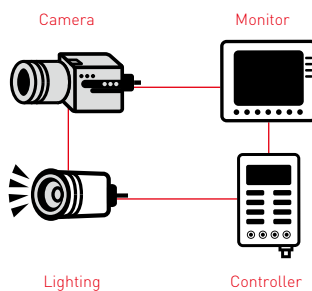
Easy Threshold adjustment

Changing sensitivity of color extraction and threshold of inspection is easily done by simple buttons.

Buttons to adjust Color range

Buttons to adjust Color Area threshold

Quick change over

8 Banks are available. You can remotely select the bank to use by PLC or other equipments.

Orange/Black
Yellow/Black
Pink
Blue   0V
NPN Type

Color Resolution

Up to 15,000 colors are available to detect.

Stable inspection

It calculates color hue of each pixel so stable inspection is available.

Wide coverage line-up

You can chose from 4 inspection range/field of view according to inspection target condition.

High performance

Setup Adjustable while line is running

CVS1easy-R provides output with the setup parameters given even while you are adjusting setup. You don't have to stop the line.

| Vision processor | Read/Write | CPU for controlling |

CVS1easy-R has two processing unit individually so it can change parameters while vision processing is running without delay.

Secret of High speed

Transferring captured data and vision processing are parallelly done utilizing internal memory. It helps to shorten response time.

Conventional vision sensor
- Image transferring
- Data writing | Data reading

CVS1easy-R
- Image transferring
- Filtering/Correction
- Inspection
- Filtering/Correction
- Inspection
- Shortened
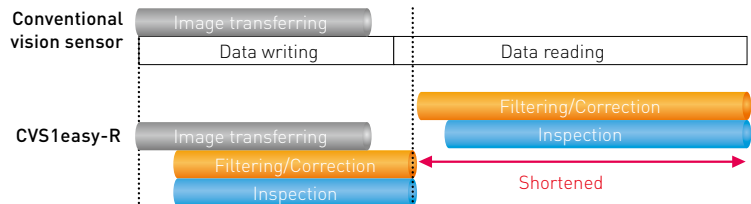
Stable inspection

It calculates color hue of each pixel that prevents miss-inspection affected by external light and brightness changes of lighting. Stable inspection is available and you can setup CVS1easy-R just like you do for photoelectric sensor.

When upper part is brighter than lower part

CVS1easy-R	Conventional vision sensor
Correct color to evenly	Inspection is done with hue and brightness

When a part is brighter than other part

CVS1easy-R	Conventional vision sensor
Correct color to evenly	It can't correct

When distance varies

CVS1easy-R	Conventional vision sensor
Correct color to evenly	The part must be set for correction

When the object is glossy

CVS1easy-R	Conventional vision sensor
Correction is done except saturated part	It can't correct

MVS Series

CVS Series

CVS Series
APPLICATION

CVS1easy-R

CVS1-R

CVS2-R

CVS3-R

CVS4-R

OPTIONS

Display

There are two mode: Normal / Setup

Normal mode

| 1 | Captured image |
Image captured by the camera

| 2 | Bank No. |
Current Bank No.

| 3 | Display mode |
F: Dark Compensated image
2: Shows black except chosen color area

| 4 | Registered color |
Min. and Max. color

| 5 | Range of color |
Shows range of color. You can adjust by Color Range buttons.
Default : 13

| 6 | Output |
🔴 : ON   × : OFF

| 7 | Color match area |
Shows area that color is in the threshold. Green: In threshold, Red: Out of threshold

| 8 | Threshold |
Shows threshold

Switches

| ▲ UP+1 |
Increase Color Range

| ▼ DOWN-1 |
Decrease Color Range

| ◯ SET / VIEW |

Teach-in by pressing 3 sec. or more. Chose and set the parameter in Setup mode

| ▲ UP+1 |
Increase Threshold

| ▼ DOWN-1 |
Decrease Threshold

* Change the mode to Setup by pressing both "DOWN-1" buttons 3 sec. or more.

Specifications

Model	CVS1easy-N10-R CVS1easy-P10-R	CVS1easy-N20-R CVS1easy-P20-R	CVS1easy-N21-R CVS1easy-P21-R	CVS1easy-N40-R CVS1easy-P40-R
Detection angle	10°	20°		40°
Working distance	210 to 270mm	90 to 150mm	31 to 39mm	50 to 100mm
Field of view	40 x 50mm to 55 x 65mm	40 x 50mm to 65 x 75mm	17 x 20mm (±10%)	50 x 65mm to 100 x 115mm
Light source	White LED 12 pcs built-in			
Image sensor	330,000 Pixel CMOS color image sensor			
Supply Voltage	12 to 24V DC±10%			
Power consumption	Max. 120mA/24V DC			
Resolution	5 x12 to 200 x 240			
LED light duration	Approx.50,000 hours (In normal temperature and humidity. Brightness level down by 1/2 of the initial level)			
Response time	11ms (Factory setting),5.0ms(min.),22ms(Max.)			
Output signal	NPN or PNP open collector output x 1 max.100mA Residual voltage 1.0V or less			
Input	3 x Bank selection,1 x Synchronous(Totally4)			
Operating temperature	0 to 40℃ (No condensation)			
Operating humidity	35 to 85%RH			
Storage temperature/humidity	-20 to 70℃,35 to 95%RH (No condensation)			
Vibration/shock resistance	10 to 55Hz Amplitude 1.5mm/50G (500m/s^2)			
Material	Case:ABS/Display and Lens:Acryl or Polycarbonate			
Protection structure	IP67			
Weight	Approx.180g (including cable)			

Parameters

Function / LCD Disp.	Setting range (Default)	Description
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 by setting "**YES**."
Off delay **OFF DLY**	0 to 5000 (0)	Sets the Off delay time of output. When set to one shot (**ONESHOT = ON**), the value means period of oneshot output. (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 is specified by the 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 area is equal to area threshold or more than that. **HIGH**: The output turns on when the area is less than area threshold.
Resolution **RESOLUT**	LOW,HIGH (LOW)	Specifies the resolution of the image to be captured. **LOW**: Reduces the horizontal resolution and response time to half. Effective for fast moving object that doesn't need higher resolution. **HIGH**: Doesn't reduce the resolution.
Synchronous input **SYNCHRO**	OFF,ON (OFF)	**OFF**: Capture continuously. **ON**: Capture at the rising point of synchronous input (purple).

LCD Disp displayed in yellow: the setting item is common to all banks.

LCD Disp displayed in purple: the setting item switches to the specific value of each bank.

⚠ When switching banks changing resolution and zoom rate, the image sensor may take approx. 2 seconds to be stable. Set same resolution and zoom rate when change banks continuously.

Connection diagram

(NPN)

- 12-24VDC (Brown)
- Bank select 0 (Orange/Black)
- Bank select 1 (Yellow/Black)
- Bank select 2 (Pink)
- Synch input (Purple)
- Output (Black)
- 0V (Blue)

(PNP)

- 0V (Blue)
- Bank select 0 (Orange/Black)
- Bank select 1 (Yellow/Black)
- Bank select 2 (Pink)
- Synch input (Purple)
- Output (Black)
- 12-24VDC (Brown)
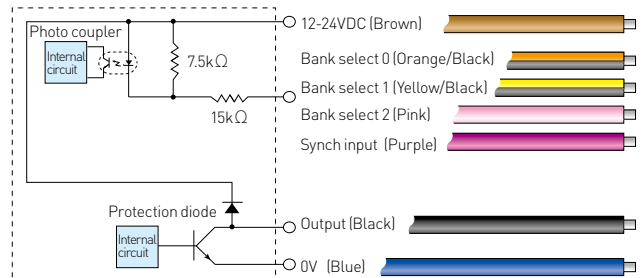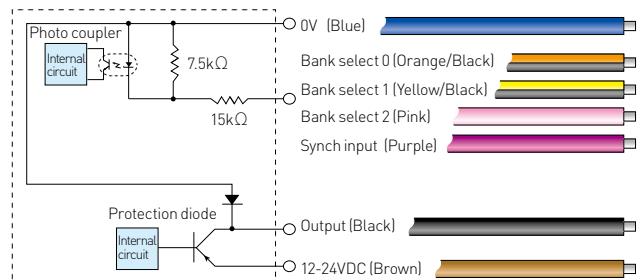
Bank table

Cable Color	Signal	Bank No. 0	1	2	3	4	5	6	7
Orange/Black	Bank selection 0 input	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Yellow/Black	Bank selection 1 input	OFF	OFF	ON	ON	OFF	OFF	ON	ON
Pink	Bank selection 2 input	OFF	OFF	OFF	OFF	ON	ON	ON	ON

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

Field of View

CVS1easy-N10-R Long range type
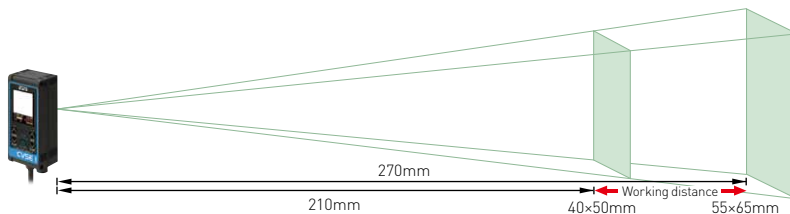
270mm
210mm
Working distance
40×50mm 55×65mm

CVS1easy-N40-R Macro view type

100mm
Working distance
50mm 50×65mm 100×115mm

CVS1easy-N20-R Standard type

150mm
Working distance
90mm 40×50mm 65×75mm

CVS1easy-N21-R Narrow view type

35mm
17×20mm

MVS Series

CVS Series

CVS Series
APPLICATION

CVS1easy-R

CVS1-R

CVS2-R

CVS3-R

CVS4-R

OPTIONS

CVS1-R SERIES
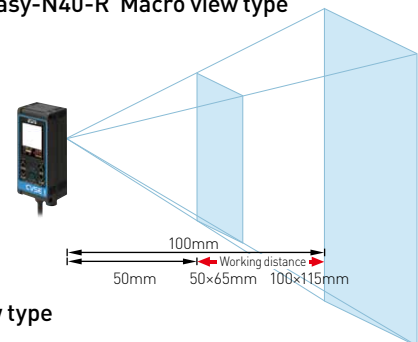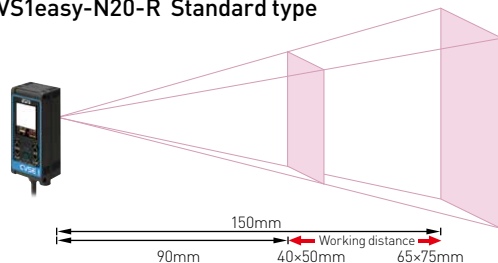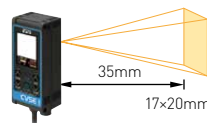
Easy setup
Color sensor

- All in one color vision sensor
- High speed : 0.6 - 22ms
- Stable color detection by calculating hue of each pixel

Wide range line-up

CVS1-N20-R Standard type
CVS1-N10-R Long range type
CVS1-N40-R Macro view type
CVS1-N21-R Narrow view type

One threshold mode

Determine OK when the area that the color matches exceeds the threshold.

OK NG
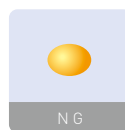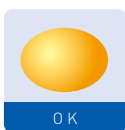
Two threshold mode

Determine OK when the area that the color matches is in two thresholds.

NG OK NG
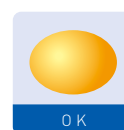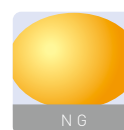
Easy Teaching

Teaching is easily done by moving the teaching cursor on the part that you want to teach the color and just set it.

Press "TEACH" button 3 sec.

Teaching

1 point
Teaching
done

Press "SET" button 3 sec.

TEACH1   4000
F [▢ ▢ ▢]   9000
CH 0   ↕SIZE

Shows changeable parameter here. This is vertical size of Teaching window.
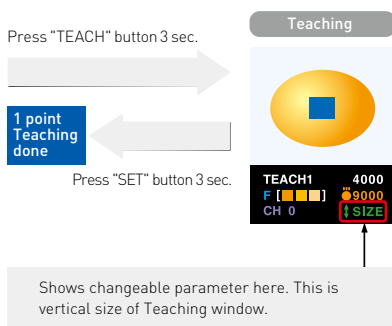
Setup per application

Set "INITIAL" proper number as following table shows. Parameters will be set automatically for the application.

Application	print	print on glossy surface	fine color difference	glossy surface	black and white		fine dark color difference	print on rough surface
	Shelf life 2005.8.25	2005.8.25						Shelf life 2005.8.25
INITIAL	1	2	3	4	5	6	7	8

High Speed : 0.6 - 22ms

Newly developed vision processor enables high speed inspection.

Up to 16 Bank

16 Banks are available in small all in one package.

Zoom function

You can zoom in a part of the object. You can inspect 16 parts of the object changing Bank efficiently.

Stable inspection

It calculates color hue of each pixel that prevent miss-inspection.

Wide coverage line-up

You can chose from 4 inspection range/field of view according to inspection target condition.

High performance

Setup Adjustable while line is running

CVS1-R provides output with the setup parameters given even while you are adjusting setup. You don't have to stop the line.

Lower Limit output

You can see which the NG output is lower than lower threshold or higher than upper threshold.
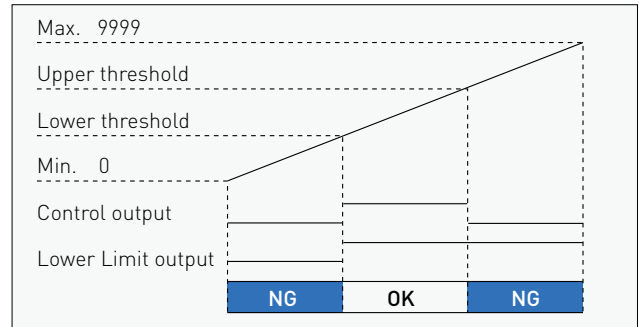
Max. 9999			
Upper threshold			
Lower threshold			
Min. 0			
Control output			
Lower Limit output			
	NG	OK	NG

Secret of High speed

Transferring captured data and vision processing are parallelly done utilizing internal memory. It helps to shorten response time.

Conventional vision sensor
- Image transferring
- Data writing
- Data reading

CVS1-R
- Image transferring
- Filtering/Correction
- Inspection
- Filtering/Correction
- Inspection
- Shortened
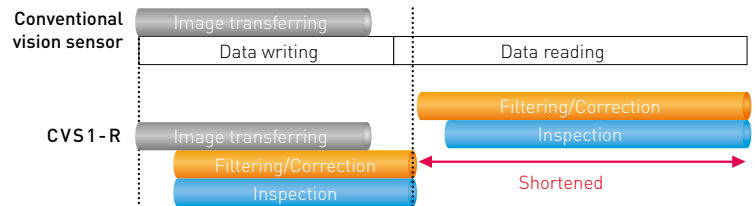
Stable inspection

It calculates color hue of each pixel that prevent miss-inspection affected by external light and brightness changes of lighting. Stable inspection is available and you can setup CVS1-R just like you do for photoelectric sensor.

When upper part is brighter than lower part

CVS1-R	Conventional vision sensor
Correct color to evenly	Inspection is done with hue and brightness

When a part is brighter than other part

CVS1-R	Conventional vision sensor
Correct color to evenly	It can't correct

When distance varies

CVS1-R	Conventional vision sensor
Correct color to evenly	The part must be set for correction

When the object is glossy

CVS1-R	Conventional vision sensor
Correction is done except saturated part	It can't correct

MVS Series

CVS Series

CVS Series APPLICATION

CVS1easy-R

CVS1-R

CVS2-R

CVS3-R

CVS4-R

OPTIONS

Display

There are two mode: Normal / Setup

Normal mode

2	RUN	4000	9
3	F [▮▮▮]	☀ 5500	8
4	CH 0	9999	

5　6　7

Setup mode

10	AREA LO	4000	11
	F [▮▮▮]	☀ 5500	
	CH 0	111	12

| 1 | Captured image |
Image captured by the camera

| 2 | Mode |
RUN : Normal mode
TEACH : Teaching mode
CAPTURE : Image storing mode
TCH LOW : 2nd point teaching
Other : Setup parameters

| 3 | Display mode |
F: Dark Compensated image
2: Shows only chosen color area
D: Shows original image

| 4 | Bank No. |
Current Bank No.

| 5 | Registered color |
Min. Center and Max. color

| 6 | Output |
● : ON　× : OFF

| 7 | Upper threshold (0 - 9999) |
Shows upper threshold

| 8 | Color match area |
Shows area that color matches

| 9 | Lower threshold (0 - 9999) |
Shows lower threshold

| 10 | Setup parameter |
Shows setup parameter

| 11 | Parameter value |
Shows setup parameter value

| 12 | Process time |
Shows process time

Switches

UP
Move cursor up and increase parameter value

DOWN
Move cursor down and decrease parameter value

SET
Change to setup mode. Chose the parameter by pressing 3 sec. or more.

VIEW
Change the display mode
F: Dark Compensated image
2: Shows only chosen color area
D: Shows original image

TEACH
Change to Teaching mode by pressing 3 sec. or more.

Specifications

Model	CVS1-N10-R CVS1-P10-R	CVS1-N20-R CVS1-P20-R	CVS1-N21-R CVS1-P21-R	CVS1-N40-R CVS1-P40-R
Detection angle	10°	20°		40°
Working distance	210 to 270mm	90 to 150mm	31 to 39mm	50 to 100mm
Field of view	40 x 50mm to 55 x 65mm	40 x 50mm to 65 x 75mm	17 x 20mm (±10%)	50 x 65mm to 100 x 115mm
Light source	White LED 12 pcs built-in			
Image sensor	330,000 Pixel CMOS color image sensor			
Supply Voltage	12 to 24V DC±10%			
Power consumption	Max. 120mA / 24V DC			
Resolution	8 x16 to 200 x 240			
LED light duration	Approx.50,000 hours (In normal temperature and humidity. Brightness level down by 1/2 of the initial level)			
Response time	0.6ms to 22ms			
Output signal	NPN or PNP open collector output x 2 (one of them is "Lower limit output"selectable with bank input #1) max.100mA Residual voltage 1.0V or less			
Input	4 x Bank selection / 1 x Synchronous / 1 x External teaching / 1 x Lower limit output (Totally 4)			
Operating temperature	0 to 40℃ (No condensation)			
Operating humidity	35 to 85%RH			
Storage temperature/humidity	-20 to 70℃,35 to 95%RH (No condensation)			
Vibration/shock resistance	10 to 55Hz Amplitude 1.5mm / 50G (500m/s^2)			
Material	Case:ABS / Display and Lens:Acryl or Polycarbonate			
Protection structure	IP67			
Weight	Approx.180g (including cable)			

Connection diagram (NPN)

	12-24VDC (Brown)
	Bank select 0 (Orange/Black)
	Bank select 2/Teach in (Pink)
	Bank select 3/Synch input (Purple)
	Bank select 1 (Yellow/Black)
	Output (Black)
	0V (Blue)

Bank table

Bank No.	Bank select input			
	3(Purple)	2(Pink)	1(Yellow/Black)	0(Orange/Black)
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON

Field of View

CVS1-N10-R Long range type
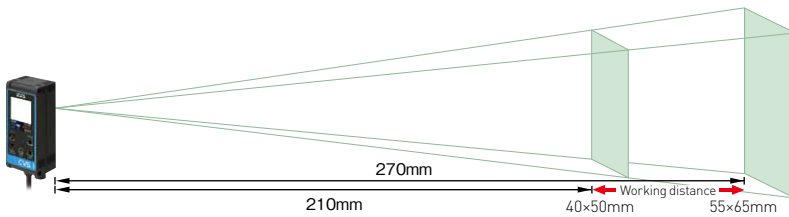
270mm
210mm
40×50mm   Working distance   55×65mm

CVS1-N40-R Macro view type

100mm
50mm   Working distance
50×65mm   100×115mm

CVS1-N20-R Standard type

150mm
90mm   40×50mm   Working distance   65×75mm

CVS1-N21-R Narrow view type

35mm
17×20mm
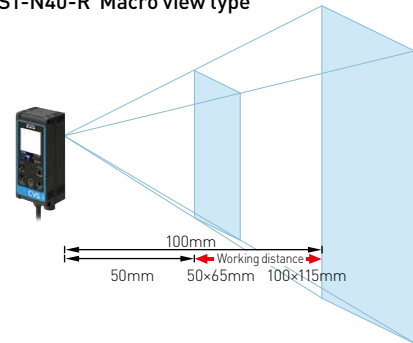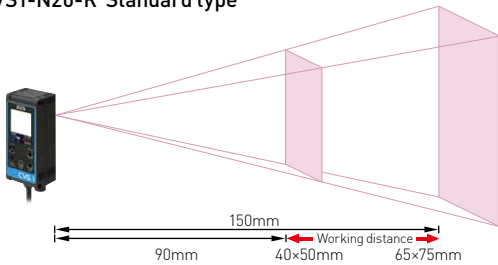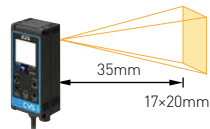
CVS2-R SERIES

Detect Color and Shape for various inspection

- All in one color vision sensor
- For Pattern matching and Color inspection
- Better sensitivity by Masking function

Wide range line-up

CVS2-N20-R Standard type
CVS2-N10-R Long range type
CVS2-N40-R Macro view type
CVS2-N21-R Narrow view type

Pattern matching mode and Color inspection mode are available

Inspection of shape and direction of the object is available by pattern matching mode. You can use CVS2-R as simple Color inspection sensor as well. Sorting by color is also available.
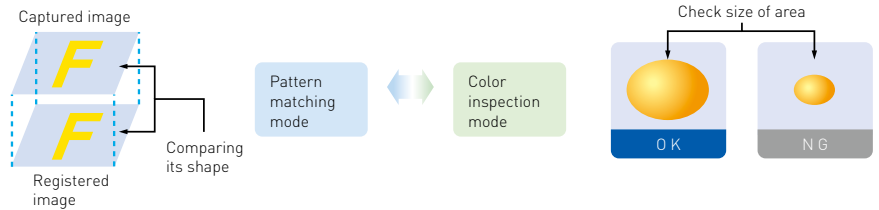
Captured image

Check size of area

Pattern matching mode

Color inspection mode

Comparing its shape

Registered image

O K   N G

Correct background brightness

CVS2-R has a function that corrects evenness of background brightness. You register just the background for reference.

Masking function

You can mask the area that doesn't have to be checked so that you can get better sensitivity of color inspection.
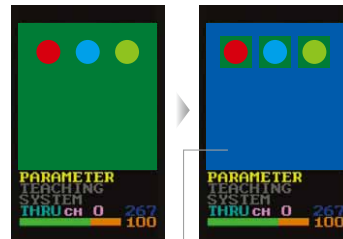
Masking area

Downloading setup parameters to PC

You can download setup data and image data into PC. You can use the image data on PC and can copy setup to other CVS2-R. Please use I/F cable CVS-C2C.
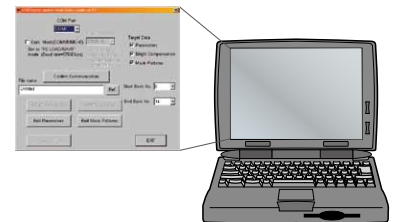
Zoom function

CVS2-R has Zoom function so you can zoom in up to twice size.
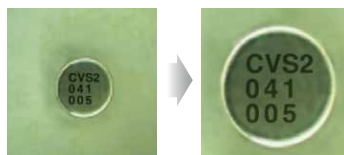
x 2

Up to 15 Bank

15 Banks are available in small all in one package.

Wide coverage line-up

You can chose from 4 inspection range/field of view according to inspection target condition.

Pattern Matching mode

CVS2-R detects up to 65,536 colors and checks its shape to compare with registered image.

Captured image

Comparing its shape

Registered image
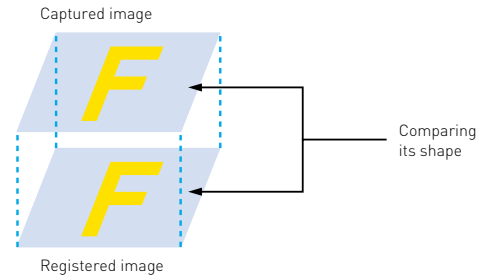
Color Inspection mode

Determine OK when the area that the color matches exceeds the threshold.

O K   N G

Determine OK when the area that the color matches is in two thresholds.

N G   O K   N G
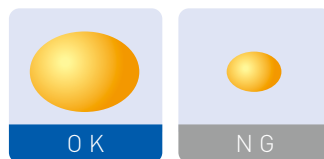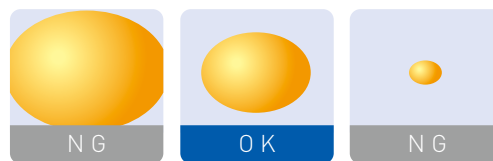
Two Color Inspection at a time

CVS2-R can inspect two colors for one application at a time.

Checking Two Color

You can set Upper and Lower threshold for two colors to inspect. You can chose a logic from 4 combination.

Two bar graphs for two colors

Two threshold for two colors each

Masking function

You can mask the area you don't want to detect the color freely in position.
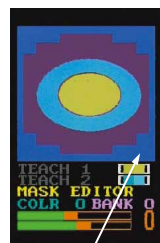
Blue part is masked area

Sorting function

Sorting is available by utilizing two outputs up to 3. You can also increase the sorting number up to 15 by utilizing RS-232C controlling or external unit TMC-N11-CVS.

When this parameter is 1, you can sort in two criteria.

Features

Secret of High speed

Transferring captured data and vision processing are parallelly done utilizing internal memory. It helps to shorten response time.

Conventional vision sensor

| Image transferring |
| Data writing | Data reading |
| Filtering/Positioning | Rotation |
| Inspection |

Response time

Shortened

CVS2-R

| Image transferring |
| Color Correction |
| Data writing |
| Filtering/Correction | Data reading |
| Searching |
| Inspection |

Response time
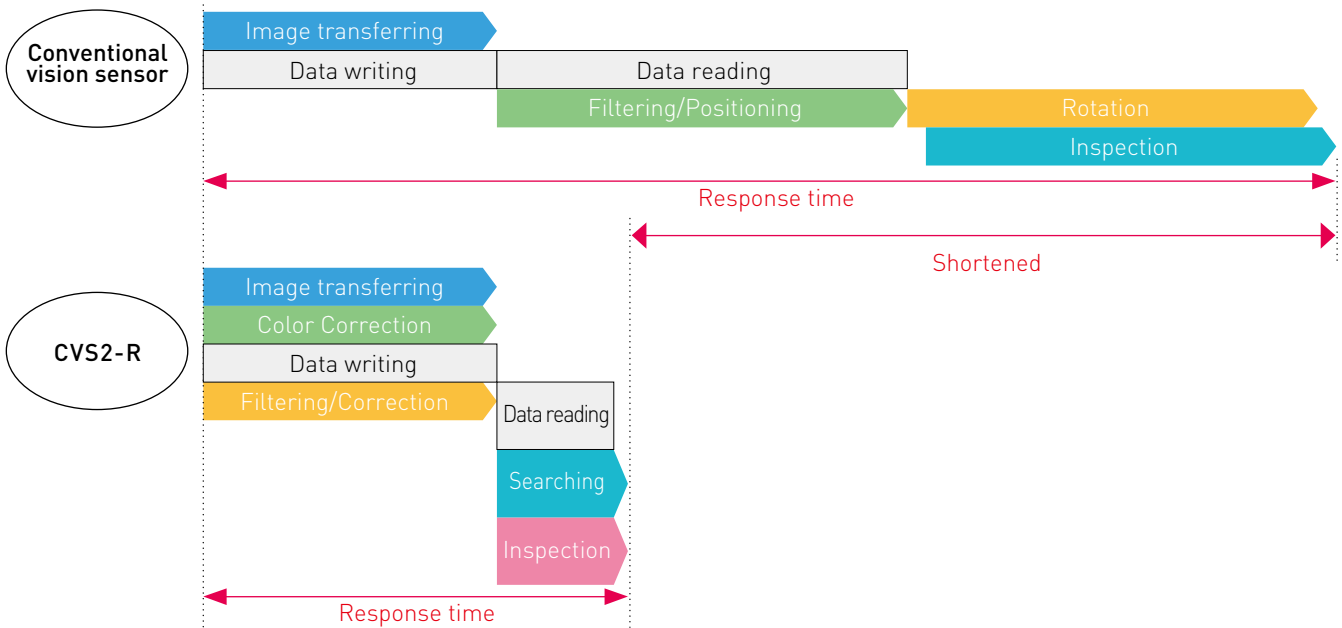
Setup Adjustable while line is running

CVS2-R provides output with the setup parameters given even while you are adjusting setup. You don't have to stop the line.

Read/Write

Vision processor ⇄ CPU for controlling
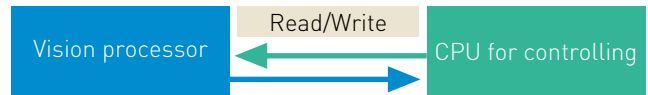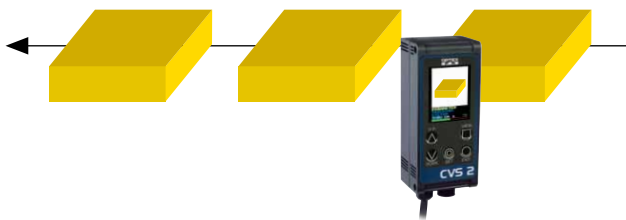
CVS2-R has two processing unit individually so it can change parameters while vision processing is running without delay.

Correct background brightness

CVS2-R has a function that corrects evenness of background brightness. You register just the background for reference.

Before correction → After correction

BRGHT CMPENST
SET 3S STORE
EXIT 3S ERASE
SHUTTER 126
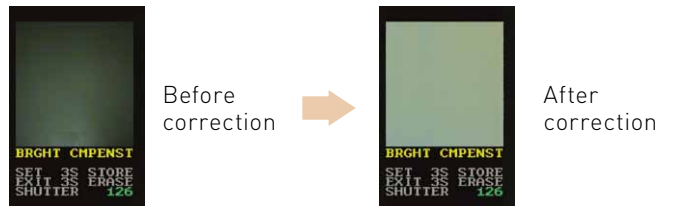
Masking

You can mask the area that doesn't have to be checked so that you can get better sensitivity of color inspection.

Setup

You can setup the area to mask as follows.

a — Move the cursor on the color you want to mask or not to mask. → Mask area turns to purple. Then, you can add the area or remove from the area to mask. You also magnify or shrink the area easily.

b — You can set the area of cursor as mask area.

a + b — You can set the area "a" and "b" combined easily.
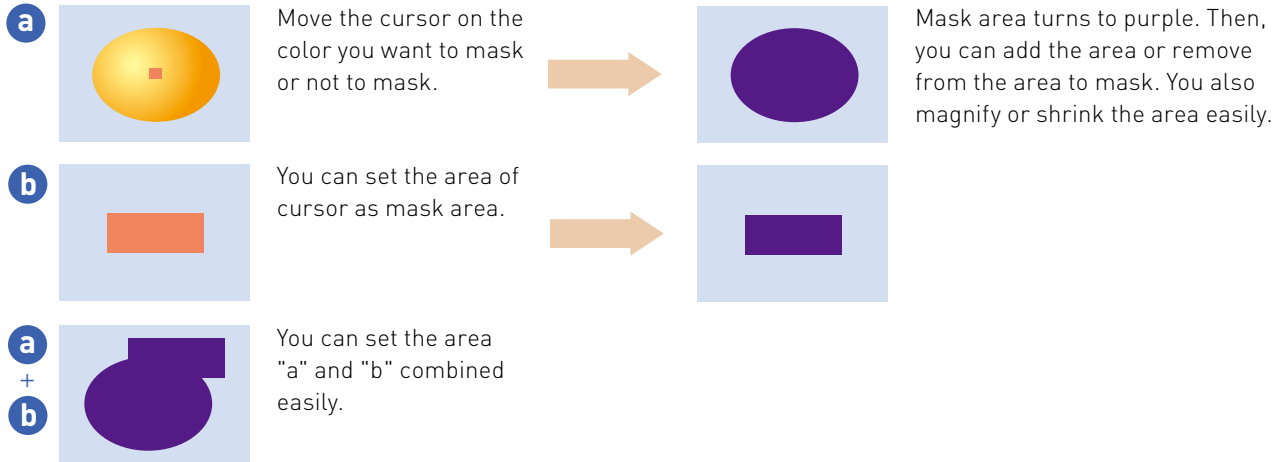
Color inspect area

You can limit the area to inspect color from. This prevents miss-detection of color at the edge of the FOV.

COLOR WINDOW
SET/EXIT FUNC
▲UP   MOVE↑↓
▼DOWN   WINDOW

Standard screen   Limit the area to detect

Area to detect the color

Area to be neglected

Example of masking

Example 1
OK   NG   Masked

Direction

TEACHING
THRU CH 0   266
          99
TEACHING
THRU CH 0   266
          0
ROTATION   IXXI
SAVE PATTERN
MASK EDITOR
PTRN CH 0   266
          94

Wrong direction

Example 2
OK   NG   Masked

Positioning

TEACHING
THRU CH 0   266
          95
TEACHING
THRU CH 0   266
          0
ROTATION   IXXI
SAVE PATTERN
MASK EDITOR
PTRN CH 0   266
          83

Displace-ment

Example 3
OK   NG   Masked

Lack

TEACHING
THRU CH 0   266
          83
TEACHING
THRU CH 0   266
          44
ROTATION   IXXI
SAVE PATTERN
MASK EDITOR
PTRN CH 0   266
          85

Lack

Example 4
OK   NG   Masked

Disposition

TEACHING
TRNS CH 0   266
          92
TEACHING
TRNS CH 0   266
          65
ROTATION   IXXI
SAVE PATTERN
MASK EDITOR
PTRN CH 0   266
          92

Leaning

You can get better result by masking the area that doesn't show characteristics of the target object.

Display

Pattern matching mode

| 1 | Captured image |

Image captured by the camera

| 2 | Parameters |

Shows parameters

| 3 | Display mode |

You can change display mode by VIEW button

| 4 | Bar graph |

Shows how big the area that the color matches. Threshold is at the border of green and orange.

| 5 | Bank No. |

Shows current Bank.

| 6 | Auxiliary output |

Status of auxiliary output.
● : means ON

| 7 | Response time |

Shows response time. Unit : 0.1ms.
Example : 266 = 26.6ms

| 8 | Color match area |

Shows area that color matches.
Orange : ON, Green : OFF

CVS1 compatible mode

When sorting is active

| 1 | Captured image |

Image captured by the camera

| 2 | Parameters |

Shows parameters

| 3 | Display mode |

Shows display mode

| 4 | Display mode |

Shows how big the area that the color matches.

| 5 | Registered color |

Min. Center and Max. color

| 6 | Bank No. |

Shows current Bank.

| 7 | Output/Sorting status |

Orange: ON, Green: OFF
Shows sorting No. when it's active.

| 8 | Monitoring Bank No. |

Shows Bank No. for sorting.

Switches

▲ UP

Move cursor up and increase parameter value

▼ DOWN

Move cursor down and decrease parameter value

○ VIEW

Change the display mode
F: Dark Compensated image
2: Shows only chosen color area
D: Shows original image

○ EXIT

Use this button when you quit changing parameter and going back to previous menu.

○ SET

Change to setup mode.
Chose the parameter by pressing 3 sec. or more.

Specifications

Model	CVS2-N10-R CVS2-P10-R	CVS2-N20-R CVS2-P20-R	CVS2-N21-R CVS2-P21-R	CVS2-N40-R CVS2-P40-R
Detection angle	10°	20°		40°
Working distance	210 to 270mm	90 to 150mm	31 to 39mm	50 to 100mm
Field of view	40 x 50mm to 55 x 65mm	40 x 50mm to 65 x 75mm	17 x 20mm (±10%)	50 x 65mm to 100 x 115mm
Light source	White LED 12 pcs built-in			
Image sensor	330,000 Pixel CMOS color image sensor			
Supply Voltage	12 to 24V DC±10%			
Power consumption	Max. 140mA/24V DC			
Resolution	8 x16 to 200 x 240			
LED light duration	Approx.50,000 hours(In normal temperature and humidity. Brightness level down by 1/3 of the initial level)			
Response time	4ms to 22ms			
Output signal	NPN or PNP open collector output x 2 max. 100mA Residual voltage 1.0V or less			
Input	4 x Bank selection / 1 x Synchronous / 1 x External teaching (Totally 4)			
Operating temperature	0 to 40℃ (No condensation)			
Operating humidity	35 to 85%RH			
Storage temperature/humidity	-20 to 70℃, 35 to 95%RH(No condensation)			
Vibration/shock resistance	10 to 55Hz Amplitude 1.5mm / 50G(500m/s^2)			
Material	Case:ABS / Display and Lens : Acryl or Polycarbonate			
Protection structure	IP67			
Weight	Approx.180g (including cable)			

Connection diagram

	12-24VDC (Brown)
	Bank select 0 (Orange/Black)
	Bank select 1 (Yellow/Black)
	Bank select 2 (Pink)
	Bank select 3 (Purple)
	Output (Black)
	Auxiliary output (Red/Black)
	0V (Blue)

Auxiliary output

AUX OUT=0: Ready - Turns OFF after switching Bank.
Turns ON when Output is ready

AUX OUT=1: Judge timing - Turns ON when Judge timing

AUX OUT=2: Light timing - Turns ON when Lighting

AUX OUT=3: Searching result - Turns ON when each search result is in its criteria, MAGNIFY%, POSIT% X, POSIT% Y, ROTATE%.

Bank table

Set up	BANK	0~14		15		16	
	SYNCHRON	4	0~3	4	0~3	4	0~3
External Input	Bank select 0	NA		Active			
	Bank select 1	NA		Active			
	Bank select 2	External Teach-in				Active	
	Bank select 3	NA	Synch.In	Active	Synch.In	Active	Synch.In

Sorting output

You can get sorting output from following table that shows which bank matches by combination of Output (Black) and Auxiliary output (Red/Black) signals.

Bank No.	Output(Black)	Auxiliary output(Red/Black)
Current Bank	ON	OFF
+1	OFF	ON
+2	ON	ON

Bank No.	Bank select input			
	3(Purple)	2(Pink)	1(Yellow/Black)	0(Orange/Black)
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	ON	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
0	ON	ON	ON	ON

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

Field of View

CVS2-N10-R Long range type
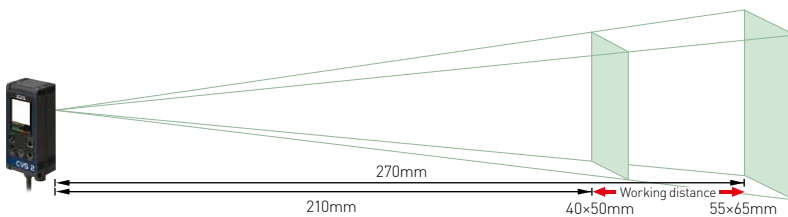
270mm
210mm
40×50mm
Working distance
55×65mm

CVS2-N40-R Macro view type

100mm
50mm
Working distance
50×65mm
100×115mm

CVS2-N20-R Standard type

150mm
90mm
40×50mm
Working distance
65×75mm

CVS2-N21-R Narrow view type

35mm
17×20mm

MVS Series

CVS Series

CVS Series
APPLICATION

CVS1easy-R

CVS1-R

CVS2-R

CVS3-R

CVS4-R

OPTIONS

CVS3-R SERIES
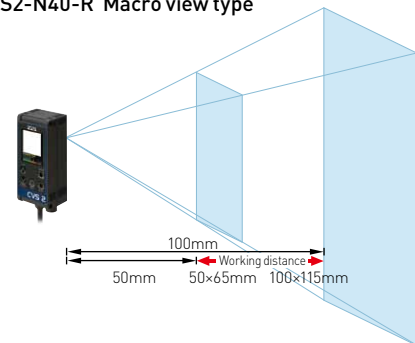
Edge sensor for various application

- All in one color vision sensor
- Easy setup and High performance
- Useful Zoom-in function

Wide range line-up

CVS3-N20-R Standard type
CVS3-N10-R Long range type
CVS3-N21-R Narrow view type

New inspection mode: Contour mode, Differential mode

New inspection mode, Contour mode and Differential mode have been added up on conventional CVS3-R compatible mode. It has improved search function and improved color/contrast correct function.
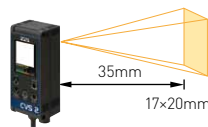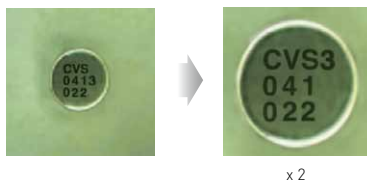
	Compatible mode	Contour mode	Differential mode
Mode			
Application	Metal parts	Metal parts Contour mode+Monochrome mode For flaw with slight color difference Contour mode+Color inspection For slight color difference and shape Contour mode+inspection of entire area	Cheking picture Differential mode For low contrast object Differential mode+Color inspection

Masking function

You can mask the area that doesn't have to be checked so that you can get better sensitivity of inspection.

Mask the area doesn't need inspection.

Zoom function

CVS3-R has Zoom function so you can zoom in up to twice size.

x 2

Downloading setup parameters to PC

You can download setup data and reference image data into PC.
You can copy the reference image data and the setup data to other CVS3-R.
Please use I/F cable CVS-C2C.

Up to 15 Bank

15 Banks are available in small all in one package.

Other FOV type is available

In case you need other FOV type like CVS1-R or CVS2-R, please contact our distributor.

Features

7 binarize level

When it compares binarized image between registered image and captured image, it chooses best binarize level to get best image automatically. This is effective when the lighting is not stable.

Existence of graved mark on metal or glass

7 levels for binarizing
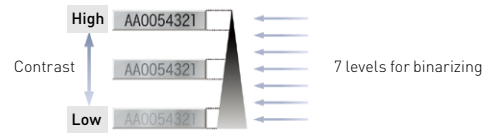
Scaling up/down

Correcting size function correct captured image size. This function is effective for inspection of the object on conveyor.

Detecting direction of object

Size of image captured is changed in case the conveyor waves or its speed changes. In this case, this function automatically changes image size when it searches target image.

Registered image   Size is changed   Corrected image

Rotate correction

Correction of rotation is available up to +/- 6.2degree.

Inspection of chocolate shape

Find out best angle rotating the captured image step by step

Registered image   Captured image   Corrected image

Detecting Color edge

Detect edge between different colors and get clear image to inspect.

Inspection of colored label direction

You can detect even red color on green background easily that monochrome camera can't.

By monochrome camera   By CVS3-R with color camera

Easy Teaching

You can externally teach CVS3-R just by inputting single Teaching signal. Then, CVS3-R updates its image for reference automatically.

**Verifying shelf life that changes everyday**

Display

Compatible mode

1	Captured image

Image captured by the camera

2	Parameters

Shows parameters

3	Lack/Stain pixels

Shows lack of edge and stain on the background

4	Stableness of threshold level

↑ : Increase THRESHLD
↓ : Decrease THRESHLD

5	Display mode

Shows current display mode

6	Judge result

Shows judge result

7	Bank No./Response time

Shows Bank No. in normal mode. Shows response time while setup mode
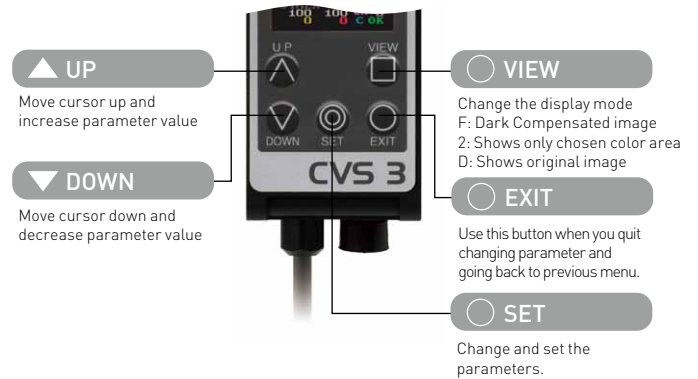
Contour mode
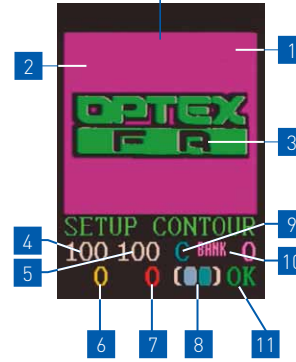
1	Area to detect stain

It shows pixel in red when it matches to the contour and Stain pixel No. will be increased

2	Area to detect lack of contour

It shows pixel in yellow when it's detected as lack of contour and Lack pixel No. will be increased

3	Area to neglect

It doesn't affect anything even if there is contour in this area

4	Threshold of lack of contour
5	Threshold of stain
6	Lack pixel No.
7	Stain pixel No.
8	Registered color (bright / dark)
9	Display mode
10	Bank No.
11	Judge result

Differential mode
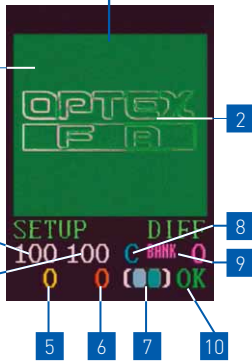
1	Area without contour

It shows pixel in yellow or red when it detect contour and differential rate will be increased

2	Area with contour should exist

It shows pixel in yellow or red when it doesn't detect contour and differential rate will be increased

3	Threshold of differential rate
4	Threshold of color area rate
5	Differential rate
6	Color area rate
7	Registered color (bright / dark)
8	Display mode
9	Bank No.
10	Judge result

Switches

▲ UP

Move cursor up and increase parameter value

▼ DOWN

Move cursor down and decrease parameter value

○ VIEW

Change the display mode
F: Dark Compensated image
2: Shows only chosen color area
D: Shows original image

○ EXIT

Use this button when you quit changing parameter and going back to previous menu.

○ SET

Change and set the parameters.

Specifications

Model	CVS3-N10-R CVS3-P10-R	CVS3-N20-R CVS3-P20-R	CVS3-N21-R CVS3-P21-R
Detection angle	10°	20°	
Working distance	210 to 270mm	90 to 150mm	31 to 39mm
Field of view	40 x 50mm to 55 x 65mm	40 x 50mm to 65 x 75mm	17 x 20mm (±10%)
Light source	White LED 12 pcs built-in		
Image sensor	330,000 Pixel CMOS color image sensor		
Supply Voltage	12 to 24V DC±10%		
Power consumption	Max. 140mA/24V DC		
Resolution	16 x16 to 208 x 236		
LED light duration	Approx.50,000 hours(In normal temperature and humidity. Brightness level down by 1/3 of the initial level)		
Response time	48ms (Factory setting).2.5ms (Min). 518ms (Max)		
Output signal	NPN or PNP open collector output x 2 max. 100mA Residual voltage 1.0V or less		
Input	4 x Bank selection / 1 x Synchronous / 1 x External teaching (Totally 4)		
Operating temperature	0 to 40℃ (No condensation)		
Operating humidity	35 to 85%RH		
Storage temperature/humidity	-20 to 70℃, 35 to 95%RH (No condensation)		
Vibration/shock resistance	10 to 55Hz Amplitude 1.5mm / 50G (500m/s^2)		
Material	Case:ABS / Display and Lens : Acryl or Polycarbonate		
Protection structure	IP67		
Weight	Approx.180g (including cable)		

Connection diagram

- 12-24VDC (Brown)
- Bank select 0 (Orange/Black)
- Bank select 1 (Yellow/Black)
- Bank select 2 (Pink)
- Bank select 3 (Purple)
- OK Output (Black)
- NG Output/Light control out (Red/Black)
- 0V (Blue)

Photo coupler · Internal circuit · 7.5kΩ · 15kΩ · Protection diode · Internal circuit

Bank table

Set up	BANK	0~14		15		16	
	SYNCHRON	4	0~3	4	0~3	4	0~3
External Input	Bank select 0	NA		Active			
	Bank select 1	NA		Active			
	Bank select 2	External Teach-in		Active			
	Bank select 3	NA	Synch.In	Active	Synch.In	Active	Synch.In

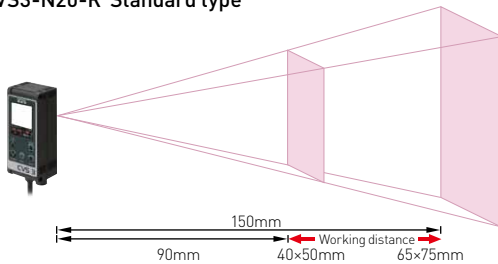| Bank No.	Bank select input			
	3(Purple)	2(Pink)	1(Yellow/Black)	0(Orange/Black)
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	ON	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
0	ON	ON	ON	ON

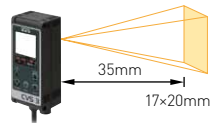| OFF	NPN: OPEN or connect with the brown line. PNP: OPEN or connect with the blue line.
ON	NPN: connect with the blue line. PNP: connect with the brown line.

Field of View

CVS3-N10-R Long range type

270mm · 210mm · Working distance · 40×50mm · 55×65mm

CVS3-N20-R Standard type

150mm · 90mm · Working distance · 40×50mm · 65×75mm

CVS3-N21-R Narrow view type

35mm · 17×20mm

MVS Series

CVS Series

CVS Series APPLICATION

CVS1easy-R

CVS1-R

CVS2-R

CVS3-R

CVS4-R

OPTIONS

CVS4-R SERIES
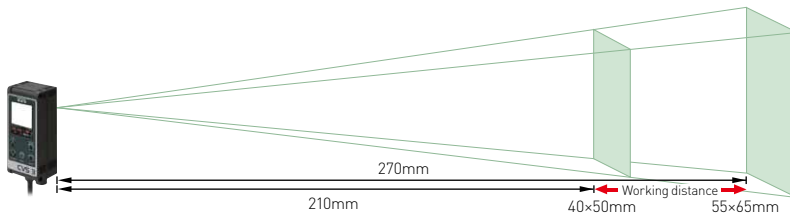
Compact OCR sensor

- All in one OCR sensor
- Easy setup and High performance
- Built-in Calendar

Wide range line-up

CVS4-N23-R Standard type
CVS4-N21-R Small character type
CVS4-N20-R Long range type
CVS4-N40-R Macro view type
CVS4-N23R-R Standard vertical type

Easy setup

You can setup easily just following the instruction on the screen.

User dictionary

You can make characters utilizing the images captured and transferred to PC.

Up to 16 Bank

16 Banks are available in small all in one package.

Built-in Calendar

It can check the date continuously overnight referring built-in calendar without error because of its tolerance of time.

All in one OCR sensor

Recognizes Alphabetic, Numeric and Special characters. It can check shelf life, date of manufacture and lot number. It recognizes characters of Thermal printer, Hot printer, Ink-jet printer and laser marker.

Thermal printer Hot printer Ink-jet printer Laser marker

It compares the characters with internal Dictionary. You can setup as it determines NG when single character is wrong. You can also setup as it determines OK when the character has only small lack.

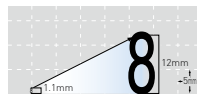Correct   Small lack   Big lack
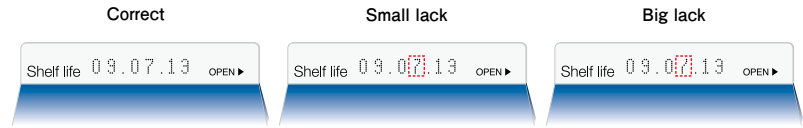
Storing NG image

When judge result changed from OK to NG, it stores NG image into internal memory up to 30 images. You can download the image data from CVS4-R through optional cable CVS-C2C.
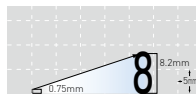
Wide range of line-up
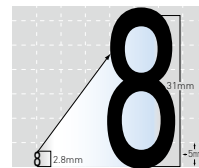
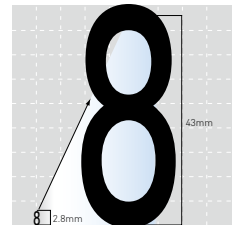You can chose a range from 4 ranges of line-up.

CVS4-N23W-R/-N23RW-R   CVS4-N21W-R   CVS4-N20W-R   CVS4-N40W-R

Character direction

CVS4-N23W-R/-N21W-R/-N20W-R/-N40W-R
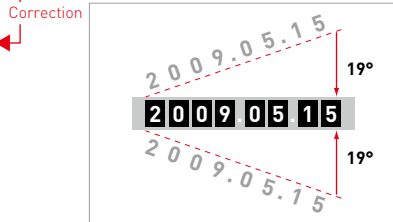
A 05 10 17
B 05 10 22

CVS4-N23RW-R

A 05 10 17
B 05 10 22
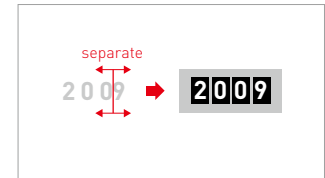
Features

Rotation search

It can search the characters rotating up to +/-19 degree.

Recognize connected characters

Connected characters can be separated by adjusting the character width.
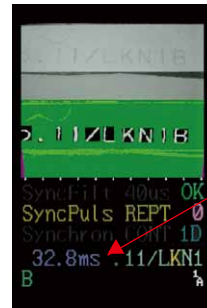

Double shutter

It captures twice by single trigger. If first image or 2nd image is OK, judge result is OK. This function is effective when the trigger timing is not stable and object position is not stable.

Continuous capture

It will automatically capture and check the image continuously from single trigger until it gets OK image. If it gets Time-out before getting OK, it outputs NG.

Expandable FOV

You can expand vertical FOV when the character lines can't be in standard FOV

FOV can be vertically doubled by this function and it can detect the character lines in a FOV.

Mirror capture

It can capture mirror reversed image

Fast capture mode

It has Fast capture mode reducing vertical resolution down to half. This is effective for the objects that move fast.

Delayed Output function

It has timer to delay activating output for the period. This function can be utilized for controlling sorting stage located after the inspection stage.

Check character number

It can just check number of characters to see existence of the printing for example.

Delayed NG mode

It can turn output to NG only when it detect NG certain times continuously. This is effective for detecting ink runs out and some special error that happens rarely.

Wild card for verifying characters

You can use "?" as a wild card to determine a character as OK whatever the character is. This function is effective when the character can be any characters.

Display

Normal mode

1 Captured image
You can change by VIEW button. When it's detached mode, background is Green for OK and Red for NG.

2 Scale
Scale for adjust character size in FOV

3 Display mode
Shows display mode in yellow

4 Judge result
OK : Data/Time is in threshold and string matches
NG : Any lines doesn't match
ER : Backup error of calendar timer

5 Current Bank No.

6 Inspection item on screen
1D : The 1st date 2D : The 2nd date
1T : The 1st time 2T : The 2nd time
CH : Number of characters and character string

7 Response time from Synch. input to Judge output

8 Recognized Date/Time

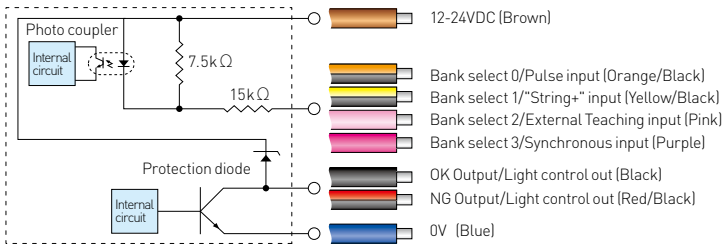**9** Upper limit of Date/Time

10 Lower limit of Date/Time

Switches

▲ UP
Move cursor up and increase parameter value

▼ DOWN
Move cursor down and decrease parameter value

○ SET
Change the mode. Chose and set the parameters.

○ VIEW
Change the display mode. Press with "UP" and "DOWN" when you change the item to monitor.

○ EXIT
Change the mode from/to Normal mode to/from Teaching mode.

▼ DOWN + **○ SET**
Press both buttons → 3sec.
Set Lock mode, inhibit Teaching and changing parameters of setup.

▲ UP + **○ SET**
Releases Lock mode.

Specifications

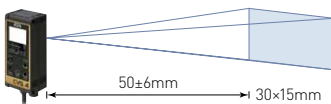| Model	CVS4-N20W-R CVS4-P20W-R	CVS4-N21W-R CVS4-P21W-R	CVS4-N40W-R CVS4-P40W-R	CVS4-N23W-R CVS4-P23W-R	CVS4-N23RW-R CVS4-P23RW-R
Detection angle	20°		40°	20°	
Working distance	90 to 150mm	31 to 39mm	50 to 100mm	44 to 56mm	44 to 56mm
Field of view	53x25mm to 79x38mm	21x10mm (±10%)	53x25mm to115x53mm	30x15mm (±10%)	30x15mm (±10%)
Light source	White LED 12 pcs built-in				
Image sensor	330,000 Pixel CMOS monochrome image sensor				
Supply Voltage	12 to 24V DC±10%				
Power consumption	Max. 140mA / 24V DC				
Resolution	512 x 244				244 x 512
LED light duration	Approx.100,000 hours(In normal temperature and humidity. Brightness level down by 1/2 of the initial level)				
Response time	23ms to 48ms (20 characters in 2 lines,Rotation search up to ±10°)				
Output signal	NPN or PNP open collector output x 2 (OK/NGoutput,External light control output) max. 100mA Residual voltage 1.0V or less				
Input	4 x Bank selection / 1 x Synchronous / 1 x External teaching (Totally 4)				
Operating temperature	0 to 40℃ (No condensation)				
Operating humidity	35 to 85%RH				
Storage temperature/humidity	-20 to 70℃, 35 to 95%RH(No condensation)				
Vibration/shock resistance	10 to 55Hz Amplitude 1.5mm / 50G(500m/s^2)				
Material	Case:ABS / Display and Lens : Acryl or Polycarbonate				
Protection structure	IP67				
Weight	Approx.200g (including cable)				
Recognizable character number	60 characters / 6 lines				
Character number per line	30 characters				
Number of date/time/string	Up to 2 x Date / 2 x Time / 4 x Strings with 22 characters (up to 4 items)				
User Dictionary	56 characters				
Built-in Timer accuracy	-45 sec. to 75 sec. per month				
Back up period of built-in timer	5 years by built-in non-rechargeable battery / Life of super capacitor : 7.8 years (when its capacity gets down to the level that keep timer 3 days)				

Connection diagram

Photo coupler	12-24VDC (Brown)
Internal circuit	
7.5kΩ	Bank select 0/Pulse input (Orange/Black)
15kΩ	Bank select 1/"String+" input (Yellow/Black)
	Bank select 2/External Teaching input (Pink)
Protection diode	Bank select 3/Synchronous input (Purple)
Internal circuit	OK Output/Light control out (Black)
	NG Output/Light control out (Red/Black)
	0V (Blue)

Bank table

Bank No.	Bank select input			
	3(Purple)	2(Pink)	1(Yellow/Black)	0(Orange/Black)
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	ON	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

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

	Parameter			Function of Bank selection input				Selectable range
Bank	Synchron	String+	SyncPlus	Orange/Black	Yellow/Black	Pink	Purple	
BKIN	CONT	OFF	Others	Bank selection0	Bank slctn 1	Bank slctn 2	Bank slctn 3	0~15
			ON		String+			0,1,4,5,8, 9,12,13
		ON,SCLR	Others		Bank slctn 1		Synchronous input	0~7
			ON		String+			0,2,4,6
	UP,HIGH DOWN, LOW	OFF	Others		Bank slctn 1			0,1,4,5
			ON	Pulse que				0,4
		ON,SCLR	Others	Bank slctn0	String+			
			ON	Pulse que				
TCH	CONT	OFF	Others	Bank selection0	Bank slctn 1	External Teaching	Bank slctn 3	0~3, 8~11
			ON		String+			
		ON,SCLR	Others					0,1,8,9
			ON					
	UP,HIGH DOWN, LOW	OFF	Others		Bank slctn 1		Synchronous input	0~3
			ON	Pulse que				0,2
		ON,SCLR	Others	Bank slctn0	String+			0,1
			ON	Pulse que				0
0~15, COMM	CONT	OFF	Others	NA	NA		NA	0~15 (Bank is set by parameter and through RS232I/F)
			ON					
		ON,SCLR	Others		String+			
			ON					
	UP,HIGH DOWN, LOW	OFF	Others		NA		Synchronous input	
			ON	Pulse que				
		ON,SCLR	Others	NA	String+			
			ON	Pulse que				

Field of View

CVS4-N23W-R

50±6mm → 30×15mm

CVS4-N21W-R

35±4mm → 21×10mm

CVS4N23RW-R

50±6mm → 15×30mm

CVS4-N20W-R

150mm
90mm
Working distance
53×25mm   79×38mm

CVS4-N40W-R

100mm
40mm
Working distance
53×25mm   115×53mm
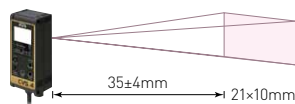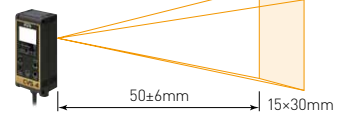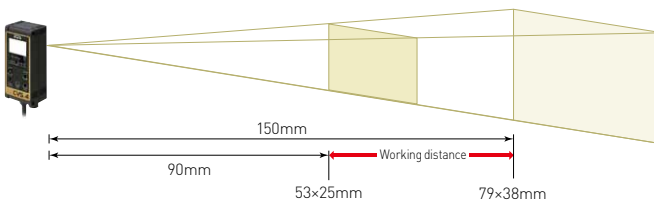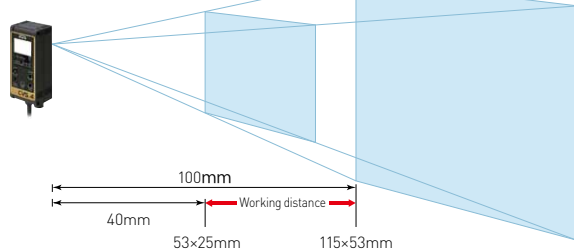
RS232 Communication

Available functions

1.Setup	2.User DIC	3.Downloading NG image	4.Remote control	5.Timer setup	6.Code recognition
You can download/modify/upload setup from/to CVS4-R.	You can make unique character referring the image from CVS4-R.	You can refer NG image and check what happened.	You can control CVS4-R through RS232 I/F.	You can set the timer of CVS4-R copying from PC.	You can modify code table that shows simple codes mean Date/Time.
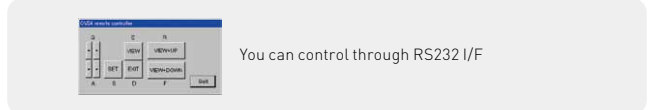
Main menu

Required PC spec.
- Microsoft Windows XP, 2000
- RS232 I/F
- Cable CVS-C2C

Downloadable from http://www.optex-fa.com

I/F cable CVS-C2C

1. Setup Modification

Parameter with "*" means that each Bank has individual setup.

Set destination Bank No. and click Execute to copy.

Bank No. to modify

2. User Dictionary

"?"means that couldn`t recognize the character. Please input the character you want to register.

Delete redundant one when it's same as another.

You can view the list

One character consists of 7 * 7 dots that you can modify.

3. Downloading NG image

Display when the moment of NG

Recognized characters

4. Remote control

You can control through RS232 I/F

5. Timer setup

You can copy the timer setup of PC to CVS4-R

6. Code recognition

CVS4-R can recognize Code of Month/Date/Hour/Minute. Example: "CAO H" -→ "March 15th, 7 O'clock"
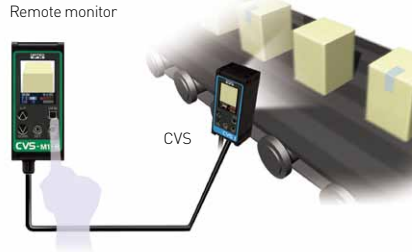
Accessories for CVS series

Remote monitor (with 3m cable)

CVS-M1-R
You can use for
CVS1-R, 2-R, 3-R, 4-R

CVSE-M1-R
Only for CVS1easy-R

Remote monitor

CVS

You can control from Remote monitor that has LCD and buttons to control remotely. The buttons work same as CVS series itself.

I/O Expansion unit

TMC-N11-CVS
With CVS2-R (only for color area mode) :
You can get sorting output up to 15 utilizing 4 output from CVS2-R
With CVS3-R and CVS4-R : You can use all Banks even using synchronous input and external teaching input
*You can't use for CVS1-R and CVS1easy-R

PC I/F cable (2m)

CVS1-R, 2-R, 3-R, 4-R

D-sub 9pin
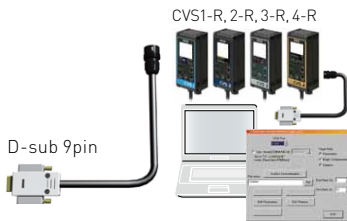
CVS-C2C
For CVS1-R, 2-R, 3-R, 4-R

You can download the I/F software from our homepage. You can setup CVS1-R, CVS2-R, CVS3-R and CVS4-R through each software and can get registered image. You can also modify mask area easily on the PC display.

> **Required PC spec.**
> **- Microsoft Windows XP, 2000**
> **- RS232 I/F**
> **Software is downloadable from**
> **http://www.optex-fa.com**

Video cable (3m)

RCA Plug
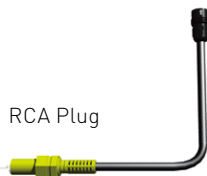
CVS-CN
For CVS series
You can see the display image connecting standard TV monitor (NTSC).

PC I/F cable + I/F cable for Video Out (2m)
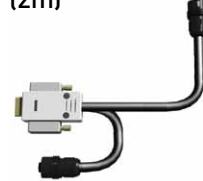
CVS-C2Y
For CVS1-R,2-R,3-R,4-R
You can connect PC and CVS-M1-R. You can see the screen image on the CVS-M1-R.
* You can't control through CVS-M1-R.

Extension cable for Remote monitor (3m)

CVS-C3S
For CVS-M1-R, CVSE-M1-R
You can connect Remote monitor through this cable up to 15m (4 CVS-C3S = 12m + 3m cable of Remote monitor)

PC I/F cable + Video cable (2m)

CVS-C2P(2m)
For CVS1-R,2-R,3-R,4-R
You can connect PC and get video signal at a time.

When you use TV monitor, please use it vertically

External light in CVS series shape

CVS-LW1(white color LED)
You can connect to CVS series up to 3 serially.

CVS-LU1(UV LED)
This lighting is effective for object with fluorescent printing to detect.

External LED lighting

When you need brighter lighting and/or lighting from other direction to get better image, you can utilize external LED lighting. Please refer Page 54 for other lighting and power supply.

Bar Light

OPB-5015W-B
50x15mm

OPB-10015W-B
100x15mm

OPDB-50x15WS

Power supply
For external LED lighting.

OPP-10-H(10W)
OPP-30-H(30W)
OPPD-15

OPP-10-H(10W)

Bracket for Lighting

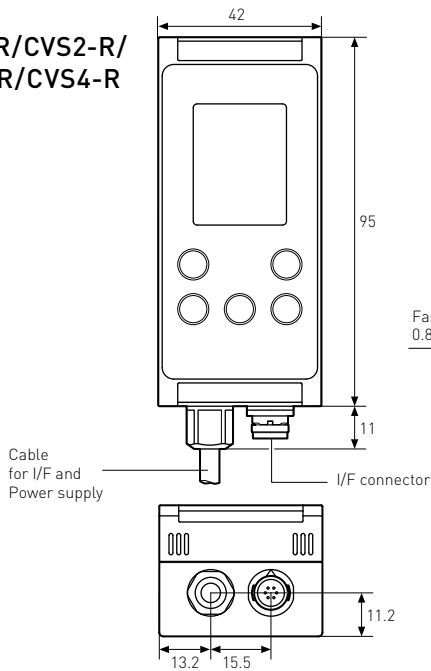**CVS-OPDB-2000**
CVS-OPDB-3040
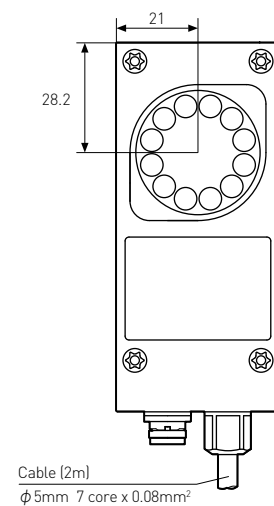**CVS-OPDB-6080**

2 OPDB-50x15WS and CVS-OPDB-2000

CVS-OP1000L
This is for mounting CVS series and external LED lighting.
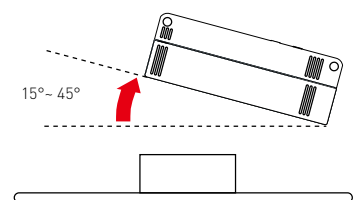
Dimensions

CVS1-R/CVS2-R/ CVS3-R/CVS4-R

42

95

11

4.2 · 33.8

4

87

Fastening torque: 0.8N*m Max.

Cable for I/F and Power supply

I/F connector

11.2

13.2 · 15.5

21

28.2

Cable (2m)
ϕ5mm 8 core x 0.08mm^2
(CVS1: 7 core)

CVS1easy-R

42

95

11

4.2 · 33.8

4

87

Fastening torque: 0.8N*m Max.

Cable for I/F and Power supply

I/F connector

11.2

13.2 · 15.5

21

28.2

Cable (2m)
ϕ5mm 7 core x 0.08mm^2
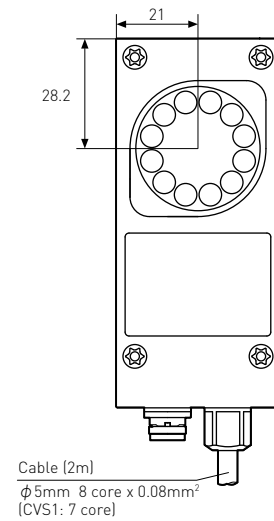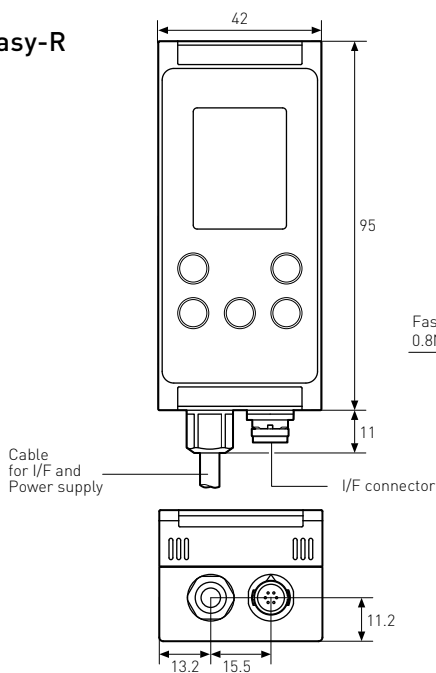
(unit: mm)

Tips for mounting CVS series

- Please determine Working distance and Field of View so that you chose correct model number of CVS series.
- Please use M4 * 50mm screws to mount CVS series
- Please take care about distance between CVS and target object to get stable size of Field of View.
- Please mount CVS at 15 to 45 degree to prevent specular reflection from the object especially from glossy object.
- When the object moves fast, you have to set shutter speed shorter. Then, you will need brighter lighting to get better image. Please try external lighting in this case.
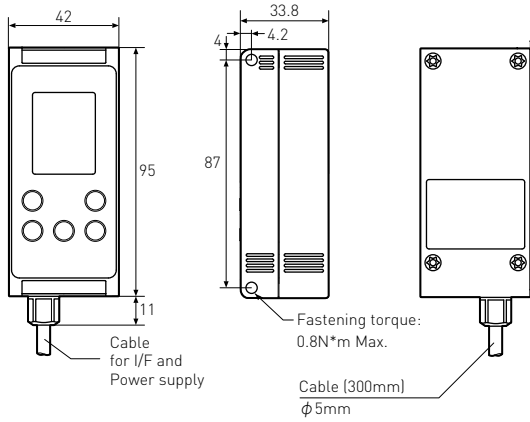
15°~ 45°

External light in CVS series shape
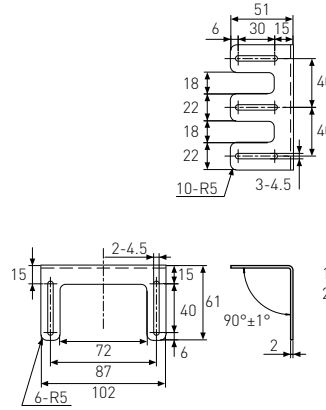## CVS-LW1(white color LED), CVS-LU1(UV LED)

I/F connector
Cable for I/F and Power supply
Fastening torque: 0.8N*m Max.
Cable (300mm) φ5mm

Bracket for Lighting
CVS-OPDB-2000

Section A-A'
Section of Counterbore
6 Counterbore

Remote monitor
CVS-M1-R

Cable for I/F and Power supply
Fastening torque: 0.8N*m Max.
Cable (300mm) φ5mm
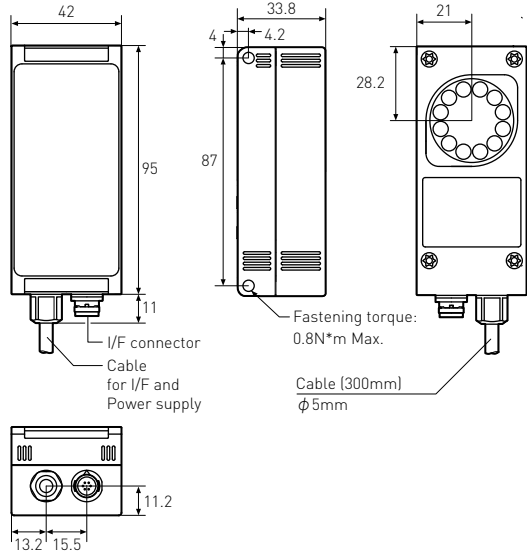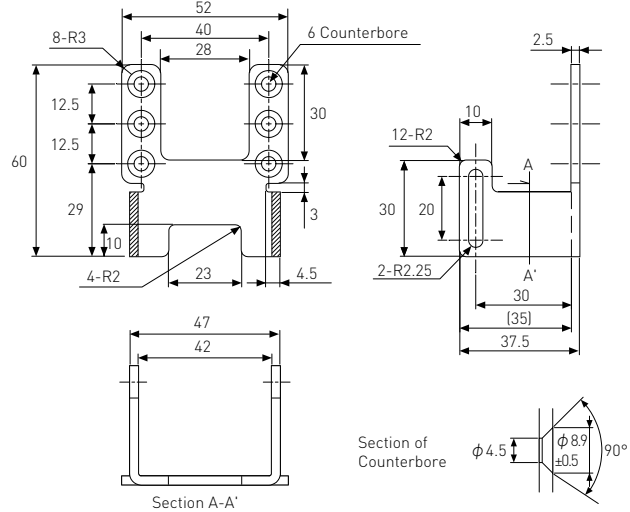
CVS-OPDB-3040   CVS-OPDB-6080

CVSE-M1-R

Cable for I/F and Power supply
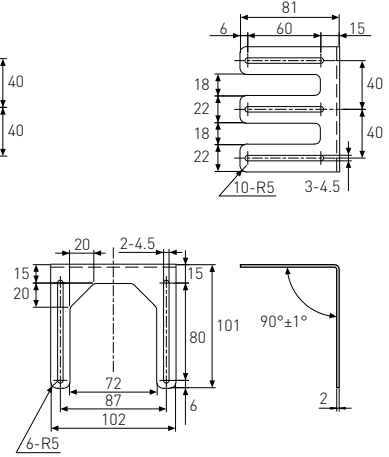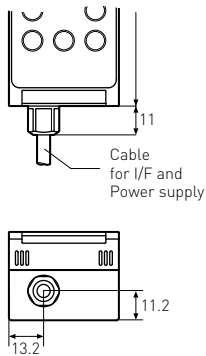
CVS-OP-1000L

(unit: mm)

MVS Series

CVS Series
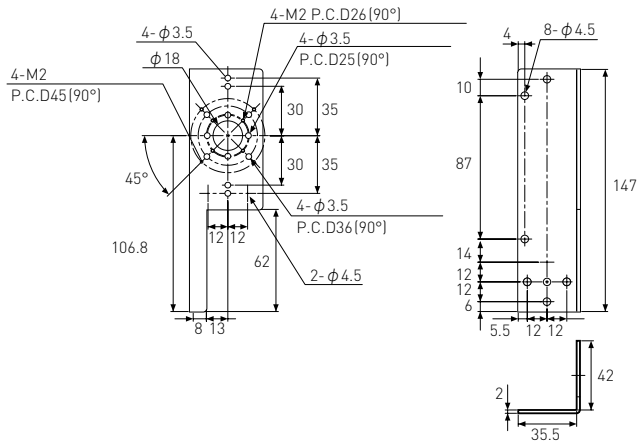
LED Lighting

OPR
Sensingt Ring Lights

OPB
Bar Lights

OPB-S
Sensing Bar Lights

OPDR
Direct Ring Lights

OPDR-F
Flat Direct Ring Lights

OPDR-LA
Low-angle Ring Lights

OPDR-H
Horizontal Ring Lights

OPDB
Bar Lights

OPIR, OPIR-S
Diffuse Ring Lights

OPLR
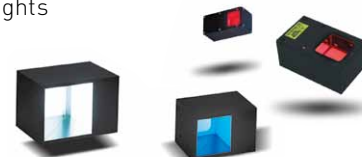Diffuse Low-angle Ring Lights

OPLQ
Diffuse Low-angle Square Lights

OPSM
Surface Mount Back Lights

OPEM
Edge Mount Back Lights

OPCX
Coaxial Lights

OPID
Diffuse Dome Lights

OPS, OPHS
Spot Lights

OPDB-RGB
Full color Diffuse Bar Lights

OPLR-RGB
Full color Diffuse Low-angle
Ring Lights

UV
UV Lights

IR
Infrared Lights

OPPD
LED Controller

OPPF
Controller Advanced

OPPCW
Power Supply
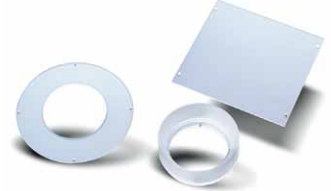(Dual output)

OPPA
Power Supply
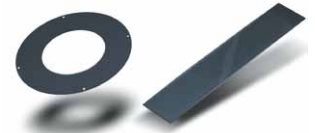(Parallel communication)

OPP, OPPW
Power Supply

DF
Diffuse Plate

PL
Polarizing Plate

OP
Cable

OPAU
Arm Unit

http://www.optex-fa.com