

PV200

- FIBER SENSORS
- LASER SENSORS
- PHOTOELECTRIC SENSORS
- MICRO PHOTOELECTRIC SENSORS
- AREA SENSORS
- LIGHT CURTAINS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- SIMPLE WIRE-SAVING UNITS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- ENDOSCOPE
- LASER MARKERS
- PLC / TERMINALS
- HUMAN MACHINE INTERFACES
- ENERGY CONSUMPTION VISUALIZATION COMPONENTS
- FA COMPONENTS
- MACHINE VISION SYSTEMS**
- UV CURING SYSTEMS



Improved inspection reliability while reducing engineering time

Features

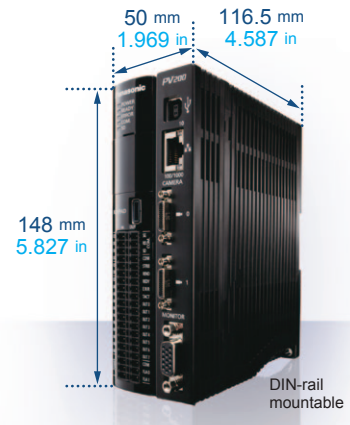
- **Ultra-compact body**
- **High accuracy inspection & Man-hour reduction**
 - Color and grey images can be simultaneously captured for inspection.
 - Compatible with 4 M pixel grey camera
 - “3+1” Quad processor provides ultra-high speed parallel processing, significantly reducing the inspection time.
 - The grey preprocess filters minimize the influence of variations in the lighting or object conditions, allowing for more accurate and reliable appearance inspections.
- Smart edge(Circle) / (Line), Geometry calculation and Screen Customization
- A variety of solution tools, including Smart Edge for circles/lines, Geometric Operation, Connector Checker and Screen Customization
- “PVWIN200” setup software for easy setup and continuous simulation

Available for download from our website free of charge

HARDWARE

Compact & High performance

Image processing with impressive accuracy and performance can now be achieved while requiring a surprisingly low implementation and programming time. The new ideal machine is a color/grey combination type.



Camera selections



Five types of cameras, including a 4M grey camera, are available with the system. You can choose color and/grey cameras according to application requirement.

Color cameras



[0.3M pixel]



[2M pixel]

Grey cameras



[0.3M pixel]



[2M pixel]



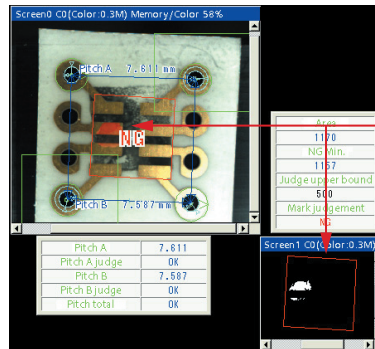
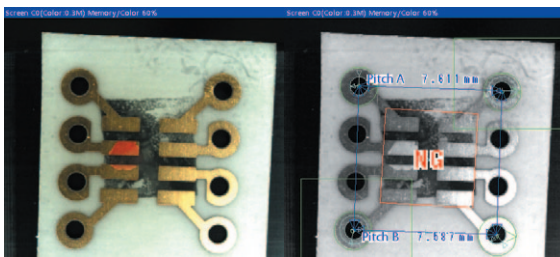
[4M pixel]

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

- Applications
- Machine Vision Systems
- PV200**
- PV500V2

Color/grey combination inspection

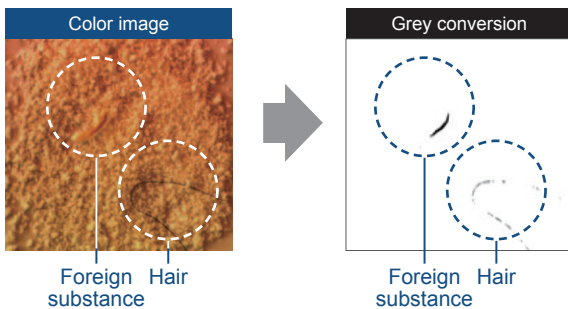
High definition color and grey cameras can be simultaneously connected. Inspections with color and grey images can be conducted concurrently.



Color images clearly show red bad marks, which are difficult to detect with grey images.

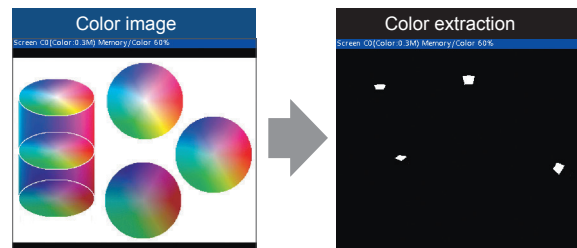
Grey conversion

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



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).



HIGH SPEED AND HIGH ACCURACY

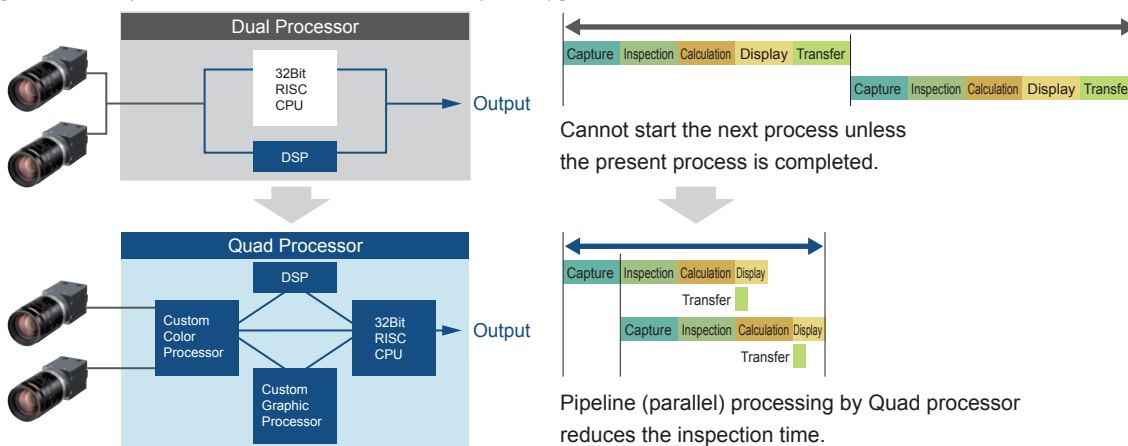
Quad processor, DSP processing & pipeline processing

"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: High-speed DSP is a processor dedicated for realtime image and grey pre-process filtering.
- Fan-less structure and high hardware reliability in standalone mode

[Process comparison with our conventional model (PV310)]



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

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PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

ENDOSCOPE

LASER MARKERS

PLC / TERMINALS

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Applications

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PV500V2

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HIGH RELIABILITY

Smart edge (Circle)/(Line)

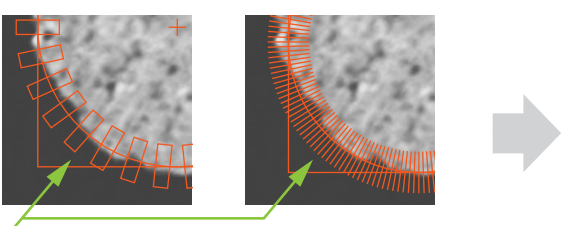


Complicated inspection processes can be easily performed with highly accurate measurements.

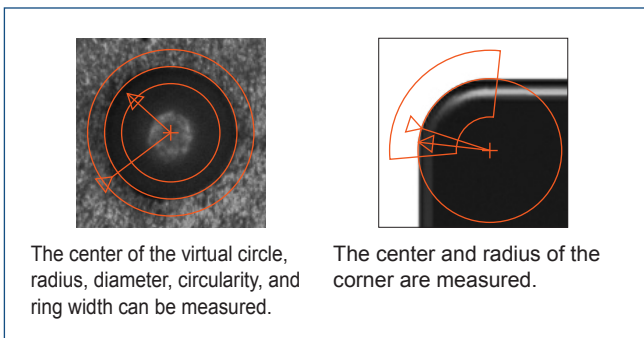
A function for accurate approximation of circles/lines

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.

Smart Edge (circle) setting example



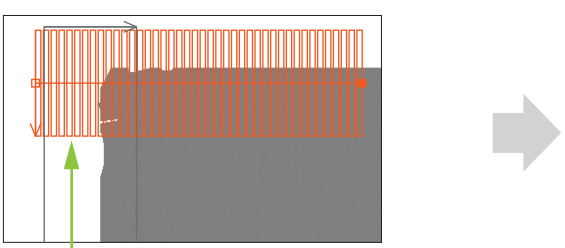
One cell can have a minimum width of one pixel (linear scanning), and a maximum of 3,600 cells can be set per 0.1°.



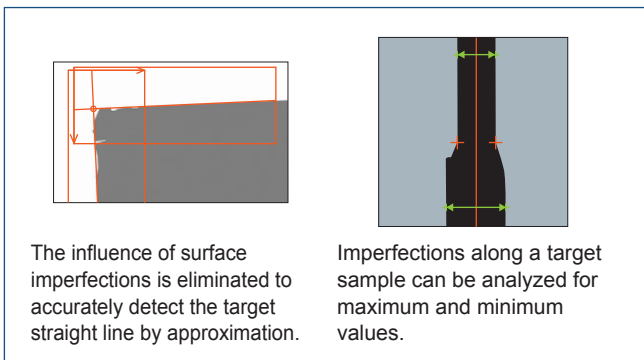
The center of the virtual circle, radius, diameter, circularity, and ring width can be measured.

The center and radius of the corner are measured.

Smart Edge (line) setting example



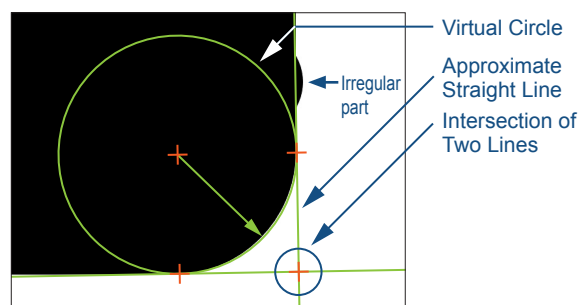
A maximum of 3,000 cells can be set.



The influence of surface imperfections is eliminated to accurately detect the target straight line by approximation.

Imperfections along a target sample can be analyzed for maximum and minimum values.

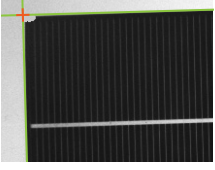
Geometry calculation



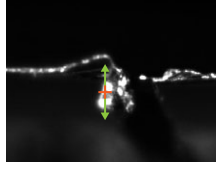
Distances, intersections, and median lines can be detected.

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 dimension and position measurements.

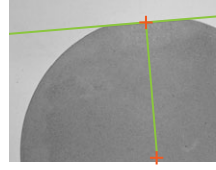
Application



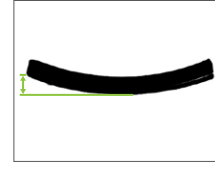
[Intersection coordinate/angle measurement]



[Burr height measurement]



[Angle/perpendicular distance measurement]

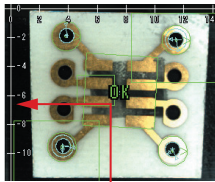


[Warpage height measurement]

Screen customization

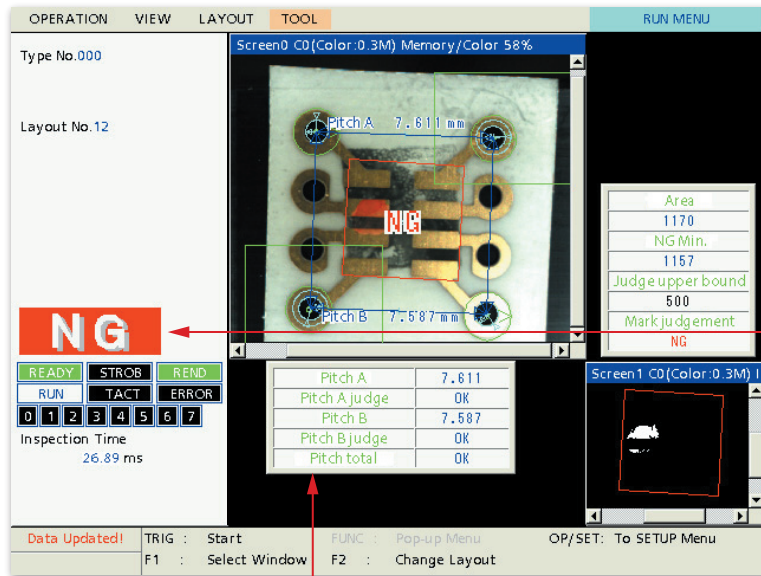


The PV200 has been designed to simplify implementation in both pre-production and post-production.



Unit conversion axes

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



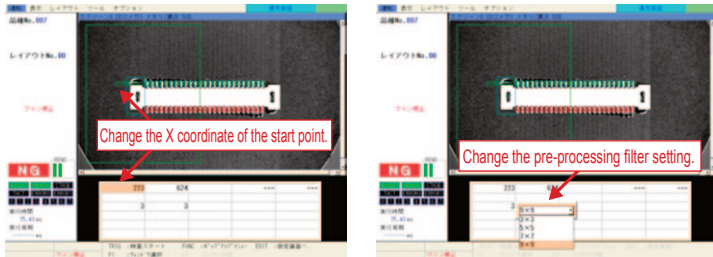
Operation customization by external signal

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

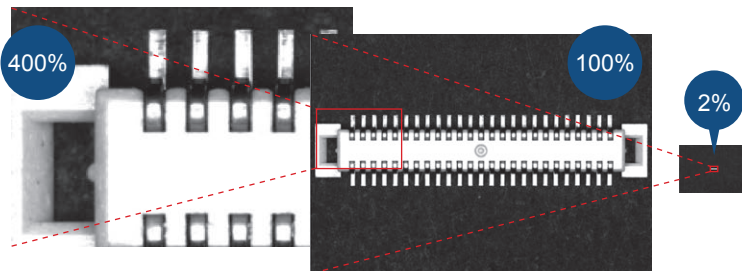
Program modifications can be quickly made in the RUN mode without replacing the program or switching to the setting screen. This is useful in cases where changes to the inspection area and pre-processing parameters must be made after the program has been finalized.

[Modification examples]



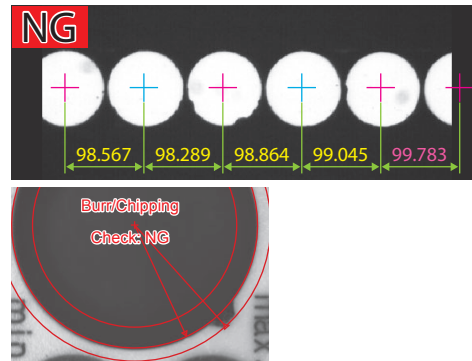
Zoom

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



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. It is also possible to specify the character size, fill regions and switch the drawn item colors or turn on/off the display of the items according to the pass/fail check results.



Layout

The VGA screen (640 × 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, and up to 16 patterns can be registered. The information displayed can be switched, according to the current status, by using an external signal as well as the keypad.

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Machine Vision Systems

Grey preprocess filters



21 types of grey 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
Flaw detection	<ul style="list-style-type: none"> • Tophat • Dynamic • Frequency Extraction
Noise removal	<ul style="list-style-type: none"> • Dilation • Erosion • Erosion → Dilation • Dilation → Erosion
Rotating and flipping	<ul style="list-style-type: none"> • Rotation • Reflect

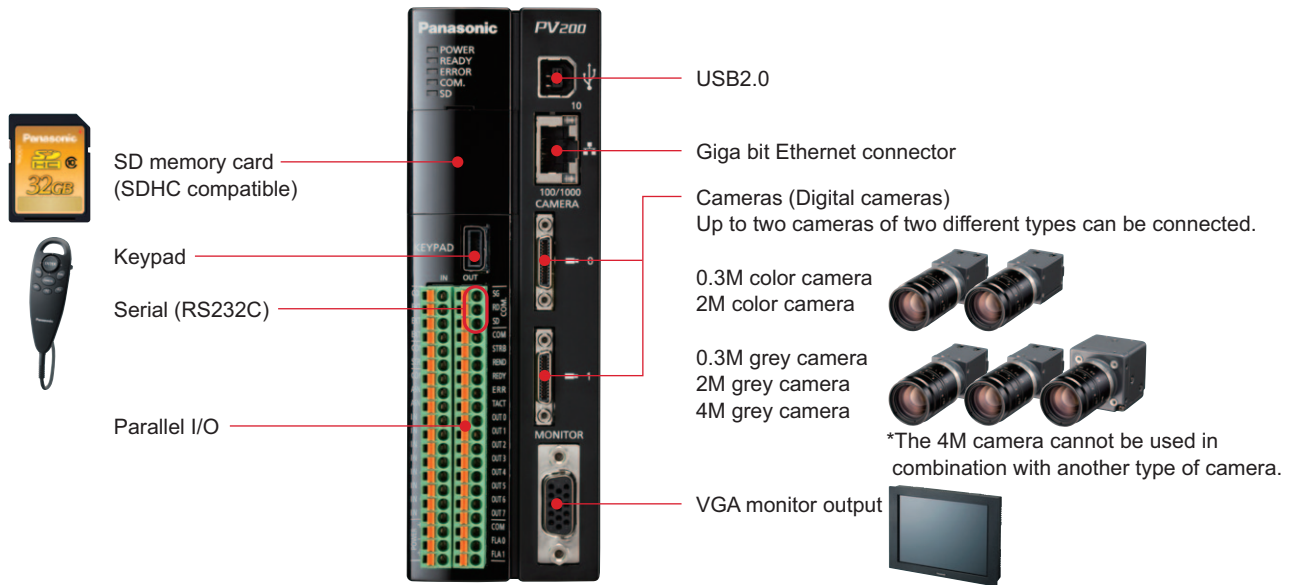
Main purpose	Filter name
Contour enhancement	<ul style="list-style-type: none"> • Sobel • Prewitt • Laplacian • Edge Extraction X • Edge Extraction Y • Sharpen
Blurring	<ul style="list-style-type: none"> • Median • Smoothing
Gray scale changing	<ul style="list-style-type: none"> • Auto Correction • Gray 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

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SYSTEM CONFIGURATION

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



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PART NUMBERS

Controller units / Cameras / Keypads / Monitors

<p>PV200 IMAGECHECKER controller</p> <p>[2-camera type] ANPV0202ADP</p>	<p>Digital cameras for PV200</p> <p>0.3M color camera (Quad-speed) ANPVC2040</p> <p>2M color camera ANPVC2260</p> <p>0.3M grey camera (Quad-speed) ANPVC1040</p> <p>2M grey camera ANPVC1210</p> <p>4M grey camera ANPVC1470</p>	<p>Keypads</p> <p>3 m 9.843 ft type ANPVP03</p> <p>10 m 32.81 ft type ANPVP10</p>	<p>Camera cables for PV200</p> <p>3 m 9.843 ft type ANPVC8103</p> <p>5 m 16.405 ft type ANPVC8105</p> <p>10 m 32.81 ft type ANPVC8110</p>	<p>Flexible camera cables</p> <p>3 m 9.843 ft type ANPVC8103R</p> <p>5 m 16.405 ft type ANPVC8105R</p> <p>10 m 32.81 ft type ANPVC8110R</p>
<p>0.3M pixel camera lenses</p> <p>f=6 with lock ANB842NL</p> <p>f=8.5 with lock ANB843L</p> <p>f=16 with lock ANB845NL</p> <p>f=16 with lock ANM88161</p> <p>f=25 with lock ANB846NL</p> <p>f=25 with lock ANM88251</p> <p>f=50 with lock ANB847L</p> <p>f=50 with lock ANM88501</p>	<p>2M pixel camera lenses</p> <p>f=16 ANPVL162</p> <p>f=25 ANPVL252</p> <p>f=50 ANPVL502</p>	<p>Adapter rings (for the 0.3M cameras and 2-megapixel cameras)</p> <p>5 mm 0.197 in × 1 ring ANB84805</p> <p>40, 20, 10, 5, 1, 0.5 mm 0.020 in × 1 ring ANB848</p>	<p>XGA monitors</p> <p>10.4 inches ANPVM11021</p>	<p>Monitor cables</p> <p>3 m 9.843 ft type ANMX83313</p> <p>5 m 16.405 ft type ANMX83315</p>

LED lighting equipment for image processing

<p>Camera attachment bracket (For 4M grey camera)</p> <p>ANPVH005</p>	<p>Digital power supply units for LED lighting</p> <p>10 W ANB86001</p> <p>30 W ANB86003</p>
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SETUP SOFTWARE

PVWIN200 setup software

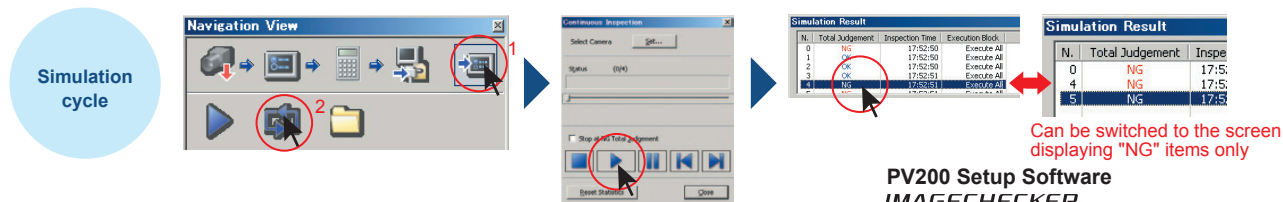


User-friendly drag-and-drop operations

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 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.



Available for download from our website free of charge

PV200 Setup Software
IMAGECHECKER
PVWIN200

SPECIFICATIONS

General specifications

Item	Specifications
Rated operating voltage	24 V 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 °F (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, double amplitude of 0.75 mm 0.030 in. , 30 minutes each in the X, Y, and Z directions
Shock resistance	196 m/s ² , 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) (Note) 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 (Note) 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

Note: 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 × 480) and 2M (1600 × 1200) grey and color cameras can be connected. Up to two 4M grey cameras can be connected. (Note)
	Monitor output	VGA (640 × 480) output
	Memory card	SD/SDHC memory card
	Serial	Models compatible with RS232C (three-wire) × 1 Modbus RTU and the PLC link function Panasonic Electric Works SUNX: FP series Mitsubishi Electric: A, Q, FX (FX1N), 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 × 1, PLCs compatible with the PLC link function Panasonic Electric Works SUNX: FP series, ET-LAN unit Mitsubishi Electric: Q series Ethernet unit

Note: The 4M grey camera cannot be used in combination with another type of camera.

Camera specifications

Item	Specifications					
Type / Part No.	4M grey / ANPVC1470	2M grey / ANPVC1210	0.3M grey / ANPVC1040	2M color / ANPVC2260	0.3M color / ANPVC2040	
Capture element	Inter line method 2/3-inch CCD fixed image element	Inter line method 1/1.8-inch CCD fixed image element	Inter line method 1/3-inch CCD fixed image element	Inter line method 1/1.8-inch CCD fixed image element	Inter line method 1/3-inch CCD fixed image element	
Pixels	2048 horizontal × 2048 vertical pixels	1600 horizontal × 1200 vertical pixels	640 horizontal × 480 vertical pixels	1600 horizontal × 1200 vertical pixels	640 horizontal × 480 vertical pixels	
	Pixel size: 3.45 μm × 3.45 μm (Square pixels)	Pixel size: 4.4 μm × 4.4 μm (Square pixels)	Pixel size: 7.4 μm × 7.4 μm (Square pixels)	Pixel size: 4.4 μm × 4.4 μm (Square pixels)	Pixel size: 7.4 μm × 7.4 μm (Square pixels)	
Frame rate	16 frams/sec max.	30 frams/sec max.	120 frams/sec max.	30 frams/sec max.	120 frams/sec max.	
Lens mount	C mount					
Ambient temperature during use (Note)	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/s ² , 1 time each in the X, Y and Z directions		700 m/s ² , 3 times each in the X, Y and Z directions			
Weight (Excluding the lens)	125g approx.	65g approx.	65g approx.	65g approx.	65g approx.	

Note: No freezing or condensation

SPECIFICATIONS

Image processing functional specifications

Item	Specifications	
Menu display	Four languages (Five 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: Grey Scale/Thresholding Group/Pre-processing Group/Color/Extraction and binary/Display area (640 × 480)	
Processing methods	Grey scale processing/Thresholding processin/Color extraction/Grey conversion	
Processing resolution	2M camera (grey/color): 1600 horizontal × 1200 vertical pixels 0.3M camera (grey/color): 640 horizontal × 480 vertical pixels 4M camera (grey): 2048 horizontal × 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 grey 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	256 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, Grey window, Binary edge, Grey edge, Feature extraction, Smart matching, Line, Flaw detection, Connector (binary window), Connector (grey window), Connector (grey 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 × 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-grey scale (0 to 255)	
Preprocess filters	Preprocessing selections: Grey conversion / Color extraction / Grey preprocessing	
	Grey conversion	Available only when a color camera is connected. For each product type, 16 groups/camera Each R/G/B value setting for grey 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.
	Grey preprocessing	For each product type, 16 groups/camera, 10 stages max. Preprocessing filters: 21 types (Dilation, Erosion, Erosion → Dilation, Dilation → Erosion, Auto correction, Grey cut, Area averaging, Correction settings, Median, Smoothing, Sobel, Prewitt, Laplacian, Edge extraction X, Edge extraction Y, Sharpen, Tophat, Dynamic, Grey difference, Rotation, and Reflect)

Item	Specifications					
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 (+, -, ×, ÷), 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 (5 × 16) 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.				
External input/output functions	○: Applicable, ×: Inapplicable	Parallel	Serial	Ethernet	SD memory card	
	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	×	○	○	—	
	Output	Scanning operation count	○	○	○	○
		Overall judgement output	○	○	○	○
		Judgement calculation (JD) result output	○	○	○	○
Numerical calculation result output		○	○	○	○	
Image output		×	×	○*1	○	
Screenshot output	×	×	○*1	○		

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

FIBER

SENSORS

LASER

SENSORS

PHOTO-

ELECTRIC

SENSORS

MICRO

PHOTO-

ELECTRIC

SENSORS

AREA

SENSORS

LIGHT

CURTAINS

PRESSURE /

FLOW

SENSORS

INDUCTIVE

PROXIMITY

SENSORS

PARTICULAR

USE

SENSORS

SENSOR

OPTIONS

SIMPLE

WIRE-SAVING

UNITS

WIRE-SAVING

SYSTEMS

MEASURE-

MENT

SENSORS

STATIC

CONTROL

DEVICES

ENDOSCOPE

LASER

MARKERS

PLC /

TERMINALS

HUMAN

MACHINE

INTERFACES

ENERGY

CONSUMPTION

VISUALIZATION

COMPONENTS

FA

COMPONENTS

MACHINE

VISION

SYSTEMS

UV

CURING

SYSTEMS

Applications

Machine Vision

Systems

PV200

PV500V2