

NAIS IMAGE PROCESSING DEVICES

A-SERIES MICRO-IMAGECHECKER

A110 Single Camera and A210 Dual Camera
MULTICHECKER Version 2.0

A220 Dual Camera (OCV)
Optical Character Verification Series

A230 Dual Camera (OCR)
Optical Character Recognition Series



NAIS - We are Shaping Smart Solutions for You.

Aromat Corporation

A Subsidiary of Matsushita Electric Works

NAiS IMAGECHECKER OVERVIEW

The most advanced Machine Vision System in its class. It offers a wide range of features including sensor-less triggering, position adjustments, and it is the only vision system capable of performing internal "branched-decision" algorithms.

This algorithm allows the system to automatically switch inspection settings to detect multiple patterns such as

- inverted parts (IC inspections)*
- automatic sorting*
- multiple product inspections*

The A-SERIES IMAGECHECKER has an extensive range of functions and built-in RS232 communication protocols for several PLC 's such as

Allen Bradley (SLC500),

Mitsubishi (FX0,A),

Omron (C),

and Matsushita (FP Series).

In addition the A SERIES MULTICHECKER is manufactured by Matsushita Electric Works, Ltd. Which guarantees a high quality product with a proven history of reliable operation. It is the preferred stand-alone vision system in Japan for its easy programming, large number of checking tools, and high speed.

This compact system is ideal for any automated production lines, which require stringent quality controls and reliable visual inspection.

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Automatic Switch Mode

Branched inspection without complicated settings

Example

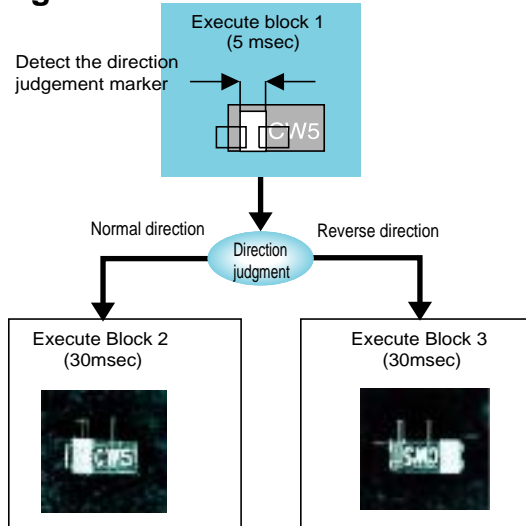
It is necessary to first make a "right side up or upside down" direction judgement, and then perform a separate inspection (character appearance or mark width measurement) based on the direction judgement.

Conventional method

- Execute all checkers and output results
 - Perform direction judgment externally and compare results
- Execution time: 65msec.**

Automatic Switch Mode

- Perform direction judgment and execute the required checker
- Execution time: 35msec!** Half the standard Execution time!



User-Defined Mode

Multiple inspections of up to three blocks without switching delay.

Example

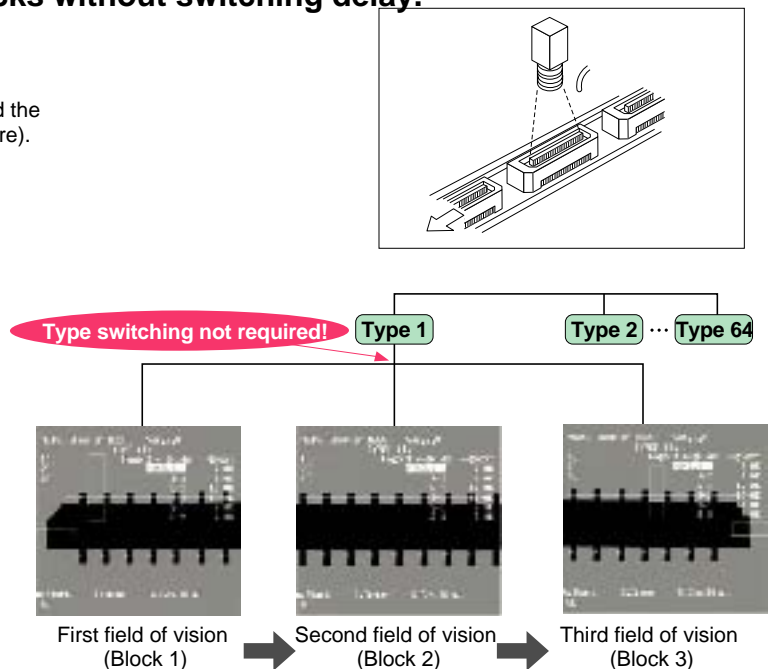
It is necessary to perform multiple continuous inspections and the part will not fit in a single the field of view (single image capture).

Conventional method

- An external device must handle the "type switching."
- Type switching control by an external device adds unnecessary execution time and there are some usage restrictions

User-Defined Mode

- Internally switches to the process block via an external signal.
 - External device is not used, so inspection time is greatly reduced!
- *Can be executed from the keypad as well.



Execute All Mode

96 checkers can be registered per type, so you can inspect many points at one time!

Example

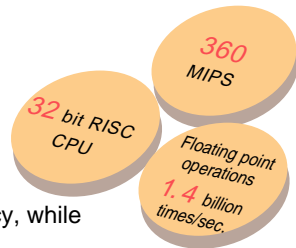
Multiple points inspections are possible simultaneously. The picture (see left) shows an LED lighting inspection. With 8 external outputs for judgment results, 96 independent inspection points for the A210 and 48 points for the A110. Allow simultaneous output of judgment results for multiple inspection points.



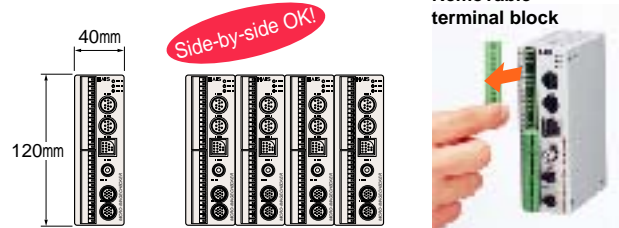
NAiS IMAGECHECKER FEATURES

Speed and precision in a super compact package (Strongest in its class)

The A series comes equipped with a 32-bit RISC, 200 MHz CPU (pipeline processing). It attains 360 MIPS (Mega Instructions per second) and 1.4 GFLOPS (Giga Floating Point Instructions per second) for high-speed processing. With our super fast CPU, increased floating point operation speed, pipeline processing, specially designed algorithms, and a large memory capacity, it achieves high performance and accuracy, while providing reliable operations.



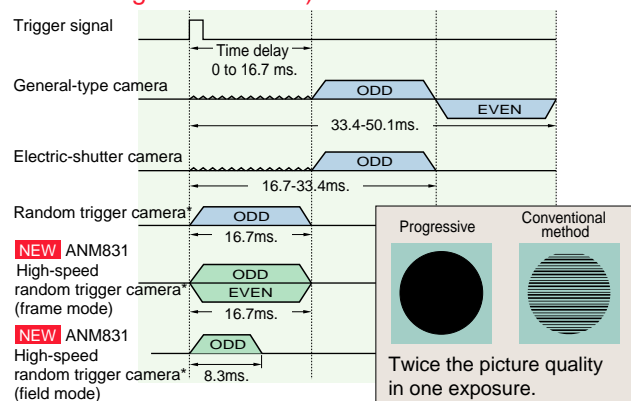
With a small footprint of 120x40mm, installation is simple. IMAGECHECKER can be DIN Rail Mounted next to each other in confined spaces. Its design provides easy wiring and removable connectors making the installation of multiple units in a single direction easy and convenient without wasting space.



High-speed random trigger camera (progressive rectangular-lattice CCD element)

The A series introduced a progressive high-speed random trigger camera that provides 3 times the maximum rate of conventional units with 1/60 second for a high-quality picture and no image degradation. In field mode, it reaches 4 times for 1/120 second. This provides fast image captures without any concerns about inspection time or image quality.

(Fastest images in its class)



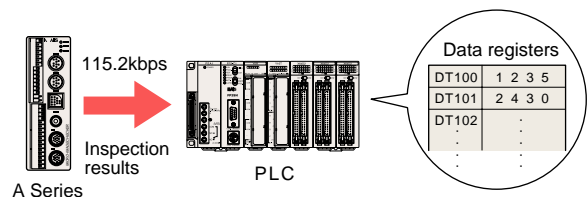
*The shutter speed on the random trigger camera, before exposure, needs to be set to 1/120 to 1/20000 seconds.

Connects to a variety of PLCs

The A Series can perform "Program type switches, Read/Write Numerical Calculations, and Inspection Results via its serial port connection (RS232) into a PLC. Without any additional or complicated PLC communication program.

Compatible PLC products

- Matsushita Electric Works FP Series
- Mitsubishi MELSEC A series/FX Series
- Omron SYSMAC-C Series
- Allen Bradley SLC Series



Inspection conditions can also be modified from the PLC!

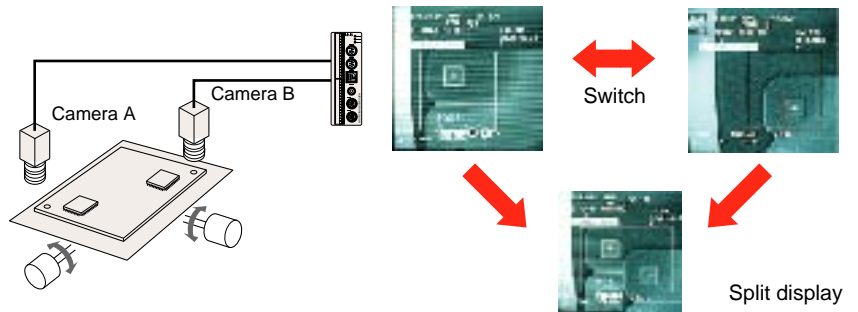
Internal synchronous signal inspection

Compatible with the internet synchronous signal (NTSC), video scopes and other manufacturer cameras may be used, depending on the model specifications and triggering type, some cameras may not be compatible. Please consult your Aromat representative.

NAiS IMAGECHECKER FEATURES

Two-image switch/split function (A210 only)

Two cameras could be use simultaneously for visual inspection such as measuring the distance between two points. It is possible to use an external signal to switch the display. It is also possible to display the captured images from both cameras, as a single image on the screen. Either vertical or horizontal split-image views are available.



Menu hide (Customize) function

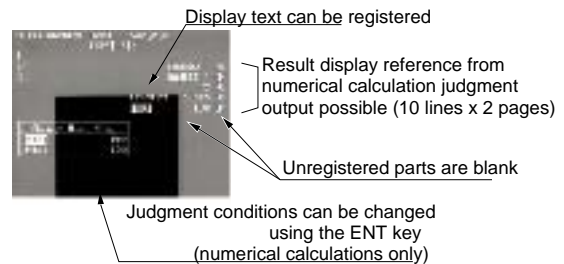
The Menu Hide function provides password protection as required for some regulated industries (reference CFR 21 Part11). It also prevents unauthorized system access or accidental configuration changes. Additionally by hiding a certain portion of the settings beforehand, reduces unnecessary menu navigation.



With the IMAGECHECKER all inspection variables may be customized. For details please contact the Aromat Corp. sales representative.

Data Monitor Function

Titles and results of numerical calculations and judgment outputs could be displayed on the inspection screen. The user could customize Numerical Calculation for display and monitoring. Additionally the user could directly change the max. and min. limits for numerical calculations directly from the display without entering system configuration menus.



Two types available to suit your application

- **A210 with two camera connection and high-end functions**



A210 shown with two cameras, controller, and keypad

- **A110 with one camera connection and cost performance.**



A110 shown with one camera, controller, and keypad.

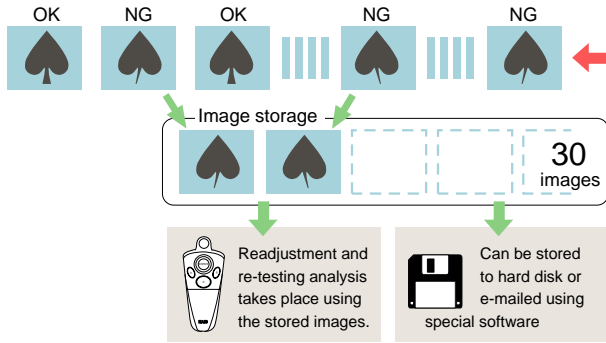
The A110 offers true cost performance. This single camera stand-alone system completely wipes away the vision industry perception, that high performance and quality image processing must always be expensive.

NAIS IMAGECHECKER FEATURES

Image storage function (A110 - A210)

A Series IMAGECHECKER can store 30 images (rejects) directly in its system memory. With VISION BACKUP TOOL Software, these images can be transfer electronically.

A maximum of *30 faulty images could be stored in the IMAGECHECKER memory, for error analysis and inspection adjustments. Standard images (Good parts) could also be stored and retrieved for machine change overs and calibration purposes. The VISION BACKUP TOOL SOFTWARE provides a safe and reliable way of archiving images, and system configuration settings for safety and replication purposes. In addition detected parts (Rejects) can be automatically illuminated so that they can be seen at a glance.



■ Vision Backup-Tool Ver.2



The product data created with the micro-image checker A series and the image data stored in the controller can be stored on a PC using Windows. Stored data can be restored to the A series controller.

A210 = Max. 30 images
A110 = Max. 8 images

Setup help function

Simple Focus, Aperture, and I/O adjustments.

The Setup Help Tools functions allow the operator to perform previously complicated tasks such as, focusing, aperture, exposure, binary level settings, and other adjustments which would required professional or experienced personnel. The IMAGECHECKER performs these tasks quantitatively (0~100% reference), and it comes equipped with an I/O test functions for easy troubleshooting. Debugging and Adjustments are easily made using the TRAP function, which halts inspection, image storage and spreadsheet functions once an error or reject inspection is detected.

Focus adjustment



Aperture adjustment



Binarization adjustment



Global application

Multi-language support and CE certification

IMAGECHECKERS support multiple languages to provide global support and usage. The A-series controllers are UL/CSA approved (File No. E219558) and conforms to CE markings.

English



Japanese



EMC(89/336/EEC)
EN50081-2
EN50082-2



File No.E219558
(C-UL)

NAiS IMAGECHECKER

MICRO-IMAGECHECKER A218 - A118 MultiChecker V2 Series

■ Specifications

		A218 Multi-checker V2	A118 Multi-checker V2
CPU		32-bit RISC CPU (high-speed processing version)	32-bit RISC CPU
Frame memory		512 x 480 (pixels) x 256 gradations	512 x 480 (pixels) x 256 gradations
Operator interface		Menu selection by specialized keypad	
Monitor display		Change between gray-scale memory/gray-scale through/binary memory (A/B/C/D/E/F)/binary through (A/B/C/D/E/F)/gray-scale NG/binary NG (A/B/C/D/E/F)	
Processing	Gray-scale	8 bit 256 gradations	
	Binarization	6 groups of binary processing from the gray-scale memory (upper and lower threshold settings)	
Number of product types		64	32
Execution modes		Execute All mode: Execute all set checkers Automatic Switch mode: Change the checker to be executed in accordance with the judgment output result User-Defined mode: Specify the checker for execution when the start signal is input	
Inspection	Position/rotation position adjustment function	Max. 96 per product type Rotation position adjustment function	Max. 48 per product type X-Y position adjustment function
		Priority adjustment multi-stage adjustment sequence setting by matching/gray-scale edge/binary edge or feature detection.	
	Exposure adjustment	Max. 96 per product type	Max. 48 per product type
		Shape: rectangular Binarization adjusts according to changes in the gray-scale data Gray-scale mean value detection/judgement	
	Smart matching/matching (sub-pixel processing)	Smart matching = Max. 96 pcs.; Equipped with post-detection differential processing function	Matching = 48 per product type
		Sub-pixel accurate multiple detection matching by gray-scale correlation processing Rotation by raster detection and raster detection position (± 30 degrees) Output = number of detected items/correlation numbers/position/angle teaching registered changes can be imported from external source smart teaching (A210) = judgement learning function by the smart template	
		Gray-scale edge detection (sub-pixel processing)	Max. 96 per product type
	Gray-scale window	Max. 96 per product type	Max. 48 per product type
		Shape: rectangular/polygonal or oval mask Shape: rectangular/polygonal or oval Gray-scale mean value detection/judgement	
	Feature extraction	Max. 96 per product type	Max. 48 per product type
		Shape = rectangular/polygonal or oval mask Shape = rectangular/polygonal or oval Image filtering Labeling Output values: counter/center of gravity (to one decimal place)/area/shading/width/principle axis angle	
	Binary window	Max. 96 per product type	Max. 48 per product type
		Shape = rectangular/polygonal or oval mas Shape = rectangular/polygonal or oval Image filtering White/black pixel number count/judgement	
	Binary edge detection	Max. 96 per product type	Max. 48 per product type
		Shape = line/plane filter/width functions forepoint edge detection	
Line	Max. 96 per product type	Max. 48 per product type	
	Shape = straight line/polygonal line/circle or arc Image filters White/black pixel number count/judgement		
Conversion data	4 registers, Can quote to numerical conversion, Can convert numerical conversion result to actual distance, Standard distance, No. of pixels, Coefficient		
Numerical calculations	Max. 96 per product type	Max. 48 per product type	
	Absolute value of difference between sine and cosine Four data calculations, arctangent, root, the distance-between-points special substitutions reference to previous data output control		
Judgement output	External output (D) register = Max. 96 per product type Internal judgement (R) register = Max. 96 per product type	External output (D) register = Max. 48 per product type Internal judgement (R) register = Max. 48 per product type	
External interface	Serial	RS232C = 2ch (max.115200bps) Compatible with Matsushita Electric Works PLC FP series Compatible with Mitsubishi MELSEC A Series/FX Series and Omron C Series PLCs	
	Parallel	Input = 11points Output = 14 points Removable screw-down terminal block Image trigger (timing sensor unnecessary) external sensor timing repeat start	
Inspection start	Image trigger (timing sensor unnecessary) external sensor timing repeat start		
Other specifications	Display functions	Display item suppressing function (menu display hide function) Image suppress function when setting checkers, Image rotation function when setting checkers (A218) Clearly display reject location, Rotational adjustment angle display (A218), Data Monitor function Display of image processed with image filter, simple spreadsheet, checker list display	
	Marker function	Maximum of 8 graphics/type (line, rectangle or circle), and registered images are displayed on the main screen	
Setup tools	Image storage function	30 screens	8 screens
		Save/load function for inspection image (all screens/problem screens) Store images for reinspection/resetting Windows-PC image save/load function	
	Debugging	Trap function Image storage function	
Setup help	Focus setup, aperture setup, lighting adjustment, image profile monitor, recommended threshold level, I/O monitor, enforce output		
Moving object inspection	High-speed random trigger camera (progressive)/flash/electronic shutter used		
Camera support	High-speed random trigger camera (progressive) = ANM831 Standard camera = ANM830A, Composite video (NTSC) input used (however the connection requires one port)		
Number of support cameras	2	1	
Operating voltage	24 V DC less than 0.9 A	24 V DC less than 0.7 A	
Setup data backup	Image data and setup data can be saved to a Windows PC using vision Backup Tool Ver.		

* Type data saved in the previous controller of the Micro Image Checker A Series (Ver. 1) cannot be directly restored to V2 using the Vision Backup-Tool. In this case, you will need the dedicated data conversion software (freeware) to convert the Ver. 1 type data for V2 use. If you require the data conversion software or information about how to use it, contact your Aromat Corporation representative. You can also download the data converter software from the following Web page. <http://www.aromat.com/acsd>

1 Smart matching (A210) and Matching (A110).

A High Speed and Precision Sub-Pixel Detection (Fastest in its class)

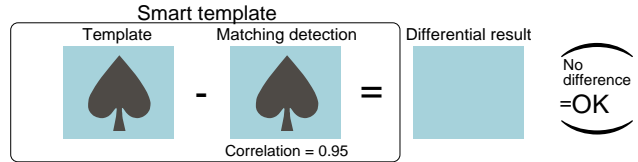
With a high-speed CPU, vast memory, original algorithms, 64 x 64-pixel template, 256 x 256-pixel search area, sub-pixel precision detection, and a processing time of about 10 ms. This is the ultimate tool for high speed and precision part inspection.



Matching search time: **Approx. 10 ms.**

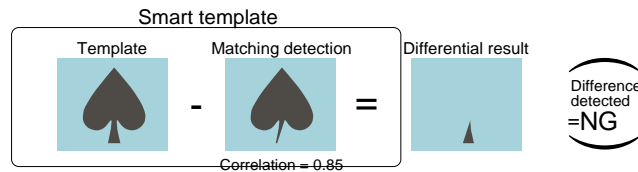
B Smart matching (A210).

Sub-pixel position detection takes place with gray-scale matching. The gray-scale differential function provides detailed object inspection. This process allows accurate inspection even in cases where standard pixel matching processing alone would fail.



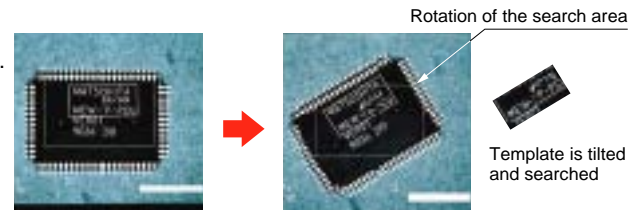
C Smart template (A210).

Registering a good part is simply done as a template, subsequently the inspection of multiple and similar parts is performed without the need of complex settings or software parameters.



D Smart matching rotational correction (A210)

The rotational correction function in the A210 conducts a search by tilting the stored image and comparing it to the smart matching search areas and templates. This allows a precise position inspection regardless of the part's tilting or rotation caused by the method of transportation (conveyor, robot arms, etc).

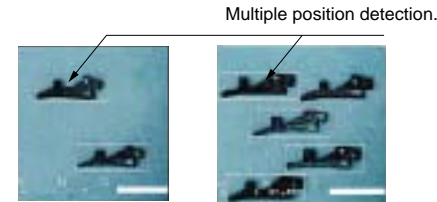


E Rotation position/tilt detection.

The rotation search function allows ±30 degrees of rotation. So parts can accurately be detected regardless of the image angle of tilt or position shifts.

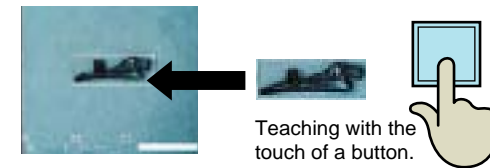
F Multiple position detection

Multiple pattern (template) detections are possible, so multiple objects can be detected within the same field of view. It is a practical and efficient tool for automatic loading machines such as robot arms, scara, or index tables.



G Teaching function.

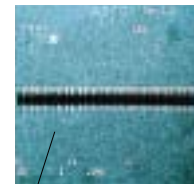
Automatic Teaching allows new templates or patterns to be registered for matching by using an external input (switch or trigger event). The new template or pattern can be accepted by simply placing the new pattern in front of the camera (field of view) for detection.



2 Sub-pixel gray-scale edge

Edge positions are measured accurately at the sub-pixel level. It supports an edge counting function equipped with projection scanning formula so that the required edge position is detected even on products with a rough surfaces. Additionally rotational correction, diagonal scanning are performed using sub-pixel edge detection with the gray-scale inter-pixel compensating function.

■ Projection scanning edge detection



Calculate total number of pins (Pitch)

3 Gray-scale window

The average value for brightness within the area is quickly calculated, gray scale differentiation still occurs when binary differentiation is difficult due to the small differences in the gray-scale levels.



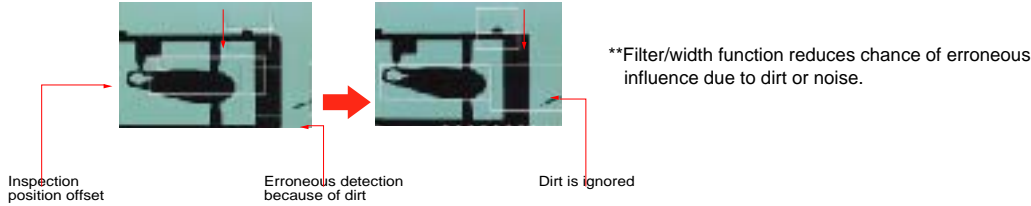
When the direction is correct:
GW1 becomes brighter than GW2, so
GW1 - GW2 > 0 and GW3 - GW4 = 0.

NAiS IMAGECHECKER TOOLS

4 Rotational* position adjustment function

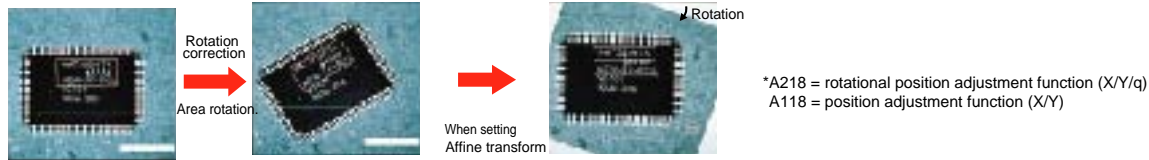
The inspection tools are automatically adjusted to compensate for the changes in the part's position or tilt, allowing precise and accurate inspections everytime. Adjustments can be made using the gray-scale data so that differences in brightness allows extremely accurate corrections. Additionally multiple tools with different priority greatly simplify complex adjustments and measurements.

■ Accurate position correction (A210/A110)



■ Rotational adjustment (A210)

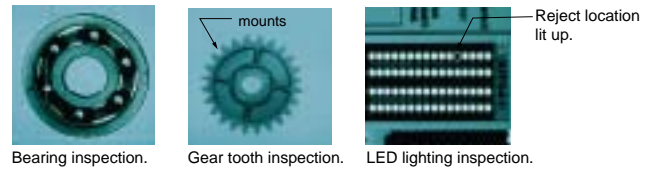
The rotational adjustment tools allow part to be inspected even if it is tilted.



5 Improved binary processing function

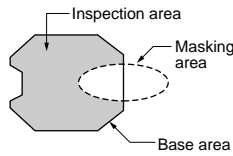
A A wide range of inspection functions

Feature Extractions are ideal for Position, attitude and size detection.
Edge Detections are ideal for High Speed Presence, size, orientation measurements.
Line Checkers are ideal for High Speed length, number, and presence inspections.



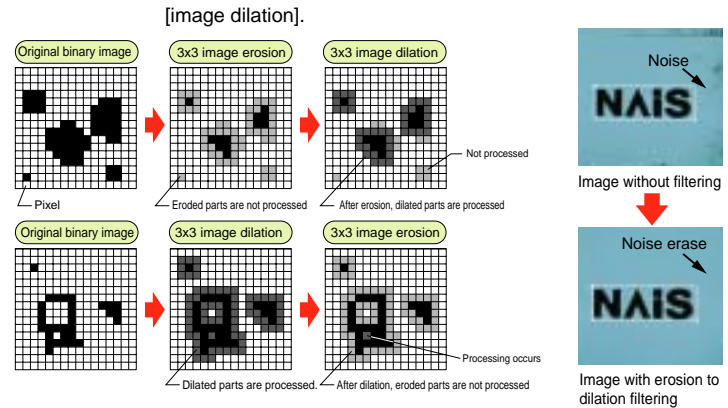
B Free shape

The shape of the inspection area can be adjusted to conform the shape of the object as a rectangular, oval, or polygonal window. Within this shape area a Mask window can be configured to filter out or block unwanted areas.



C Image filter function.

Some Binary images may contain substantial noise. The IMAGECHECKER is capable of filtering (stabilizing) the image simply by providing erosion or dilation compensation. These filter settings remove or blend the background noise from the original image, and provide an stable inspection at all times.



6 Numerical calculation and judgement output functions.

A Ninety Six Independant Numerical Calculations are available (48 on the A110)

Includes trigonometric functions (sine, cosine, square root, arctangent) as well as standard operators (add, subtract, multiply and divide) . Within each calculation up to16 checkers results may be referenced.

B Min and Max adjustments for all Numerical Calculations.

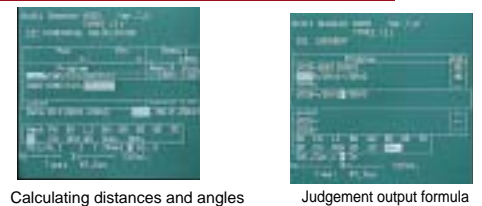
For complex pass or fail judgement may be executed directly on Numerical Calculations without an external device such as a PLC. Additionally the Min and Max Values may be set individually for each calculation and inspection.

C Direct Data transfer to the PLC (native protocol communications)

Numerical calculations and judgement output results are automatically written to data registers in the PLC memory at a maximum baud rate of 115200 bps.

It supports the following PLC protocols,

- FP-series PLC - Matsushita Electric Works.
- FX/A series PLC - Mitsubishi MELSEC or
- C series PLC - Omron SYSMAC
- SLC series PLC - Allen Bradley.

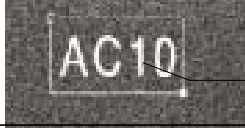




	Internal judgement calculations	External judgement calculations	Total
A210	96 formulas	96 formulas	192 formulas
A110	48 formulas	48 formulas	96 formulas

Simple, Reliable and Flexible

The A228 OCV Checker provides a simple, reliable and flexible solution to character inspection requirements for electronic components, food packaging, pharmaceutical, and cosmetic packaging application.

Three easy steps to setup and adjustment

STEP1	Range Specification	No Character Dictionary is required for inspection. Regardless of background condition, the A228 automatically segments the gray-scale template on a character-by-character basis.		Range setting
STEP2	Character Segmentation	If Character Contrast or Background conditions are deficient, the background processing noise cut function will automatically segment character using the gray-scale method. Adjustments are performed in real time, without PC acquisition delay		
STEP3	Dispersion	The Smart Setting Function allows character that are only slightly off to be judge as acceptable, and characters with critical defects are judge unacceptable. Adjustments are performed in real time, without PC acquisition delay		

The A228 OCV Checker is not designed to inspect dot-based characters.

Advanced Gray Scale Inspection Tools

■ Inspection Theory: Character Verification Smart Settings

Use the gray-scale template registered as the standard to automatically generate a range from thin characters to thick ones. You can set the processing range while viewing the generated characters on the screen.

The character verification checker performs gray-scale differential processing, after smart setting processing has been applied. Unlike the conventional differential method, that cannot distinguish between critical defects such as non-critical differences, this new method can make a more intelligent decision, and perform more reliable inspection

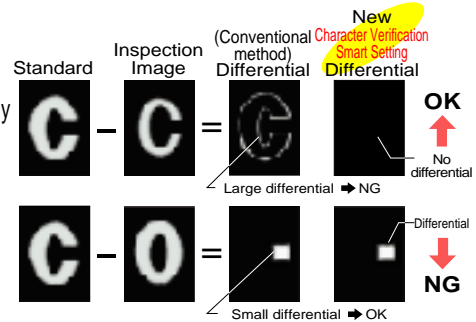
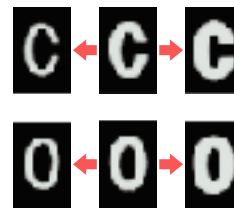
The Smart Setting function allows characters that are only slightly off to be judged as acceptable, and characters with critical defects judged as unacceptable. Adjustments are performed easily in real time.

■ Integrated Chip Lead Inspection

The A228 OCV requires the user only to specify a rectangular area to be inspected (location of the pins within the IC body). Within this area the system could measure the following characteristic with sub-pixel accuracy,
 Lead Pitch - Distance from pin to pin
 Lead Width - Thickness of each pin
 Pin Count - Total number of pins
 All the measurements are executed automatically and the information is stored inside the lead inspection checler.

The Gray-scale data pixel interpolation function allows highly accurate rotation adjustments. To compensate for part shifting and tilting.

Thin Standard Thick



Sub pixel
Lead count
Pitch
Width

■ Specifications

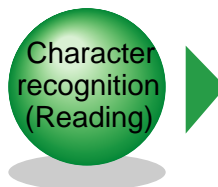
Item	Specifications	
Frame memory	512 X 480 (pixels) X 256 gradations	
Operator interface	Menu selection using special-purpose keypad	
Monitor display	Can be switched between Gray Scale Memory, Gray Scale Thru and Gray Scale NG	
Cameras	2 maximum (horizontal/vertical screen splitting possible) High-speed random camera (progressive type)/Electric shutter camera/Other commercially available cameras	
Menus	Japanese/English (switchable)	
Number of product types	32	
Inspection functions	Position/rotation adjustment	8 per type/Two-point adjustment function using gray edge/matching
	Smart matching (sub-pixel processing)	4 per type/Includes a differential processing function that operates after detection matching Sub-pixel accuracy multiple detection matching by gray scale correlation processing Rotation by raster detection and raster detection position (± 30 degrees) Output: number of detected items, correlation values, position and angle Teaching registration changes possible from external source Smart matching: Judgment learning function via smart template
	Gray edge	32 per type/Detection at gray sub-pixel units Area specification: Line or rectangle Scan method: Single/projection, gray filter/width Detection position: Edge, front edge and rear edge, maximum differential, and multiple edge (256 max.) Output: Detected edge coordinates (X 10), number of detections Judgment: Number of detections
	Lead inspection	32 per type/Detection at gray sub-pixel units Area specification: Line or rectangle Scan method: Single, gray filter/width Detection position: Dual edge detection Output: Number of leads Judgment: Number of leads, pitch, width, and overall judgment
	Character verification	16 per type/Character quality inspection using matching, subtraction and labeling. Possible to select between individual character inspection and pattern inspection. Individual: Possible to inspect up to a maximum of 30 characters. Auto pattern registration function that uses an original character segmentation function. It is possible to set so that only character edges are masked during pattern registration. Pattern: Patterns can be registered without character segmentation. Output: No. of detections, Detection position, Maximum differential, No. of differentials, and Correlation value for each character. Judgment: OK/NG for all characters and individual characters.
	Gray window	32 per type/Area: Rectangle, polygon (3 to 16 points), circle or ellipse Mask area: None, rectangle, polygonal (3 to 16 points), circle or ellipse Output value: Gray scale mean value
Numerical calculation	32 per type/Arithmetic, arctan, square root, distance between two points, specific substitution, referencing of previous data, and output control	
Judgment output	External output (D) registers: 32 per type Internal judgment (R) registers: 32 per type	
Serial	RS-232C: 2ch Start input, product type switch, numerical/judgment inspection result output, changing the maximum and minimum numerical limits, camera switch	
Parallel	Inputs: 11, Outputs: 14 Inputs: Start input, product type switch, screen switch, template registration, character registration Outputs: READY signal, numerical calculation results, judgment results, overflow, error signal, flush period signal	
Display functions	Image suppress function when setting checkers Image rotation function when setting checkers Bright display of reject locations Numerical calculations results display	
Image save function	8 screens Save/load function for inspection image (all screens/problem screens) Store images for re-inspection/resetting Windows-PC image save/load function using the Vision Backup- Tool Ver.2	
Debug function	Trap function, Simple Spreadsheet	
Setup data backup	Image data and settings can be saved to a Windows PC using the Vision Backup- Tool Ver. 2	

Multiple Character Inspections (OCR and OCV)

The A230 is a low cost optical character recognition system. Its character recognition tools can distinguish date code, lot numbers, and expiration dates, and its character verification tools can check for the printing quality on a majority of surfaces, and packages under deficient lighting conditions. The A230 combines these very powerful tools and it remains easier to implement than any dedicated character verification system in the market today.

Matsushita Electric Works continuously innovates their entire line of Image Processing Devices to provide better, more flexible and easier to use features capable of handling a wide range of character inspection applications.

OCR
(Optical Character Recognition)



OCV
(Optical Character Verification)



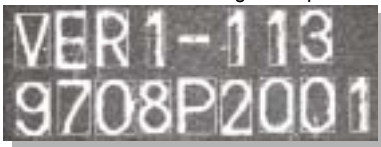
MICRO-IMAGECHECKER A230
Character recognition type

Advanced Extraction Algorithms (No background interference)

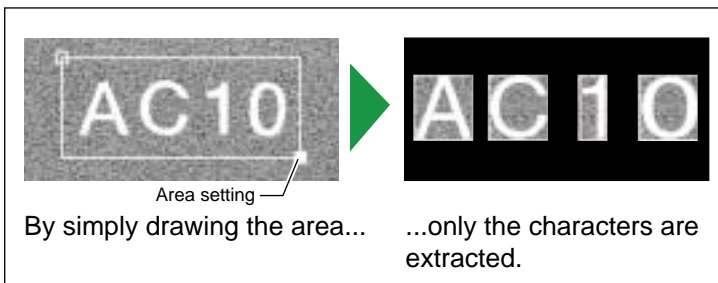
The most advanced Character Extraction Algorithms (Gray scale processing) provide superb character recognition, while completely eliminating background noise. Extracting Characters Strings is done simply by drawing a rectangular window around the target area to be inspected.

Simple Operation

Even when there a background pattern...



Even if there a line in the background...

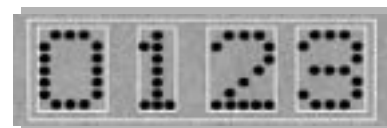


Advanced Recognition for Dot-Matrix, Joined, or Blurred character Recognition

The quality of printed characters constanly changes for typical printing processes such as dot-matrix inkjet, thermally printed or pressure stamp characters. In many cases the characters become "joined, blurred or partially omitted."

The A230 powerful new features provide accurate recognition and inspection of such characters. Specially on applications which have been named "tough, cumbersome or impossible" by more expensive, and complicated vision inspection systems.

● Dot matrix characters



● Joined characters



● Chipped or blurred characters



Multiple Character Size (OCR Tools)

Character learning functions based on Neural Network technology allows the A230 to recognize characters, regardless of size changes.



NAiS IMAGECHECKER A230 (OCR)

Multiple Character Dictionaries (Standard OCR Fonts)

Recognition

The A230 comes pre-installed with two default character dictionaries for OCR fonts (OCR-A and OCR-B). These dictionaries allow standard characters to be recognized by the controller without any additional setup. The A230 provides three additional User-Configurable Dictionaries for the most versatile character recognition (non-alphanumeric symbols).

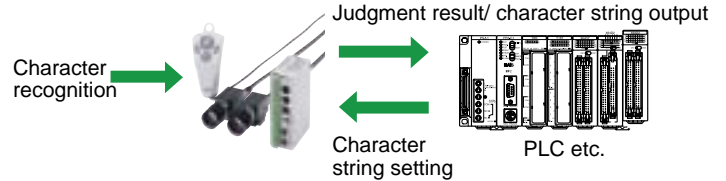
• OCR-A
1234567
890ABCD

• OCR-B
12345678
90ABCDEF

String Outputs Functions

Recognition

A recognized character string can be compared with a pre-specified string in a PLC or PC and the result can be output as a judgement result. In addition the recognized strings can be output as string data via the serial port as Standard ASCII strings.

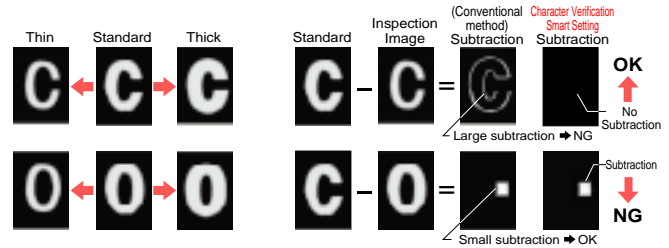


Optical Character Verification Tools

Verification

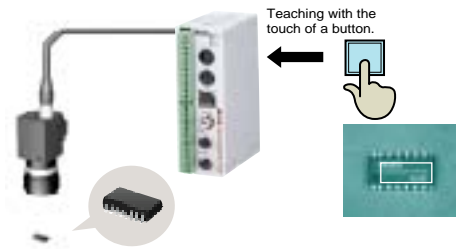
Smart Processing Function for OCV

Eroding or dilating characters (thin or thick) are automatically processed based on a gray scale subtraction method. This allows the system to accurately judge the detected characters on "hard to detect" products. Which normally fail inspection due to minute changes in thinness or thickness of the characters.



Teaching Function

Date codes, batch numbers, and expiration dates can be re-registered using external input signals. This allows the user to install local controls such as push-buttons or foot pedals for convenient operation of the A230 automatic registration and automatic position adjustments.

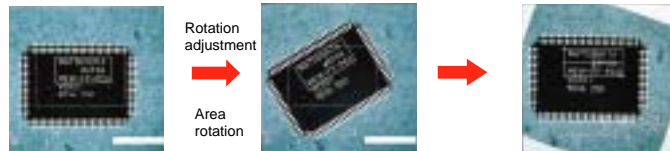


Grayscale Inspection Tools

Rotation Adjustment

The grayscale function quickly and accurately detects the most minute differences in contrast and compensates for work rotation or shift.

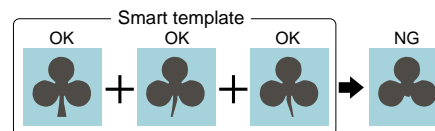
Adjustments are quick because there is no need to manually reposition the part



The Rotation adjustment allows the image to rotate so the part can be inspected even if it is tilted.

Smart Matching

The pattern-matching algorithm is the fastest in its class for a stand-alone machine vision system. The smart template setting procedure allows the user to self-register and adjust new templates based on an image from a good part.



Lead Inspection of Connector or IC

Just specify the area, and the A230 will accurately measure the lead pitch and lead width in sub-pixel units and count the number of pins.



NAIS IMAGECHECKER A230 (OCR)

MICRO-IMAGECHECKER A230 Character Recognition Type

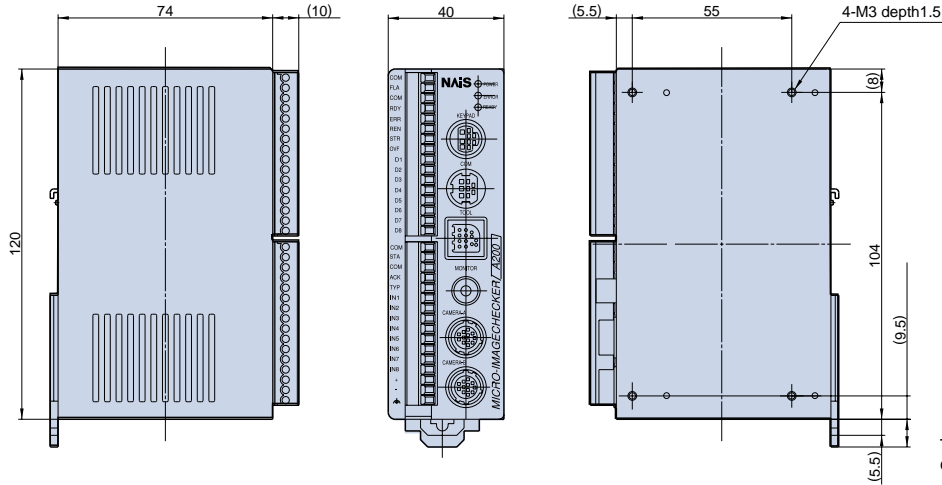
■ Specifications

Item	Specifications	
Frame memory	512 × 480 (pixels) × 256 gradations	
Operator interface	Menu selection using special-purpose keypad (English/Japanese switchable)	
Monitor display	Can be switched between Gray Scale Memory, Gray Scale Thru and Gray Scale NG	
Processing	Gray scale 8-bit 256 gradations	
Number of product types	32	
Inspection functions	Position and Rotation position adjustment function	8 per type Sequence setting by matching/gray scale edge Priority adjustment function, Multi-stage adjustment function
	Character recognition	Max. 8 per type Area: Rectangle Inspection method: Outputs character label with highest match with specified dictionary. Processing: Character reading using Neural Network Inspection object: Black/white specification possible Inspection direction: Right to left, left to right, up to down, and down to up Character segment: Gray scale, automatic binarization, fixed binarization, with dilation/erosion function Adjustment: Position and rotation adjustment group Output value: Read character string (16 characters max.) Other: Read function for joined characters and ability to specify character strings for judgment
	Dictionary for character recognition	5 max. (equipped with OCR-A and OCR-B fonts) 40 characters max. (36 alphanumeric characters and 4 symbols) per dictionary 3 patterns max. per character
	Character verification	16 per type Character quality inspection using matching, subtraction, and labeling. (Supports up to ±30 degrees rotation for each character.) Character: Possible to inspect up to a maximum of 30 characters. Auto pattern registration function that uses an original character segmentation function. It is possible to set so that only character edges are masked during pattern registration. Pattern: Patterns can be registered without character segmentation. Output: Number of detections, Detection position, Maximum subtraction, Number of subtraction, and Correlation value for each character. Judgment: OK/NG for whole characters and individual characters.
Smart matching (sub-pixel processing)	4 per type Includes a subtraction processing function that operates after detection matching Sub-pixel accuracy multiple detection matching by gray scale correlation processing Rotation by raster detection and raster detection position (±30 degrees) Output: number of detected items, correlation values, detection position and angle, teaching registration changes possible from external source Judgment learning function via smart template	
Lead inspection (sub-pixel processing)	32 per type Detection at gray sub-pixel unit Area specification: Line or rectangle Scan method: single, gray filter/width Detection position: Dual edge detection Output: Number of leads Judgment: Number of leads, pitch, width, and overall judgment	

Item	Specifications	
Inspection functions	Gray edge (sub-pixel processing)	32 per type Detection at gray sub-pixel units Area specification: Line or rectangle Scan method: Single/projection, gray filter/width Detection position: Edge, front edge and rear edge, maximum differential value, or multiple edge (256 max.) Output: Detected edge coordinates, number of detections Judgment: Number of detections
	Gray window	32 per type Area: Rectangle, polygon (3 to 16 points), circle, or oval Mask area: None, rectangle, polygon (3 to 16 points), circle or oval Output value: Gray scale mean value
Conversion data	4 registers, Can quote to numerical calculation. Can convert numerical calculation result to actual distance. Standard distance, Number of pixels, Coefficient	
Numerical calculation		32 per type Arithmetic, arctan, square root, distance between two points, specific substitution, referencing of previous data, and output control
Judgment output	External output (D) registers: 32 per type Internal judgment (R) registers: 32 per type	
External I/O	Serial	RS232C: 2 channels (max. 115200bps) Compatible with Matsushita Electric Works "FP Series" PLCs, Mitsubishi "MELSEC A Series/FX Series" PLCs, and Omron "C Series" PLCs.
	Parallel	Input: 11 points, Output: 14 points, Removable screw-down terminal block
Display functions	Display image brightness modification Image suppress function when setting checkers Image rotation function when setting checkers Bright display of reject locations, Data monitor, Checker list	
Setup support tools	Image save function	8 screens Save/load function for inspection image (all screens/problem screens) Store images for re-inspection/resetting Windows-PC image save/load function using the Vision Backup- Tool Ver.2
	Debug function	Trap function, Spreadsheet
	Setup help	Focus setup, Aperture setup, Lighting adjustment, Gray scale profile monitor, Input monitor function, Forced output function
Moving work compatibility	Double-speed random camera (progressive), Flash, Electronic shutter	
Camera	Double-speed random camera (progressive): ANM831, Standard camera: ANM832 Composite video (NTSC) input compatible (however the connection requires one port)	
Number of cameras	2	
Operating voltage	24V DC, 0.9A max.	
Setup data backup	Image data and settings can be saved to a Windows PC using the Vision Backup- Tool Ver. 2	
Dimensions (mm)	40 (W) × 120 (H) × 84 (D)	

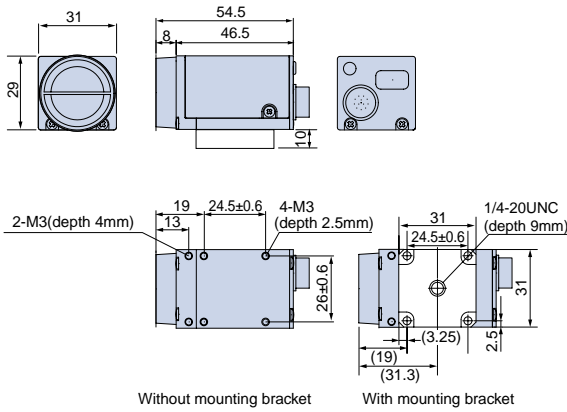
■ Dimensions (unit: mm)

- A118/A218 Controller
 - ANMA218V2
 - ANMA118V2
 - ANMA228

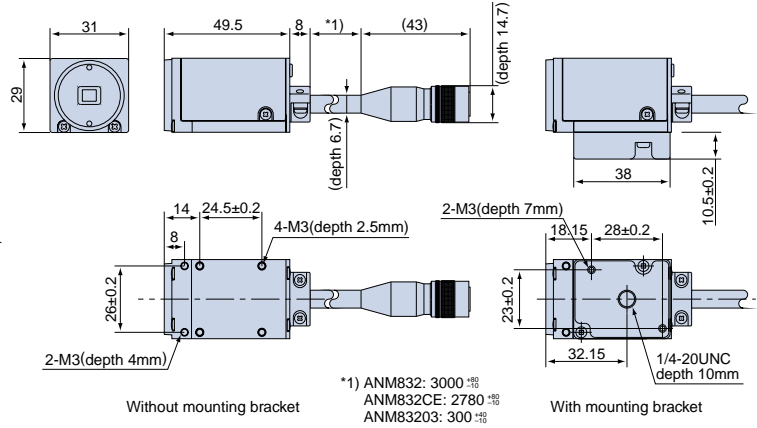


The A118 does not have a camera B port

● High-speed random trigger camera: C mount ANM831

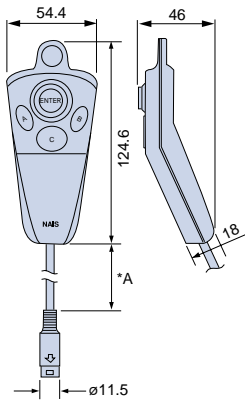


● CS mount camera: CS mount ANM832CE/ANM83203



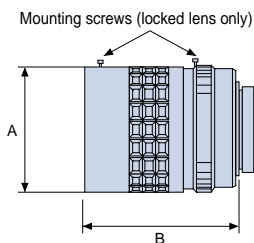
● Operating key pad

- ANM8520 □ CE
- : Length of cable



*A: Approximated length of cable for keypad used

● Lens

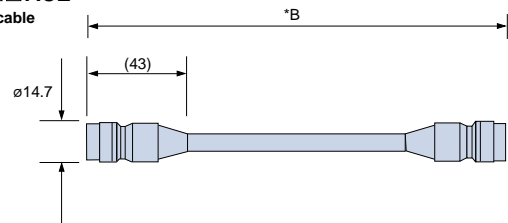


C Mount lens		A	B
ANB845N(L)	f=16	f=30	33
ANB846N(L)	f=25	f=30	37.3
ANM8850	f=50	f=27.5	38.5
ANM88501	f=50	f=30.5	38.5

CS Mount lens		A	B
ANM8808	f=8	f=34	35
ANM88081	f=8	f=31	35

● Camera cable

- ANM840 □ ACE
- : Length of cable



*B: Approximated length of cable used

NAIS IMAGECHECKER ORDERING INFORMATION

System configuration diagram

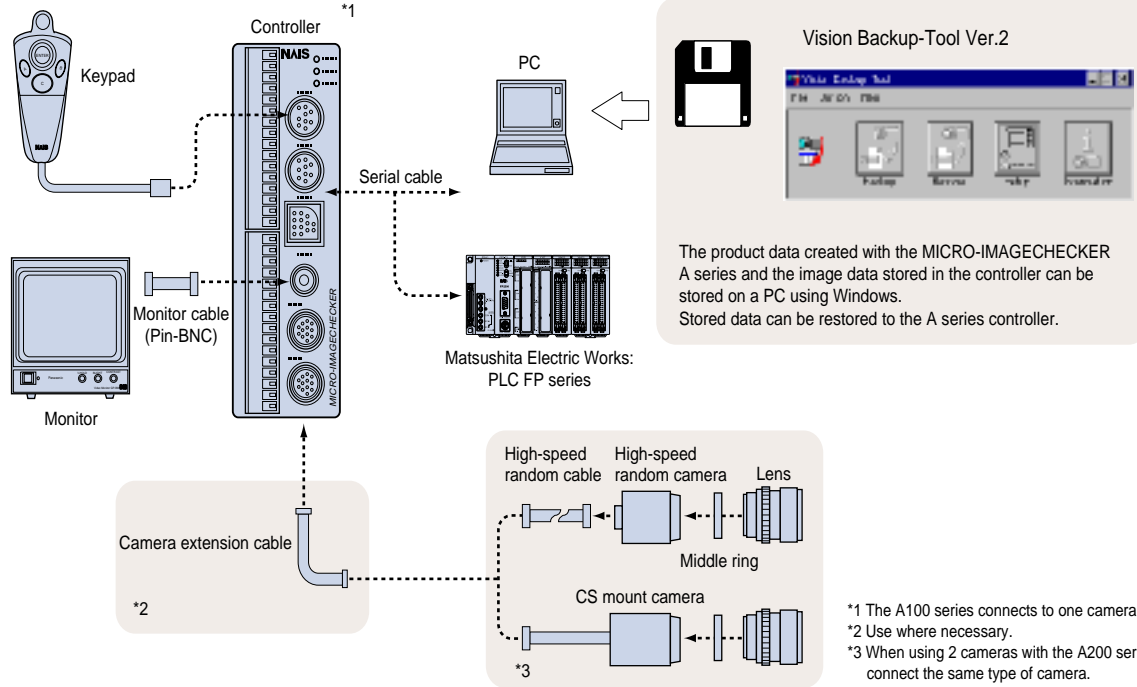


Table of Product Numbers

● MICRO-IMAGECHECKER A-Series Controller

MICRO-IMAGECHECKER	Specifications	Part No.	Price.
A110 Multi-Checker Ver 2	Single Camera	ANMA118V2	\$2,113
A210 Multi-Checker Ver 2	Dual Camera	ANMA218V2	\$3,013
A220 OCV Checker	Dual Camera OCV	ANMA228	\$3,013
A230 OCR Checker	Dual Camera OCR	ANMA238	\$3,333

*PhotoMOS output Controller supports PNP (sourcing) and NPN (sinking) outputs.

● Camera/Keypad/Monitor

CAMERAS	Specifications	Part No.	Price.
CS mount camera	Standard Electric Shutter	ANM832CE	\$870
C mount camera	Double Speed Random Shutter	ANM831	\$1,295
*C mount camera cable	Double Speed Random (9 ft cable)	ANM84303CE	\$200

COMPONENTS	Specifications	Part No.	Price.
Keypad	2 meter cable	ANM85202CE	\$107
Keypad	3 meter cable	ANM85203CE	\$119

● Camera cable

CAMERAS CABLES	Specifications	Part No.	Price.
Camera	6 feet (2 meter) cable	ANM84002CE	\$182
Extensions	21 feet (7 meter) cable	ANM84007CE	\$250
Cables	36 feet (12 meter) cable	ANM84012CE	\$320.
	51 feet (17meter) cable	ANM84017CE	\$390

● Serial Cable

COMM CABLES	Specifications	Part No.	Price.
Comm Cables (RS232)	ICH Comm port to PC (9 feet)	ANM81103	\$206
	*ICH Comm port to PLC (9 feet)	ANM81303	\$140
Tool Port Cable (RS232)	ICH Comm port to PC (3.6 inch)	ANM812001	\$246

* Note: ICH Comm port to PLC (9 feet) provides flying leads on the PLC end.

● Lens/middle ring

C MOUNT LENS	Specifications	Part No.	Price.
C MOUNT LENSES	f6.5 C mount	ANB842	\$545
	f8.5 C mount	ANB843	\$251
	f8.5 C mount with Lock	ANB843L	\$414
	f16 C mount compact lens	ANB845N	\$205
	f16 C mount compact lens with lock	ANB845L	\$305
	f25 C mount compact lens	ANB846N	\$286
	f25 C mount compact lens with lock	ANB846L	\$383
	f50 C mount compact lens	ANM8850	\$326
	f50 C mount compact lens with lock	ANM88501	\$422

CS MOUNT LENS	Specifications	Part No.	Price.
CS MOUNT LENSES	f8 CS mount compact lens	ANM8808	\$217
	f8 CS mount compact lens with lock	ANM88081	\$369

LENSES	Specifications	Part No.	Price.
ADAPTORS	5mm ring	ANB84805	\$28
MIDDLE RINGS	(0.5, 1, 5, 10, 20, 40 mm) rings	ANB848	\$172

● Accessories

ACCESSORIES	Specifications	Part No.	Price.
I/O TERMINAL BLOCK	2 pieces (Input and Output)	ANMA8001	**N/S
BNC CONNECTOR	Monitor BNC jack to RCA connector	ANM8606	**N/S
MONITOR	Panasonic GPBM910	AUGPBM910	**N/S

** Non Stock items allow 4-6 week lead time.

● Data backup software

SOFTWARE	Specifications	Part No.	Price.
Vision Backup Tool Ver. 2	Program upload/download	ANM70131V2	FREE

In addition, a full lineup of accessories including lenses and illumination equipment is available.

To USA Customer

• Products sold by seller are covered by the warranty and patent indemnification provisions in its Terms and Conditions of Sale only.

MICRO-IMAGECHECKER

System configuration diagram

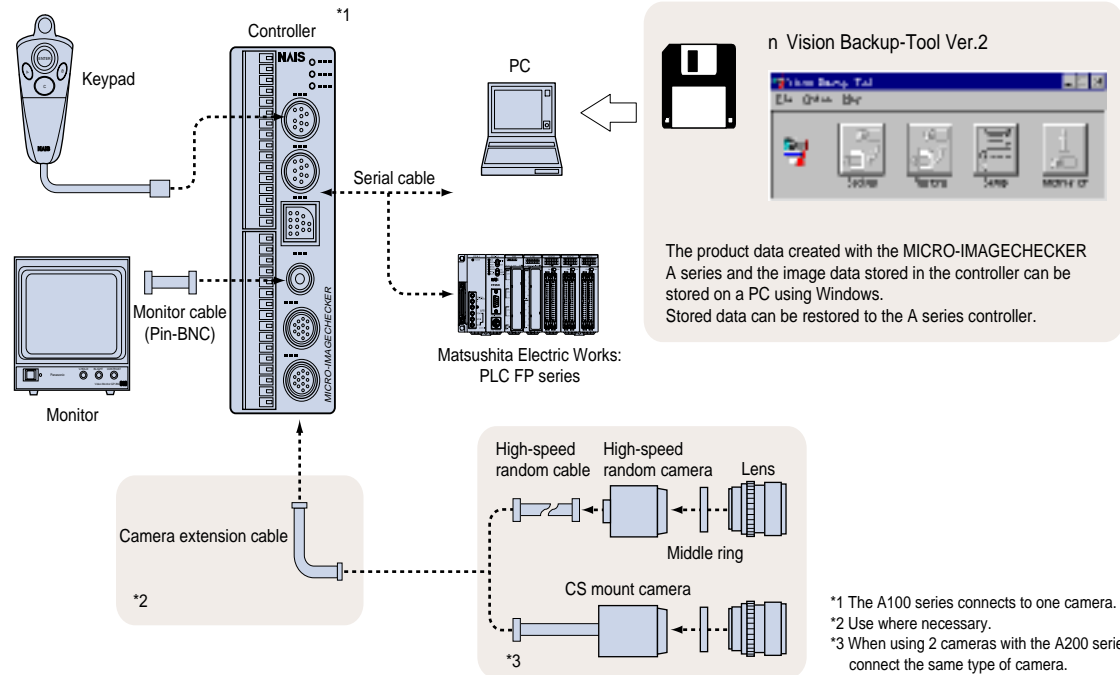


Table of Product Numbers

MICRO-IMAGECHECKER A-Series Controller

Item	Specifications		Part No.
MICRO-IMAGECHECKER A110 Multi-Checker with CE	PhotoMOS Output	English	ANMA118V2
MICRO-IMAGECHECKER A210 Multi-Checker with CE	PhotoMOS Output	English	ANMA218V2
		OCV	ANMA228

Each Controller supports English and Japanese Characters. PhotoMOS output Controller supports PNP/NPN output.

Cameras

Item	Specifications	Part No.
C mount camera	Progressive High speed Random	ANM831
CS mount camera	support electric-shutter with 3 m cable	ANM832CE

Keypad

Item	Specifications	Part No.
Keypad	with 2 m cable: CE	ANM85202CE
	with 3 m cable: CE	ANM85203CE

Camera cable

Item	Specifications	Part No.
High-speed random camera cable	3m: CE	ANM84303CE
Camera extension cable	2 m extension : total 5 m: CE	ANM84002CE
	7 m extension: total 10 m: CE	ANM84007CE
	12 m extension: total 15 m: CE	ANM84012CE
	17 m extension: total 20 m: CE	ANM84017CE

Lens/middle ring

Item	Specifications	Part No.
CS mount lens	f2.8 CS mount compact lens	ANM8828
	f2.8 CS mount compact lens with lock	ANM88281
	f4 CS mount compact lens	ANM8804
	f4 CS mount compact lens with lock	ANM88041
	f8 CS mount compact lens	ANM8808
	f8 CS mount compact lens with lock	ANM88081
C mount lens	f16 C mount compact lens	ANB845N
	f16 C mount compact lens with lock	ANB845NL
	f25 C mount compact lens	ANB846N
	f25 C mount compact lens with lock	ANB846NL
	f50 C mount lens	ANB847
	f50 C mount lens with lock	ANB847L
	f50 C mount compact lens	ANM8850
	f50 C mount compact lens with lock	ANM88501
Middle ring	5 mm middle ring	ANB84805
	(0.5/1/5/10/20/40 mm) middle ring	ANB848

Data backup software

Item	Specifications	Part No.
Vision Backup-Tool Ver.2	English version	ANM70131V2

Microsoft windows NT4.0/95/98 compatible. An operating system is not included with this software.

Serial Cable

Item	Specifications	Part No.
COM port connecting cable	COM port and PC (D-SUB : 9 pin) connection, 3 m	ANM81103
	COM port and PLC (discrete-wire cable) connection, 3 m	ANM81303
TOOL port connecting cable	COM port and PC (D-SUB : 9 pin) connection, 10 cm	ANM812001

Note: Products sold by Seller are covered by the warranty and patent indemnification provisions in its Terms and Conditions of Sale only.

NAiS

Image Processing Device
MICRO-IMAGECHECKER

A218 · A118

MultiChecker Ver.2 Series

A228

OCV Checker



Aromat Corporation
 Automation Controls Sales Division
 629 Central Ave, New Providence, NJ 07974
 (800) 228-2350 fax: (908)464-4128
 www.aromat.com/acsd
 E-mail: TSC@aromat.com

The MultiChecker V2 Series - more powerful than ever!



The most advanced Image Processing Devices in its class, is finally available in the US. It offers a wide range of image checking tools, sensor-less triggering system, and it is the only vision system capable of providing a two branch decision making algorithm, which allows the system to automatically branch its inspection settings to detect separate patterns such as inverted parts (IC inspections), automatic sorting, or multiple product inspections. With such an extensive range of functions and built-in RS232 communications capable of accessing direct serial commands, the IMAGECHECKER is ideal for automated production lines, and suitable for stringent quality controls applications.

Faster Image Processing in its class
(with Double Speed Random Camera)

Built-In Video Output
(No additional converters are needed)

Two RS-232 Serial Communication Ports
(Ideal for PC based control)

- A218 MultiChecker can provide up to **96** number of checkers
- A118 MultiChecker: increased from 16 to **48**

Possible to choose from **three execution models** to suit your inspection requirements!



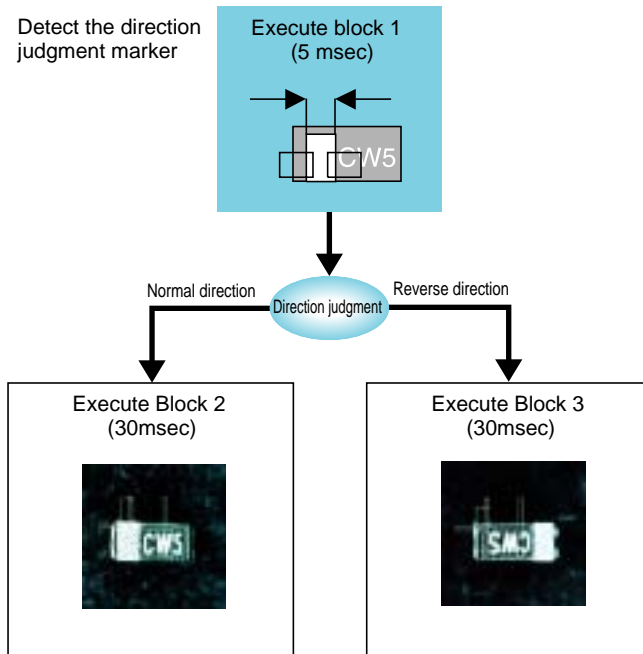
MICRO-IMAGECHECKER A218 and A118
MultiChecker V2 (Photo shows A218)

Automatic Switch Mode

Branch inspection without complicated settings provides great convenience!

Example

It is possible to first make a direction judgment, and then perform a separate inspection (character appearance or mark width measurement) based on this direction.



Conventional method

- Execute all checkers and output results
 - Perform direction judgment externally and compare results
- Execution time: 65msec.**

Automatic Switch Mode

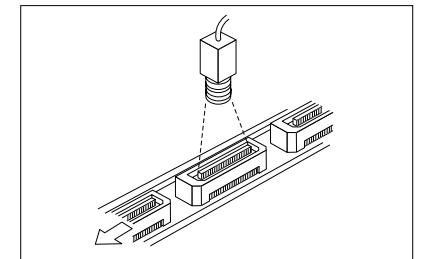
- Perform direction judgment and execute the required checker
- Execution time: 35msec!** Execution time reduced by half!

User-Defined Mode

Multiple inspections of up to three blocks with no switching time!

Example

When you wish to perform multiple continuous inspections but the work will not fit in the field of view of a single image capture.

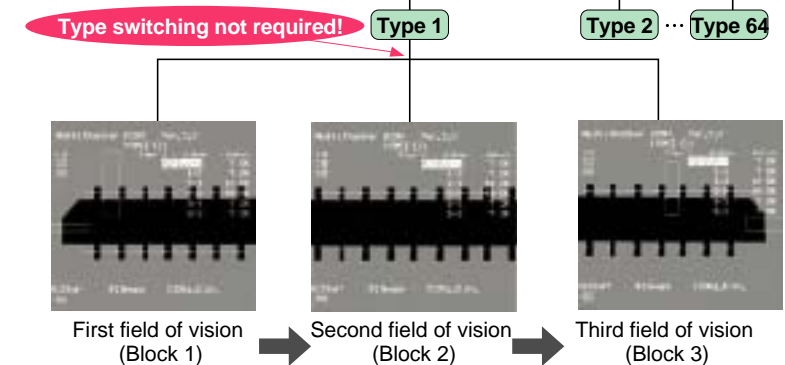


Conventional method

- Handled by type switching using an external device.
- Type switching requires time and usage restrictions apply.

User-Defined Mode

- Internally switches to the process block via an external signal.
 - External device is not used, so inspection time is greatly reduced!
- *Can be executed from the keypad as well.



Execute All Mode

96 checkers can be registered per type, so you can inspect many points at one time!

Example

Multiple simultaneous point inspection is possible for applications such as inspecting LED lighting.



Plenty of external outputs for judgment results (96 points for the A218 and 48 points for the A118) allow simultaneous output of judgment results for multiple inspection points.

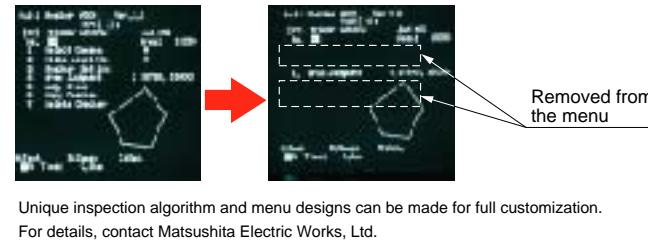
As always, the A Series is packed with easy-

In addition to the ease-of-use and reliability, we also provide convenient new features for a diverse range of applications.

Convenient new display function

Menu hide (Customize) function

After various settings have been made, you can hide the portions that you don't want to be changed by mistake. This eliminates any accidental down-time. Also, by hiding a certain part of the settings beforehand, it saves time for any modification. The menu hide function is protected with a password to prevent unauthorized access.



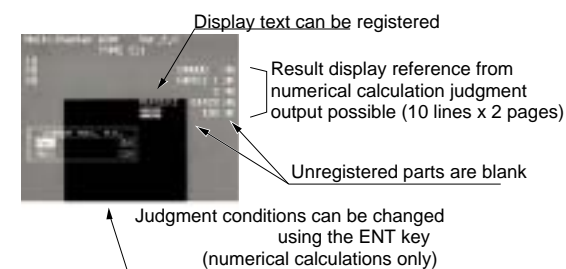
Marker Function

Up to eight graphics (circles, ellipses, rectangles and lines) can be displayed on the inspection screen. This is very convenient when you perform manual positioning for camera adjustment with production equipment.



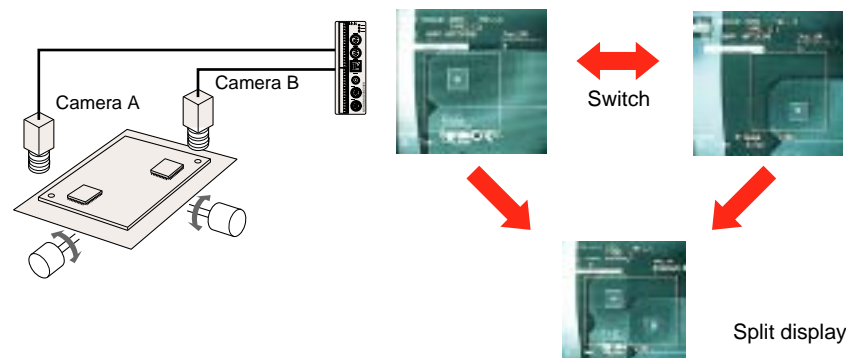
Data Monitor Function

Titles and results of numerical calculations and judgement outputs can be displayed on the inspection screen. You can register your own text for display, and change the maximum and minimum limits for numerical calculations directly from the menu.



Two-image switch/split function (A218 only)

When using two cameras simultaneously for an operation such as measuring the distance between two points, you can use an external signal to switch the display. It is also possible to split images captured by two cameras for display as one image on the screen. You can select either vertical or horizontal for the image split direction.



Extensive array of image capture functions

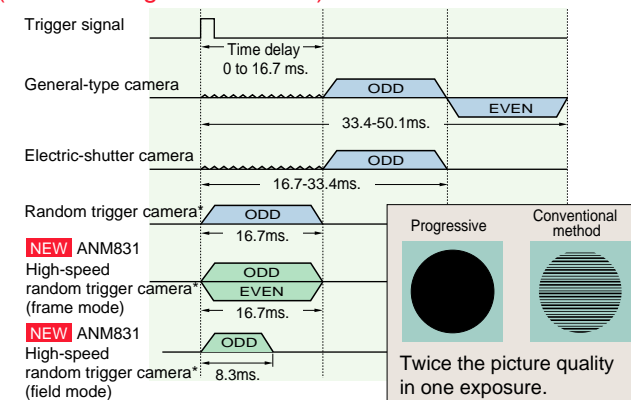
High-speed random trigger camera (progressive rectangular-lattice CCD element)

With the A series, we introduced a progressive high-speed random trigger camera that provides 3 times the maximum ratio of conventional units with 1/60 second for a high-quality picture and no image degradation. In field mode, it reaches 4 times for 1/120 second. The result is fast inspection without worrying about inspection time or image quality.

Internal synchronous signal inspection

Compatible with the internet synchronous signal of NTSC, video scopes and special cameras can also be used. However, depending on the model, some may not be able to be connected. Consult your Aromat representative (there is one connection port.)

(Fastest images in its class)

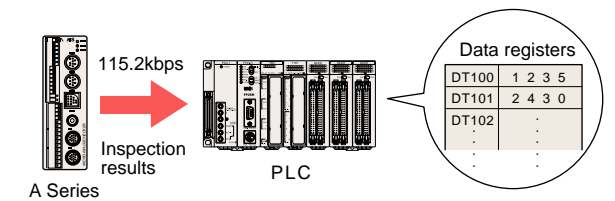


*The shutter speed on the random trigger camera, before exposure, needs to be set to 1/120 to 1/20000 seconds.

to-use features.

Connects to a variety of PLCs

The A Series can connect to a range of PLCs without a communication program. In addition to the NAiS FP Series PLCs, it can be used with PLC products from Mitsubishi, Omron and Allen Bradley. The A Series can perform type switching data communication, and read and write measurement data, and inspection results to and from PLCs without you creating a communication program.



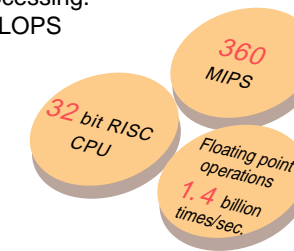
Inspection conditions can also be modified from the PLC!

Compatible PLC products

- Matsushita Electric Works FP Series
- Mitsubishi MELSEC A series/FX Series
- Omron SYSMAC-C Series
- Allen Bradley SLC Series

Speed and precision (Strongest in its class)

The A series comes equipped with a 32-bit RISC, 200 MHz CPU with pipeline processing. It attains 360 MIPS and 1.4 GFLOPS for high-speed processing. With the super quick CPU, increased floating point operation speed, pipeline processing, specially designed algorithms, and a large memory capacity, it achieves not only extremely high-speed inspection, but also the ultimate in precision.



Reduced size (Smallest in its class)

With a small footprint of 120x40mm, installation is simple. You can install checkers next to each other in tight space. Considering wiring, connectors and removable terminal blocks, it is possible to install all units facing one direction. There is no wasted space. It is also possible to install them on DIN rails.



Two types available to suit your application

A218 with two camera connection and high-end functions



A218 (set)

A118 with one camera connection and cost performance.

The A118 offers true cost performance. It wipes away the industry common sense that image processing is expensive.



A118 Controller

A118 (set)

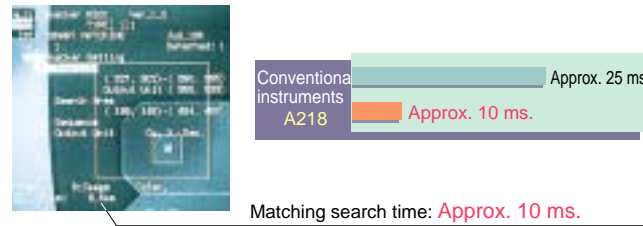
Further refined inspection functions.

The A Series is loaded with inspection know how that we have distilled over our years in this industry. With a single unit you can perform fast and accurate detection, dimension measurement and coordinate detection!

1 Smart matching (A218)/Matching(A118).

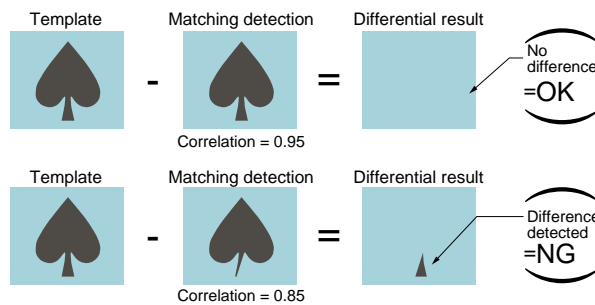
A High-speed, high-precision sub-pixel detection (Fastest level in its class).

With a high-speed CPU, vast memory, original algorithm, even with 64 x 64-pixel template, 256 x 256-pixel search area, and sub-pixel precision detection, you still get a processing time of about 10 ms. As you can see, this is the ultimate in speed and precision for position detection.



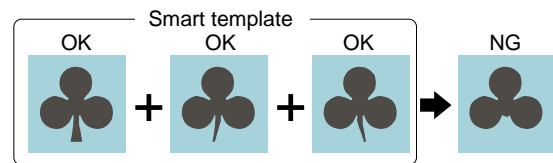
B Smart matching (A218).

Sub-pixel position detection takes place with gray-scale matching. The gray-scale differential function gives even more detailed work inspection. This gives you accurate inspection even in cases where matching processing alone would fail.



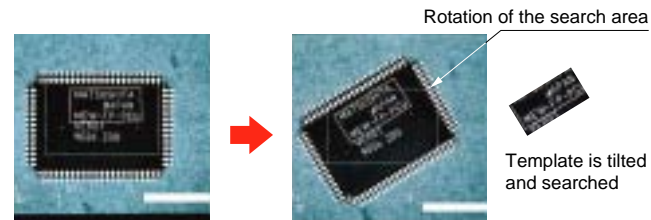
C Smart template (A218).

Just by showing multiple examples of the correct products, correct product images can be automatically composed. This allows simple inspection without setting complex parameters.



D Smart matching rotational correction (A218)

With the rotational correction function and the A218, a search is conducted by tilting the matching and smart matching search areas and templates. Therefore, even if the work has been tilted, a more precise position inspection is obtained.

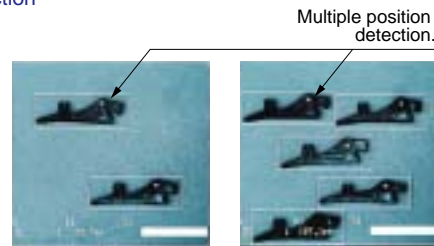


E Rotation position/tilt detection.

With the rotation search function (± 30 degrees), no matter how much the detection image is tilted, the position and angle of tilt are accurately ascertained.

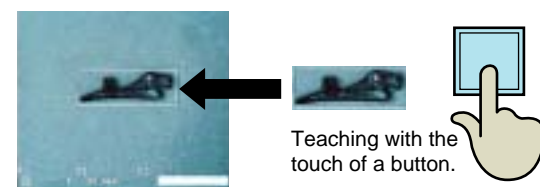
F Multiple position detection

Supports the multiple detection function with matching to allow the separate detection of multiple objects of the same pattern in the search area. It is an efficient function when loading is performed by robot or the like.



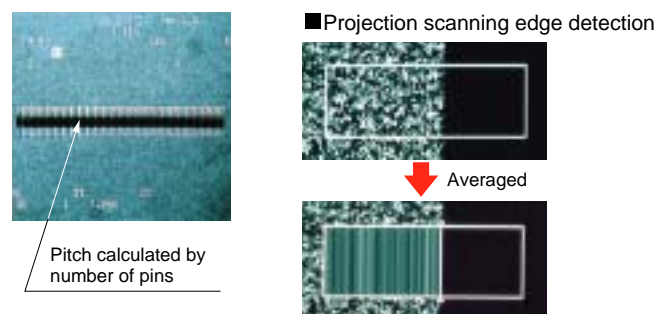
G Teaching function.

Teaching allows changes to be made to the template for matching even from an external signal. Registering the change can be done simply by showing the object for detection. Teaching also supports positional corrections so that even when work is displaced, teaching can occur.



2 Sub-pixel gray-scale edge

Edge positions are measured accurately at the sub-pixel level. Also supports an edge counting function. Also equipped with the projection scanning formula so that the required edge position is detected even with products with a poor surface. With rotational correction, diagonal scanning performs sub-pixel edge detection with the gray-scale inter-pixel compensating function.



3 Gray-scale window

Since the average value for brightness within the area is quickly calculated, directional distinction can still occur even when binary distinction is difficult due to the small differences in the gray-scale levels. You can set mask processing with free shapes (rectangular, oval, polygonal) set to match the inspected object.

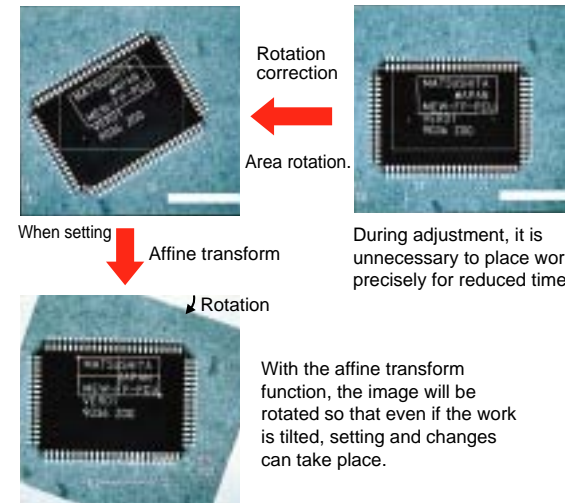


4 Rotational* position adjustment function

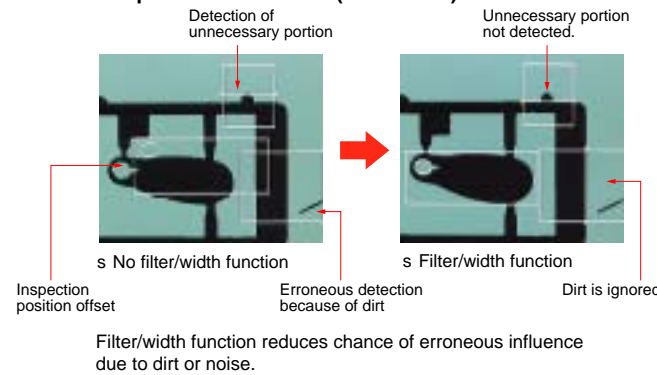
Automatic adjustment and precise inspection takes place even if the work is tilted or displaced. Adjustments can be made using the gray-scale data so that differences in brightness can allow accurate corrections. With multiple and priority functions, complex adjustments are also greatly simplified.

*A218 = rotational position adjustment function (X/Y/q)
A118 = position adjustment function (X/Y)

Rotational adjustment (A218)



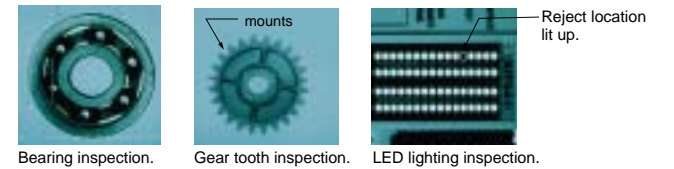
Accurate position correction (A218/A118)



5 Improved binary processing function

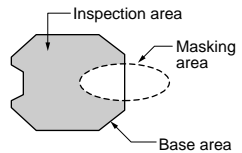
A A wide range of inspection functions

Position/attitude/size detection with optimum feature extraction labeling. Presence/size/orientation inspection with optimum binary window functions. High-speed dimension measurements with optimum edge detection functions. High-speed length/number/presence inspections with optimum line functions.



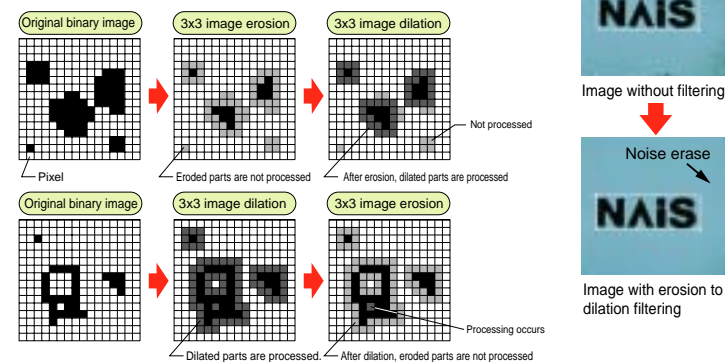
B Free shape

The shape of the inspection area can be freely adjusted between rectangular, oval, or polygonal to match the inspection object. Moreover the mask area (where no inspection takes place) can also be adjusted freely as desired.



C Image filter function.

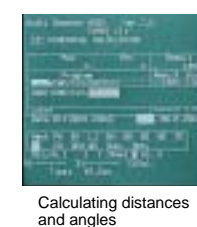
Even with binary images containing substantial noise, stable image processing is possible using filter processing such as [image erosion] → [image dilation]. The filter functions will differ depending on the inspection processing.



6 More numerical calculation and judgement output functions.

A Supports 96 numerical calculation formulas (48 on the A118)

Includes sine, cosine, square root, arctangent absolute differential and projection distance functions in addition to addition, subtraction, multiplication and division, and you can set up to 96 formulas (48 for the A118). You can also reference up to 16 items per formula for complex calculations.



New calculation formula copy function (also compatible with judgment formulas)

B Leeway in judgement calculations

Even for complex pass/fail judgement outputs, internal judgement formulae can be made without using the external PLC. Depending on the application, Judgement output can be set for individual and general judgement for each inspection area freely as desired.

	Internal judgement calculations	External judgement calculations	Total
A218	96 formulae	96 formulae	192 formulae
A118	48 formulae	48 formulae	96 formulae



C Programless data transfer to the PLC

Using the Matsushita Electric Works. FP-series PLC, the Mitsubishi MELSEC A/FX series PLC or the Omron SYMAC C series PLC, Allen Bradley SLC series PLC, numerical calculation result data and judgement output results can be automatically written to the data register of the PLC at a maximum baud rate of 115200 bps. The image processing data can be used with the I/O sensitivity of the PLC.

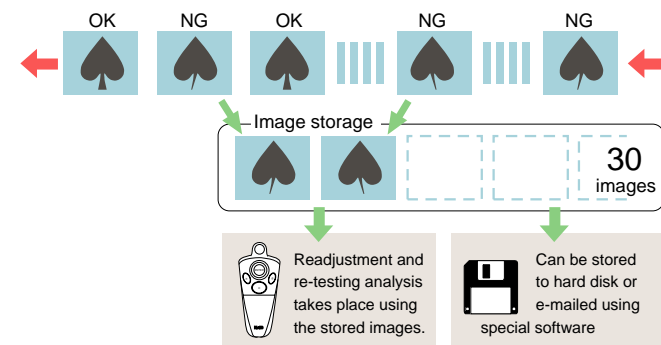
Excellent maintenance characteristics and global compatibility.

Powerful support for startup and maintenance and designed for worldwide use.

Image storage function (A218, A118)

The A Series can store up to 30 defect images, and with the dedicated software tools you analyze the cause of defects at remote locations using e-mail.

Storing up to 30 pictures* of fault occurrences in its memory, makes it possible for analyzing error causes and making adjustments. When setting up the equipment, inspection images are stored and can be used when making new adjustments and changes. Moreover, the stored images can be used for testing. Also, using special software, image data and inspection conditions can be stored, and then faults can be analyzed and adjustments made at any location using e-mail. Furthermore, the location of all errors are clearly displayed and illuminated so that they can be seen at a glance.



■ Vision Backup-Tool Ver.2



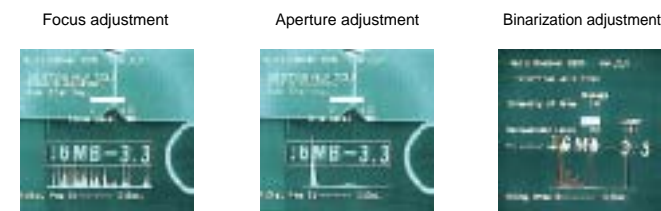
The product data created with the micro-image checker A series and the image data stored in the controller can be stored on a PC using Windows. Stored data can be restored to the A series controller.

*A218 = 30 image, A118 = 8 images

Setup help function

Quantitative support for settings that once relied on intuition.

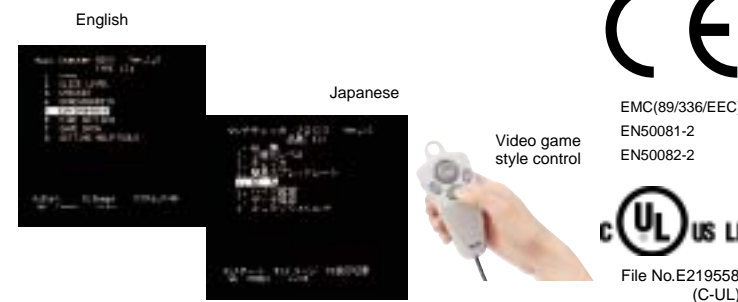
With the setup help function, focusing, brightness adjustment, exposure adjustment, binary level settings, and other adjustments that used to be performed by the operator's professional experience can now be performed quantitatively. Equipped with an input monitor and test output functions, connections to external equipment are also greatly simplified. Great savings can be made in debugging and adjustment by the combination of the trap function, which halts inspection when an error is found, and the image storage and spreadsheet functions.



Global application

English-Japanese interchange and CE certification

Displays for the one controller can be set to either English or Japanese to allow use in a great number of countries around the globe. The A-series controllers are UL/CSA approved (File No. E219558) and conformed to CE marking.



MICRO-IMAGECHECKER A218• A118 MultiChecker V2 Series

■ A218 • A118 Multi-checker V2 specifications

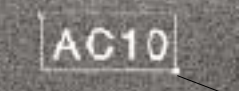


		A218 Multi-checker V2	A118 Multi-checker V2	
CPU		32-bit RISC CPU (high-speed processing version)	32-bit RISC CPU	
Frame memory		512 x 480 (pixels) x 256 gradations	512 x 480 (pixels) x 256 gradations	
Operator interface		Menu selection by specialized keypad		
Monitor display		Change between gray-scale memory/gray-scale through/binary memory (A/B/C/D/E/F)/binary through (A/B/C/D/E/F)/gray-scale NG/binary NG (A/B/C/D/E/F)		
Processing	Gray-scale	8 bit 256 gradations		
	Binarization	6 groups of binary processing from the gray-scale memory (upper and lower threshold settings)		
Number of product types		64	32	
Execution modes		Execute All mode: Execute all set checkers Automatic Switch mode: Change the checker to be executed in accordance with the judgment output result User-Defined mode: Specify the checker for execution when the start signal is input		
Inspection	Position/rotation position adjustment function	Max. 96 per product type Rotation position adjustment function	Max. 48 per product type X-Y position adjustment function	
	Exposure adjustment	Max. 96 per product type	Max. 48 per product type	
	Smart matching/matching (sub-pixel processing)	Shape: rectangular/polygonal or oval mask Shape: rectangular/polygonal or oval Gray-scale mean value detection/judgement	Matching = 48 per product type	
	Gray-scale edge detection (sub-pixel processing)	Sub-pixel accurate multiple detection matching by gray-scale correlation processing Rotation by raster detection and raster detection position (±30 degrees) Output = number of detected items/correlation numbers/position/angle teaching registered changes can be imported from external source smart teaching (A210) = judgement learning function by the smart template		
	Gray-scale window	Max. 96 per product type	Max. 48 per product type	
	Feature extraction	Max. 96 per product type	Max. 48 per product type	
	Binary window	Max. 96 per product type	Max. 48 per product type	
	Binary edge detection	Max. 96 per product type	Max. 48 per product type	
	Line	Max. 96 per product type	Max. 48 per product type	
	Conversion data	4 registers, Can quote to numerical conversion, Can convert numerical conversion result to actual distance, Standard distance, No. of pixels, Coefficient		
	Numerical calculations	Max. 96 per product type	Max. 48 per product type	
	Judgement output	Absolute value of difference between sine and cosine Four data calculations, arctangent, root, the distance-between-points special substitutions reference to previous data output control		
	External interface	Serial	RS232C = 2ch (max.115200bps) Compatible with Matsushita Electric Works PLC FP series Compatible with Mitsubishi MELSEC A Series/FX Series and Omron C Series PLCs	
		Parallel	Input = 11points Output = 14 points Removable screw-down terminal block	
	Inspection start		Image trigger (timing sensor unnecessary) external sensor timing repeat start	
	Other specifications	Display functions	Display item suppressing function (menu display hide function) Image suppress function when setting checkers, Image rotation function when setting checkers (A218) Clearly display reject location, Rotational adjustment angle display (A218), Data Monitor function Display of image processed with image filter, simple spreadsheet, checker list display	
		Marker function	Maximum of 8 graphics/type (line, rectangle or circle), and registered images are displayed on the main screen	
Setup tools	Image storage function	30 screens	8 screens	
	Debugging	Save/load function for inspection image (all screens/problem screens) Store images for reinspection/resetting Windows-PC image save/load function		
	Setup help	Trap function Image storage function Focus setup, aperture setup, lighting adjustment, image profile monitor, recommended threshold level, I/O monitor, enforce output		
Moving object inspection		High-speed random trigger camera (progressive)/flash/electronic shutter used		
Camera support		High-speed random trigger camera (progressive) = ANM831 Standard camera = ANM830A, Composite video (NTSC) input used (however the connection requires one port)		
Number of support cameras		2	1	
Operating voltage		24 V DC less than 0.9 A	24 V DC less than 0.7 A	
Setup data backup		Image data and setup data can be saved to a Windows PC using vision Backup Tool Ver.		

* Type data saved in the previous controller of the Micro Image Checker A Series (Ver. 1) cannot be directly restored to V2 using the Vision Backup-Tool. In this case, you will need the dedicated data conversion software (freeware) to convert the Ver. 1 type data for V2 use. If you require the data conversion software or information about how to use it, contact your Aromat Corporation representative. You can also download the data converter software from the following Web page. <http://www.aromat.com/acsd>

The A228 OCV Checker provides a simple and flexible solution to the character inspection requirements for electronic components, food products, pharmaceutical/cosmetic packaging and more.

Simple, Reliable and Flexible

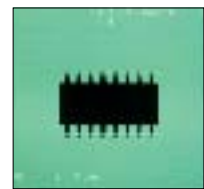
Easy three-step screen-based setup and adjustment

STEP1	Range Specification	All you need to do is setup the area to be inspected. No need to create an inspection character dictionary. Even with poor background condition, the A228 automatically segments the gray-scale template on a character-by-character basis.	 Range setting
STEP2	Character Segmentation	When the character contrast and background condition are poor, the background processing noise cut function will automatically segment character using the gray-scale method. You can perform adjustment while viewing the text in the segmented state on the screen.	
STEP3	Dispersion	Handles character thickness variations intelligently. The Smart Setting function allows characters that are only slightly off to be judged as acceptable, and only characters with critical defects judged as unacceptable. This allows you to perform adjustments easily while viewing the screen.	

The A228 OCV Checker is not designed to inspect dot-based characters.

Extensive Gray-Scale Inspection Functions

Connector, QFP, SOP and lead inspection



Just specify the area, and the A228 will accurately measure the lead pitch and lead width in sub-pixel units and count the number of pins. The Gray-scale Data Pixel interpolation function allows highly accurate rotation adjustment.



Sub pixel
Lead count
Pitch
Width

Inspection Principle

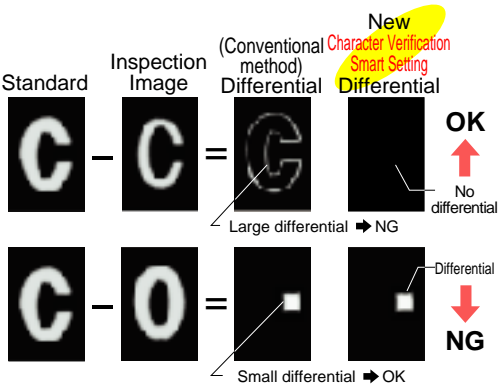
New Character Verification Smart Setting

Thin Standard Thick



Use the gray-scale template registered as the standard to automatically generate a range from thin characters to thick ones. You can set the processing range while viewing the generated characters on the screen. The character verification checker performs gray-scale differential processing, after smart setting processing has been applied.

Unlike the conventional differential method, that cannot distinguish between critical defects such as non-critical differences, this new method can make a more intelligent decision, and perform more reliable inspection.

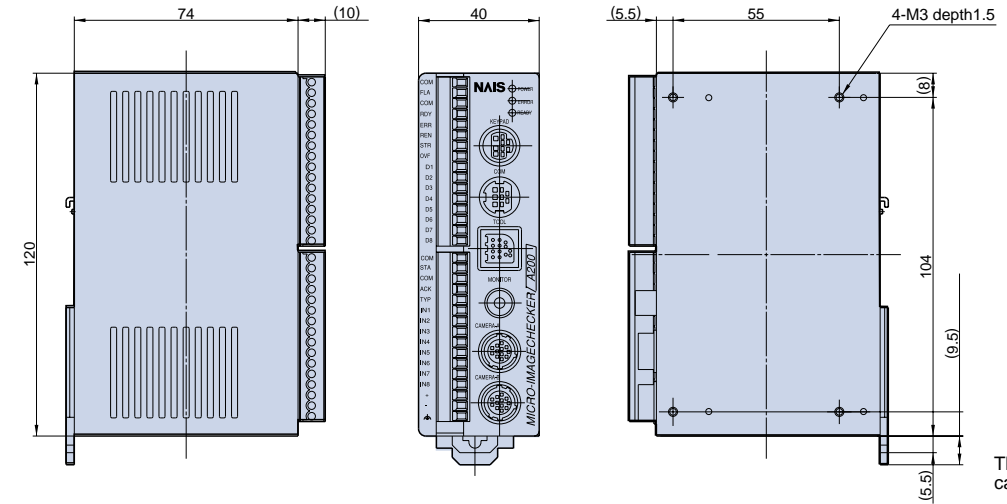


A228 OCV checker specifications

Item	Specifications
Frame memory	512 X 480 (pixels) X 256 gradations
Operator interface	Menu selection using special-purpose keypad
Monitor display	Can be switched between Gray Scale Memory, Gray Scale Thru and Gray Scale NG
Cameras	2 maximum (horizontal/vertical screen splitting possible) High-speed random camera (progressive type)/Electric shutter camera/Other commercially available cameras
Menus	Japanese/English (switchable)
Number of product types	32
Inspection functions	Position/rotation adjustment Smart matching (sub-pixel processing)
	Gray edge
Lead inspection	32 per type/Detection at gray sub-pixel units Area specification: Line or rectangle Scan method: Single, gray filter/width Detection position: Edge, front edge and rear edge, maximum differential, and multiple edge (256 max.) Output: Detected edge coordinates (X 10), number of detections Judgment: Number of detections
	Character verification
Gray window	32 per type/Area: Rectangle, polygon (3 to 16 points), circle or ellipse Mask area: None, rectangle, polygonal (3 to 16 points), circle or ellipse Output value: Gray scale mean value
	Numerical calculation
Judgment output	External output (D) registers: 32 per type Internal judgment (R) registers: 32 per type
Serial	RS-232C: 2ch Start input, product type switch, numerical/judgment inspection result output, changing the maximum and minimum numerical limits, camera switch
Parallel	Inputs: 11, Outputs: 14 Inputs: Start input, product type switch, screen switch, template registration, character registration Outputs: READY signal, numerical calculation results, judgment results, overflow, error signal, flush period signal
Display functions	Image suppress function when setting checkers Image rotation function when setting checkers Bright display of reject locations Numerical calculations results display
Image save function	8 screens Save/load function for inspection image (all screens/problem screens) Store images for re-inspection/resetting Windows-PC image save/load function using the Vision Backup- Tool Ver.2
Debug function	Trap function, Simple Spreadsheet
Setup data backup	Image data and settings can be saved to a Windows PC using the Vision Backup- Tool Ver. 2

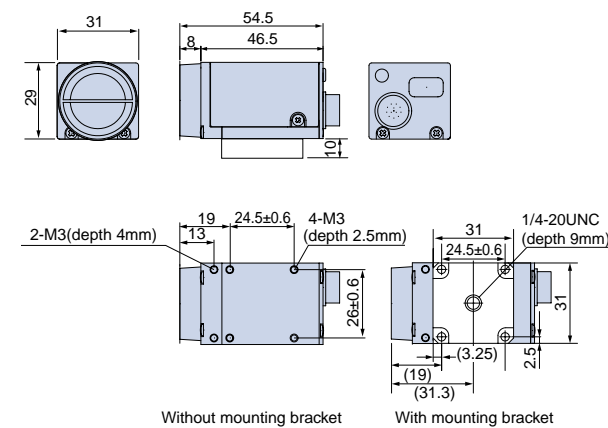
Dimensions (unit: mm)

- A118/A218 Controller
ANMA218V2
ANMA118V2
ANMA228

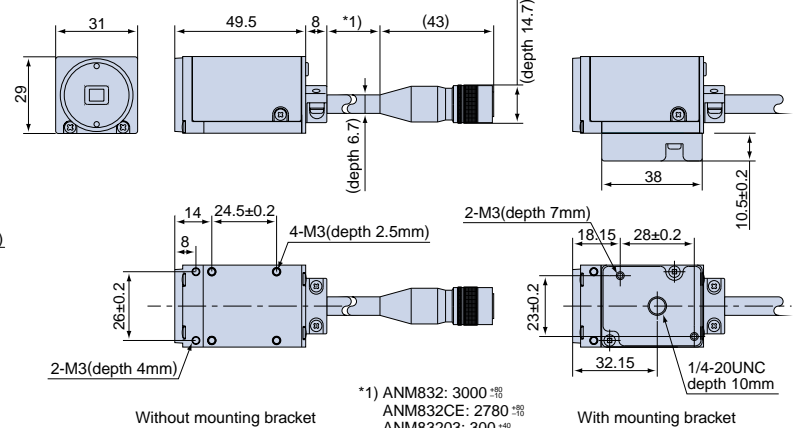


The A118 does not have a camera B port

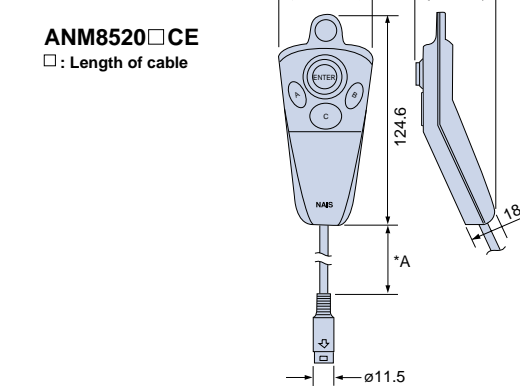
High-speed random trigger camera: C mount ANM831



CS mount camera: CS mount ANM832CE/ANM83203



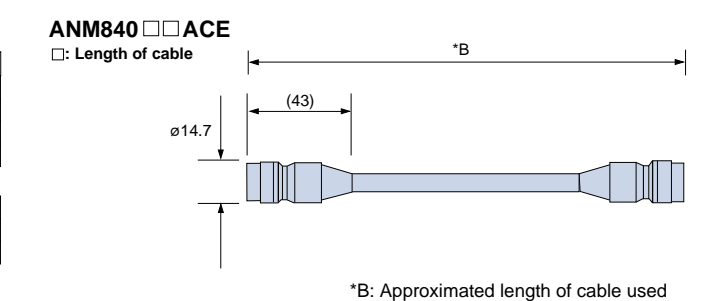
Operating key pad ANM8520 □ CE



Lens

Mounting screws (locked lens only)	C Mount lens		
	ANB845N(L)	f=16	f=30
	ANB846N(L)	f=25	f=30
	ANM8850	f=50	f=27.5
	ANM88501	f=50	f=30.5
CS Mount lens			
ANM8808	f=8	f=34	
ANM88081	f=8	f=31	

Camera cable ANM840 □ ACE



Compact High-speed Gray-scale Machine Vision System **MICRO-IMAGECHECKER® A220**

OCV Checker

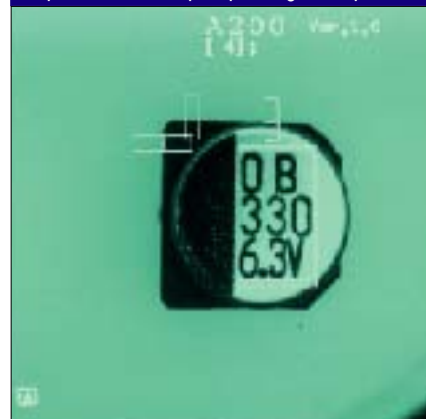
All of our character verification know-how is now packed into the world's best-selling machine vision system. The A220 is a snap to setup, and will handle even difficult character verification problems with ease.

Inspection of printing and leads on connectors.



High-speed inspection of characters produced by laser marking. The A220 will reliably inspect even fine and low-contrast characters. Uses two cameras to perform simultaneous and highly accurate sub-pixel inspection of lead pins.

Inspection of stamped printing on capacitors.



High-speed inspection of characters produced by UV marking. The A220 will reliably inspect stamped characters that have variable thickness.

Inspection of stamped printing on boxes for cosmetics and pharmaceuticals.



High-speed inspection of embossed markings such as usage restrictions and lot numbers. Presence of included instructional documents can be accomplished by using the two cameras together.

Inspection of "Use by" date information on film packaging for food.



High-speed inspection of text such as "use by" dates produced by thermal transfer printing. In addition to character inspection, the A220 is equipped with an extensive range of inspection functions for other applications as well.

A compact machine vision system from the market leader* designed especially for character verification.

We lead the world in sales of machine vision systems and have continually worked to develop and evolve our MICRO-IMAGECHECKER to meet the needs of the market.

The **A220 OCV Checker** provides a simple and flexible solution to the character inspection requirements for electronic components, food products,



Simple, Reliable and Flexible

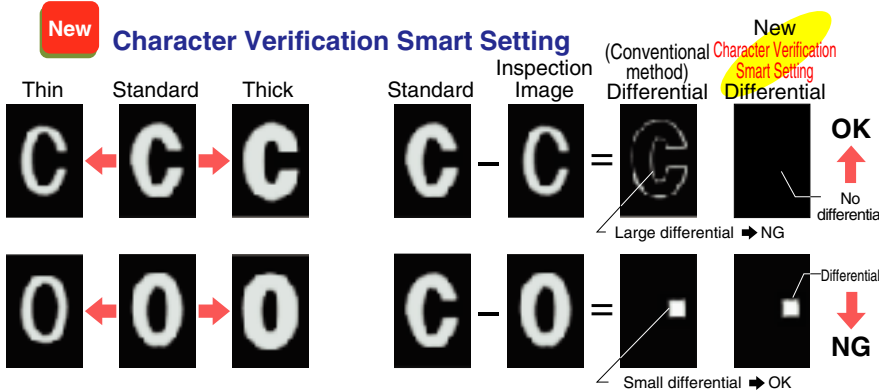
A state-of-the-art algorithm simplifies character inspection. Based on extensive study of the needs of manufacturers and the knowledge that we have acquired from right on the factory floor, we have developed a reliable character inspection algorithm that does not require complicated setup. This product will greatly expand your inspection possibilities.

Three-step screen-based setup and adjustment

STEP1	Easy setting Range specification	Just perform area setup for the characters to be inspected. There is no need to create an inspection character dictionary as with conventional character verification checkers. If the condition of the background is poor, the A220 automatically segments the gray-scale template on a character-by-character basis, so all you need to do is specify the range.	
STEP2	Easy setting Character segmentation	Automatic segmentation using the gray-scale method (for character separation) When the character contrast and background condition are poor, the background processing noise cut function uses the gray-scale method to automatically segment the characters. This also works well with low-contrast text such as that drawn by laser markers. You can perform adjustment while viewing the text in the segmented state on the screen.	
STEP3	Easy setting Dispersion	Handles character thickness variations intelligently The Smart Setting function can take into account variations between acceptable characters and prevent them from being judged as unacceptable. Characters that are only slightly off are judged as acceptable, and only characters with critical defects are judged as unacceptable. This allows you to make inspection settings that grasp the essence of the characters, and to perform adjustments easily while viewing the screen.	

The A220 OCV Checker is not designed to inspect dot-based characters.

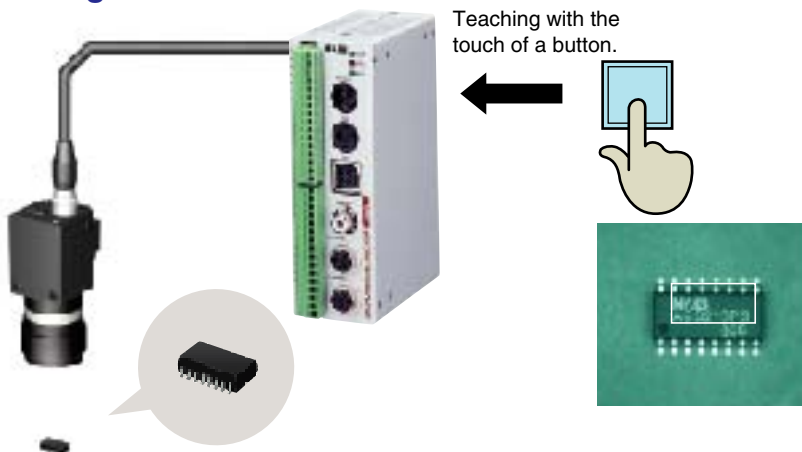
Inspection Principle



Use the gray-scale template registered as the standard to automatically generate a range from thin characters to thick characters. You can set the processing range while viewing the generated characters on the screen. The character verification checker performs gray-scale differential processing using the character, after smart setting processing has been applied, and the inspected character.

Unlike the conventional differential method, that cannot distinguish between critical defects such as incorrectly joined lines in a character and non-critical differences such as slight variations in thickness, and that judges both as unacceptable, this new method can make a more intelligent decision, and perform more reliable inspection.

Teaching function.

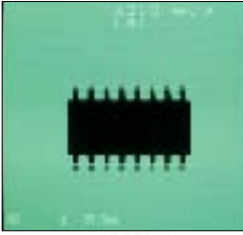


Teaching allows changes to be made to the template for matching even from an external signal. Registering the change can be done simply by showing the object for detection. Teaching also supports positional corrections so that even when work is displaced, teaching can occur.

The Teaching function is compatible with the Position Adjustment function, and will reliably change if the work position shifts.

Extensive Gray-Scale Inspection Functions

Connector, QFP, SOP and lead inspection



Just specify the area, and the A220 will accurately measure the lead pitch and lead width in sub-pixel units and count the number of pins. The Gray-scale Data Pixel Interpolation function allows highly accurate rotation adjustment.



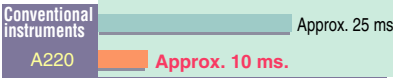
Gray-scale window



Since the average value for brightness within the area is quickly calculated, directional distinction can still occur even when binary distinction is difficult due to the small differences in the gray-scale levels. You can set mask processing with free shapes (rectangular, oval, polygonal) set to match the inspected object.

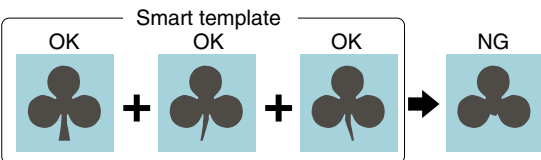


Smart matching (Fastest in its class).



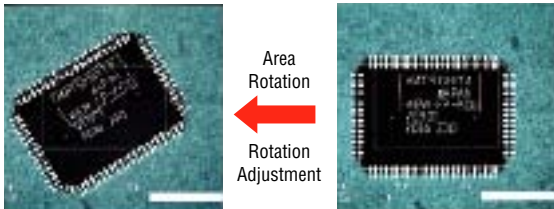
With the smart matching with a high-speed CPU, vast memory, and original algorithm, even with a 64 x 64-pixel template,

256 x 256-pixel search area, and sub-pixel precision detection, you still get a processing time of **about 10 ms**. As you can see, this is the ultimate in speed and precision for position detection. With smart template, just by showing multiple examples of the correct products, correct product images can be automatically composed. This allows simple inspection without setting complex parameters.



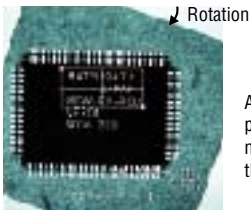
Rotation Adjustment

This uses the High-Speed Gray-Scale function to detect work rotation or shift and perform accurate correction to ensure reliable inspection even when there are variations in light.



When setting ↓ Affine Transformation

The Affine Transformation function rotates the work; so making settings and changes is possible even if the work is inclined.



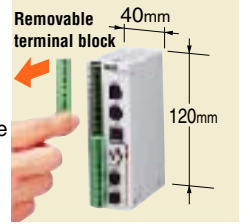
Adjustment is a quick procedure because there is no need to correctly position the work.

Performance

Reduced size (Smallest in its class)

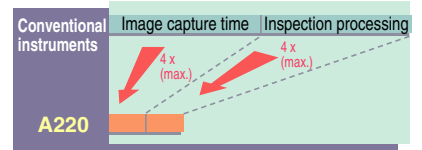
Equipped with a 200MHz 32-bit RISC CPU (320MIPS, 1.4GFLOPS) that runs our independently developed algorithm, and plenty of memory to allow fast and accurate inspection.

With a small 120 40mm footprint, installation is simple. Tight installation with checkers next to each other is also possible. With considerations for wiring, connectors, and removable terminal blocks, installation with all units facing one direction is possible for no wasted space.



Fastest Image Capture in its Class

Uses a high-speed random camera that captures images at four times the speed of our previous products (approximately 8.3ms). This combined with the high-speed image-processing algorithm provides a large reduction in total inspection time.



Simultaneous Image Capture Using Two Cameras

In addition to the high-speed image capture and processing functions, the A220 can perform simultaneous image capture using two cameras, so it can easily be introduced onto high-speed production lines for total inspection. The monitor display can also be freely switched using external input. Also, using the Image Composition function, you can display two camera images on one monitor at the same time. It has been designed with compact built-in cameras in mind, and is also compatible with many commercially available cameras.

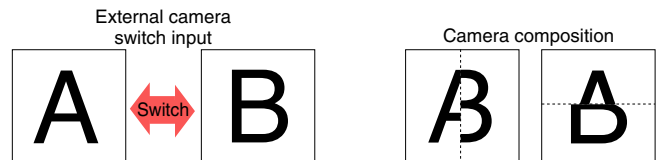
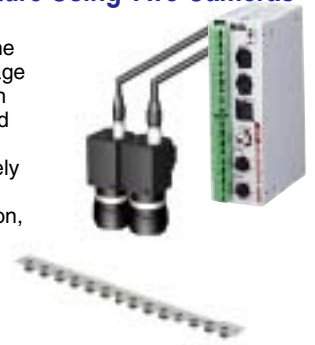
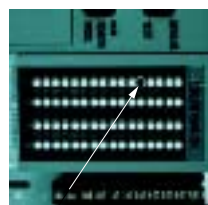


Image storage function

Storing up to 8 pictures of fault occurrences in its memory, it is useful for analyzing error causes and making adjustments. Saving does not take up time, and does not disturb the inspection tact time. Also, using special software, image data and inspection conditions can be stored, and then faults can be analyzed and adjustments made from any location using e-mail.

Also, using special software, image data and inspection conditions can be stored, and then faults can be analyzed and adjustments made from any location using e-mail. Saved image data can be converted to Windows format and pasted into documents such as instruction manuals.



Error location clearly illuminated

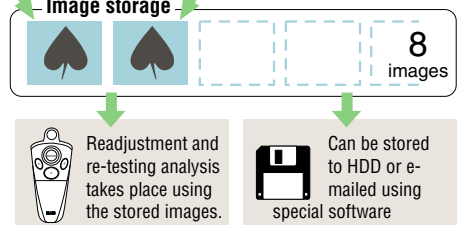


Table of Product Numbers

Controller

Specifications	Part No.
Micro-Imagechecker A220 OCV Checker with CE (NPN output)	ANMA222
Micro-Imagechecker A220 OCV Checker with CE (Photo MOS output)	ANMA228

Camera

Specifications	Part No.
C mount camera, Progressive High speed Random: CE	ANM831
CS mount camera support electric-shutter with 3 m cable	ANM832
CS mount camera, support electric-shutter with 3 m cable: CE	ANM832CE

High-speed random trigger camera cable

Specifications	Part No.
3m	ANM84303
3m: CE	ANM84303CE

Camera extension cable

Specifications	Part No.
2 m extension: total 5 m	ANM84002
7 m extension : total 10 m	ANM84007
12 m extension: total 15 m	ANM84012
17 m extension: total 20 m	ANM84017
2 m extension : total 5 m: CE	ANM84002CE
7 m extension: total 10 m: CE	ANM84007CE
12 m extension: total 15 m: CE	ANM84012CE
17 m extension: total 20 m: CE	ANM84017CE

Keypad

Specifications	Part No.
with 2 m cable	ANM85202
with 3 m cable	ANM85203
with 2 m cable: CE	ANM85202CE
with 3 m cable: CE	ANM85203CE

Data backup software

Specifications	Part No.
Vision Backup-Tool Ver.2 English version	ANM70131V2

Microsoft windows NT4.0/95/98 compatible.
An operating system is not included with this software.

Accessories

Specifications	Part No.
I/O terminal block For input: 1 piece, for output, 1 piece	ANMA8001
BNC connector Monitor BNC jack to PIN jack adapter	ANM8606

In addition, a full lineup of accessories including lenses and illumination equipment is available.

Unless otherwise specified, estimate and delivery prices do not include technician dispatching and other related services. Therefore, for the situations given below, additional charges may be added.

- Installation and trial operation guidance
- Inspections, adjustments, and repairs
- Technical support and instruction

A220 OCV checker specifications

Item	Specifications
Frame memory	512 X 480 (pixels) X 256 gradations
Operator interface	Menu selection using special-purpose keypad
Monitor display	Can be switched between Gray Scale Memory, Gray Scale Thru and Gray Scale NG
Cameras	2 maximum (horizontal/vertical screen splitting possible) High-speed random camera (progressive type)/Electric shutter camera/Other commercially available cameras
Menus	Japanese/English (switchable)
Number of product types	32
Inspection functions	Position/rotation adjustment: 8 per type/Two-point adjustment function using gray edge/matching Smart matching (sub-pixel processing): 4 per type/Includes a differential processing function that operates after detection matching Sub-pixel accuracy multiple detection matching by gray scale correlation processing Rotation by raster detection and raster detection position (±30 degrees) Output: number of detected items, correlation values, position and angle Teaching registration changes possible from external source Smart matching: Judgment learning function via smart template
	Gray edge: 32 per type/Detection at gray sub-pixel units Area specification: Line or rectangle Scan method: Single/projection, gray filter/width Detection position: Edge, front edge and rear edge, maximum differential, and multiple edge (256 max.) Output: Detected edge coordinates (X 10), number of detections Judgment: Number of detections
	Lead inspection: 32 per type/Detection at gray sub-pixel units Area specification: Line or rectangle Scan method: Single, gray filter/width Detection position: Dual edge detection Output: Number of leads Judgment: Number of leads, pitch, width, and overall judgment
	Character verification: 16 per type/Character quality inspection using matching, subtraction and labeling. Possible to select between individual character inspection and pattern inspection. Individual: Possible to inspect up to a maximum of 30 characters. Auto pattern registration function that uses an original character segmentation function. It is possible to set so that only character edges are masked during pattern registration. Pattern: Patterns can be registered without character segmentation. Output: No. of detections, Detection position, Maximum differential, No. of differentials, and Correlation value for each character. Judgment: OK/NG for all characters and individual characters.
	Gray window: 32 per type/Area: Rectangle, polygon (3 to 16 points), circle or ellipse Mask area: None, rectangle, polygonal (3 to 16 points), circle or ellipse Output value: Gray scale mean value
Numerical calculation	32 per type/Arithmetic, arctan, square root, distance between two points, specific substitution, referencing of previous data, and output control
Judgment output	External output (D) registers: 32 per type Internal judgment (R) registers: 32 per type
Serial	RS-232C: 2ch Start input, product type switch, numerical/judgment inspection result output, changing the maximum and minimum numerical limits, camera switch
Parallel	Inputs: 11, Outputs: 14 Inputs: Start input, product type switch, screen switch, template registration, character registration Outputs: READY signal, numerical calculation results, judgment results, overflow, error signal, flush period signal
Display functions	Image suppress function when setting checkers Image rotation function when setting checkers Bright display of reject locations Numerical calculations results display
Image save function	8 screens Save/load function for inspection image (all screens/problem screens) Store images for re-inspection/resetting Windows-PC image save/load function using the Vision Backup- Tool Ver.2
Debug function	Trap function, Simple Spreadsheet
Setup data backup	Image data and settings can be saved to a Windows PC using the Vision Backup- Tool Ver. 2



The standard A220 Micro-ImageChecker and High-speed random camera are compliant with the EC directive (CE marking). EMF performance has been improved, so you can safely include the equipment in systems destined for Europe.
The A220 Micro-ImageChecker and High-speed random camera comply with the following EMC directives:
EMC directive (89/336/EEC) EN50081-2: 1993 EN50082-2

These materials are printed on ECF pulp.
These materials are printed with earth-friendly vegetable-based (soybean oil) ink.



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