A110 Single Camera MultiChecker V.2 Series
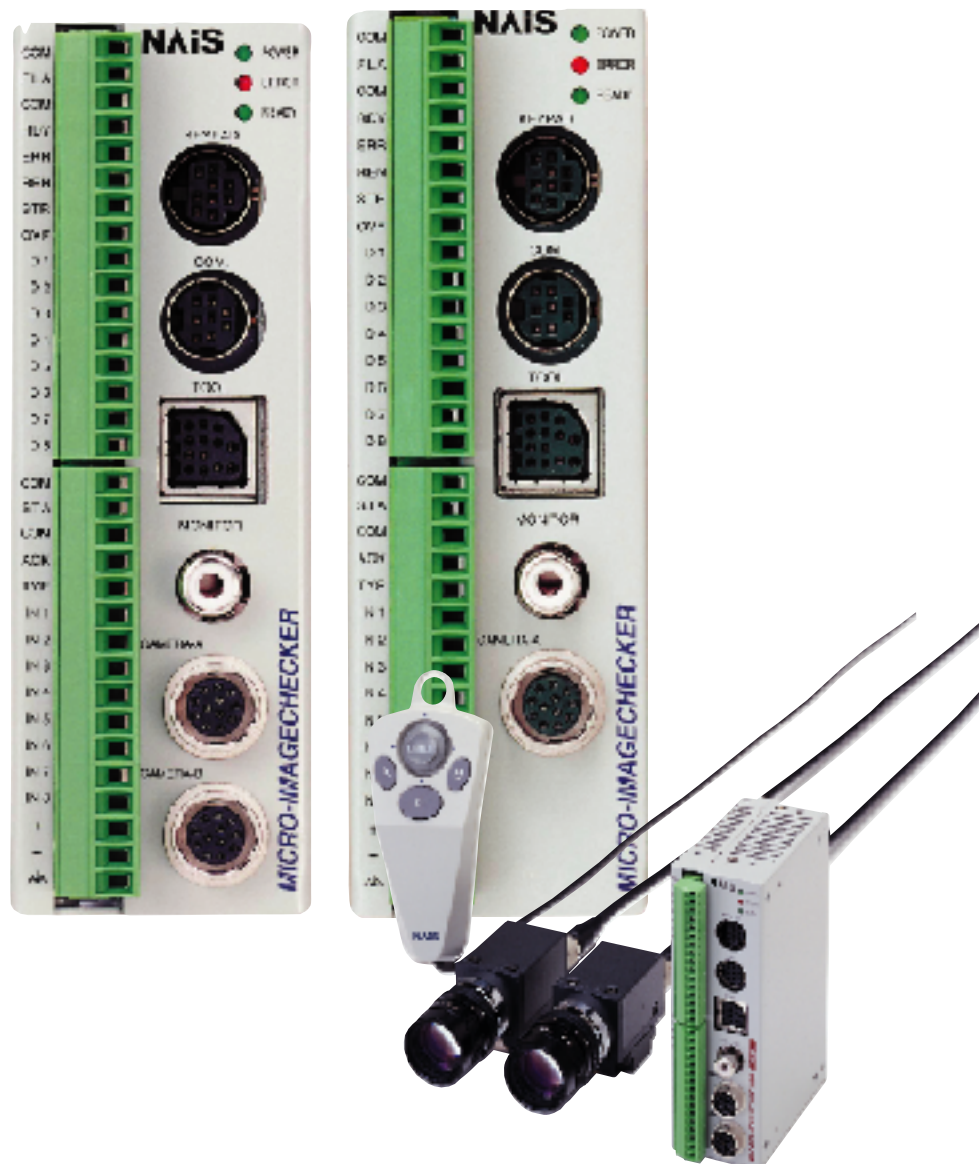
A210 Dual Camera MultiChecker V.2 Series

A220 Dual Camera OCV Series

A230 Dual Camera OCR Series

NAiS IMAGECHECKER OVERVIEW

The most advanced Machine Vision System 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 a 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
- multiple product inspections

With such an extensive range of functions and built-in RS232 communications capable of accesssing direct serial commands, the IMAGECHECKER (ICH) is ideal for automated production lines, and suitable for stringent quality controls applications.

In addition the A Series MULTICHECKER is manufactured by Matsushita Electric Works, Ltd. Which guarantees a defect free and high quality inspection system, with over 15 years of proven and reliable operation. And it is the number one vision system in Japan, prefered for its stand-alone, easy of use and simple programming setup.

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NAiS IMAGECHECKER ALGORITHMS

Automatic Switch Mode

Branch inspection without complicated settings provides maximum flexibility!
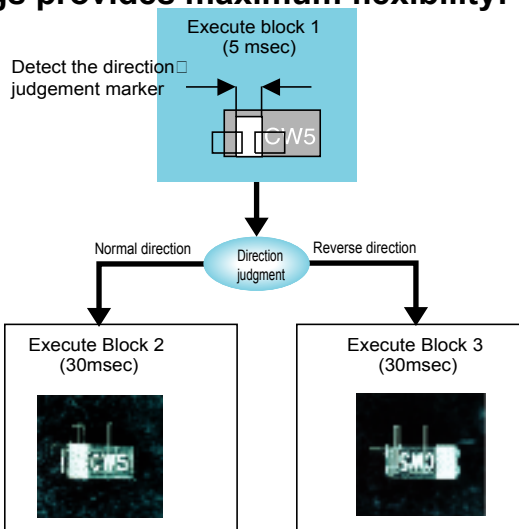
Example

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!

Half the standard Execution time!

Execute block 1 (5 msec)

Detect the direction judgement marker

CW5

Normal direction — Direction judgment — Reverse direction

Execute Block 2 (30msec)

Execute Block 3 (30msec)

User-Defined Mode

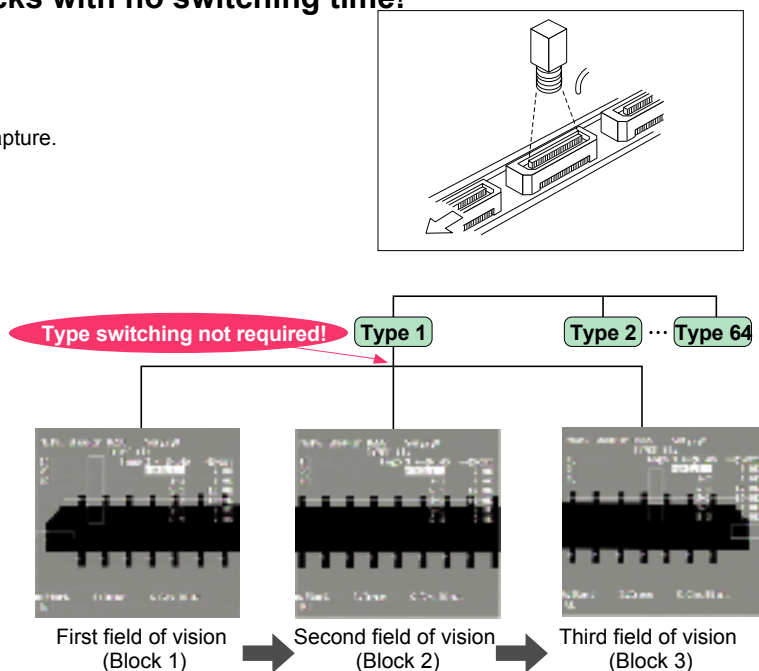### Multiple inspections of up to three blocks with no switching time!

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.

Type switching not required! Type 1 ⋯ Type 2 ⋯ Type 64

First field of vision (Block 1) → Second field of vision (Block 2) → Third field of vision (Block 3)

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.

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 with 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 not only extremely high-speed inspection, but also the ultimate precision.

360 MIPS

32 bit RISC CPU
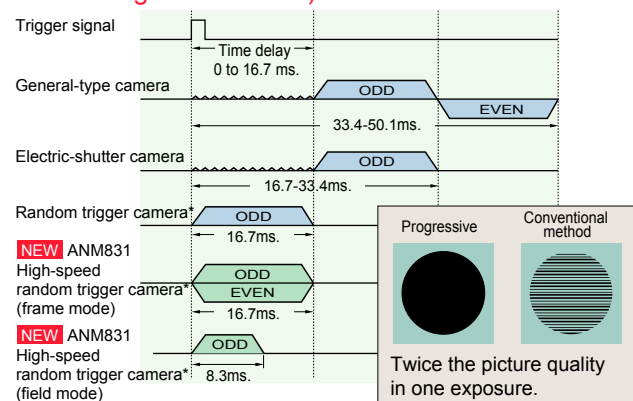
Floating point operations 1.4 billion times/sec.
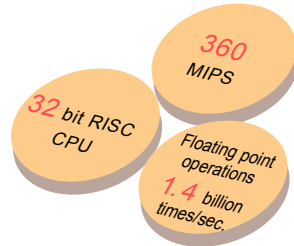
With a small footprint of 120x40mm, installation is simple. You can install checkers next to each other in tight space. Considering wiring, connectors and removable terminal blocks, it is possible to install all units facing one direction. There is no wasted space. It is also possible to install them on DIN rails.

Removable terminal block

40mm

Side-by-side OK!

120mm
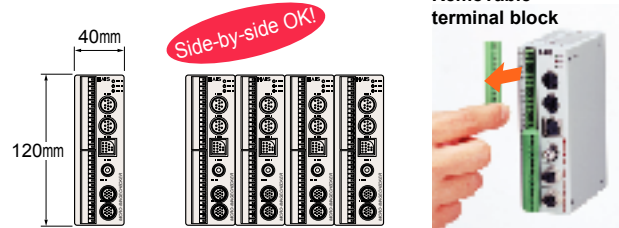
High-speed random trigger camera (progressive rectangular-lattice CCD element)

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 pitcure and no image degradation. In field mode, it reaches 4 times for 1/120 second. The result is fast inspection without worring about inspection time or image quality.

(Fastest images in its class)
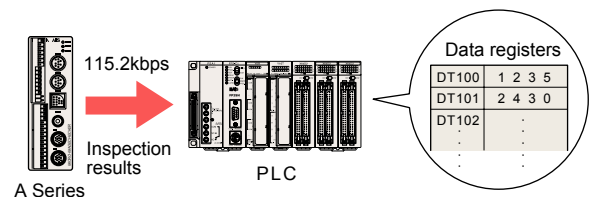
Trigger signal

Time delay 0 to 16.7 ms.

General-type camera — ODD — EVEN

33.4-50.1ms.

Electric-shutter camera — ODD

16.7-33.4ms.

Random trigger camera* — ODD

16.7ms.

NEW ANM831 High-speed random trigger camera* (frame mode) — ODD EVEN

16.7ms.

NEW ANM831 High-speed random trigger camera* (field mode) — ODD

8.3ms.

Progressive | Conventional method

Twice the picture quality in one exposure.

*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 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.

115.2kbps

Inspection results

A Series

PLC

Data registers

DT100	1 2 3 5	
DT101	2 4 3 0	
DT102	:	

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

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.

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 selected either vertical or horizontal for the image split direction.

Camera A
Camera B

Switch
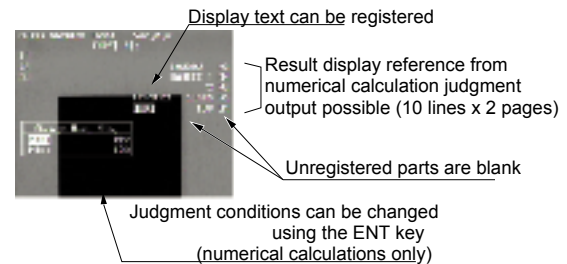
Split display
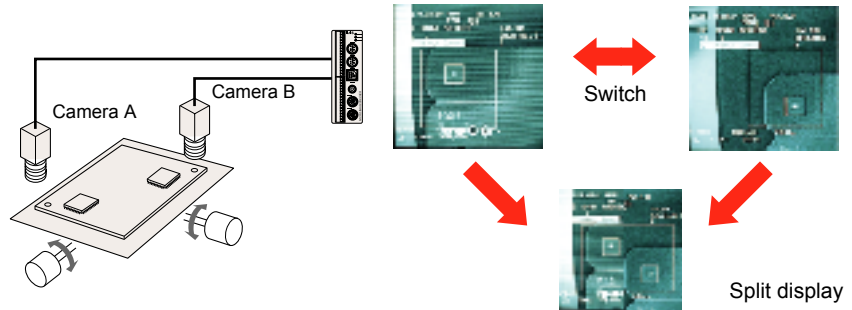
Menu hide (Customize) function

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 preven from unauthorized access.

Removed from the menu

Unique inspection algorithm and menu designs can be made for full customization. For details, contact Matsushita Electric Works, Ltd.

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.

Display text can be registered

Result display reference from numerical calculation judgment output possible (10 lines x 2 pages)

Unregistered parts are blank

Judgment conditions can be changed using the ENT key (numerical calculations only)

Two types available to suit your application

◼ **A218 with two camera connection and high-end functions**

A218 (two cameras, controller, and keypad)

◼ **A118 with one camera connection and cost performance.**

A118 (camera, controller, and keypad)

The A118 offers true cost performance. It wipes away the industry common sense that image processing is expensive.
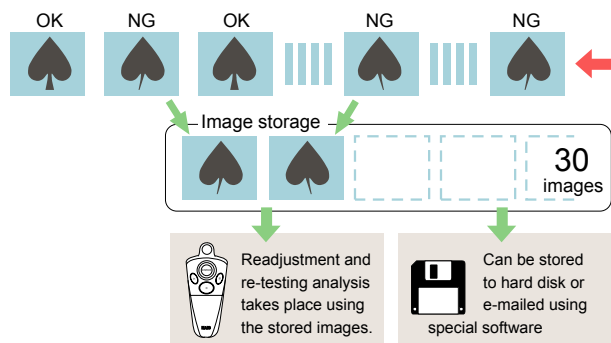
Image storage function (A218, A118)

The A Series IMAGECHECKER is capable of storing up to 30 images (rejects). Combined with our friendly and easy to use software (Viaon Backup Tool), images can be transfer via e-mail for remote location analysis.

A maximum of *30 faulty images could be store in the IMAGECHECKER memory, making it possible to analyze error causes and make correction and adjustments. Standard images (Good parts) coud be stored and retrieve for machine change overs and calibration purposes.

The VISION BACKUP SOFTWARE provides a safe and reliable way of backing up images, and system configuration for archiving or machine replication purposes. The archive files or images can be e-mail or electronically sent for analysis and adjustments from any location.

Finally the location of all errors are clearly displayed and illuminated so that they can be seen at a glance.

OK NG OK NG NG

Image storage

30 images

Readjustment and re-testing analysis takes place using the stored images.

Can be stored to hard disk or e-mailed using special software

■ **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 = Max. 30 images
A118 = Max. 8 images

Setup help function

Focus, aperture, and I/O adjustement are made simple.

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.
Debugging and inspection adjustments are made easily using the TRAP function, which halts inspection, image storage and spreadsheet functions adjustment once an error or reject inspection is detected.

Focus adjustment   Aperture adjustment   Binarization adjustment

Global application

Multi-language support 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.

English

Japanese

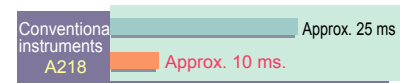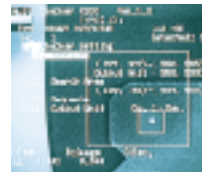Video game style control

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

CE

c(UL)us LISTED
File No.E219558
(C-UL)

NAiS IMAGECHECKER TOOLS

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, and a processing time of about 10 ms. It is easy to see, this is the ultimate tool for hight speed and precision part inspection.
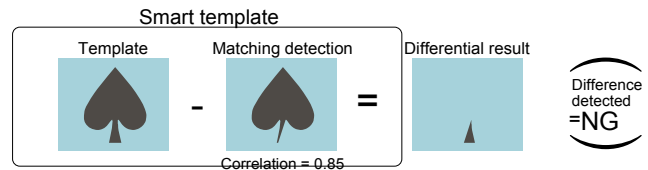
B Smart matching (A218).

Sub-pixel position detection takes place with gray-scale matching, The gray-scale differential function provides detailed object inspection. This process allows accurate inspection en in cases where standard pixel matching processing alone would fail
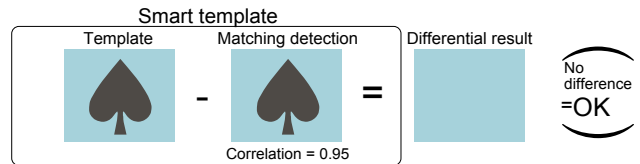
C Smart template (A218).

Simply by registering a good part as a template, and inspection of multiple similar parts can be performed. Without the need of complex settings or software parameters.

D Smart matching rotational correction (A218)

The rotational correction function in the A218 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 due to the transportation method.

E Rotation position/tilt detection.

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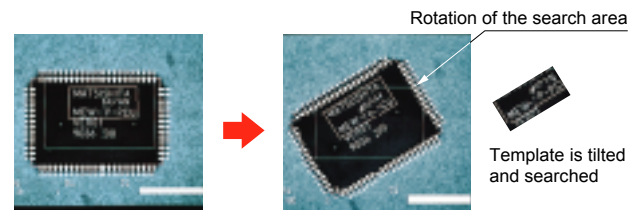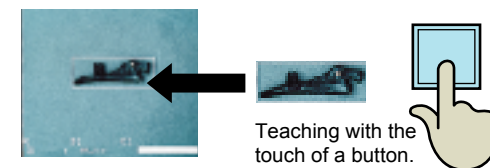
F Multiple position detection

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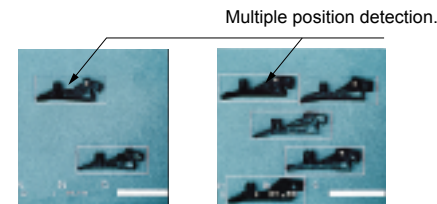
G Teaching function.

Automattic Teaching allows new templates or patterns to be register 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.

Matching search time: Approx. 10 ms.

Conventional instruments — Approx. 25 ms
A218 — Approx. 10 ms.

Smart template

| Template | Matching detection | Differential result |

Correlation = 0.95

No difference =OK

Smart template

| Template | Matching detection | Differential result |

Correlation = 0.85

Difference detected =NG

Rotation of the search area

Template is tilted and searched

Multiple position detection.

Teaching with the touch of a button.

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
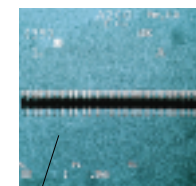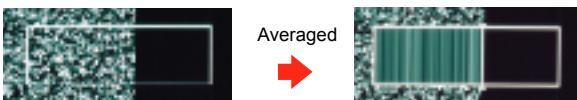
Averaged

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.

Direction: OK   Direction: Reject

GW1 GW2 GW3 GW4

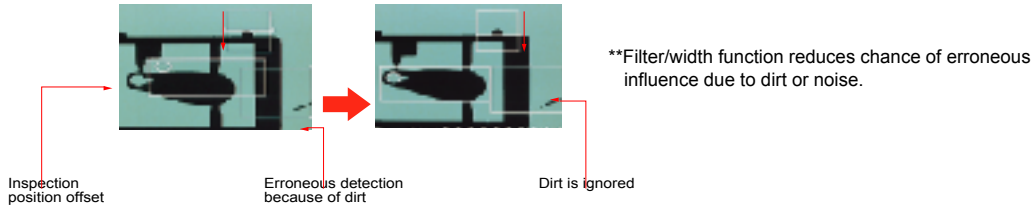When the direction is correct:
GW1 becomes brighter than GW2, so GW1 - GW2 > 0 and GW3 - GW4 = 0.

NAiS IMAGECHECKER TOOLS
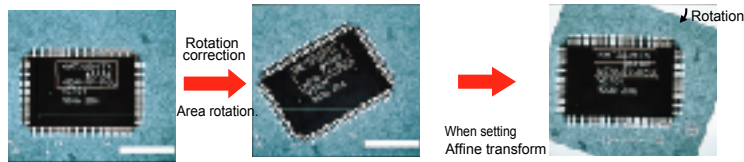
4 Rotational* position adjustment function

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 (A218/A118)

**Filter/width function reduces chance of erroneous influence due to dirt or noise.

Inspection position offset

Erroneous detection because of dirt

Dirt is ignored

■ Rotational adjustment (A218)

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

Rotation correction

Area rotation.

When setting Affine transform

Rotation

*A218 = rotational position adjustment function (X/Y/q)
A118 = position adjustment function (X/Y)
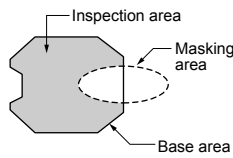
5 Improved binary processing function

A A wide range of inspection functions

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

Reject location lit up.

mounts

Bearing inspection.

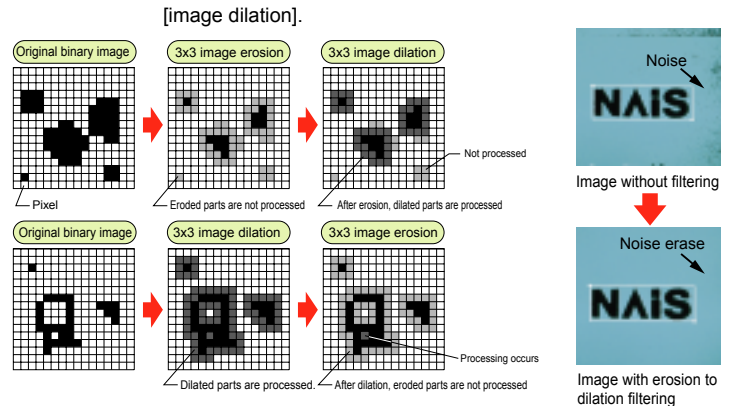Gear tooth inspection.

LED lighting inspection.
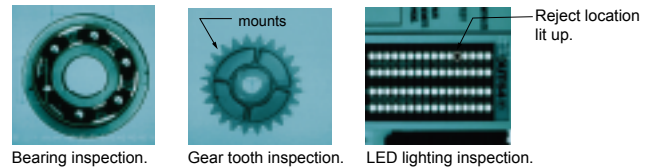
B Free shape

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.

Inspection area

Masking area

Base area

[image dilation].

Original binary image | 3x3 image erosion | 3x3 image dilation

Pixel

Eroded parts are not processed

After erosion, dilated parts are processed

Not processed

Noise

NAiS

Image without filtering

C Image filter function.

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

Original binary image | 3x3 image dilation | 3x3 image erosion

Dilated parts are processed.

After dilation, eroded parts are not processed

Processing occurs

Noise erase

NAiS

Image with erosion to dilation filtering

6 More numerical calculation and judgement output functions.

A Capable of 96 independent numerical calculations (48 on the A118)
Includes trig functions (sine, cosine, square root, arctangent) as well as standard operators (add, subtract, multiply and divide) .
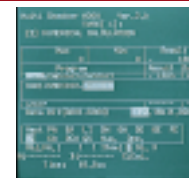Within each calculation 16 checkers or tools can be reference maximum calculation flexibility.

B Calculations provide range adjustments.
For complex pass/fail judgement outputs, internal judgment formulas can be made executed without an external device such as a PLC. Depending on the application, Judgement outputs could be set individually for each inspection.

Calculating distances and angles

Judgement output formula

C Direct Data transfer to the PLC (native protocol communications)
Numerical calculations and judgement output results can be 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
A218	96 formulae	96 formulae	192 formulae
A118	48 formulae	48 formulae	96 formulae

NAiS IMAGECHECKER

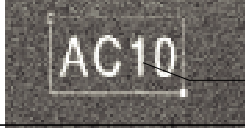## MICRO-IMAGECHECKER A218 - A118 MultiChecker V2 Series

■ 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 ifferential 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	Max. 48 per product type
		Scanning method = individual/projection gray-scale filter/width function detection by sub-pixel unit Detection position = forepoint/forepoint and afterpoint/largest differential/multiple edge	
	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, Cooefficient	
	Numerical calculations	Max. 96 per product type	Max. 48 per product type
		Absolute balue 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	
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 follwing Web page. http://www.aromat.com/acsd

NAiS MACHINE VISION OCV IMAGECHECKER

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	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. Adjustments are performed easily in real time.	
STEP3	Dispersion	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.	

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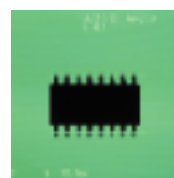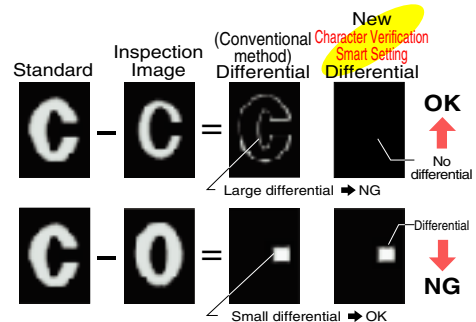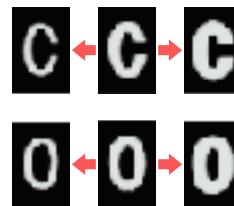The character verification checker performs gray-scale differential processing, after smart setting processing has been applied. Unlike the conventional differential method, that cannot distinguish between critical defects such as non-critical differences, this new method can make a more intelligent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

Thin   Standard   Thick

Standard   Inspection Image   (Conventional method) Differential   New Character Verification Smart Setting Differential

OK — No differential

Large differential ➡ NG

Small differential ➡ OK   NG — Differential

■ 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.

Sub pixel   Lead count   Pitch   Width

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NAiS IMAGECHECKER OCV

MICRO-IMAGECHECKER A220 Character Verification Type

■ 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 angleTeaching 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

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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 defficient 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 continuosly 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)

Character recognition (Reading)

OCV
(Optical Character Verification)

Character verification (Quality)

MICRO-IMAGECHECKER A230
Character recognition type

Advanced Extraction Algorithms (No background interferance)

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.

Even when there's a background pattern...

VER1-113
9708P2001

Even if there's a line in the background...

13.10.05

Simple Operation

AC10

AC10

Area setting

By simply drawing the area...

...only the characters are extracted.

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

The quality of printed characters constanly changes for typical printing processes such as dot-matirx inkjet, thermally printed or pressure stamp characters.
In many cases the characters become "joined, blurred or or partially omitted."
The A230 powerful new features provide accurate recognition and inspection of such characters.
Specially on aplications which have been named "tough, cumbersome or impossible" by more expensive, and complicated vision inspection systems.

● Dot matrix characters

0123

● Joined characters

010611

● Chipped or blurred characters

43232

Multiple Character Size (OCR Tools)

Recognition

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

AAAAAAA

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NAiS IMAGECHECKER OCR

Multiple Character Dictionaries (Standard OCR Fonts)

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

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.
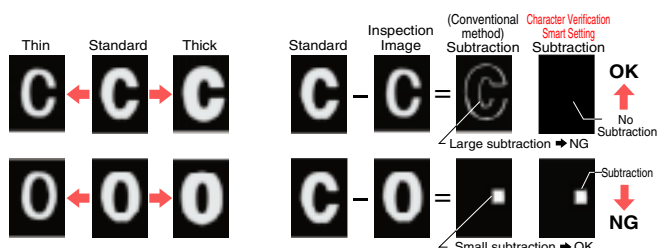In addition the recongized strings can be output as string data via the serial port as Standard ASCII strings.

Character recognition

Judgment result/ character string output

Character string setting

PLC etc.
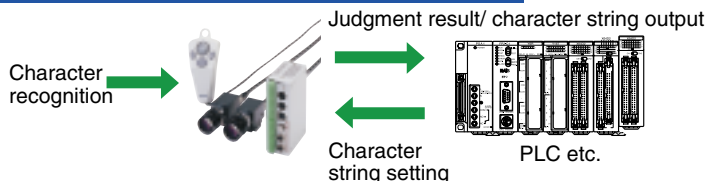
Optical Character Verification Tools

Smart Processing Function for OCV

Eroding or dilating characters (thin or thick) are automatically processed based on a gray scale substraction 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.

Thin Standard Thick

Standard Inspection Image (Conventional method) Subtraction Character Verification Smart Setting Subtraction

C – C = ⟳ OK
No Subtraction
Large subtraction ➡ NG

C – O = Subtraction
Small subtraction ➡ OK NG

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.

Teaching with the touch of a button.
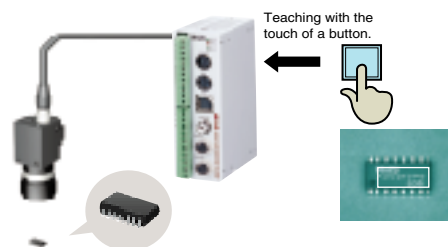
Grayscale Inspection Tools

■ Rotation Adjustment

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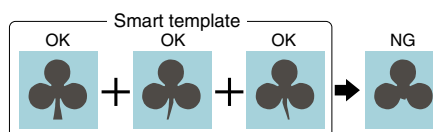
■ Smart Matching

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.

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

Rotation adjustment

Area rotation

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

Smart template
OK + OK + OK ➡ NG

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NAiS IMAGECHECKER OCR

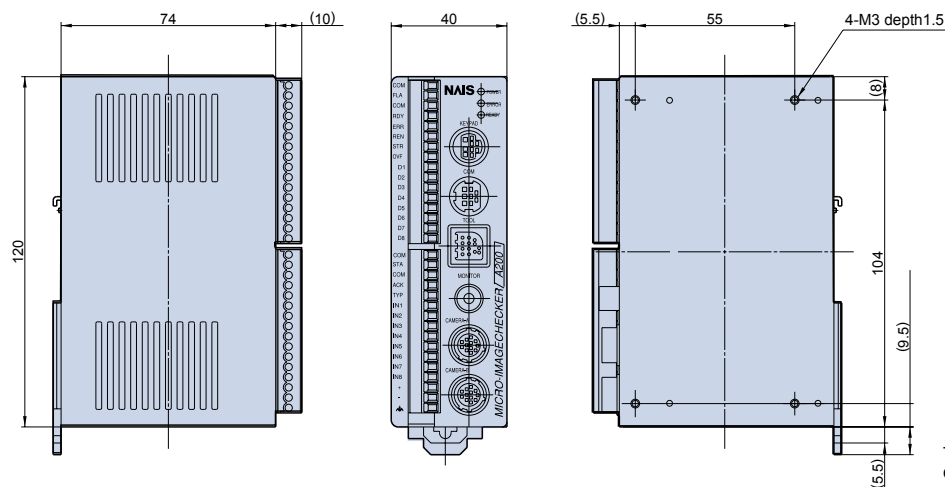## *MICRO-IMAGECHECKER A230 Character Recognition Type*

■ Specifications

Item		Specifications
Frame memory		512×480 (pixels) $\times 256$ 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

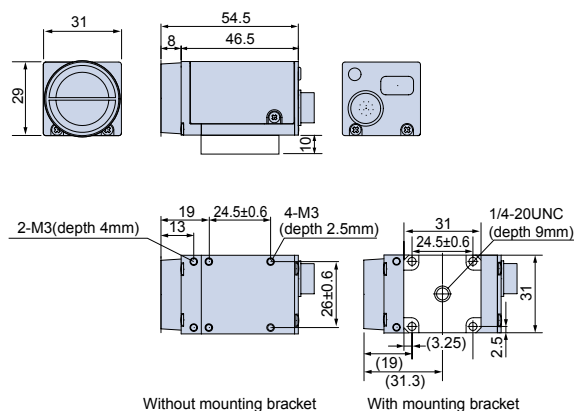| Item		Specifications
Inspection functions	Gray edge (sub-pixel processing)	32 per type Detection at gray sub-pixel units Area specification: Line or rectangle Scan method: Single/projection, gray filter/width Detection position: Edge, front edge and rear edge, maximum differential value, or multiple edge (256 max.) Output: Detected edge coordinates, number of detections Judgment: Number of detections
	Gray window	32 per type Area: Rectangle, polygon (3to 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) $\times$ 120 (H) $\times$ 84 (D)

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NAIS IMAGECHECKER DIMENSIONS

■ 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

Without mounting bracket

With mounting bracket

● CS mount camera: CS mount
ANM832CE/ANM83203

Without mounting bracket

With mounting bracket

*1) ANM832: 3000
ANM832CE: 2780
ANM83203: 300
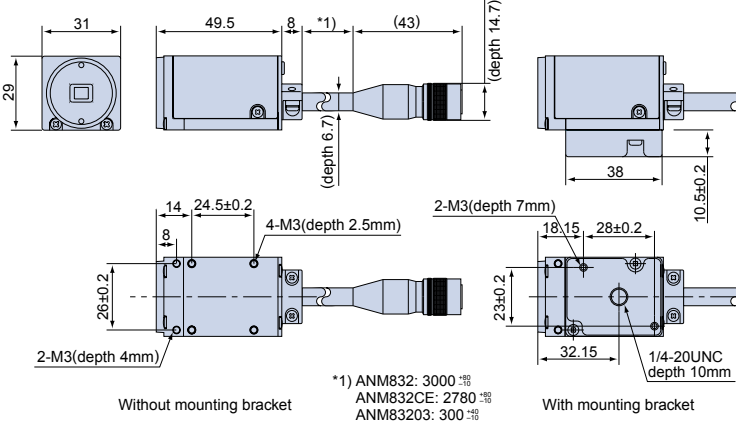
● Operating key pad

ANM8520□CE
□ : Length of cable
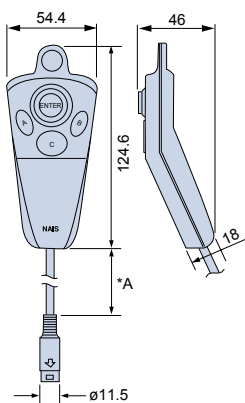
*A: Approximated length of cable for keypad used

● Lens

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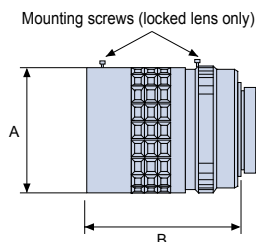
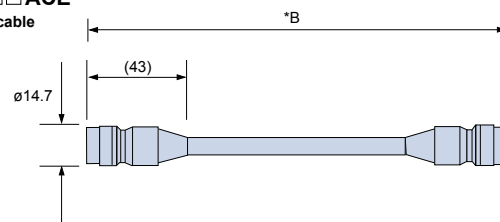
C Mount lens		A	B
ANB845N(L)	f=16	f =30	33
ANB846N(L)	f=25	f =30	37.3
ANM8850	f=50	f =27.5	38.5
ANM88501	f=50	f =30.5	38.5

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

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NAiS IMAGECHECKER PARTS

■ System configuration diagram

Vision Backup-Tool Ver.2

The product data created with the MICRO-IMAGECHECKER 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.

*1 The A100 series connects to one camera.
*2 Use where necessary.
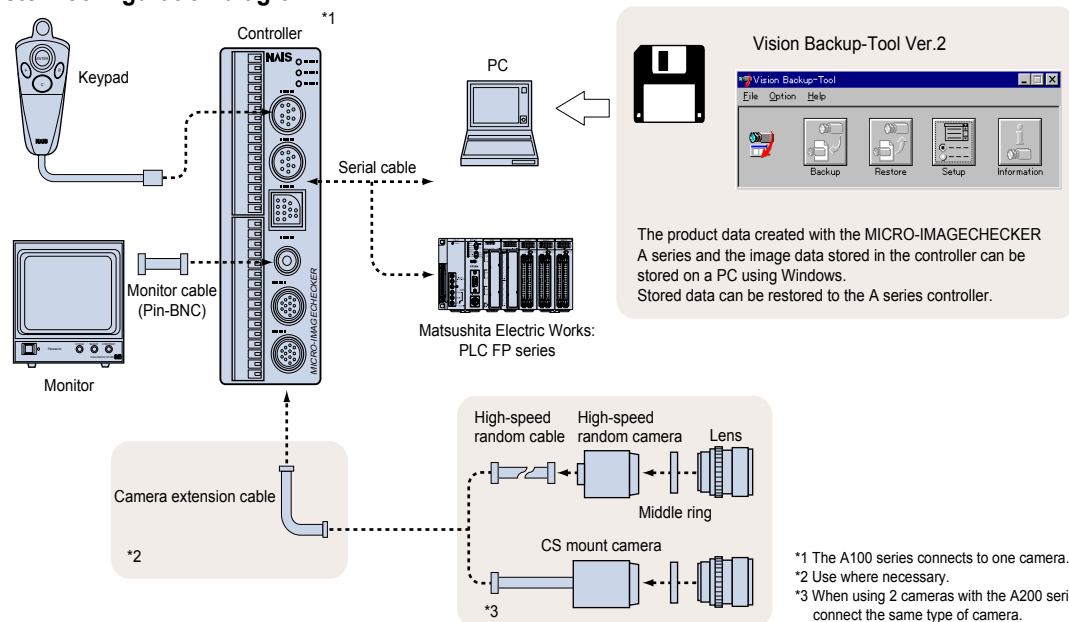*3 When using 2 cameras with the A200 series, connect the same type of camera.

■ Table of Product Numbers

● MICRO-IMAGECHECKER A-Series Controller

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

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

● Camera/Keypad/Monitor

Item	Specifications	Part No.	Price.
C mount camera	Progressive High speed Random: CE	ANM831	$1,295
CS mount camera	support electric-shutter with 3 m cable	ANM832CE	$870
Keypad	with 2 m cable: CE	ANM85202CE	$107
	with 3 m cable: CE	ANM85203CE	$119

● Camera cable

Item	Specifications	Part No.	Price.
High-speed random camera cable	3m	ANM84303CE	$200
Camera extension cable	2 m extension : total 5 meters	ANM84002CE	$182
	7 m extension: total 10 meters	ANM84007CE	$250
	12 m extension: total 15 meters	ANM84012CE	$320
	17 m extension: total 20 meters	ANM84017CE	$390

● Serial Cable

Item	Specifications	Part No.	Price.
COM cables	COM port to PC - 3 meters (D-SUB : 9 pin)	ANM81103	$206
	COM port to PLC - 3 meters (flying leads)	ANM81303	$140
TOOL port cable	COM port to PC - 0.1 meters (D-SUB : 9 pin)	ANM812001	$246

● Lens/middle ring

Item	Specifications	Part No.	Price
CS mount lens	f2.8 CS mount compact lens	ANM8828	N/S
	f2.8 CS mount compact lens with lock	ANM88281	N/S
	f4 CS mount compact lens	ANM8804	N/S
	f4 CS mount compact lens with lock	ANM88041	N/S
	f8 CS mount compact lens	ANM8808	$217
	f8 CS mount compact lens with lock	ANM88081	$369
C mount lens	f6.5 C mount lens	ANB842	$545
	f8.5 C mount lens	ANB843	$251
	f8.5 C mount lens with lock	ANB843L	$414
	f16 C mount compact lens	ANB845N	$205
	f16 C mount compact lens with lock	ANB845NL	$305
	f25 C mount compact lens	ANB846N	$286
	f25 C mount compact lens with lock	ANB846NL	$383
	f50 C mount compact lens	ANM8850	$326
	f50 C mount compact lens with lock	ANM88501	$422
Middle ring	5 mm middle ring	ANB84805	$172
	(0.5/1/5/10/20/40 mm) middle ring	ANB848	$28

● Data backup software

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

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

● Monitor

	Specifications	Part No.	Price
Panasonic GPBM910	100V AC/12 VDC	AUGPBM910	N/S

● Accessories

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

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.

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