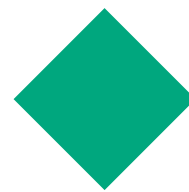# USHIO

Applying Light to Life

PLUS-E:

Mold Protection Device   Model PE-700

PLUS-E provides a solution to customers that prevents a trouble of injection machine, and achieves the total cost reduction and the high productivity of a production line.

New! PLUS-E PE-700

The First Digital Color Monitoring with 4 Cameras*1

Ushio's long selling product PLUS-E is compact, light weight and all-in-one function. The latest model PE-700 is now available for the mold monitoring with 4 cameras. The digital color processing with 4 cameras enables monitoring of a very fine and complicated molding, and a large size mold. The renewed PE-700 based on Ushio's mold support experience over 40 years and its know-how will protect the valued molding machine.

*1 The research for 4 cameras was in June 2021.
The research for digital processing was in June 2016.

Even Faster

PLUS-E digitally processes the high definition image with full color HD resolution (2million pixels) at the outstanding speed of 0.012 seconds. It is compatible with high cycle molding at less than 1 second.

Even More Accurate

The image analysis technology of RGB digital color accurately identifies the resin color that is sometimes mis-recognized through the monochrome monitoring.
More accurate color analysis reduces the machinery stops by detection error, and brings stable production.

Even Easier

The main unit has 10.4 inch touch-panel display. This large display clearly indicates the high definition (HD) images in full color. The interface is redesigned to improve the operability at setting a monitoring area and to enable intuitive, quick, and highly detailed area setting.
Support Functions such as position correction and filtering to improve the monitoring precision are also automated. It saves the time for presetting.

10.4-inch large touch-panel display
Digital HD Full Color (1920x1080)

PLUS-E:
Mold Protection Device

USHIO

* The screen shown is an inserted image.

PLUS-E protects a molding process with checking from multi angles.

What 4-Cameras can do

The product quality is required higher and higher. For the requests from customers who want multi monitoring in one process, PE-700 provides monitoring from 4 different positions and monitoring for multiple steps.
It enables the mold monitoring to the fine and complicated structure or large size components for vehicles and electric appliances. As molds become more complex and refined, the demand of product inspection and monitoring the parting surfaces is increasing.
4 cameras monitoring makes a difference in such a situation.

I/O Unit
Main Unit
I/O Cable
USB Memory
USB Cable
IF Cable
CMOS Camera
Camera Cable
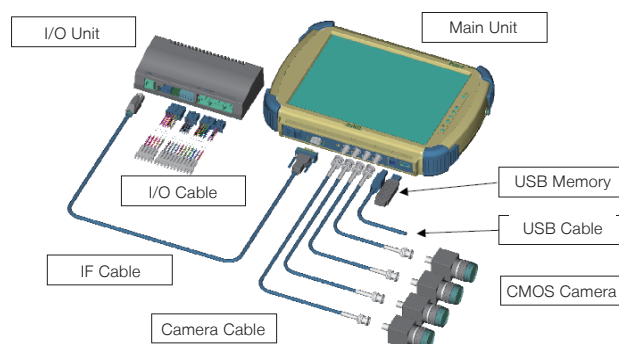
Accurate Color identification to protect a mold.

## Difference of full color and monochrome monitoring

In general, the mold monitoring analyzes the luminance of the monochrome image. On the other hand, PE-700 full color monitoring analyzes whether the RGB color value is the same color or not.
The image shown in right indicates just after the product is formed in the mold. For the human eyes, it is clear to identify the color green or blue, but there are some cases that monochrome monitoring is not able to identify the color. It happens when different colors are identified as the same luminance value.
When the luminance value of the mold surface and the product are not that different, the product is not identified correctly.
The digital full color monitoring with PE-700 accurately identifies the difference of color and shape, it brings the accurate monitoring.

Color monitoring

R:136
G:154
B:76

R:0
G:156
B:191

Monochrome monitoring

K:56

K:56
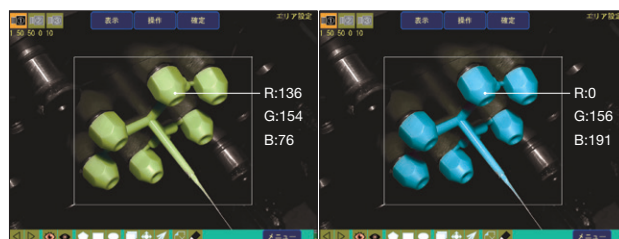
Even if the RGB color is different,
Monochrome monitoring shows the same color value K56.

The value of PLUS-E

Benefit of installing the mold protecter

It prevents the mold to break

By PLUS-E monitoring molding process, it detects the residue or ejector pin failures that cause the mold breakage. In that case, molding will be stopped or re-ejection is conducted. For this process, the valuable mold is protected from being damaged or broken.

● Reduce the mold repair cost
● Prevent the delivery delays
   due to the line shutdown

Cycle Up of the production line

PLUS-E monitors if there are any remainings after the ejection.
When nothing remains, the following step "re-eject" is skipped, and it shortens the cycle time.

● Cycle Up in the production process
● Productivity improvement

Preventing the leak of defective product

When PLUS-E detects the "short-shot" or "burr" through the process, it stops the injection machine. That helps to remove the defective products during the production and prevents their leak out to customers.
In addition, PLUS-E can be applied to the exterior check.

● As an exterior inspection*
● Stable Quality

＊ There is a difficult case depending on the size and shape of products.

Labor Saving

In the injection machine with a take-out robot running, PLUS-E is able to check the product being picked up by the take-out robot. It helps the early detection and removing defective products, and it leads to the omission of the exterior check in the following process.
The combination of PLUS-E and a take-out robot completes the process from pick up, carry, to product check in one process, then it shortens the whole operation process.

● Shorten the production process
● Reducing the operator's burden

Cost Saving

PLUS-E covers both the multi-monitoring and product check with 4 cameras, the user does not need the further investment for these processes.
The time saving and labor saving by improving work efficiency reduce related expenses.

● No further capital investment
● Cost Saving & Labor saving

■ The monitoring image when the product is taken out.

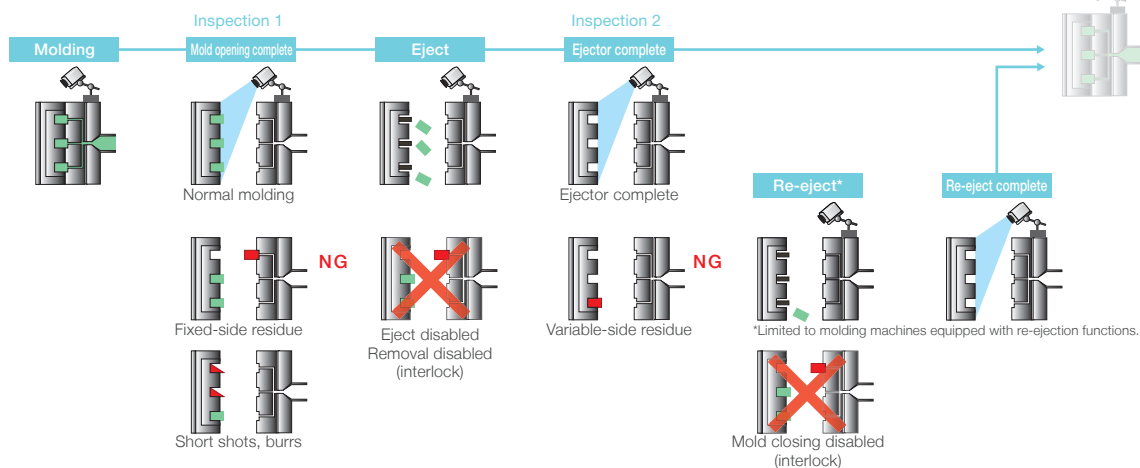OK   NG

Camera judges OK/NG of products
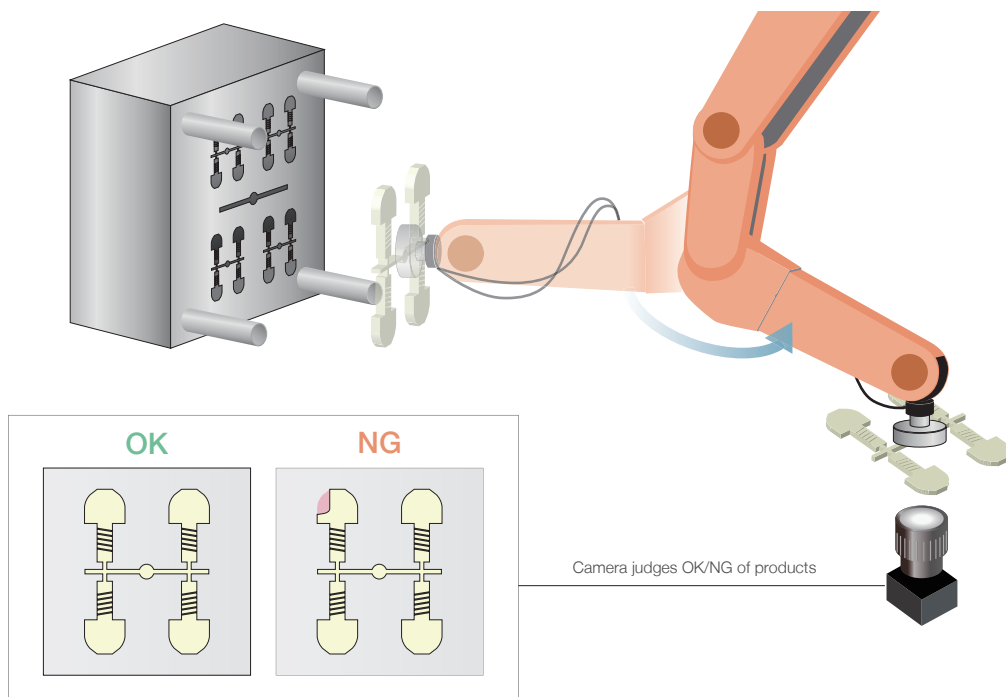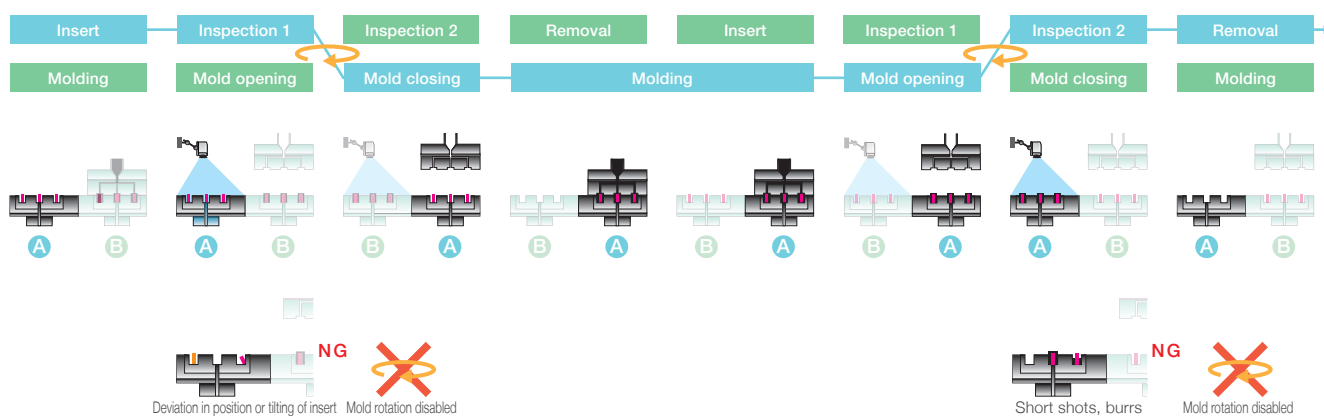
Monitoring flow on a molding line

PLUS-E judges OK or Error by comparing the RGB value difference between the registered reference image and the image taken at every molding cycle.
Considering cases that ambient light affects to the error detection, setting the error tolerance is effective to the stable monitoring.

◆ Injection molding

Inspection 1 — Inspection 2

| Molding | Mold opening complete | Eject | Ejector complete |

Normal molding

Ejector complete

Re-eject*

Re-eject complete

Fixed-side residue — NG

Eject disabled
Removal disabled
(interlock)

Variable-side residue — NG

*Limited to molding machines equipped with re-ejection functions.

Short shots, burrs

Mold closing disabled
(interlock)

◆ Vertical Insert Molding

| Insert | Inspection 1 | Inspection 2 | Removal | Insert | Inspection 1 | Inspection 2 | Removal |
| Molding | Mold opening | Mold closing | Molding | | Mold opening | Mold closing | Molding |

A B A B B A B A B A B A A B A B

Deviation in position or tilting of insert — NG — Mold rotation disabled

Short shots, burrs — NG — Mold rotation disabled

Features

Basic Function

Image Recording

When an error is detected, the monitoring image of before /after for 5 seconds is recorded. The recorded image is storable if needed. It allows the cause of error will be investigated quickly, and bring the recovery of the production line quicker.

Removing Defective Products

When a molding defects is detected, the signal is sent to a peripheral device like a take out robot, the defective product gets removed.

Alarm

When the molding operation is stopped due to a detection of an error, an alarm is turned on to notify the line manager.

User Support

Auto Adjustment

PE-700 is equipped with the user support function to bring the stable monitoring.
For example, Auto Adjustment corrects the mold open position, and adjusts the filtering function.

Testing

After the reference image capture, testing function displays the result with the sensitivity.
It shortens the time for adjustment.

Link with a molding machine*

The registered setting is adjustable with the signal from the injection machine.
For example, PLUS-E selects a setting along the mold type.

IoT Function*

USB3.0 interface is integrated to enable the connection to the internal network.
The user can remotely check PLUS-E monitoring.

Global Standard

Multi-Language Support

Switching Languages to Chinese, English and Korean is available.

Directives and Certifications

Adapted to CE, FCC (ClASS-A), KC.

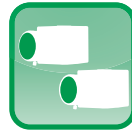✳ This feature will be supported in the future software upgrade.

Functions to enhance the monitoring precision

Maximum 30 Area Setting are available.

The easy and direct area setting with touch panel control allows you to create 30 areas in maximum, a circle, and a polygon upto Icosa-gon. A variety of options to select the shape, and surrounding the necessary monitoring area bring more accurate monitoring.
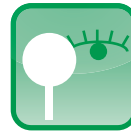
Reference Image Capture in One Cycle

The judgement with the captured image is only once in a cycle.
It makes the whole cycle quicker.

4 Monitoring Cameras

One PLUS-E with 4 cameras enables higher definition monitoring and a large component monitoring.

Masking (non-monitored area)

By masking the unnecessary area to monitor, it minimizes the monitoring area.
It prevents the incidental stop, and leads a stable monitoring.

User Interface for Intuitive Operation

Flexible to shape the monitoring area as circle, rectangular, and making multiple areas

Setting the monitoring area is a key factor. Excluding the unnecessary monitoring area prevents the monitoring error often caused by the influence of ambient light, leads the speedy and accurate monitoring.
The user can intuitively draw, stretch and move the area. It greatly shortens the time to setup the monitoring area even for complicatedly shaped mold.
The display with simple icons helps anyone to easily access the necessary functions.

✳ This is an inserted image.

■ Specifications

Model No.	PLUS-E PE-700
Resolution	1920 x 1080 pixels
Processing Speed	0.012 seconds
Display	10.4inch XGA color LCDs touch panel
Synchro Input/Output Signal	No Voltage Contact Signal
Re-ejection Circuit	Standard
4 Cameras Monitoring Function	Standard
Input Power	DC24V
Power Consumption	36W
Ambient Temperature	0 ～ 45°C
Ambient Humidity	Relative Humidity 85% max. (without condensation)
External Dimensions	W298 x H210 x D49 mm (excluding projection portion)
Weight	1.4kg
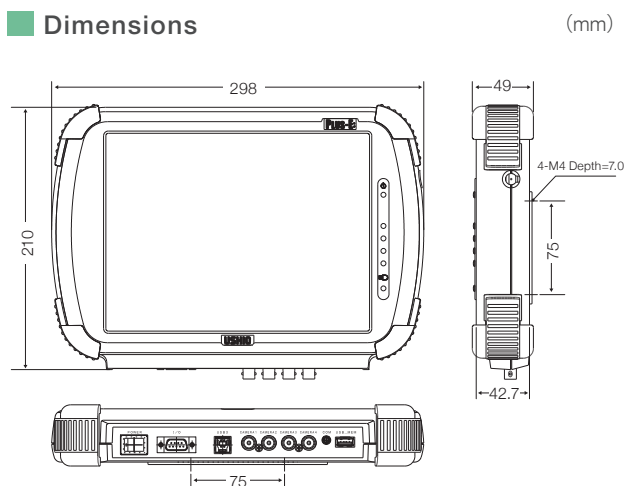
■ Device Configuration

Standard Set	Options
Main Unit	Lens (Wide / Zoom)
CMOS Camera	Filters
Camera Cable	Lighting Fixtures
Camera Stand	Lamps (LED, Infrared, Halogen)
Camera Mounting Shaft	Flood Light
Interface Cable	USB Memory
I/O Unit	Camera Stand（L）
I/O Cable	
Stylus Pen	

Main Unit PLUS-E PE-700

Lens（Wide/Zoom）

CMOS Camera
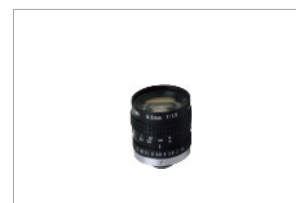
Lighting Fixture
（lamp is excluded ）

LED

Infrared

Halogen

Camera Stand

I/O Unit

Flood Light

■ Dimensions

(mm)

298

210

49

4-M4 Depth=7.0

75

42.7

75

⚠ Safety precautions

Before operating or carrying out any work involving this equipment, be sure to read the instruction manual to understand the product description, its operation, and safety requirements.

● Please note that the form, specifications and price of the products in the catalog are subject to change without notice.
● The color of the actual product and as depicted in the catalog may slightly differ because of the printing process.
● All information including technical details mentioned in this brochure is as of September, 2021.

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