Advanced Ultra High-Speed Imagechecker

Ultra-compact camera
Double-speed random camera
Standard camera Camera switching unit

PV310

Image Processing Device

Matsushita Electric Works, Ltd.
Automation Controls Business Unit
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Panasonic

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Panasonic Electric Works
The PV310 achieves ultra high-speed image processing by:

- utilizing two processors
  (image processor + high-performance RISC CPU)
- optimizing its software
  (unique, high-speed image processing algorithm)

Scratches, stains, chipped edges, burrs and other defects that could previously only be detected by a more upscale model can now be detected.

13 filters are available to increase the reliability and accuracy of inspections. You may combine up to 5 filters.

Image data can be saved on a CF card even during inspection, which allows you to examine the data in your office at your convenience or transfer configuration settings to another Imagechecker. You can also transfer image data via Ethernet. You can set the file name to be transferred, image output method, etc. The software which allows you to receive data is available on our website free of charge.
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High-Speed Enhancements

[High Speed 1]

Smart Matching
Detects the presence (or absence) of a pattern (object) in the search area that matches the templates registered. Detection of sub-pixel position possible with gray scale matching. In addition, using the gray scale differential processing function, shape inspection, e.g. to detect chips or other flaws in an object, can also be carried out simultaneously.

Feature Extraction
Features, such as the number of objects, the area, central coordinates, angle of the main axis, projection width or perimeter length, can be extracted using a binary image.

Gray Scale Window
An area can be created in a 256 gray scale image, with a rectangular, circular or polygonal shape over the area where object detection is to take place. An average value for the brightness data (gray scale value) for all pixels in that area can be calculated.

[High Speed 2]

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[High Speed 3]

Gray Scale Edge
The distance between lead pins or pitch size can be measured for an inspection object. Parameters allow settings to be made in great detail. Using the extreme accuracy of sub-pixel processing, the edge in question can be reliably extracted for a wide variety of object states.

Binary Window
Judges whether a certain amount of area for an object is present using a binary image. High-speed processing is 20 times as fast as previous models, even when multiple inspection areas are specified.

Binary Edge
Determination of position and simple size measurement can be carried out at approximately twice the speed of previous models. There is no effect on inspection speed even if the inspection area is increased for purposes of stability.

Rich Information Display
The high performance VGA monitor displays inspected objects on the screen with high fidelity. Operations and settings can be carried out easily via the pull-down menus and keypad.

Readability has been improved by displaying guidelines and character information in color and using a large character font. In addition, parallel inspection output results can be monitored in color.

User-Friendly Interface
An operation keypad makes configuration as easy as child’s play. The color display is easy to read and allows you to grasp information quickly.

Menu Background Settings
A semi-transparent mode, allowing operations to be carried out while viewing captured images, and a fill mode, which blocks out background colors, are both supported. You can select the menu background color and set it as default.

Data Monitor
Up to 50 inspection results can be displayed in a list on the monitor, allowing the operator to check the results on the monitor. Threshold adjustment (upper and lower limit values) can also be changed on the data monitor without having to enter them in the settings menu. The size and display position can also be changed.

The PV310 can be used for a wide range of applications where high-speed processing is required, e.g. inspecting:
- Presence/absence of parts
- Part size
- Part orientation
- Presence/absence of date or serial no.
- Product nameplate label
- Remote control switch printing
- Cap tightness
- Logo mark printing
- Flat cable width
- Label position
- Debris/dirt on part
- 7-segment illumination
- Substrate positioning
- Metal part picking, etc.
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[High Speed 4]

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- Metal part picking, etc.

PV310
**Full Selection of Interfaces**

External interfaces are essential for image processing devices of the future. The PV310 is equipped with a full selection of interfaces that rival even large-scale devices.

**Ethernet Connection**
- The PV310 can be connected to a LAN using high-speed Ethernet (100BASE-TX) to meet various application requirements.
- Captured images and measurement data can be transmitted to a PC at high speed even during operation.
- The inspection status of multiple PV310 units can be monitored from a single PC.
- With the high-speed connection to a PC, backing up image data is also easy.

**Operation Keypad**
The dedicated keypad with an ergonomic structure provides excellent operability.

**PLC Link Function**
- The PV310 can communicate easily with external devices, such as PLCs, using the RJ232C port.
- The PV310 can be connected to other companies’ PLCs without requiring additional programming. Of course it can be connected to our PLCs, too.

Supported Models:
- Mitsubishi Electric Works PLCs
- Omron Corporation C, CV and CS1 series
- Mitsubishi Electric Corporation A, Q and FX series
- Rockwell Automation DF1 protocol
- Fuji Electric SX series

**VGA Monitor**
Judgment results and program settings are displayed in color for outstanding visibility. (Captured images are in black and white.)

Note: Commercially available VGA monitors may also be connected (devices supporting horizontal synchronous frequency: 31.466KHz and vertical synchronous frequency: 59.94KHz only.)

Operation cannot be guaranteed with devices from other manufacturers.

**External Memory (CF Card) Support**
- In FILE mode:
  - Can save captured images.
  - [Storage capacity: Approx. 2,000 images (0.12 MB)]
  - Saves inspection results.
  - Facilitates trend tracking and data analyses.

- In the setting mode:
  - Backs up setting data and image data captured by the unit.
  - Note: Backup image data can be used as regular bitmap files on a PC.

**Connection of up to Two Identical Cameras**
Up to two identical cameras can be connected. The following camera types are available.
- Standard camera (ANM832 (CE))
- Double-speed random camera (ANM831)
- Ultra-compact camera (APVCA1012)

**Connection of up to Four Cameras by a Camera Switching Unit**
Up to four identical standard or double-speed random cameras can be connected using a camera switching unit (option: ANPV3700).

* Excluding Ultra-compact camera
* This connection is ideal for:
  - Control of different inspections by a single controller unit
  - Inspection of wide areas, and positioning of workpieces during the LCD lamination process, etc.

**PV310 Two cameras**

**Gray Scale Window**
An inspection area can be created in a 256 gray scale image, with a rectangular, circular or polygonal shape. Over the area where object detection is to take place, an average value for the brightness data (gray scale value) for all pixels in that area can be calculated.

**Feature Extraction**
Features, such as the number of objects, workpieces, area, central coordinates, angle of the main axis, projection width or perimeter length can be extracted.

**Smart Matching**
- **Difference detected =**
- **Detection Image**
- **Matching Template**
- **Detection Image**

**Differential Function**
Detection of sub-pixel position possible with gray scale matching. In addition, using the gray scale differential processing function, shape inspection, etc., can also be carried out simultaneously. Memory capacity has been increased 4 times over previous models, allowing support for an even wider range of applications.

**Smart Matching**
- **Multiple Adjustment**
- **Position Adjustment**
- **Rotation Adjustment**
- **Multiple Adjustment**
- **Priority Adjustment**

**Rotation/Position Adjustment**
Highly accurate and reliable inspection is realized by automatically adjusting object orientation and stop position deviation. Complicated adjustments are also possible using the multiple adjustment function.

**Numerical Calculation/ Judgment Output**
The numerical output function has been greatly simplified so that even a novice can set it easily. Operation has also become even easier as both numerical calculations and judgment output can now be set on the same screen (up to 96 formulas).

**Mask**
The shape of the inspection area can be set to match particular targets. Mask area settings can also be combined to allow efficient inspections to be carried out only on the necessary parts.

**Functions**
Inspection programs for as many as 64 product types can be set.

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- With the high-speed connection to a PC, backing up image data is also easy.

**External Memory (CF Card) Support**
- In FLIN mode:
  - Can save captured images.
  - Storage capacity: Approx. 2,000 images (12 MB)
  - Saves inspection results.
  - Facilitates trend tracking and data analyses.
- In the setting mode:
  - Back up setting data and image data captured by the unit.
Note: Backup image data can be used as regular bitmap files on a PC.

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- The PV310 can communicate easily with external devices, such as PLCs, using the RS232C port.
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- Siemens PLCs

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**360° Contour Matching**
Stable position detection is possible even for objects that overlap because their contours can be extracted. The range of settings has been doubled and support has been added for 4 cameras.

**Rotation/Position Adjustment**
Highly accurate and reliable inspection is realized by automatically adjusting object orientation and stop position deviation. Complicated adjustments are also possible using the multiple adjustment function.

**Functions**
Inspection programs for as many as 64 product types can be set.

**Smart Matching**
Detection of sub-pixel position possible with gray scale matching. In addition, using the gray scale differential processing function, shape inspection, etc., can also be carried out simultaneously Memory capacity has been increased 4 times over previous models, allowing support for an even wider range of applications.

**Differential Function**
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 fail-safe judgments.

**Numerical Calculation/ Judgment Output**
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The shape of the inspection area can be set to match particular targets. Mask area settings can also be combined to allow efficient inspections to be carried out only on the necessary parts.

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A full range of inspection modes to meet customers’ needs. Support functions for optimal settings.

Support
Our popular menus and support software greatly improve workability during inspections.

Download from CF Card
A program stored on a Compact Flash card can be downloaded to the controller unit using a parallel external signal.

Statistical Support
Statistical data such as the maximum, minimum and average values, number of failed results, etc. can be displayed. Maximum, minimum and average values in pass judgments can be checked, allowing them to be used as a guide for subsequent upper and lower limit settings.

Parallel Handshake Support
Parallel external output of 96 inspection and numerical calculation results is available.

Full Peripheral Support with "AXTOOL" Vision Support Tool
The “AXTOOL” Vision Support Tool is full of enhanced functions and connects to PV310s using a high-speed interface (100BASE-TX) to meet various application requirements.

Settings
This function helps the user make settings that in the past relied heavily on human judgment, e.g. setting the focus, adjusting the aperture, finding the optimal settings for the parallel monitor, lighting adjustment, density profile display, etc.

Collective Movement
Checkers that have been set can be moved collectively all at once. This is useful for fine adjustment when re-setting cameras. It is also convenient when transferring product type data to a different device.

Security
Passwords can be set in “environment” - “initial settings”. Vital setting data can be protected from careless operating errors.

Image Storage
Using a calendar function, the date a defect was discovered and the number of inspections can be added to saved color images. This is useful for later verification (checking a defective product against a saved image) and for analyzing defect tendencies.

Global Support
(Multi-language Display & CE Compliance)
Considering that the device may be shipped overseas, the display can be switched between 6 different languages. The controller and dedicated cameras are standardized items and CE compliant.

Inspection Mode
The PV310 is equipped with a variety of inspection modes, such as position adjustment, rotation adjustment, gray scale and binarization, to support a wide range of inspection needs.

Feature Extraction
Smart Matching
Contour Matching
Flaw Detection

Download AXTOOL for free from:
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A full range of inspection modes to meet customers’ needs. Support functions for optimal settings.

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**Print Screen**
Display and settings screens can be saved to a memory card as bitmap files. This is convenient for creating documents or for checking previous images.

**Download AXTOOL for free from:**
http://www.mew.co.jp/ac/e/fasys/vision/
### Dimensions (Unit: mm)

- **Main Unit (Controller)** ANM8522\*CE
- **Operation Keypad** ANM8522\*CE
- **Standard Camera: CS-Mount** AMM8332/AMM8332CE/AMM8332D
- **Ultra-Compact Camera** ANPVCA1012
- **VGA Monitor** ANM832/ANM832D/ANM832CE
- **Double-Speed Random Camera (C-Mount)** AMM8330
- **Double-Speed Random Camera Cable (Durable Type)** ANM8430
- **Lens**
  - Mounting screws ( keine with lock only)
  - C mount super-compact lens with lock
  - C mount compact lens
  - C mount compact lens with lock
  - C Mount
  - Gray scale processing - Binary processing
  - edge

### Part Nos. and Specifications

#### Part Nos.

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<th>Product Name</th>
<th>Specification</th>
<th>Part No.</th>
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<td>Controller</td>
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<td>Double-Speed Random Camera (C-Mount)</td>
<td>ANM845</td>
<td>ANM845-300</td>
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<td>Standard Camera (CS-Mount)</td>
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<td>AMM845-300</td>
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<td>Double-Speed Random Camera Cable</td>
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<td>Ultra-Compact Camera</td>
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<td>VGA Monitor</td>
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<td>With Keypad Connector</td>
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<td>Without Keypad Connector</td>
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#### General Specifications

- **Controller**: ANPV310
  - **Input**: 100 to 240 V AC (50/60 Hz) / 85 to 264 V DC
  - **Output**: 12 V DC
  - **Power Consumption**: 24 W
  - **Ambient Temperature**: 0 to 50°C
  - **Humidity**: 10 to 90% RH (non-condensing)
  - **Weight**: 0.8 kg

- **Random Camera**: ANM845
  - **Input**: 100 to 240 V AC (50/60 Hz) / 85 to 264 V DC
  - **Output**: 12 V DC
  - **Power Consumption**: 12 W
  - **Ambient Temperature**: 0 to 50°C
  - **Humidity**: 10 to 90% RH (non-condensing)
  - **Weight**: 0.8 kg

- **Double-Speed Random Camera**: AMM845\*\*
  - **Input**: 100 to 240 V AC (50/60 Hz) / 85 to 264 V DC
  - **Output**: 12 V DC
  - **Power Consumption**: 12 W
  - **Ambient Temperature**: 0 to 50°C
  - **Humidity**: 10 to 90% RH (non-condensing)
  - **Weight**: 0.8 kg

- **Ultra-Compact Camera**: ANPV310
  - **Input**: 100 to 240 V AC (50/60 Hz) / 85 to 264 V DC
  - **Output**: 12 V DC
  - **Power Consumption**: 12 W
  - **Ambient Temperature**: 0 to 50°C
  - **Humidity**: 10 to 90% RH (non-condensing)
  - **Weight**: 0.8 kg

- **VGA Monitor**: ANM832\*\*
  - **Input**: 100 to 240 V AC (50/60 Hz) / 85 to 264 V DC
  - **Output**: 12 V DC
  - **Power Consumption**: 12 W
  - **Ambient Temperature**: 0 to 50°C
  - **Humidity**: 10 to 90% RH (non-condensing)
  - **Weight**: 0.8 kg

### Functional Specifications

- **Image Processing Functional Specifications**
  - **Max. Resolution (in use)**: 1920 × 1080 pixels
  - **Frame Memory**: 1024 × 1080 pixels
  - **Max. Frame Rate**: 25 frames per second (fps)
  - **Max. Product Type**: 64 types
  - **Max. Number of Product Types**: 8
  - **Resolution Function**: Support of D-SUB: 9 pins)
  - **Statistics**: Max. 50 product types
  - **Judgment Output**: Max. 50 product types
  - **Input/Output**: RS-232C x 1 channel, RS-422A/B x 1 channel, RS-485 x 1 channel
  - **Camera Switch Unit**: ANPV310
    - **Input**: 100 to 240 V AC (50/60 Hz) / 85 to 264 V DC
    - **Output**: 12 V DC
    - **Power Consumption**: 12 W
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Dimensions (Unit: mm)

- **Main Unit (Controller) ANPV0310EDN**
- **VGA Monitor ANMV6301**
- **Camera Switching Unit ANPV0370**
- **240mm x 190mm x 56mm ( at 25°C C (no freezing or condensation) Max. 64 types Max. 96 functions/product type Functions: not shift/cut/split images/2-camera input - 1-camera output of left/right split images Functions: not shift/cut/split images/2-camera input - 1-camera output of left/right split images
cameras, or ultra-compact cameras (max. 4 cameras when using camera switching unit, excluding ultra-compact camera)

General Specifications

- **Controller: ANPV0310**
  - Current consumption: 600 mA
  - Operating voltage range: 24 V DC
  - Power consumption: Approximately 450 W
  - Operating environment: 0 to 50°C, 0 to 85% RH
  - Weight: 3.5 kg
  - Dimensions: 550 x 450 x 120 mm

- **Camera Switching Unit: ANPV0370**
  - Current consumption: 600 mA
  - Operating voltage range: 24 V DC
  - Power consumption: Approximately 450 W
  - Operating environment: 0 to 50°C, 0 to 85% RH
  - Weight: 3.5 kg
  - Dimensions: 550 x 450 x 120 mm

Functional Specifications

- **Input/Output**
  - 14 input, photo-coupler bidirectional input
  - 2 output, photo-coupler bidirectional output (acronymous)
  - 1 input, photo-coupler bidirectional input
  - 2 output, photo-coupler bidirectional output (acronymous)

- **Communication**
  - RS-232C x 1 channel

- **Image Processing Functional Specifications**
  - Display Switching: Automatic
  - Switching Method: Automatic

- **VGA Monitor**
  - Cable length: 0.5 m
  - Weight: 1.2 kg
  - Dimensions: 450 x 368 x 120 mm

- **Camera Extension Cable**
  - Cable length: 0.5 m
  - Weight: 0.5 kg
  - Dimensions: 185 x 23 x 57 mm

- **Ultra-Compact Lens**
  - C mount compact lens
  - Focal length: 8.5 mm
  - Weight: 0.2 kg
  - Dimensions: 30 x 25 x 30 mm

- **Lens**
  - C mount super-compact lens with lock
  - Focal length: 8.5 mm
  - Weight: 0.2 kg
  - Dimensions: 30 x 25 x 30 mm

- **Cable**
  - Double-Speed Random Camera C: Mount ANMV8301
  - Cable length: 3 m
  - Weight: 2 kg
  - Dimensions: 185 x 23 x 57 mm

- **Password function for when moving between
  lighting adjustment/gray scale profile display
  • Matsushita Electric Works PLC
  • OMRON Corporation - C, CV and CS1 series
  • Mitsubishi Electric Corporation - A, Q and FX series

- **Parallel**
  -.NotNull/AND/OR/XOR/parenthesis
  - Functions: not shift/cut/split images/2-camera input - 1-camera output of left/right split images
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Advanced Ultra High-Speed Imagechecker