Automation for a Changing World

Delta Machine Vision System DMV1000 Series

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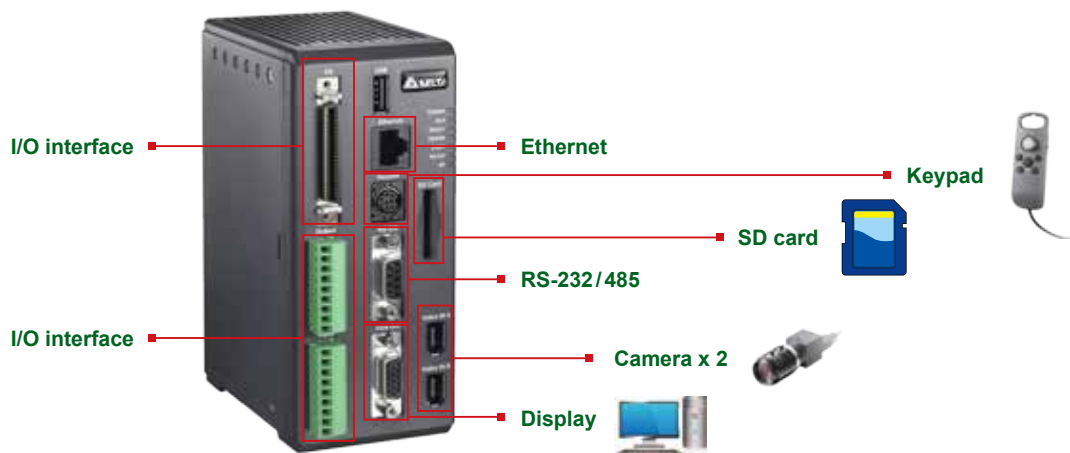# *Delta Machine Vision Solution*

Intelligent Human Visual Inspection System for a Variety of Applications

DMV1000 *- Industrial Machine Vision System*

Delta's DMV1000 Series Machine Vision System provides a user-friendly interface that with just a few simple steps, can simulate the visual quality inspection process on a production line by capturing clear images of moving objects using an IEEE 1394 series high-speed digital camera. Detection, measuring, counting, identification, comparing, alignment, coordination and positioning take only one pass to fulfill the total inspection requirement for a variety of applications.

The DMV1000 series is equipped with built-in camera flash control and dual cameras simultaneous control functions. The built-in camera flash is triggered at fixed times and operates synchronously with two cameras, which reduces the hardware cost spent on flash controllers and the machine vision system. It also supports Ethernet, serial communication and multiple I/O interfaces for rapid data transmission to a PLC and other kinds of host controllers. High speed, high precision and multi-processing capabilities make the DMV1000 series an intelligent, user-friendly, and reliable machine vision system ideal for any automation system.

Part Names and Functions

- ■ **I/O Interface 1:** Parallel I/O interface, one 50-pin mixed input / output terminal block
- ■ **I/O Interface 2:** Input / Output European-type terminal blocks, one 9-pin output terminal block and one 9-pin input terminal block
- ■ **Ethernet:** Connects to PC for images transfer and process
- ■ **Keypad:** Special keypad used to setup and operate with the DMV1000 system
- ■ **SD card:** Stores programs, parameters, records and images of the DMV1000 system
- ■ **RS-232 / 485**: Connects to Delta's PLC or other brands of controllers rapidly through standard RS-232 communication without complicated user-defined programs
- ■ **Camera:** Connects to two standard 1394a cameras
- ■ **Display:** Standard SVGA output interface

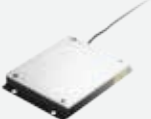# DMV1000 System Features

- Built-in multi-functional developing tools
- New user-friendly operation interface
- High specification hardware with performance better than comparable products
- Ethernet, RS-232 and RS-485 interfaces for data output
- Passes high industrial standards superior to PC-based systems
- Built-in camera flash control function
- Built-in PLC communication reduces program compilations

- Displays the images, inspection records and data in real time
- Provides a complete product line-up
- Supports SD card (16 GB)
- Flowchart programming interface saves development time
- Versatile digital I/O interface
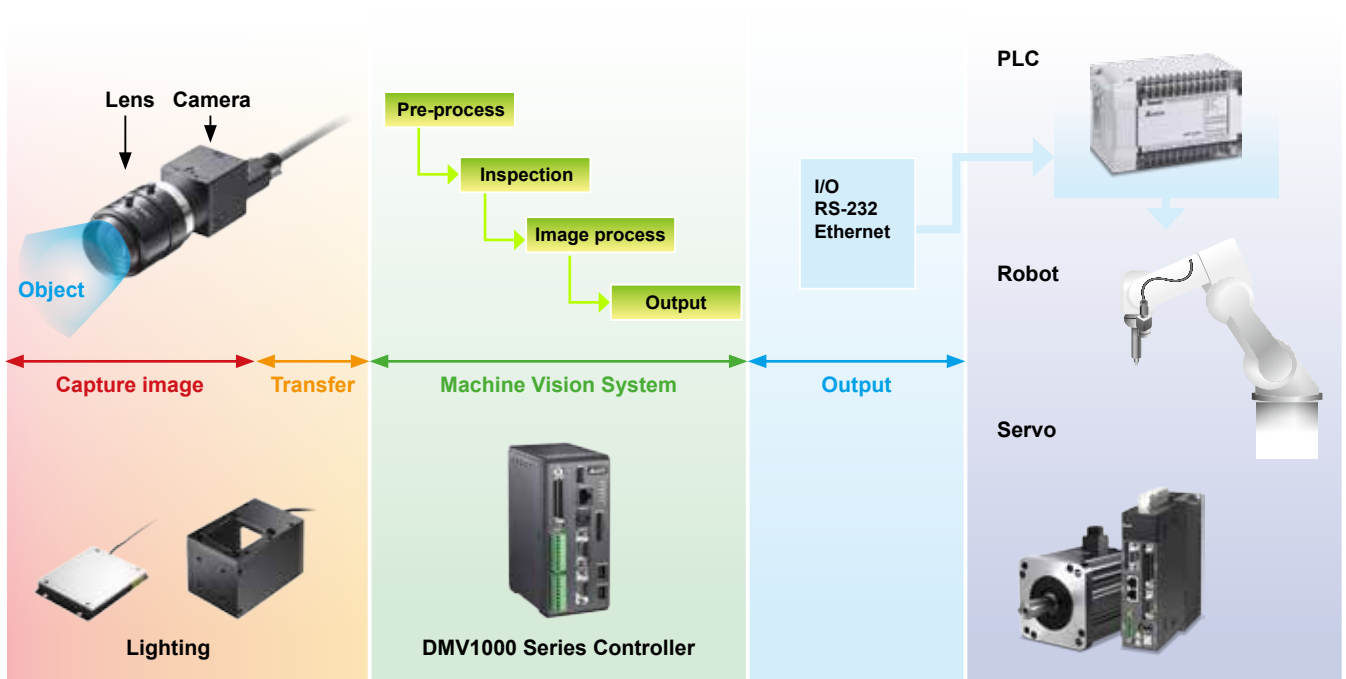- Compact and light, saves wiring and space easily

Controller and Optional Accessories

Controller	Keypad	Camera	Cable
DMV1000-80GXC	DMV1000-KEY	DMV-CDA80GS (Grey scale, standard) DMV-CDA30GS (Grey scale, standard)	DMV-CA45 (4.5 m standard)

Lighting			
DMV-PS12C1 DMV-PS12C2 DMV-CA30P	DMV-BL60R	DMV-CX40W	DMV-DR6736R DMV-DR6736W DMV-DR6736D

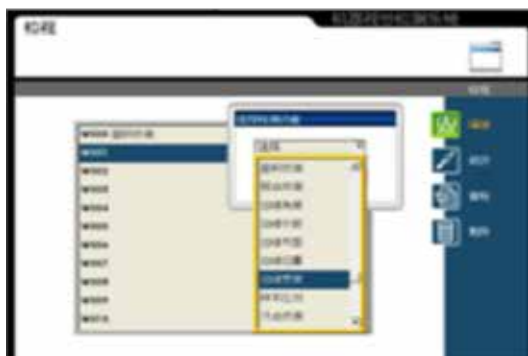| Specific Lenses for Industrial Cameras					
DMV-LN08M (focal length: 8 mm, Mega-pixel)	DMV-LN12M (focal length: 12 mm, Mega-pixel)	DMV-LN16M (focal length: 16 mm, Mega-pixel)	DMV-LN25M (focal length: 25 mm, Mega-pixel)	DMV-LN35M (focal length: 35 mm, Mega-pixel)	DMV-LN50M (focal length: 50 mm, Mega-pixel)

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System Configuration

| Capture image | Transfer | Machine Vision System | Output |

Lens Camera

Object

Lighting

Pre-process → Inspection → Image process → Output

DMV1000 Series Controller

I/O
RS-232
Ethernet
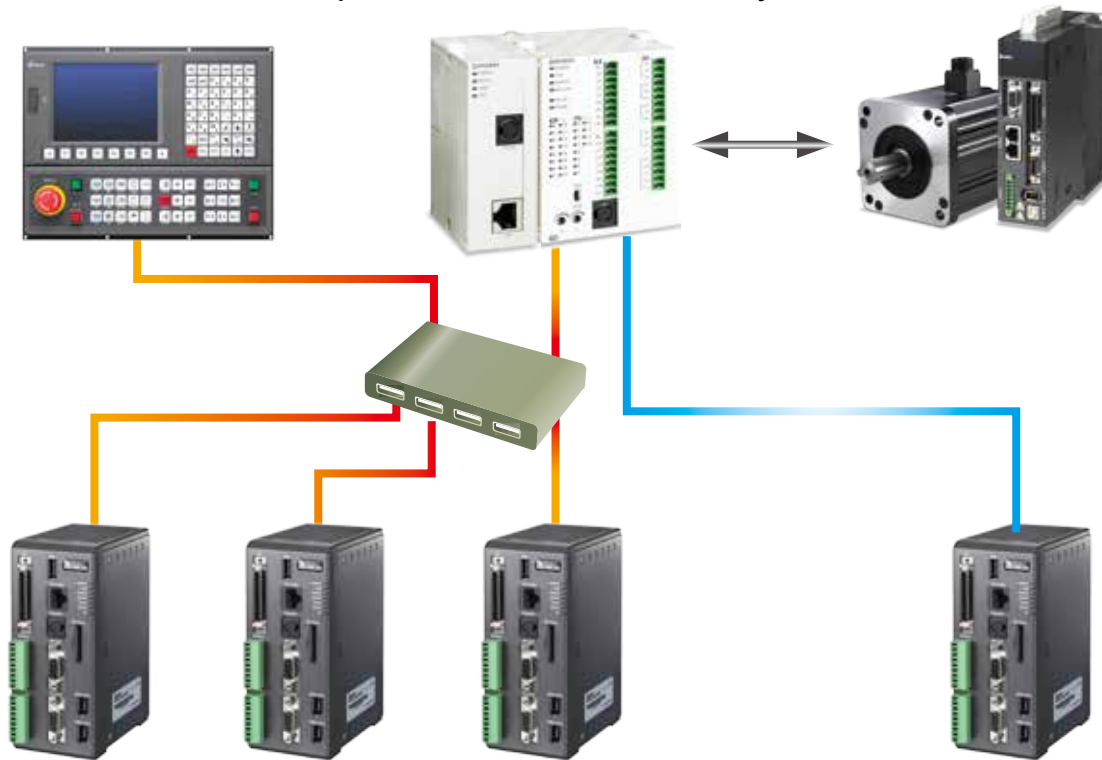
PLC

Robot

Servo

New User-Friendly Flowchart Interface

▶ Sets up camera related parameters
▶ Selects inspection mode
▶ Edits image processing results
▶ Sets output mode and content

Easy to Use!
Simple to Start!

Inspection demo

BA5934FP
732 114

OK

Ethernet, RS-232 Communication Interfaces

Rapid Connection to External Control System.

"Goalkeeper" on Production Line

▶ **High Precision:** Provides high-resolution visual control for accurate and stable inspection
▶ **Continuity:** Replaces labor and provides uninterrupted service
▶ **Flexibility:** Offers convenient software setting for objects inspection
▶ **Repeatability:** Non-contact, no abrasion or damage

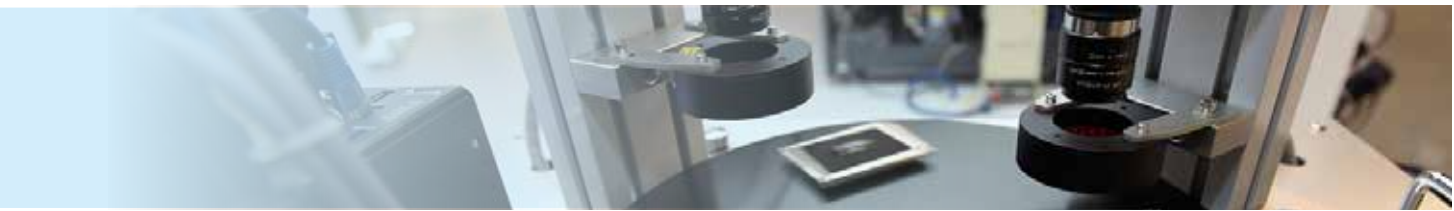**Improve quality, reduce RMA returns**
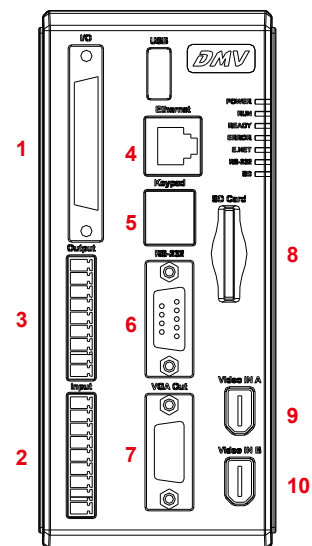**Increase production capacity, lower labor costs**

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Specifications

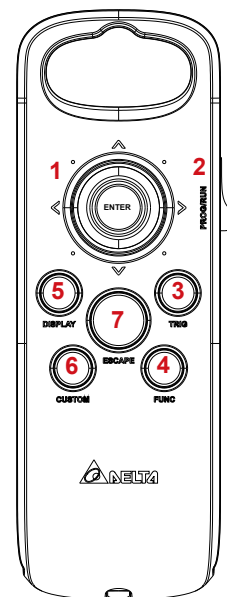|	
General Specifications	▶ Power supply: 24 V$_{DC}$ ▶ Operating ambient temperature: 0°C~+50°C ▶ Operation voltage range: 21.6~26.4 V ▶ Rated consumption current: 1 A below ▶ Storage temperature: -20°C ~+65°C ▶ Battery life: 5 years ▶ Vibration resistance: 10~55 Hz 10 m/s, 3-axis direction for 10 min ▶ Operating relative humidity: 35%~65% RH (non-condensing) ▶ Shock resistance: max. 300 m/s, 3-axis (6 directions), each 3 times ▶ Altitude : under 2000 m
Camera	▶ Model: IEEE 1394a digital gray scale ▶ Pixel: 640×480 (300,000-pixel)/80 fps, 1024 x 768 (800,000-pixel)/30 fps ▶ Qty: Max. 2 ▶ Shutter speed: 0.05 ms~1 s or user-defined (16 kinds of speeds) ▶ Interface: C mount
Number of Projects	▶ 32 projects in internal memory, 968 projects in SD Card
Inspection Window	▶ Qty: 128/project ▶ Functions: Area, Edge position, Edge count, Edge width, Edge pitch, Edge angle, Pattern matching, Shape matching, Image intensity, Blob, Stain, Edge tracking, Width tracking ▶ ROI type: Rectangle, Circle, Polygon, Ellipse, Ring, Sector, Rotated Rectangle ▶ Mask number: 4/inspection window
Preprocess	▶ Setup: 6 types ▶ Type: Gray out, Dilation, Erosion, Averaging, Median, Sharpen, Laplacian, SobelX, SobelY, Sobel, Prewitt, Roberts, Subtract (total 13 types)
Execution Mode	▶ Always Execute, Never Execute, Reference Execute
Numerical Calculation	▶ Qty: 32 ▶ Four arithmetic operations: Plus, Subtract, Multiply, Divide ▶ Functions (36 types): MAX, MIN, AVG, ABS, MOD, POW, SQR, SQRT, INT, ROUND, SIN, COS, TAN, ASIN, ACOS, ATAN, DIST, ISECT_X, ISECT_Y, LINE_DIST, LINE_DIST_X, LINE_DIST_Y, ANGLE, LINE_ANGLE, D_LINE_ANGLE, CIRCLE_X, CIRCLE_Y, CIRCLE_R, PANEL_ANGLE, PANEL_DIST, NOT, RAD, DEG, PI, LE, EQ
Boolean Calculation	▶ Qty: 32 ▶ Type: AND, OR, XOR, NOT
Communication Interface	▶ RS-232 (Max.115200 bps), Ethernet (10/100BASE-T), RS-485
Display	▶ Screen display: SVGA 800×600 output ▶ Display scale: 20%~200% adjustable ▶ Language: Traditional Chinese, Simple Chinese, English
Camera Flash Control	▶ Mode: I/O control, 2 lights independent setting
Memory Card	▶ SD Card (Max. 16 GB)

Controller Parts

NO.	Name	Description
1	Parallel I/O interface	Input/Output
2	Input terminal	Input
3	Output terminal	Output
4	Ethernet	10/100BASE-T communication
5	Keypad connector	Connect to keypad
6	RS-232/RS-485 serial port	Supports Master, Slave serial communication
7	VGA output port	Connects to external VGA monitor made by other manufacturers
8	SD memory card	Stores the project settings and images backup
9	Camera 1 connector	Resolution: 1024×768, 640×480
10	Camera 2 connector	Resolution: 1024×768, 640×480

Keypad Parts

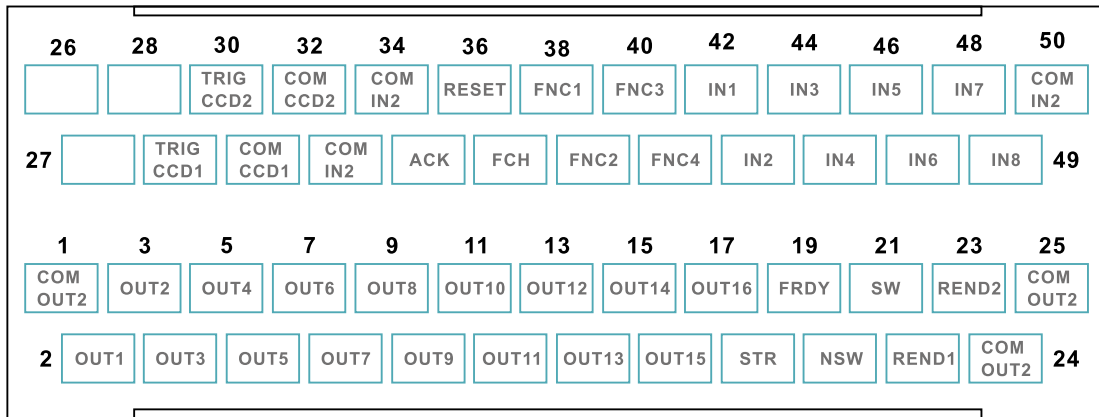| NO.	Name	Description
1	Move and Enter	8 directions selectable and enter setting
2	PROG/RUN	Switches between programming mode and run mode
3	TRIG	Inspection trigger
4	FUNC	Selects different modes during RUN operation
5	DISPLAY	Switches screen between camera1 and camera 2
6	CUSTOM	Image preprocessing select
7	ESCAPE	Exit key

Built-in Multi-Functional Vision Development Tools

- ▶ Area measuring
- ▶ Detection of edge position, distance, counter, angle
- ▶ Stain and blob detection

- ▶ Shape Finder
- ▶ Coordinate and angle calculation
- ▶ Edge and image tracing measurement
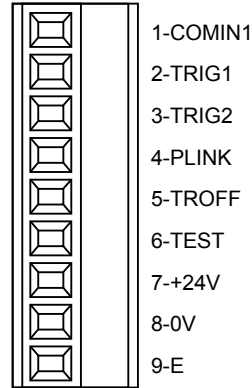
50-pin I/O Mixed Terminal

26	28	30	32	34	36	38	40	42	44	46	48	50
		TRIG CCD2	COM CCD2	COM IN2	RESET	FNC1	FNC3	IN1	IN3	IN5	IN7	COM IN2

| 27 | | TRIG CCD1 | COM CCD1 | COM IN2 | ACK | FCH | FNC2 | FNC4 | IN2 | IN4 | IN6 | IN8 | 49 |

1	3	5	7	9	11	13	15	17	19	21	23	25
COM OUT2	OUT2	OUT4	OUT6	OUT8	OUT10	OUT12	OUT14	OUT16	FRDY	SW	REND2	COM OUT2

| 2 | OUT1 | OUT3 | OUT5 | OUT7 | OUT9 | OUT11 | OUT13 | OUT15 | STR | NSW | REND1 | COM OUT2 | 24 |

Signal Identification for Wiring

Pin	Name	Description	Status
1	COMOUT2	50-pin output COM	Output
2	OUT1	Parallel output 1	Output
3	OUT2	Parallel output 2	Output
4	OUT3	Parallel output 3	Output
5	OUT4	Parallel output 4	Output
6	OUT5	Parallel output 5	Output
7	OUT6	Parallel output 6	Output
8	OUT7	Parallel output 7	Output
9	OUT8	Parallel output 8	Output
10	OUT9	Parallel output 9	Output
11	OUT10	Parallel output 10	Output
12	OUT11	Parallel output 11	Output
13	OUT12	Parallel output 12	Output
14	OUT13	Parallel output 13	Output
15	OUT14	Parallel output 14	Output
16	OUT15	Parallel output 15	Output
17	OUT16	Parallel output 16	Output
18	STR	Parallel output handshaking sign	Output
19	FRDY	Enable function switch sign	Output
20	NSW	Fail function switch sign	Output
21	SW	Success function switch sign	Output
22	REND1	Camera 1 capture image	Output
23	REND2	Camera 2 capture image	Output
24	COMOUT2	50-pin output COM	Output
25	COMOUT2	50-pin output COM	Output

Pin	Name	Description	Status
26		No use	---
27		No use	---
28		No use	---
29	TRIGCCD1	Camera 1 image capture internal trigger	Internal
30	TRIGCCD2	Camera 2 image capture internal trigger	Internal
31	COMCCD1	TRIGCCD 1 specific COM	Internal
32	COMCCD2	TRIGCCD 2 specific COM	Internal
33	COMIN2	50-pin input COM	Input
34	COMIN2	50-pin input COM	Input
35	ACK	Parallel output handshaking sign	Input
36	RESET	System reset	Input
37	FCH	Function select start trigger	Input
38	FNC1	Function 1	Input
39	FNC2	Function 2	Input
40	FNC3	Function 3	Input
41	FNC4	Function 4	Input
42	IN1	Input 1	Input
43	IN2	Input 2	Input
44	IN3	Input 3	Input
45	IN4	Input 4	Input
46	IN5	Input 5	Input
47	IN6	Input 6	Input
48	IN7	Input 7	Input
49	IN8	Input 8	Input
50	COMIN2	50-pin input COM	Input

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9-pin Input Terminal Block

NO.	Name	Description
1	COMIN1	9-pin input COM
2	TRIG1	Camera 1 image capture trigger
3	TRIG2	Camera 2 image capture trigger
4	PLINK	PLC communication link start sign
5	TROFF	Disable image capture trigger
6	TEST	Test condition (no data output)
7	+24V	Power positive input
8	0V	Power negative input
9	E	Grounding

1-COMIN1
2-TRIG1
3-TRIG2
4-PLINK
5-TROFF
6-TEST
7-+24V
8-0V
9-E

Input Circuit (NPN)

Input Circuit (PNP)

9-pin Output Terminal Block

NO.	Name	Description
1	TOUT	Final result output
2	RUN (TOUT2)	RUN status indication (Final result output 2)
3	READY	Controller is ready for outputtingthe required images
4	ERROR	Error indication
5	COMOUT1	9-pin output COM
6	FLASH1	Camera 1 Flash output
7	FLASH2	Camera 2 Flash output
8	COMFLA+	Flash output positive COM
9	COMFLA-	Flash output negative COM

1-TOUT
2-RUN (TOUT2)
3-READY
4-ERROR
5-COMOUT1
6-FLASH1
7-FLASH2
8-COMFLA+
9-COMFLA -

Output Circuit (NPN output) (FLASH1 and FLASH2 exclusive)

FLASH 1&2 Output Circuit (NPN output)
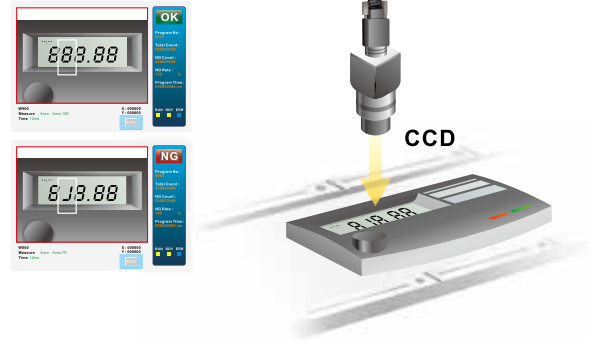
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Applications

Beverage Packing Inspection

Inspects the liquid level of each bottle

Character Inspection

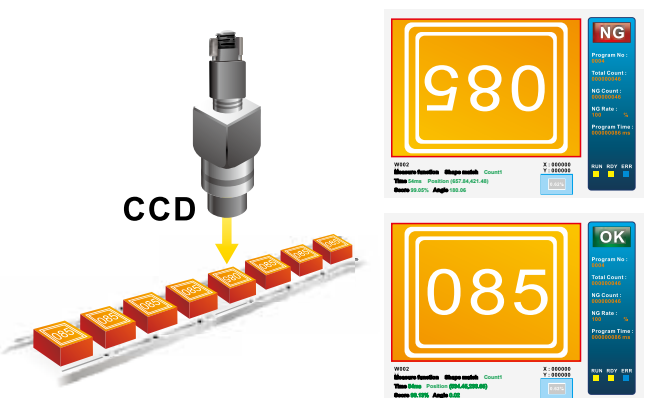Inspects the characters on electronic devices

Bottle Cap Position Identification

Identifies the bottle capping position

Direction Identification

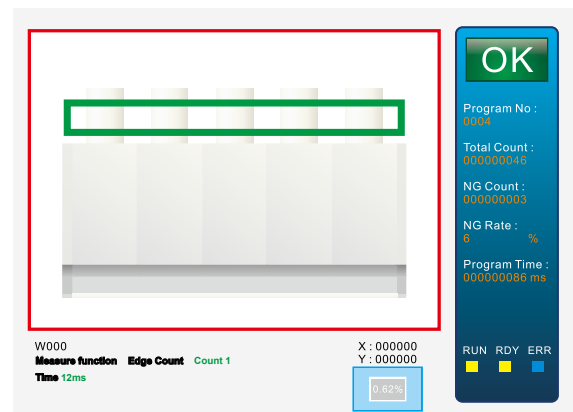Inspects the direction of work pieces conveyed on a production line

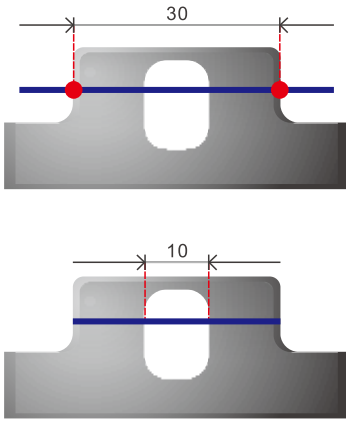## Positioning

Positionings control integrated with robot

Pin Number Counting

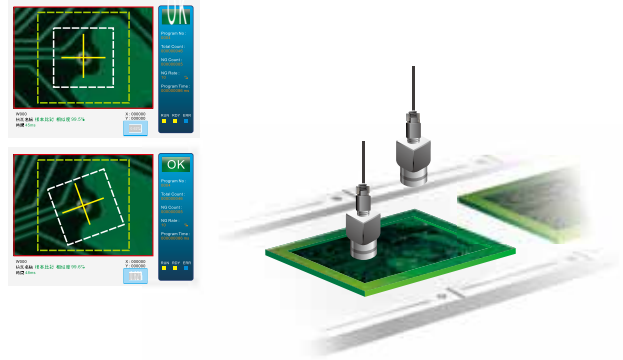Counts connector pin numbers automatically

Dimensions Measurement

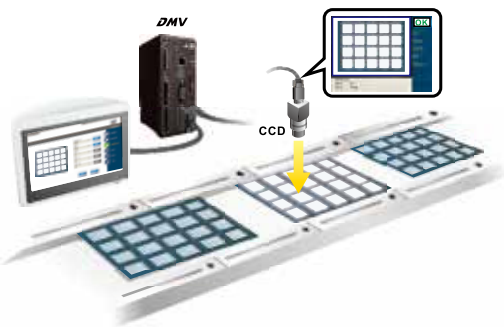Measures the dimensions of components automatically

Alignment System

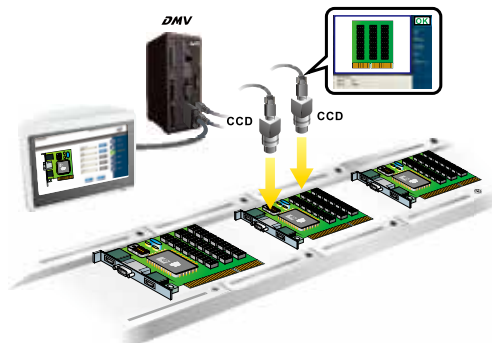Aligns the positions of PCB and TFT panels automatically

Luminance Inspection

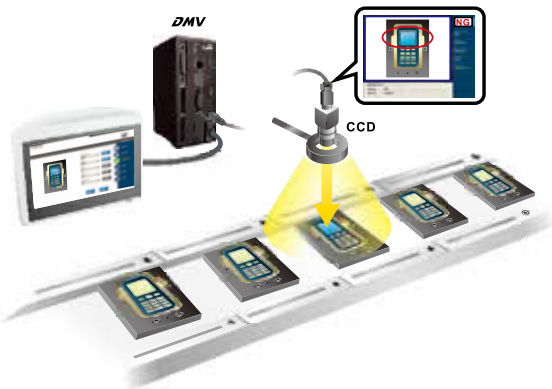Inspects LED luminance automatically

Position Identification

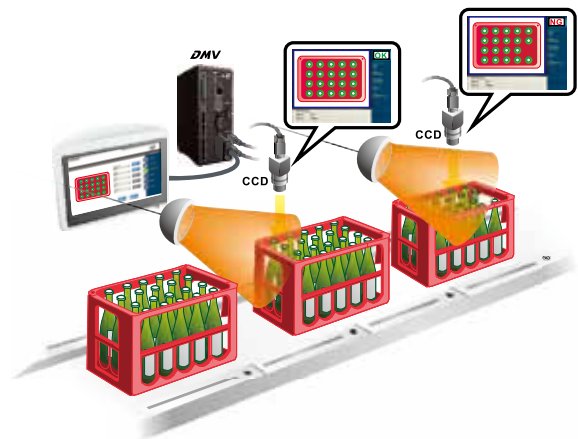Inspects the position of IC components on PCB boards

Module Inspection

Inspects the normality of mobile phone modules, such as touchscreens and push buttons
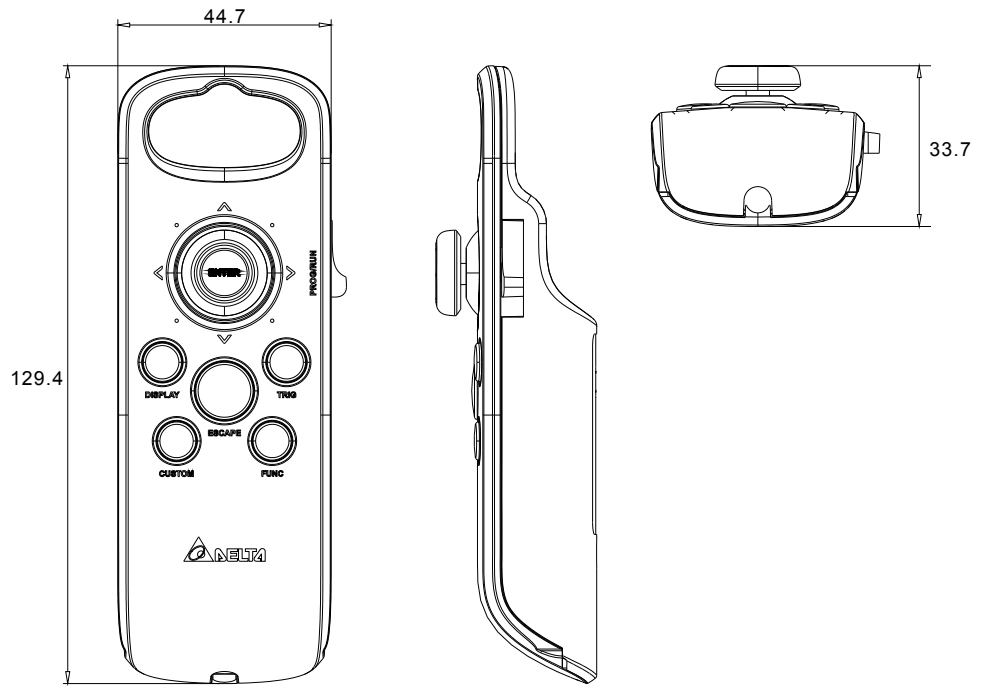

Object Counting

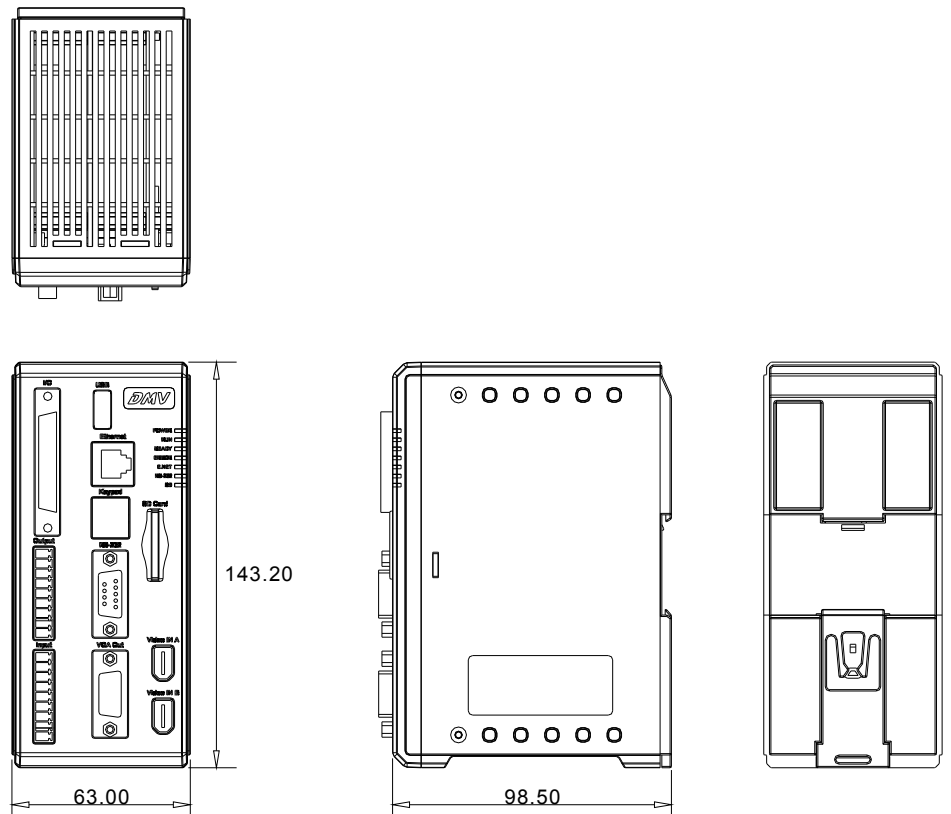Counts the quantity of objects in a basket or carton
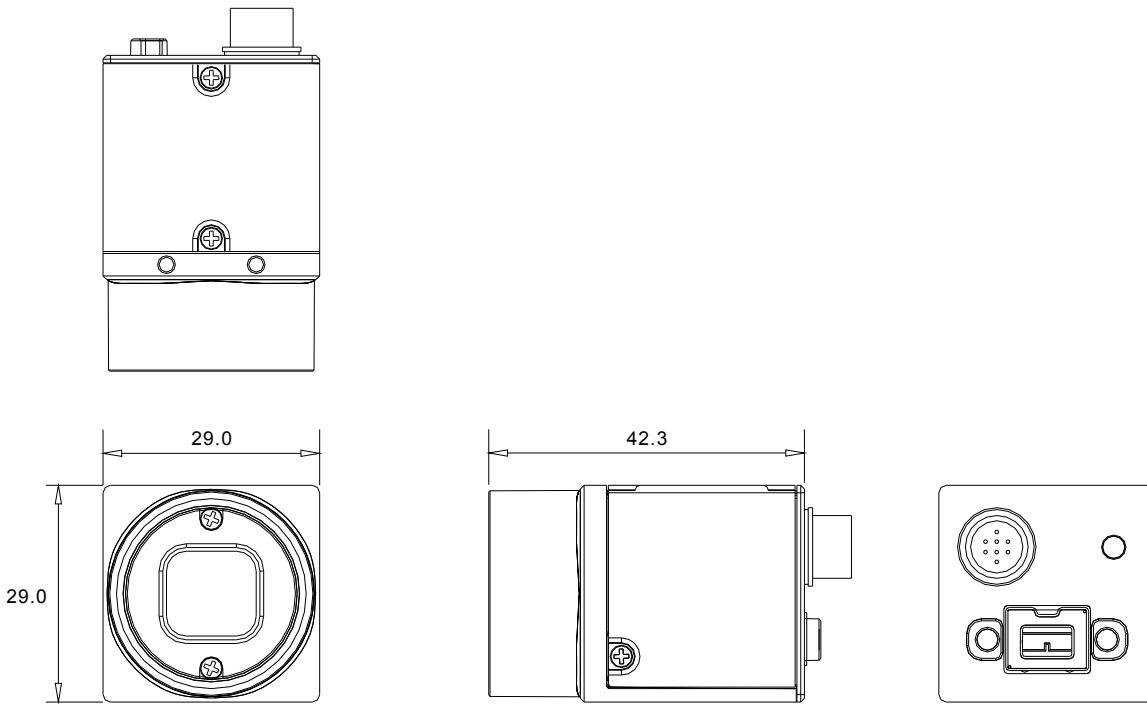
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Keypad Dimensions

Dimensions are in mm

44.7

129.4

33.7

Controller Dimensions

Dimensions are in mm

143.20

63.00

98.50

Camera Dimensions Dimensions are in mm

```
29.0

29.0

42.3
```

Ordering Information

DMV1000 System	**DMV1000-80GX** (Controller, Keypad, a 800,000-pixel camera and 4.5 m cable included) **DMV1000-30GX** (Controller, Keypad, a 300,000-pixel camera and 4.5 m cable included)
Image Process Controller	DMV-80GXC
Keypad	DMV1000-KEY
CCD	**1/3 inch, 800,000 pixel, monochrome camera** ■ **DMV-CDA80GS** (a 800,000-pixel camera and CCD cable included) ■ **DMV-CDA30GS** (a 300,000-pixel camera and CCD cable included) ■ **4.5 m 1394b Cable** DMV-CA45 (4.5 m standard) ■ **1 m 1394b Trigger Cable** DMV-CA10T (1 m)

Lens	■ **Mega pixels, focal point: 8,12,16,25,35,50** DMV-LN08M (focal point: 8 mm, Mega-pixel) DMV-LN12M (focal point: 12 mm, Mega-pixel) DMV-LN16M (focal point: 16 mm, Mega-pixel) DMV-LN25M (focal point: 25 mm, Mega-pixel) DMV-LN35M (focal point: 35 mm, Mega-pixel) DMV-LN50M (focal point: 50 mm, Mega-pixel) ■ **Telecentric lens** DMV-LN50T (Telecentric)
Illumination	■ **Coaxial** DMV-CX40W (Coaxial white light) ■ **Direct Ring** DMV-DR6736R (Red) DMV-DR6736W (White) Diffusion board: DMV-DR6736D (Diffusion) ■ **Back light** DMV-BL60R (White) ■ **Power supply** DMV-PS12C1 (Power Supply) DMV-PS12C2 DMV-CA30P

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