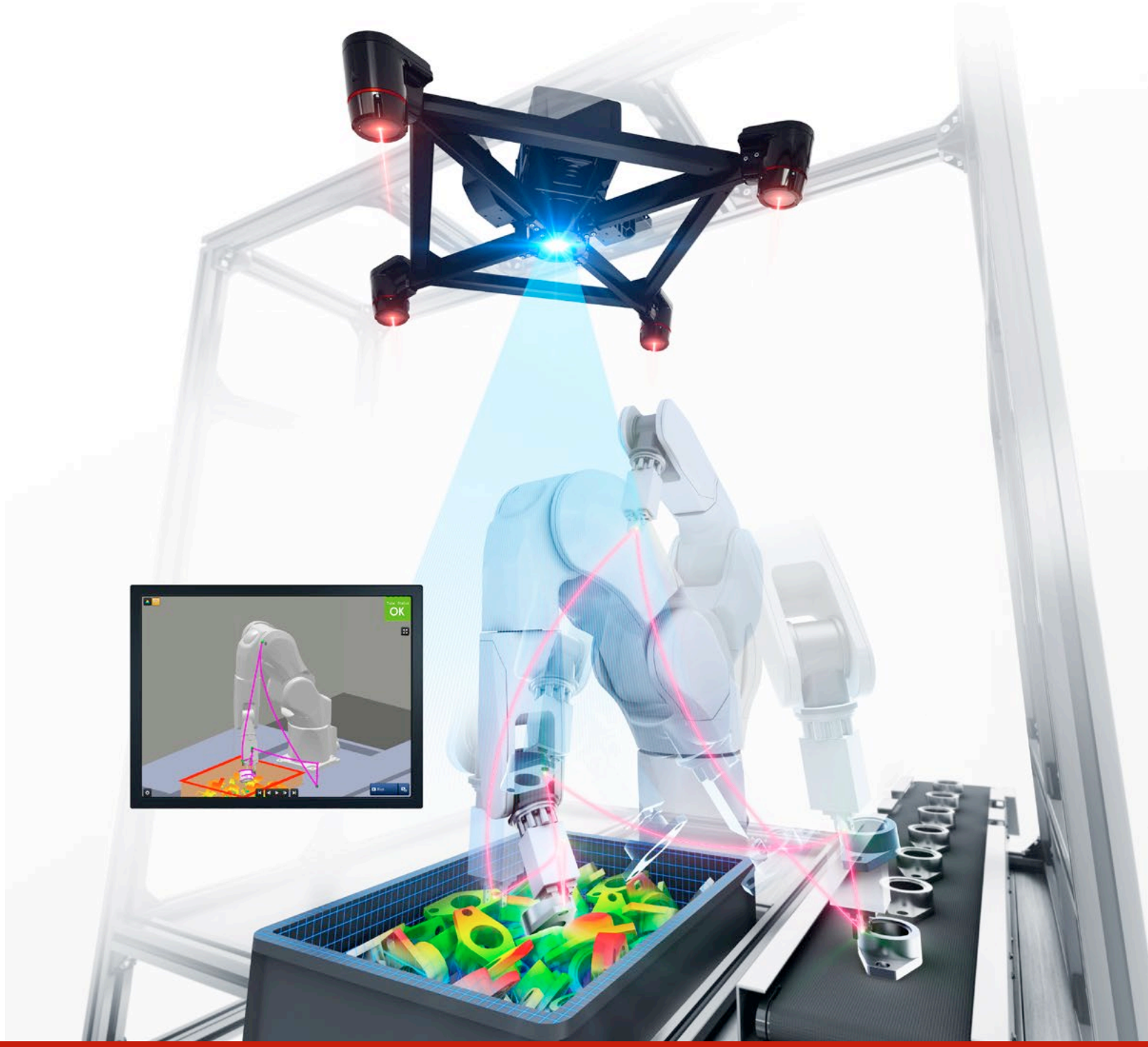
KEYENCE

3D Vision-Guided Robotics

NEW CV-X Series

Unmatched Detection Performance and Usability



CV-X Series

Unmatched Detection Performance

Designed Specifically for 3D Vision-Guided Robotics

Integrated design comprised of four cameras and a single projector.

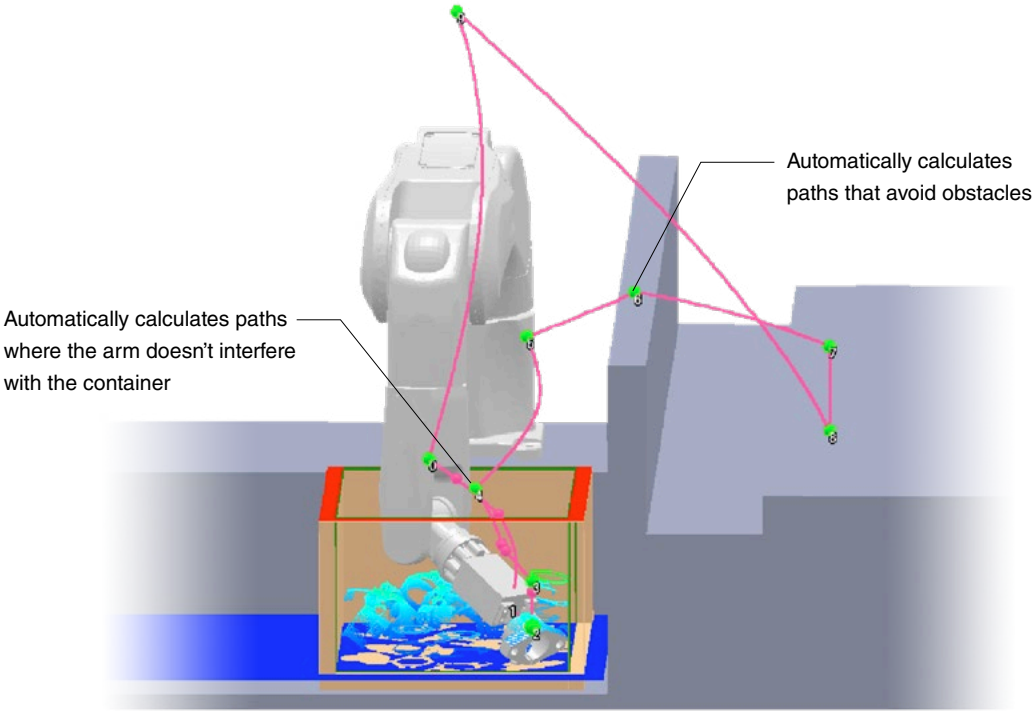
Equipped with a Newly-Developed 3D Scanning Function

Calculates the optimal solution from 136 captured images in 0.5 seconds

Automatic Path Planning

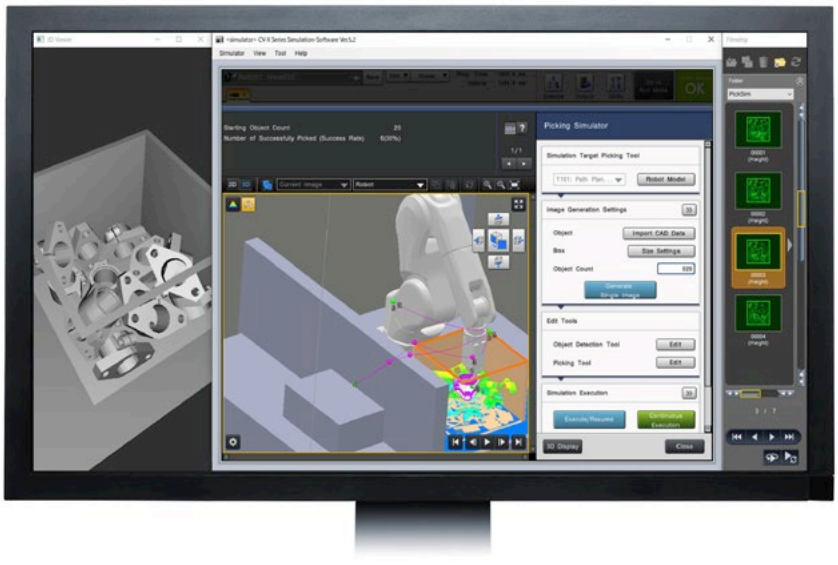
Automatically calculate robot movements with path planning tool

Account for environment and robot position



All simulations performed on PC

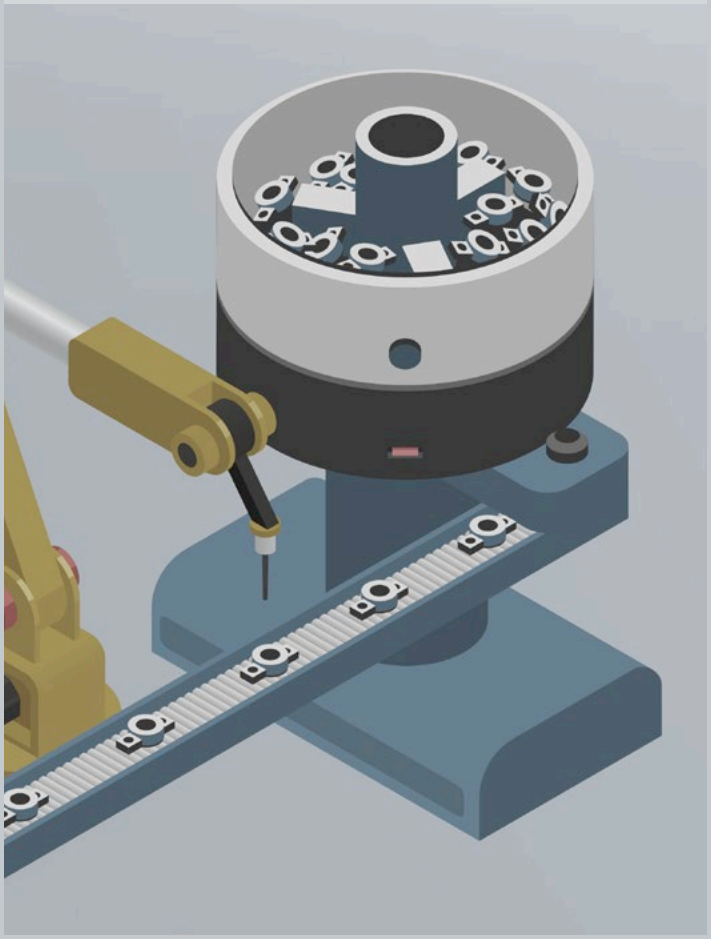
Optimize workplace design on a PC



Conventional Problems with Product Supply Processes

With the increasing demand for improved productivity in factories, the following issues have become apparent.

Parts Feeder



- To handle a variety of products, many part feeders of different designs are needed, requiring high costs and large amounts of floor space

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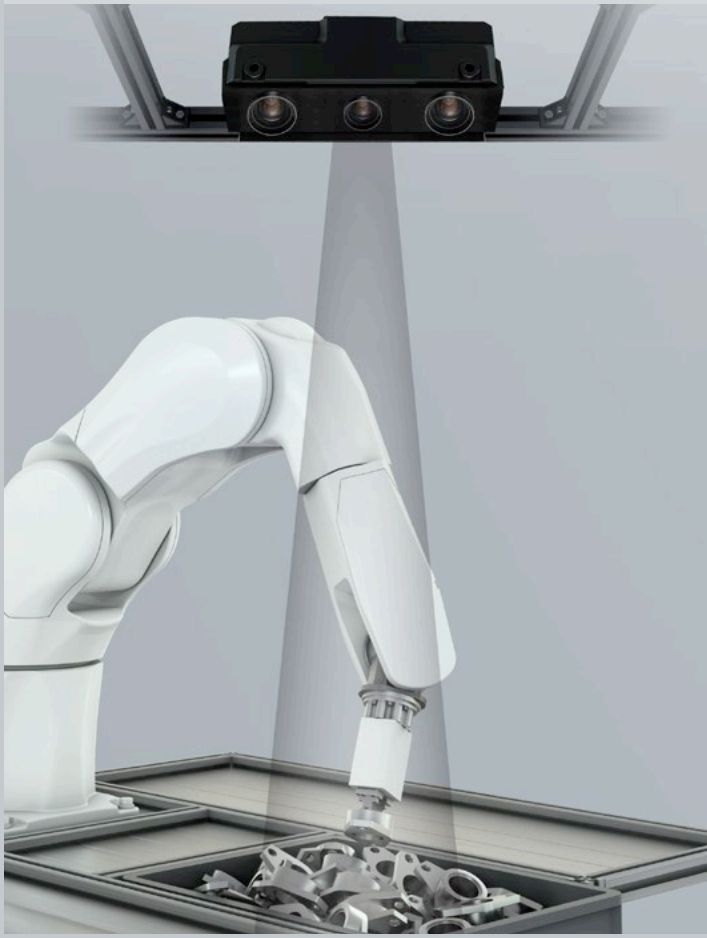
- Handling large or easily damaged targets is difficult

Manual Work

- Limitations in work speed
- Human error causes costly mistakes
- Personnel costs required
- Required work may be burdensome or hazardous

Conventional 3D Vision-Guided Robotics



- Unstable target detection
- Industrial PC required for operation
- Large investment of setup time
- Collisions between robot arm and environment cannot be prevented

KEYENCE has provided a solution ▶▶

Advantages to using KEYENCE 3D Vision-Guided Robotics

These features solve the problems of conventional methods to improve production efficiency.

Superior Image Quality & Detection Performance

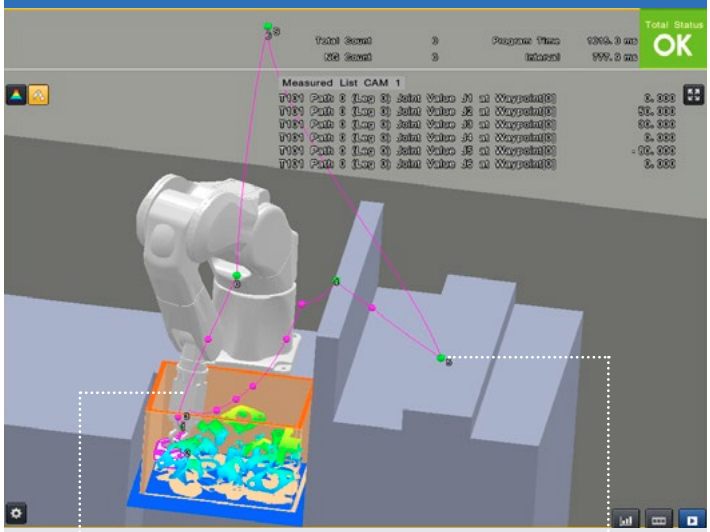
Highly cost effective

Multiple products can be detected with a single system, as the ideal image settings are automatically selected to eliminate blind spots and account for differences in product color, material, and shape.

Stable, continuous operation possible

System is designed to run constantly, and robust detection can enable equipment to operate 24 hours a day.

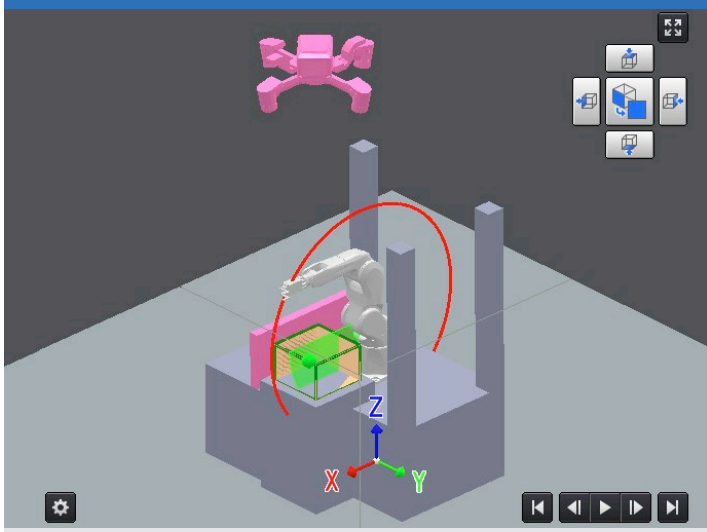
Path Planning Tool

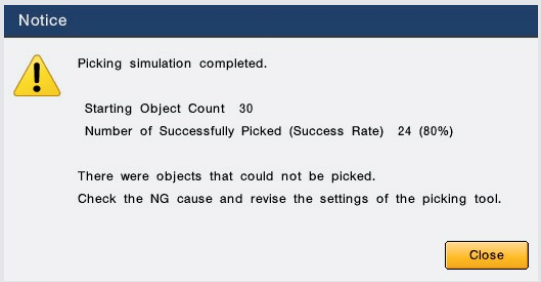


Generates robot motion to avoid hitting other objects in the work area.

Generates robot motions to avoid any part of the robot from colliding with container.

Picking simulator





Significant reduction in labor-hours for creating robot programs

Building complicated robot programs is not required by the user, as the Path Planning tool will calculate the needed motion to pick each part while avoiding collisions and robot singularities. KEYENCE-provided robot programs acquire these generated paths from the system directly.

Improvement in cycle time

Avoid disruptions in operation caused by collisions or robot singularities and enable the robot to pick targets that were formerly unreachable.

Eliminate waste from poor designs

The Picking Simulator can identify problems with end-of-arm-tool design or workcell layout before any physical setup, as these exact details can be used to run bin pick simulations.

Dramatic improvement in success rate

All program settings can be developed in the simulator software and then instantly tested on any number of simulated bins of parts, giving the user confidence in the program before even loading it to the system.

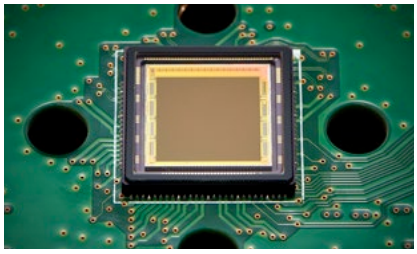
Optimal Hardware and Algorithms for 3D Vision-Guided Robotics Systems

Optimally Designed Image Capture Angle

The four cameras each capture images from different angles, eliminating blind spots and allowing the creation of stable 3D images.

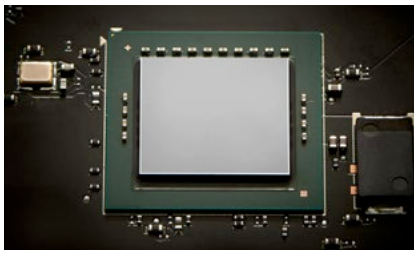
High Precision CMOS Sensor

The high pixel density, high precision, low noise image sensor provides unparalleled detection performance.



High Speed Processor

The newly introduced high speed processor delivers ultra fast 3D calculations. Its high precision, high speed, KEYENCE-developed algorithms generate a single 3D image from 136 unique images.



Specially Designed Projector

The high-intensity LEDs and high-resolution projector components allow the creation of high precision 3D images.

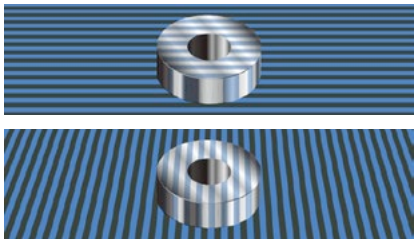
Detection Principle

PATTERN PROJECTION TECHNIQUE

Multiple stripe patterns are projected at high speed. The light reflected from the targets is analyzed in real-time by an ultra-high-speed CMOS sensor and processor to generate a 3D image.

Dual-Axis Light Projection Algorithm

The system projects and analyzes projection patterns cast at 90-degree angles, reducing the impact of reflections from glossy surfaces.



Reflected light that creates noise data is eliminated.

KEYENCE-Developed 3D Search Algorithms and Optical Systems Deliver High Precision and High Speed Performance

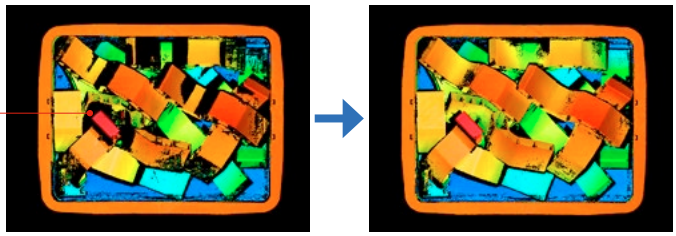
Directionally Independent and Blind Spot-Free Search

The newly developed 3D search function uses four separate cameras to create a 3D image free of blind spots in order to provide optimum detection results. It also allows the stable search of target workpieces, regardless of their position or orientation.

Multiple Reflection Suppression Function

By using a special projection pattern, it is possible to suppress the effect of multiple reflections from highly glossy targets and the bottom and inner surfaces of containers.

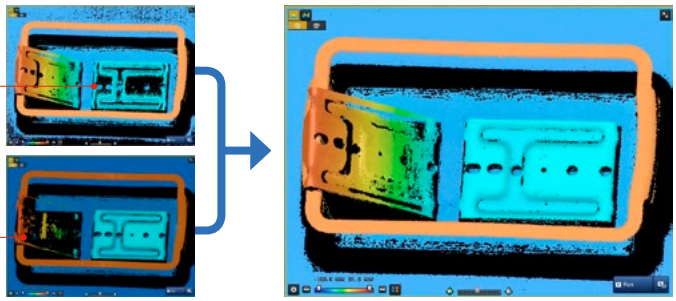
- Height data cannot be acquired correctly in black areas.



HDR Image Function

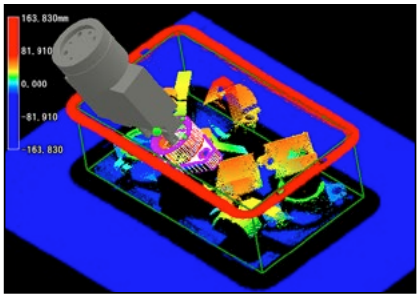
It is possible to switch the internal exposure time, capture an image, and identify bright areas and dark areas at the same time.

- Bright areas are overexposed when the exposure time is extended.
- When the exposure time is set to suppress overexposure, height data cannot be acquired in dark areas.

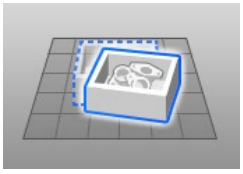


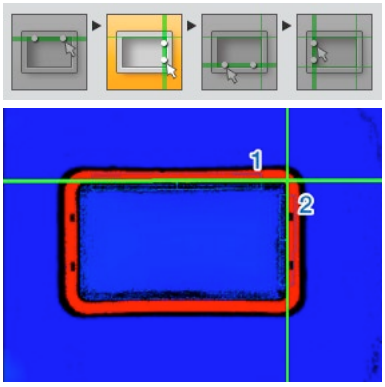
Box Specification Function for Reliable Detection of Target Workpieces

Accurate searching while preventing the misdetection of the box base and end surfaces.



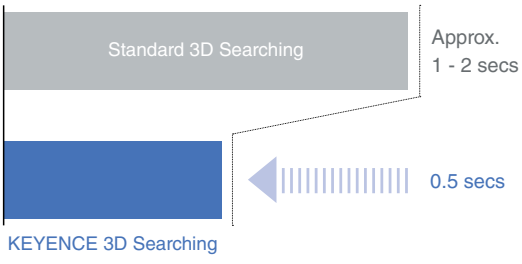
It will also automatically track objects, even if the box shifts. Always searches at the exact position of the box.





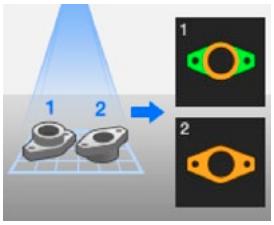
Reduced Takt Time

Delivers extremely high speed 3D searching with a dramatically shortened takt time when compared to standard searching.



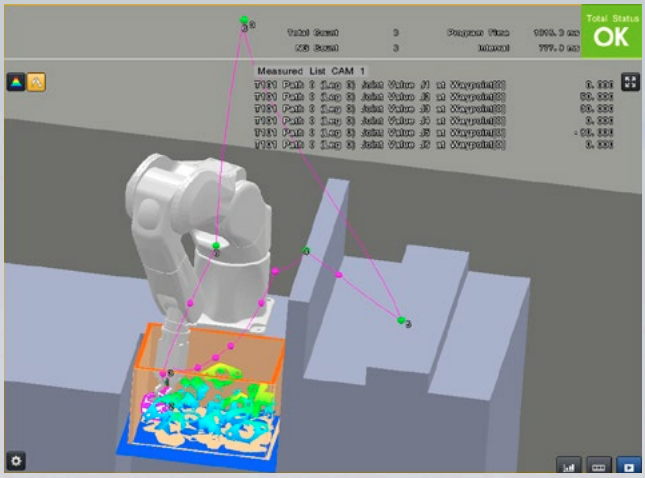
Register Search Models with Both CAD Data and Real World Objects

Simply load in CAD data for high precision searching.
It is also able to register real world objects, so it can deliver high precision 3D scanning even when no CAD data is available.



Automatically calculate movements for the robot, taking peripheral equipment and the position of the robot into account

Path Planning Tool



Start position

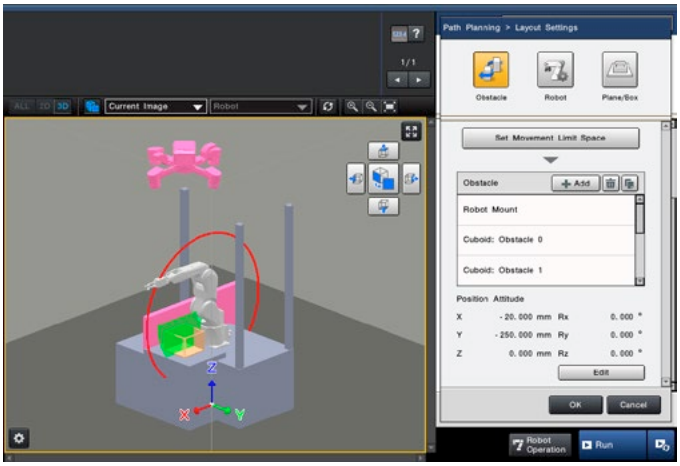
Place position

Approach position

Grip position

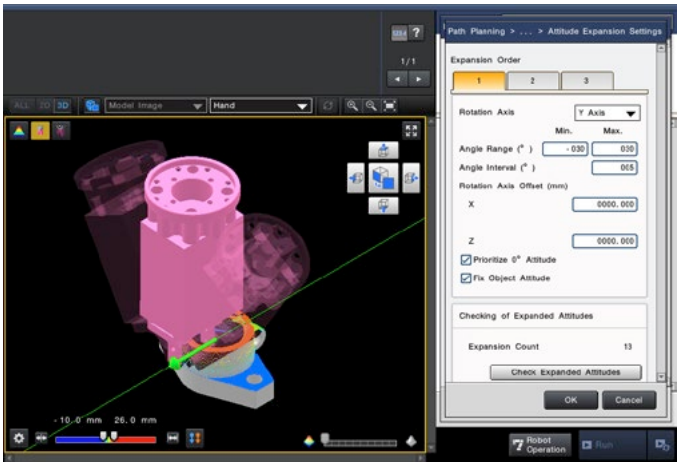
Build the environment layout in the software to ensure the gripped object will not hit surroundings

Position the robot, container and obstacles on the screen using only the mouse.
No specialized knowledge is necessary.



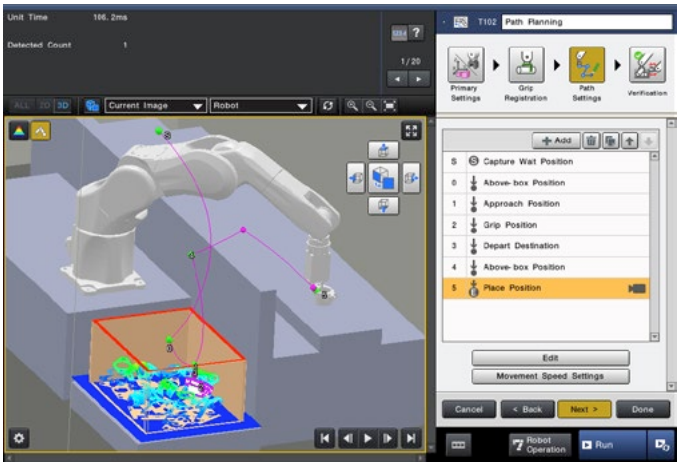
Easily register grips in multiple orientations in program settings

The grip position for the target can be taught just by using the mouse.
There is no need to move the robot, so set-up speed is drastically increased compared with conventional teaching methods.



Add specified points to move to, and waypoints in between will be calculated automatically

Specify the waypoints to the robot's target position on the created layout. The optimal paths will be automatically calculated, taking the robot position at each waypoint into account.

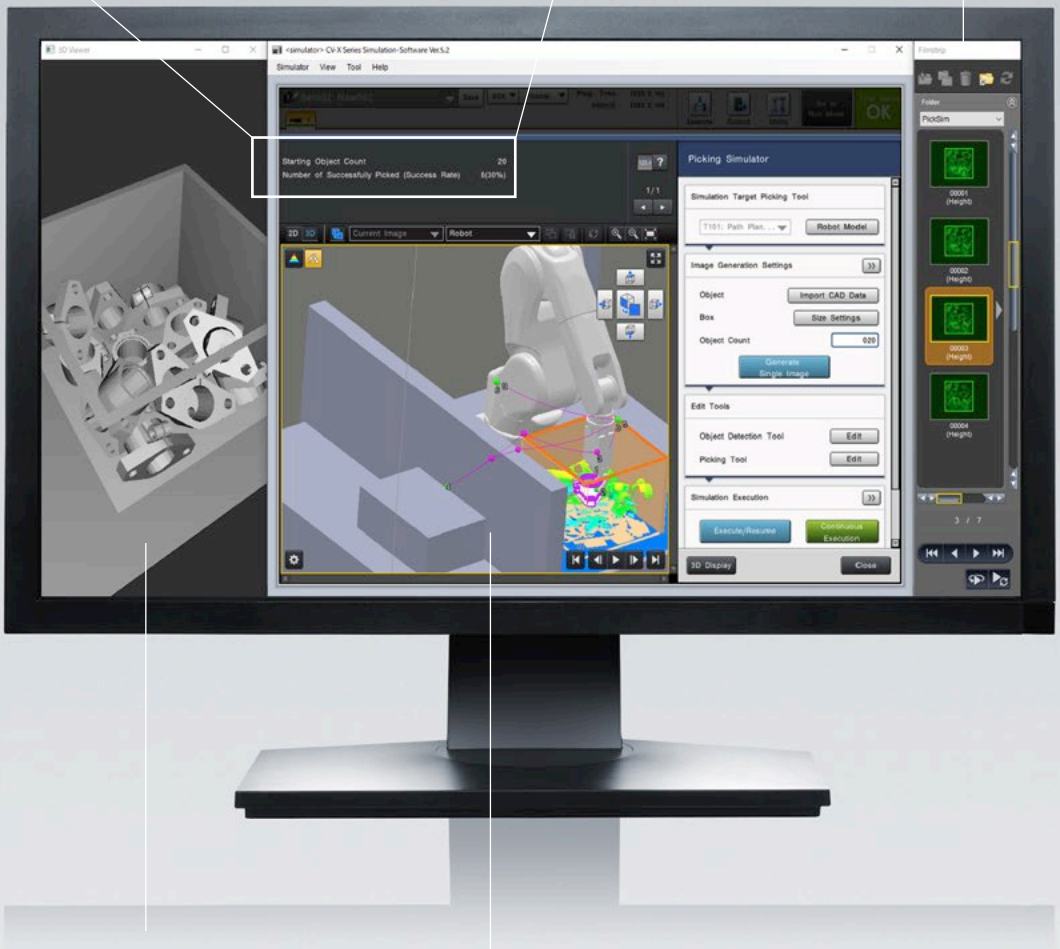


Simulate everything from image generation to robot movements on a PC

Picking simulator

Starting Object Count 20
Number of Successfully Picked (Success Rate) 6(30%)

A new image will be created each time a target is picked. All the images generated during picking will remain in the image history.

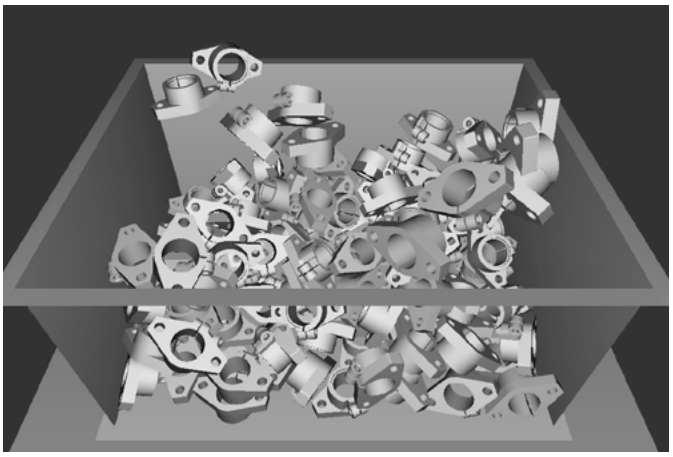


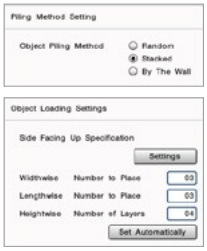
When a target is picked, the shifting of other workpieces in the pile will be simulated as well.

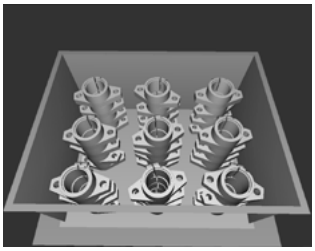
You can check the robot's movement path for each pick. If pick is not possible at any point, you can review the settings, make adjustments and quickly check if your changes have improved operation.

Through physical simulation, targets can be reproduced in bulk.

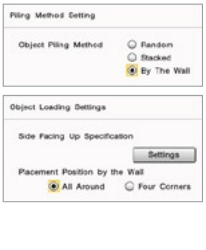
Creates a realistic simulation of target pileup using a dedicated physics engine. No need to prepare real workpieces or containers.

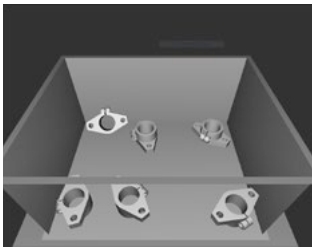






Support for stacking targets

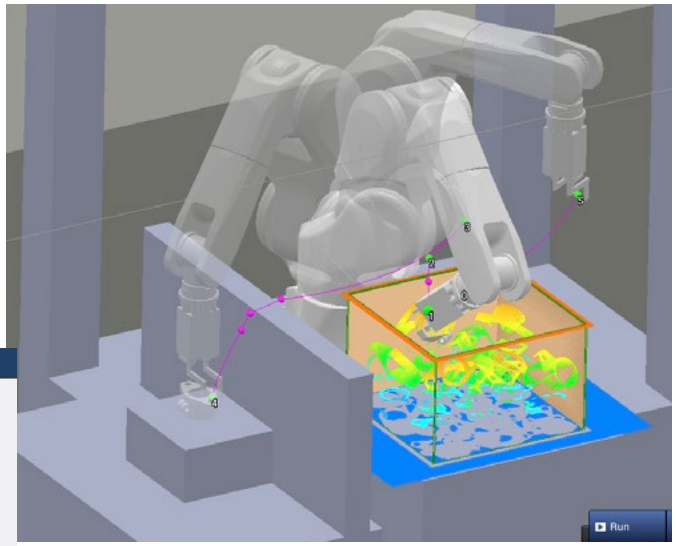


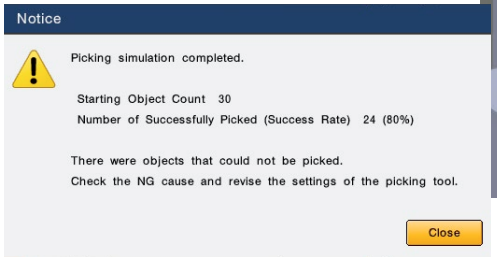


Targets can only be placed along a wall

Test picking success with current program settings offline. This significantly reduces labor-hours compared to running tests with physical setup.

Press the Run button and the picking simulation will be carried out on all the simulated images automatically. Each result is stored and can be reviewed to confirm that the entire bin can be picked as programmed before being set-up on-site.





The setup process is shortened dramatically, no longer requiring days of labor.

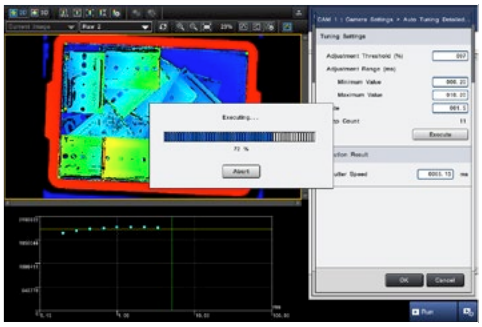
	1 Image Creation	2 Calibration
Previous Issues	Did not know the optimal parameters.	Manual, time-consuming calibration. Prone to human error.
Using KEYENCE 3D Vision-Guided Robotics	Automatic parameter adjustment.	One-click 3D auto-calibration

Begin Setup

1 Image Creation

Automatic Shutter Speed Calibration

Automatically calibrates the shutter speed to match the target condition, giving the ideal conditions for 3D measurement. Any user can obtain the ideal image settings with one click.



2 Calibration

One-click 3D Auto-Calibration

Issues with Conventional Method

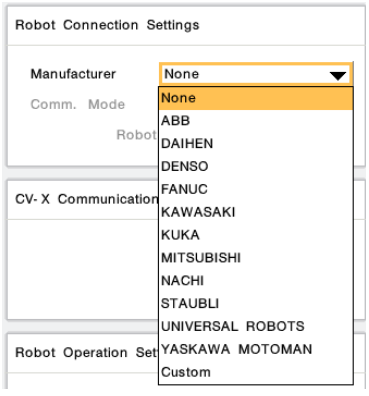
- Manual, time-consuming calibration.
- Accuracy varies according to operator
- Difficult to perform readjustments.

Solved by KEYENCE Vision-Guided Robotics

- Simple one-click operation.
- Consistently high precision levels, regardless of the operator.
- Allows for both immediate execution and immediate recovery.

Simple to Connect Directly by Linking with Robot

Can be connected with the standard controllers from all the major manufacturers. Simply select the vendor from the list.



Other manufacturers not listed here may be able to provide compatible custom products. For more details, contact your local sales representatives.

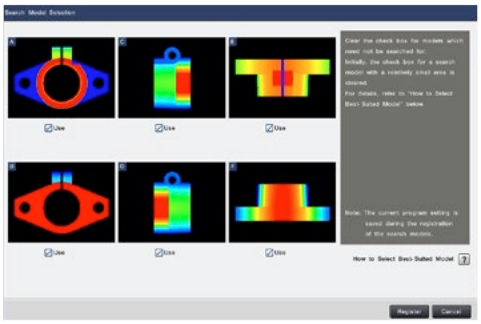
3 Search Settings	4 Gripper Settings Path Settings	5 Inspection Picking Simulator
Required complex configuration.	Each robot required on-site registration, one movement at a time.	Actual robot operation required to confirm whether configuration was successful or not.
Simply load in CAD data	**Configure in software. No robot required.**	**Confirm operation. Instantly identify issues needing adjustment.**

Significant reduction of setup period

3 Search Settings

Load CAD Data to Configure Scanning

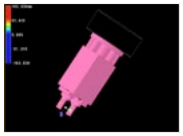
Load in CAD data to automatically register scan models for each direction and to complete scanning configuration.



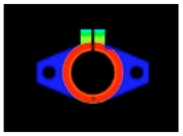
4 Gripper Settings, Path Settings

Easy Grip Position Registration without Robot Operation

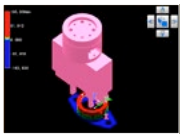
Use only a mouse to teach grip positions within the program settings. This process of moving the gripper model to the desired locations on the workpiece model is much faster than conventional teaching methods.



Registering robotic hands. Also works with CAD data.



Click the grip position.

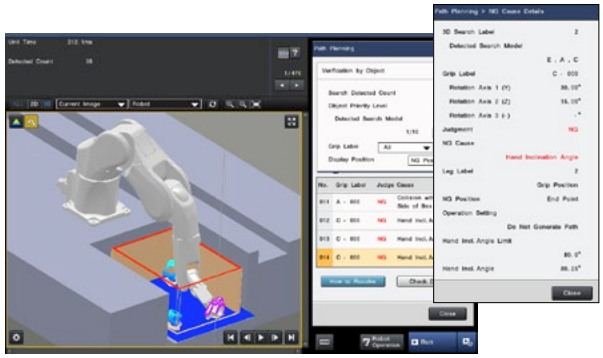


Finalize the grip position.

5 Inspection

Gripper Position Inspection Simulation

This utility displays any NG causes such as collisions on-screen. Needed adjustments in the settings can therefore be quickly identified.

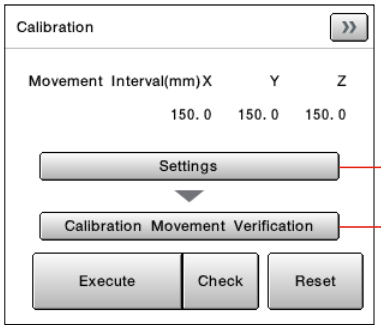


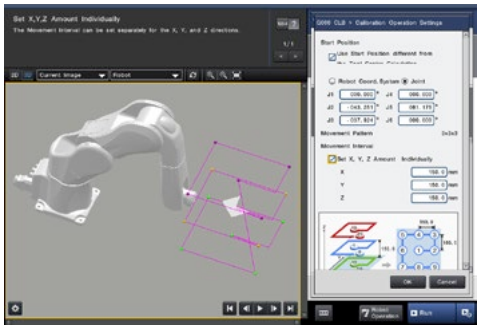
Functions to Simplify Setup and Operation

KEYENCE 3D Vision-Guided Robotics is designed to help mitigate problems that can occur on-site.

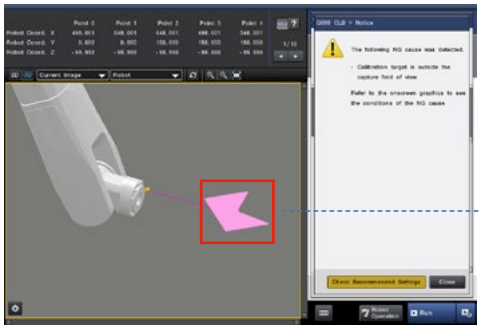
For accurate calibration in a short time

The operation path during calibration is optimized according to the robot model that is used.





Visually check the calibration operation path when configuring settings.



If there is a problem along the calibration operation path, you can check for points along the path that might be the cause.

[Items included in an operation check]

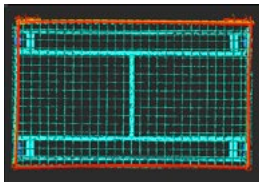
- Interference with the robot
- Movement range of the robot
- Search target out of the field of view
- Interference between search target and robot
- Search target hidden behind the robot

Container identification method for stable detection of targets

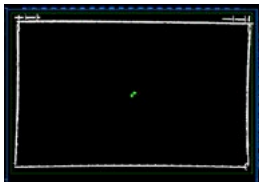
This function can be used for containers that are difficult to detect in 3D images and for operations with the mesh pallet open.

If it is difficult to detect a container in a 3D image, it can be combined with the KEYENCE 2D vision algorithm to achieve stable detection.

- 3D image

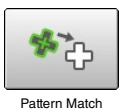


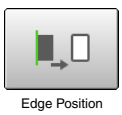
- 2D image



2D inspection tool used for position correction

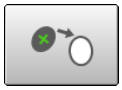

Pattern Match (Shading) Position


Pattern Match (Profile) Position

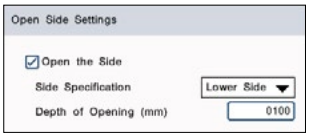

Edge Position

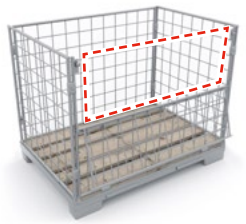

Line Position and Angle

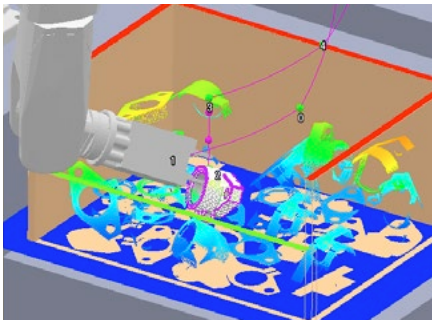

Center of Circle


Gravity Center of Cluster

When an operation is performed with the side of a mesh pallet open, the interference judgment function, which accounts for this state, is used for efficient removal of the target.

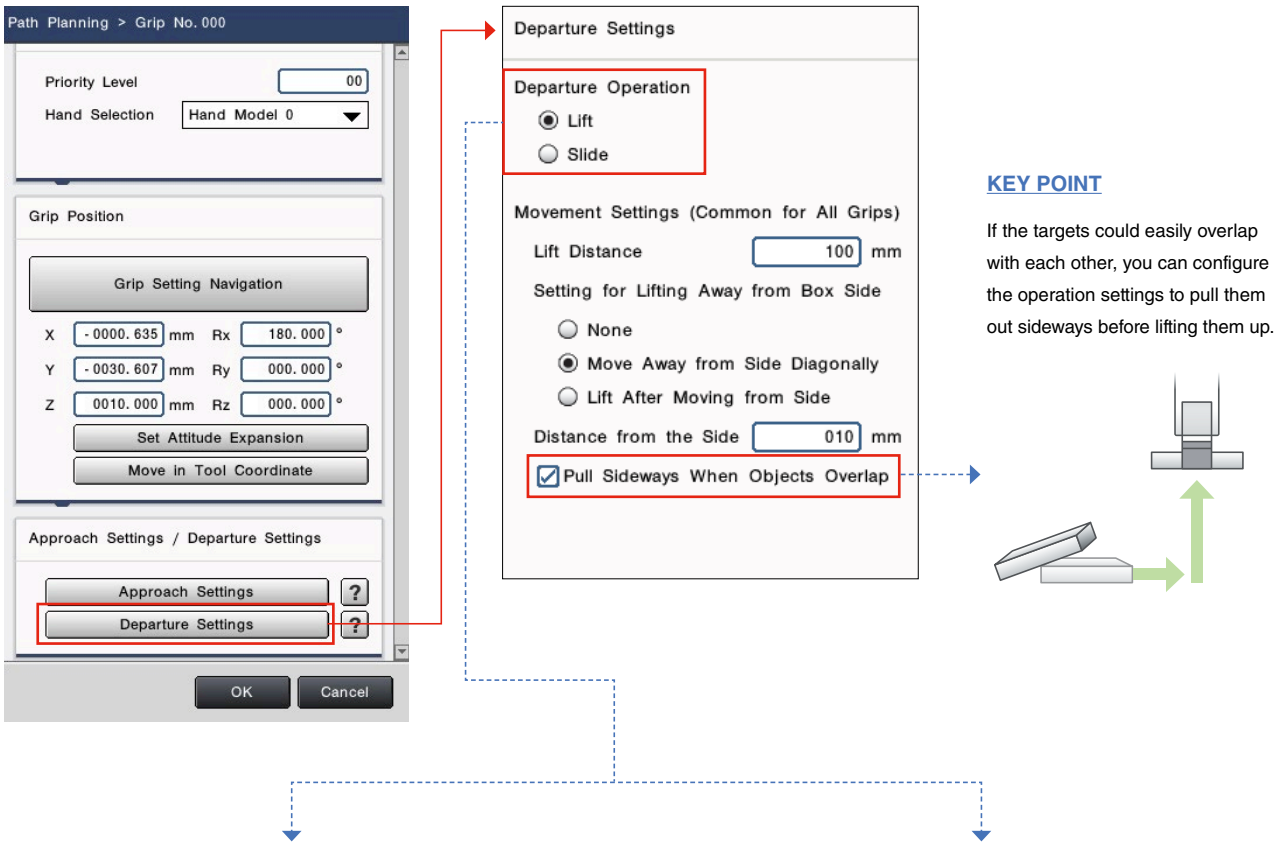






Advanced departure settings to remove difficult targets

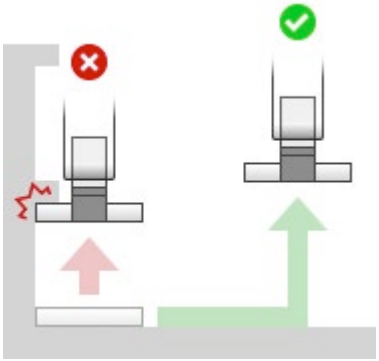
When a target that has been gripped is lifted, the target might rub against the inside of the container and fall out of the hand, or the weight of a target placed on top might cause it to be dropped. This function is provided to avoid these problems.



KEY POINT

If the targets could easily overlap with each other, you can configure the operation settings to pull them out sideways before lifting them up.

1 Lifting up operation

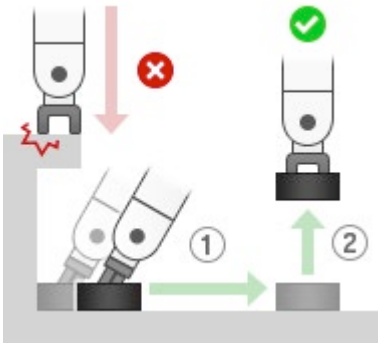


There are two patterns for this operation setting.

- **Lift diagonally while moving away from the side**
- **Move away from the side, and then lift up**

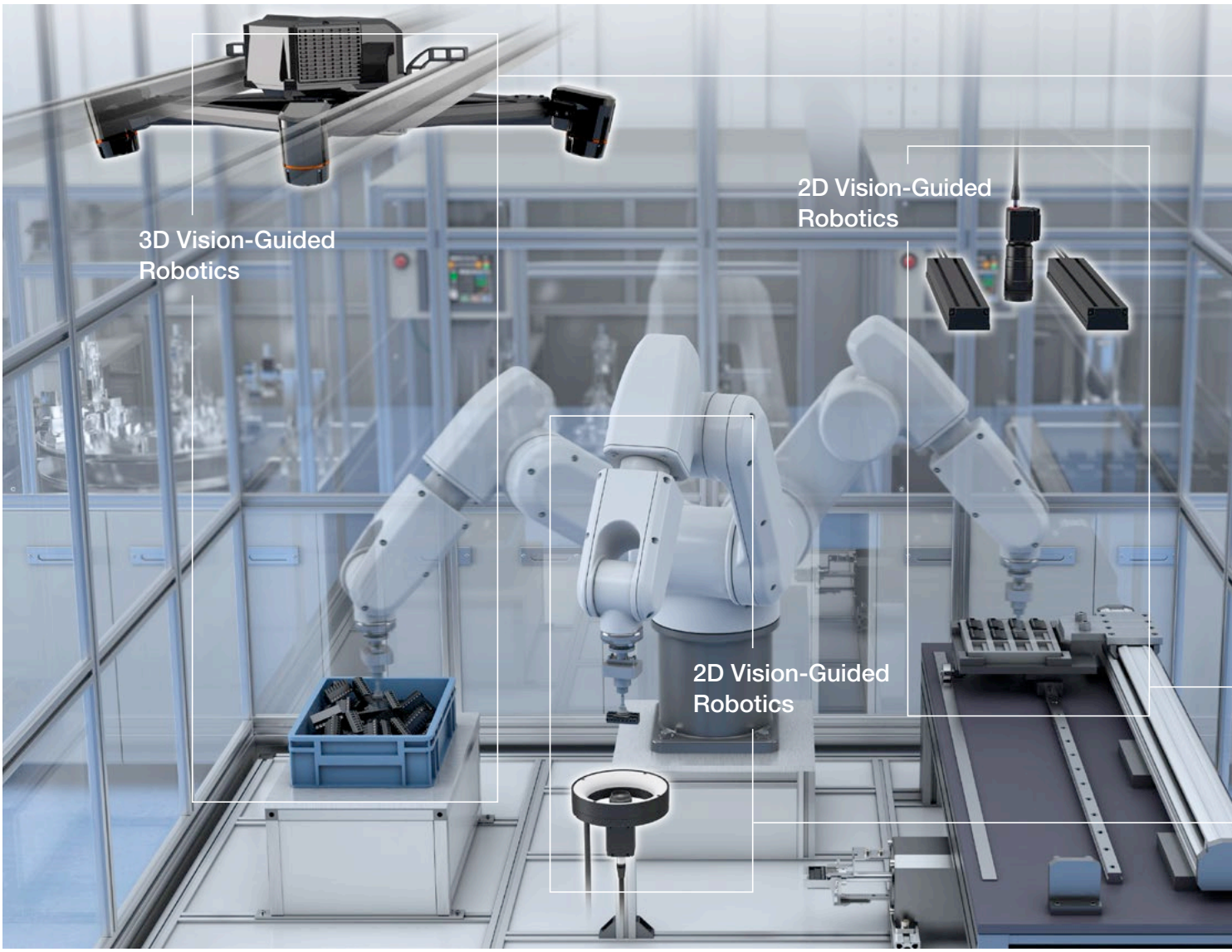
These patterns are effective in preventing collision with the inside of the container.

2 Sliding operation

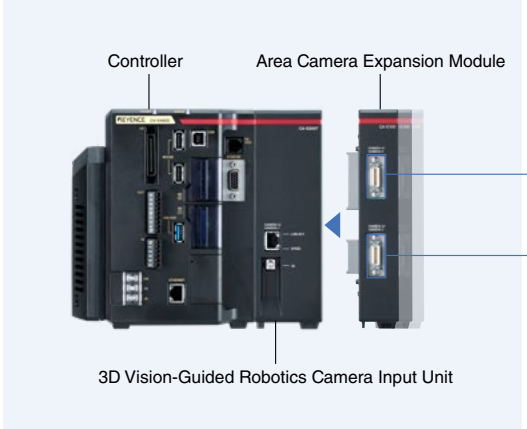


This operation is effective when there are few or no targets that can be gripped. Targets near the side of the container are pulled away from the side, or targets leaning against the side of the container are tipped over. This allows the target to be gripped in the next operation.

KEYENCE Offers a Full Lineup of Vision-Guided Robotics Systems and Area Inspection Products to Support a Complete Solution



Area Camera Expansion Module



• Up to two 2D area cameras can be added.

5M Pixel Camera

2432 × 2040 Pixels

2M Pixel Camera

1600 × 1200 Pixels

0.47M Pixel Camera

784 × 596 Pixels

0.31M Pixel Camera

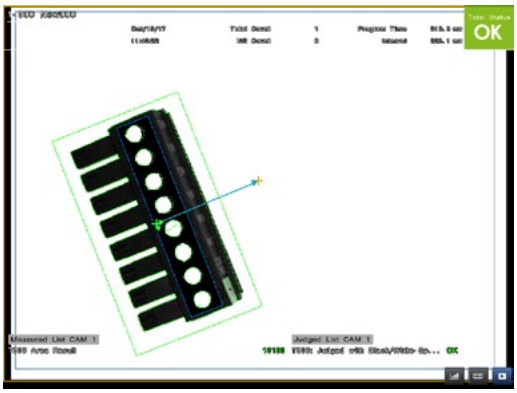
640 × 480 Pixels

Bin Picking

The 3D vision-guided robotics system allows for targets to be picked in bulk.

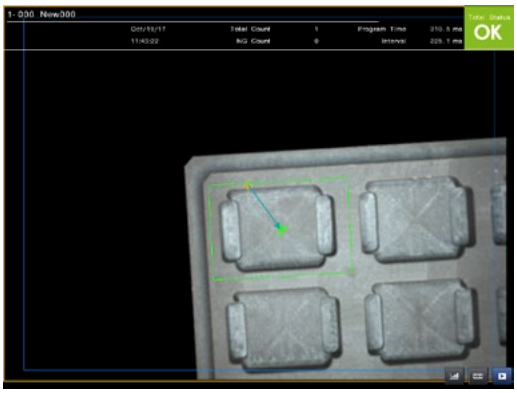
Gripping Misalignment Correction Product Type Difference Check

Uses 2D vision-guided robotics to provide high precision positioning after bulk picking. Simultaneously perform inspections of targets and identify product orientation.



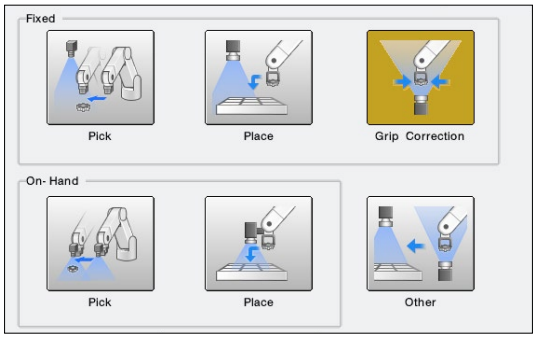
Place Position Displacement Correction

Detects the position of the tray for the product to be placed in. Will calculate offset to place product accurately in each open slot.



2D Vision-Guided Robotics

Simply select the application and a base program with the needed tools will be added automatically.



Product Type Difference Check / Inspection for Presence / Absence

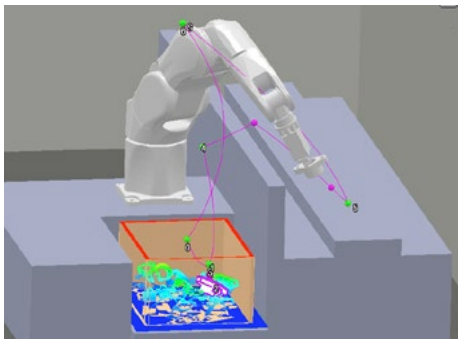
Provides simultaneous inspection along with vision-guided robotics operations.

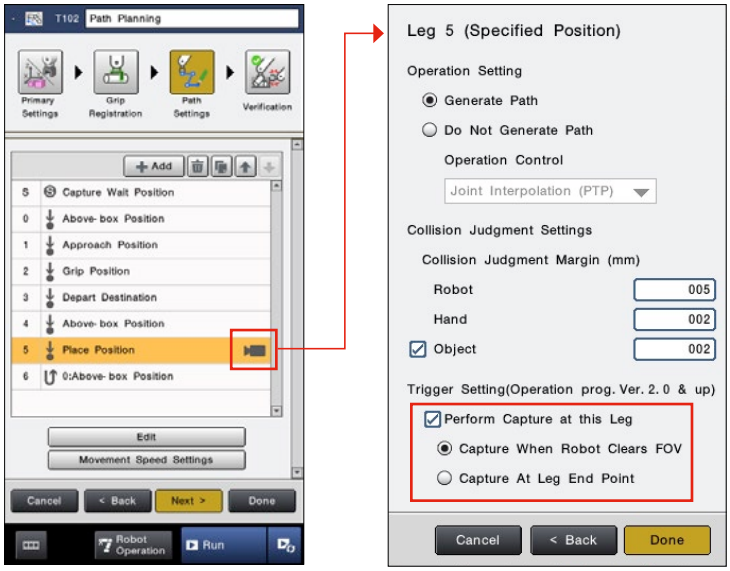
Functions to Optimize Robot Programs

Specify when the capture occurs *When using Path Planning

By setting the capture to occur when the robot reaches a specified position, the process cycle time can be shortened. The trigger timing that is set is linked with the KEYENCE robot operation program.

* Please contact our sales representative for details about the robot operation program.





Sample program creation function

Problems with conventional methods

Creating a robot program which works together with a vision system is difficult.

The program needs to be recreated whenever robots from a different manufacturer are used.

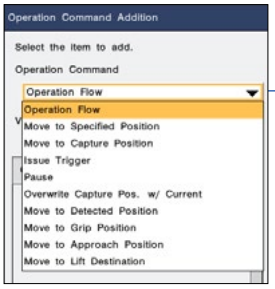
Operation verification is difficult for a combined vision system and robot.

KEYENCE Vision-Guided Robotics solve these problems

Robot programs can be automatically created simply by intuitively specifying the Operation Flow.

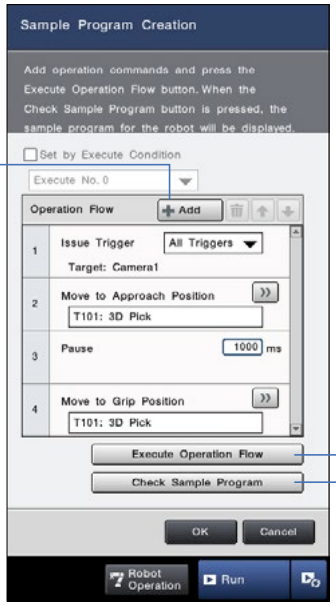
Create a program catered to a manufacturer simply by specifying the robot manufacturer.

Operation verification for a combined vision system and robot is possible with just one button press.



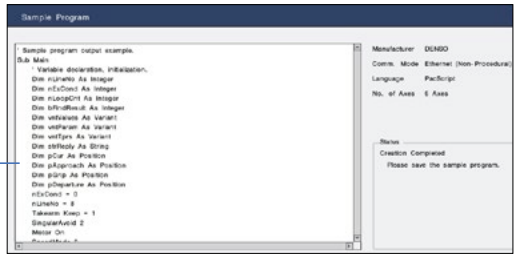
Operation commands

Easy configuration by simply choosing the expected vision system and robot operations for the Vision-Guided Robotics.



Operation Flow implementation

The set operations can be easily verified on the spot. Operation verification for Vision-Guided Robotics, a difficult task with conventional methods, can be carried out with just one button press.

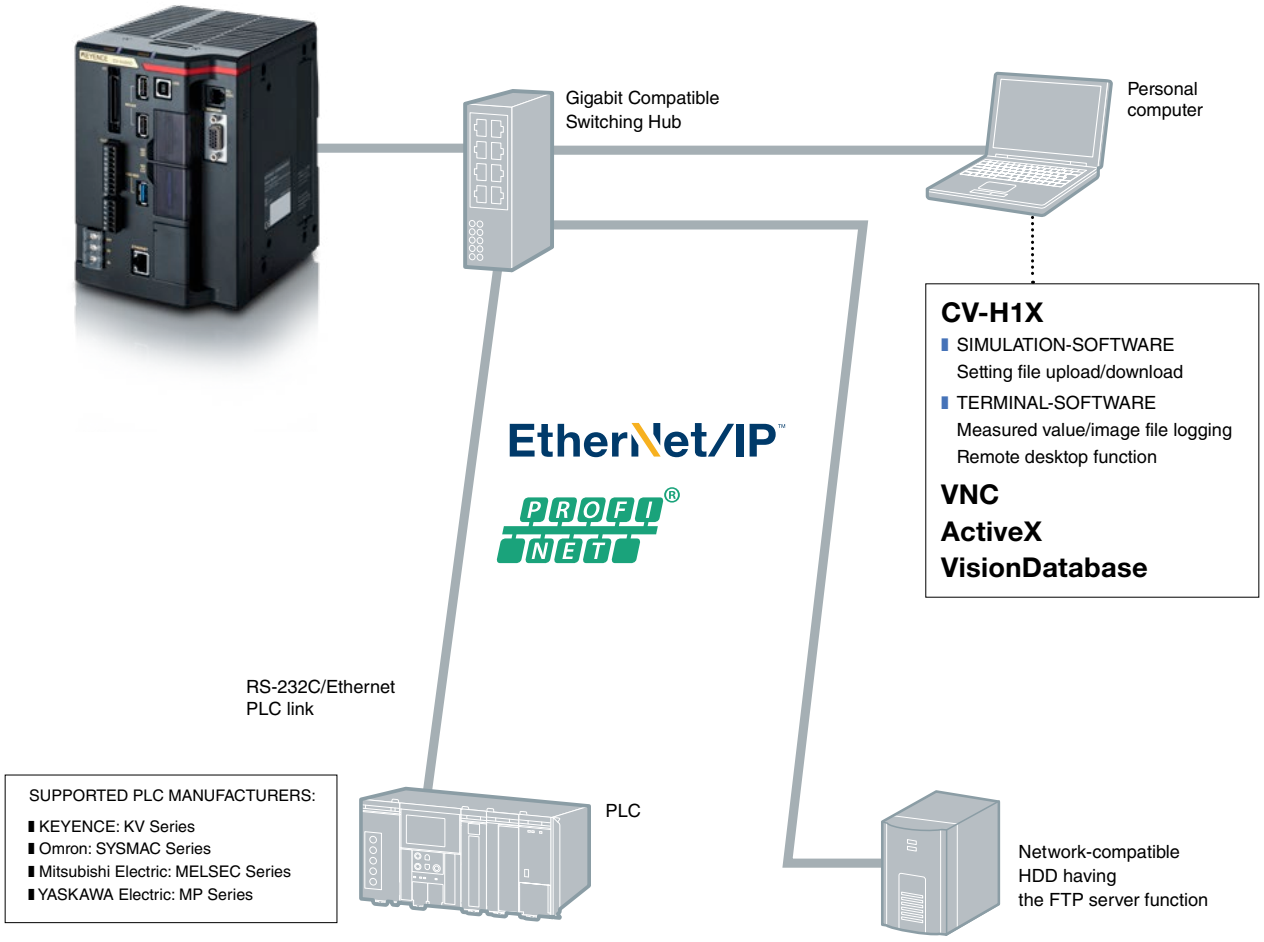


Sample program verification

The set operations can be checked and exported in the robot language of each robot manufacturer.

Communication Interfaces

Supports linking to PLCs made by several manufacturers as well as EtherNet/IP™ and PROFINET, which enables easy integration into an existing system. In addition, remote control via connection to a personal computer and image/result logging to an FTP server are also available.



PLC LINK

PLCs made by several manufacturers can be linked via RS-232C/ Ethernet.

I/O MONITOR FUNCTION

Built-in monitor function checks communication for EtherNet/IP™, PROFINET, RS-232C, TCP/IP and discrete signals to troubleshoot problems quickly.

COMPATIBLE WITH USB 3.0 STORAGE DEVICES

Save images on large-capacity storage devices up to 2 TB. Hard disks will be recognized just by connecting to the controller, eliminating the need for configuration of communication and other settings.

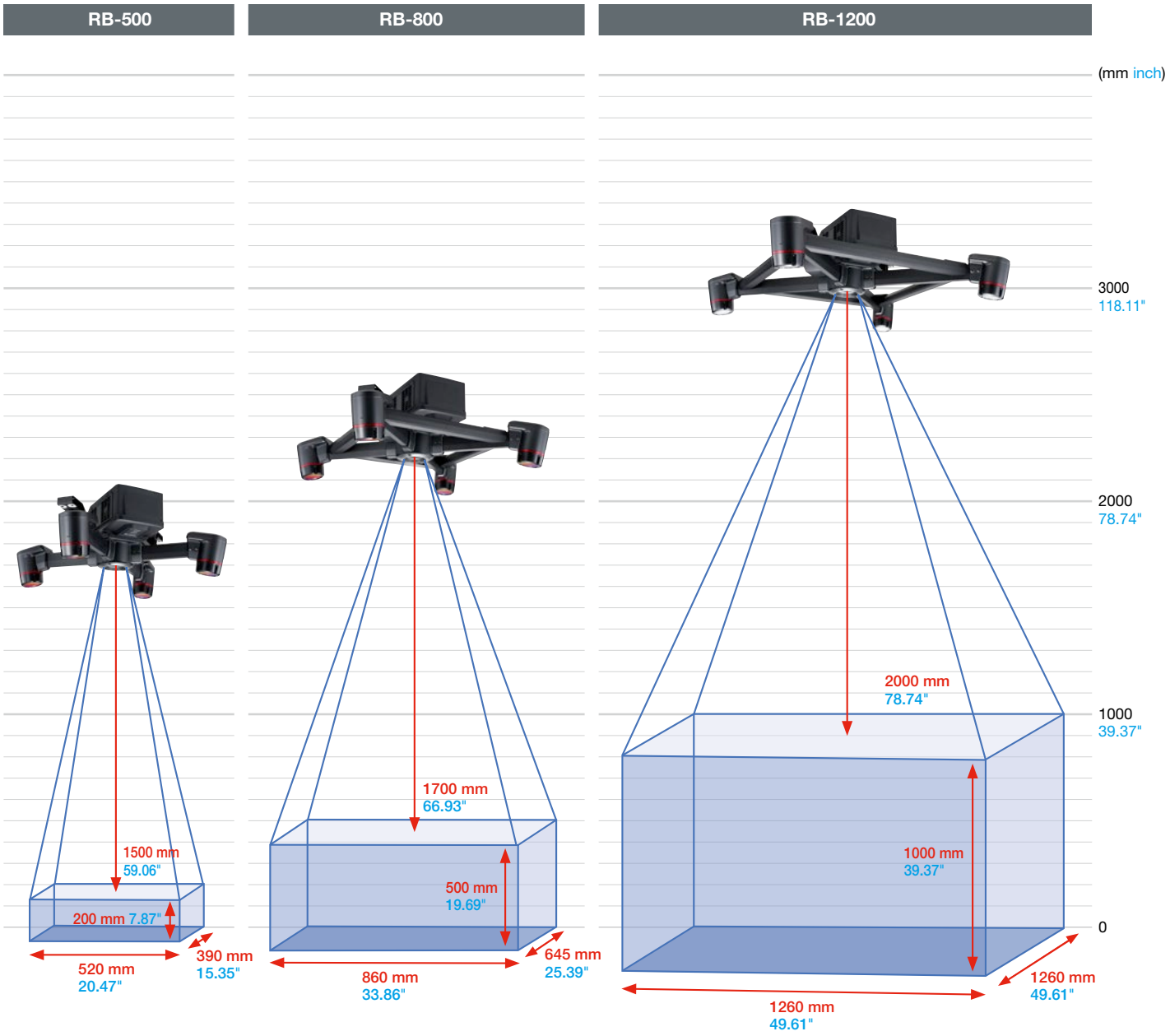
EtherNet/IP™- and PROFINET- compatible

FTP OUTPUT FUNCTION

Supports image/measured value output to an FTP server. Images can be saved for a long period of time by connecting a high-capacity HDD having the FTP server function.

Lineup of 3D Vision-Guided Robotics Cameras

Three Camera Types Available Depending on the Detection Range

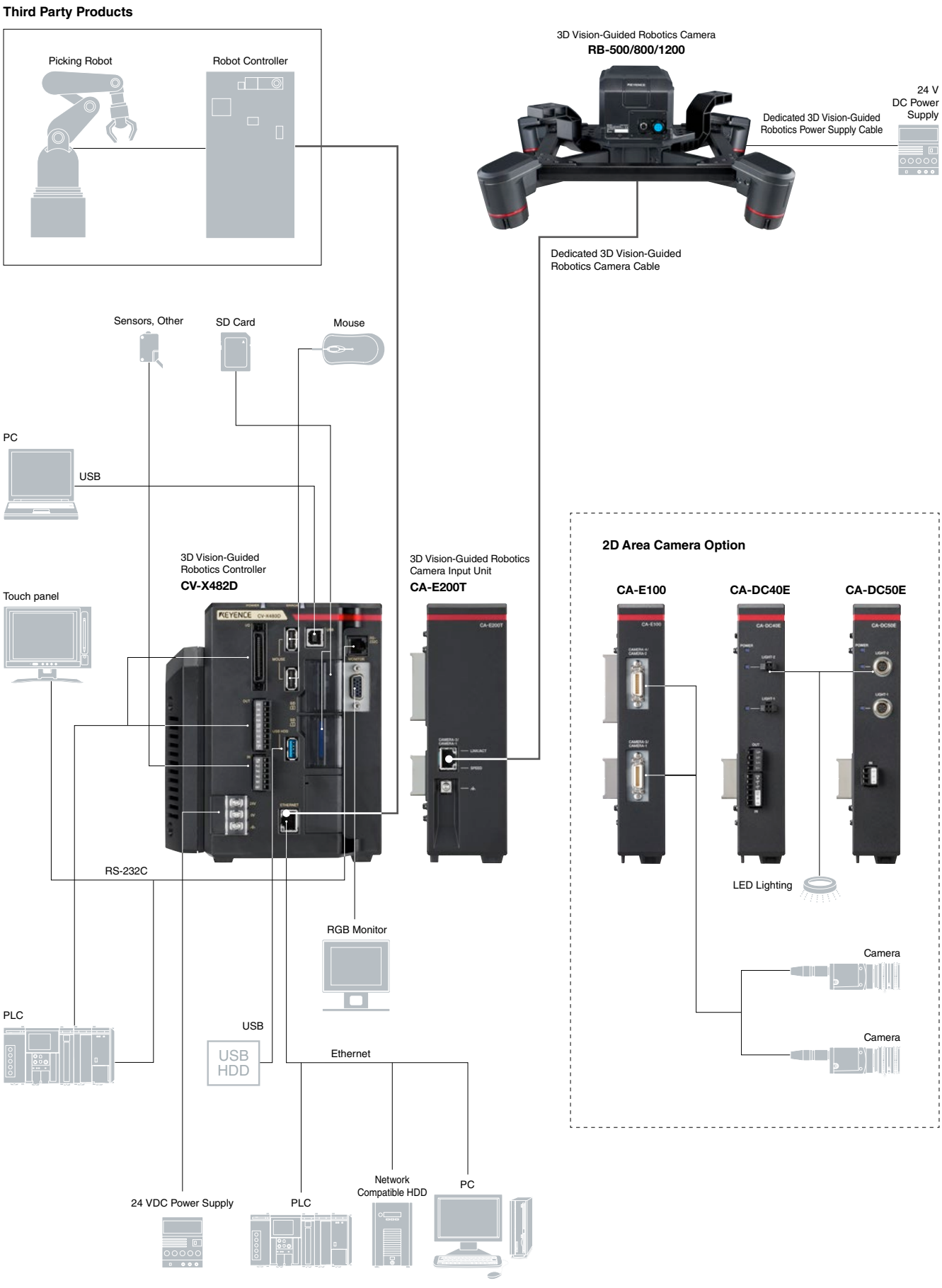


Measurement Range (mm inch)	520 × 390 × 200 20.47" × 15.35" × 7.87
Working Distance (mm inch)	1500 59.06"
Repeatability (± 3σ)	± 0.1 mm ±0.004"

Measurement Range (mm inch)	860 × 645 × 500 33.86" × 25.39" × 19.69"
Working Distance (mm inch)	1700 66.93"
Repeatability (± 3σ)	± 0.2 mm ±0.008"

Measurement Range (mm inch)	1260 × 1260 × 1000 49.61" × 49.61" × 39.37"
Working Distance (mm inch)	2000 78.74"
Repeatability (± 3σ)	± 0.4 mm ±0.016"

System Configuration Diagram



Product Configurations/Optional Accessories

3D Vision-Guided Robotics Camera

RB-500
Detection Range (mm)
Length × Width × Height
520 × 390 × 200
20.47" × 15.35" × 7.87"

RB-800
Detection Range (mm)
Length × Width × Height
860 × 645 × 500
33.86" × 25.39" × 19.68"

RB-1200
Detection Range (mm)
Length × Width × Height
1260 × 1260 × 1000
49.60" × 49.60" × 39.37"

Controller

3D Vision-Guided Robotics Controller
CV-X482D

Expansion Unit

3D Vision-Guided Robotics Camera Input Unit
CA-E200T

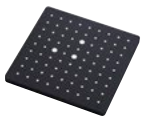
Dedicated 3D Vision-Guided Robotics Camera Cable

CA-CD5
(5 m 16.4')
CA-CD10
(10 m 32.8')
CA-CD20
(20 m 65.6')

Dedicated 3D Vision-Guided Robotics Power Supply Cable

OP-88220
(5 m 16.4')
OP-88221
(10 m 32.8')
OP-88222
(20 m 65.6')

Camera Calibration Target



OP-88216
(for **RB-500**)

OP-88217
(for **RB-800/1200**)

Vision-Guided Robotics Calibration Target

OP-88218

Other

Dedicated 24 VDC Power Supply
CA-U4
CA-U5

Mouse Stand
OP-87601

SD Card

SD Card
(industrial grade)
16 GB **CA-SD16G**
4 GB **CA-SD4G**
1 GB **CA-SD1G**

Monitor/Touch Panel

12-inch multi-touch supporting touch panel
CA-MP120T

Monitor for XGA
CA-MP120

CA-MP120 (T) monitor stand
OP-87262

Optional Accessories for CA-MP120T
OP-87264 (Touch panel modular RS-232C cable **3 m** 9.8')
OP-87265 (Touch panel modular RS-232C cable **10 m** 32.8')

CA-MP120 (T) Pole-Mounting Bracket
OP-42279

CA-MP120 (T) Protection seal
OP-87263

RGB Monitor Cable
OP-66842 (3 m 9.8')
OP-87055 (10 m 32.8')
*To use the CA-MP120T, RGB monitor cable and touch panel RS-232C cable are required.

Options

Mouse (Accessory)

PC Software DVD-ROM **CV-H1X**
Windows 10 (Home/Pro/Enterprise)
The OS supports the following languages: English, Japanese, Chinese (Simplified/Traditional), Korean, Thai, German, French, Italian, Spanish, Indonesian, Portuguese (Brazilian), Vietnamese.
Supports the 64-bit version only.

* A special activation code must be obtained from the KEYENCE website in order to use the 3D Vision-Guided Robotics simulation. For more details, contact our team of sales representatives.

* Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and other countries. Other listed company and product names are registered trademarks of their respective companies.

Communication Cable

Extension I/O Cable
OP-51657 (3 m 9.8')

Communication Cable Conversion Connector
For 9 Pin **OP-26486**
For 25 Pin **OP-26485**
For 9 Pin SYSMAC **OP-84384**
For 9 Pin MELSEC* **OP-86930**

* Whenconnecting the MELSEC-FX, which requires a 9-pin connection, use the **OP-26486**.

RS-232 Communication Cable
OP-26487
(2.5 m 8.2')

Ethernet Cable
OP-66843
(3 m 9.8')

USB Cable
OP-66844
(2 m 6.6')

Specifications (Controller)

Model		CV-X482D	
Camera Input [*1]		• With the CA-E200T 3D Vision-Guided Robotics Camera Input Unit connected, monochrome 3D Vision-Guided Robotics cameras connection possible.	• With the CA-E100 Area Camera Input Unit connected [*2] two color/monochrome camera connection possible.
	Trigger Input	Simultaneous/individual capture with up to 3 cameras can be selected (with CA-E200T and CA-E100 simultaneous connection only)	
Supported Cameras / Number of Pixels	3D Vision-Guided Robotics Camera	• RB-500/800 2048 (H) × 1536 (V), Approx. 3.15M Pixels 1024 (H) × 768 (V), Approx. 0.79M Pixels (Using Binning)	• RB-1200 2048 (H) × 2048 (V), Approx. 4.19M Pixels 1024 (H) × 1024 (V), Approx. 1.05M Pixels (Using Binning)
	Area Camera	• CV-035C/S035C/H035C/035M/S035M/H035M 0.31M Pixel Mode: 640 (H) × 480 (V), Approx. 0.31M Pixels 0.24M Pixel Mode: 512 (H) × 480 (V), Approx. 0.24M Pixels • CA-HX048C/HX048M 0.47M Pixel Mode: 784 (H) × 596 (V), Approx. 0.47M Pixels 0.31M Pixel Mode: 640 (H) × 480 (V), Approx. 0.31M Pixels 0.24M Pixel Mode: 512 (H) × 480 (V), Approx. 0.24M Pixels • CV-200C/S200C/H200C/200M/S200M/H200M 2M Pixel Mode: 1600 (H) × 1200 (V), Approx. 1.92M Pixels 1M Pixel Mode: 1024 (H) × 960 (V), Approx. 0.98M Pixels	• CA-HX200C/HX200M 2M Pixel Mode: 1600 (H) × 1200 (V), Approx. 1.92M Pixels • CV-H500C/H500M 5M Pixel Mode: 2432 (H) × 2050 (V), Approx. 4.99M Pixels • CA-HX500C/HX500M 5M Pixel Mode: 2432 (H) × 2040 (V), Approx. 4.96M Pixels 2M Pixel Mode: 1600 (H) × 1200 (V), Approx. 1.92M Pixels
Main Image Processor		DSP (High-Speed Type)	
Number of Inspection Registration Settings		Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually. External switching is possible.	
Number of Reference Images		Each setting supports 400 images per camera or 900 images per 3D camera and area camera (depending on SD card capacity), compressed save function, and reference image registration of position adjusted images.	
Memory Card		• SD Card Slot × 2 • Supports OP-87133 (512 MB), CA-SD1G (1 GB: Equipped as standard for SD1 slot), CA-SD4G (4 GB), CA-SD16G (16 GB)	
Interface	Control Input	• 20 Points (includes 4 high speed input terminals which support trigger input assignment) • Input Rating: 26.4 V max., 2 mA min. (High Speed Input Terminals: 3 mA min.)	
	Control Output	• 28 Points (includes 4 high speed output terminals which can be assigned to FLASH output linked to external trigger) • Photo MOSFET [*3]50 mA max. (30 V max.)	
	Monitor Output	Analog RGB Output, XGA (1024 × 768, 24 bit Color)	
	Unit Indicators	Power, ERROR LED Display	
	RS-232C	• Value output and control I/O function can be switched to a CA Series touch panel interface (when this is in use, PLC-Link using RS-232C port cannot be used) • Supports baud rates up to 230,400 bps	
	• PLC Link	• Can output numerical values and perform control input/output using the Ethernet or RS-232C ports (EtherNet/IP™ and PROFINET cannot be used in conjunction with PLC-Link). • The following PLCs are supported via link unit [*4]: KEYENCE: KV-700 Series, KV-1000 Series, KV-3000 Series, KV-5000 Series, KV-5500 Series, KV-7000 Series, KV Nano Series Mitsubishi Electric: MELSEC A Series (RS-232C Only), Q Series, L Series, iQ-R Series, iQ-F Series, FX Series (RS-232C Only) OMRON: SYSMAC C Series (RS-232C Only), CP1/CS1/CJ1/CJ2 Series YASUKAWA Electric Corporation: MP900 Series (RS-232C Only)/MP2000 Series	
	Ethernet	• Can output numerical values and perform control input/output • Can output measured values and image data to a PC, upload/download settings, and be used with remote connection programs via KEYENCE PC program software • Supports FTP client and FTP server functions • Supports VNC server functions (for non-PC clients, only displaying the monitor screen is supported) • Supports BOOTP functions • 1000BASE-T/100BASE-TX/10BASE-T	
	USB	• Can output measured values and image data to a PC, upload/download settings, and be used with remote connection programs via KEYENCE PC program software • USB2.0 Dedicated	
	EtherNet/IP™	• Value I/O and control I/O using Ethernet port (when this is in use, PLC-Link and PROFINET cannot be used) • Supports cyclic communication (max. 1436 bytes) and message communication • Maximum Connections: 32 • Conforms to Version.CT12 conformance test	
	PROFINET	• Value input and control input/output using Ethernet port (when this is in use, PLC-Link and EtherNet/IP™ cannot be used) • Supports cyclic communication (max. 1408 bytes) • Supports non-cyclic communication (recorded data) • Conforms to Conformance Class A	
	Mouse	Possible to control various menus via the dedicated mouse (OP-87506: included with the controller)	
	Touch panel	Settings can be operated from the CA Series touch panel using the RS-232C port (when this is in use, no-protocol RS-232C communication and PLC-Link using RS-232C cannot be used)	
	USB HDD	By connecting the HDD (max. 2 TB) to the dedicated USB port (supports USB 3.0, bus-powered, rated output: 900 mA), image and other data can be output	
Language		Switchable between English, Japanese, Chinese (Simplified), German, and French	
Illumination Control		By connecting the optional light expansion unit CA-DC40E/DC50E, lighting-up and intensity control for the LED lighting is possible. [*5]	
Cooling Fan		The CA-F100 fan unit is equipped as standard	
Ratings	Power Voltage	24 VDC ±10%	
	Current Consumption	5.3 A	
Environmental Resistance	Operating Ambient Temperature	0 to 45°C 32 to 113°F (DIN Rail Mounting) / 0 to 40°C 32 to 104°F (Base Surface Mounting)	
	Operating Ambient Humidity	35 to 85% RH (no Condensation)	
Weight		Approx. 1750 g	

*1 A 3D Vision-Guided Robotics camera input unit (CA-E200T - optional) is required since the main controller does not support camera input.
*2 The area camera input unit (CA-E100) can be used only when the 3D Vision-Guided Robotics camera input unit (CA-E200T) is connected simultaneously.
*3 Positive common connection is supported for NPN input devices, and negative common connection for PNP input devices.
*4 Models that are equipped with an Ethernet port on the CPU unit support direct connection with the Ethernet port.
*5 Up to eight light control expansion units can be connected (max. two CA-DC50E units out of eight).

Specifications (Camera Unit)

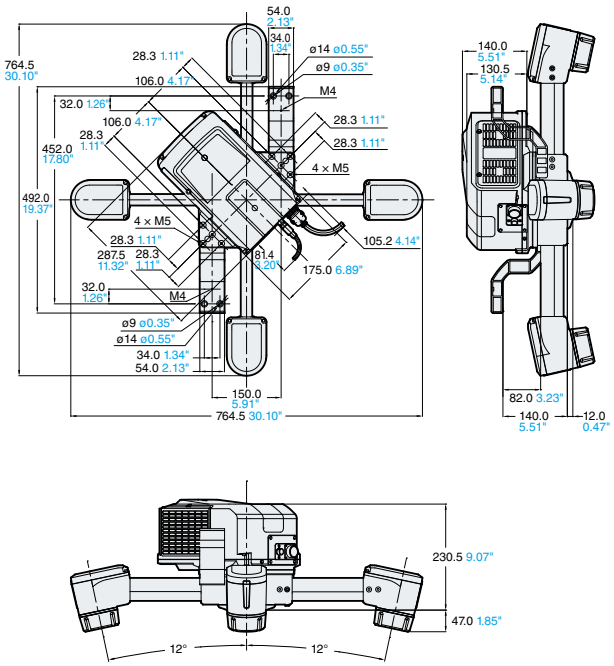
Model		RB-500	RB-800	RB-1200
Image Element		Monochrome CMOS Image Receiving Element		
Valid Pixel Count		2048 (H) × 1536 (V)		2048 (H) × 2048 (V)
	With Binning	1024 (H) × 768 (V)		1024 (H) × 1024 (V)
Detection Range (X, Y, Z) / mm inch		520 × 390 × 200 20.47" × 15.35" × 7.87"	860 × 645 × 500 33.86" × 25.39" × 19.66"	1260 × 1260 × 1000 49.61" × 49.61" × 39.37"
Working Distance to top of detection range / mm inch		1500 59.05"	1700 66.93"	2000 78.74"
Repeatability (±3 σ) *		±0.1 mm 0.004"	±0.2 mm 0.008"	±0.4 mm 0.016"
Light Source		LED (Blue, Green)		LED (Blue)
Ratings	Power Voltage	24 V ±10%		
	Current Consumption	6.0 A		4.5 A
Environmental Resistance	Operating Ambient Temperature	0 to 45°C 32 to 113°F		
	Operating Ambient Humidity	35 to 85% RH (no Condensation)		
Weight		Approx. 12 kg	Approx. 14 kg	Approx. 15 kg

* Measurement values taken with binning off and with KEYENCE standard white plates used as the target workpiece.

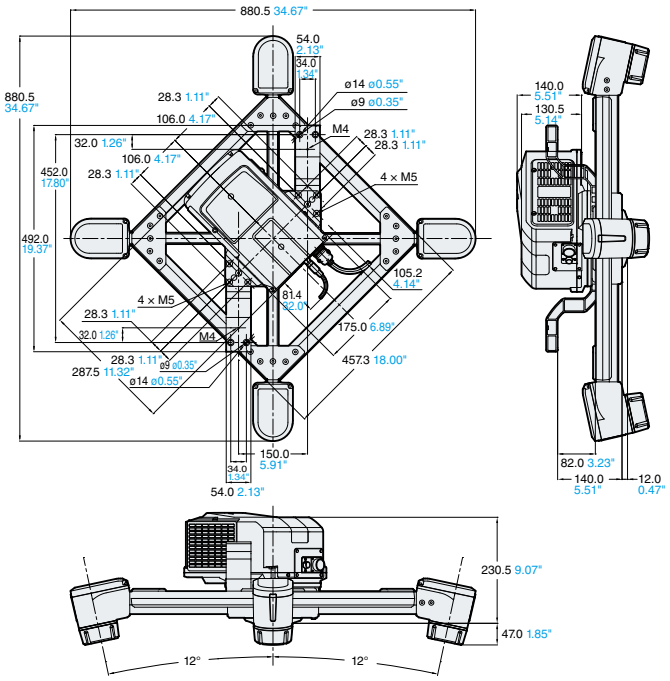
Dimensions Units: mm inch

3D Vision-Guided Robotics Camera

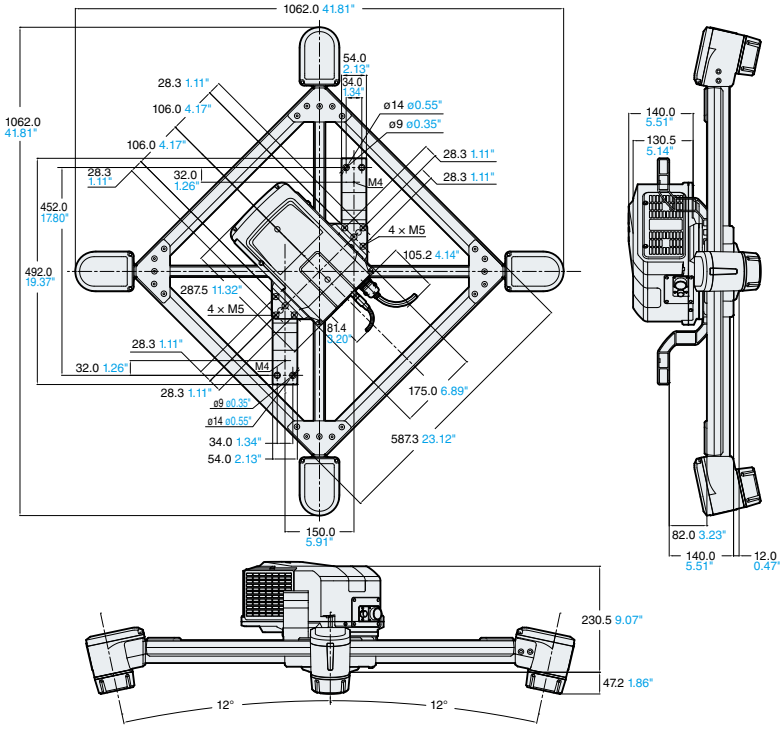
RB-500



RB-800

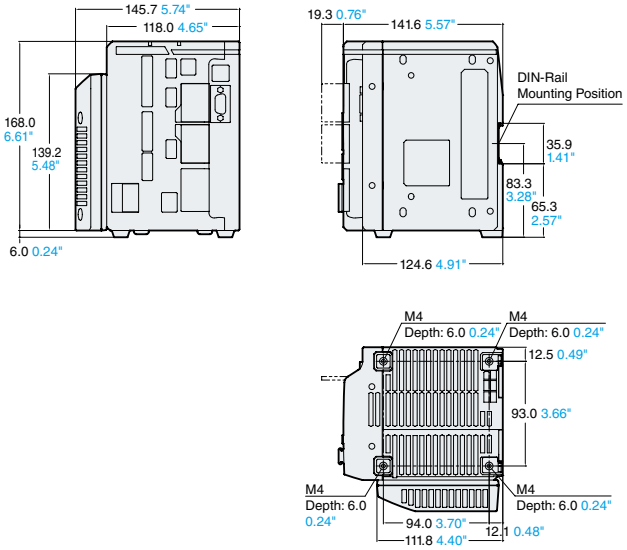


RB-1200

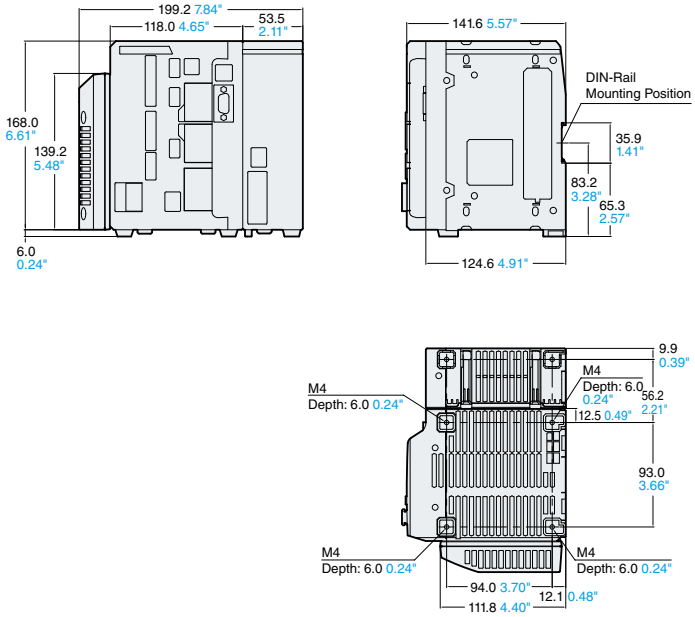


Dimensions Units: mm inch

3D Vision-Guided Robotics Controller **CV-X482D**

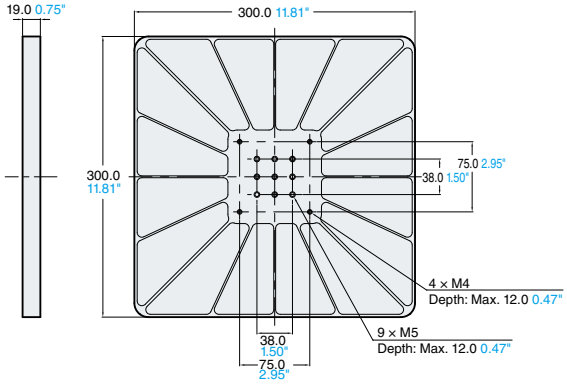


With 3D Vision-Guided Robotics Camera Input Unit **CA-E200T**

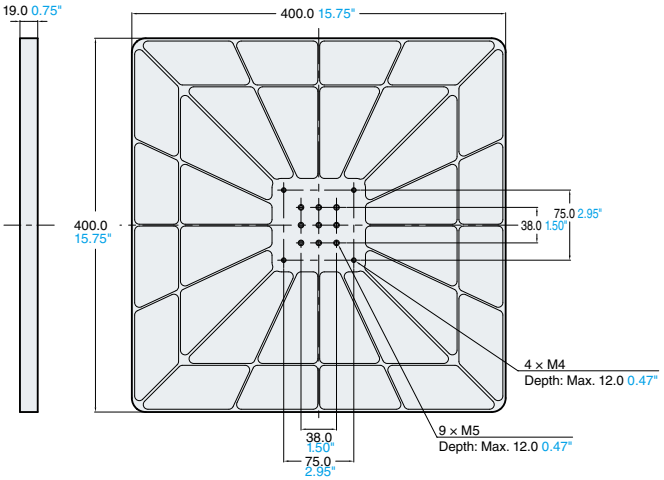


Camera Calibration Target

OP-88216 (for RB-500)



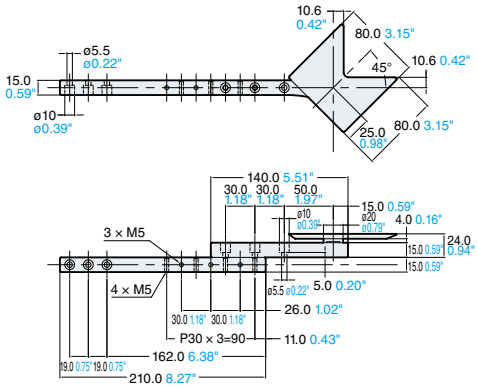
OP-88217 (for RB-800/1200)



* The front view shows the reverse side of the product.
The surface is the one with the printed calibration pattern.

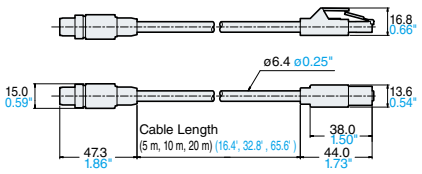
Vision-Guided Robotics Calibration Target

OP-88218



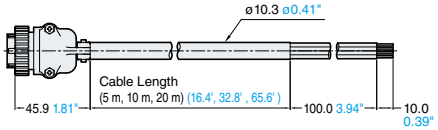
3D Vision-Guided Robotics Camera Cable

CA-CD5/CA-CD10/CA-CD20

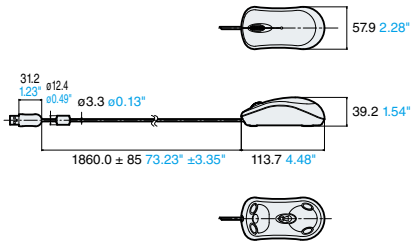


Dedicated 3D Vision-Guided Robotics Power Supply Cable

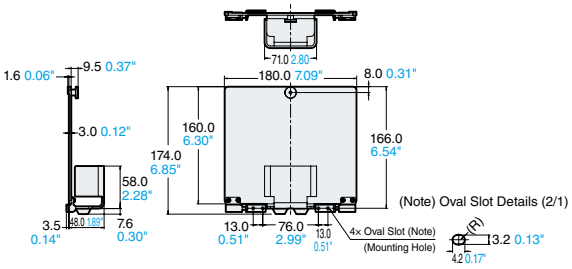
OP-88220/OP-88221/OP-88222



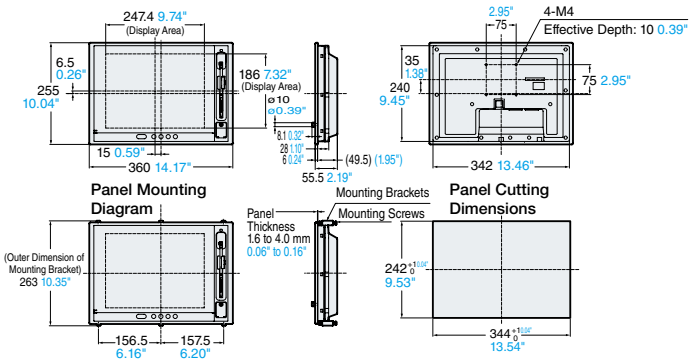
Mouse **OP-87506**



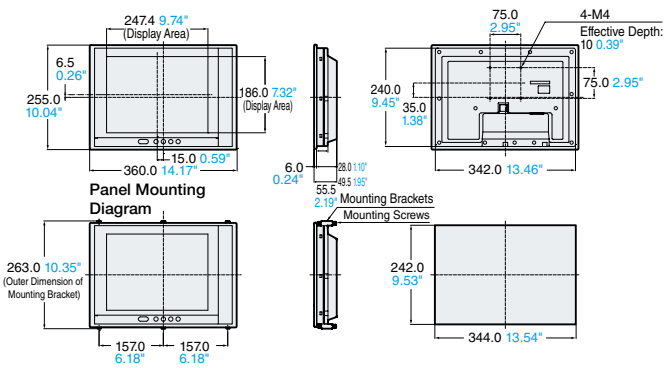
Mouse Stand **OP-87601**



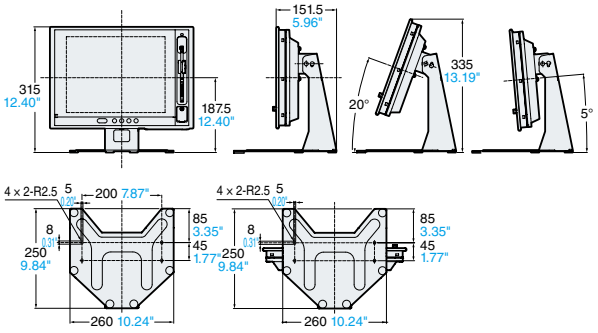
Touch Panel LCD Monitor **CA-MP120T**



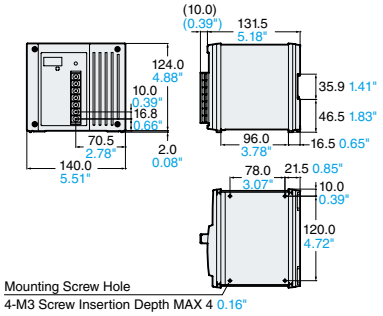
Monitor **CA-MP120**



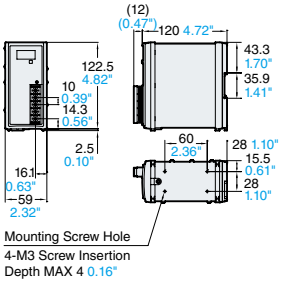
Monitor Stand **OP-87262**



24 VDC Power Supply **CA-U5**



24 VDC Power Supply **CA-U4**



Related Products

2D Vision-Guided Robotics

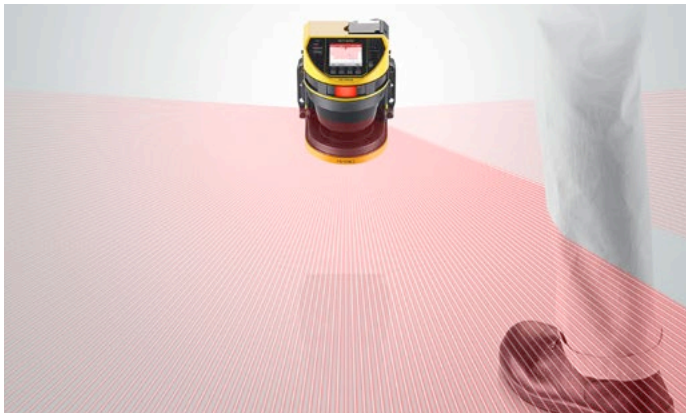
CV-X/XG-X Series

Ensure product quality and proper part positioning with 2D area camera inspection and vision-guided robotics.

Safety Laser Scanner

SZ-V Series

Ensure safety around robotics to allow for open and cooperative work environments.



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