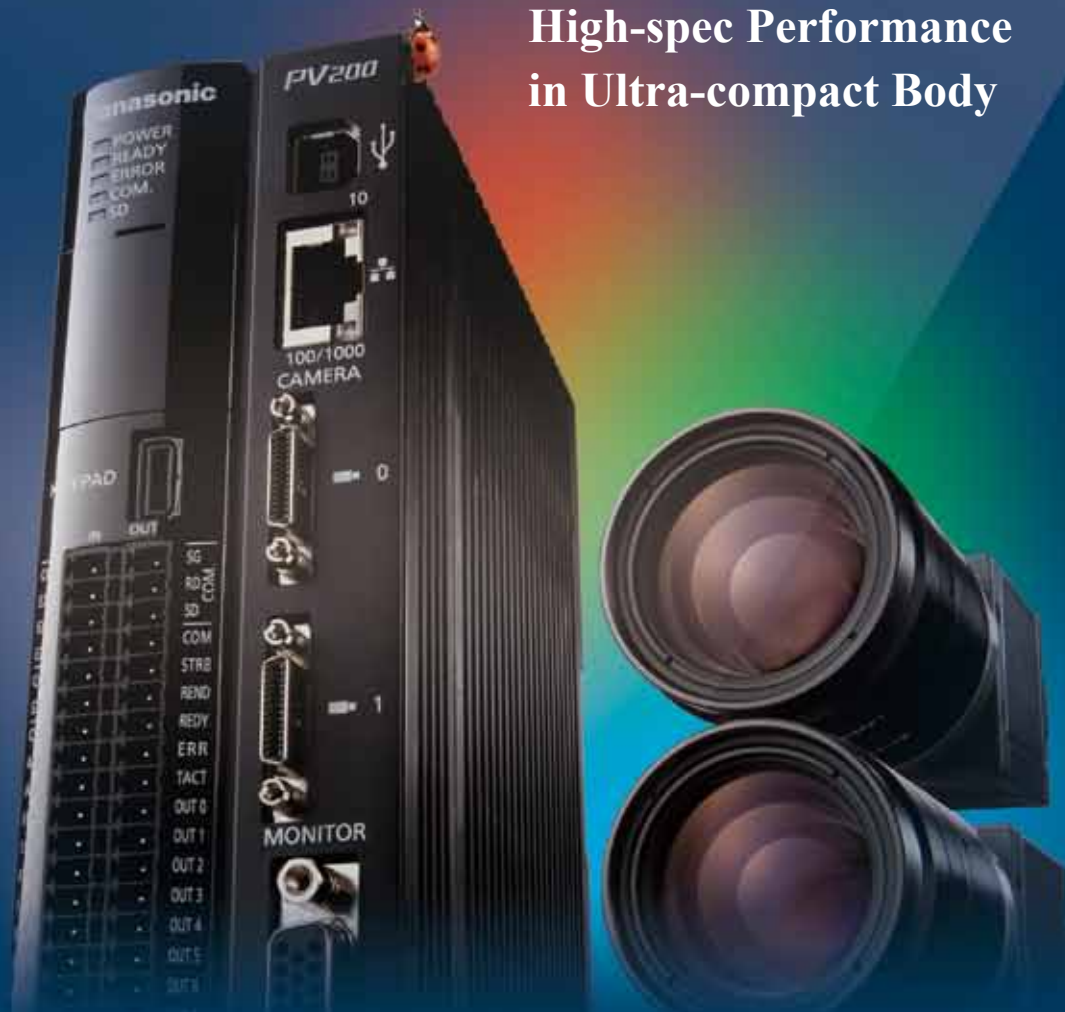# Panasonic
ideas for life

Machine Vision System
IMAGECHECKER PV200

High-spec Performance
in Ultra-compact Body

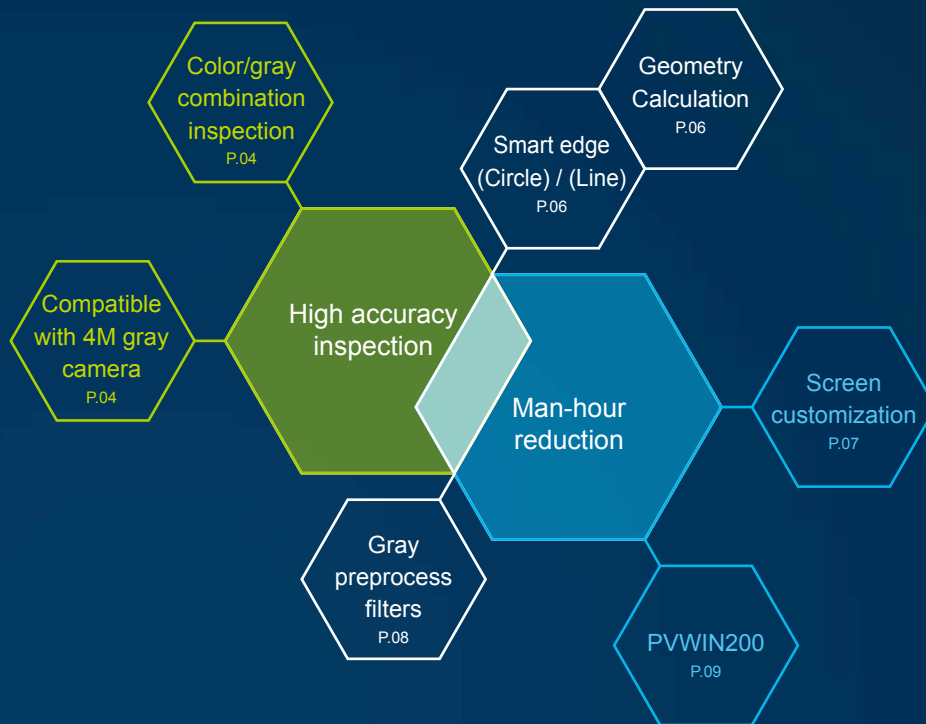# COMPACT & **HIGH SPEC**
ULTRA HIGH SPEED VISION SYSTEM IMAGECHECKER PV200

Panasonic Electric Works SUNX

COMPACT & **HIGH SPEC**

ULTRA HIGH SPEED VISION SYSTEM IMAGECHECKER PV200

Color/gray
combination
inspection
P.04

Geometry
Calculation
P.06

Smart edge
(Circle) / (Line)
P.06

Compatible
with 4M gray
camera
P.04

High accuracy
inspection

Man-hour
reduction

Screen
customization
P.07

Gray
preprocess
filters
P.08

PVWIN200
P.09

Improve inspection reliability
while reducing engineering man-hours

Image processing with top-level accuracy and performance in its class is available

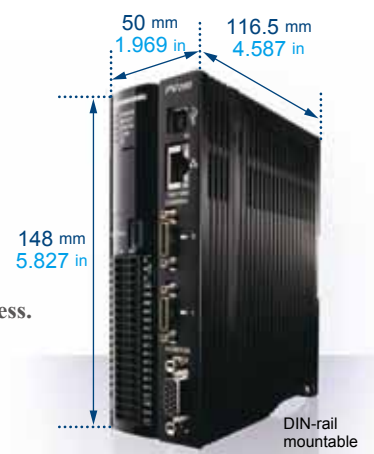with an unprecedentedly small number of man-hours required for programming.

The new ideal machine is a color/ gray combination type.

Hardware

Color and gray images can be simultaneously captured for inspection.

In addition, the "3+1" Quad Processor provides ultra-high speed parallel processing, significantly reducing the inspection time.

The features condensed into the ultra-compact body guarantee outstanding user-friendliness.

50 mm
1.969 in

116.5 mm
4.587 in

148 mm
5.827 in

DIN-rail mountable

● Camera selections

High accuracy inspection

Five types of cameras, including a 4M gray camera, are compatible with the system.
You can choose color and/gray cameras according to the purposes of use.

Color cameras		Gray cameras		
new	new			new
[0.3M]	[2M]	[0.3M]	[2M]	[4M]

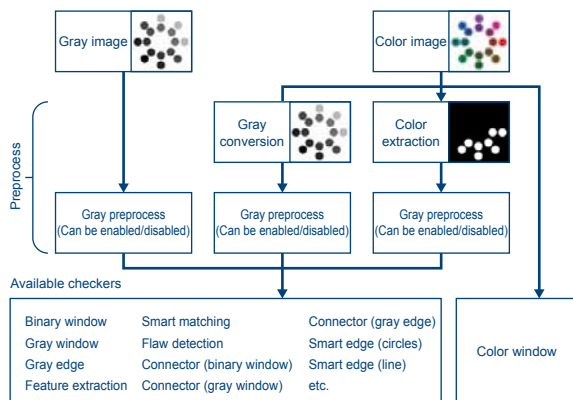*The 4M camera cannot be used in combination with another type of camera.

● Two cameras, including a combination of color and gray cameras, can be simultaneously connected.

High definition color and gray cameras can be simultaneously connected. Inspections with color and gray images can be conducted concurrently.
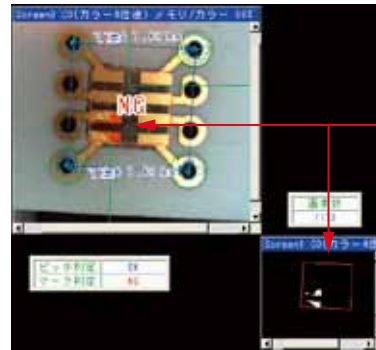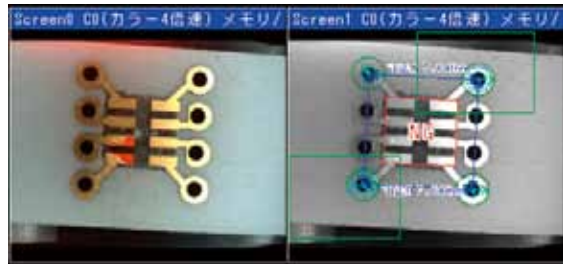
Color images clearly show red bad marks, which are difficult to detect with gray images.

● Color/ gray combination inspection system

High accuracy inspection

Gray image

Color image

Gray conversion

Color extraction

Preprocess

Gray preprocess (Can be enabled/disabled)

Gray preprocess (Can be enabled/disabled)

Gray preprocess (Can be enabled/disabled)

Available checkers

|		
Binary window	Smart matching	Connector (gray edge)
Gray window	Flaw detection	Smart edge (circles)
Gray edge	Connector (binary window)	Smart edge (line)
Feature extraction	Connector (gray window)	etc.

Color window

Color window

The maximum, minimum, average, and deviation of RGB values in an area can be obtained. The results can be used for numerical calculations and externally output.

Evaluation criteria setting
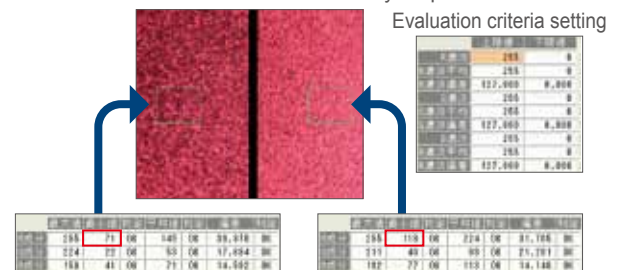
The RGB value data can be used for color unevenness and other inspections.

Gray conversion

Color images can be converted into gray images by specifying RGB values. This function makes it easier to find foreign substances, raising the inspection accuracy.

Color image

Gray conversion

Foreign substance   Hair

Foreign substance   Hair
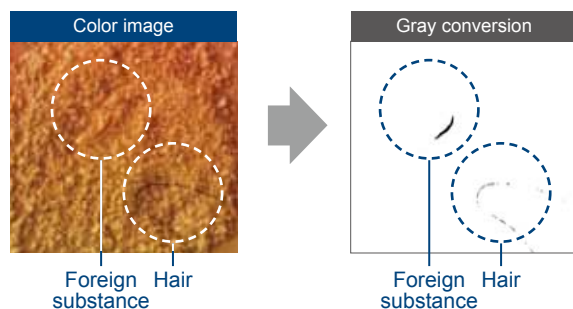
Color extraction

Colors in different color phases can be simultaneously extracted and inspected by using one inspection checker, which was previously impossible with a conventional model (AX40).
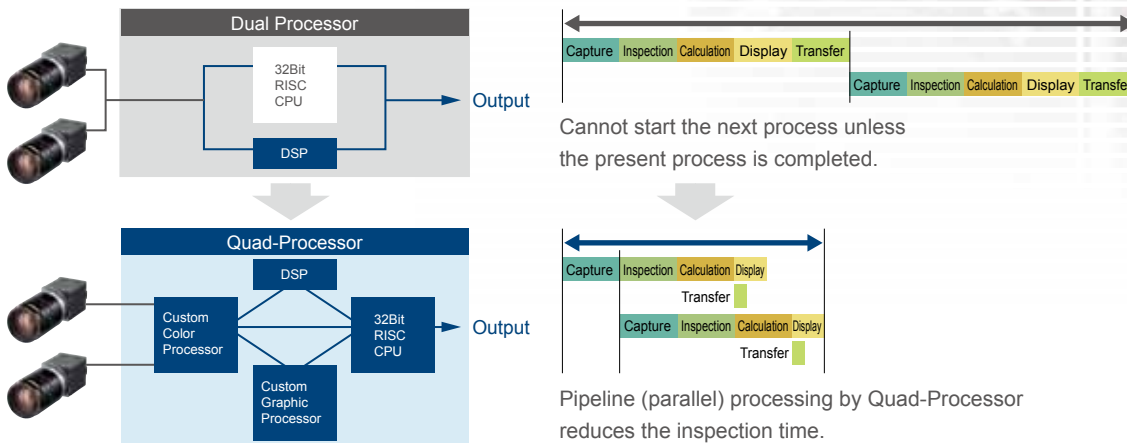
Color image

Color extraction
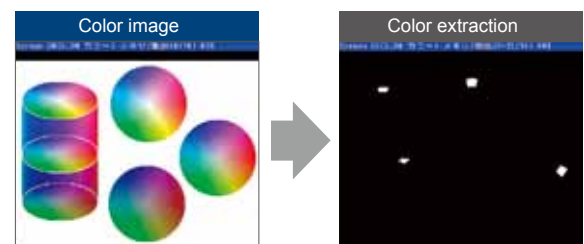
◉ Quad-processor, DSP processing & pipeline processing

"3 + 1" Quad-processor for high speed processing

Consists of a processor exclusively for image capture and transfer, a high-speed RISC-CPU, image-processing DSP, and a processor exclusively for display processing

- Pipeline processing by the Quad Processor enables concurrent operation of the image capture process and inspection process.
- Image transfer, image processing, inspection processing, calculation, and display processing operations can be carried out asynchronously, achieving high speed processing.
- DSP processing: The high-speed DSP as an engine dedicated to image processing perform gray preprocessing filtering in real time
- Fan-less structure and high hardware reliability in standalone mode

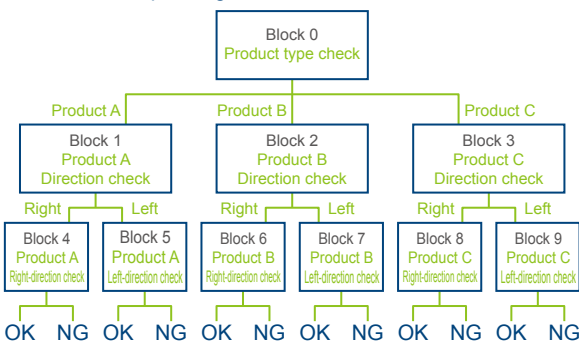[Process comparison with our conventional model (PV310)]

Dual Processor

32Bit RISC CPU

DSP

→ Output

| Capture | Inspection | Calculation | Display | Transfer |

| Capture | Inspection | Calculation | Display | Transfer |

Cannot start the next process unless the present process is completed.

Quad-Processor

DSP

Custom Color Processor

32Bit RISC CPU

Custom Graphic Processor

→ Output

| Capture | Inspection | Calculation | Display |

Transfer

| Capture | Inspection | Calculation | Display |

Transfer

Pipeline (parallel) processing by Quad-Processor reduces the inspection time.

◉ Branch execution/Designated execution *Man-hour reduction*

High-speed inspections are possible without a product type switching operation even if inspections to be executed should be switched due to high-mix production or depending on conditions. The "branch execution" or "designated execution" options can be chosen for each product type
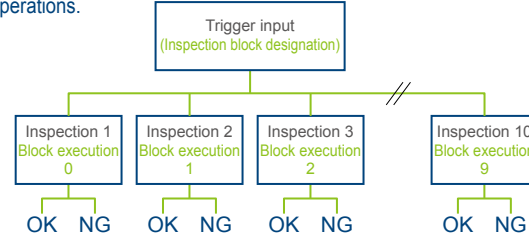
Branch execution

Up to nine branches can be set to choose an inspection to be executed depending on the test results.

Block 0
Product type check

Product A | Product B | Product C

Block 1
Product A
Direction check

Block 2
Product B
Direction check

Block 3
Product C
Direction check

Right | Left | Right | Left | Right | Left

Block 4
Product A
Right-direction check

Block 5
Product A
Left-direction check

Block 6
Product B
Right-direction check

Block 7
Product B
Left-direction check

Block 8
Product C
Right-direction check

Block 9
Product C
Left-direction check

OK NG | OK NG | OK NG | OK NG | OK NG | OK NG

Designated execution

Up to ten different inspections can be executed immediately after a trigger signal is input without spending time for product type switching operations.

Trigger input
(Inspection block designation)

Inspection 1
Block execution
0

Inspection 2
Block execution
1

Inspection 3
Block execution
2

Inspection 10
Block execution
9

OK NG | OK NG | OK NG | OK NG

The inspection results data of each block is held. The result data can be used for other blocks, allowing you to customize the inspection conditions according to the purpose of use by operating multiple inspection blocks in optimum order.

## ◉ High-speed communications and storage (Built-in memory / Ethernet / SD memory card)

Inspection result data output

- Compatible with parallel I/O , RS232C (115.2 kHz), Ethernet (Gigabit). The RS232C PLC communications are now compatible with Modbus RTU. **new**

Image data

- Up to 312 images captured by the 0.3M camera, 39 images captured by the 2M camera and 14 images captured by the 4M camera can be stored in the built-in memory in real time (without increasing the processing time).[*1]
- A 32 GB SD memory card can store a maximum of about 90,000 images captured by the 0.3M camera, about 16,500 images captured by the 2M camera or about 7,600 images captured by 4M camera. [*2]
- The Gigabit Ethernet LAN port allows image transfers at three to five times the speed of 100-Megabit Ethernet. Via this port, one image captured by the 0.3M camera can be transferred in 80 msec.[*3]

*1: When one camera is connected.   *2: Color camera images: Bayer format
*3 Depends on the connected equipment.

| PV310 | Transfer |
100-Megabit Ethernet

| PV200 | Transfer |
Gigabit Ethernet
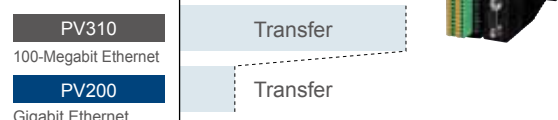
High Inspection Reliability and Small Number

Smart Edge function accurately detects circles and lines without complicated area settings or numerical calculation programming.

The character/figure drawing and data R (Read)/W (Write) functions accurately communicate the inspection status with high viewability.

These features improve the operability at production sites where there are many restrictions to enhance the reliability and productivity while significantly reducing engineering man-hours.

◎ Smart Edge (Circle)/(Line) [High accuracy inspection] [Man-hour reduction]

Complicated inspection processes can be easily operated through high accuracy measurements.

A function for accurate approximation of circles/lines
This function detects a maximum of 3,000 edge points for a line and 3,600 for a circle in one area, dramatically improving the accuracy of the measurement of dimensions and positions. This function has also significantly reduced the man-hours required for setting.

Operation principle

1. A Gray Scale Edge scanning area is created, and edge points in the area are searched to detect the contour of the object.

2. Virtual circles and approximate straight lines can be identified with a high degree of accuracy based on the target edge points.

3. Pass (OK) /fail (NG) evaluations are made based on the measured values (radius, diameter, and width), deviations, circularity, straightness, and the number of edges outside the area.
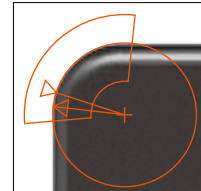
Smart Edge (circle) setting example
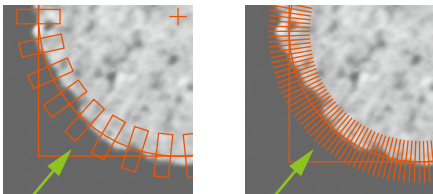
One cell can have a minimum width of one pixel (linear scanning), and a maximum of 3,600 cells can be set per 0.1°.
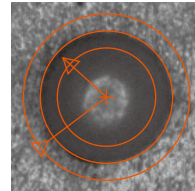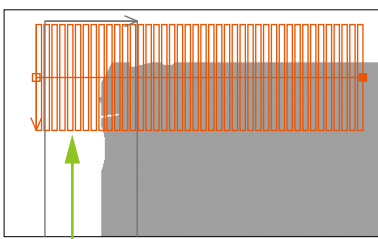

The center of the virtual circle, radius, diameter, circularity, and ring width can be measured.
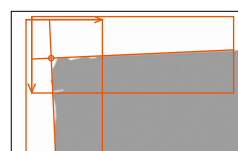
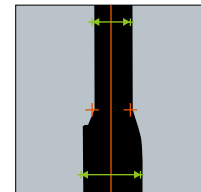The center and radius of the corner are measured.

Smart Edge (line) setting example
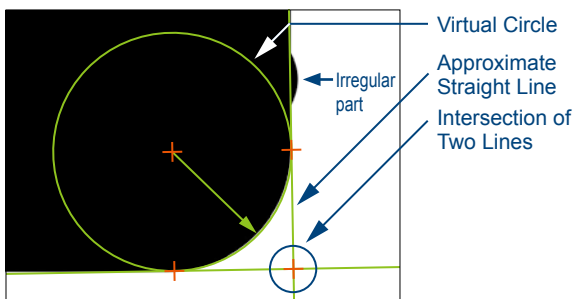

A maximum of 3,000 cells can be set.

The influence of chippings and burrs is eliminated to accurately detect the target straight line by approximation.

The width, chipping, and straightness of a strip-shaped object are measured, and the maximum and minimum values are obtained.

◎ Geometry Calculation [High accuracy inspection] [Man-hour reduction]

Virtual Circle
Irregular part
Approximate Straight Line
Intersection of Two Lines

Distances, intersections, and median lines can be detected.

This function detects the distance between two points, the intersection of two lines, the median line of two lines, the perpendicular distance, and an approximate ellipse. In combination with Smart Edge (circle) / (line), this function recognizes the object as a geometric figure, allowing the coordinates, distances, dimensions, and angles to be obtained without preparing calculation formulas.

Versatile application
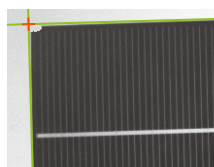
[Intersection coordinate/angle measurement]   [Burr height measurement]   [Angle/perpendicular distance measurement]   [Warpage height measurement]
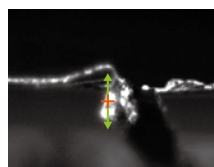
# of Engineering Man-Hours

◎ Screen customization

PV200 has been designed by pursuing high productivity, work efficiency, and user friendliness at all stages from the image processor introd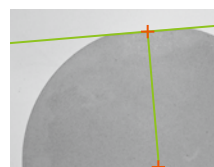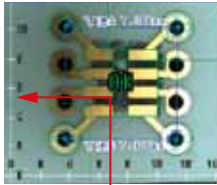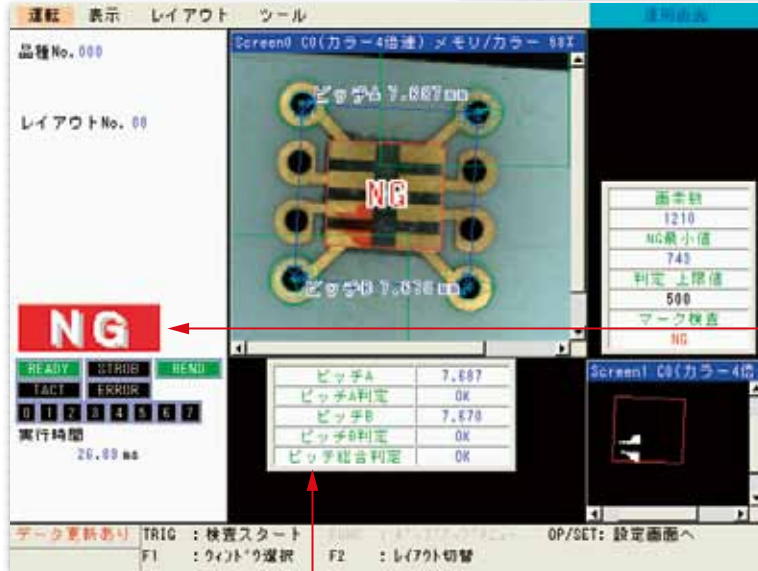uction evaluation through operation for full-scale production after introduction to reduce the operation time and burden on users, and to support the display of appropriate inspection information.

Unit conversion axes

X and Y axes indicate the scale converted into the actual dimensions. (Separately settable for each camera)

Operation customization by external signal

The unit is equipped with a total of five points for ASSIGN and EXTRA signals, which allow you to customize the allocations of tasks, such as image data output and screenshot printing.

Data R (Read) / W (Write) function

There are cases where tuning of the inspection area, preprocessing parameters, etc. is required even after finalizing a program. Such minor modifications can be quickly made in RUN mode without replacing the program or moving to the setting screen (80 items/page, up to two pages). In combination with PVWIN200 setup software, any text data can be indicated (four languages and five fonts).

[Modification examples]

Change the X coordinate of the start point.

Change the pre-processing filter setting.

Customizable Display `new`

A function for drawing text (multi-lingual), measured values, cross marks, arrow marks (dimension lines), rectangles, and ellipses. This function allows drawn items to be displayed following the calculation results or detected positions, and it is possible to specify the character size and fill regions. It is also possible to switch the drawn item colors or turn on/off the display of the items according to the pass/fail check results so that users can get inspection results more easily.
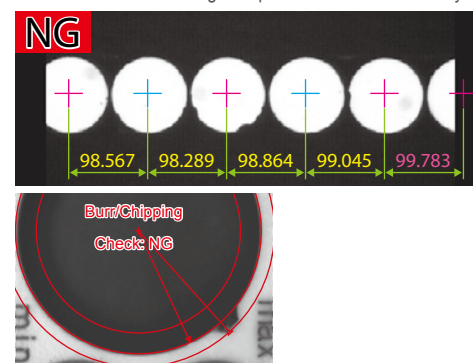
Zoom

Image displays can be zoomed in the 2 to 400% range.
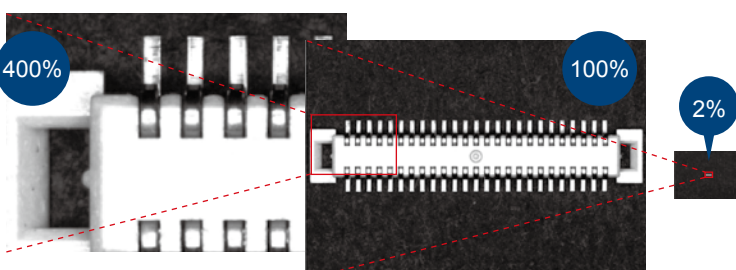
Layout

The VGA screen (640 x 480 pixels) can display a maximum of two images and two pages of the Data R/W screen. Screens and data R/W field layouts can be customized. Up to 16 patterns can be registered. The information displayed can be switched according to the status by using an external signal as well as the keypad.

High Performance and Simple Setting

The gray preprocess filters minimize the influence of variations in the lighting or object conditions, allowing for more accurate and reliable appearance inspections.

A variety of utility functions are available for simple, stress-free, and easy setting work.

⊙ Gray preprocess filters

21 types of gray preprocess filters are available. Reliable inspections are possible even under non-uniform lighting conditions or in the case of images with noise.

• Preprocess filters: 21 types • Preprocess groups: A maximum of 16 groups/camera • Preprocess steps: A maximum of 10 steps/group

Main purpose	Filter name		Main purpose	Filter name	
Flaw detection	• Tophat • Dynamic • Frequency Extraction		Contour enhancement	• Sobel • Prewitt • Laplacian	• Edge Extraction X • Edge Extraction Y • Sharpen
Noise removal	• Dilation • Erosion	• Erosion → Dilation • Dilation → Erosion	Blurring	• Median • Smoothing	
Rotating and flipping	• Rotation • Reflect		Gray scale changing	• Auto Correction • Gray Cut	• Area Averaging • Correction settings

Application example	Original image	Processed image	Filter used
Checking container lids for adhesion of foreign substances			Tophat
Checking films/sheets for scratches/wrinkles			Frequency Extraction Area Averaging
Detecting dirt on transparent sheets			Dynamic
Extracting printed characters (deleting the background)			Dynamic
Checking the inside of containers for adhesion of foreign substances			Frequency Extraction Tophat
Checking sintered parts for breaks/cracks			Frequency Extraction Tophat

Procedures

IMAGECHECKER
PV200

⬡ Utility [Man-hour reduction]

Checker list

The checker list shows the on/off state of each inspection function and the inspection results so that users can check the program outline. It is possible to jump to the setting screen for a selected function and edit the settings.

Check on the checker list

Choose and jump

Jump to the checker setting screen
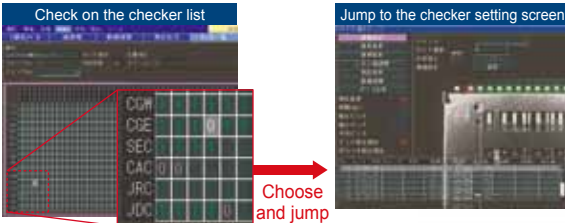
Histogram

In the image preprocessing and the binarization setting screens, both the original image and its histogram are displayed as guidance for processing

Thumbnail of the original image

After processing   Before processing
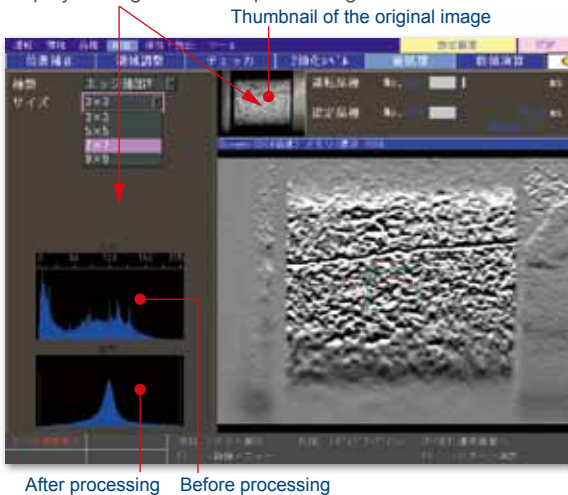
Password protection

The operation for switching to the setting screen can be password-protected to prevent incorrect settings due to an unintended keypad operation. The password can have a maximum of 15 digits (from 84 alphanumeric and symbol characters).

⬡ PVWIN200 setup software [Man-hour reduction]

User-friendly drag-and-drop operations

Drag the target image and drop it onto a PVWIN200 screen to start the operation. The guidance by the navigation view icons will help you set the inspection conditions.

Simulation cycle

Download PVWIN for free from:
http://panasonic-electric-works.net/sunx

Collective moving of inspection areas

This function is essential to simultaneously move multiple inspection areas for the purpose of fine adjustment of the target position. The areas can be chosen by camera, position correction group, or inspection checker type.

Collective moving
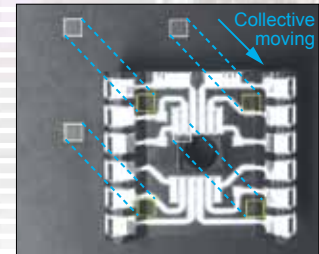
Setting help

Setting help function
- Focus adjustment
- Aperture adjustment
- Gray data analysis
- Communication test
- Parallel I/O test

Splash screen

The splash (startup) screen can be changed to an original screen, such as a screen suitable for the user's equipment or a screen including a brand logo. (A bitmap with a maximum size of 640 x 480 pixels)

Marker function

A straight line, rectangle, circle, ellipse, and cross line can be displayed at any position. The display position can be specified by using external signal.

Result output [new]

Judgement results and numeric result data can be simultaneously output through the RS232C and Ethernet port and to an SDHC card. For example, inspection result data can be output to a PLC for machine control purposes while saving the same data on an SD memory card.

Simulation cycle for debugging

The continuous simulation and data logging functions facilitate setting data corrections and verifications. The export function allows you to manage the setting data change history.

Can be switched to the screen displaying "NG" items only

PV200 Setup Software
IMAGECHECKER
PVWIN200

Fulfilling Basic Functions

This model also features the existing model's gray-scale and binary inspection functions. The sufficient capacity allows for storage of up to 25,600 types of inspection function settings (with an SD memory card inserted) and up to 1,000 checkers (per product type) to be ready for inspections of many items or points. This level of capacity will also enable the future expansion of the inspection scope.

◉ Connector checker

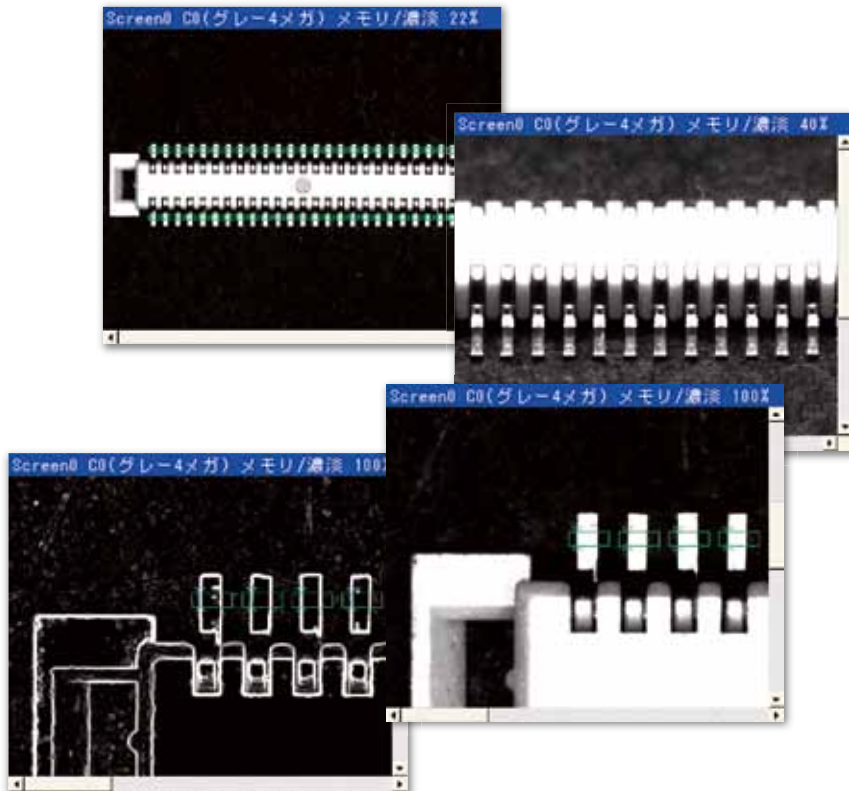PV200 features three types of checkers exclusively designed for connector inspections, which was previously very time-consuming, requiring only one area to be prepared. These checkers make it easier to add product types and modify settings, and significantly reduce the required number of man-hours.

Inspection example

Pin pitch inspection

This function measures the distance between the edges of each pair of adjacent pins and evaluates the results based on the preset upper and lower limits. Data of the "start point", "end point", and "number of pins" should be input.
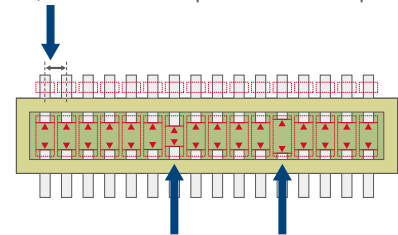
Inside pin gap inspection

This function inspects the gap between facing ends of pins. Simply input the number of pins, and the data will be attached. The upper and lower limits of the gap can be set.

Pin coplanarity inspection

This function detects raised pins. In the same way as the pin pitch inspection, adjust the position using one checker and input the number of pins, and the data will be attached. Then simply input the threshold.
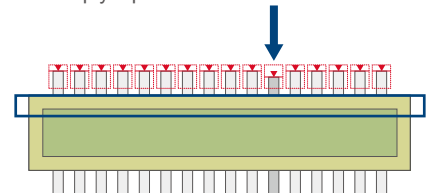
◉ Flaw detection

This function is ideal for appearance inspections for scratches, stains, chipped edges, burrs, and other flaws in objects, which are indispensable elements of in-process inspections.
The inspection is carried out based on the gray scale comparison with neighboring parts, even enabling the detection of minor scratches, stains, and chipping.

Chipping and burrs

Chipping and burrs
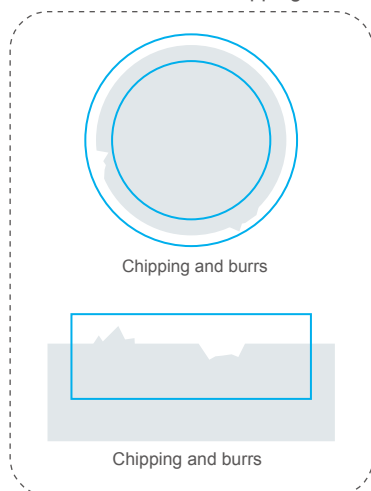
Scanning conditions

The micro cell area (a minimum of 3x3 pixels) is continuously generated, and defects are detected based on the amount of change in the density in the inspection area.

[Line]

256 cells max.

[Plane]

256 cells

256 cells

65,536 cells max.
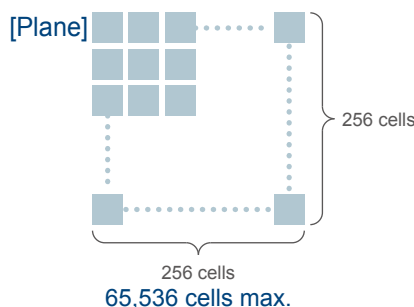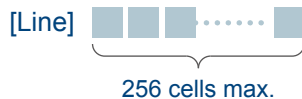
[Circles, Ellipses, and Partial arcs]

0.1°
pitches min.

3,600 cells max.

* Minimum size of one cell: 3x3 pixels

● Matching

Low contrast matching

Reliable detection is possible even if the object image has a low contrast (the contrast between the background and the object (work piece) is low) or if the object is chipped.
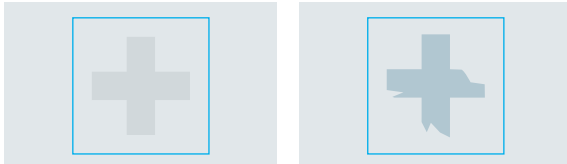
Detects low-contrast images

Detects partly chipped marks

Black/white inversion

Even negative images can be detected.

Multiple template search

A high-precision inspection is possible by searching a maximum of 64 templates in the same search area to detect a result with the highest correlation.

Template images

| Template 0 | Template 1 | Template 2 | Template 3 | Template 4 |

Object of search

After searching all templates, Template 2 with the highest correlation is used for detection.
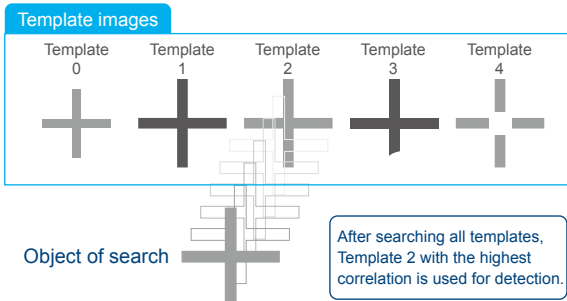
360° rotation search

The matching function has been upgraded. Even if object positions are rotated up to 360°, they can be inspected. Even if objects are roughly positioned, a high-precision inspection is possible.

AABB123
Made in JAPAN
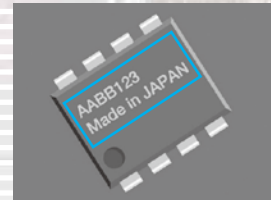
Difference detection

Based on the position information obtained by the matching function, the registered object and detected object are overlapped and compared on a pixel-by-pixel basis. Any pixels with a difference in brightness over a certain level are detected. The area value of such pixels can then be used to make pass/fail evaluations.

Template

Difference detection result

Detected by matching

Detects different portions only
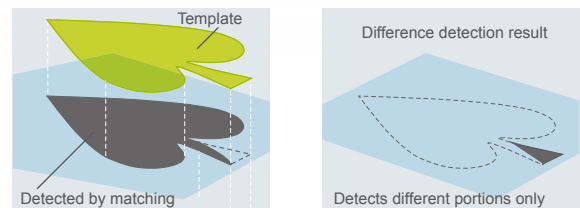
Common template registration

Common templates of alignment marks can be shared. The same template can be used for all product types, preventing variations in the inspection accuracy among different product types. Duplication of registration can be avoided, saving on the total memory space. Individual registration by product type is also available.

● Inspections of a variety of points of a variety of products

■ Data for up to 256 types can be saved in the built-in memory alone, and 25,600 with an SD memory card inserted.

■ Maximum registrable number of checkers: 1,000 checkers/type

 [Checker types]

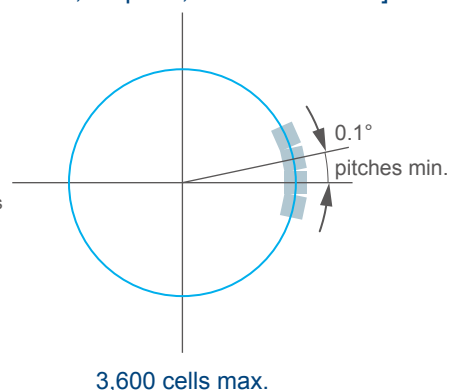 Line, binary window, gray window, binary edge, gray edge, feature extraction, smart matching, flaw detection, three connectors (binary window, gray window, and gray edge), smart edge (circles)/(line) and geometry calculation --- A total of 14 types

■ Maximum registrable number of numerical computation expressions: 1,000 expressions/type

 A variety of operators for numerical computation are available: Four fundamental operations (+, -, x, ÷), bracket operation, trigonometric function (14 types), comparison function (6 types), mathematical function (15 types), geometric function (18 types), and statistical function (18 types)

■ Binary level groups: 16 groups/type per camera

■ Execution blocks: 10 blocks/type

■ Position adjustment: 1,000 checkers/type Area adjustment: 1,000 checkers/type

System Configuration

Equipped with a full selection of interfaces essential for image processing devices of the future

SD memory card (SDHC compatible)

Keypad

Serial (RS232C)

Parallel I/O
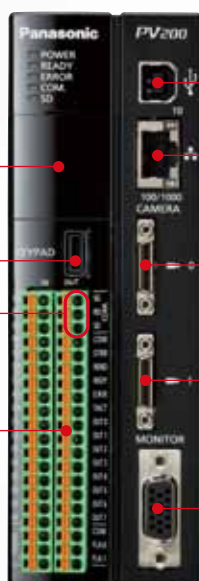
USB2.0

Giga bit Ethernet connector

Cameras (Digital cameras)
Up to two cameras of two different types can be connected.

0.3M color camera
2M color camera

0.3M gray camera
2M gray camera
4M gray camera

*The 4M camera cannot be used in combination with another type of camera.

VGA monitor output

Model Numbers

Controller units/Cameras/Keypads/Monitors

PV200 IMAGECHECKER units	Digital cameras for PV200	Keypads	Camera cables for PV200	Flexible camera cables

Digital cameras for PV200:
0.3M color camera (Quad-speed) ANPVC2040
2M color camera ANPVC2260
0.3M gray camera (Quad-speed) ANPVC1040
2M gray camera ANPVC1210
4M gray camera ANPVC1470

[2-camera type] ANPV0202ADP

Keypads:
3 m type: ANPVP03
10 m type: ANPVP10

Camera cables for PV200:
3 m type: ANPVC8103
5 m type: ANPVC8105
10 m type: ANPVC8110

Flexible camera cables:
3 m type: ANPVC8103R
5 m type: ANPVC8105R
10 m type: ANPVC8110R

0.3M camera lenses

f=6 with lock ANB842NL	f=8.5 with lock ANB843L	f=16 with lock ANB845NL	f=16 with lock ANM88161	f=25 with lock ANB846NL	f=25 with lock ANM88251	f=50 with lock ANB847L	f=50 with lock ANM88501

2-megapixel camera lenses

f=16 ANPVL162
f=25 ANPVL252
f=50 ANPVL502

Adapter rings (for the 0.3M cameras and 2-megapixel cameras)

5 mm x 1 ring ANB84805
40, 20, 10, 5, 1, 0.5 mm x 1 ring ANB848

XGA monitors

10.4 inches ANPVM11021

Monitor cables

3 m type: ANMX83313
5 m type: ANMX83315

LED lighting equipment for image processing

Digital power supply units for LED lighting

10W ANB86001
30W ANB86003

Dimensional Drawing (Unit: mm in)

Controller units/Monitors/Cameras/Keypads

● Controller unit ANPV0202ADP

148 5.827
116.5 4.587
(16.5) (0.650)
50 1.969

● XGA monitor ANPVM11021

265.0 10.433
4 0.157
43 1.693 (11) (0.433)
257 10.118
(16) (0.630)
140 5.512
(16) (0.630)
157.8 6.213 (LCD screen area)
210.4 8.283 (LCD screen area)
200 7.874
192 7.559
4-M4 4-M0.157
75 2.953
75 2.953
53 2.087
75 2.953
(11) (0.433)

● 0.3M color and gray cameras
ANPVC2040•ANPVC1040

● 2M color and gray cameras
ANPVC2260•ANPVC1210

29 1.142
29 1.142
12 0.472
38 1.496
(57.3) (2.256)
(7.3) (0.287)
(39) (1.535)
10 0.394
31.3 1.232
1/4-20UNC (Depth 9 0.354)
20 0.787
2-M3 2-M0.118 (Depth 7 0.276)

12 0.472
38 1.496
(57.3) (2.256)
(7.3) (0.287)
14 0.551
15 0.591
32.7 1.287
2×4-M3 2×4-M0.118 (Depth 3 0.118)
14 0.551
15 0.591
32.7 1.287
2×4-M3 2×4-M0.118 (Depth 3 0.118)

● 4M gray camera
ANPVC1470

44 1.732
6.5 0.256
40.5 1.594
(53.3) (2.098)
(6.3) (0.248)
44 1.732
44 1.732
(54) (2.126)
10 0.394
Insulating base
2-M4 M0.157 (Depth 7 0.276)
2-M2 M0.079 (Depth 3 0.118)
10 0.394
34 1.339
27.5 1.083
10 0.394
10 0.394
25 0.984
21 0.827
2-M3 M0.118 (Depth 3 0.118)
2-M3 M0.118 (Depth 3 0.118)
10 0.394
34 1.339
2-M2 M0.079 (Depth 3 0.118)
10 0.394
25 0.984
3 0.118

Top view (without the insulating base)
1/4"–20UNC (Depth 9 0.354)
Bottom view (without the insulating base)

● Operation keypad ANPVP**

48 1.890
145 5.709
(43) (1.693)
(20) (34)
(ø4.8) (ø0.189)
L
(0.787) (1.339)

● Lenses for camera

	0.3M camera lenses									2-megapixel camera lenses		
	f=6	f=8.5	f=16		f=25		f=50			f=16	f=25	f=50
	ANB842NL	ANB843L	ANB845NL	ANM88161	ANB846NL	ANM88251	ANB847NL	ANM88501		ANPVL162	ANPVL252	ANPVL502
F-number	1.2	1.5	1.4	1.4	1.4	1.6	1.4	2.8		1.4	1.4	2.8
ØA	42 1.654	42 1.654	31 1.220	30.5 1.201	31 1.220	30.5 1.201	48 1.890	30.5 1.201		34 1.339	34 1.339	34 1.339
L	46 1.811	40 1.575	33 1.299	31.21 1.229	37.3 1.469	31.5 1.240	48 1.890	38.5 1.516		38 1.496	52.2 2.055	77.5 3.051
B	– *1	– *1	– *1	21	– *1	21 0.827	– *1	21 0.827		22.5 0.886	22.5 0.886	22.5 0.886
C	– *1	– *1	– *1	19.8	– *1	20.05 0.789	– *1	20.6 0.811		22 0.866	22 0.866	22 0.866
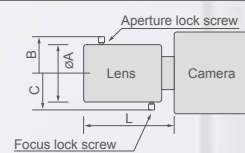
*1 The projection of the lock screw (M1.4 M0.055 pan-head machine screw) is a maximum of 2 mm 0.079 in.

Aperture lock screw
Lens
Camera
ØA
B
C
L
Focus lock screw

LED lighting equipment for image processing

● Digital power supply units for LED lighting

ANB86001
90 3.543
140 5.512
60 2.362

ANB86003
62 2.441
170 6.693
90 3.543
110 4.331
9.5 0.374
15 0.591
140 5.552

13
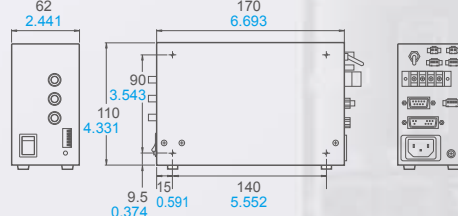
Specifications

General specifications

Item	Specifications
Rated operating voltage	24V DC
Operating voltage range	21.6 to 26.4 V DC (including ripples)
Rated current consumption	1.2 A max.
Ambient temperature during use	0 to +45°C 32 to +113°F (no freezing or condensation)
Storage ambient temperature	-20 to +60°C -4 to +140°C (no freezing or condensation)
Ambient humidity during use	35 to 85%RH (at 25°C 77°F, no freezing or condensation)
Storage ambient humidity	35 to 85%RH (at 25°C 77°F, no freezing or condensation)
Noise immunity	1,000 V, Pulse width: 50 ns, 1 μs (using the noise simulator method)
Vibration resistance	10 to 55 Hz, 1 sweep/min, amplitude of 0.75 mm 0.030 in, 30 minutes each in the X, Y, and Z directions
Shock resistance	196 m/s², 5 times each in the X, Y and Z directions
Insulation resistance (initial value)	100 MΩ or higher (measured by a 500 V DC megger) *1
	Input and output terminals -- Power and ground terminals
	Input and output terminals -- Non-energized metal part
	Power terminal -- Non-energized metal part
Breakdown voltage (initial value)	500 V AC for 1 min (600 V AC for 1 sec), Cutoff current: 10 mA *1
	Input and output terminals -- Power and ground terminals
	Input and output terminals -- Non-energized metal part
	Power terminal -- Non-energized metal part
Battery life	10 years approx. (at 25°C 77°F)
Weight	0.5 kg approx. (incl. terminal blocks)
Pollution degree	Pollution degree 2

*1 The evaluation was carried out with the primary side power supply varistor and capacitor removed from the internal circuit of the unit.

Functional specifications

Item		Specifications
CPU		32-bit, RISC CPU & DSP
Input/output	Cameras	Up to two cameras selected from among 0.3M (640 x 480) and 2M (1600 x 1200) gray and color cameras can be connected. Up to two 4M gray cameras can be connected.
	Monitor output	VGA (640x480) output
	Memory card	SD/SDHC memory card
	Serial	Models compatible with RS232C (three-wire) x 1 Modbus RTU and the PLC link function Panasonic Electric Works SUNX: FP Series Mitsubishi Electric: A, Q, FX (FX1N), and FX-2N series (FX2N, FX3U, and FX3UC) OMRON: C, CV, and CS1 series Allen-Bradley: SLC500 Fuji Electric: MICREX-SX SPH series
	Parallel	14 inputs / 15 outputs
	Keypad input	1 connector for dedicated keypad (ANPVP**) MIL terminals: 32 inputs / 32 outputs
	USB	USB 2.0, A-B type (Only PVWIN200)
	Ethernet	Ether net x 1, PLCs compatible with the PLC link function Panasonic Electric Works SUNX: FP series ET-LAN unit Mitsubishi Electric: Q series Ethernet unit

*2 The 4M gray camera cannot be used in combination with another type of camera.

Image processing functional specifications

Item	Specifications
Menu display	Eight languages (nine fonts), Switchable (Japanese, English, Korean, Traditional Chinese and Simplified Chinese)
Monitor display (VGA)	Split-screen display of up to two camera images, Zoom function (2 to 400%) Image display: Through/Memory/NG object images Display effects: Gray Scale/Thresholding Group/Pre-processing Group/Color/Extraction and binary/Display area (640 x 480)
Processing methods	Gray scale processing/thresholding processin/Color extraction/gray conversion
Processing resolution	2M camera (gray/color): 1600 horizontal x 1200 vertical pixels 0.3M camera (gray/color): 640 horizontal x 480 vertical pixels 4M camera (gray): 2048 horizontal x 2048 vertical pixels
Trigger input	Select from: All cameras or detection trigger
Number of connected cameras	Up to two cameras
Camera connection	Connection by Power Over Camera Link (PoCL)
Capture method	Frame shooting only. Capable of partial capture of one point In partial capture mode, the minimum capture area to be set for the 0.3M/4M camera is one line, and that for the 2M camera is 100 lines. (The area can be set in increments of one line for the gray camera, and two lines for the color camera.)
Shutter speed	30 μs to 1000 ms (Set in increments of 10 μs)
Gain setting range	1.0 to 5.0
No. of product types	25,600 types max. (depends on setting data)
Inspection functions (Checkers)	1,000 checkers/product type max., including those for geometric calculation and character/figure drawing (depends on setting data) Position adjustment, Position/rotation adjustment, Rotation adjustment area size adjustment binary window, Gray window, Binary edge, Gray edge, Feature extraction, Smart matching, Line, Flaw detection, Connector (binary window), Connector (gray window), Connector (gray edge), Smart edge (circles), Smart edge (line), Color window
Geometry Calculation	1,000 checkers/product type max., including those for inspection functions and character/figure drawing (depends on setting data) Seven calculation functions (distance between two points, intersection of two lines, median lines of two lines, perpendicular distance, approximate straight line, approximate circle, and approximate ellipse)
Character/Figure Drawing	Up to 10,000 characters/graphics (1,000 checkers x 10)/product type can be displayed on the images (depends on setting data).
Inspection operation mode	Sequential processing: After completing the result output, the next image capture for inspection can be started. Parallel processing: After the capture and the synchronized output of results of the previous inspection are completed, the image capture process for the next inspection is ready to start, and then the capture and inspection results output are processed concurrently.
Slice level group	16 group/camera, 256-gray scale (0 to 255)

Image processing functional specifications

Item		Specifications
Preprocess filters		Preprocessing selections: Gray conversion / Color extraction / Gray preprocessing
	Gray conversion	Available only when a color camera is connected. For each product type, 16 groups/camera Each R/G/B value setting for gray conversion can be changed within the range of -1,000 to 1,000.
	Color extraction	Available only when a color camera is connected. Color extraction mode: Selectable between high speed and expansion Number of extractable colors High speed: A total of 16 colors when one camera is connected and eight colors when two cameras are connected. Expansion: A total of 128 colors when one camera is connected and 64 colors when two cameras are connected. Only eight registered colors can be selected from one checker.
	Gray preprocessing	For each product type, 16 groups/camera, 10 stages max. Preprocessing filters: 21 types (Dilation, Erosion, Erosion → Dilation, Dilation → Erosion, Auto correction, Gray cut, Area averaging, Correction settings, Median, Smoothing, Sobel, Prewitt, Laplacian, Edge extraction X, Edge extraction Y, Sharpen, Tophat, Dynamic, Gray difference, Rotation, and Reflect)
Numerical calculation		1,000 formulae/product type max., including those for evaluation result output (depends on setting data) Calculations involving output values of inspection functions
	Operators	Four fundamental operations (+, -, x, ÷), bracket operations, trigonometric functions (14 types), comparison functions (6 types), math functions (15 types), geometric functions (18 types)
	Statistic data operation items	Scan count/OK count/NG count/Average/Variance/Max./Min./Range/ OK average/OK variance/OK judgment max./OK judgment min./OK range/ NG average/NG variance/NG judgment max./NG judgment min./NG range User limit: 1000 items /product type max.
	Other operation items	Previous data of numerical calculation and judgment results, general-purpose registers
	Number of reference operators	16 items/formula
Judgement		1,000 formula/product type max., including those for numerical calculation (depends on setting data) Substitution for and logical calculation of evaluation results from checkers and numerical computations
	Operators	NOT/AND/OR/XOR/Brackets
	Number of substitution items	16 items/formula
	Others	Total judgment conditions, save image conditions, Image output conditions, parallel output setting (8 outputs from OUT0 to OUT7 and 16 outputs from OUT0 to OUT15, or all setting output)
Group move		Collective movement of set checkers in units of position/rotation adjustment groups Specify the "Move" or "Not move" option for each checker type. Position and rotation adjustment checkers cannot be moved.
Marker		8 markers/product type max. for each camera, Graphic display on the operation screen, Selectable from six colors
	Shapes	Rectangle/Circle, Ellipse/Polygon/Line/Cross
Data R/W		Two-window display of up to 80 (5x16) cells/product type on screen in table form in RUN mode Substitution of title input, checker conditions/results, numerical calculation results, numerical calculation judgment results, judgment results, statistical results possible. Change of upper/lower limits of numerical computation in the table in RUN mode possible.
Conversion data		Coordinates, coordinate origin, horizontal and vertical coefficients can be set for each camera to obtain actual dimensions.
	Others	Comment input
Template settings	Position	Set position/Adjusted position
	Display	Yes/No
Execution mode	Normal execution	Execution of all checkers
	Branch execution	Destination blocks (0 to 9) can be set.
	Designated execution	Blocks to be executed (0 to 9) can be set.

○: Applicable, ✕: Inapplicable

		Parallel	Serial	Ethernet	SD memory card
External input/output functions	Input				
	Inspection start instruction	○	○	○	—
	Re-inspection start instruction	○	○	○	—
	Product type change instruction	○	○	○	—
	Template re-registration instruction	○	○	○	—
	Display layout switch instruction	○	○	○	—
	Operation/stop switch instruction	○	○	○	—
	Statistics reset instruction	○	○	○	—
	Error reset instruction	○	○	○	—
	Instruction to save setting data in the built-in memory	○	○	○	—
	Instruction to save setting data in the SD memory card	○	○	○	—
	Instruction to read setting data from the built-in memory	○	○	○	—
	Instruction to read setting data from the SD memory card	○	○	○	—
	Instruction to cancel the saving/reading of setting data	○	○	○	—
	Instruction to save the image memory in the SD memory card	○	○	○	—
	Instruction to erase the image memory	○	○	○	—
	Instruction to print the screenshot	○	○	○	—
	Inspection/processing cancellation display	○	○	○	—
	Instruction to save the latest inspection image	○	✕	✕	—
	Instruction to read/change the set value	✕	○	○	—
	Instruction to prohibit the keypad screen operation	✕	○	○	—
	Keypad emulation instruction	✕	○	○	—
	Computer link	✕	○	✕	—
	Output				
	Scanning operation count	○	○	○	○
	Overall judgement output	○	○	○	○
	Judgement calculation (JD) result output	○	○	○	○
	Numerical calculation result output	○	○	○	○
	Image output	✕	✕	○*4	○
	Screenshot output	✕	✕	○*4	○

*3 Image and screenshot output functions via Ethernet are received by dedicated software, Image Receiver for PV.

Specifications
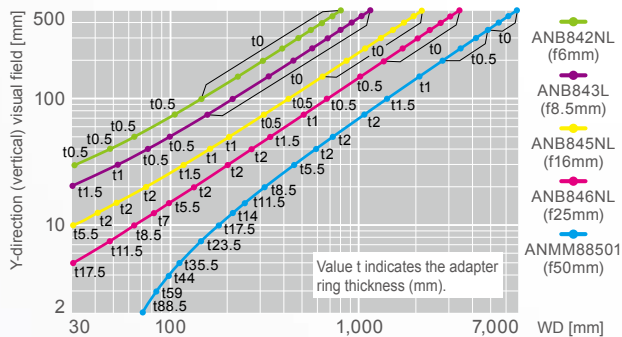
Camera Specifications

Item	Specifications				
Type/Mode No.	4M gray/ANPVC1470	2M gray/ANPVC1210	0.3M gray/ANPVC1040	2M color/ANPVC2260	0.3M color/ANPVC2040
Capture element	Inter line method	Inter line method	Inter line method	Inter line method	Inter line method
	2/3-inch CCD fixed image element	1/1.8-inch CCD fixed image element	1/3-inch CCD fixed image element	1/1.8-inch CCD fixed image element	1/3-inch CCD fixed image element
Pixels	2048 horizontal x 2048 vertical pixels	1600 horizontal x 1200 vertical pixels	640 horizontal x 480 vertical pixels	1600 horizontal x 1200 vertical pixels	640 horizontal x 480 vertical pixels
	Pixel size: 3.45 µm x 3.45 µm	Pixel size: 4.4 µm x 4.4 µm	Pixel size: 7.4 µm x 7.4 µm	Pixel size: 4.4 µm x 4.4 µm	Pixel size: 7.4 µm x 7.4 µm
	(Square pixels)	(Square pixels)	(Square pixels)	(Square pixels)	(Square pixels)
Frame rate	16 flams/sec max.	30 flams/sec max.	120 flams/sec max.	30 flams/sec max.	120 flams/sec max.
Lens mount	C mount				
Ambient temperature during use *5	0 to +40°C 32 to +104°F	0 to +40°C 32 to +104°F	0 to +45°C 32 to +113°F	0 to +40°C 32 to +104°F	0 to +45°C 32 to +113°F
Ambient humidity during use	35 to 85%RH (at 25°C (no freezing or condensation)				
Vibration resistance	10 to 55 Hz, 1 sweep/min, double amplitude of 0.75 mm, 30 minutes each in the X, Y, and Z directions				
Shock resistance	490.3 m/s², 1 time each in the X, Y and Z directions	700 m/s², 3 times each in the X, Y and Z directions			
Weight (Excluding the lens)	110g approx.	65g approx.	65g approx.	65g approx.	65g approx.

*5 No freezing or condensation

Visual fields

● 0.3M color `new` and gray camera
ANPVC2040・ANPVC1040

- ANB842NL (f6mm)
- ANB843L (f8.5mm)
- ANB845NL (f16mm)
- ANB846NL (f25mm)
- ANMM88501 (f50mm)

Value t indicates the adapter ring thickness (mm).

● 2M color `new` and gray camera
ANPVC2260・ANPVC1210

- ANPVL162 (f16mm)
- ANPVL252 (f25mm)
- ANPVL502 (f50mm)

Value t indicates the adapter ring thickness (mm).
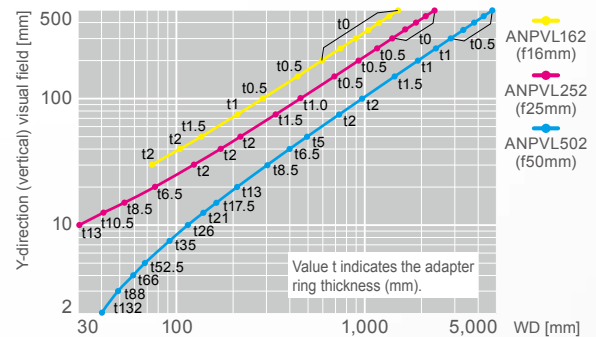
● 4M gray camera `new`
ANPVC1470

- ANPVL162 (f16mm)
- ANPVL252 (f25mm)
- ANPVL502 (f50mm)

Value t indicates the adapter ring thickness (mm).
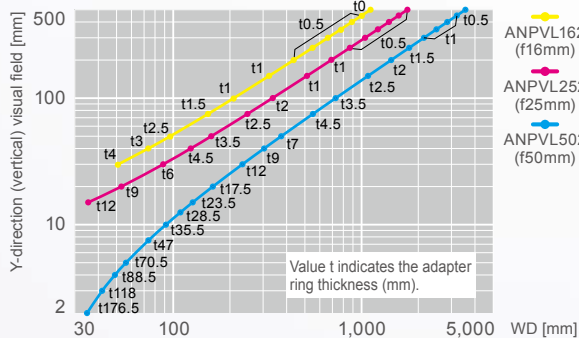
The X-direction (horizontal) visual field is the Y-direction visual field multiplied by 1.3.
* Please use these values as reference purposes only. Check the details with the PV200 User's Manual.

Customized LED light sources

24 V DC type
NTN Series

The brightness, shape, number of lamps, and installation method can be customized to fit purposes of use.

Connection with ANB86001 or ANB86003 LED lighting power supply enables continuous lighting.
These LED light sources can be used only with 24 V DC.
Do not use with any other power voltage.

Contact for inquiries about NTN series customizable LED light sources

Single unit series

Single unit
Wide angle: NTN141
Diffusion: NTN142
(External dimensions of the unit: 80 mm x 50 mm 3.150 in x 1.969 in)

Line unit series

2-lamp type
Wide angle: NTN138
Diffusion: NTN139
(External dimensions: 180 mm x 44 mm 7.087 in x 1.732 in)

4-lamp type
Wide angle: NTN136
Diffusion: NTN137
(External dimensions: 280 mm x 44 mm 7.087 in x 1.732 in)

Customization examples
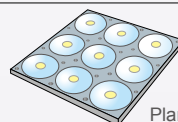
Plane type   Linear type   Frame type

New Business Promotion Department, Lighting Manufacturing Business Unit, Panasonic Electric Works Co., Ltd.
Address: 1048 Kadoma, Kadoma-city, Osaka 571-8686, Japan Tel: +81-6-6909-5734

Product Lineup

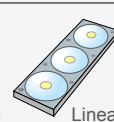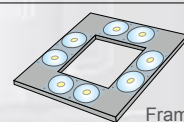| Function item		PV200					PV500V2		AG50V3	
Control unit		Color and gray scale combination					High speed, high productivity		Advanced appearance inspection	
		Image processing with top-level accuracy in its class is available with a surprisingly small number of man-hours required for programming.					Achieving both inspection reliability improvement and reduction of engineering man-hours		Featuring high performance and user friendliness Flowchart-based programming facilitates setting work for high-accuracy appearance inspection.	
Number of connected cameras max.		2					4		4	
Camera	Pixel	0.3M	2M	0.3M	2M	4M	0.3M	2M	0.3M	1M
	Gray/Color	Color		Gray			Gray		Gray	
	Shutter speed	30 µs to 1000 ms (Set in increments of 10 µs)					30 µs to 1000 ms (Set in increments of 10 µs)		30 µs to 1000 ms (Set in increments of 10 µs)	
Monitor display		VGA					XGA		VGA/NTSC	
Processing methods		Color, Gray scale, Binary					Gray scale, Binary		Gray scale, Binary	
No. of product types max. *1		25,600 types					25,600 types		256 types	
Maximum settable number of checkers *2		1,000 checkers/product type max.					1,000 checkers/product type max.		999 symbols/product type max. (*3)	
Major inspection functions (Checkers) ○ : Applicable model	Position adjustment, Position/rotation adjustment	○					○		○	
	Area size adjustment	○					○		○	
	Binary window/Binary edge	○					○		○	
	Feature extraction	○					○		○	
	Character recognition (neural network)	−					−		○	
	Gray window/Gray edge	○					○		○	
	Smart matching	○					○		○	
	Flaw detection	○					○		○	
	Connector (binary window, gray window, gray edge)	○					○		○ (Cracks/chips)	
	Smart edge (circles) / (Line)	○					○		− (Leads/Loose contact)	
	Geometry Calculation	○					○		−	
	Character/Figure Drawing	○					○		○	
	Others						Program editing/testing in RUN mode		Edge extension	
									Foreign substance inspection	
									Chip inspection	
Numerical calculation/Judgment		1,000 formula/product type max.					1,000 formula/product type max.		−	
Data R/W		160 data					320 data		1,000 data max.	
Execution mode	Execution all	Execution of all checkers					Execution of all checkers		Flowchart-based programming is available.	
	Branch execution	0 to 9 can be set.					0 to 9 can be set.			
	Designated execution	0 to 9 can be set.					0 to 9 can be set.			
Password protection		○					○		○	
Image preprocess/Image conversion		Preprocessing filters: 21 types, for each product type 16 groups/camera, 10 stages max.					Preprocessing filters: 21 types, for each product type 5 groups/camera, 10 stages max.		Differentiation/Directional differentiation/Unfolding fan/Image rotation	
Others										
Interface	RS232C	1 port					1 port		1 port	
	Ethernet	○					○		○	
	SD/SDHC	○					○		−	
	USB	○					○		−	
	Parallel input/output	14 inputs, 15 outputs					PHOENIX terminal: 14 inputs, 15 outputs MIL terminal: 32 inputs, 32 outputs		CPU board: 4 inputs, 10 outputs I/O board: 24 inputs, 40 outputs	
Setup tool software		Vision PVWIN200 Off-line simulation					Vision PVWIN Off-line simulation		Vision AGWIN Off-line simulation	
Recommended monitor (cable)		ANPVM11021 (ANMX83313)					ANPVM11021 (ANMX83313)		ANPVM11021 (ANMX83313) or ANMA811 (ANM87303, ANM8606)	

Notes:
1) and 2) Depend on the setting data size. 3) The number of symbols used varies depending on the library.

Function item		A230	A210V2 / A110V2	AE20		PD60 / 65
Control unit		Optical character recognition & character checker type	General gray type	Vision Sensor		2D Code Reading Sensor
		Fully equipped with advanced character recognition and character check functions	Outstanding machine vision with a compact body loaded with excellent features and offering top-notch performance	Easy-to-install, easy-to-setup, all-in-one visual sensor featuring reliable detection performance		Compliant with international standards Featuring a 2D code print quality verification function
Number of connected cameras max.		2	2 / 1	1		1
Camera	Pixel	0.24M	0.24M	0.1M		0.1M
	Gray/Color	Gray	Gray	Color	Gray	Gray
	Shutter speed	30 µs to 1000 ms (Set in increments of 10 µs)	30 µs to 1000 ms (Set in increments of 10 µs)	30 µs to 50 ms		30 µs to 50 ms
Monitor display		NTSC	NTSC	Dedicated tool		Dedicated tool
Processing methods		Gray scale	Gray scale, Binary	Color, Gray scale, Binary		Binary
No. of product types max.		32 types	64 types/32 types	Seven product types/application		7 types
Maximum settable number of checkers		8 checkers/product type (character recognition)	96 checkers/product type	1 checker/product type		1 checker/product type
Major inspection functions (Checkers) ○ : Applicable model	Position adjustment, Position/rotation adjustment	○	○ / — (Position adjustment)	—		—
	Area size adjustment	—	—	—		—
	Line	—	○	—		—
	Binary window/Binary edge	—	○	—		—
	Gray window/Gray edge	○	—	—		—
	Feature extraction	○	○	—		—
	Smart matching	○	○ / —	—		—
	Flaw detection	—	—	—		—
	Connector (binary window, gray window, gray edge)	○ (Lead inspection)	—	—		—
	Smart edge (circles) / (Line)	—	—	—		—
	Geometry Calculation	—	—	—		—
	Character/Figure Drawing	—	—	—		—
	Others	Character checker		Color and Pattern matching		2D code reading • Data matrix (ECC200) • QR code • Micro QR code
		Up to five dictionaries		Gray scale Pattern matching		
				Feature extraction		
				Color discrimination		
				Color area		
				Size measurement		
				Edge detection		
				Apex detection		
Numerical calculation/Judgment		96 per product type	96/48 per product type	—		—
Data R/W		20 data (data monitor)	20 data (data monitor)	—		—
Execution mode	Execution all	Execution of all checkers	Execution of all checkers	Execution of all checkers		Execution of all checkers
	Branch execution	Two branch inspection based on the results of block 1	Two branch inspection based on the results of block 1	—		—
	Designated execution	Block 1 to 3 can be set.	Block 1 to 3 can be set.	—		With retry function
Password protection		○ (Hiding)	○ (Hiding)	—		—
Image preprocess/Image conversion		—	—	—		Preprocessing filters: 14 types, 10 stages max.
Others				Integrated lens and lighting unit Protective construction: IP67		Integrated lens and lighting unit Protective construction: IP67 Stationary type: PD60 Handy type: PD65
Interface	RS232C	2 ports	2 ports	1 port		1 port
	Ethernet	—	—	—		—
	SD/SDHC	—	—	—		—
	USB	—	—	○		○
	Parallel input/output	11 inputs, 14 outputs	11 inputs, 14 outputs	5 inputs, 4 outputs		3 inputs, 3 outputs
Setup tool software		Vision bachup Tool (Data saving)	Vision bachup Tool (Data saving)	AETOOL		PDTOOL
Recommended monitor (cable)		ANMA811 (ANM87303)	ANMA811 (ANM87303)	—		—

Model Number List

Control units

Product Name	Specification	Model No.
AG50V3	NPN output, 4-camera type	ANAG50000V3
IMAGECHECKER PV500V2	NPN output, 2-camera type	ANPV0502V2ADN
	PhotoMOS relay output, 2-camera type	ANPV0502V2ADP
	NPN output, 4-camera type	ANPV0504V2ADN
	PhotoMOS relay output, 4-camera type	ANPV0504V2ADP
IMAGECHECKER PV200	PhotoMOS relay output, 2-camera type	ANPV0202ADP
A230 character recognition type	NPN Jpn/Eng menu, Jpn manual	ANMA230
A210V2 Controller	NPN Jpn/Eng menu, Jpn manual	ANMA210V2
	Photomos Jpn/Eng menu, Jpn manual	ANMA211V2
	NPN Eng/Jpn menu, Eng manual	ANMA212V2
	Photomos Eng/Jpn menu, no manual	ANMA213V2
	Photomos Ger/Eng menu, no manual	ANMA214V2
	Photomos Fre/Eng menu, no manual	ANMA215V2
	Photomos Spn/Eng menu, no manual	ANMA216V2
	Photomos Itl/Eng menu, no manual	ANMA217V2
	Photomos Eng/Jpn menu, Eng manual	ANMA218V2
	NPN Chi/Eng menu, Chi manual	ANMA219V2
	NPN Kor/Eng menu, Eng manual	ANMA21KV2
A110V2 Controller	NPN Jpn/Eng menu, Jpn manual	ANMA110V2
	Photomos Jpn/Eng menu, Jpn manual	ANMA111V2
	NPN Eng/Jpn menu, Eng manual	ANMA112V2
	Photomos Eng/Jpn menu, no manual	ANMA113V2
	Photomos Ger/Eng menu, no manual	ANMA114V2
	Photomos Fre/Eng menu, no manual	ANMA115V2
	Photomos Spn/Eng menu, no manual	ANMA116V2
	Photomos Itl/Eng menu, no manual	ANMA117V2
	Photomos Eng/Jpn menu, Eng manual	ANMA118V2
	NPN Chi/Eng menu, Chi manual	ANMA119V2
	NPN Kor/Eng menu, Eng manual	ANMA11KV2
LightPix AE20 Main unit	Visual Field: 2 × 1.6 mm 0.079 × 0.063 in, Installation Distance: 15 mm 0.591 in	ANE2000
	Visual Field: 10 × 8 mm 0.394 × 0.315 in, Installation Distance: 45 mm 1.772 in	ANE2010
	Visual Field: 30 × 25 mm 1.181 × 0.984 in, Installation Distance: 55 mm 2.165 in	ANE2020
	Visual Field: 80 × 70 mm 3.145 × 2.756 in, Installation Distance: 170 mm 6.693 in	ANE2030
2D Code reading sensor PD60	Field of view: 2 × 1.6 mm 0.079 × 0.063 in, Installation distance: 15±0.5 mm 0.591±0.020 in	ANPD060-02
	Field of view: 4 × 3.2 mm 0.157 × 0.126 in, Installation distance: 50±2.5 mm 1.969±0.098 in	ANPD060-04
	Field of view: 5 × 4 mm 0.197 × 0.157 in, Installation distance: 27±1.0 mm 1.063±0.039 in	ANPD060-05
	Field of view: 6 × 4.8 mm 0.236 × 0.189 in, Installation distance: 30±1.5 mm 1.181±0.059 in	ANPD060-06
	Field of view: 10 × 8 mm 0.394 × 0.315 in, Installation distance: 100±5.0 mm 3.937±0.197 in	ANPD060-10
	Field of view: 12 × 10 mm 0.472 × 0.394 in, Installation distance: 110±5.5 mm 4.331±0.217 in	ANPD060-12
	Field of view: 15 × 12 mm 0.591 × 0.472 in Installation distance: 65±3.0 mm 2.559±0.118 in	ANPD060-15
	Field of view: 20 × 16 mm 0.787 × 0.630 in Installation distance: 80±4.0 mm 3.150±0.157 in	ANPD060-20
	Field of view: 25 × 20 mm 0.984 × 0.787 in Installation distance: 200±10 mm 7.784±0.394 in	ANPD060-25
	Field of view: 30 × 25 mm 1.181 × 0.984 in Installation distance: 55±2.5 mm 2.165±0.098 in	ANPD060-30
	Field of view: 10 × 8 mm 0.394 × 0.315 in, Installation distance: 45±2.0 mm 1.772±0.079 in	ANPD060S10
	Field of view: 25 × 20 mm 0.984 × 0.787 in Installation distance: 105±5 mm 4.134±0.197 in	ANPD060S25
2D Code reading sensor PD65	Field of view: 12 × 10 mm 0.472 × 0.394 in, Installation distance: Contact type	ANPD065-12
	Field of view: 25 × 20 mm 0.984 × 0.787 in, Installation distance: Contact type	ANPD065-25

Cameras and Camera cables   ○ : Applicable model

Product Name	Specification	Model No.	PV200	PV500V2	AG50V3	A230	A210V2/A110V2	AE20	PD60/65
Megapixel camera	—	ANAG5811			○				
Double speed random camera (C mount)	Progressive, CE product	ANM831			○	○	○		
Standard camera (C mount)	with 3 m 9.843 ft cable	ANM832				○	○		
	with 30 cm 0.984 ft cable	ANM83203				○	○		
	with 3 m 9.843 ft cable, CE product	ANM832CE				○	○		
0.3M Gray camera	0.3M	ANPVC1040	○	○					
2M Gray camera	2M	ANPVC1210	○	○					
0.3M Color camera	0.3M	ANPVC2040	○						
2M Color camera	2M	ANPVC2260	○						
4M Monochrome camera	4M	ANPVC1470	○						
Double speed random camera cable for AG50V3	Camera cable: 3 m 9.843 ft for AG50V3 random camera	ANAG58213			○				
Camera extension cable	2 m 6.562 ft extension: total 5 m 16.404 ft for AG50V3 random camera	ANM84002			○				
	2 m 6.562 ft extension: total 5 m 16.404 ft	ANM84002A				○	○		
	2 m 6.562 ft extension: total 5 m 16.404 ft	ANM84002ACE				○	○		
	7 m 22.966 ft extension: total 10 m for AG50V3 random camera	ANM84007			○				
	7 m 22.966 ft extension: total 10 m 32.808 ft	ANM84007A				○	○		
	7 m 22.966 ft extension: total 10 m 32.808 ft	ANM84007ACE				○	○		
	12 m 39.370 ft extension: total 15 m 49.213 ft for AG50V3 random camera	ANM84012			○				
	12 m 39.370 ft extension: total 15 m 49.213 ft	ANM84012A				○	○		
	12 m 39.370 ft extension: total 15 m 49.213 ft	ANM84012ACE				○	○		
	17 m 55.774 ft extension: total 20 m 65.617 ft for AG50V3 random camera	ANM84017			○				
	17 m 55.774 ft extension: total 20 m 65.617 ft	ANM84017A				○	○		
	17 m 55.774 ft extension: total 20 m 65.617 ft	ANM84017ACE				○	○		
Megapixel camera cable	3 m 9.843 ft	ANM84103			○				
	5 m 16.404 ft	ANM84105			○				
	10 m 32.808 ft	ANM84110			○				
	15 m 49.213 ft	ANM84115			○				
	20 m 65.617 ft	ANM84120			○				

Camera cables ○ : Applicable model

Product Name	Specification	Model No.	PV200	PV500V2	AG50V3	A230	A210V2/A110V2	AE20	PD60/65
Double-speed random camera cable	3 m 9.843 ft	ANM84303				○	○		
	3 m 9.843 ft CE product	ANM84303CE				○	○		
	2 m 6.562 ft extension: total 5 m 16.404 ft	ANM84502				○	○		
	7 m 22.966 ft extension : total 10 m 32.808 ft	ANM84507				○	○		
	12 m 39.370 ft extension: total 15 m 49.213 ft	ANM84512				○	○		
	17 m 55.774 ft extension: total 20 m 65.617 ft	ANM84517				○	○		
	Flexible random camera cable: 3 m	ANM84603				○	○		
Camera cable	3 m 9.843 ft	ANPVC8103	○	○					
Flexible camera cable	3 m 9.843 ft	ANPVC8103R	○	○					
	5 m 16.404 ft	ANPVC8105	○	○					
	5 m 16.404 ft	ANPVC8105R	○	○					
	10 m 32.808 ft	ANPVC8110	○	○					
	10 m 32.808 ft	ANPVC8110R	○	○					

Keypads ○ : Applicable model

Product Name	Specification	Model No.	PV200	PV500V2	AG50V3	A230	A210V2/A110V2	AE20	PD60/65
Operational keypad for A series	with 2 m 6.562 ft cable	ANM85202			○	○	○		
	with 2 m 6.562 ft cable, CE product	ANM85202CE				○	○		
	with 3 m 9.843 ft cable	ANM85203			○	○	○		
	with 3 m 9.843 ft cable, CE product	ANM85203CE				○	○		
	with 5 m 16.404 ft cable	ANM85205			○	○	○		
	with 5 m 16.404 ft cable, CE product	ANM85205CE				○	○		
	with 10 m 32.808 ft cable	ANM85210			○	○	○		
	with 10 m 32.808 ft cable, CE product	ANM85210CE				○	○		
Keypad for PV series	3 m 9.843 ft	ANPVP03	○	○					
	10 m 32.808 ft	ANPVP10	○	○					

Lens ○ : Applicable model

Product Name	Specification	Model No.	PV200	PV500V2	AG50V3	A230	A210V2/A110V2	AE20	PD60/65
For 0.3M camera	f6 C mount lens with lock	ANB842NL	○	○	○	○	○		
	f8.5 C mount lens with lock	ANB843L	○	○	○	○	○		
	f16 C mount compact lens with lock	ANB845NL	○	○	○	○	○		
	f25 C mount compact lens with lock	ANB846NL	○	○	○	○	○		
	f50 C mount lens with lock	ANB847L	○	○	○	○	○		
	f16 C mount ultra compact lens with lock	ANM88161	○	○	○	○	○		
	f25 C mount ultra compact lens with lock	ANM88251	○	○	○	○	○		
	f50 C mount compact lens with lock	ANM88501	○	○	○	○	○		
For Megapixel camera	f=16	ANPVL162	○	○	○				
	f=25	ANPVL252	○	○	○				
	f=50	ANPVL502	○	○	○				

Middle rings ○ : Applicable model

Product Name	Specification	Model No.	PV200	PV500V2	AG50V3	A230	A210V2/A110V2	AE20	PD60/65
For C mount/CS mount lens	Set (40/20/10/5/1/0.5 mm 1.575/0.787/0.394/0.197/0.039/0.020 in middle ring)	ANB848		○	○				
	5 mm 0.197 in middle ring	ANB84805		○	○				

Monitors and Monitor cables ○ : Applicable model

Product Name	Specification	Model No.	PV200	PV500V2	AG50V3	A230	A210V2/A110V2	AE20	PD60/65
XGA monitor	24 V DC, 10.4 inches	ANPVM11021	○	○	○				
NTSC monitor	24 V DC, 5.7 inches	ANMA811				○	○		
BNC connector	Monitor BNC jack to PIN jack adapter	ANM8606							
Monitor cable	Length: 3 m 9.843 ft, BNC-Pin (RCA)	ANM87303				○	○		
For VGA monitor and XGA monitor	Monitor cable: 3 m 9.843 ft	ANMX83313	○	○	○				
	Monitor cable: 5 m 16.404 ft	ANMX83315	○	○	○				

Others ○ : Applicable model

Product Name	Specification	Model No.	PV200	PV500V2	AG50V3	A230	A210V2/A110V2	AE20	PD60/65
Attachment bracket	For mounting AE20 and PD60	ANE8870						○	○
I/O terminal block	For input: 1 piece, for output, 1 piece	ANMA8001				○	○		
Options (repair parts)	Set with PD65 guide pipe, packing, and stop screws	ANPD068-G1							○
	Set with PD65 guide pipe (short pipe type), packing, and stop screws	ANPD068-G2							○
	Power supply I/O cable (2700 mm 106.299 in) for PD 60	ANPD068-K1							○
	Set with PD60 front panel, packing, and stop screws	ANPD068-P1							○
	Set with PD60 front panel (narrow view type), packing, and stop screws	ANPD068-P2							○
LightPix AE20 Optional cable	RS232C cable, Length: 3 m 9.843 ft	ANE2803						○	
Extension cables	3 m 9.843 ft	ANPD068-03							○
	5 m 16.404 ft	ANPD068-05							○
	10 m 32.808 ft	ANPD068-10							○
RS232C cable	For PC connection, 3 m 9.843 ft	AFB85853	○	○	○				
COM. port connecting cable	For PLC (discrete-wire cable) connection, 2 m 6.562 ft	AIP81842	○	○	○				
	COM port and PC (D-SUB : 9 pin) connection, 3 m 9.843 ft	ANM81103				○	○		
	COM port and PLC (discrete-wire cable) connection, 3 m 9.843 ft	ANM81303				○	○		