Automation for a Changing World

Delta Machine Vision System
DMV2000 Series

Smarter. Greener. Together.

Speed, Precision Smart Visual Inspection

The latest Delta Machine Vision System DMV2000 Series provides a smart and user friendly operation interface of high-speed, high-precision, and multi-processing ability. It supports multi I/O input and output, standard industrial network interfaces (Ethernet, RS-232, RS-485) and various machine vision inspection functions.

With the help of vision inspection tools in the DMV Series, the product quality and efficiency of the automated production line are substantially enhanced. The DMV Series can be effectively used in areas such as: general industrial machinery, automotive, rubber and plastics, pharmaceuticals, food, printing, packaging, metal processing, robotic arm integrated applications, TFT, semiconductors, solar energy and other related electronics industries, to achieve customer satisfaction with high quality products.

- Multiple cameras work synchronously for multi-tasking to enhance efficiency and save development costs
- Image auto calibration and lens distortion correction function
- New user-friendly operation interface
- Smart operation flow and interface for faster programming
- Built-in multi-functional developing tools
- Provides digital I/O and flash control module for various applications
- Superior hardware specification to same grade products. Achieves high-speed processing
- High-speed cameras with CameraLink interface
- Ethernet, RS-232, RS-485 interfaces for data output
- Passes high industrial standards superior to PC-based systems
- Built-in PLC communication reduces program compilations
- Self-defined display and operation interfaces in RUN mode

for Humanization

Appearance

microSD card slot

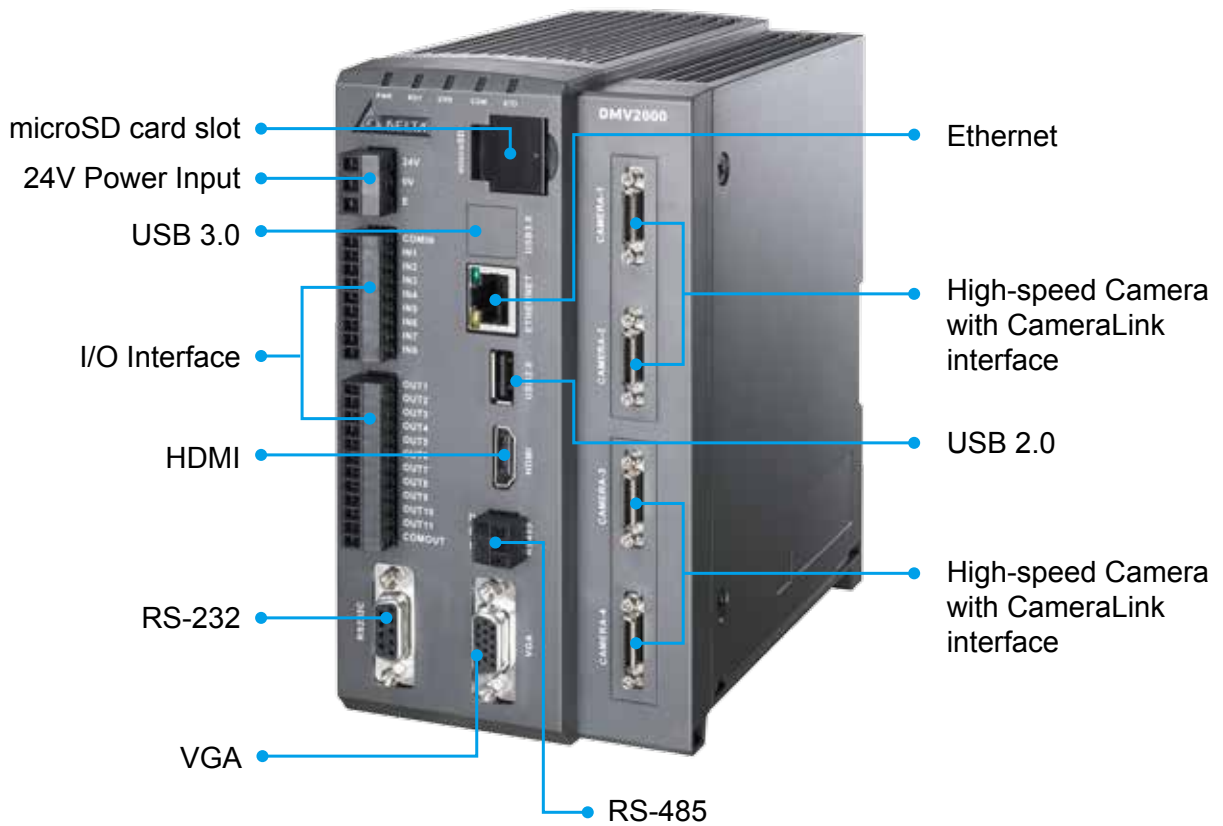24V Power Input

USB 3.0

I/O Interface

HDMI

RS-232

VGA

RS-485

Ethernet

High-speed Camera with CameraLink interface

USB 2.0

High-speed Camera with CameraLink interface

Advanced Functions

Functions			
2D platform positioning	√	**Edge position tracing**	√
Pattern matching	√	**Edge width tracing**	√
Shape matching	√	**Stain inspection**	√
Edge angle	√	**OCV**	√
Edge counting	√	**Subtle inspection**	√
Edge pitch	√	**Color inspection**	√
Edge position	√	**Barcode identification**	√
Edge width	√	**QR code identification**	√
Area	√	**PC applications**	**Off-line simulation**	√
Blob	√		**Program upload/ download**	√
Image intensity	√		**Software update**	√

Features

01 Multi-camera system

Allows simultaneous use of several different cameras (Max. 8) for multi-tasking in visual inspection operation

## 02 High-speed cameras with CameraLink interface

Supports high-speed CameraLink Full configuration with maximum frame rate up to 480 fps
Supports maximum 12 M pixels in gray scale and color using standard CameraLink cameras

Resolution (Mega Pixels)		0.3 M	2 M	4 M	5 M	12 M
Level	**Mono**	√	√	√	√	√
	Color	√	√	√	√	√
Frame Rate		432 fps	333 fps	180 fps	35 fps	62 fps
Pixel Dimensions (Horizontal x Vertical)		642 × 484	2048 × 1088	2048 × 2048	2448 x 2058	4096 × 3072
Sensor Size		1/3"	2/3"	1"	2/3"	1.76"
Pixel Size (Horizontal x Vertical)		7.4 × 7.4 μm	5.5 × 5.5 μm	5.5 × 5.5 μm	3.45 x 3.45 μm	5.5 × 5.5 μm
Lens Mount		C mount	C mount	C Mount	C Mount	M42

ΔELTA

Features

03 New inspection features

Color inspection
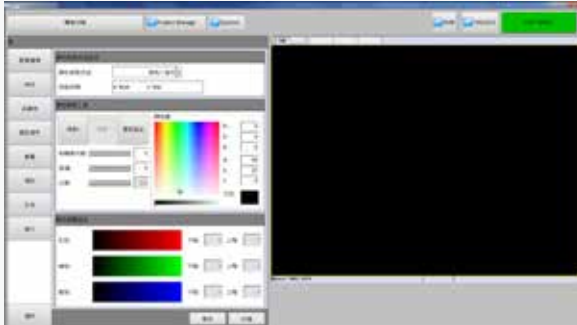
Barcode/ QR code identification

High dynamic range

underexposed   normal   overexposed

composite version
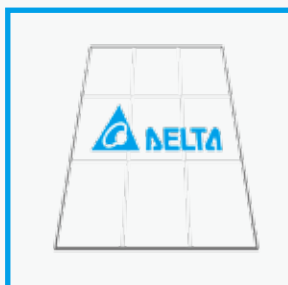
Lens and perspective distortion calibration
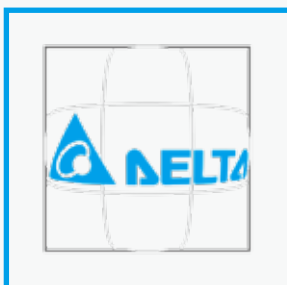
lens distortion   perspective distortion
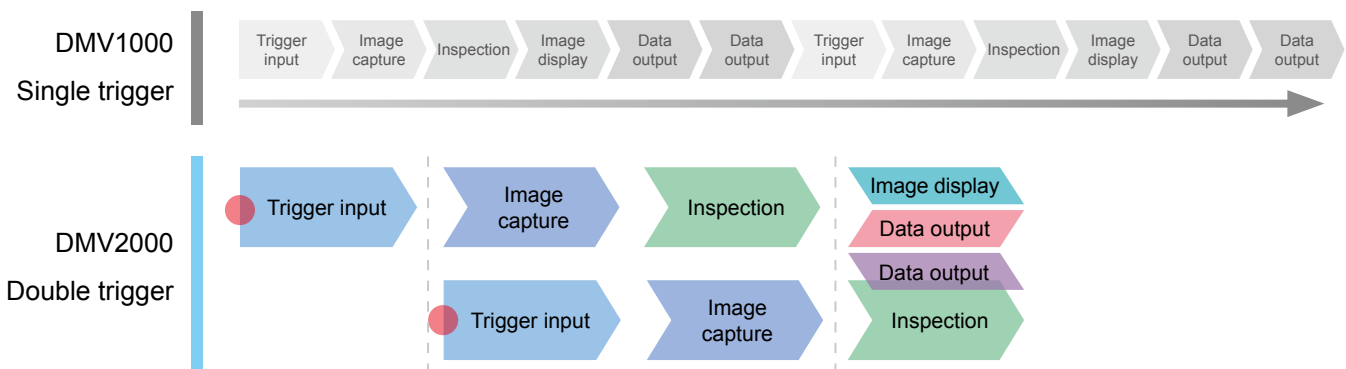
corrected version

04 Faster processing

- Higher resolution. Ehanced precision in inspection and calculation precision
- Multiple cameras can inspect parallel processes asynchronously
- Greatly enhanced system performance
  Inspection, storage, communication and UI operation can work synchronously. Real-time inspection and operation time is minimally affected (It costs a total of 15ms for single trigger input, lighting, image capture, inspection and data output for a 0.3 M pixels full area inspection).
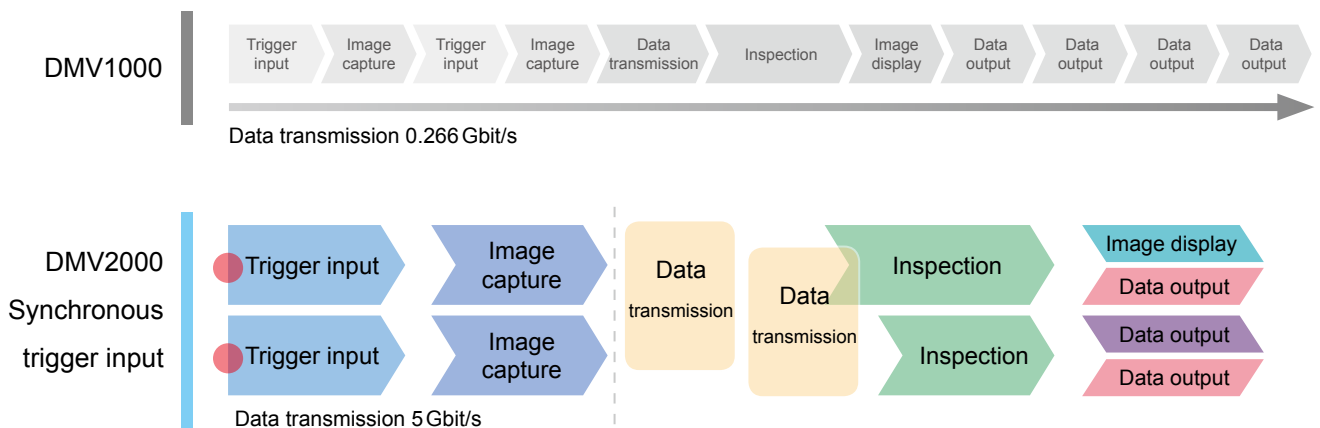
05 DMV2000 inspection system

Supports double-buffer (double trigger inputs in one camera depend on camera quantity)

DMV1000 Single trigger

Trigger input → Image capture → Inspection → Image display → Data output → Data output → Trigger input → Image capture → Inspection → Image display → Data output → Data output

DMV2000 Double trigger

Trigger input → Image capture → Inspection → Image display / Data output / Data output / Inspection

Trigger input → Image capture

Supports two cameras synchronous trigger input and double core algorithm processing

DMV1000

Trigger input → Image capture → Trigger input → Image capture → Data transmission → Inspection → Image display → Data output → Data output → Data output → Data output

Data transmission 0.266 Gbit/s

DMV2000 Synchronous trigger input

Trigger input → Image capture → Data transmission → Data transmission → Inspection → Image display / Data output / Data output / Inspection / Data output

Trigger input → Image capture

Data transmission 5 Gbit/s

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Features

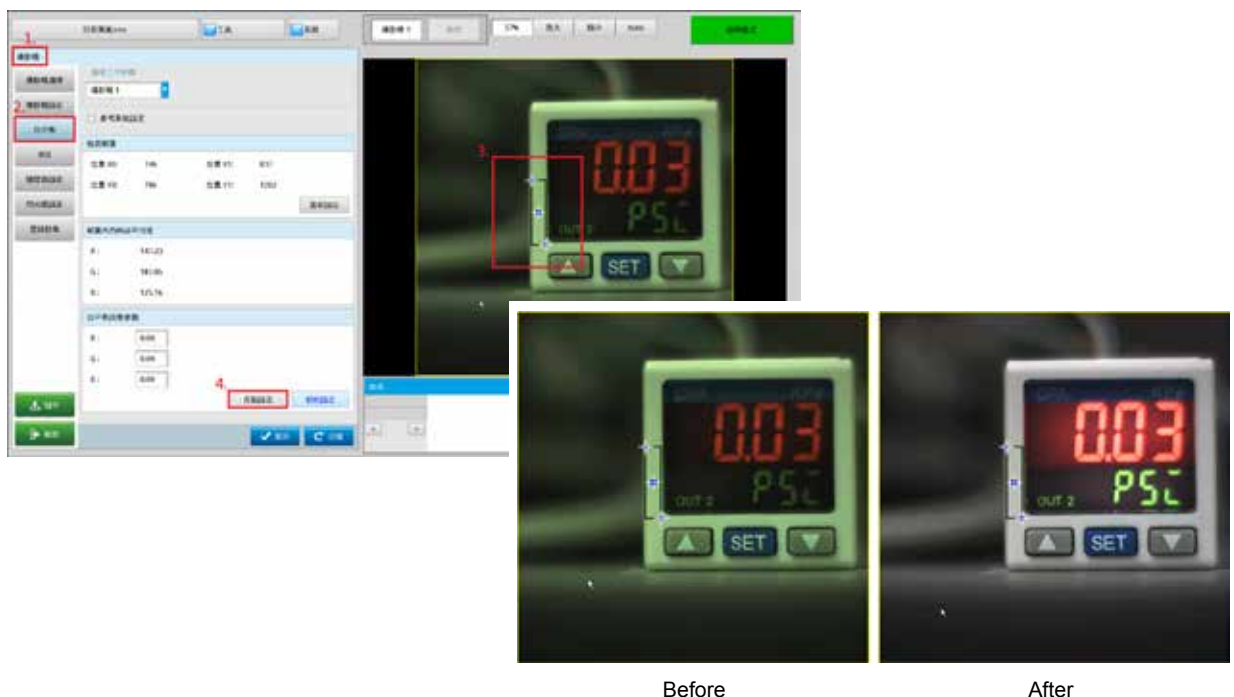## 06 Friendly UI and functions

User-friendly interface in operating system

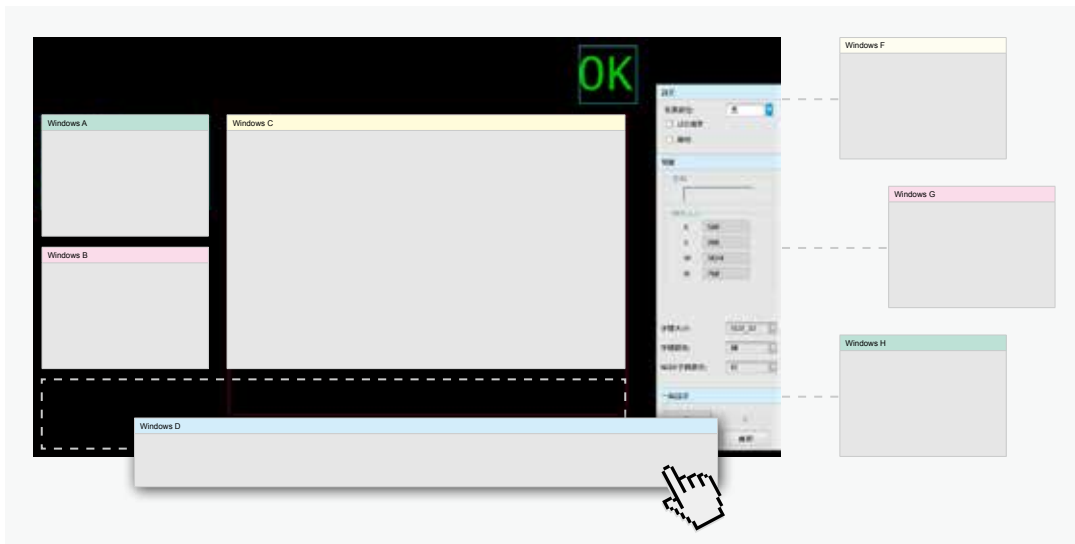User-friendly UI for convenient operation using mouse and keyboard

White balance color correction

Corrects the color of images through white balance setting.

Before   After

Customized RUN mode UI

Provide screen parameter setting tool for self-defined run mode UI
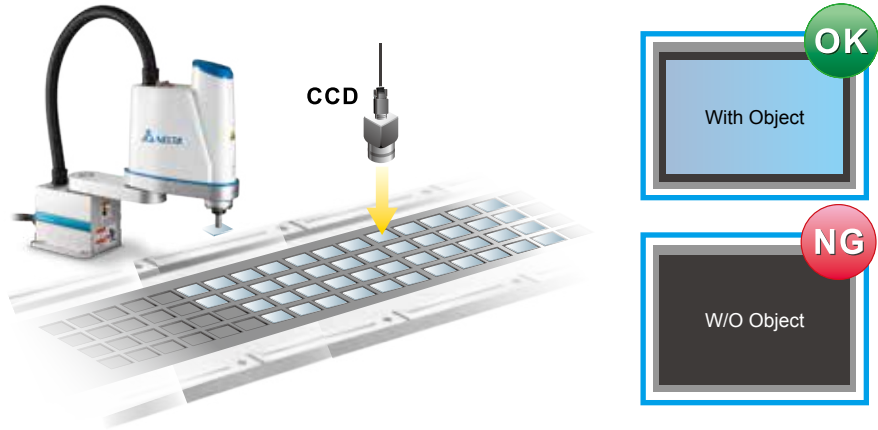

Flexible and expandable module

- **Display output (1080p FHD)**

  Triple the visible content of the DMV1000

  Supports 15 Pin VGA and HDMI output terminal

- **Digital input/output**

  Input/Output pins for flexible self-defined functions

- **Expandable modules**
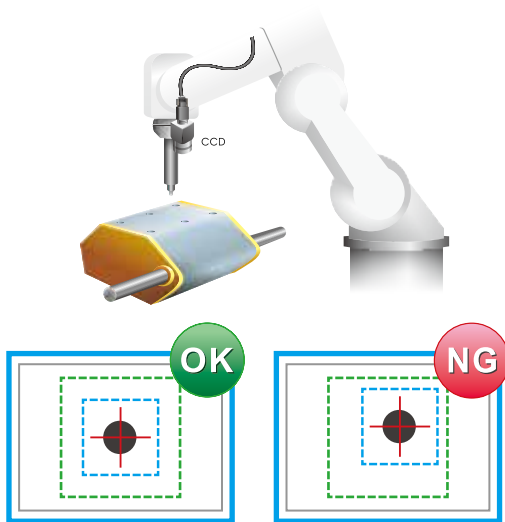
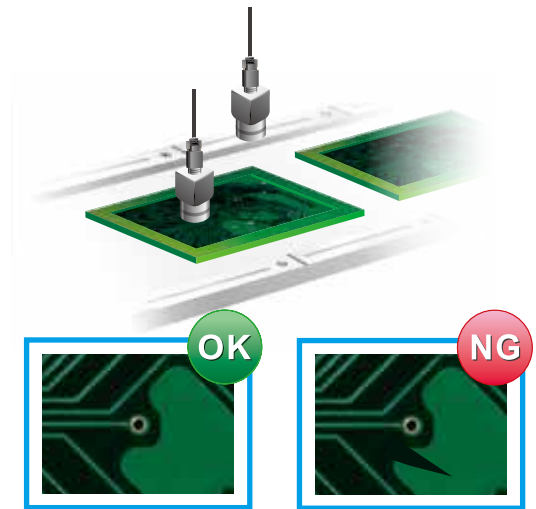 Flash control

  Expanded I/O
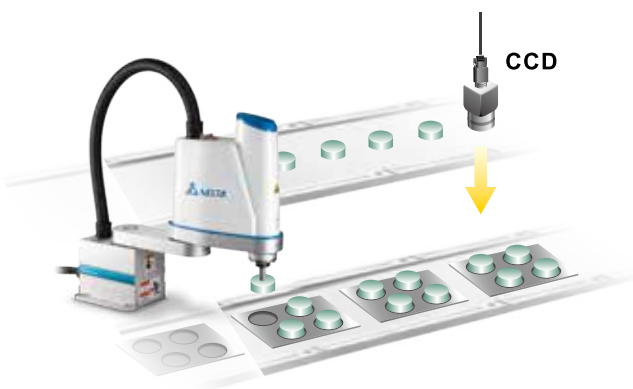
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Applications

01 Motion Control

Product Pick and Place

CCD

OK
With Object

NG
W/O Object

Product Processing and Assembly

CCD

OK

NG

Defect Detection

OK

NG

Parts Placement

CCD

Vision Guided Robotic System (VGRS)

CCD

CCD
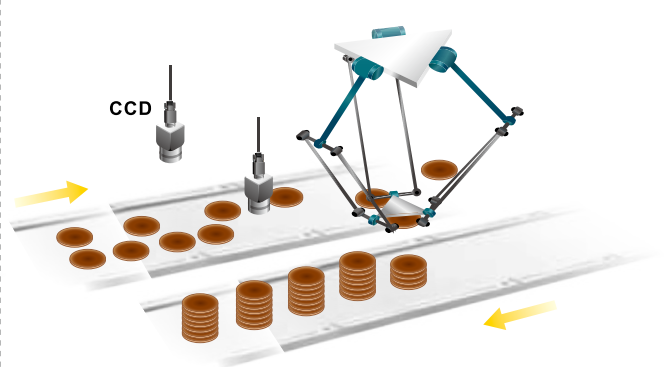
02 Quality Control Inspection

Color Inspection

OK **ΔELTA** Smarter. Greener. Together.

NG **ΔELTA** Smarter. Greener. Together.

Dimension Gauge

30

10
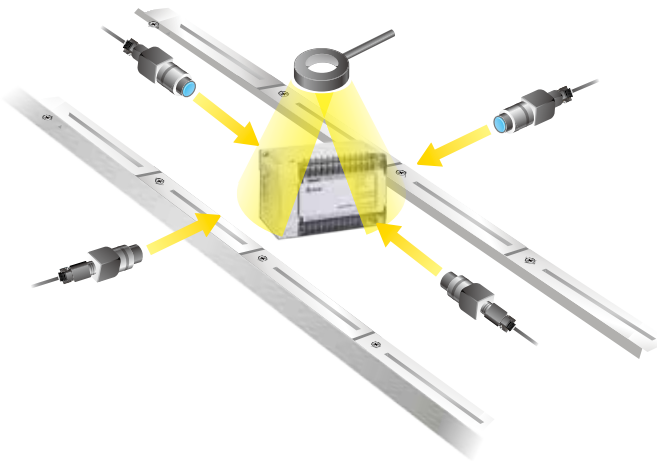
Product Inspection
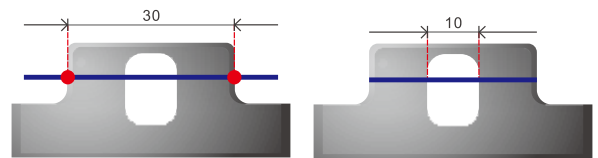
Printing Quality Inspection

CCD

OK

NG
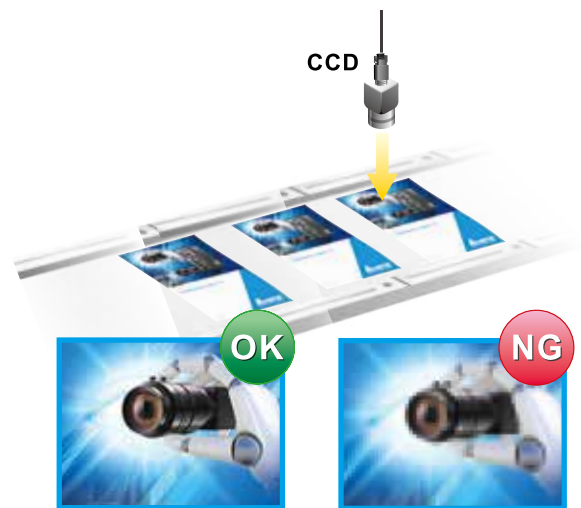
03 Identification

OCV

CCD

OK

DELTA
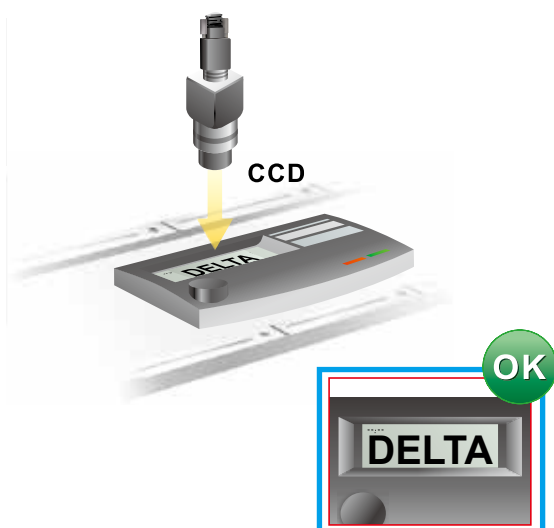
Barcodes Identification

CCD

OK

Barcode

OK

QR code

ΔELTA
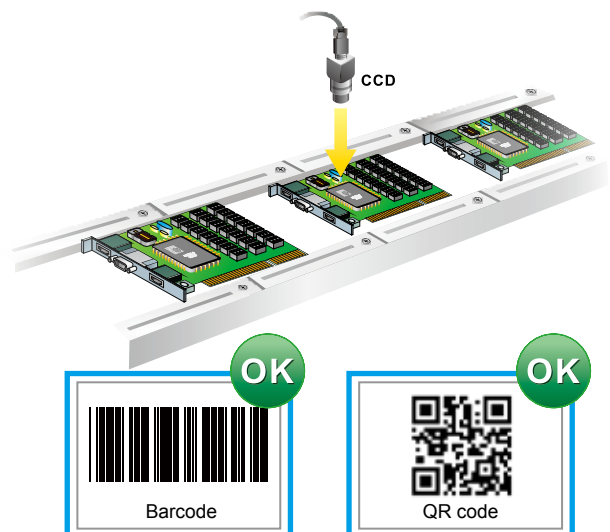
Specifications

► Product Types

Three types for different applications

- **Advanced model:** Maximum 4 or 8 cameras connectable; advanced performance; large storage; supports USB 3.0 and Micro SDXC
- **Standard model:** Maximum 2 or 4 cameras connectable; standard performance; standard storage
- **Basic model:** Maximum 2 cameras connectable; basic performance; basic storage; supports GigE camera

► Controller (DMV2000-CL4-HS/DMV2000-CL2-HS)

Power Supply	$24V_{DC}$
Operation Voltage Range	Rated Voltage 90% ~110%
Current Consumption	4 Cameras: below 4 A / 2 Camera: below 3.4 A
Vibration Resistance	No error: XYZ 10 to 55 Hz 10 m/s^2【1.0 G】for 10 minutes No damage: XYZ 10 to 55 Hz 20 m/s^2【2.0 G】for 2 hours
Shock Resistance	No error: 200 m/s^2【20 G】drop 3 times for each 6-surface, 3-edge and 1-corner No damage: 300 m/s^2【30 G】drop 3 times for each 6-surface, 3-edge and 1-corner
Operating Ambient Temperature	0°C~+45°C
Storage Temperature	-20°C~+65°C
Operating Relative Humidity	35%~85% RH (with no icing or condensation)
Altitude	Under 2000 m
Battery Life	5 years

► Camera
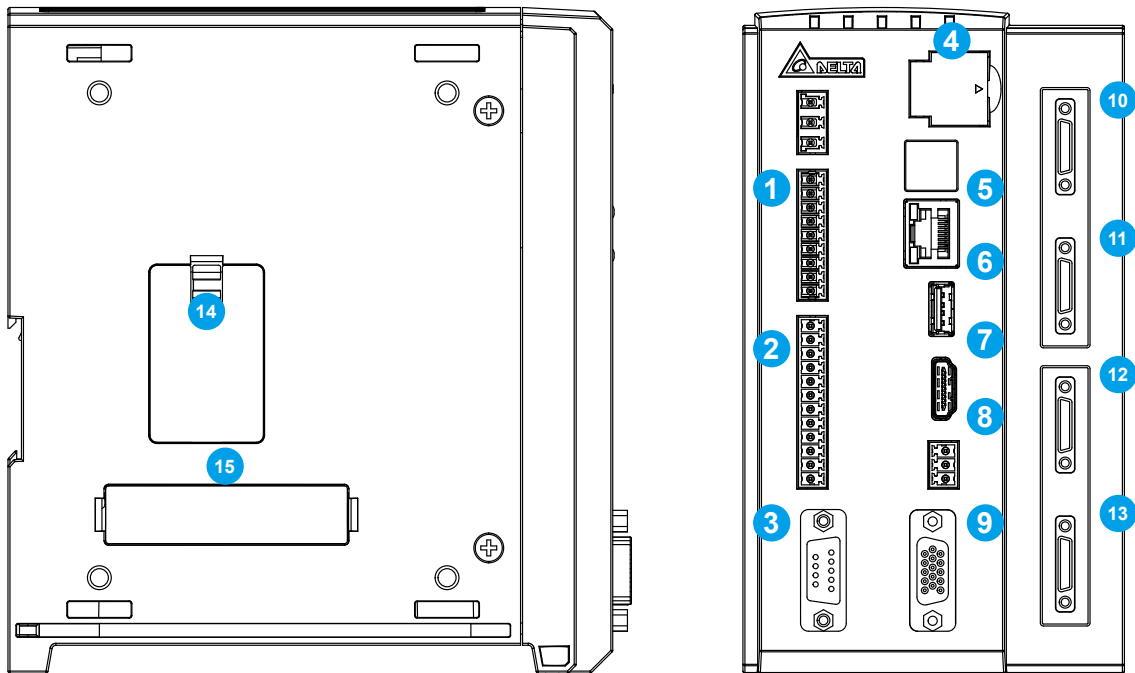
Camera	Type	Digital Color/ Gray Scale Camera with CameraLink Interface
	Resolution (Mega Pixels, Horizontal / Vertical)	12 M: 4096 (H) X 3072 (V), Base: 13 fps, Full: 50 fps
		4 M: 2048 (H) X 2048 (V), Base: 40 fps, Full: 159 fps
		2 M: 2048 (H) X 1088 (V), Base: 74 fps, Full: 295 fps
		0.3 M: 642 (H) X 484 (V), Base: 480 fps
	Shutter Speed	25.8 μs ~ 45 s
	Lens Mount	C mount
	Operation Environment Temperature	0°C~+45°C
	Storage Environment Temperature	-20°C~+65°C
	Operation Environment Humidity	35%~85% RH (with no icing or condensation)
	Weight	Approx. 140 g

► Functions and Peripherals

Number of Cameras Connectable		DMV2000-CL4-HS: Max. 4 DMV2000-CL2-HS: Max. 2
Number of Projects		Internal memory: Approx. 6000 projects SD card: based on memory card capacity Supports changeover by I/O and communication (RS-232, RS-485, Ethernet)
Inspection Window	**Q'ty**	Max. 1000 screens/ project
	Function	2D platform positioning, pattern matching, shape matching, edge angle, edge counting, edge pitch, edge position, edge width, area, blob, image intensity, edge position tracing, edge width tracing, stain inspection, OCV, subtle inspection, color inspection, barcode identification, QR code identification
	ROI Type	Rectangle, Circle, Polygon, Ellipse, Ring, Sector, Rotated Rectangle
	Mask Area	8 areas/ window
Preprocess	**Type**	Gray out, Dilation, Erosion, Averaging, Median, Laplacian, SobelX, SobelY, Sobel, Subtract, Color extraction, Illumination adjustment, Contrast conversion, Shade correction, self-defined(total 15 types)
Execution Mode		Always Execute, Never Execute, Reference Execute
Numerical Calculation	**Q'ty**	Max. 1000 screens/ project
	Four Arithmetic Operations	Plus, Subtract, Multiply, Divide
	Functions (71 types)	EQ, NOT_EQ, LT, LE, GT, GE, AND, BIT_AND, OR, BIT_OR, XOR, BIT_XOR, NOT, BIT_NOT, INRANGE, CHOOSE, IF, MAX_INDEX, MIN_INDEX, MAXth_INDEX, MINth_INDEX, ABS, POW, MOD, LOG10, LN, EXP, SQR, SQRT, SUM, TRUNC, ROUND, CEIL, FLOOR, SIN, COS, TAN, ASIN, ACOS, ATAN, ATAN2, RAD, DEG, PI, MAX, AVG, AVG_RANGE, MIN, SDEV, MEDIAN, MODE, LINE_FIT, CIRCLE_FIT, POINT_TO_POINT, POINT_TO_LINE, POINT_TO_CIRCLE, POINT_TO_POINT_DIST, POINT_TO_POINT_ANGLE, LINE_ANGLE, LINE_MIN_ANGLE, LINE_TO_LINE, LINE_TO_CIRCLE, CIRCLE_TO_CIRCLE, BLOB_TO_POINT, BLOB_TO_LINE, BLOB_TO_BLOB, BLOB_TO_POINT_ANGLE, STAIN_TO_POINT, STAIN_TO_LINE, STAIN_TO_STAIN, STAIN_TO_STAIN_ANGLE
Communication Interface		Configurable Input Pins: 8 (High speed use); 24 (normal use) Configurable Output Pins: 11 (High speed use); 38 (normal use) RS-232 (Max.115,200 bps), RS-485 (Max. 230,400 bps) Ethernet (1000 BASE-T / 100 BASE-TX / 10 BASE-T), Delta PLC-Link
Display	**Screen**	FHD 1920 x 1080 output, XGA 1024 × 768 output
	Scale	5% ~ 1000% adjustable
	Language	Traditional Chinese, Simple Chinese, English and dozens more
Operation Interface	**Mouse**	standard 3 key
	Keyboard	standard 104 key
Camera Flash		DMV2000-CL4-HS: I/O control, max. 4 settings DMV2000-CL2-HS: I/O control, max. 2 settings
Memory Card		SD Card (Max. 32 GB), Class 10

Specifications

► Controller Parts

No.	Name	Description
1	Input I/O terminal block	Input terminal (8 pin)
2	Output I/O terminal block	Output terminal (11 pin)
3	RS-232 serial port	Supports Master, Slave serial communication
4	SD memory card	Stores the project settings and images backup
5	Ethernet connector	10/100/1000 BASE-T communication
6	USB 2.0 connector	Mouse, keyboard
7	HDMI output port	Connects to external HDMI monitor
8	RS-485 serial port	Supports Master, Slave serial communication
9	VGA output port	Connects to external VGA monitor
10	Camera 1 connector	Resolution: 0.3M, 2M, 4M, 5M or 12M camera
11	Camera 2 connector	Resolution: 0.3M, 2M, 4M, 5M or 12M camera
12	Camera 3 connector	Resolution: 0.3M, 2M, 4M, 5M or 12M camera
13	Camera 4 connector	Resolution: 0.3M, 2M, 4M, 5M or 12M camera
14	Button cell battery slot	Maintain system time
15	Expansion module slot	Flash control, expanded I/O

Ordering Information

All cameras and cables are for the CameraLink interface

▪ Cameras

DMV-CM30GCL	CMOS CAMERA 0.3 M MONO CameraLink
DMV-CM30CCL	CMOS CAMERA 0.3 M COLOR CameraLink
DMV-CM2MGCL	CMOS CAMERA 2.0 M MONO CameraLink
DMV-CM2MCCL	CMOS CAMERA 2.0 M COLOR CameraLink
DMV-CM4MGCL	CMOS CAMERA 4.0 M MONO CameraLink
DMV-CM4MCCL	CMOS CAMERA 4.0 M COLOR CameraLink
DMV-CM5MGCL	CMOS CAMERA 5.0 M MONO CameraLink
DMV-CM5MCCL	CMOS CAMERA 5.0 M COLOR CameraLink
DMV-CM12MGCL	CMOS CAMERA 12 M MONO CameraLink
DMV-CM12MCCL	CMOS CAMERA 12 M COLOR CameraLink

▪ Controllers

DMV2000-CL4-HS	Standard model controller for maximum 4 cameras connectable
DMV2000-CL2-HS	Standard model controller for maximum 2 cameras connectable

▪ Illumination

Illumination	Coaxial	DMV-CX40W (white light)
	Direct ring	DMV-DR6736R (red light) DMV-DR6736W (white light)
	Diffusion board	DMV-DR6736D
	Back light	DMV-BL60R (red light)
	Power supply	DMV-PS12C1 DMV-PS12C2 DMV-CA30P (extension cable)

▪ Flexible High-speed camera cable

DMV-CAF03CL	CameraLink FLEX CABLE 3 M
DMV-CAF05CL	CameraLink FLEX CABLE 5 M
DMV-CAF10CL	CameraLink FLEX CABLE 10 M

▪ Lenses

DMV-LN06W40	0.4 M 2/3" 6 mm
DMV-LN08W40	0.4 M 2/3" 8 mm
DMV-LN12W40	0.4 M 2/3" 12 mm
DMV-LN16W40	0.4 M 2/3" 16 mm
DMV-LN25W40	0.4 M 2/3" 25 mm
DMV-LN35W40	0.4 M 2/3" 35 mm
DMV-LN50W40	0.4 M 2/3" 50 mm
DMV-LN75W40	0.4 M 2/3" 75 mm
DMV-LN100W40	0.4 M 2/3" 100 mm
DMV-LN05M	2 M 2/3" 5 mm
DMV-LN06M	2 M 2/3" 6 mm
DMV-LN08M	2 M 2/3" 8 mm
DMV-LN12M	2 M 2/3" 12 mm
DMV-LN16M	2 M 2/3" 16 mm
DMV-LN25M	2 M 2/3" 25 mm
DMV-LN35M	2 M 2/3" 35 mm
DMV-LN50M	2 M 2/3" 50 mm
DMV-LN12M05	5 M 1" 12.5 mm
DMV-LN35M05	5 M 1" 35 mm
DMV-LN50M05	5 M 1" 50 mm
DMV-LN12M06	6 M 1" 12 mm
DMV-LN16M06	6 M 1" 16 mm
DMV-LN25M06	6 M 1" 25 mm
DMV-LN35M06	6 M 1" 35 mm
DMV-LN50M06	6 M 1" 50 mm
DMV-LN28M12	12 M F-Mount 28mm
DMV-LN35M12	12 M F-Mount 35mm
DMV-LN50M12	12 M F-Mount 50mm

3-Pin Power Terminal

No.	Name	Description
1	+24V	Positive power supply
2	0V	Negative power supply
3	E	Grounding

1 - +24V
2 - 0V
3 - E
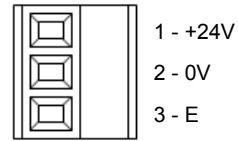
9-Pin Input Terminal

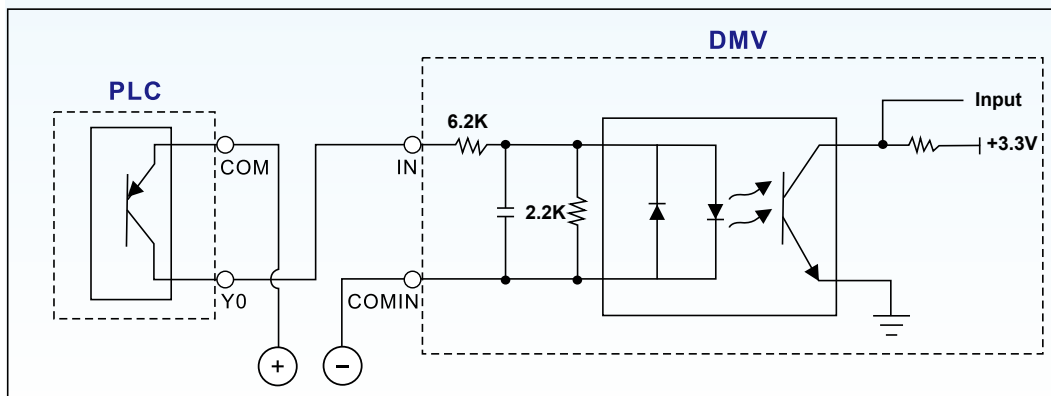| No.	Name	Description
1	COMIN	9-pin input COM
2	IN1 (TRG1)	Camera 1 image capture trigger
3	IN2 (TRG2)	Camera 2 image capture trigger
4	IN3 (TRG3)	Camera 3 image capture trigger
5	IN4 (TRG4)	Camera 4 image capture trigger
6	IN5 (TEST)	Test condition (no data output)
7	IN6 (PLINK)	PLC communication link start sign
8	IN7 (TROFF)	Disable image capture trigger
9	IN8 (ACK)	Controller parallel input handshaking sign

Default Setting

1 - COMIN
2 - IN1 (TRG1)
3 - IN2 (TRG2)
4 - IN3 (TRG3)
5 - IN4 (TRG4)
6 - IN5 (TEST)
7 - IN6 (PLINK)
8 - IN7 (TROFF)
9 - IN8 (ACK)
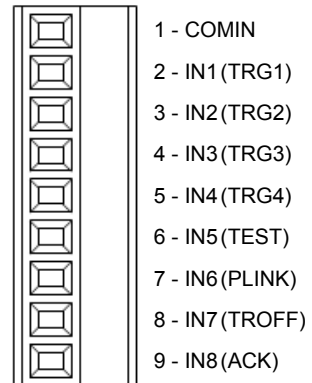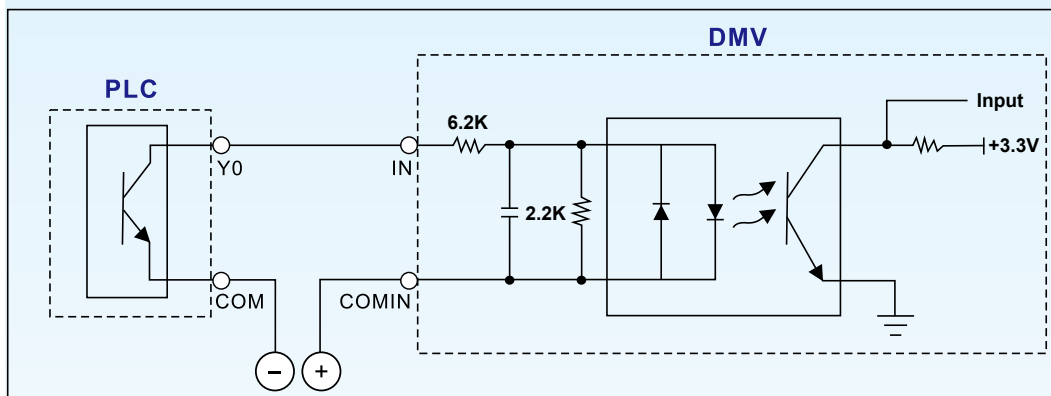
Input Circuit (NPN)

Input Circuit (PNP)

15

12-Pin Input Terminal

| No.	Name	Description
1	OUT1 (RDY)	Enable function switch sign
2	OUT2 (TOUT1)	Total inspection output 1 (synchronous display with operation screen OK/NG)
3	OUT3 (TOUT2)	Total inspection output 2 (synchronous display with operation screen OK/NG)
4	OUT4 (ERROR)	Error sign
5	OUT5 (STR)	Parallel output handshaking sign
6	OUT6 (REN1)	Camera 1 capture image
7	OUT7 (REN2)	Camera 2 capture image
8	OUT8 (REN3)	Camera 3 capture image
9	OUT9 (REN4)	Camera 4 capture image
10	OUT10 (FLH1)	Camera 1 flash output
11	OUT11 (FLH2)	Camera 2 flash output
12	COMOUT	12-pin output COM

Default Setting
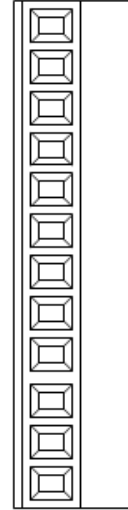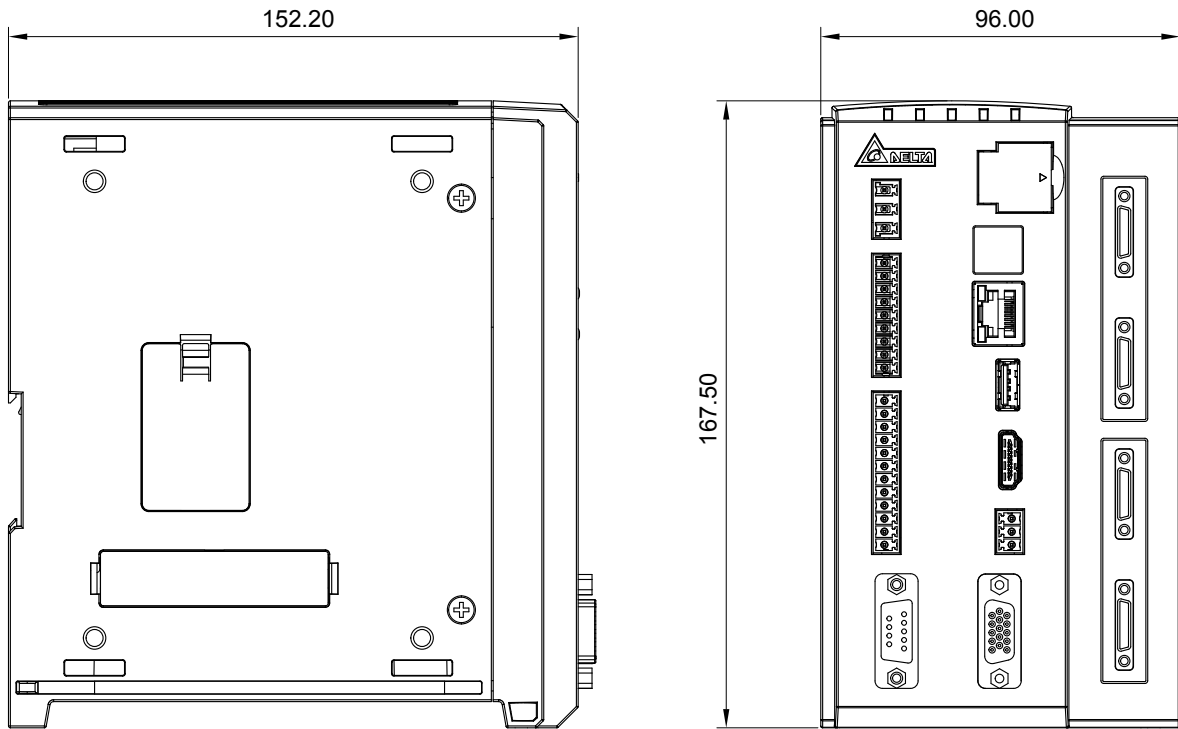
1 - OUT1 (RDY)
2 - OUT2 (TOUT1)
3 - OUT3 (TOUT2)
4 - OUT4 (ERROR)
5 - OUT5 (STR)
6 - OUT6 (REN1)
7 - OUT7 (REN2)
8 - OUT8 (REN3)
9 - OUT9 (REN4)
10 - OUT10 (FLH1)
11 - OUT11 (FLH2)
12 - COMOUT
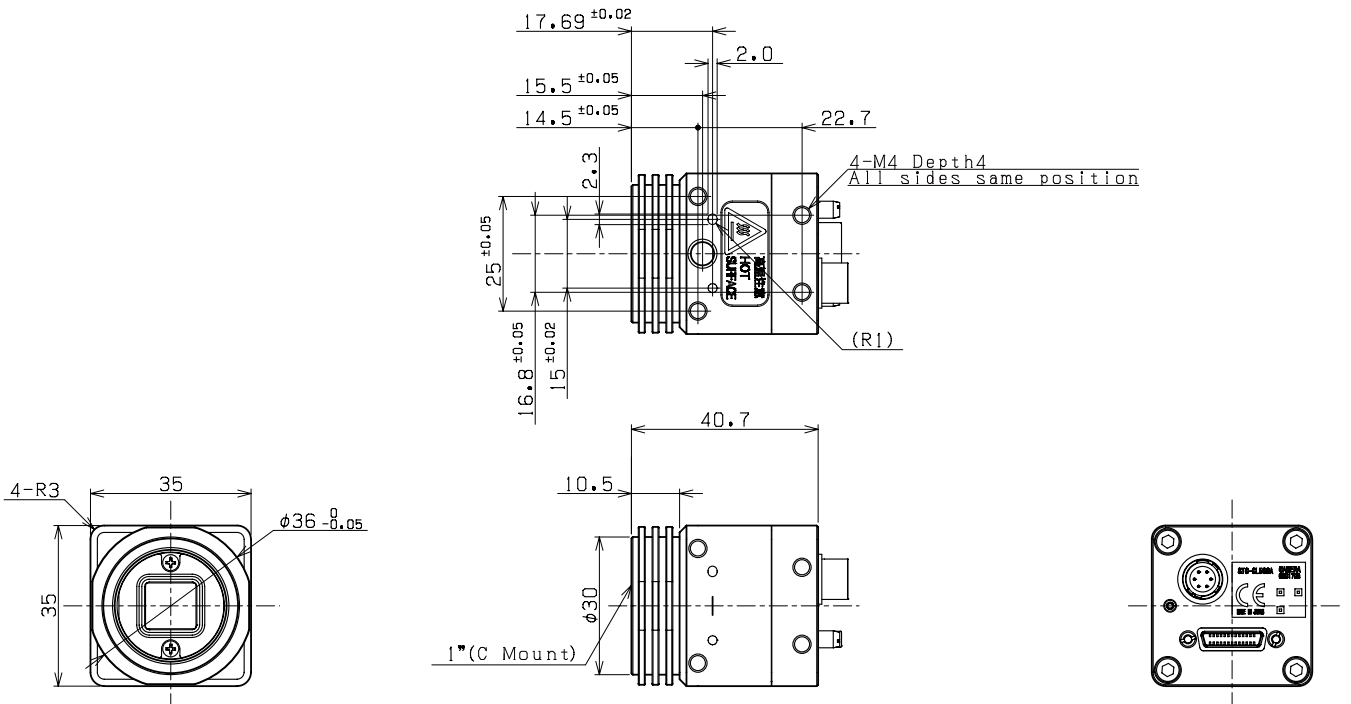
Output Circuit (NPN output)
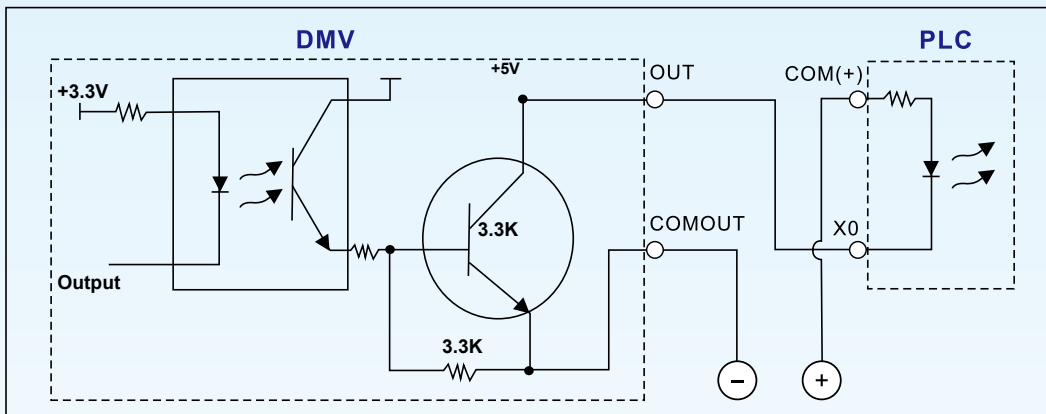
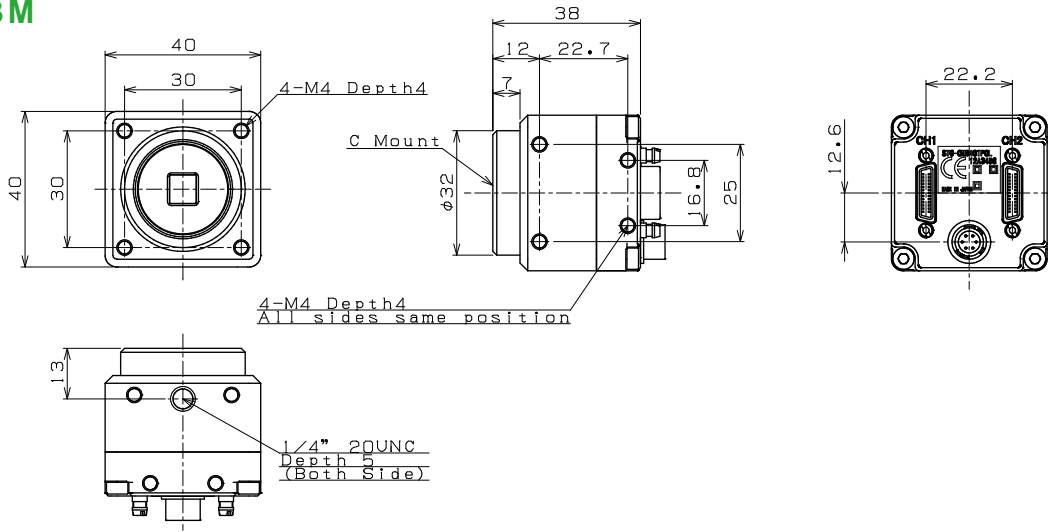# Controller Dimensions

Unit: mm

Camera Dimensions

Unit: mm
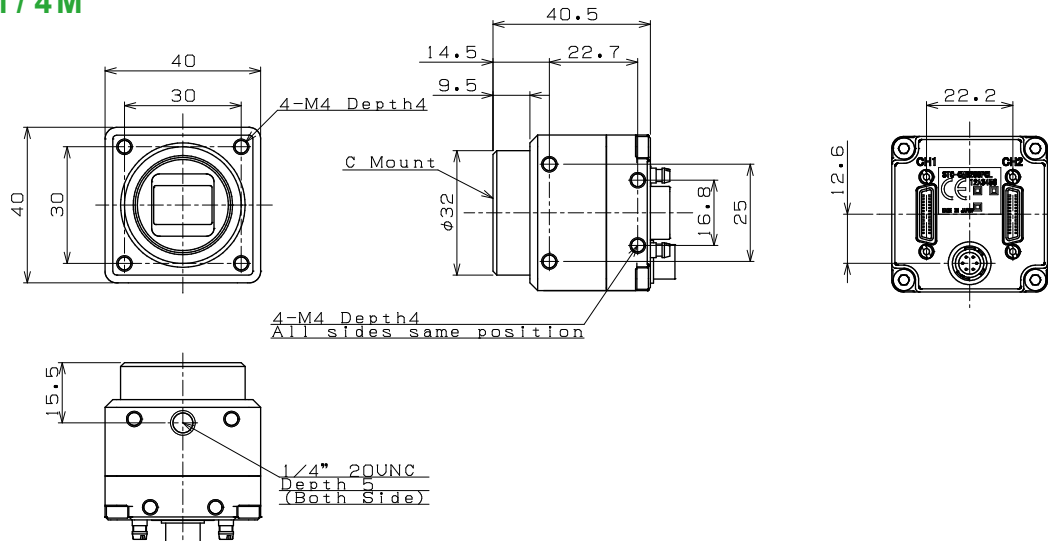
CCD 5M

Camera Dimensions

Unit: mm

CMOS 0.3 M

CMOS 2 M / 4 M

CMOS 12 M

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