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High-Speed Digital Machine Vision System

CV-2100 Series





Features

- Fastest in its class Ultra-high-speed processing of 20,000 parts/min.
- Digital image transfer
- Repeatability of ±0.05 pixels
- On-screen statistical data processing

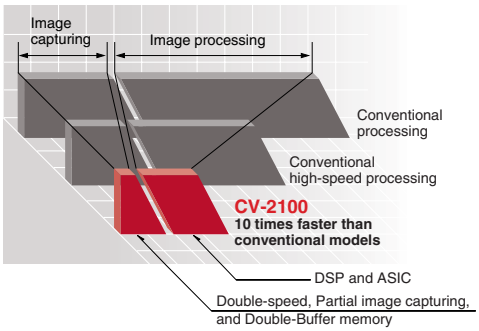
Description

Fastest in its class

Ultra-high-speed processing of 20,000 parts/min.

The combination of a new image-processing engine, doublespeed progressive camera, and partial image capturing function produces a minimum processing time of 3 ms (20,000 times/min.*).

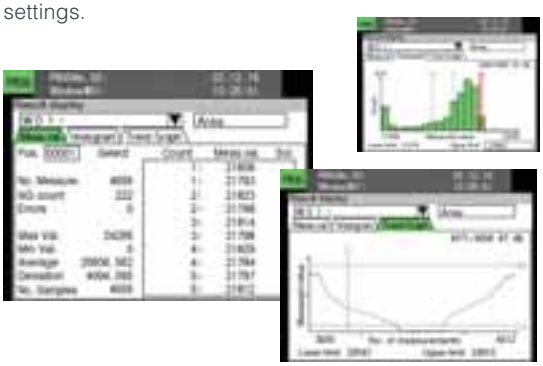
* At a shutter speed of 1/20000 seconds with 12-line reading. Produces a minimum processing time of 10 ms (6,000 parts/min.) for 1-screen interlaced reading.



On-screen statistical data processing

Simplified tolerance setting and inspection history analysis First in its class

The first-in-class statistical function of the CV-2100 allows the user to check the maximum, minimum, and average values of up to 11264 data points. The data is broken down by inspection number and displayed on a histogram and a trend graph, allowing for easy analysis of failed parts and optimization of tolerance settings.



Digital image transfer First in its class

The image data captured onto the CCD is converted to digital data within the camera unit and then transferred to the controller. As a result, the image will not deteriorate and is resistant to noise interference.

Repeatability of ±0.05 pixels New

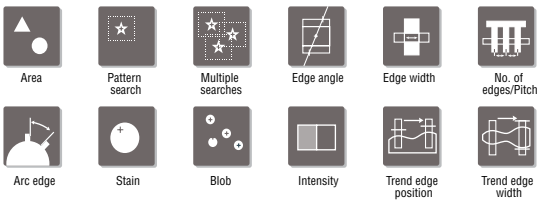
Enabling highly accurate positioning and measurement

The combination of sub-pixel processing and digitalization of image data allows the CV-2100 to achieve high accuracy and repeatability down to ±0.05 pixels. Sub-pixel processing allows the display resolution to be reduced to 1/1,000 pixel.

Basic Inspection tools

Suitable for every inspection need

Features various inspection tools including Area, Pattern search, Multiple searches, Edge angle, Edge width, No. of edges/Pitch, Stain, Blob, Intensity, Trend edge position, and Trend edge width. Ready to solve all of your application needs.



Specifications

Controller

Model			NPN	CV-2100
			PNP	CV-2100P
No. of pixels				512 (H) x 480 (V)
Camera input				2 cameras
Processing cycle				100 c/s (Varies depending on the setting.)
Program registration				32 programs. Programs are externally selectable.
No. of registered screens				64 screens (Up to 4 screens/1 program)
Window setting		Measurement area		64 areas/1 program
		Mask area		4 areas/1 windows
Functions	Measurement mode	Area sensor		Window shape: square/circle/ellipse/ring/arc/polygon (up to dodecagon)/edge detection area
		Position detection	Pattern search	Multiple searches are available. Window shape: square/circle/ellipse/polygon (up to dodecagon)
			Edge detection	Angle measurement available. Window shape: square/rotating square/perimeter/arc
			Gravity position	Window shape: square/circle/ellipse/perimeter/arc/polygon (up to dodecagon)
			Trend edge position	Window shape: square/rotating square/ring/arc
		Inspection mode	Width measurement	Window shape: square/rotating square/ring/arc
			Pitch measurement	Window shape: square/perimeter/arc
			No. of edges	Window shape: square/rotating square/ring/arc
			Edge angle	Window shape: square
			Blob (Feature volume)	No. of blobs, gravity, principal axis angle, area, ferret diameter, circumference length, and circularity
				Window shape: square/circle/ellipse/ring/arc/polygon (up to dodecagon)
			Stain detection	Window shape: square/circle/ellipse/perimeter/arc/ polygon (up to dodecagon)/edge detection area
			Intensity inspection	Window shape: square/circle/ellipse/perimeter/arc/polygon (up to dodecagon)/edge detection area
			Trend edge width	Window shape: square/rotating square/perimeter/arc
	Multiple measurement	Split capturing		2 to 4-split capture processing
		Serial capturing		Serial capture processing for up to 32 times (Maximum, minimum and average values)
	CCD partial image capturing			0 to 479 lines. The starting and end lines can be specified arbitrarily.
	Correction functions	Position adjustment		Total/individual adjustments (Up to 64/programs), X-/Y-axis direction, rotation ±180°
		Camera gain adjustment		9 sensitivity levels, shift and span adjustment
		Illumination adjustment		1 illumination adjustment window/1 program (2 program when 2 cameras are used.)
		Filter function		Up to 4 applications/window. Expand, shrink, average, median, edge enhancement, and edge extraction (In X, Y, and XY directions)
		Calibration function		X and Y scaling factors can be set for each camera.
	Operation functions	Numerical operation		32 operations/program. Operator (four operations, square, maximum, minimum, square root, absolute value, remainder, distance, angle, sine, cosine, and a-tangent)
		Comparator operation		32 operations/1 program. Operator (AND, OR, NOT, and XOR)
Support functions	Statistic function			The maximum/minimum, average values, deviation, measurement counts, and NG count of up to 11264 measurements.
	Screen save			Up to 54 screens can be saved in the main memory.
	Screen customize function			Text: measurement values, judgment results, free text, and fixed text
				Graphic: line, cross-point, circle, and square
	Online setting update function			The tolerances and binary level can be rewritten during operations.
	CF memory save function			Measurement values, judgment results, NG count, and screens can be saved directly to a CF memory card.
	Major functions			I/O monitor, screen capture function, password function, and retest function
Memory card [1]				CompactFlash memory card (GR-M256/NR-M32)
Interface	Control input	External trigger input		1 input. Input rating: 26.4 V max, 3 mA min.
		Control input		9 inputs. Selecting programs, switching screens, switching windows, registering screens, and capturing screens
				Input rating: 26.4 V max, 2 mA min.
	Control output	Universal output		16 outputs. NPN/PNP open-collector, 50 mA max (30 V min.)
		Total comparator output		1 output. NPN/PNP open-collector, 50 mA max (30 V min.)
	Video output			Conforming to the NTSC system
	RS-232C			Numerical value output and image data and control input/output. (Baud rate: 115,200 bit/s max. selectable)
	Ethernet			100 BASE-TX/10 BASE-T (Numerical value output, image data and control input/output)
Display language				English/Japanese/German selectable
Power supply voltage				24 VDC ±10%
Current consumption				1 A
Ambient temperature				0 to 40°C (32 to 104°F), No condensation
Relative humidity				35 to 85%, No condensation
Weight				Approx. 510 g

Camera

Model	CV-020
Image receiving element	1/3-inch CCD image receiving element, square-pixel, all-pixel double-speed reading, 350,000 pixels
Scanning system	1/60s progressive, 1/120s interlaced
Transfer system	Digital serial transfer
Electronic shutter	1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000 sec.
Lens mount method	C mount
Ambient temperature	0 to 50°C (32 to 122°F), No condensation
Relative humidity	35 to 85%, No condensation
Weight	Approx. 100 g

1. Use of KEYENCE GR-M256 and NR-M32 are recommended.

Application

Stain mode



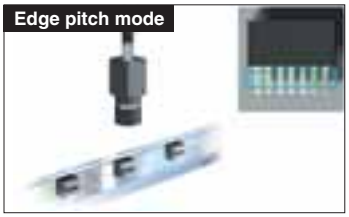
Inspection of flaws on the bottom of abeverage can
Detects flaws on the bottom of aluminum beverage cans

Pattern search mode



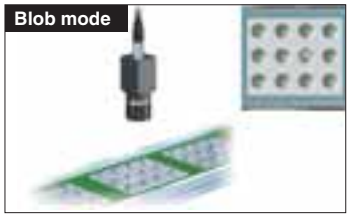
Detecting marks on a fiberglass PCB
Measures the position and angle of marks on a PCB

Edge pitch mode



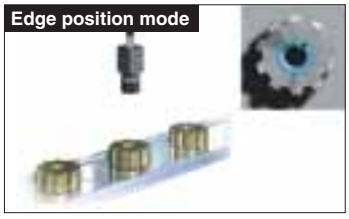
Inspection of the lead pitch of a connector
Measures the center pitch of connector pins

Blob mode



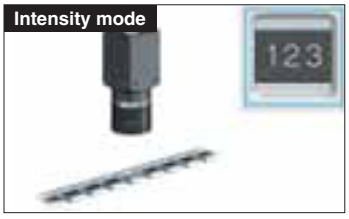
Counting the number of tablets
Counts the number of properly shaped tablets

Edge position mode



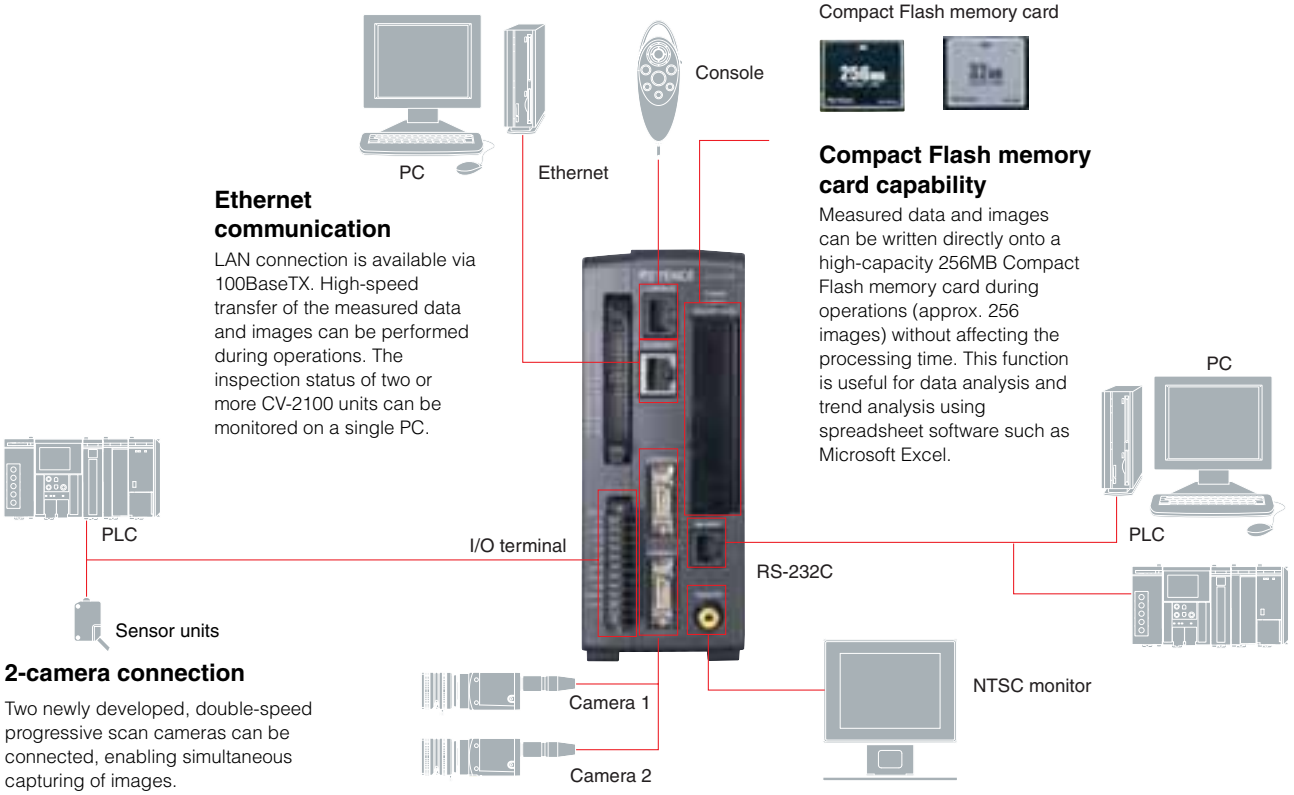
Measuring the notch position of a gear
Detects the notch on the inner diameter of agear and detects/checks the angle

Intensity mode



Differentiation of the correct/incorrect sides of a chip component
Differentiates correct/incorrect sides of a chip based on the difference in brightness

System Configurations



Ethernet communication

LAN connection is available via 100BaseTX. High-speed transfer of the measured data and images can be performed during operations. The inspection status of two or more CV-2100 units can be monitored on a single PC.

Compact Flash memory card capability

Measured data and images can be written directly onto a high-capacity 256MB Compact Flash memory card during operations (approx. 256 images) without affecting the processing time. This function is useful for data analysis and trend analysis using spreadsheet software such as Microsoft Excel.

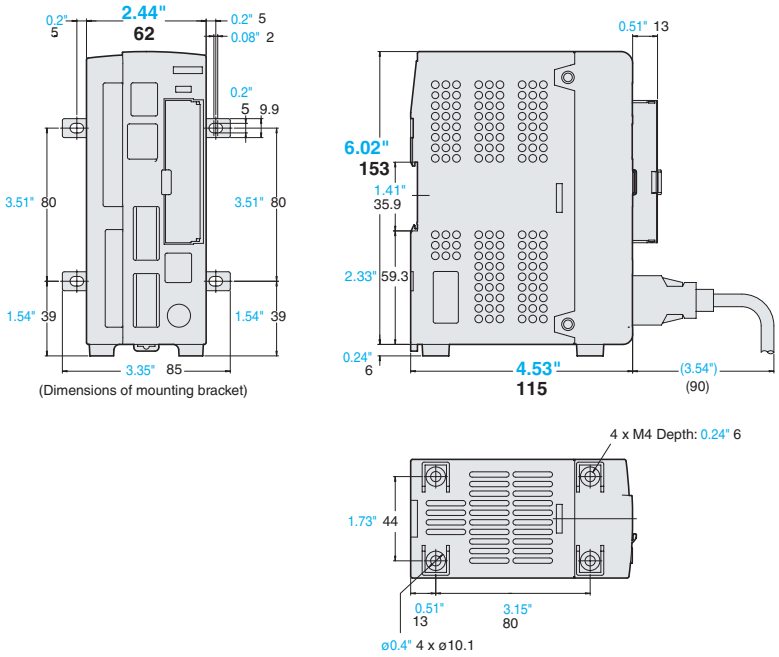
2-camera connection

Two newly developed, double-speed progressive scan cameras can be connected, enabling simultaneous capturing of images.

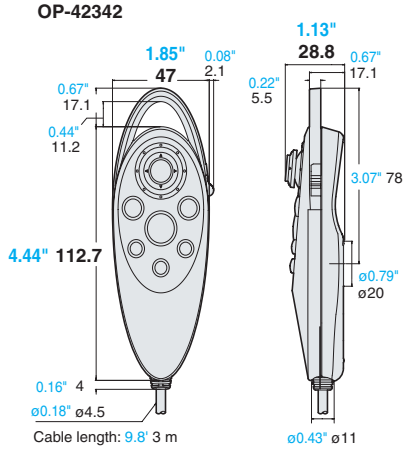
Dimensions

Unit: inch mm

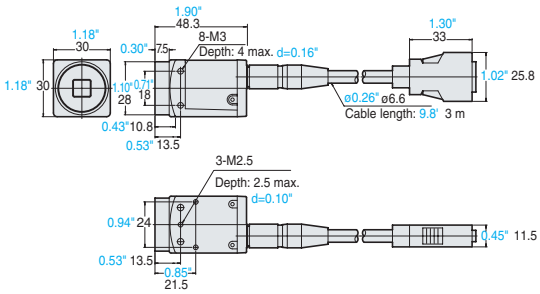
Controller
CV-2100



Console
OP-42342

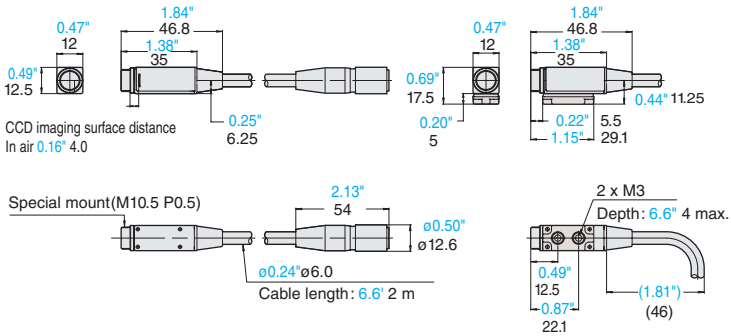


Camera
CV-020

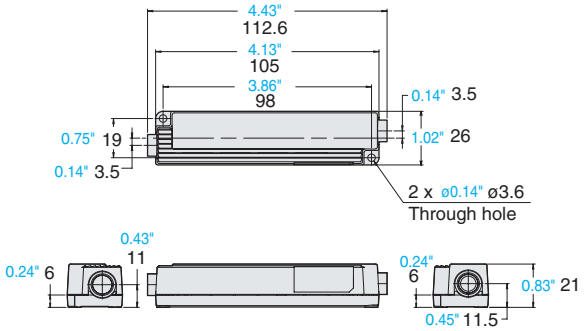


Camera
CV-022

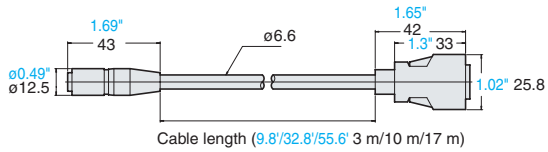
When a mounting bracket is installed



Camera control unit
CV-022U



Camera cables
CV-C3/CV-C10/CV-C17



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