

**OMRON**

# **F350** *Visual Inspection System*

**The Real-time,  
Gray-processing,  
Visual Inspection System.**

# Features

For automated inspection or positioning...

...the F350 Visual Inspection system is ideal.

## ► Real-time Gray Processing

Provides stable inspection of objects that cannot be inspected with conventional binary processing.

Grayscale imaging process data taken from cameras is processed at 256 levels of gray. Compared with binary processing, gray-scale processing is more stable and more precise

Simultaneous searching for 12 models enables high-speed processing.

## ► Easy to Use

The system can be easily set up using the Hand-held Console with eight pushbuttons and menu-driven software.

Connect up to eight cameras to the system to achieve a multi-directional inspection system.

## ► Ready-to-run Application Software

Ready-to-use application software gets you up and running quickly. Choose from a variety of application software packages.

For more complex applications, OMRON's powerful BASIC programming environment can be used to customize specific applications for optimum performance.

## ► Excellent Cost Performance

Modular-style hardware for flexible and cost-effective configuration.

## ► Meets a Variety of International Standards

F350 conforms to the Electromagnetic Compatibility (EMC) Directive and Low-voltage Directive.

### EMC

#### Conformance to the EMC Directive (89/336/EEC)

EMI: Conforms to the EN Generic Emission Standards

EN50081-2: 1994      EN55011: 1991

EN61000-3-2: 1995      EN61000-3-3: 1995

EMS: Conforms to the EN Generic Immunity Standards

EN50082-2: 1995      EN61000-4-2: 1995

EN50082-2: 1995      ENV50140: 1993

EN50082-2: 1995      ENV50141: 1993

EN50082-2: 1995      EN61000-4-4: 1995

EN50082-2: 1995      EN61000-4-8: 1993

### Safety

#### Conformance to the Low-voltage Directive (72/23/EEC)

Conforms to:      EN61010-1: 1993

IEC1010-1: 1990 +A1: 1992, modified

+A2: 1995, modified

# Application Software Selection Guide

## Features

## Application Examples

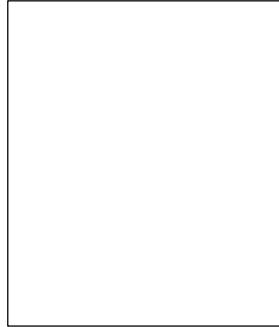
## Application Software

### Character Inspection

For stable character reading.  
Character read data is output in character strings to the host.

For high-accuracy character inspection.

For basic character inspection



Character Reading Software 1  
(F350-U004E)  
See page 5.

Character Inspection Software 2  
(F350-U008E)  
See page 15.

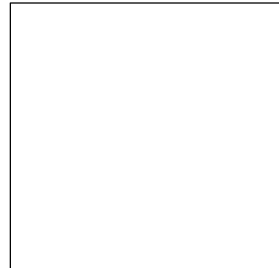
Character Inspection Software 1  
(F350-U001E)  
See page 18.

### Defect Inspection

For inspecting IC packages.

For high-speed surface inspection

For basic defect inspection.



IC Package Inspection Software  
(F350-U005E)  
See page 7.

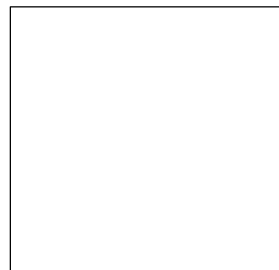
Can and Bottling Inspection  
Software 1  
(F350-U006E)  
See page 9.

Gray Inspection Software 1  
(F350-U002E)  
See page 18.

### Positioning

For high-speed and high-accuracy positioning.

For basic positioning.



Rotation Position Software 1  
(F350-U007E)  
See page 13.

Positioning Software 1  
(F350-U003E)  
See page 18.

This catalog is designed as a guide for selecting products.  
Please be sure to read the relevant manuals listed on page ntlp before using any product.

# F350 Application Software

Each Application Software contains application programs and measurement items. Select an appropriate Application Software depending on the items to be inspected.

Application Softwares	Application Programs	Measurement Items
Character Inspection Software 1 F350-U001E	Demonstration Software Inspection Program for General Characters Production and Expiration Date Verification program Date and Lot Number Verification Program 1 Date and Lot Number Verification Program 2	
Gray Inspection Software 1 F350-U002E	Demonstration Software Surface Defect Inspection Program Pattern Inspection Program	
Positioning Software 1 F350-U003E	Demonstration Software Positioning Program 1 Positioning Program 2	
Character Reading Software F350-U004E		Position Compensation Standard Character Reading Steady Character Reading
IC Package Inspection Software 1 F350-U005E		Position Compensation Lead Inspection Pattern Inspection Surface Defect Inspection A Surface Defect Inspection B Surface Defect Inspection C
Can and Bottling Inspection Software 1 F350-U006E	Fast Defect Inspection Program	Position Compensation Surface Defect Inspection A Surface Defect Inspection B Surface Defect Inspection C
	Pattern Inspection Program	Position Compensation Region Split Inspection Pattern Inspection Classification
Rotation Positioning Software 1 F350-U007E		Position Compensation Rotation Positioning
Character Inspection Software 2 F350-U008E	Standard Character Inspection Program	Position Compensation Standard Character Inspection
	Steady Character Inspection Program	Position Compensation Steady Character Inspection

# F350 Measurement Items and Features

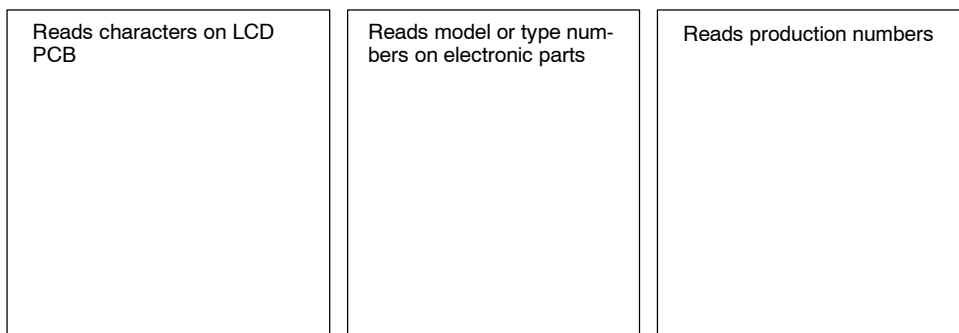
Measurement Items	Features
Position Compensation	The position of the measured object can be compensated so that the measurement location does not fall outside of the measurement.
Standard Character Reading	Reads alphanumeric characters and symbols. Used when character status is stable, i.e., when there is little deformation. Standard character reading reads characters faster than steady character reading.
Steady Character Reading	Reads alphanumeric characters and symbols. Used when character status is unstable, e.g., blurred or smudged, or when characters overlap. Steady character reading detects characters more reliably than standard character reading.
Lead Inspection	Inspects the pitches, widths, and lengths of the pins on a side of the IC.
Pattern Inspection	Inspects for defects in patterns, such as chips, scratches, and blurring. Patterns other than characters, such as symbols, designs, or character strings, can be registered as models to inspect presence/absence or defects. The degree of movement from a reference position can also be determined.
Surface Defect Inspection A	Inspects for defects such as burrs and chips, and for surface defects and dirt. The inspection region can be set to match the shape of the products. For high-speed detection of defects and dirt use "Surface defect inspection B."
Surface Defect Inspection B	Inspects for surface defects and dirt. The inspection region can be set to match the area for inspection.
Surface Defect Inspection C	Detects defects or presence/absence defects. Converts the image to binary and finds the center of gravity of the white pixels.
Region Split Inspection	Automatically divides the specified region into several models and registers them. Using these models, the region is inspected for pattern and character strings defects and dirt.
Classification	If the classification marks are registered as models, the number of the model with the highest degree of similarity to the mark is output and the products are classified.
Rotation Positioning	Positioning of measurement objects can be executed by obtaining the amount of deviation in reference positions and also in rotation angles. Measured results are output to an RS-232C Unit or a Parallel I/O Unit.
Standard Character Inspection	Detects chip and blurring in fine characters with a high level of accuracy. This makes it possible to inspect characters faster than with the steady character inspection.
Steady Character Inspection	Inspects each character within an inspection region for chips and bleeding. Use this if the characters in the inspection region are greatly deformed. This program makes it possible to inspect characters with more stability than with the standard character inspection.

# Character Inspection Software 1 (F350-U004E)

## Features

- High-speed reading at speed of 200 ms/12 characters available with Standard Character Reading function.
- For improving reliability in reading poor-quality characters, Steady Character Reading function is available.
- Read data is output to the host via RS-232C. Operates via commands from the host.

## Applications



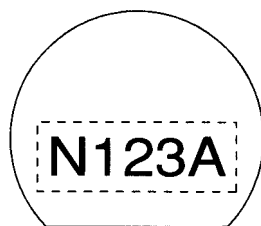
## Measurement Items

The Character Reading Software 1 contains three available measurement items: Standard Character Reading, Steady Character Reading, and Position Compensation.

### Standard Character Reading

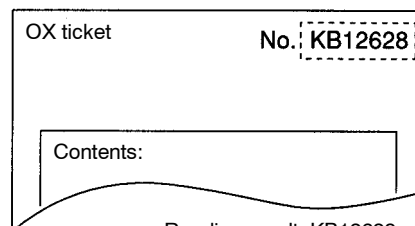
Use standard character reading to read characters within an area when the character status is stable i.e., where there is little deformation. Characters can be read more quickly than with steady character reading.

Characters etched on a wafer



Reading result: N123A

Characters printed on a ticket

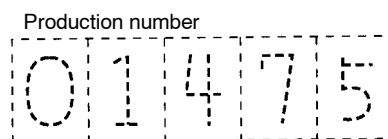


Reading result: KB12628

### Steady Character Reading

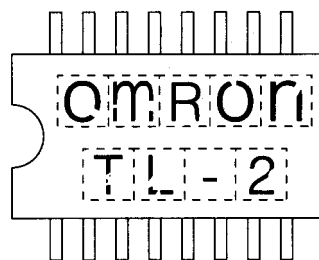
Use steady character reading to read characters within an area when the character status is unstable (e.g., blurred or smudged), or when adjacent characters overlap. Steady character reading detects characters more reliably than standard character reading.

Ink jet printer characters



Reading result: 01475

Seal characters on ICs (Blurred or smudged)



Reading result: OMRON TL-2

### Position Compensation

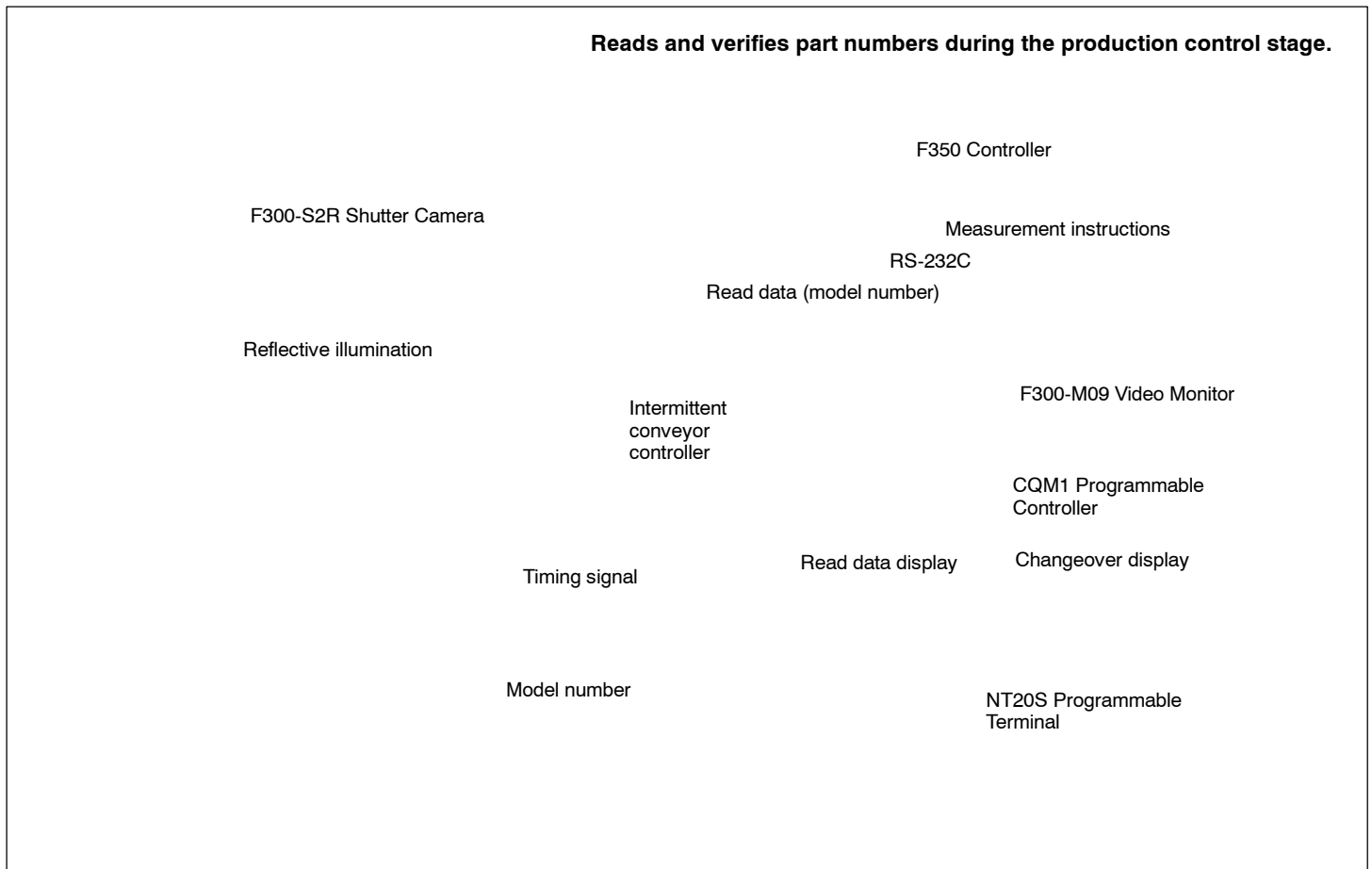
The position of the measured object can be compensated so that the measurement location does not fall outside of the measurement.

## Main Specifications

Measurement items	Standard character reading	Steady character reading	Position compensation
Processing time (see note)	200 ms/12 characters min.	300 ms/12 characters min.	16.7 ms min.
Inspection regions per measurement item	6 regions max. (2 regions: 24 characters max. per string, 4 regions: 12 characters max. per string)		---
No. of models	308 max.		
Inspected characters	Alphanumeric and symbols		
Inspection feature	Correlation values		
Max. No. of connectable cameras	5		
Max. No. of scenes	16		
Max. No. of measurement items per scene	16 (5 items max. for character reading)		
Output	RS-232C (Read character strings are output)		
Display	Monitor (OK or NG, and read character strings)		
Filtering	Smoothing (2 levels), edge enhancement (5 levels), edge selection (3 levels), and background suppression		

**Note:** This value is for the F350-C41E. The operation speed will vary depending on the selected IMP Unit and settings.

## Application Examples



# IC Package Inspection Software 1 (F350-U005E)

## Features

- Performs high-speed processing at the speed of 200 ms/piece for SOP ICs and 300 ms/piece for QFP ICs for surface inspection of leads, character patterns, surface defects, etc.

## Applications

Surface inspection of SOP ICs	Surface inspection of QFP ICs	Surface inspection of connectors
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## Measurement Items

There are several measurement items available in the IC package inspection programs, making it possible to inspect several measurement items, such as lead inspection and pattern inspection, simultaneously.

### Lead Inspection

Inspects IC pin pitches, widths, and lengths.

### Pattern Inspection

Detects missing and blurred patterns on surfaces with various patterns. Patterns other than characters, such as symbols, designs, or character strings, can be registered as models to inspect presence/absence or defects.

### Surface Defect Inspection A

Detects chips, burrs, scratches, and dirt on IC packages.

### Surface Defect Inspection B

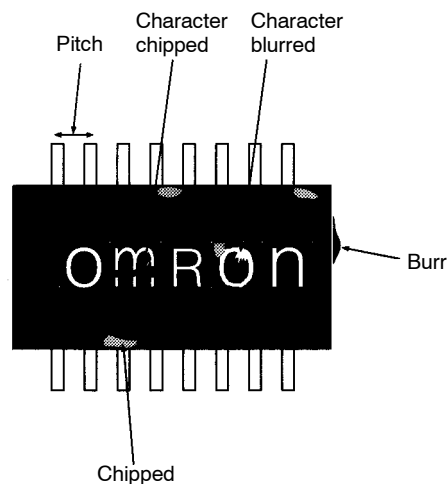
Detects scratches and dirt on IC packages quickly.

### Surface Defect Inspection C

Detects faults in shapes from binary images.

### Position Compensation

The position of the measured object can be compensated so that the measurement location does not fall outside of the measurement.



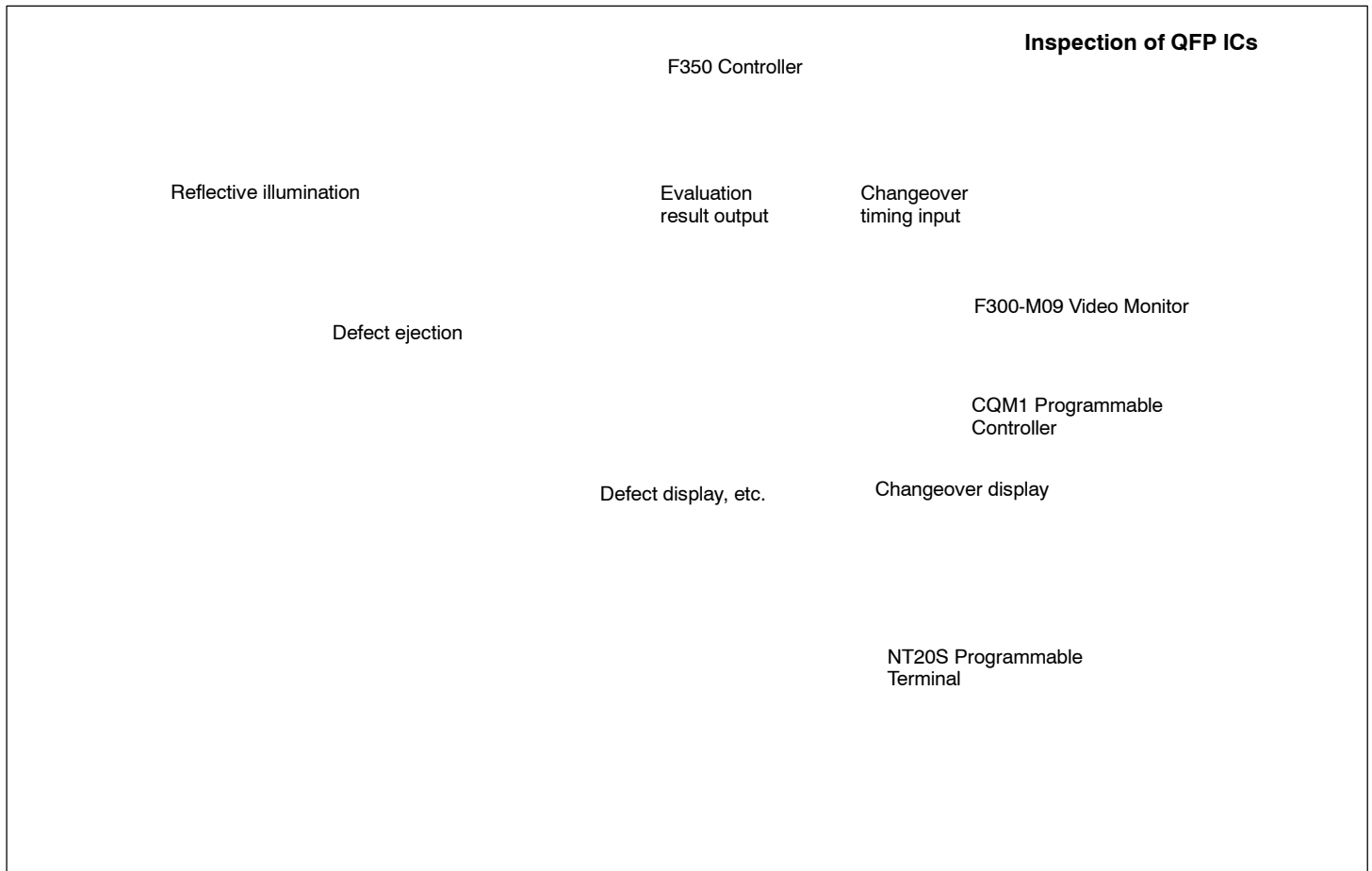


## Main Specifications

<b>Measurement items</b>	1) Lead inspection, 2) Pattern inspection, 3) Surface defect inspection A, 4) Surface defect inspection B, 5) Surface defect inspection C, 6) Position compensation
<b>Processing time (see note)</b>	200 ms/piece min. (SOP IC) 300 ms/piece min. (QFP IC)
<b>Calibration</b>	Available
<b>Max. No. of connectable cameras</b>	8
<b>Max. No. of scenes</b>	16
<b>Max. No. of measurement items/scene</b>	16
<b>Output</b>	Terminal Block Unit, Parallel I/O Unit (Correct/Incorrect, and the logical OR signal turns ON when even one of the measurement result is NG.)
<b>Display</b>	Monitor
<b>Filtering</b>	Smoothing (2 levels), edge enhancement (5 levels), edge selection (3 levels), and background suppression

**Note:** This value is for the F350-C41E. The operation speed will vary depending on the selected IMP Unit and settings.

## Application Examples

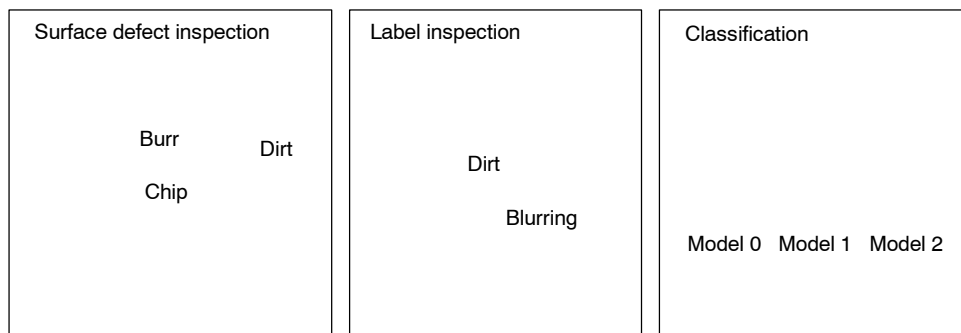


# Can and Bottling Inspection Software 1 (F350-U006E)

## Features

- Suitable for inspecting defects such as chips, burrs, flaws, or dirt.
- Two inspection programs available:  
Fast Defect Inspection Program and Pattern Inspection Program
- Fast Defect Inspection Program allows inspections where high-speed operation is required for detecting defects.  
Speed is 33 ms/piece.
- Pattern Inspection Program is for high-accurate detection. Classification function is available.

## Applications



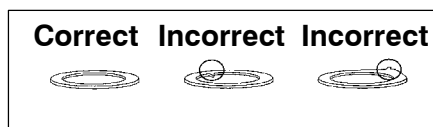
The Can and Bottling Inspection Software 1 contains two different programs: Fast Defect Inspection Program and Pattern Inspection Program. Select one based on your requirements.

## Fast Defect Inspection Program

Several measurement items can be measured simultaneously, provided they are on the same program. For example, surface defect inspection A and surface defect inspection B can be performed simultaneously because they are both in the fast defect inspection program.

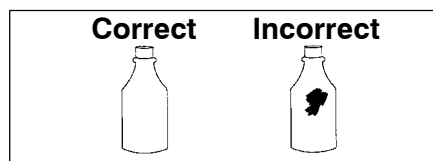
### Surface Defect Inspection A

Chips, burrs, flaws, and dirt on products are detected using unique algorithms.



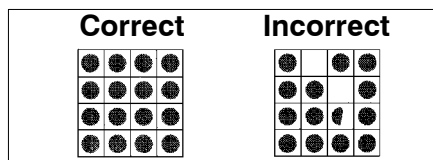
### Surface Defect Inspection B

Dirt and other unwanted marks on the surface of products are detected at high-speed.



### Surface Defect Inspection C

A binary image is produced and the products are inspected for figure defects, presence/absence defects, etc.



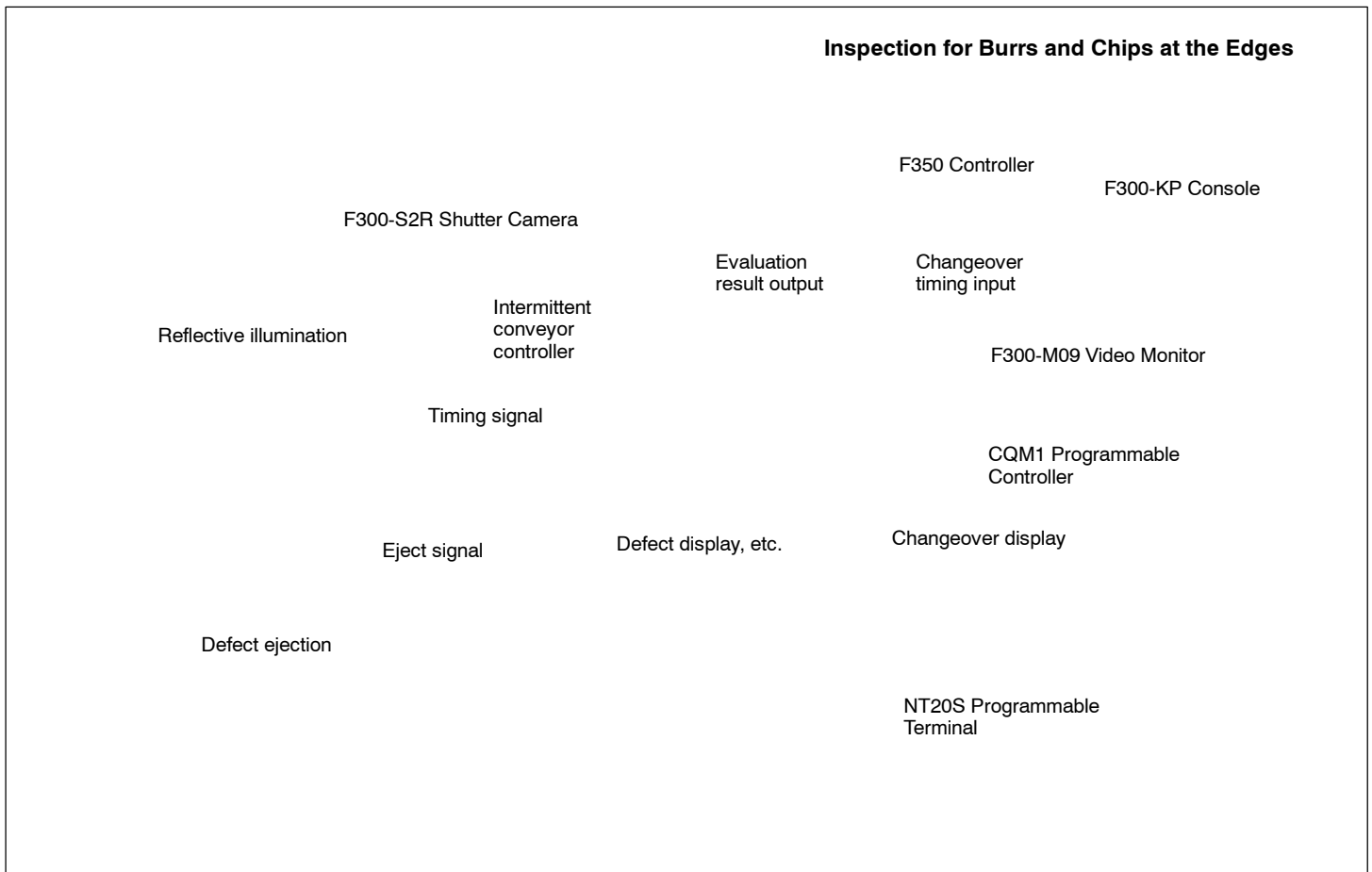
### Position Compensation

The position of the measured object can be compensated so that the measurement location does not fall outside of the measurement.

## Main Specifications

<b>Measurement items</b>	1) Surface defect inspection A, 2) Surface defect inspection B, 3) Surface defect inspection C, 4) Position compensation
<b>Processing time</b>	33 ms/piece min. (Varies depending on setting.)
<b>Inspection region</b>	16 regions max. for each one of the above inspections 1), 2), and 3).
<b>Max. No. of connectable cameras</b>	8
<b>Max. No. of scenes</b>	16
<b>Output</b>	Terminal Block Unit, Parallel I/O Unit (Correct/Incorrect, and the logical OR signal turns ON when even one of the measurement result is NG.)
<b>Display</b>	Monitor
<b>Filtering</b>	Smoothing (2 levels), edge enhancement (5 levels), edge selection (3 levels), and background suppression

## Application Examples

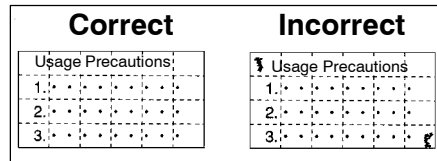


# Can and Bottling Inspection Software 1 (F350-U006E)

## Pattern Inspection Program

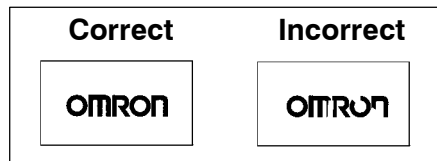
### Region Split Inspection

Detects dirt, character blurring, and other defects within a region. When the region is specified, it is divided automatically into several models and registered.



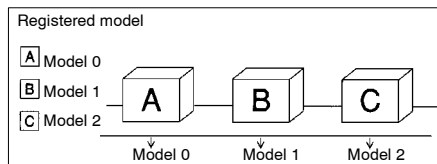
### Pattern Inspection

Detects defects in the pattern such as chips, wear, and blurring. The pattern is automatically split and each character is registered as a model.



### Classification

If classification marks are registered as models, the number of the model with the highest degree of similarity to the mark is output and the products are classified.



### Position Compensation

The position of the measured object can be compensated so that the measurement location does not fall outside of the measurement.

## Main Specifications

<b>Measurement items</b>	1) Region split inspection, 2) Character pattern inspection, 3) Classification, 4) Position compensation
<b>Processing time</b>	33 ms/piece min. when inspecting 12 models of 100 x 100 pixels with F350-C41E IMP Unit
<b>Inspection region</b>	Possible to set mask regions
<b>Max. No. of models</b>	60 (for each measurement item)
<b>Max. No. of connectable cameras</b>	8
<b>Max. No. of scenes</b>	16
<b>Max. No. of measurement items per scene</b>	16
<b>Output</b>	Terminal Block Unit, Parallel I/F Unit: Region split inspection, Character pattern inspection, Position compensation (Correct/Incorrect, and the logical OR signal turns ON when even one of the measurement result is NG.) Parallel I/O Unit: Classification (Correct/Incorrect, and the model number with the highest correlation value.)
<b>Display</b>	Monitor
<b>Filtering</b>	Smoothing (2 levels), edge enhancement (5 levels), edge selection (3 levels), and background suppression

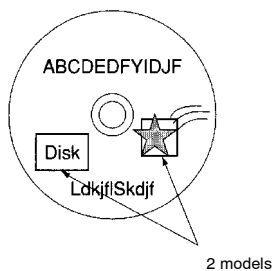
# Rotation Positioning Software 1 (F350-U007E)

## Features

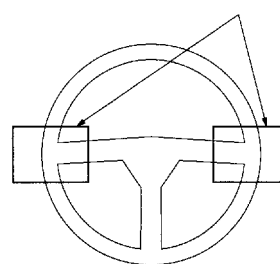
- Suitable for inspecting PCBs, components, etc., which require high-accuracy positioning.
- Capable of high-speed operation at speeds greater than 100 ms.
- Detection of positions in subpixel units is possible.
- Provided with calibration function that can be applied to correct lens distortion.
- Since the deviations in X, Y, and rotation directions are detected, there is no need for comparison with the reference positions using an external device such as a PC.

## Applications

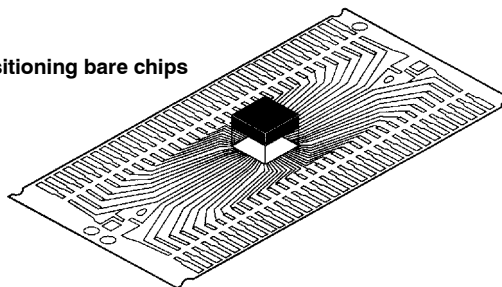
### Detection of the angle of rotation of a CD



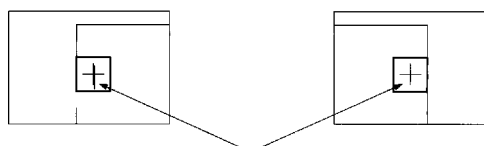
### Positioning a wheel 2 models



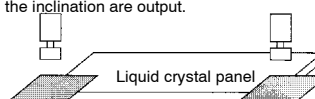
### Positioning bare chips



### Two-camera positioning



Positioning is executed from two fields of vision and the displacement in the center of gravity and the inclination are output.

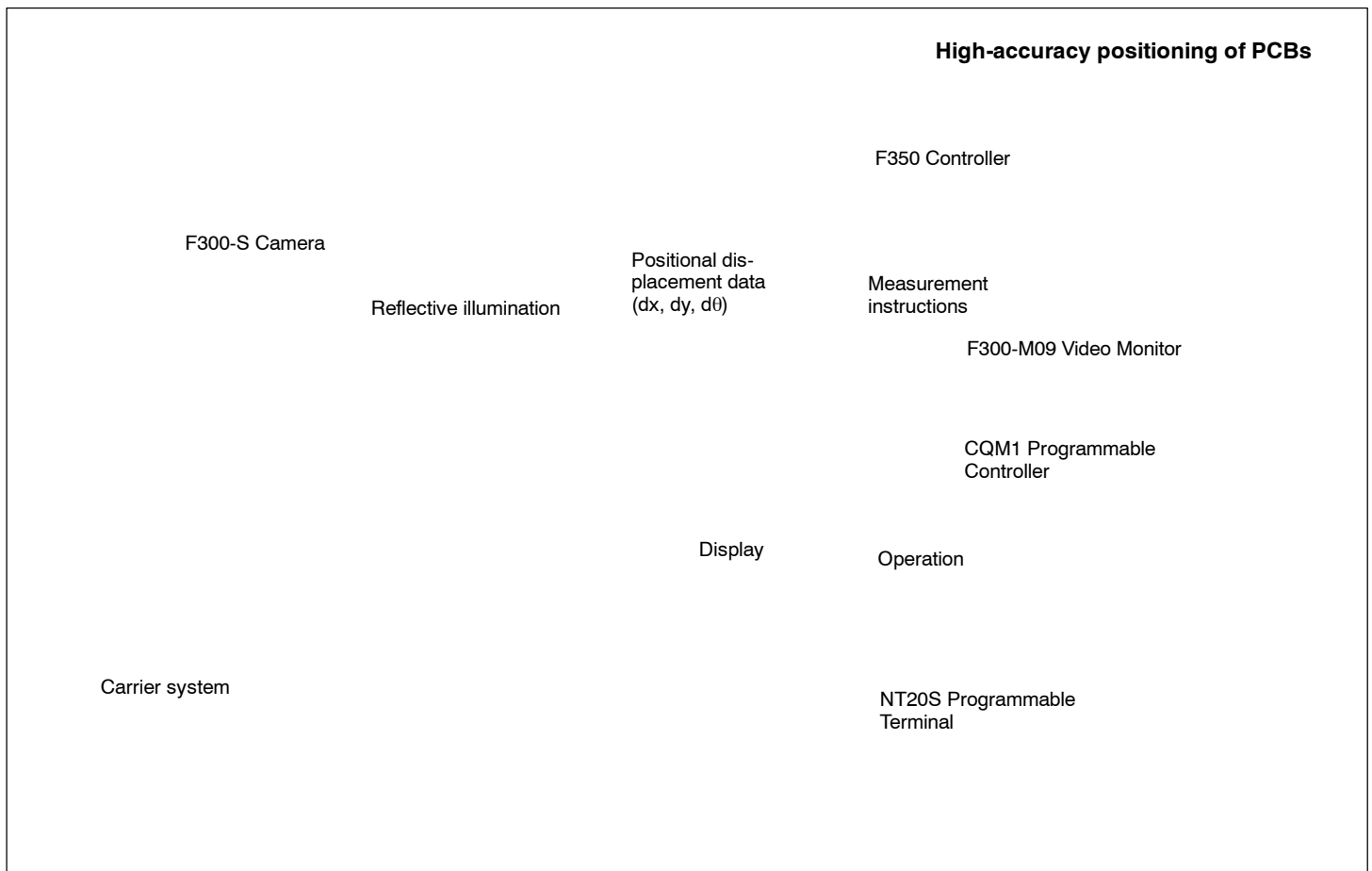


## Main Specifications

<b>Measurement items</b>	dx, dy, dθ (displacement from the reference position in X, Y, or/and rotation direction(s)), Position compensation
<b>Processing time (see note)</b>	100 ms (Varies depending on setting.)
<b>Max. No. of models</b>	8 (for each measurement item)
<b>Max. No. of connectable cameras</b>	8
<b>Max. No. of scenes</b>	16
<b>Calibration</b>	Available
<b>Output</b>	RS-232C I/F Unit, Parallel I/O Unit (Correct/Incorrect, and positional, displacement data in X, Y, or/and rotation direction(s))
<b>Display</b>	Monitor
<b>Filtering</b>	Smoothing (2 levels), edge enhancement (5 levels), edge selection (3 levels), and background suppression

**Note:** This value is for the F350-C41E. The operation speed will vary depending on the selected IMP Unit and settings.

## Application Examples



# Character Inspection Software 2 (F350-U008E)

## Features

- High-accuracy character inspection.
- High-speed processing at the speed of 100 ms/12 characters.
- Two inspection programs are available.

## Applications

Date verification/character inspection of labels printed on food packaging	Manufacturing No. verification/printing inspection	Model mark inspection
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The Character Inspection Software 2 contains two different programs: Standard Character Inspection Program and Steady Character Inspection Program. Select one based on your requirements.

### Standard Character Inspection Program

The standard character inspection program uses a combination of gray-scale correlation and binary weight correlation to detect missing or blurring of small characters with a high level of accuracy. The standard character inspection program detects improper characters faster than does the steady character inspection program.

#### Silk-screen Printing Characters



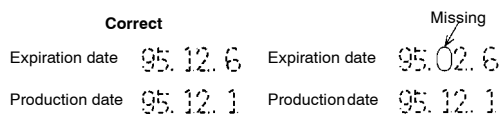
#### Laser Marking Characters



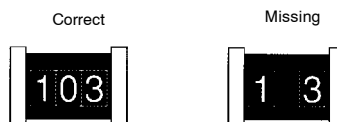
### Steady Character Inspection Program

The steady character inspection program inspects each character within an inspection region for missing or blurring of characters. Even when a character is so seriously deformed that it cannot be searched for, the position of the deformed character is still output.

#### Inkjet Printing Characters



#### Stamping Characters





## Standard Character Inspection Program

<b>Measurement items</b>	Standard character inspection, position compensation
<b>Processing time (see note)</b>	100 ms/12 characters min.
<b>Inspection regions per measurement item</b>	6 regions max. (2 regions: 24 characters max. per string, 4 regions: 12 characters max. per string)
<b>Internal calendar</b>	Dates are automatically updated.
<b>No. of models</b>	308 max.
<b>Inspected characters</b>	Alphanumeric and symbols
<b>Inspection feature</b>	Correlation values
<b>Max. No. of connectable cameras</b>	5 when using F350-C41E 2 when using F350-C12E
<b>Max. No. of scenes</b>	16
<b>Max. No. of measurement items/scene</b>	16 For the standard character inspection; 5 items max. when using F350-C41E 2 items max. when using F350-C12E
<b>Output</b>	Terminal Block Unit, Parallel I/O Unit (Correct/Incorrect, and the logical OR signal turns ON when even one of the measurement result is NG.)
<b>Display</b>	Monitor
<b>Filtering</b>	Smoothing (2 levels), edge enhancement (5 levels), edge selection (3 levels), and background suppression

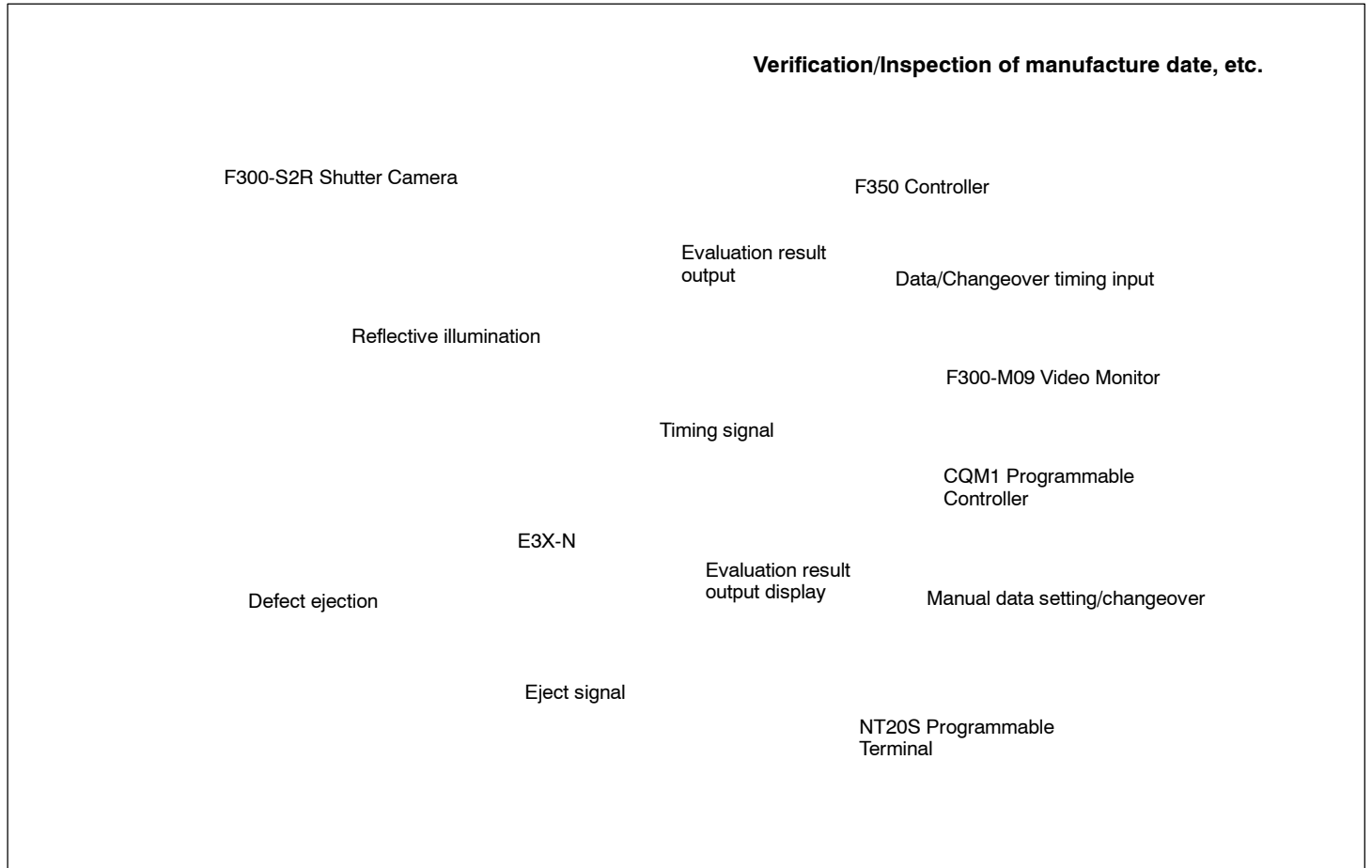
**Note:** This value is for the F350-C41E. The operation speed will vary depending on the selected IMP Unit and settings.

## Steady Character Inspection Program

<b>Measurement items</b>	Steady character inspection, position compensation
<b>Processing time (see note)</b>	100 ms/12 characters min.
<b>Inspection region/measurement item</b>	6 regions max. (2 regions: 24 characters max. per string, 4 regions: 12 characters max. per string)
<b>Internal calendar</b>	Dates are automatically updated.
<b>No. of models</b>	308 max.
<b>Inspected characters</b>	Alphanumeric and symbols
<b>Inspection feature</b>	Correlation values, Binary weight correlation values (ON/OFF selectable)
<b>Max. of connectable cameras</b>	5 when using F350-C41E 2 when using F350-C12E
<b>Max. No. of scenes</b>	16
<b>Max. No. of measurement items/scene</b>	16 For the steady character inspection; 2 items max. when using F350-C12E 5 items max. when using F350-C41E
<b>Output</b>	Terminal Block Unit, Parallel I/O Unit (Correct/Incorrect, and the logical OR signal turns ON when even one of the measurement result is NG.)
<b>Display</b>	Monitor
<b>Filtering</b>	Smoothing (2 levels), edge enhancement (5 levels), edge selection (3 levels), and background suppression

**Note:** This value is for the F350-C41E. The operation speed will vary depending on the selected IMP Unit and settings.

# Application Examples



# Character Inspection Software 1 (F350-U001E)

## Specifications

### ■ Date and Lot Number Verification Programs

Name	Type		
	Production and Expiration Date Verification Program	Date and Lot Number Verification Program 1	Date and Lot Number Verification Program 2
	2 x 12 characters/string	1 x 12 characters/string 1 x 24 characters/string	1 x 24 characters/string
Speed	100 ms/12 characters (according to settings)		
Inspected characters	Alphanumeric characters, symbols		
Number of models	264 max.		
Number of settable character strings	2 max. (24 characters, 12 characters max. per string)		
Number of scenes	16		
Position compensation functions	1-model positioning, 2-model positioning Angle of rotation: 60° max.		

### ■ Inspection Program for General Characters

Type	128 x 12 characters/string
Speed	100 ms/12 characters (according to settings)
Inspected characters	Alphanumeric characters, symbols
Number of character models	308 max.
Number of registerable character strings	128 max. (12 characters max./string)
Number of scenes	16
Position compensation functions	1-model positioning, 2-model positioning Angle of rotation: 60° max.
Number of connectable cameras	1

# Gray Inspection Software 1 (F350-U002E)

### ■ Surface Defect Inspection Program

Speed	33.3 ms min. (according to settings)
Inspection regions	16 max. per camera
Inspection characteristic	Small defect/large defect/correlation value/density
Number of connectable cameras	8 max.
Number of scenes	8
Position compensation function	Available. Can handle rotational displacement to ±180° max.

### ■ Pattern Inspection Program

Speed	33.3 ms min. (according to settings)
Models	60 max. per camera
Search region settings	Settable for each model
Number of scenes	12
Number of cameras	8 max.
Relative position inspection	Sub-pixel detection available
Position compensation functions	1-model positioning, 2-model positioning, circle positioning Angle of rotation: 180° max.

# Positioning Software 1 (F350-U003E)

### ■ Positioning Program

Measurement items	X, Y, $\theta$ data output for each model
Speed	50 ms min. (according to settings)
Number of connectable cameras	8 max.
Number of registered patterns	12 per camera, 96 total for 8 cameras
Calibration function	Lens distortion compensation compatible
Output results	96 pattern measurements (12 patterns per camera)
Rotation models	Not applicable

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**NTLP**

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# System Configuration

(Conforming to the EMC Directive and Low-voltage Directive)



Some products may not be available in your area. Please contact your OMRON representative for details.

## Required Units

**F300-P2E**  
(200 to 240 VAC)  
**Power Supply Unit**

Supplies power to the entire system.

**F350-C12E**  
**IMP Unit**

Image processing unit

**F300-FM2**  
**MMI Unit**

Possesses menu operations from video monitor or console and Memory Card functions.

**F300-KP**  
**Console**

For menu operations.

## Base Units

Available in 3-slot and 5-slot versions. Select the version according to the number of I/F Units and I/O Units.

**F300-B32 3-slot Base Unit**

**F300-B52 5-slot Base Unit**

### Camera I/F Unit (one of these is required)

**F300-A22S**  
**Normal Simultaneously Camera I/F Unit**

For simultaneous multiple-position measurements on workpieces with short stopping times. Applicable to F300-S camera only.

**F300-A22RS**  
**Shutter Simultaneously Camera I/F Unit**

For simultaneous multiple-position measurements on workpieces moving at high speed.

**F309-VSR2**  
**Camera Cable**

Length 5 m

**F309-VSR2**  
**Camera Cable**

Length 5 m

## I/O Units

Select appropriate Units depending on the devices to be connected. Three slots can be used for the F300-B32 and five slots for the F300-B52.

Up to four Camera I/F Units (eight cameras) can be added. Connect the same kind of Camera I/F Unit.

**F300-S Camera**

Compact, high-resolution (380,000-pixel) CCD camera. Can be used for simultaneous monitoring from two directions.

**F300-S2R**  
**Shutter Camera**



Lens

Two cameras of the same type can be connected to the Camera I/F Unit

## Memory Card

SRAM card for storing data and programs.

When using the F350-C12E IMP Unit with the U004E, U005E, U006E, U007E, or U008E Application Software, one Memory Card will be required (recommended: F300-N2M) for storing set data such as the scene data required for operation.

### F300-N256 Memory Card

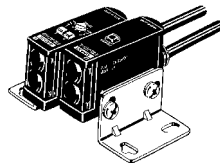
256 Kbyte SRAM. For changeover and program/data storage.

### F300-N512 Memory Card

512 Kbyte SRAM. Holds more programs and data than F300-N256.

### F300-N2M Memory Card

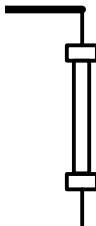
2 Mbyte SRAM. Large-capacity type.



Synchronizing Sensor Photoelectric or other sensors can be used.

### F309-VM Monitor Cable

Length 2 m. BNC connector at monitor end.



## Video Monitor

Select to match the connected units. The F300-B32 offers three slots and the F300-B52 has five slots.

### F300-E2 RS-232C I/F Unit

For data communication with computers and robots.

### F300-D2 Terminal Block Unit

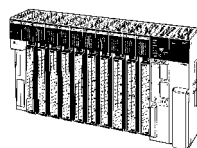
For input of measurement instructions from photoswitch or PC, and output of measurement results to PC.

### F300-DC2 Parallel I/O Unit

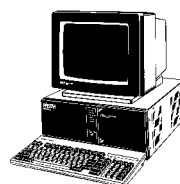
For input of measurement instructions from PC, and output of measurement results to PC. (F300-DC2 occupies 2 slots).

### F300-G Dummy Unit

Occupies empty slots to improve environmental resistance.



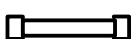
PC



IBM PC/AT or compatible

### F309-VR RS-232C Cable

Length 5 m, 25-pin connector



## Application Software

Select the Application Software according to the requirements. Also, the user can create and run programs in the dedicated OVL language.

- F350-U001E Character Inspection Software 1
- F350-U002E Gray Inspection Software 1
- F350-U003E Positioning Software 1
- F350-U004E Character Reading Software 1
- F350-U005E IC Package Inspection Software 1
- F350-U006E Can and Bottling Inspection Software 1
- F350-U007E Rotation Positioning Software 1
- F350-U008E Character Inspection Software 2

## Items Required for Programming in the Dedicated OVL Language

### F350-L12E OVL Unit

The F350-L12E OVL Unit required for programming occupies one slot and reduces the number of I/O Units which can be mounted.

# System Configuration

Some products may not be available in your area. Please contact your OMRON representative for details. Some products do not conform to the EMC Directive and Low-voltage Directive. Refer to pages 24 and 25 for products that conform to the EMC Directive and Low-voltage Directive.

RC

## Required Units

**F300-P2**  
(100 to 120 VAC)  
**F300-P2E**  
(200 to 240 VAC)  
**Power Supply Unit**

Supplies power to the entire system.

Select any one.

**F300-P2E**  
**Power Supply Unit**

Supplies power to the entire system.

Select either one.

**F350-C12E**  
**IMP Unit**

Image processing unit

**F350-C41E**  
**IMP Unit**

High-speed, large-capacity image processing unit

**F300-FM2**  
**MMI Unit**

Possesses menu operations from video monitor or console and Memory Card functions.

**F300-KP**  
**Console**

For menu operations.

**F309-VKP**  
**Console Cable**

Length 2 m. The Console connector and Video Monitor connector can be extended externally to the F309-J.

**F309-J Console Connector**

The Console connector and Video Monitor connector can be extended externally from the MMI Unit.

## Base Units

Available in 3-slot and 5-slot versions. Select the version according to the number of I/F Units and I/O Units.

**F300-B32 3-slot Base Unit**

**F300-B52 5-slot Base Unit**

### Camera I/F Unit (one of these is required)

**F300-A20**  
**Normal Camera I/F Unit**

For general measurements.

**F300-A22S**  
**Normal Simultaneously Camera I/F Unit**

For simultaneous multiple-position measurements on workpieces with short stopping times. Applicable to F300-S camera only.

**F300-A20R**  
**Shutter Camera I/F Unit**

For measurement of workpieces moving at high speed.

**F300-A22RS**  
**Shutter Simultaneously Camera I/F Unit**

For simultaneous multiple-position measurements on workpieces moving at high speed.

**F300-A23RS**  
**Frame Shutter Simultaneously Camera I/F Unit**

For measuring objects moving at high speed and high accuracy, and for measuring two places simultaneously using two cameras.

### I/O Units

Select appropriate Units depending on the devices to be connected. Three slots can be used for the F300-B32 and five slots for the F300-B52.

Up to four Camera I/F Units (eight cameras) can be added. Connect the same kind of Camera I/F Unit.

**F309-VSR2**  
**Camera Cable**

Length 5 m

**F309-VSR2**  
**Camera Cable**

Length 5 m

**F309-VSR2**  
**Camera Cable**

Length 5 m

**F200-S Camera**

Compact, high-resolution (250,000-pixel) CCD camera

**F300-S Camera**

Compact, high-resolution (380,000-pixel) CCD camera. Can be used for simultaneous monitoring from two directions.

**F300-S3DR**  
**Shutter Camera**

Separate amplifier allows use in confined spaces

**F300-S2R**  
**Shutter Camera**

**F300-S4R**  
**Frame Shutter Camera**



Lens

Two cameras of the same type can be connected to the Camera I/F Unit.

## Memory Card

SRAM card for storing data and programs.

When using the F350-C12E IMP Unit with the U004E, U005E, U006E, U007E, or U008E Application Software, one Memory Card will be required (recommended: F300-N2M) for storing set data such as the scene data required for operation.

### F300-N256 Memory Card

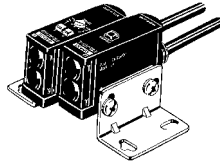
256 Kbyte SRAM. For changeover and program/data storage.

### F300-N512 Memory Card

512 Kbyte SRAM. Holds more programs and data than F300-N256.

### F300-N2M Memory Card

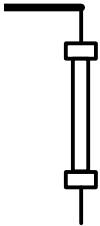
2 Mbyte SRAM. Large-capacity type.



Synchronizing Sensor Photoelectric or other sensors can be used.

### F309-VM Monitor Cable

Length 2 m. BNC connector at monitor end.



## Application Software

Select the Application Software according to the requirements. Also, the user can create and run programs in the dedicated OVL language.

- F350-U001E Character Inspection Software 1
- F350-U002E Gray Inspection Software 1
- F350-U003E Positioning Software 1
- F350-U004E Character Reading Software 1
- F350-U005E IC Package Inspection Software 1
- F350-U006E Can and Bottling Inspection Software 1
- F350-U007E Rotation Positioning Software 1
- F350-U008E Character Inspection Software 2

## Items Required for Programming in the Dedicated OVL Language

### F350-L12E OVL Unit

### F300-K Keyboard

The F350-L12E OVL Unit required for programming occupies one slot and reduces the number of I/O Units which can be mounted.

## Video Monitor

Select to match the connected units. The F300-B32 offers three slots and the F300-B52 has five slots.

### F300-E2 RS-232C I/F Unit

For data communication with computers and robots.

### F300-D2 Terminal Block Unit

For input of measurement instructions from photoswitch or PC, and output of measurement results to PC.

### F300-DC2 Parallel I/O Unit

For input of measurement instructions from PC, and output of measurement results to PC. (F300-DC2 occupies 2 slots).

### F300-FS Strobe I/F Unit

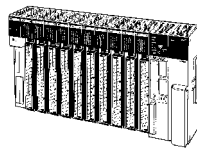
Flashes the strobe for measurement of high-speed objects. Connect to the Strobe Controller with F309-VFS Strobe Cable to control strobe timing.

### F300-G Dummy Unit

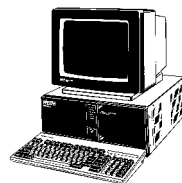
Occupies empty slots to improve environmental resistance.

### F309-VFS Strobe Cable

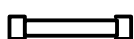
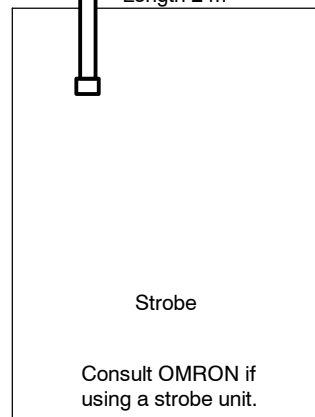
Length 2 m



PC



IBM PC/AT or compatible



### F309-VR RS-232C Cable

Length 5 m, 25-pin connector



# Units Conforming to the EMC Directive and Low-voltage Directive

## Model Number Changes

The following Units have been modified to conform to the EMC Directive and Low-voltage Directive. The following table shows the model number of the Unit before the modification and the new model number.

Unit name	New model number (Modified to conform to the EMC Directive and Low-voltage Directive)	Old model number
IMP Unit	F350-C12E	F350-C10E
Power Supply Unit	F300-P2E	F300-PE
MMI Unit	F300-FM2	F300-FM
Normal Simultaneously Camera I/F Unit	F300-A22S	F300-A20S
Shutter Simultaneously Camera I/F Unit	F300-A22RS	F300-A20RS
Parallel I/O Unit	F300-DC2	F300-DC
Terminal Block Unit	F300-D2	F300-D
RS-232C I/F Unit	F300-E2	F300-E
OVL Unit	F350-L12E	F350-L100E
Base Unit	F300-B32	F300-B3
	F300-B52	F300-B5

## Conformance to the EMC Directive and Low-voltage Directive

Use the following Units when constructing a Visual Inspection System that must conform to the EMC Directive and Low-voltage Directive.

Unit name	Model number
IMP Unit	F350-C12E
Power Supply Unit (200 to 240 VAC, UL/CSA approval)	F300-P2E
MMI Unit	F300-FM2
Normal Simultaneously Camera I/F Unit	F300-A22S
Shutter Simultaneously Camera I/F Unit	F300-A22RS
Parallel I/O Unit	F300-DC2
Terminal Block Unit	F300-D2
RS-232C I/F Unit	F300-E2
Dummy Unit	F300-G
Console	F300-KP
Normal Camera	F300-S
Shutter Camera	F300-S2R
Monitor Cable	F309-VM
Camera Cable	F309-VSR2
RS-232C Cable	F309-VR
Memory Card	F300-N256
	F300-N512
	F300-N2M
Base Unit	F300-B32
	F300-B52
Key Board	F300-K
OVL Unit	F350-L12E

## Non-conformance to the EMC Directive and Low-voltage Directive

Do not use the following Units when constructing a Visual Inspection System that must conform to the EMC Directive and Low-voltage Directive.

Unit name	Model number
IMP Unit	F350-C41E
Power Supply Unit (100 to 120 VAC, UL/CSA approval)	F300-P2
Normal Camera I/F Unit	F300-A20
Shutter Camera I/F Unit	F300-A20R
Frame Shutter Simultaneously Camera I/F Unit	F300-A23RS
Strobe I/F Unit	F300-FS
Video Monitor	F300-M09
Normal Camera	F200-S
Shutter Camera	F300-S3DR
Frame Shutter Camera	F300-S4R
Srobe Cable	F309-VFS
Console Connector	F309-J
Console Cable	F309-VKP

# Functions and Specifications

## Controller

Supply voltage	100 to 120 VAC or 200 to 240 VAC
Supply frequency	50/60 Hz
Power consumption	200 VA max.
Insulation	20 M $\Omega$ min. between all AC external terminals and GR terminal (at 500 VDC).
Dielectric strength	1,500 VAC, 50/60 Hz for 1 minute between all AC external terminals and GR terminal; detected current: 10 mA max.
Noise resistance	1,500 Vp-p; pulse width: 1 $\mu$ s; rising time: 1 ns (pulse)
Operating temperature	0°C to 50°C
Operating humidity	35% to 85% RH (no condensation)
Operating environment	No corrosive gases
Storage temperature	-25°C to 65°C
Ground	Ground resistance: 100 $\Omega$ max.

## IMP Unit

Model	F350-C12E	F350-C41E
Operating and setting method	Menu operation after installation and execution of application software, or execution of OVL programs.	
CPU	Main: Equivalent to MC68020 (16 MHz) Sub CPU: 16 bits for I/O control	Main: Equivalent to MC68040 (32 MHz)
Main memory areas	1 Mbytes Measurement item memory area: 256 Kbytes RAM disk area for scene data: Not available	4 Mbytes Measurement item memory area: 512 Kbytes RAM disk area for scene data: available
Video memory	Two 8-bit planes corresponding to 512 (H) x 484 (V)	
Filtering	Smoothing, edge reinforcing, edge selection (real-time) Background suppression: available with the F350-U004E/U005E/U006E/U007E/U008E	
Calendar/Timer functions	Internal timer IC with battery back-up	
I/F control	Camera	8 cameras max., external/internal synchronization selectable
	Shutter/Strobe functions	External synchronization
	Strobe	8 channels max.
	RS-232C	2 channels
	Parallel I/O	Input 8 to 32 points, output 8 to 72 points
	Keyboard	Keyboard 1 point, Console 1 point
	Memory Card	1 slot, JEIDA Version 4.0 specification
	Keyboard	Keyboard 1 point, Console 1 point
Programming	Requires OVL (dedicated BASIC language), F350-L12E OVL Unit (English), and F300-K Keyboard	
Weight	Approx. 1.7 kg	Approx. 1.75 kg

## F300-B32 3-slot Base Unit

Weight	Approx. 2.4 kg
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## F300-B52 5-slot Base Unit

Weight	Approx. 2.8 kg
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## Cameras

Model	F200-S	F300-S	F300-S4R	F300-S2R	F300-S3DR
<b>Image element</b>	CCD solid-state image device (4.91 (H) x 3.69 (V) mm <sup>2</sup> )	CCD solid-state image device (8.8 (H) x 6.6 (V) mm <sup>2</sup> )	1/2-inch CCD solid-state image device		
<b>Pixel number</b>	512(H) x 492(V)	768(H) x 493(V)	659(H) x 494(V)	768(H) x 494(V)	
<b>Synchronization</b>	Internal	Internal/external (automatic selection)	External		
<b>Scanning</b>	2:1 interlace		---		
<b>Lens mounting</b>	C mount				
<b>Image output</b>	1.0 Vp-p/75 W				
<b>Shutter function</b>	None		Select from 1/1000 s, 1/1500 s, 1/2000 s, 1/3000 s, 1/4000 s, 1/6000 s, 1/8000 s, 1/10000 s, 1/30000 s, or 1/50000 s (default setting: 1/2000 s)	Select from 1/1000 s, 1/2000 s, 1/4000 s, or 1/10000 s (default setting: 1/2000 s)	
<b>Weight</b>	Approx. 150 g (excluding lens/connector)	Approx. 200 g (excluding lens/connector)	Approx. 160 g (excluding lens/connector)	Approx. 200 g (excluding lens/connector)	Amplifier: Approx. 510 g Head: Approx. 220 g (excluding lens)
<b>Camera cable</b>	F309-VSR2				
<b>Camera I/F Unit</b>	F300-A20	F300-A20 or F300-A22S	F300-A23RS	F300-A20R or F300-A22RS	

## Camera I/F Units

Product	F300-A20 Normal Camera I/F Unit	F300-A22S Normal Simultaneously Camera I/F Unit	F300-A23RS Frame Shuuter Simultaneously Camera I/F Unit	F300-A20R Shutter Camera I/F Unit	F300-A22RS Shutter Simultaneously Camera I/F Unit
<b>Cameras connected</b>	2 channels				
<b>Connectable Camera</b>	F300-S, F200-S	F300-S	F300-S4R	F300-S2R, F300-S3DR	
<b>Image signal input</b>	EIA (NTSC)				
<b>Video memory</b>	None	2 planes built-in	2 planes built-in	1 plane built-in	2 planes built-in
<b>Shutter trigger output</b>	None		2 channels (output simultaneously)	2 channels	2 channels (output simultaneously)
<b>Weight</b>	Approx. 400 g	Approx. 400 g	Approx. 400 g	Approx. 400 g	Approx. 400 g

## F350-L12E OVL Unit

Language	OVL (special BASIC)
Interface	F300-K Keyboard
Weight	Approx. 320 g

## Power Supply Unit

Model	F300-P2	F300-P2E
Supply voltage	100-120 VAC, 50/60 Hz	200-240 VAC, 50/60 Hz
Output signals	RUN, ERROR, 12 VDC	
Weight	Approx. 1.7 kg	

## F300-FM2 MMI Unit

Output image	EIA (NTSC)
Interface	Console
Memory card	1 slot (JEIDA Ver. 4.0 spec.)
Weight	Approx. 660 g

## F300-KP Console

Keys	Up, Down, Right, Left, Shift, Help, Escape, Enter
Cable	1 m curled cord
Weight	Approx. 240 g (excluding cord)

## F300-M09 Video Monitor

Display size	9" monochrome long-persistence monitor
Input signal	1.0 Vp-p
Operating temperature	0°C to 40°C
Weight	Approx. 5.8 kg

## F300-D2 Terminal Block Unit

Supply Voltage	12 to 24 VDC
Input signal	DI 0 to 7 (8 points), DSA, STEP, RESET
Output signal	DO 0 to 7 (8 points), AND, OR, GATE, BUSY
Weight	Approx. 550 g

## F300-DC2 Parallel I/O Unit

Supply Voltage	12 to 24 VDC
Input signal	DI 0 to 7 (8 points), DSA, STEP, RESET
Output signal	DO 0 to 31 (32 points), AND, OR, GATE, BUSY
Weight	Approx. 800 g

## F300-E2 RS-232C I/F Unit

Number of channels	2 channels
Weight	Approx. 400 g

## F300-FS Strobe I/F Unit

Strobes connected	4 channels
Strobe error detection	4 channels
Weight	Approx. 400 g

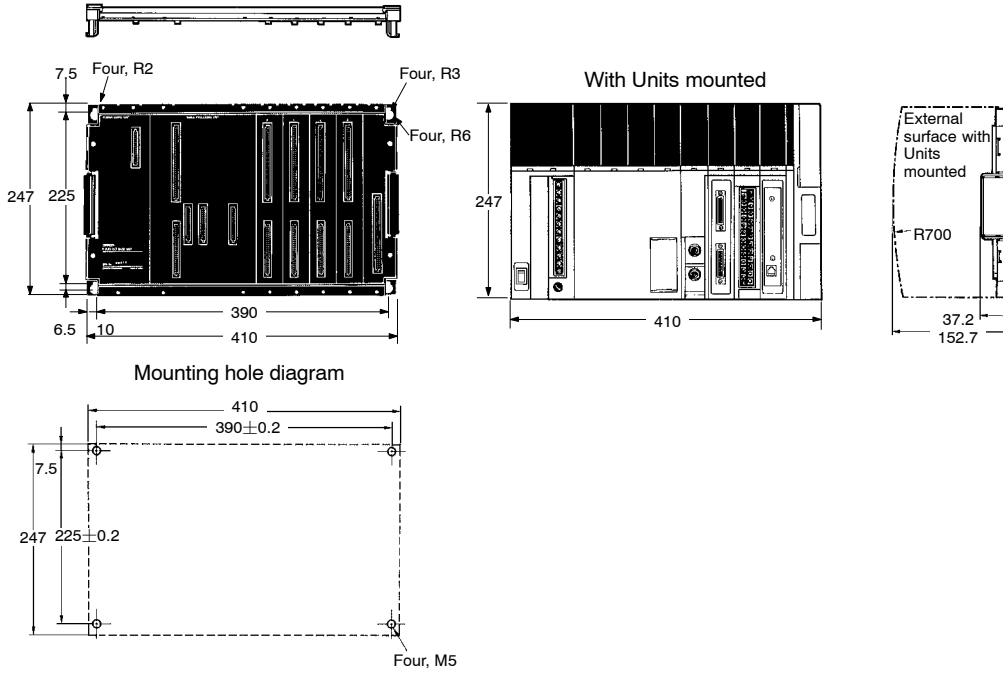
## F300-G Dummy Unit

Weight	Approx. 200 g
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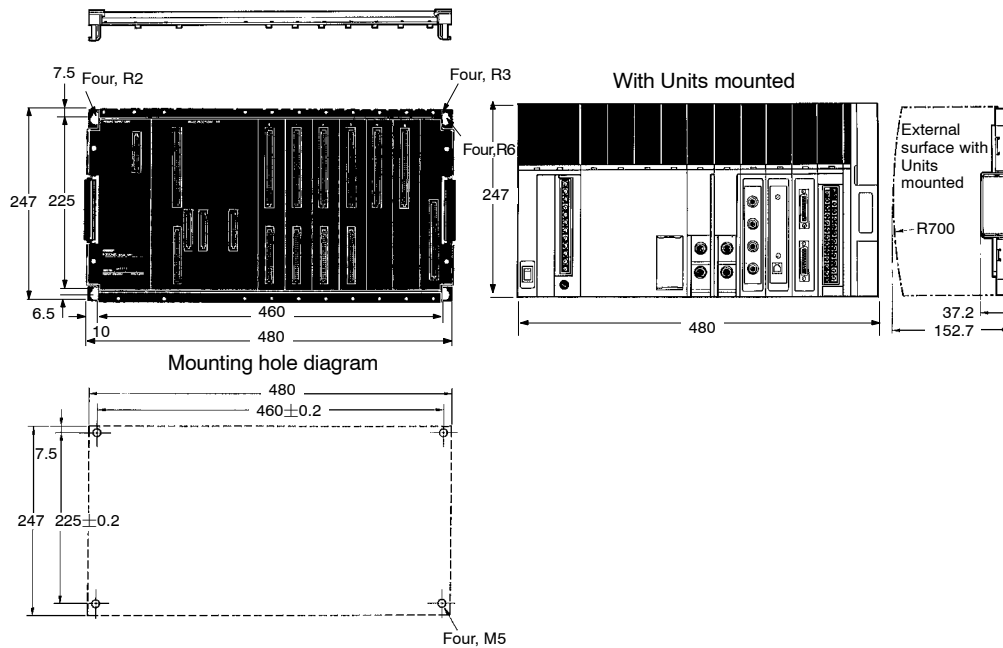
# External Dimension

(Unit: mm)

## F300-B32 Base Unit

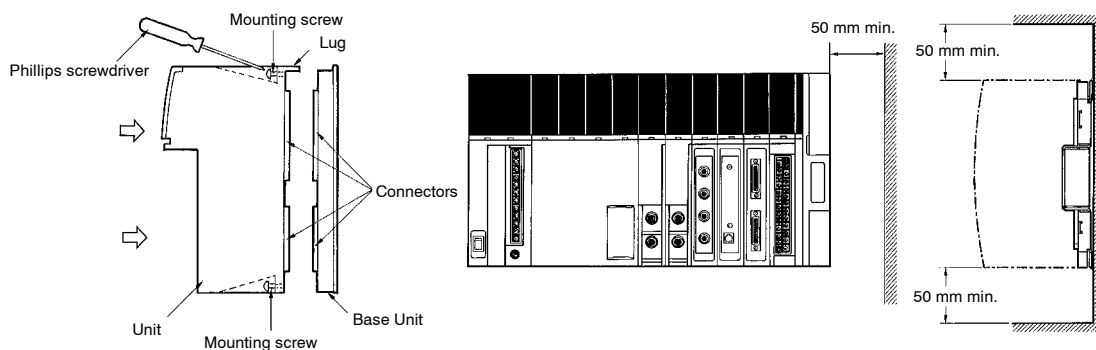


## F300-B52 Base Unit



## Installing the Base Unit

- Install the Base Unit with sufficient working space above and below to insert a screwdriver as shown in the lower diagram below when mounting Units to the Base Unit.
- Leave a space of at least 50 mm to the right of the Base Unit, as shown in the middle diagram below, to allow opening and closing of the MMI Unit memory card slot cover.
- Leave at least 50 mm for ventilation above and below the Unit between other Units and walls.



**F200-S Camera (250,000 Pixels)**

Two, M5x8 deep

C mount cap

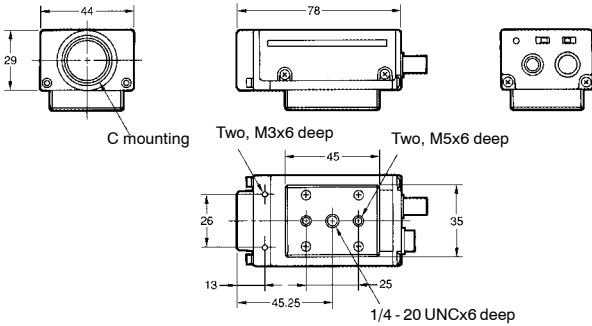
1/4 in. 20 UNCx8 deep

**F300-S2R Shutter Camera**

Four, M3x6 deep

Two, 1/4 - 20 UNCx6.3 deep

**F300-S Camera (380,000 Pixels)**



**F300-S3DR Shutter Camera**

**Head**

1/4 - 20 UNCx7.0 deep

Two, M3

Cord length: Approx. 2,000

Approx. 50

**F300-S4R Frame Shutter Camera**

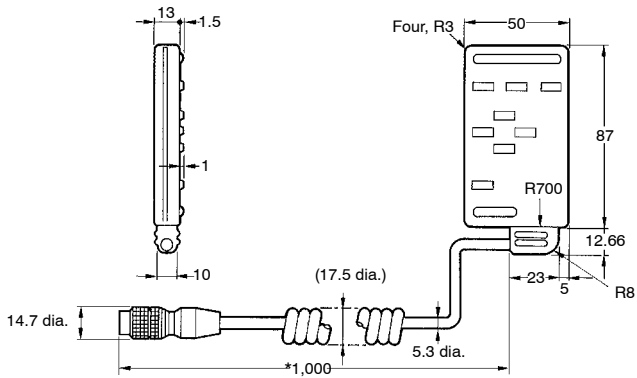
C mounting

Four, M3x8 deep

1/4 in-20UNCx8 deep

**Amplifier<sup>6</sup>**

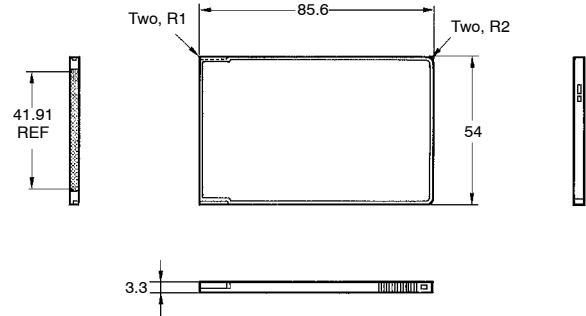
### F300-KP Console



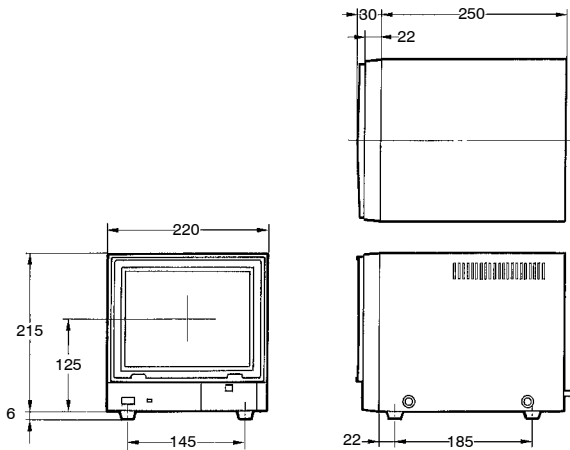
\*Can be extended by using a coiled cord. However, the extension length is not guaranteed.

### F300-N256/N512/N2M Memory Card

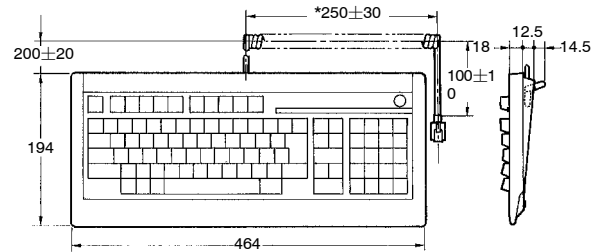
#### F350-U□□□E Application Software



### F300-M09 Video Monitor



### F300-K Keyboard



\*Can be extended by using a coiled cord. However, the extension length is not guaranteed.



# Operation Manuals List

Catalog number	Title
Z108-E1	F350 Visual Inspection System Setup Menu Operation Manual
Z109-E1	F350 Visual Inspection System OVL Reference Manual
Z105-E1	F350-U001E Character Inspection Software 1 Operation Manual
Z106-E1	F350-U002E Gray Inspection Software 1 Operation Manual
Z107-E1	F350-U003E Positioning Software 1 Operation Manual
Z111-E1	F350-U004E Character Reading Software 1 Operation Manual
Z112-E1	F350-U005E IC Package Inspection Software 1 Operation Manual
Z113-E1	F350-U006E Can and Bottleing Inspection Software 1 Operation Manual
Z114-E1	F350-U007E Rotation Positioning Software 1 Operation Manual
Z115-E1	F350-U008E Character Inspection Software 2 Operation Manual