

F150-2

Vision Sensor


**Manual 2:
AUTO MENU
OPERATION MANUAL**


OMRON


Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Visual Aids

The following headings will help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

→ Indicates pages where additional information can be found.

1 Indicates a procedure. The step numbers in the procedure correspond to the numbers in any related illustrations.

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About this Manual:

This manual describes the operation of the F150 Vision Sensor using the Auto Menu and includes the sections described below. This is one of three manuals used to operate the F150. Refer to the following table for the contents of each manual.

Manual	Contents	Cat. No.
1: Setup Manual	Provides information on system hardware and installation. Be sure to read this manual first.	Z132
2: Auto Menu Operation Manual	Describes operation of the F150 using the Auto Menu. The Auto Menu enables the simplest operation for OK/NG outputs based on registered images of acceptable and unacceptable products.	Z133
3: Expert Menu Operation Manual	Describes operation of the F150 using the Expert Menu. The Expert Menu enables application of all F150 capabilities, including setting region images and criteria, and outputting judgement results and data via the terminal block, RS-232C or CompoBus/D.	Z134

Please read the above manuals carefully and be sure you understand the information provided before attempting to install and operate the F150.

Section 1 The Auto Menu Mode outlines the features of the Auto Menu mode and explains what can be achieved by using it. It also describes the overall flow of F150 application and basic operations, and the conventions used in this manual.

Section 2 Basic Operation describes the starting and quitting of Auto Menu mode operation and the basic menu operations.

Section 3 Operating Procedures describes how to operate the F150 using the Auto Menu mode.

Section 4 Terminal Block describes the communications settings and I/O formats for communications with external devices via the terminal blocks.

Section 5 CompoBus/D Settings describes the communications settings required when the F150 is used as a CompoBus/D Slave.

Section 6 RS-232C Communications Settings describes the communications settings for the RS-232C port when making a backup to a personal computer or operating the F150 menus from a personal computer.

Section 7 Troubleshooting lists the errors that may occur during F150 operation, along with their probable causes and remedies.



WARNING

Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the F150 Vision Sensor.

The information contained in this section is important for the safe and reliable application of the F150 Vision Sensor. You must read this section and understand the information contained before attempting to set up or operate a F150 Vision Sensor.

1 Safety Precautions	x
2 General Precautions	xi

1 Safety Precautions



Caution Do not touch fluorescent or halogen lights while the power is ON or immediately after the power is turned OFF. These lights generate heat and can cause burns.



Caution Cover the terminal blocks with the Terminal Block Protection Covers.



Caution Use DC power supplies with safe extra low-voltage circuits on the secondary side for the main F150 power supply and power supplies for the terminal blocks.



Caution Do not use the F150 in environments with flammable or explosive gases.



Caution Install the F150 away from high-voltage equipment or motors to ensure safety during operation and maintenance.



Caution Use the power supply cables and crimp terminals of specified sizes.



Caution Use at the power supply voltages specified in this manual.




Caution Be sure to securely tighten the screws when mounting F150 components.




Caution Do not dismantle, repair or modify any F150 components.



Caution Dispose of F150 components as industrial waste.

 **Caution** To prevent damage from static electricity, use a wrist strap or another device for preventing electrostatic charges when touching terminals or connector signal lines.

 **Caution** Do not turn OFF the power while a message is being displayed indicating that processing is being performed. Data in memory will be destroyed, and the F150 may not operate correctly the next time it is started.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

SECTION 1

The Auto Menu Mode

This section outlines the features of the Auto Menu mode and explains what can be achieved by using it. It also describes the overall flow of F150 application and basic operations, and the conventions used in this manual.

1-1	Features	2
1-2	Overview of F150 Installation and Operation	4
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1-1 Features

The Auto Menu mode provides the easiest operation of the F150. Measurement conditions can be set automatically merely by registering images of acceptable (OK) and unacceptable (NG) products. Up to 23 images of unacceptable objects can be stored in memory, allowing easy verification of previous faults. Various options, such as for image adjustment, position compensation, and drawing of measurement regions have been added.

The following F150 features are supported by Auto Menu mode.

Sample Image Registration → p 18

Acceptable and unacceptable images can be registered as samples, and the measurement conditions for the F150 are automatically set by simply inputting OK or NG for the samples.

Optional Functions → p. 29

Images can be adjusted for easier measurement. Refer to *Image Adjustment* for details.

When measuring objects in almost exactly the same position (i.e.: the objects are positioned), processing time can be reduced by turning OFF the position compensation function. Refer to *Filtering* for details.

The measurement region can be drawn in the desired position. Refer to *Drawing Measurement Region* for details.

Scenes → p 44

Up to 16 different sets of measurement conditions can be set. Each set of measurement conditions is called a “scene.” You can switch scenes to automatically change the measurement conditions, e.g. to those for a different measurement object.

Measurement Images → p 52

Up to 23 measurement images are stored in memory for easy confirmation of past images to see what problems have occurred. The images in memory are cleared when power is turned OFF or the scene is changed. These images, however, may be backed up to a computer.

Terminal Blocks, CompoBus/D

Measurement triggers can be input, and judgements (OK/NG) can be output via the terminal blocks or CompoBus/D. (Actual measurement values cannot be output from the terminal blocks, only the OK/NG measurement results.)

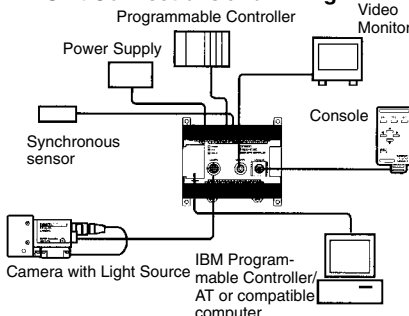
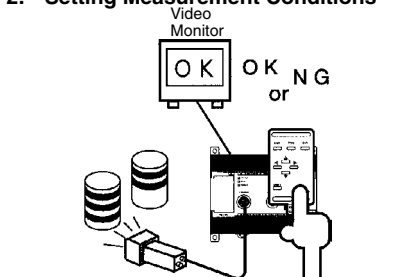
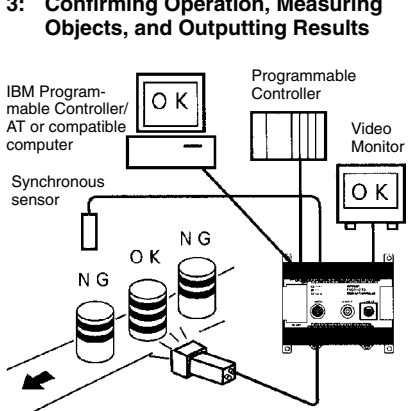
Note The external devices with which communications are supported vary with the model. → **p. 5**

RS-232C Port → **p 48**

Data can be backed up on a personal computer or other external device via the RS-232C port.

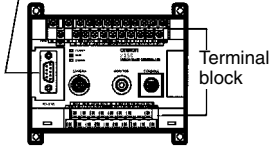
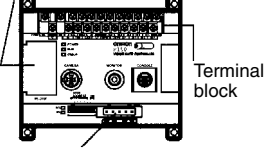
1-2 Overview of F150 Installation and Operation

The following table shows the basic steps that must be performed to use the F150.

Step	Manual
<p>1: Unit Connections and Wiring</p> 	<p>Setup Manual</p>
<p>2: Setting Measurement Conditions</p> 	<p>Easy Operation: Auto Menu Operation Manual</p> <p>Advanced Operation: Expert Menu Operation Manual</p>
<p>3: Confirming Operation, Measuring Objects, and Outputting Results</p> 	

1-3 Input and Output

The kind of communications supported varies with the model as shown below.

Item		F150-C10E-2 F150-C15E-2	F150-C10E-2-DRT
External communications		Connector for RS-232C connections 	Connector for RS-232C connections 
Input	Console	Yes	Yes
	Terminal block	Yes	Yes (except DI0 to DI7)
	CompoBus/D	No	Yes
	RS-232C	No (see note)	No (see note)
Output	Terminal block	Yes	Yes (except DO0 to DO15)
	CompoBus/D	No	Yes
	RS-232C	No (see note)	No (see note)

Note RS-232C can be used to operate the F150 from a personal computer or to make backup data. However, input of commands and output of results are not supported.

1-4 Data Compatibility

Scene and system data for version 1.□□ is not compatible with this version and cannot be used. It is necessary to make new data settings.

SECTION 2

Basic Operation

This section describes the starting and quitting of Auto Menu mode operation and the basic menu operations.

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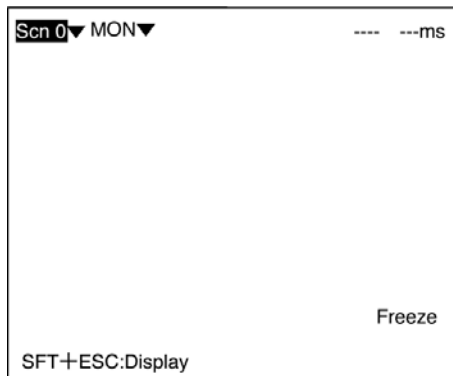
2-1 Starting and Quitting

2-1-1 Starting

Note Before connecting components or wiring power supply lines and grounding wires, be sure to refer to the relevant section in the Setup Manual.

Use the following procedure to start up the F150.

- 1 Be sure that the basic F150 components have been connected correctly. → **Setup Manual p. 7**
- 2 Turn ON the power supply on the monitor.
- 3 Turn ON the power supply on the F150.
A startup message will appear followed by a processing message. After a short pause, the initial screen will appear. The following screen will appear the first time power is turned ON.




Note The startup scene and startup mode that appear when power is turned ON can be set. Use these settings to make daily operation more efficient once the F150 is ready for actual operation.
→ **p. 58**

2-1-2 Quitting

Save all settings to flash memory before turning OFF the power. The data in flash memory is loaded each time the F150 is started. Any changes made will be lost unless they are saved to the flash memory.

The measurement images and sample images in memory are also cleared when the power is turned OFF. These images cannot be saved to flash memory, but they can be backed up on a computer if required. → **p 48**

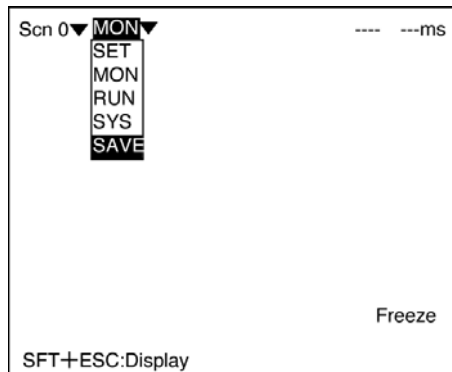
 **Caution** Do not turn OFF the power or input a RESET signal while a message is being displayed in any save or load operation. Data in memory will be destroyed, and the F150 may not operate correctly the next time it is started.

1 Display the Basic Screen.

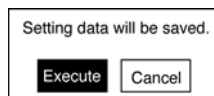


2 Move the cursor to **MON** and press the **ENT** Key.

3 Select **SAVE**.



4 A confirmation message will be displayed. Select **Execute** to save any changes. When saving is completed, the screen from step 1 will be returned.

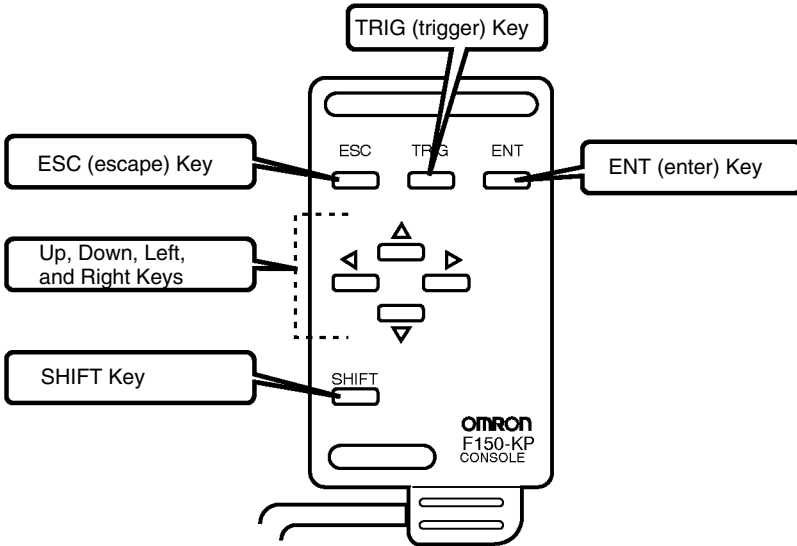


5 Turn OFF the power to the F150.

2-2 Input Devices

2-2-1 Console

The Console is used to perform menu operations. Be sure to familiarize yourself with Console operations before actually using the menus.



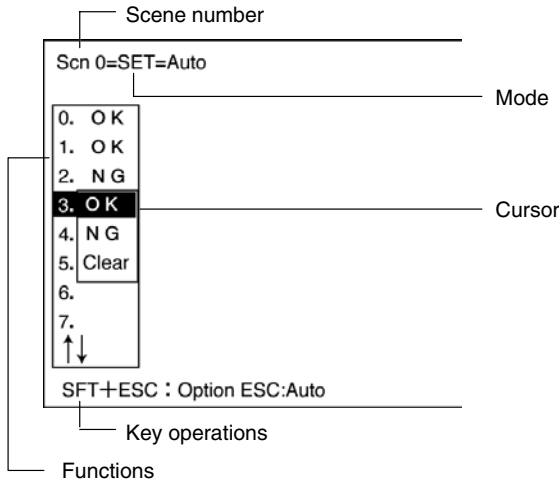
Key	Function
ESC: Escape Key	The function of this key varies with the screen displayed. The function is displayed at the bottom of the screen. When moving between menus, pressing this key interrupts processing and returns the user to the previous menu display.
TRIG: Trigger Key	Starts object measurement.
ENT: Enter Key	Executes a function or set a value.
Up and Down Keys	Used to move the cursor up and down to select items. Also used to set values. The Up Key will increase a value by 1 and the Down Key will decrease a value by 1. Continue pressing the Up or Down Key to quickly increase or decrease a value.
Left and Right Keys	Used to move the cursor left or right to select items.
SHIFT Key	Must be pressed in combination with another key to have any affect. Specific functions are assigned to Shift + another key for specific screens.

2-2-2 RS-232C

For details of menu operation via RS-232C, refer to *Section 6 RS-232C Communications Settings.* → p. 91

2-3 Screen Displays

The F150 is operated by selecting functions from the screen.



Scene Number

The current scene number is given. There are 16 scenes that can be created.

Mode

The current operating mode is displayed.

Display	Meaning
SET	Sets the measurement conditions.
MON (Monitor)	Checks whether measurement is being performed correctly under the set measurement conditions. The measurement results are displayed on the monitor only. The results cannot be output to external devices.
RUN	Performs measurement. The measurement results are output to an external device via a terminal block or CompoBus/D.
SYS (System)	Sets system conditions for the F150.
SAVE	Saves data to flash memory. If new settings have been made, be sure to save the data before quitting.

Key Operations

Displays special key combinations at the bottom of the screen where available.

Functions

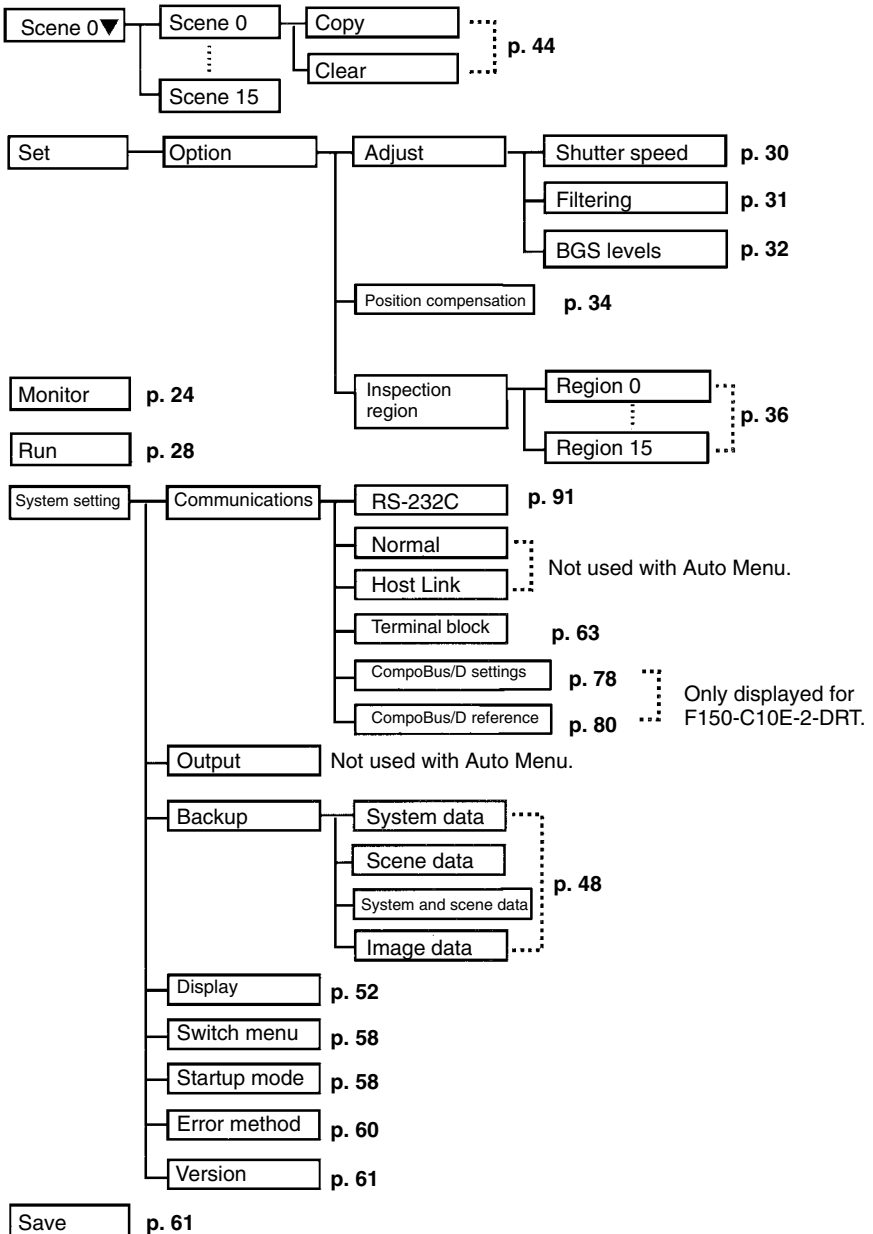
The available functions are displayed on the menus.

Cursor

The cursor is moved to the desired function by pressing the Cursor Keys. The selected item is displayed in reverse black/white.

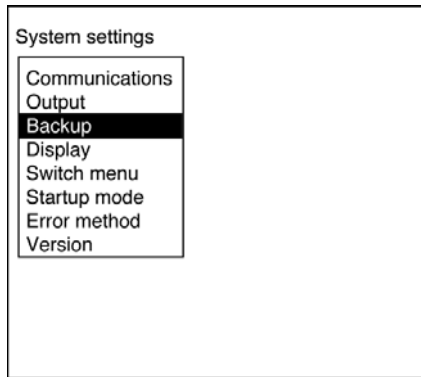
2-4 Menu Tree

The following diagram shows the menu tree of the F150.

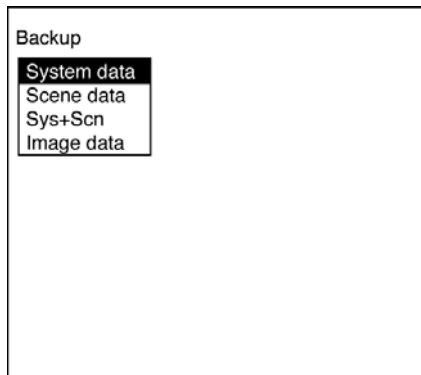


Use the following procedure to move around the menus.

- 1 Move the cursor to the desired item using the **Up**, **Down**, **Left**, and **Right** Keys.



- 2 Press the **ENT** Key. In this example, operation will move to **Backup**.



- 3 Repeat the above two steps to move to lower levels.
- 4 Press the **ESC** Key. The display will move to the previous menu level (the screen shown in step 1).

SECTION 3

Operating Procedure

This section describes how to operate the F150 using the Auto Menu mode.

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3-1 Overview

The main procedure for operating in the Auto Menu mode consists of only five steps. These steps are outlined below and described in more detail in the remainder of *Section 3*.

- 1** An image of the measurement object is displayed on the video monitor.

For details about optional functions refer to *3-7 Optional Functions*. → **p. 29**

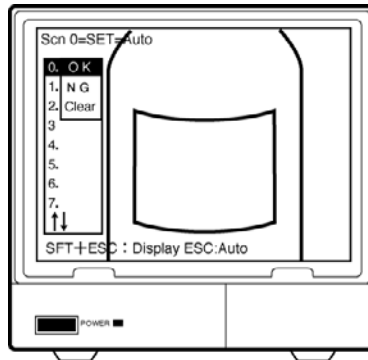
- The shutter speed can be adjusted in accordance with the speed of movement for the measurement object (shutter speed).
 - Edges can be enhanced and the influence of noise can be reduced (filtering).
 - Background patterns can be cut (background suppression).
- 2** Images of acceptable (OK) and unacceptable (NG) products are registered so that measurement conditions can be set automatically. These are called sample images.
 - 3** Measurement conditions are set automatically using the registered sample images from step 2.
 - Measurement regions can be drawn in desired positions, enabling measurement that is focussed on particular areas.
 - When measuring objects in almost exactly the same position (i.e.: the objects are positioned), processing time can be reduced by turning OFF the position compensation function.
 - 4** Measurement conditions are checked to ensure that proper measurement is possible under the measurement conditions set in step 3.
 - 5** Actual measurements are performed according to the set measurement conditions.

3-2 Displaying Images

Display the measurement object on the Video Monitor. Adjust the camera distance to get a clear image.

Camera distances → Section 2 Product Introduction in the Setup Manual

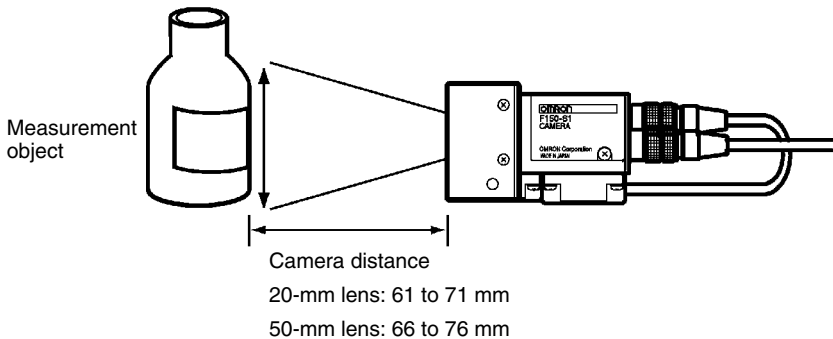
Note Adjust the image so that the part of the object to be measured is in the center of the screen.



Field of vision: (H × W)

20-mm lens: 20 mm × 20 mm

50-mm lens: 50 mm × 50 mm



Caution The light will gradually become darker if used for long periods of time. Adjust the measurement conditions regularly. The light will lose approximately 20% illumination after 1,500 hours of use.

Optional Functions → p. 29

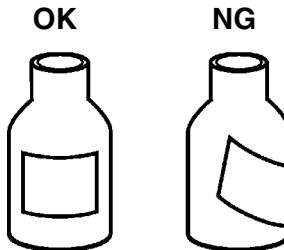
Measurement cannot be performed properly with unclear images. Using one of the following optional functions, adjust the images so that the difference between OK objects and NG objects is clear.

- Shutter Speed: Change the camera shutter speed if the image is blurred due to fast (or slow) movement of the measurement object.
- Filtering: Reduce the effects of noise and enhance the edges of the measurement object.
- Background Suppression: Use this function to exclude any background patterns from measurement.

3-3 Registering Images

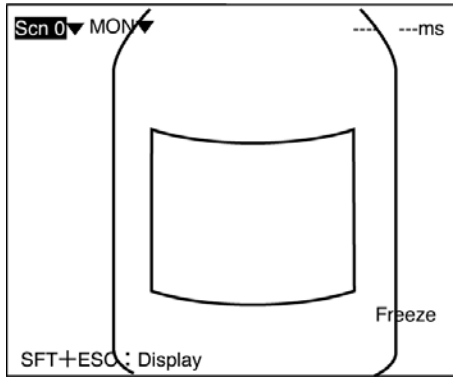
Register acceptable and unacceptable images as samples so that the measurement conditions can be set automatically.

Note Register at least one OK sample image. The measurement conditions cannot be set if no OK sample image is registered.

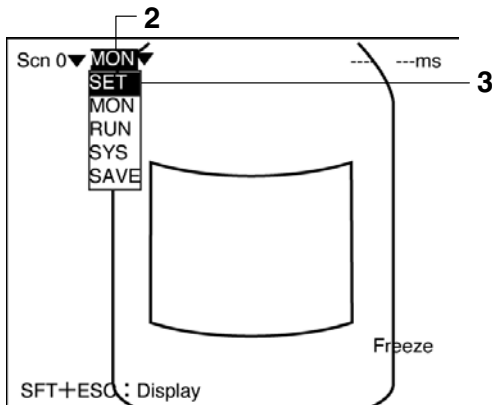


Procedure

- 1 When the power is turned ON for the first time, the following screen will be displayed.

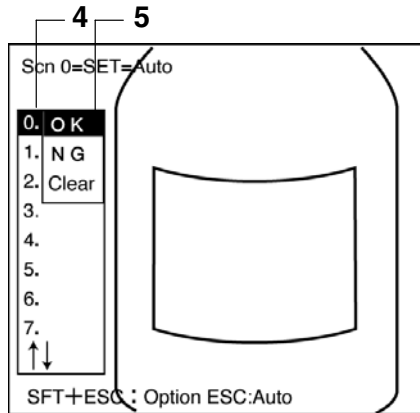


- 2 Select **MON**. The mode menu will be displayed.



- 3 Select **SET**. The F150 will enter Set mode.

- 4 Display the measurement object to be registered on the screen, and press the **ENT** Key. The selections **OK**, **NG** and **Clear** will be displayed.



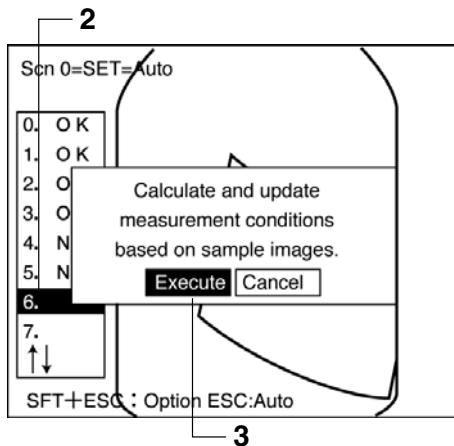
- 5 Select either **OK** or **NG** as appropriate for the displayed image. The sample image will be register as memory image 0. When registration has been completed, the cursor will automatically move to Memory 1. To register more images as samples, repeat steps 4 and 5 as required.

3-4 Setting Measurement Conditions

The F150 performs the calculations necessary for measurement condition parameters according to the sampled images. Carry out the operation in accordance with the messages displayed on screen.

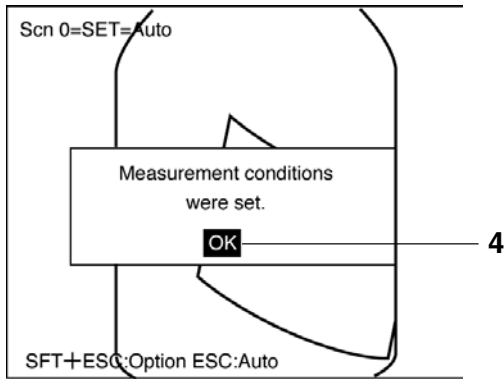
Procedure

- 1 Check that all of the registered sample images show either **OK** or **NG**. If **??** appears as a memory number, parameter calculation cannot be performed. Either set to **OK** or **NG**, or clear that memory image.
- 2 Press the **ESC** Key. A confirmation message will be displayed.



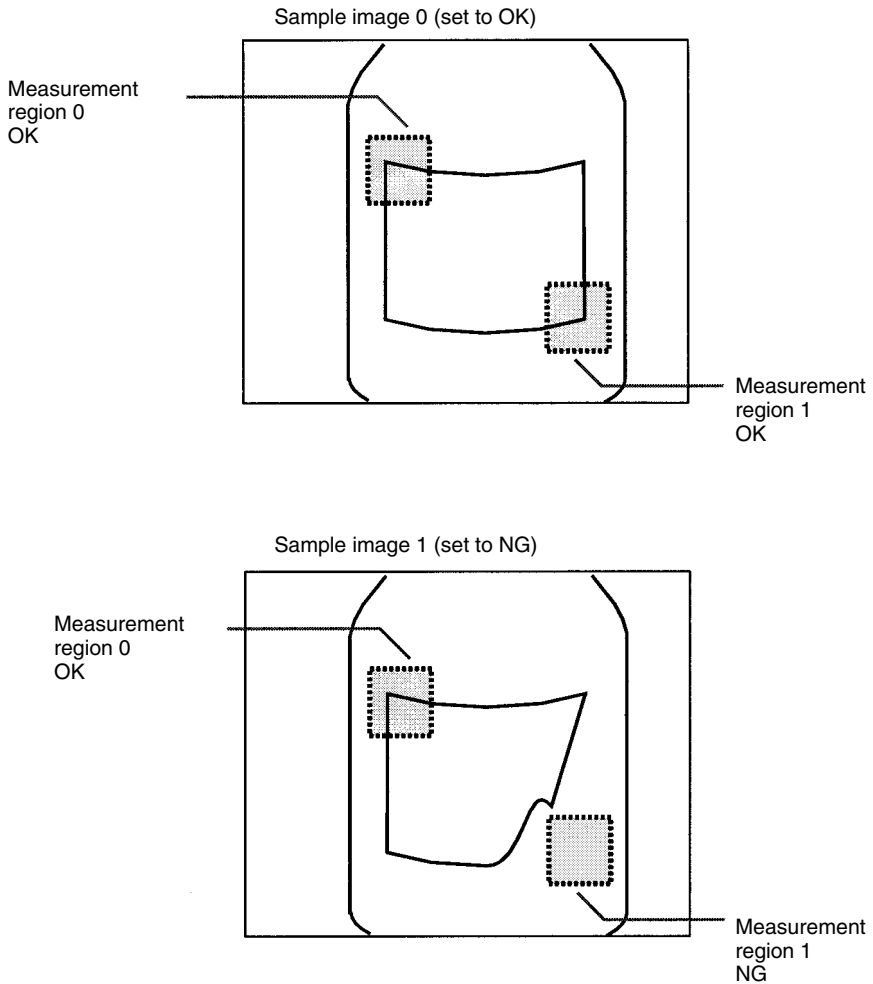
- 3 Select **Execute**. Automatic setting will be performed. Wait until the setting result is displayed.

- 4 Select **OK** to confirm the settings and to exit this screen. The F150 will automatically enter Monitor mode.



Optional Functions → p. 29

- Measurement regions can be drawn in desired positions, enabling measurement to be focussed on particular areas. Also, OK or NG can be set for individual regions allowing more precise measurement conditions.

Example

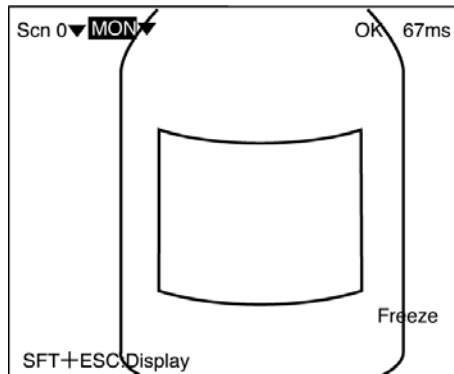
- The position displacement compensation function can be turned ON or OFF. When measuring objects in almost exactly the same position (i.e.: the objects are positioned), processing time can be reduced by turning OFF this function.

3-5 Checking Measurements

Check whether or not objects can be correctly measured using the measurement conditions set in the last section. Measurement results cannot be output to external devices. The measurement conditions can only be checked on the screen.

Procedure

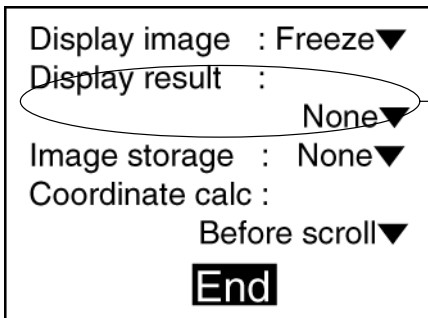
Display the measurement object on the screen, and either press the **TRIG** Key or input the STEP signal. The overall judgement result and the time taken for measurement will be displayed. Display several different measurement objects, and check that measurement is performed correctly for each of them.



- Note**
1. If measurement is not performed correctly, perform one of the following steps.
 - Register another sample image and perform the setting procedure again. → **p. 18**
When registering another NG image, clear the scene first. Otherwise, the measurement conditions will not be set correctly. The registered sample images are not deleted from memory by clearing the screen. Reset an OK or NG judgement for the sample images. → **p. 46**
 - Adjust the measurement conditions using the optional functions. → **p. 29**

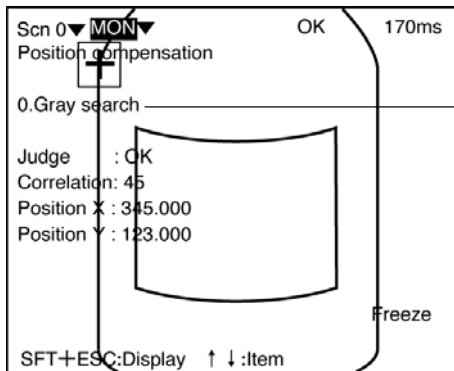
2. The contents of the screen display can be changed. Press the **SHIFT + ESC** Keys to go to **Display settings**.

Display settings menu



Change this item.
For details of other items refer to 3-9-3 Measurement Screen Settings → p. 52

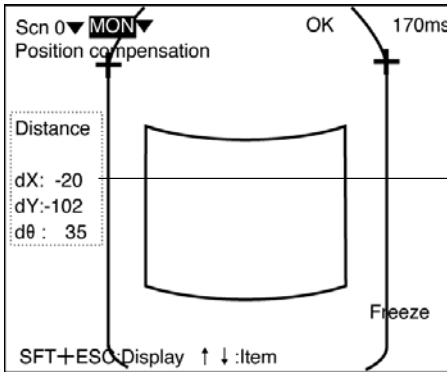
- Position Compensation:
If the position compensation function is ON, the displacement of the measurement object and the method for position displacement compensation can be checked. (NG items will displayed in reverse black and white.)



Position displacement compensation method. (see note)
Switch region using **Up/Down** Keys.
Press the **SHIFT + ENT** Keys from this screen to display the judgement conditions screen. (see note)

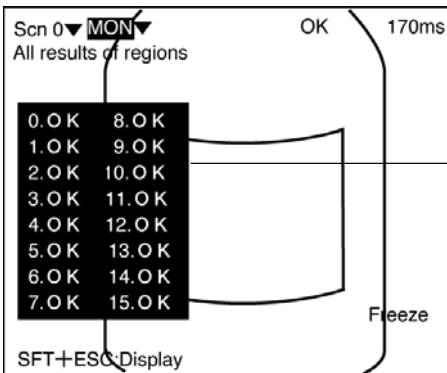
Note For details of procedures required to change position displacement compensation methods and judgement conditions, refer to the Expert Menu Operation Manual.

Switch the screen with **Up/Down** Keys.



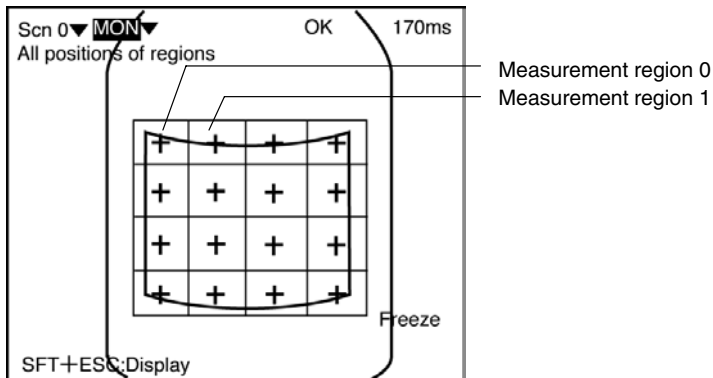
If the judgement result for position displacement compensation is NG, the image will not be scrolled, and the displacement will be 0.

- All Results of Regions:
Judgement results for all the regions are displayed on one list. (NG items will displayed inverted.)

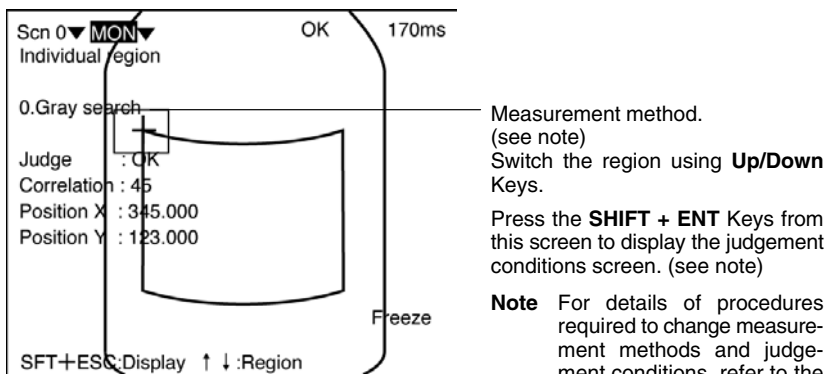


Press the **SHIFT + Left/Right** Keys to change the brightness of the background (dark ↔ clear).

- All Positions of Regions:
The positions and number of measurement regions can be checked.



- Individual Region:
The measurement method for each region can be checked individually. (NG items are displayed in reverse black and white.)



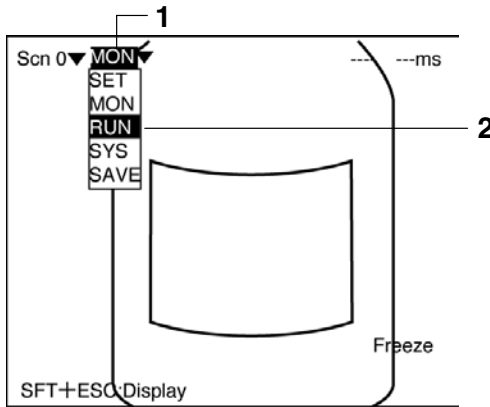
Note For details of procedures required to change measurement methods and judgement conditions, refer to the Expert Menu Operation Manual.

3-6 Measuring Objects

Measure objects using the set measurement conditions. Overall judgement results are output to the terminal blocks or Compo-Bus/D.

Procedure

- 1 Select **MON**.
- 2 Select **RUN**. The F150 will enter Run mode.



- 3 Display the measurement object on the screen, and either press the **TRIG** Key or input the STEP signal. Measurement will be performed and the overall result will be output. The overall measurement result and the time taken for measurement will be displayed on the screen.

- Note**
1. Measures images can be stored in memory. Go to **Display settings** by pressing the **SHIFT + ESC** Keys and make the relevant settings for **Image storage**. → p. 52
 2. To display an image from memory on the screen, press the **SHIFT + Up/Down** Keys, and the display image will change. By pressing the **SHIFT + TRIG** Keys, measurement will be performed for the displayed image. → p. 57
 3. To display a measurement value on the screen, press the **SHIFT + ESC** Keys, and make the relevant setting in the **Display settings** screen. For details refer to the section on Monitor mode. → p. 25

3-7 Optional Functions

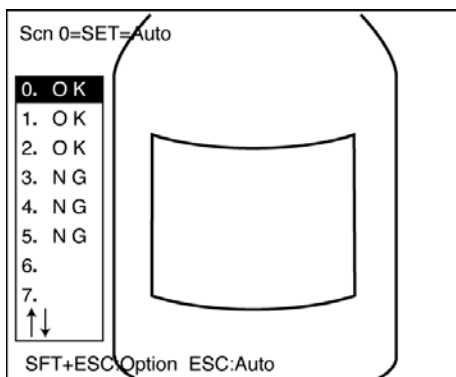
This section explains the following procedures:

- Moving to the optional functions menu.
- Performing image adjustment.
- Turning ON/OFF the position compensation function.
- Drawing a measurement region in a desired position.

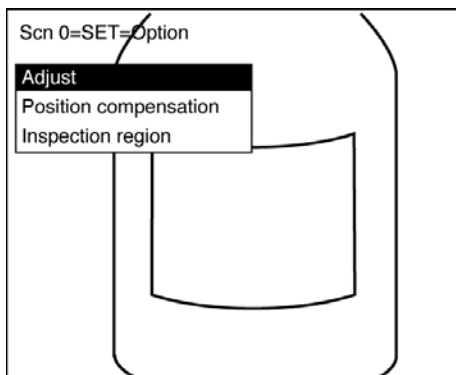
3-7-1 Optional Functions Menu

Procedure

- 1 Go into Set mode.



- 2 Press the **SHIFT + ESC** Keys. The basic screen for the optional functions will be displayed. Press the **ESC** Key to return to Set mode.



3-7-2 Image Adjustment

Measurement cannot be performed properly with unclear images. Using one of the following optional functions, adjust the images so that the difference between OK objects and NG objects is clear.

Shutter Speed

Change the shutter speed when the object is moving quickly, causing the image to be blurred.

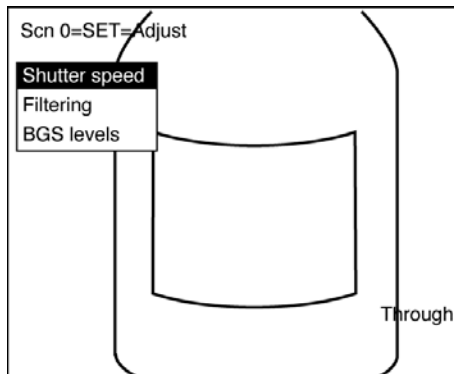
Object movement	Shutter speed
Slow ▲	1/100 s 1/500 s 1/2000 (*) s 1/10000 s
Fast ▼	

* Default setting

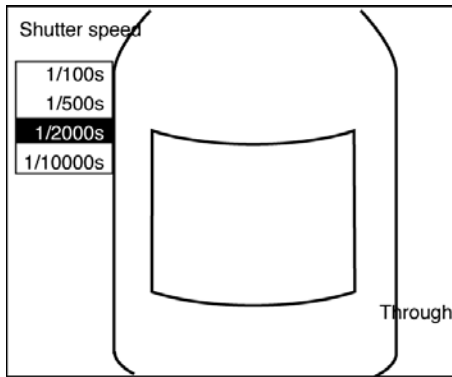
Note When changing the shutter speed after sample images have been registered, clear the sample images first and re-register them.

Procedure

1 Go to **Adjust/Shutter speed**.



2 Select the shutter speed while monitoring the image.



Filtering

The image read by the Camera can be manipulated to create an image that is easier to measure, by using smoothing or edge enhancement.

Smoothing displays a smoothed image with reduced noise. Smoothing allows suppression of the effects of uneven lighting due to an uneven or damaged surface.

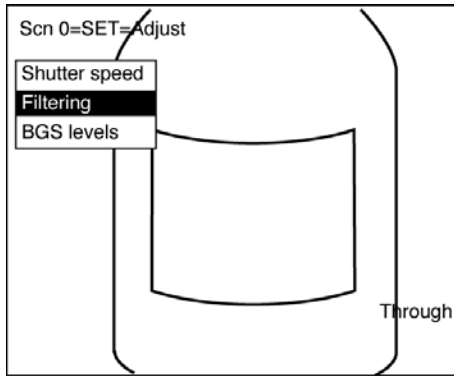
Edge enhancement displays an image with enhanced edges between bright and dark regions to compensate for blurred images.

The cursor can be moved on the image to see the effects of filtering.

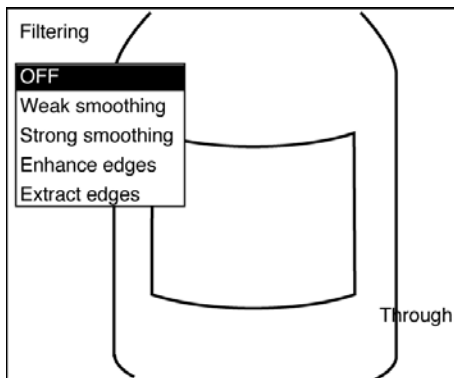
Filtering method	Function
OFF	No filtering.
Smoothing	Displays a smooth image with reduced noise. Select either weak or strong smoothing.
Enhance edges	Displays an image with enhanced edges between bright and dark regions.
Extract edges	Displays an image with the edges between the bright and dark regions extracted.

Procedure

1 Go to **Adjust/Filtering**.



2 Select the type of filtering required while monitoring the image.



Background Suppression

Background suppression (BGS) excludes the background of the measurement object from the measurement process.

BGS changes image areas with densities below the lower limit to 0, and image areas with densities above the upper limit to 255. Image areas with densities between the lower and upper limits are graded from 0 to 255 so that only images with densities between the lower and upper limits are measured.

Look at the image and set the upper and lower limits of the density to eliminate the background.

Example

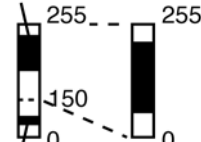
Lower limit: 150 Upper limit: 255

Measurement object



Background

Density



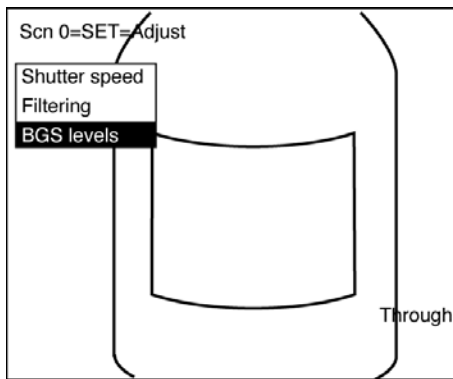
Background density (cut)

Image areas with densities of 149 or lower will not be measured and the density will be changed to 0.

Only image areas with densities between 150 and 255 will be measured. The whole image is graded from 0 to 255.

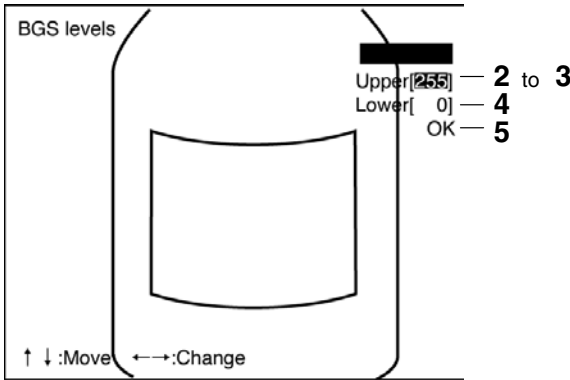
Procedure

1 Go to **Adjust/BGS levels**.



2 Move the cursor to the upper limit.

- 3 Using the **Left/Right** Keys, change the numerical value. Press the **Right** Key to increase the smallest digit by 1. Press the **Left** Key to decrease the smallest digit by 1.



- 4 Change the lower limit in the same way.
- 5 Select **OK** to enter the settings and to exit this screen.

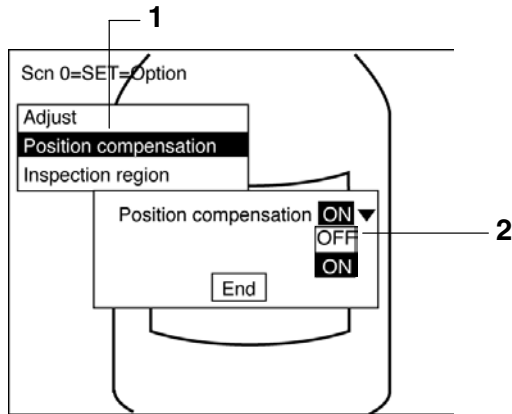
3-7-3 Position Compensation ON/OFF

Using the position displacement compensation function, even if the position of the measurement object is slightly different to that of the OK sample images, position displacement compensation is automatically performed to ensure correct measurement of the object. When using this function, the processing time will be longer than the ordinary measurement time by the time taken to perform position compensation. When measuring objects in almost exactly the same position (i.e.: the objects are positioned), processing time can be reduced by turning OFF the position compensation function.

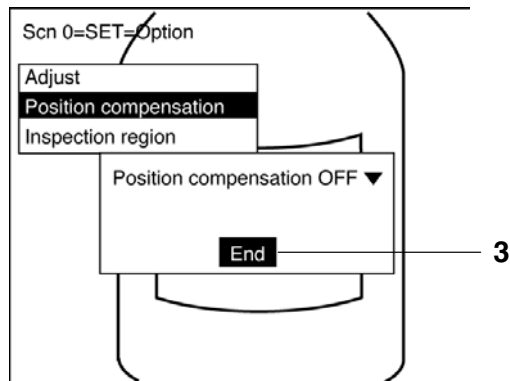
Procedure

1 Select **Position compensation**.

2 Select **OFF**.








3 Select **End** to enter the setting and to exit this screen.



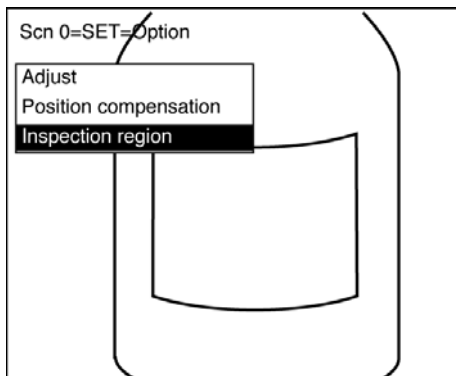
3-7-4 Drawing Measurement Region

Up to 16 measurement regions can be drawn in desired positions. Set OK or NG for each region in a sample image. The measurement conditions for each region will be set automatically. The measurement regions created in this way can be edited or cleared as required.

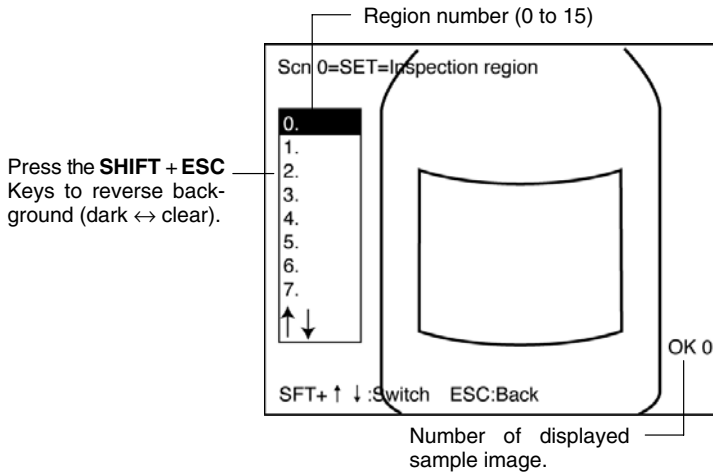
Type of region		Drawing method
Box		Specify 2 opposite corners.
Ellipse		Specify 2 opposite corners for the circumscribed rectangle of the ellipse.
Circle		Specify the center and the radius.
Circumference		Specify the center, radius, and thickness.
Polygon		Specify up to 10 neighboring vertices. At the last point, press the ENT Key twice and the last point will be joined to the first point and the region will be drawn.

Procedure

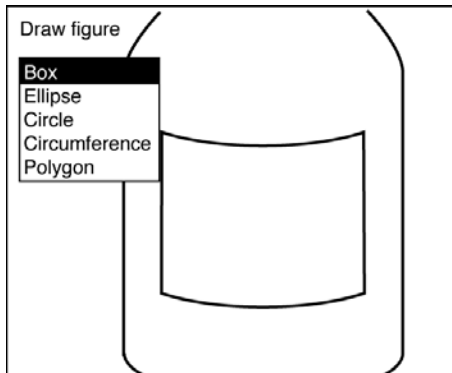
- 1 Select **Inspection region**. If the position compensation function is ON, the image of the measurement object will be scrolled so that it is in the center of the screen. Sample image 0 will be displayed.



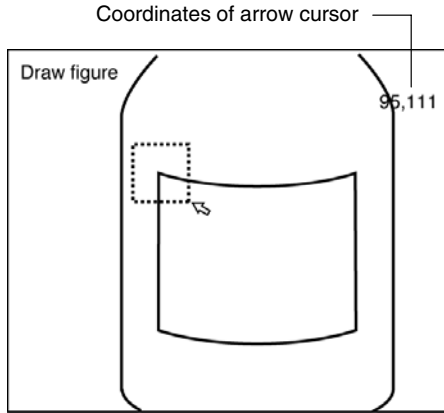
2 Move the cursor to 0, and press the ENT Key.



3 Select the desired shape.

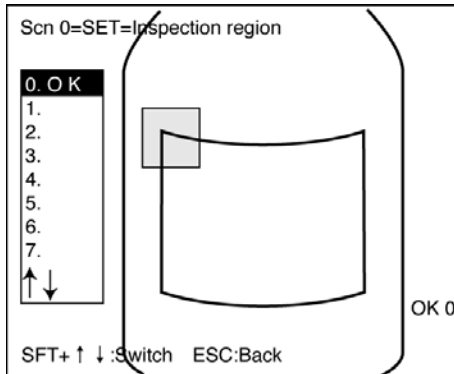


4 Draw the region.

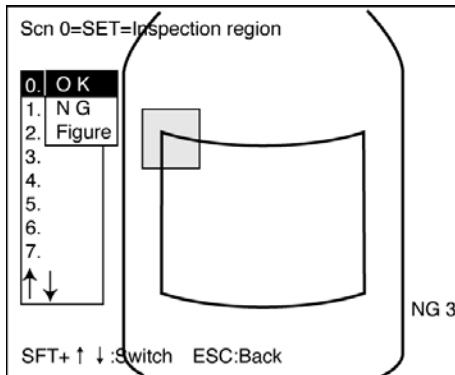


5 Set either OK or NG for the drawn region.

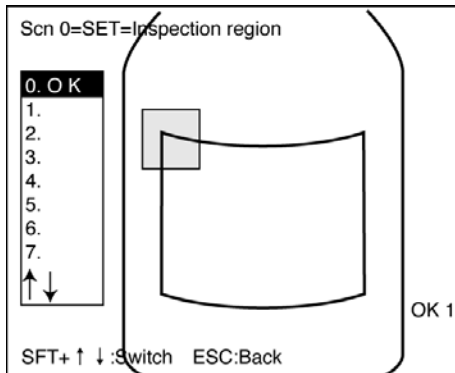
If an OK image is being displayed, an OK setting will automatically be made.



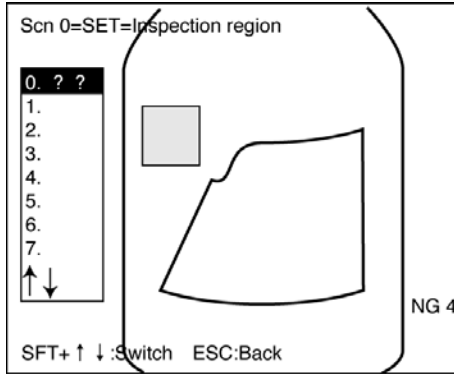
If an NG image is being displayed, set OK or NG as desired.



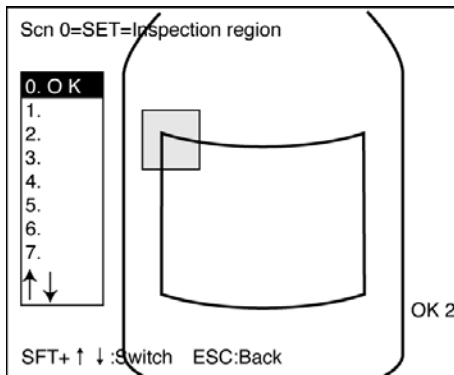
- 6** Switch sample images using the **SHIFT + Up/Down** Keys, and make OK/NG settings for all of the registered images. If the image is switched to an OK image, an OK setting will automatically be made.



If the image is switched to an NG image, ?? will be displayed. Set OK or NG as desired.

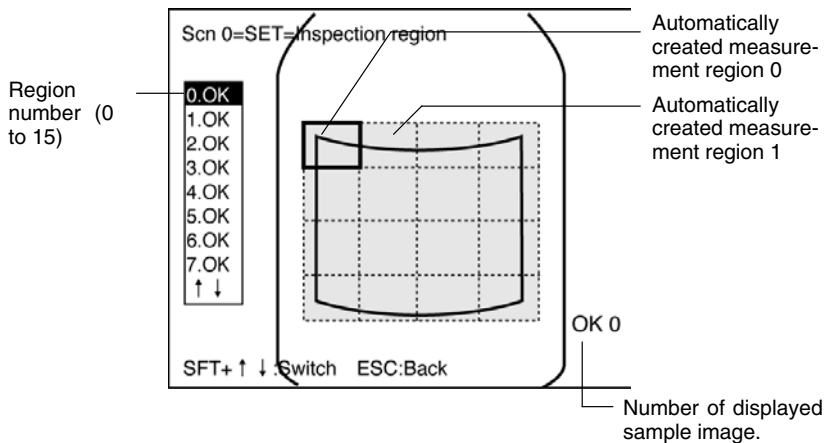


7 Press the **ESC** Key to return to the basic screen for the optional functions.



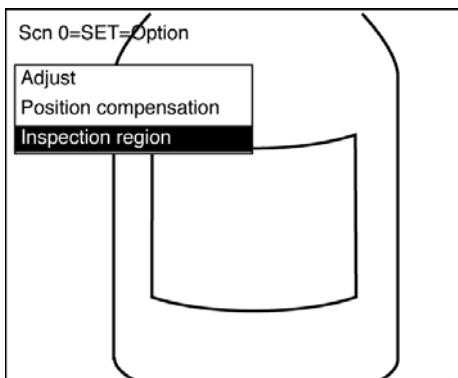
Correcting/Clearing Measurement Regions

The procedures for correcting and clearing measurement regions are given below. These procedures can be used not only for drawn regions, but also for regions created automatically.

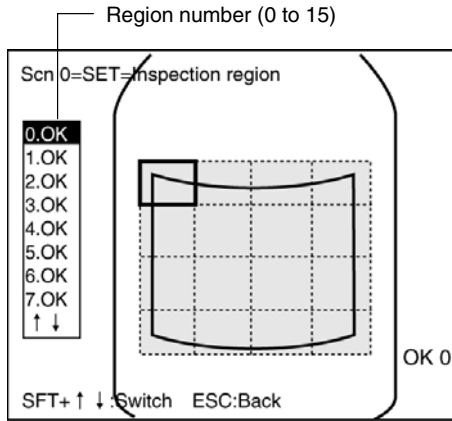


Procedure

- 1 Select **Inspection region**.

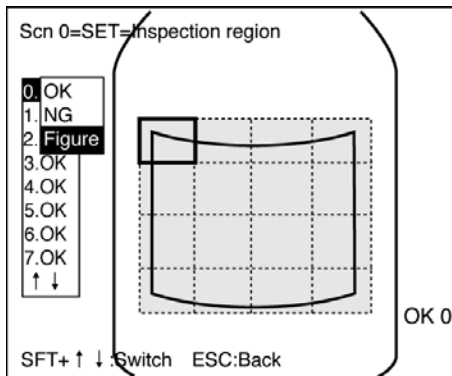


2 Move the cursor to the number of the region to be corrected or cleared and press the **ENT** Key.

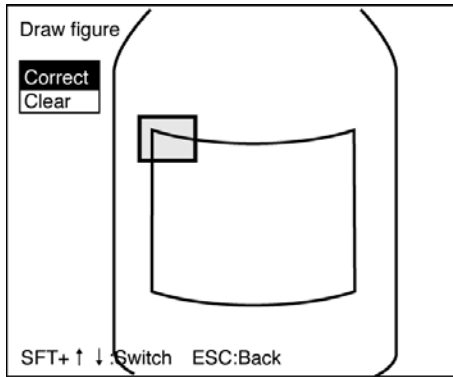


3 Move the cursor to **Figure** and press the **ENT** Key.

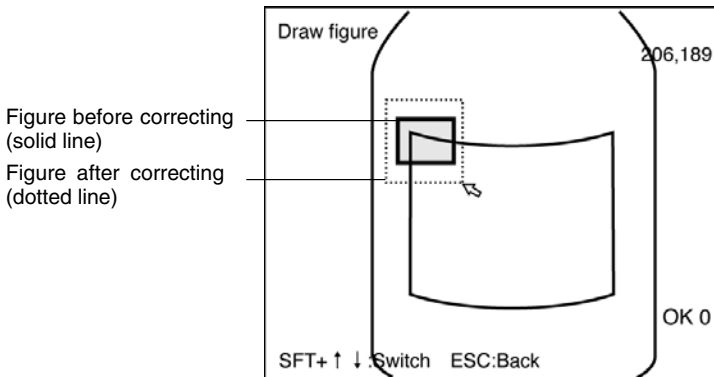
- For correcting, go to steps 4 and 5.
- For clearing, go to step 6.



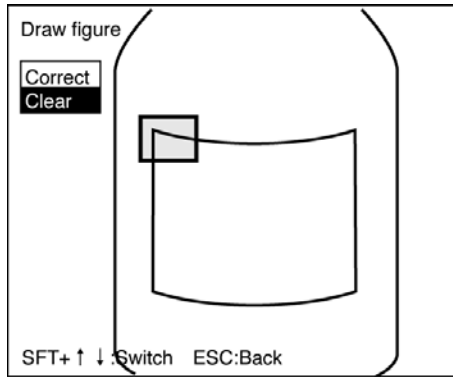
4 Select **Correct**.



5 Correct the figure as desired.
Return to step 2.



- 6 Select **Clear**. The region will be cleared and the screen for step 2 will be returned.



Note To clear all regions together, clear the scene. → p. 46

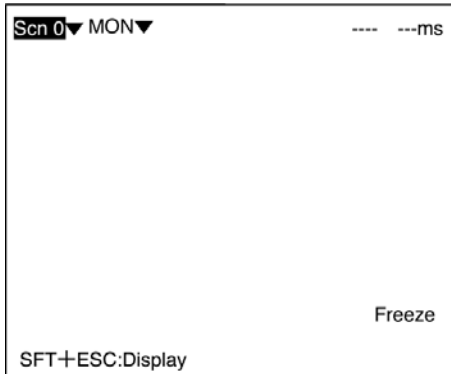
3-8 Changing Scenes

All the settings for measurement conditions are input under "scenes." Up to 16 scenes can be set, numbered from 0 to 15 (see note). Scenes can be changed to switch between different measurement conditions for different measurement setups or measurement objects. Scene 0 will be displayed by default when the power is turned ON.

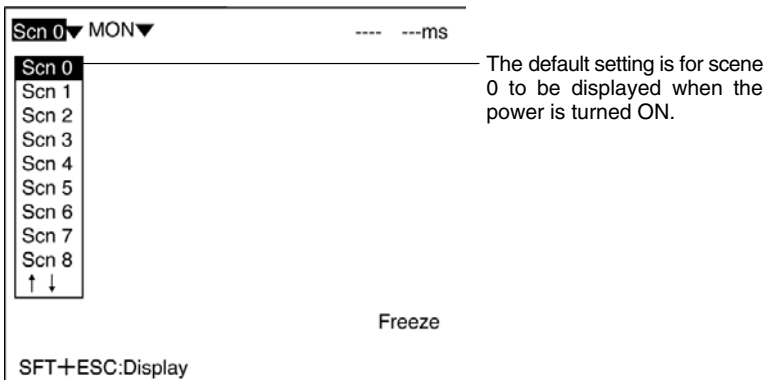
Note It may not be possible to use all 16 scenes if there is a lack of available memory. In this case, a warning message will be displayed on the screen. Make regions and models as small as possible and delete any regions and models that are not required, before continuing operation.

Procedure

- 1 Display the basic screen.



- 2 Move the cursor to **Scn 0** and press the **ENT** Key. A list of scenes, from scene 0 to scene 8, will be displayed. Use the **Down** Key to scroll down and display the rest of the list, from scene 9 to scene 15.



- 3 Using the **Up** and **Down** Keys, move the cursor to the desired scene and press the **ENT** Key. The selected scene will be displayed. After the scene has been selected, the mode will return to the original one.

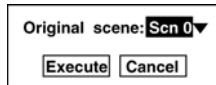
Copying Scene Data

Procedure

- 1 Move the cursor to the scene number to which data is to be copied, and press the **SHIFT + ESC** Keys. The **Copy/Clear** selection menu will be displayed.



- 2 Select **Copy**.
- 3 Enter the number of the scene from which data is to be copied (**Original scene**), and select **Execute**. The data will be copied.



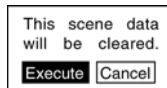
Clearing Scene Data

Procedure

- 1 Move the cursor to the number of the scene to be cleared, and press the **SHIFT + ESC** Keys. The **Copy/Clear** selection menu will be displayed.



- 2 Select **Clear**. A confirmation message will be displayed.
- 3 Select **Execute**. The scene will be cleared.



3-9 System Settings

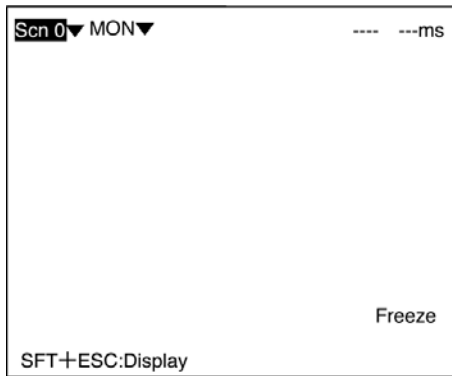
The following system settings are available for the F150:

- Communications: Used to make settings necessary for communications with an external device. → p. 72, 78, 92
- Output: (Not used with Auto Menu.)
- Backup: Used to make a backup to a computer.

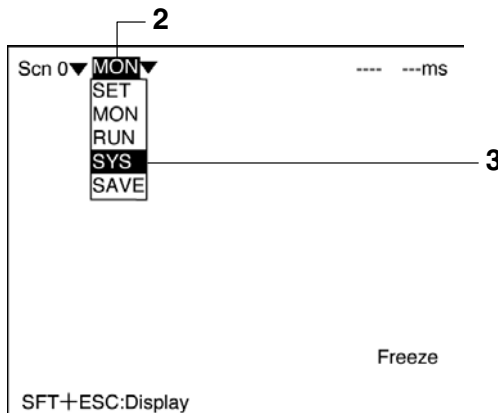
- Display: Used to make settings related to measurement screens.
- Switch menu: Used to change menus.
- Startup mode: Used to set the startup scene and startup mode.
- Error method: Used to select the output method for error terminals.
- Version: Used to display the system version.

3-9-1 System Menu

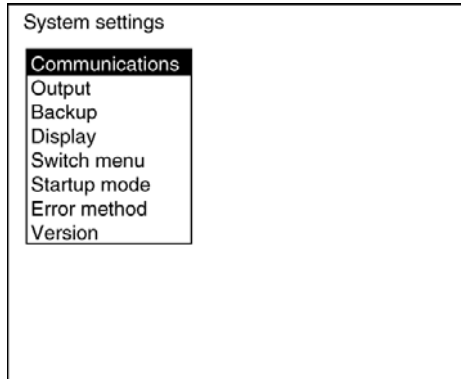
1 Display the basic screen.



2 Move the cursor to **MON** and press the **ENT** Key.



3 Select **SYS**. The system menu will be displayed.




3-9-2 Saving/Loading System and Scene Data

The system and scene data can be backed up on a computer. The same data can also be loaded from a computer to the F150. Saving and loading data enables using the same data on other F150 Controllers.

It is recommended that data is backed up in case data is lost or the F150 malfunctions.

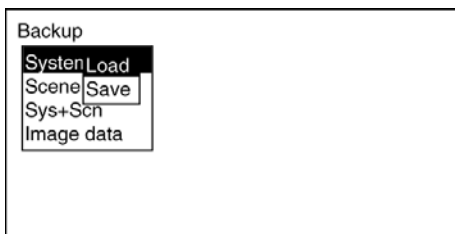
Data	Contents
System data	Settings for communications, output destinations, screens, switching menus, startup mode, and error output method.
Scene data	Measurement condition settings for scenes.
System data and scene data	Both the system data and scene data (0 to 15) together.
Image data	Memory images in BMP format. This is the basic image format for Windows and so the images can be displayed on a personal computer.

Note Data is saved from the F150 to a computer, and loaded to the F150 from a computer.

 **Caution** Do not turn OFF the power or input a RESET signal while a message is being displayed in any save or load operations. Data in memory will be destroyed, and the F150 may not operate correctly the next time it is started.

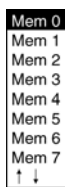
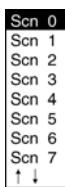
Procedure

- 1 Go to **SYS/Backup**.
- 2 Select the kind of data to be loaded/saved.
- 3 Select **Load** or **Save** as required.



- 4 For scene data or image data, select the corresponding number.

Scene number (0 to 15) Image data (Mem 0 to 23)



- 5 A confirmation message will be displayed. Select **Execute**. When data transfer has been completed, a notification message will be displayed.

Sample Operation for Personal Computer

As an example, this section explains how to perform data transfers using HyperTerminal on Windows 95/98 or Windows NT 4.0. It is assumed that an RS-232C cable is connected to COM1 on the personal computer. If the COM number is different, adapt the procedure accordingly. If different communications software is to be used, refer to the relevant manual for that software. Data communications are performed according to Xmodem (-CRC or -SUM) protocol.



Caution Do not turn OFF the power or input a RESET signal while a message is being displayed in any save or load operations. Data in memory will be destroyed, and the F150 may not operate correctly the next time it is started.

Saving Data to the Computer

- 1 Connect the COM 1 port on the computer and the F150 using an RS-232C cable.
- 2 Make the F150 communications settings. The default communications settings are as shown in the following table. These settings can normally be used.

Item	Setting
Baud rate	38,400 bps
Data length	8 (bits)
Parity	None
Stop bits	1 (bit)
Delimiter	CR

- 3 Start the HyperTerminal program on the computer and make the following communications settings. The same communications settings must be used on both the F150 and the modem on the computer.

Item	Setting
Speed	38,400 bps
Data bits	8 (bits)
Parity	None
Stop bits	1 (bit)
Flow control	None (Xmodem protocol is used.)

- 4 Execute the saving operation from the F150. The data transfer screen will be displayed.

Saving data.

- 5 Select **Transfer/Receive File** from the HyperTerminal menu.
- 6 Specify where the file is to be saved and set the protocol to **Xmodem**.
- 7 Select **Receive**. The data will be transferred from the F150 to the computer.

The F150 will generate a timeout error if no response is received from the external device within 30 seconds. An error message will be displayed, and the error terminal will turn ON.

Loading Data from the Computer

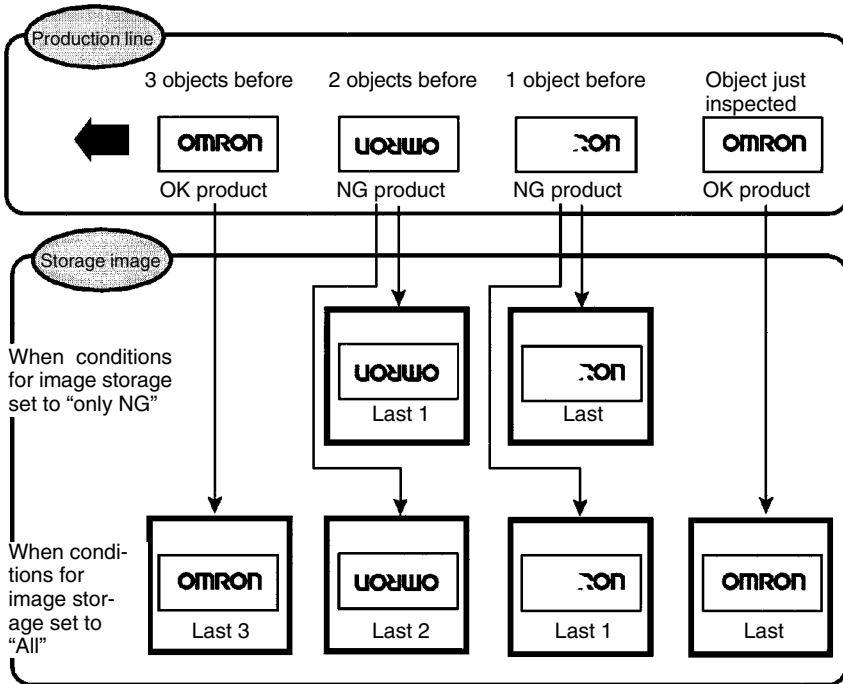
- 1** Follow steps 1 to 3 in the above procedure to connect the F150 and the computer.
- 2** Select ***Transfer/Send File*** from the HyperTerminal menu.
- 3** Select the file to be sent and set the protocol to ***Xmodem***.
- 4** Select ***Send***. The data transfer screen will be displayed.
- 5** Execute the loading operation from the F150.

The F150 will generate a timeout error if no response is received from the external device within 30 seconds. An error message will be displayed, and the error terminal will turn ON.

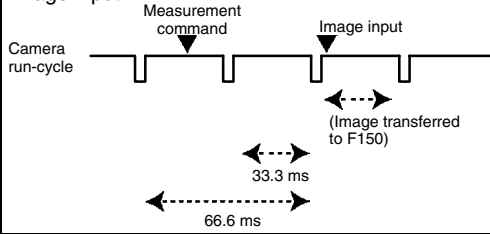
3-9-3 Measurement Screen Settings

Image Types to be Stored and Measurement Result Display

The F150 can store up to 23 measured images. It is possible to set the F150 to only store images which resulted in NG judgements, or to store all images regardless of the measurement result. Also, measurement results and other information can be displayed on the measurement screens and monitor screens. Make settings to determine which information is displayed.



- Note**
1. If measurement is performed with the **Image storage** setting set to **NG only** or **All**, the image samples registered in Set mode will be written over with measurement images. Therefore, it is recommended that at the measurement condition adjustment stage, the **Image storage** setting is set to **None**.
 2. Stored images are cleared when the power is turned OFF. Save the images by backing them up to a personal computer. → p. 48

Item	Details	
Display image	Select the display status for the screen.	
	Freeze (default setting)	Displays a still image (updated each time a measurement is performed.) When inspecting moving objects, select “freeze.”
	Through	<p>Displays the image currently being taken by the Camera. If measurement is performed in the through state, depending on the input timing of the measurement command, there will be a time-delay of between 33.3 and 66.6 ms before image input.</p> 
Display result	Select the data displayed for measurement results. → p. 25	
Image storage	Select the conditions for storage of measured images.	
	None (default setting)	Nothing stored.
	Only NG	Only images with NG judgements are stored. (However, the most recent image is stored regardless of the judgement.)
	All	All images are stored regardless of the judgement.
Coordinate calculation	Select the coordinates for output.	
	Before scroll (default setting)	Output made using the coordinate values before position displacement compensation.
	After scroll	Output made using the coordinate values after position displacement compensation.

Procedure

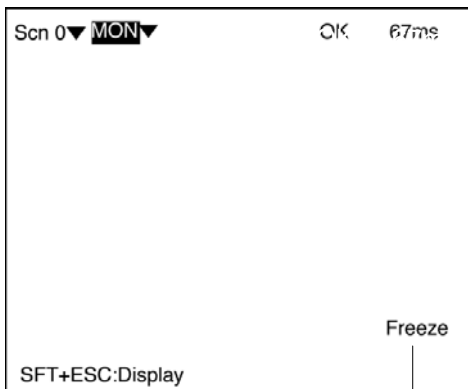
- 1** Go to **SYS/Display**.
- 2** Set the conditions.
- 3** Select **End** to enter the settings and to exit this screen.

Display settings

Display image :	Freeze▼
Display result :	None▼
Image storage :	None▼
Coordinate calc :	Before scr!!▼
End	

Changing the Display Image

By displaying a stored image on the screen, the reason for a previous NG judgement can be checked. Also, measurement can be re-performed on the stored image with different evaluation criteria. The message in the lower-right corner of the screen indicates the type of image being displayed.



Refer to the following table.

Display	Details
Freeze	The image that has just been measured is displayed. Whether this image is a freeze image or a through image depends on the settings in SYS/Display .
Through	
_(Mem <input type="checkbox"/>)	A previously stored image is displayed. Up to 24 (Mem 0 to 23) images are stored in accordance with the conditions for storage of measured images (only NG or All). When the image is to be backed up to a personal computer, specify a memory number in <input type="checkbox"/> .
Last (Mem <input type="checkbox"/>)	The measured image most recently stored is displayed. If this image had an NG judgement, "Last" will be in reverse black/white.
Last * (Mem <input type="checkbox"/>)	The * after "Last" contains the number indicating how many screens previously the image was stored. Up to 23 previous images can be displayed. "Last *" will be displayed in reverse black/white for NG images.
...(Mem <input type="checkbox"/>)	Either no image is stored in memory, or an image other than a measurement image (an image loaded from a personal computer or an image registered with the Auto Menu) is displayed.

Example



Second most recently stored NG image.

Memory number for the currently displayed image.

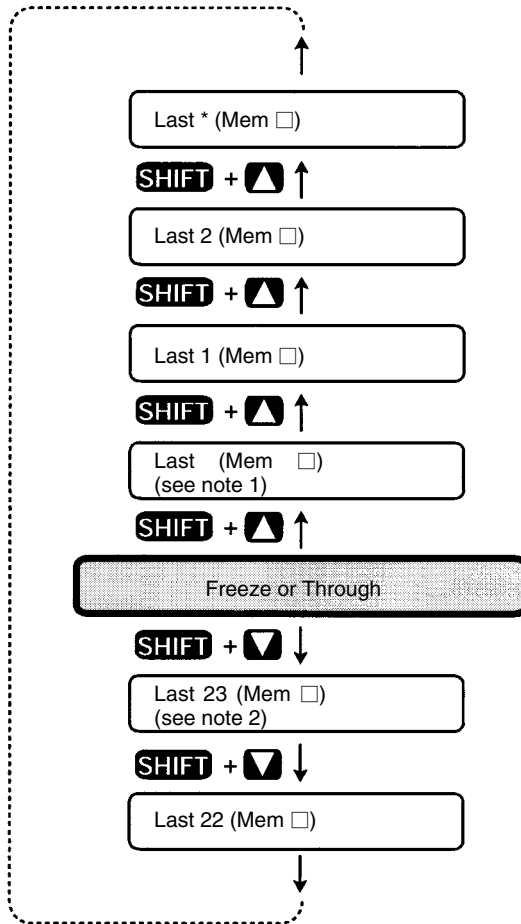
Image Switching

The displayed image can be switched in the following 2 screens:

- The Monitor mode Screen.
- The Run mode Screen.

Switching Method

Display any of the 2 screens listed above, and press the **SHIFT + Up/Down** Keys.



- Note**
- Under the following conditions, the images for “Last (Mem □)” and “Freeze” will be the same.
 - Display image: Set to freeze.
 - Image storage: Set to all.
 - or
 - Display image: Set to freeze.
 - Image storage: Set to only NG.
 - Last measurement was NG.

- If the following conditions hold, the number of stored images will not exceed 22.

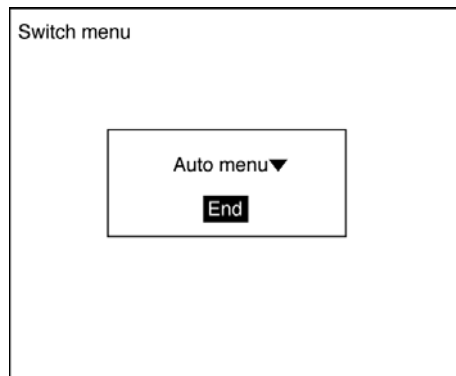
Image memory: Set to only NG
Last measurement was OK.

3-9-4 Switching Menu

The F150 features 2 menus: Auto Menu and Expert Menu. Use the following procedure to select which Menu is used when the power to the F150 is turned ON.

Procedure

- Go to **SYS/Switch menu**.
- Select the desired menu.
- Select **End** to enter the setting and to exit this screen.



3-9-5 Startup Scene and Mode

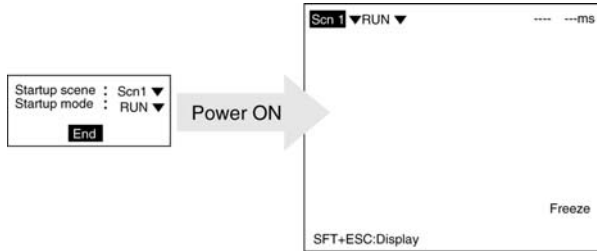
Use the following procedure to set the startup scene and mode that will be used when the power is turned ON.

If the F150 is set to start in Run mode for the scene where the desired measurement conditions are registered, measurement of objects can be started by simply turning the power ON.

The default setting is for scene 0 and Monitor mode.

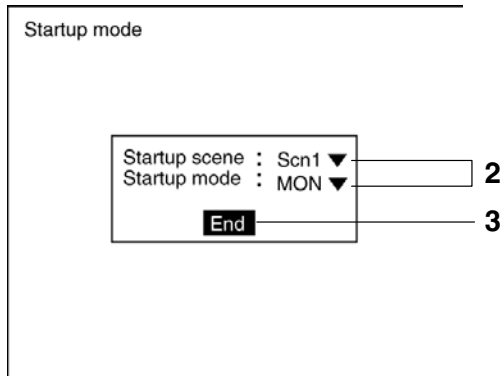
The following example illustrates operation when the startup scene is set to 1 and the startup mode is set to Run.

The next time the power is turned ON, the F150 will start at scene 1 and in Run mode.



Procedure

- 1 Go to **SYS/Startup mode**.
- 2 Select the startup scene number and the startup mode.
- 3 Select **End** to enter the settings and to exit this screen.



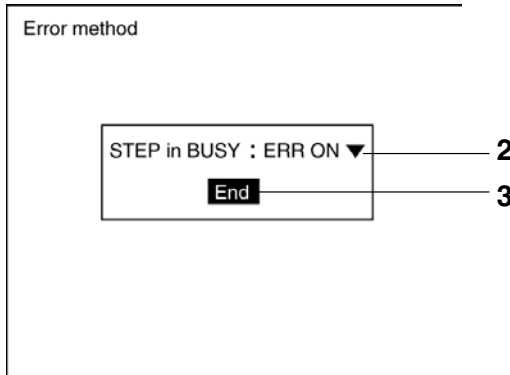
3-9-6 Selecting Output Method for Error Terminal

During processing (i.e.: while BUSY terminal is ON), even if the STEP terminal is turned ON, the F150 will not perform measurement. It is possible to set the ERR terminal so that it turns ON to indicate to an external device that input to the STEP terminal could not be received.

Selection	Details
ERR ON (default setting)	During processing (i.e.: BUSY terminal ON), if the STEP terminal turns ON, the ERR terminal will be turned ON and measurement will not be performed. The next time a STEP signal is input with the BUSY terminal OFF, the ERR terminal will go OFF.
OFF	During processing (i.e.: BUSY terminal ON), if the STEP terminal turns ON, the ERR terminal will not come ON. Measurement will not be performed.

Procedure

- 1 Go to **SYS/Error method**.
- 2 Select the desired setting.
- 3 Select **End** to enter the setting and to exit this screen.

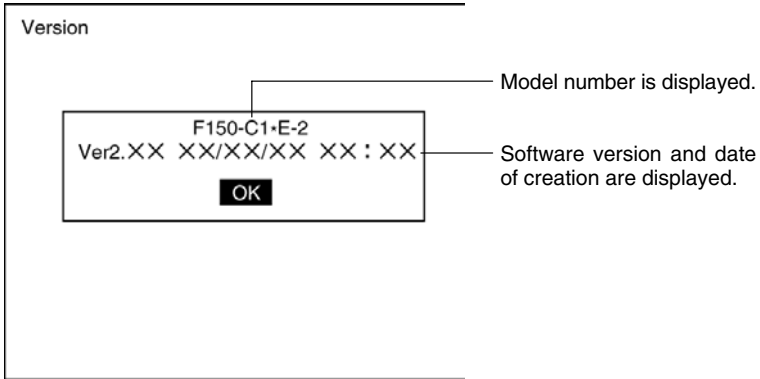


3-9-7 Checking the Software Version

Use the following procedure to check the Vision Sensor model and the software system version.

Procedure

- 1 Go to **SYS/Version**.
- 2 Select **OK** to exit this screen.

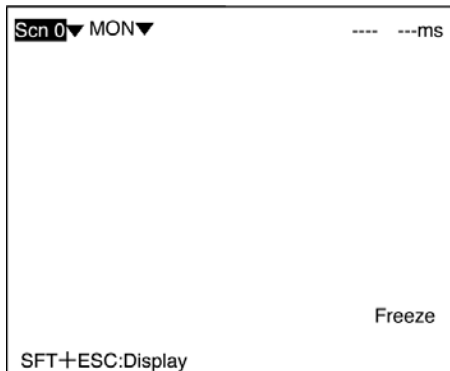


3-10 Saving to Flash Memory

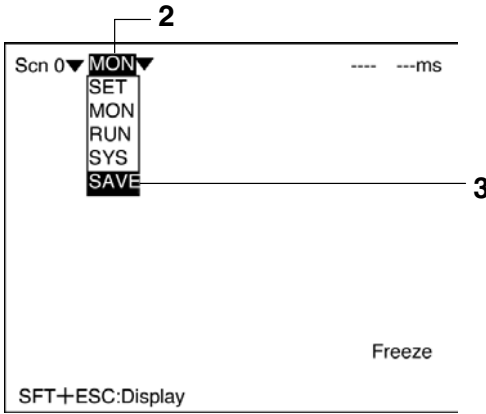
Use the following memory to save set data to flash memory. Flash memory data is loaded each time the F150 is started up. Therefore, when settings have been changed, be sure to save to flash memory before turning the power OFF. If the power is turned OFF without saving, all of the setting changes will be lost.

Procedure

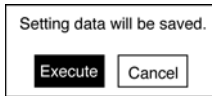
- 1 Display the basic screen.




2 Move the cursor to **MON** and press the **ENT** Key.



3 Select **SAVE**. A confirmation message will be displayed.



4 Select **Execute**. When saving has been completed, the screen for step 1 will be returned.

 **Caution** Do not turn OFF the power or input a RESET signal while a message is being displayed in any save or load operations. Data in memory will be destroyed, and the F150 may not operate correctly the next time it is started.

SECTION 4

Terminal Block

This section describes the communications settings and I/O formats for communications with external devices via the terminal blocks. For connection methods, refer to the Setup Manual.

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4-1-1	Inputs	64
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4-1 I/O Formats

The terminal blocks can be used to input and output various signals, e.g., to input a measurement trigger from a photoelectric or other sensor and to output the overall judgement to a Programmable Controller or other external device.

The I/O formats are described below. The operation of the terminal signals is described in the following section.

4-1-1 Inputs

The following commands can be input in Monitor mode or Run mode.

STEP Terminal

One measurement will be performed when the STEP terminal turns ON.

DI0 to DI7 Terminals (F150-C10E-2, F150-C15E-2)

The DI0 to DI7 inputs can be used to execute measurements continuously or to switch scenes as shown in the following table.

To use these inputs, turn ON DI7 1 ms or more after setting the status of the DI0 to DI6 inputs.

The F150-C10E-2-DRT does not have any DI terminals and therefore does not support the following commands.

Command	DI inputs								Function
	Execute	Command			Operand				
	7	6	5	4	3	2	1	0	
Continuous measurement	1	0	0	1	*	*	*	*	Measurement is performed continually during command input.
Switching scenes	1	0	1	0	Scene No.				Switches the scene.
Example	1	0	1	0	0	0	1	0	Switches to scene 2.


0: OFF


1: ON

*: Status is not read by F150, i.e., the status does not matter.

4-1-2 Outputs

The overall judgements (OK or NG) are output to the OR terminal on the terminal block. When using the F150-C10E-2 or F150-C15E-2, judgements are also output to the DO0 terminal. This output is only made in Run mode. It is not supported in Monitor mode. Also, the F150 can be set to turn ON output for either OK or NG judgements. The default is for output to be ON for NG judgements. → **p. 72**

 **Caution** After measurement is performed in Run mode, the data output to the OR terminal and DO terminal will be held until the next time measurement is performed in Run mode. The output status will be held even if the mode is changed.

 **Caution** The initial status of the output terminals is OFF. The terminals, however, may turn ON for approximately 0.5 s when the power is turned ON. Be sure to allow for this when reading the status at an external device.

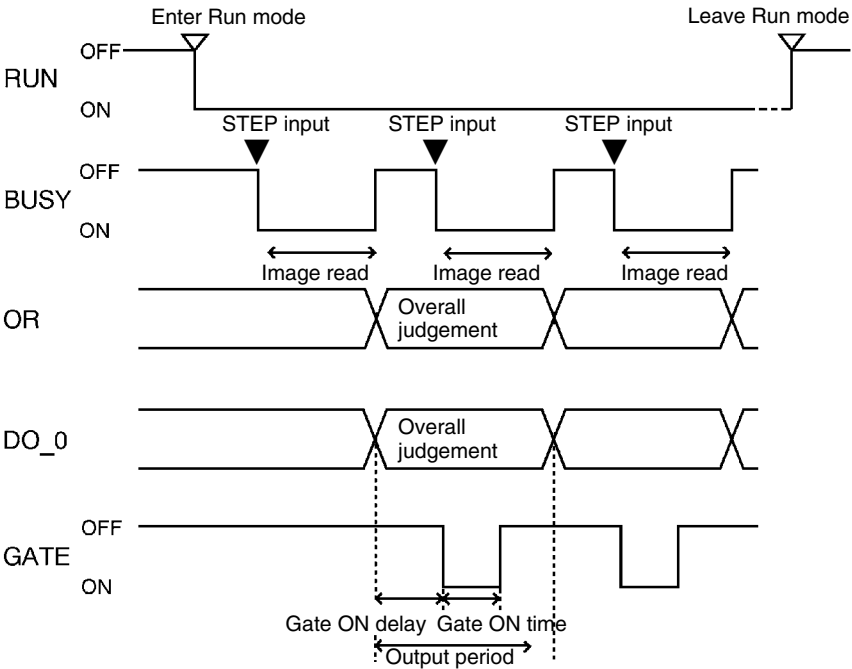
4-2 Terminal Signal Operation and Timing

This section describes the operation of the terminal signals based on the various communications settings that are possible. Use the information provided in this section to determine the proper communications settings to be made.

4-2-1 No Handshaking

The F150 outputs the measurement result without synchronizing with the external device. Read the measurement result at the external device while the GATE terminal is ON.

Using the STEP Signal as a Measurement Trigger



Output Terminals

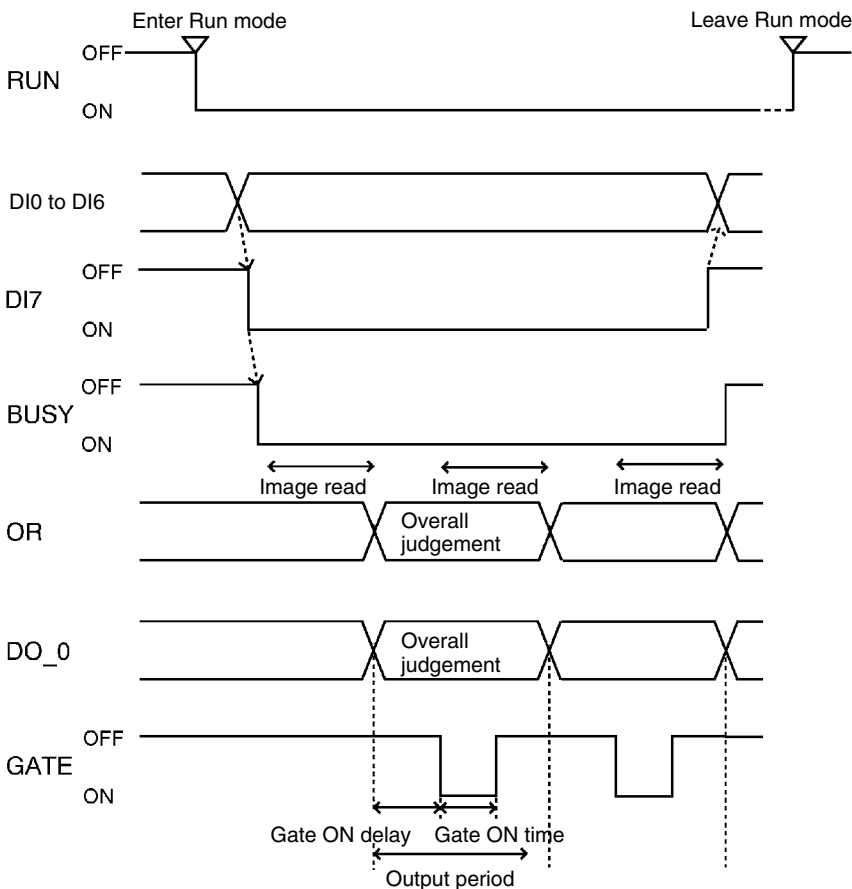
Terminal	Function
RUN	Turns ON during Run mode.
BUSY	Shows that the F150 is reading an image, changing a scene, etc. Do not input the next command while the BUSY signal is ON. Otherwise, commands may not be properly executed.
OR DO 0	Outputs the overall judgement. Can be set to turn ON for either OK or NG judgement in the settings screen for communications specifications. Note There are no DO terminals for the F150-C10E-2-DRT.
GATE	Used to time the reading of the measurement result at the external device. The time that GATE is turned ON can be set as required for the external device to correctly read the measurement result. Make the output time shorter than the duration of the measurement (STEP input). If the cycle is longer, the output timing will fall behind as measurements are repeated. Note If the GATE terminal control output is set to user output in the communications specifications settings menu for CompoBus/D, the GATE terminal cannot be used to control timing.

Input Terminals

Terminal	Function
STEP	Inputs a measurement trigger from a photoelectric sensor or other external device. One measurement will be taken on the rising edge of the STEP signal. Turn ON the STEP for at least 0.5 ms.

Note If a STEP signal is input while the BUSY terminal is ON, the ERR terminal will come ON. → p. 60

Performing Continuous Measurements (F150-C10E-2, F150-C15E-2)



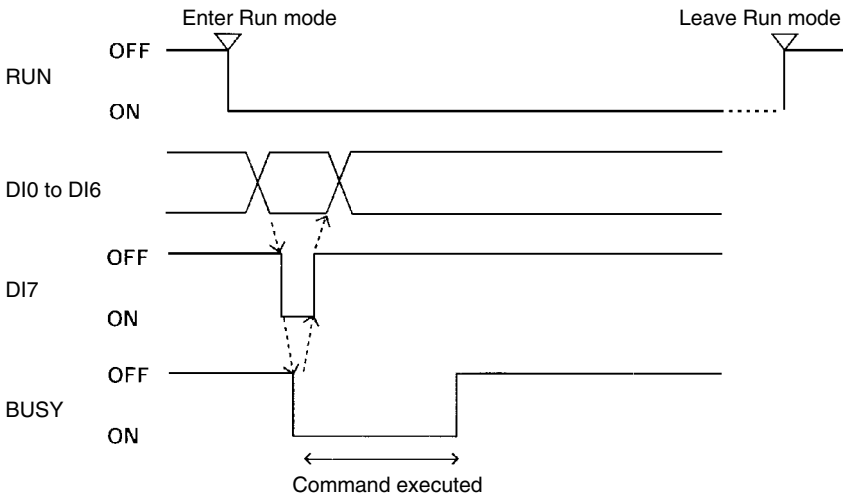
Output Terminals

The function of the output terminals is the same as when inputting a measurement trigger using the STEP terminal, as described previously.

Input Terminals

Terminal	Function
DI0 to DI3	OFF
DI4	ON
DI5 to DI6	OFF
DI7	Execution trigger. Leave at least 1 ms after setting DI0 to DI6 before turning DI7 ON. During command execution, the BUSY terminal will stay ON.

Scene Changing and Model Registration (F150-C10E-2, F150-C15E-2)



Output Terminals

Terminal	Function
RUN	Turns ON during Run mode.
BUSY	Shows that the F150 is reading an image, changing a scene, etc. Do not input the next command while the BUSY terminal is ON. Otherwise, commands may not be properly executed.

Input Terminals

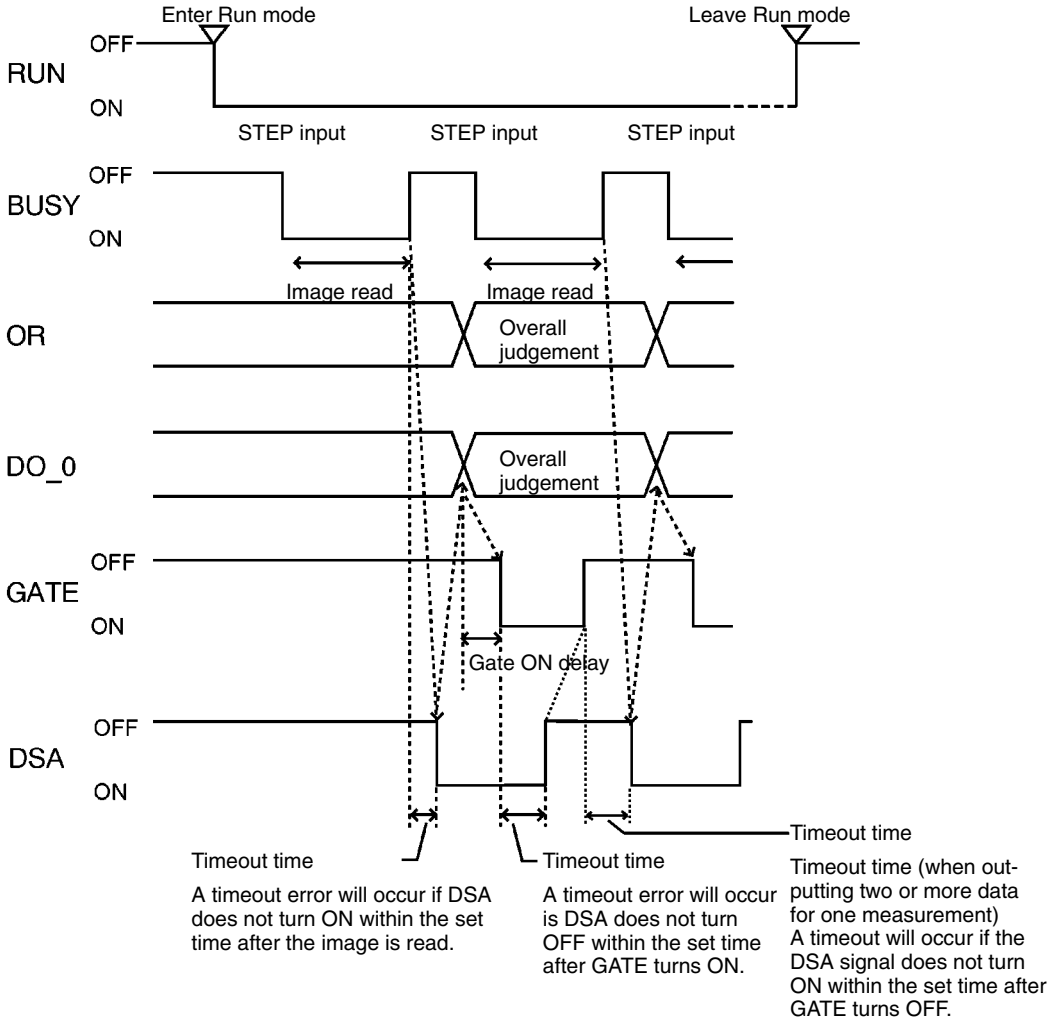
Scene Changing

Terminal	Function
DI0 to DI3	Set the scene number (0 to 15).
DI4	OFF
DI5	ON
DI6	OFF
DI7	Execution trigger. Leave at least 1 ms after setting DI0 to DI6 before turning DI7 ON. During command execution, the BUSY terminal will turn ON. After confirming that the BUSY terminal has turned ON, turn OFF DI7 before turning OFF DI0 to DI6.

4-2-2 Using Handshaking (F150-C10E-2, F150-C15E-2)

Handshaking can be used to sync the F150 with an external device to output the measurement result. This is an effective way to output several measurement results in order, allowing data to be properly transferred.

Using the STEP Signal as a Measurement Trigger



The function of all terminals except DSA is the same as for communications without handshaking. The DSA terminal is used only with handshaking.

DSA Terminal

Terminal	Function
DSA	<p>Requests the next data output from the external device. The F150 will not output data until this terminal is turned ON.</p> <p>Turn ON the DSA terminal when the external device is ready to receive data and the F150 has finished measurement.</p> <p>The BUSY terminal is ON during measurement, i.e., measurement will be completed when the BUSY terminal turns OFF. Use the BUSY signal to time reading measurement results.</p>

Note If a STEP signal is input while the BUSY terminal is ON, the ERR terminal will come ON. → p. 60

4-3 Communications Settings

The communications specifications must be set when communicating with an external device. This section describes the operations required to make the following communications settings.

Item	Description				
ON state	Select to turn ON the OR and DO_0 terminals for either OK or NG. The default is ON for NG.				
Handshaking (F150-C10E-2, F150-C15E-2)	<table border="1"> <tr> <td data-bbox="390 382 486 475">OFF</td> <td data-bbox="486 382 966 475">Used to output the measurement result without synchronizing with the external device. This is the default setting.</td> </tr> <tr> <td data-bbox="390 475 486 531">ON</td> <td data-bbox="486 475 966 531">Used to output the measurement result while synchronizing with the external device.</td> </tr> </table>	OFF	Used to output the measurement result without synchronizing with the external device. This is the default setting.	ON	Used to output the measurement result while synchronizing with the external device.
OFF	Used to output the measurement result without synchronizing with the external device. This is the default setting.				
ON	Used to output the measurement result while synchronizing with the external device.				
Output period (Only effective without handshaking)	<p>Set the output period for the measurement result.</p> <p>Set a value between 2 and 10,000.0 ms that is greater than the Gate ON delay + Gate ON time, and less than the measurement interval. If this cycle is longer than the measurement interval, the output timing will fall behind as the measurements are repeated.</p> <p>The default setting is 10.0 ms.</p>				
Gate ON delay	<p>Set the time from when the result is output to the terminal block to when the GATE signal is turned ON.</p> <p>This time is used to wait until the data output becomes stable. Set a time between 1.0 and 1,000 ms that is longer than the delay time for the external device.</p> <p>The default setting is 1.0 ms.</p>				
Output time (Only effective without handshaking)	<p>Set the time during which the GATE signal is ON.</p> <p>Set a value between 1.0 and 1,000 ms so that the external device can read the measurement result.</p> <p>The default setting is 5.0 ms.</p>				
Timeout (F150-C10E-2, F150-C15E-2) (Only effective with handshaking)	<p>A timeout error will occur if there is no response from the external device within the set time.</p> <p>Set the value to between 0.5 and 120.0 s.</p> <p>The default setting is 10.0 s.</p>				

Procedure

- 1 Go to **SYS/Communications/Terminal block**.
- 2 Set the required items.

3 Select *End* to exit this screen.

F150-C10E-2, F150-C15E-2

Communications(TC)

ON state	: [NG : ON ▼]
Handshaking	: OFF ▼
Output period	: [10.0]ms
Gate ON delay	: [1.0]ms
Gate ON time	: [5.0]ms
Timeout	: [10.0]s

[End]

F150-C10E-2-DRT

Communications(TC)

ON state	: [NG : ON ▼]
Output period	: [10.0]ms
Gate ON delay	: [1.0]ms
Gate ON time	: [5.0]ms

[End]

SECTION 5

CompoBus/D Settings

This section describes the communications settings required when the F150 is used as a CompoBus/D Slave.

CompoBus/D communications are only supported for the F150-C10E-2-DRT.

For details on the baud rate and node address settings, refer to the *Setup Manual*.

For detailed information relating to CompoBus/D, such as system configuration and cable connections, refer to the *CompoBus/D (DeviceNet) Operation Manual (W267)*.

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5-1 Communications Settings

The F150-C10E-2-DRT operates as a CompoBus/D Slave. Data is automatically exchanged with the Master Unit using remote I/O.

Set Mode

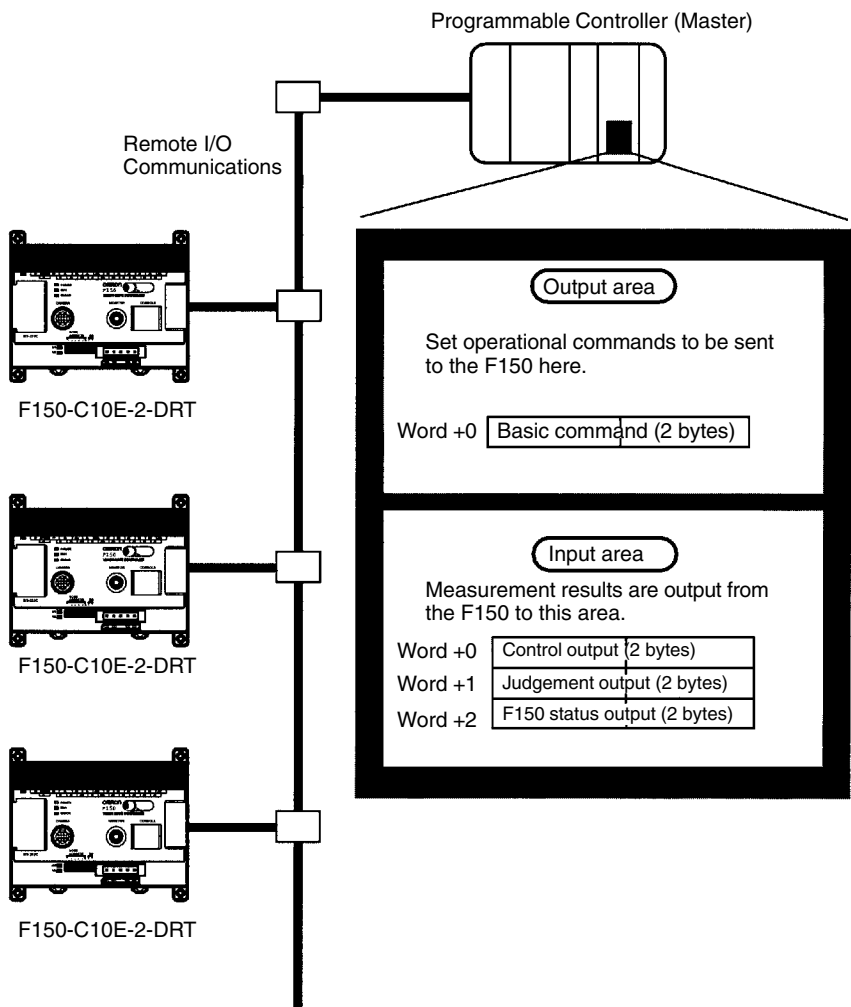
Command inputs cannot be received.

Monitor Mode

Command inputs can be received, but judgements are not output to external devices. Control output and F150 status output are supported, however.

Run Mode

Both command input and output of measurement results are supported.



5-1-1 Communications Settings

This section explains the setting methods required for communications specifications when performing communications with the CompoBus/D.

Item	Selections	Details
Input mode	Basic*	Use in this (default) setting.
	Expand	Expand mode is not supported in Auto Menu.
GATE terminal control	Measure output*	The GATE terminal on the terminal block is used as a timing signal for obtaining measurement results output from the terminal block.
	Any output	The GATE terminal on the terminal block is controlled by commands, and used as required by the user (e.g.: lighting control, etc.).
Data Output	OFF* BCD Binary	Use in the default setting (OFF). In Auto Menu, only judgement results can be output.
Response output	OFF* ON	Use in the default setting (OFF). Expand commands are not supported in Auto Menu.
Communications errors (see below)	Keep*	When a network error occurs, the data that was sent from the Programmable Controller to the F150 immediately before the error occurred (in the output area) is saved, and the F150 continues operation based on this data.
	Clear	When a network error occurs, the data sent from the Programmable Controller to the F150 is cleared to 0, and the F150 continues operation based on this data. The Command Enable Bit will also be reset to 0. Therefore, when the network error has been cleared, if the output area of the Programmable Controller is in the same state as it was when the error occurred, the same command will be executed twice.

Note The default settings are marked with asterisks.*

Communications Errors

When a network error occurs, the status of data input from the Programmable Controller to the F150 via the network may change. Therefore, select the way the status of data input from the Programmable Controller to the F150 is to be defined when an error occurs.

Procedure

- 1 Go to **SYS/Communications/CompoBus/D Set**.
- 2 Set the required items.

Communications(CompoBus/D Set)

Input mode	: Basic▼
GATE terminal	
	: Measure output▼
Data output	: OFF▼
Response output	: OFF▼
Communication error	
	: Keep▼

End

- 3 Select **End**. A confirmation message will be displayed.

Save data , restart and
set network again.

OK

- 4 Select **OK**.

Note In order to register these settings it is necessary to save the settings to flash memory and restart the F150. Also, the number of I/O bytes will change in accordance with the new settings. Therefore, restart the whole network. → p. 61

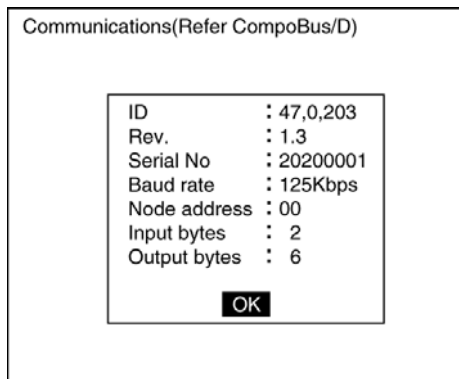
5-1-2 Confirming CompoBus/D Communications Settings

CompoBus/D communications settings can be confirmed by displaying them on the screen. If an error occurs in CompoBus/D communications, take note of the contents of this screen and contact your OMRON representative.

Item	Details
ID	Vendor ID (A), product type (B), product code (C). 47, 0, 203 (A) (B) (C)
Rev.	DeviceNet specifications version.
Serial number	Serial number for the model. (20200001 on)
Baud rate	Baud rate set with DIP switch.
Node address	Node address set with DIP switch.
Number of input bytes	Depends on the input mode in the CompoBus/D settings. 2: Basic; 10: Extension
Number of output bytes	Depends on the data outputs and response outputs in the CompoBus/D settings. 6: Data output OFF; Response OFF 16: Data output OFF; Response ON 54: Data output BCD or binary; Response OFF 64: Data output BCD or binary; Response ON

Procedure

- 1 Go to **SYS/Communications/CompoBus/D ref.**
- 2 Select **OK** to exit this screen.



5-2 Input Format

This section explains the format of commands that are set in the output area of the Programmable Controller in order to control F150 operation. The word numbers given here are the offset values from the first word in the allocated area of the Master. The “-” indicates that either 0 or 1 can be set without affecting the setting.

ONE MEASUREMENT

When bit 8 turns ON, one measurement is executed.

Word	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	-001	0000	----	Bit 8: one measurement

CONTINUOUS MEASUREMENT

Starts continuous measurement. Measurements are continued until the STOP MEASUREMENT command is input. To input other commands, input the STOP MEASUREMENT command. If other commands are input while continuous measurement is being executed, continuous measurement will be stopped temporarily and start up again once processing for the input command has been completed.

Word	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	-000	1001	----	Bit 4: Start continuous measurement Bit 7: Command Enable Bit

After the command has been input, set bit 7 to 0 to start measurement.

STOP MEASUREMENT

Stops continuous measurement.

Word	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	-000	1000	----	Bit 4: Stops continuous measurement Bit 7: Command Enable Bit

SWITCH SCENE

Switches to a specified scene number.

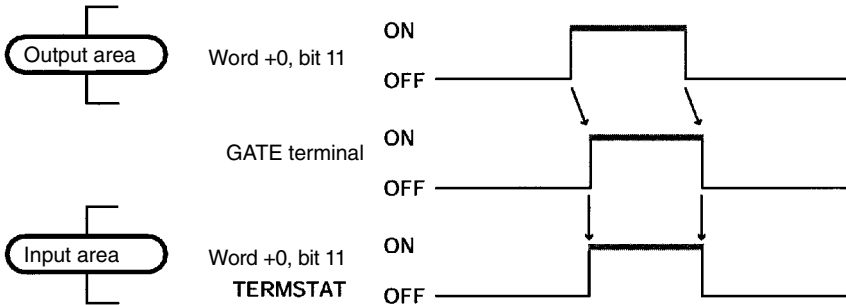
Word	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	-000	1010	Scene number	Bit 5: Switch scene Bit 7: Command Enable Bit

Specify a number in the range 0 to 15 in binary format.

GATE TERMINAL OUTPUT CONTROL

When “any output” has been selected for GATE terminal control in the communications specifications setting menu, bit 11 will control the GATE terminal. If the GATE terminal is used for measurement output, the status of bit 11 will be ignored.

Word	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	----	*-0-	----	----	Bit 11: GATE terminal control



Area	Bits	Function
OUT	Bit 11	Controls the output from the user terminal (GATE terminal).
IN	TERMSTAT	The status of the GATE terminal will be reflected by the status of word +0, bit 11 of the input area (TERMSTAT). Therefore, the status of the GATE terminal can be obtained by monitoring this bit. There will be a time lag before changes in bit 11 of the output area are reflected in the GATE terminal due to DeviceNet communications delays and the status of the F150.

RESET

Resets the F150.

Word	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	-010	0000	0000	Bit 9: system reset

5-3 Output Format

The following explains the contents of output from the F150 to the input area of the Programmable Controller.

Word	Bits				Bytes
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	Control output				6 bytes
+1	Judgement output				
+2	F150 status output				

5-3-1 Control Output (Word +0)

Bits	Flag	Function
0	ERROR	Turns ON if an error is generated during F150 processing. Turns ON/OFF in synchronization with the ERR terminal on the terminal block.
1	RUN	ON while the F150 is in Run mode. Turns ON/OFF in synchronization with the RUN terminal on the terminal block.
2	BUSY	Indicates that the F150 is executing a command from CompoBus/D. Do not input a command while the BUSY Flag is ON. The currently executed command or the input command will not be executed properly. When commands are made from RS-232C, or when using a STEP signal from a terminal board, this output will not turn ON. When inputting in this way, use the BUSY signal on the terminal board.
3	Empty	(Always 0)
4	OR	Outputs an overall judgement when a measurement command has been executed. If there is one NG in the specified measurement region or the output expressions, the overall judgement will be NG. Select whether to turn ON this output for OK or NG in the output polarity setting in SYS/Communications/Terminal block . (The default setting is ON for NG.) → p. 72
5 to 7	Empty	(Always 0)
8	JDGFLG	Alternates between 0 and 1 to indicate that judgement output has been refreshed.

Bits	Flag	Function
9 to 10	Empty	(Always 0)
11	TERMSTAT	Indicates the current status of the GATE terminal. Only output when the GATE terminal control is set to "any output."
12 to 15	Empty	(Always 0)

5-3-2 Judgement Output (+1)

Overall judgement is output to bit 0 when a measurement command is executed. Select whether the bit is turned ON by an OK or an NG judgement, in the output polarity setting in ***SYS/Communications/Terminal block***. (The default setting is for the bit to come ON for an NG judgement.) → p. 72

Bits	Allocation
0	Overall judgement result
1 to 15	Empty (always 0)

5-3-3 F150 Status Output (+2)

Bits	Allocation
0 to 3	Number of currently displayed scene (refreshed when the Switch Scene command is executed)
4 to 7	Empty (always 0)
8 (see note)	Continuous Measurement Start Flag
9 (see note)	Continuous Measurement Stop Flag
10 (see note)	Switch Scene Completed Flag
11	Empty (always 0)
12 (see note)	One Measurement Completed Flag
13 to 15	Empty (always 0)

Note When a command has been executed, the corresponding flag will turn ON. Wait for the flag to turn ON, and turn OFF the command. When the command is turned OFF, the corresponding flag will also turn OFF. For details refer to the relevant timing chart.

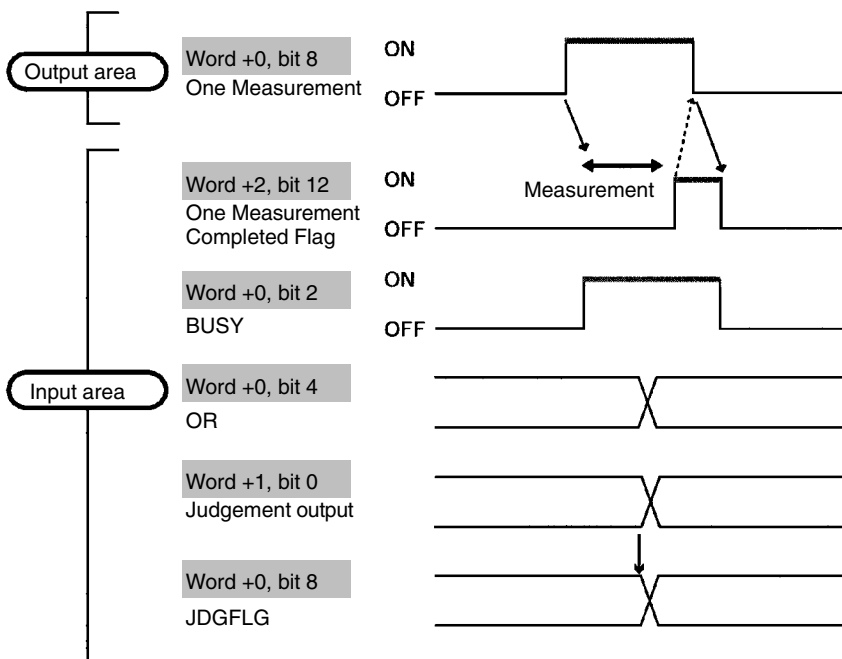
5-4 Timing Charts

The meanings of the arrows and dotted lines used in this section are as follows:

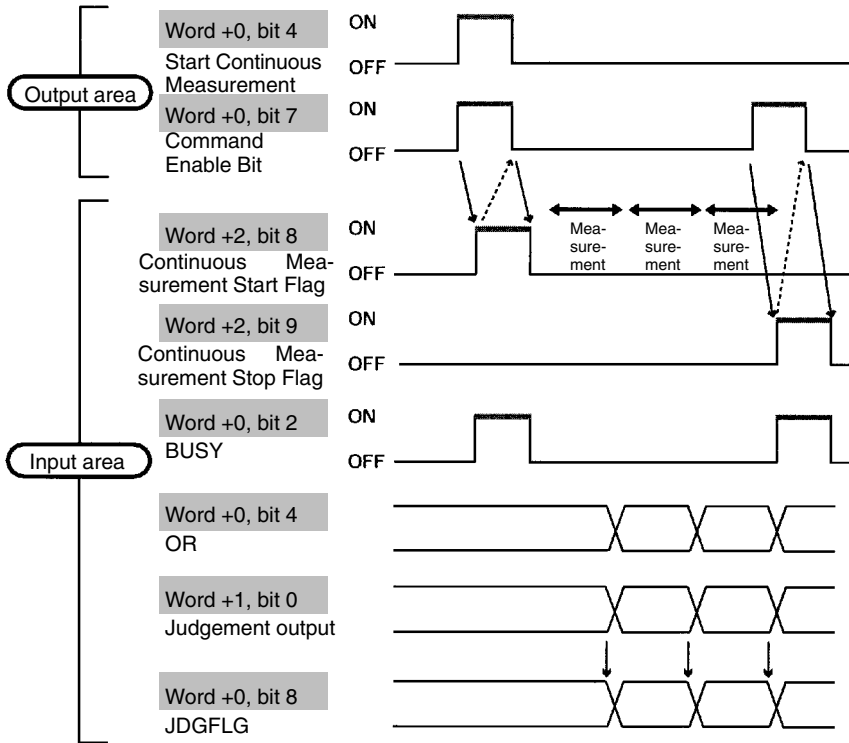
↓	The F150 is controlled automatically according to the status of the bit at the base of the arrow.
⋮ ↓	Perform ON/OFF control according to the status of the bit at the base of the arrow.
- - - - - - - - - -	Dotted lines indicate optional output. By deselecting outputs, the number of bytes can be reduced.

5-4-1 Basic Mode

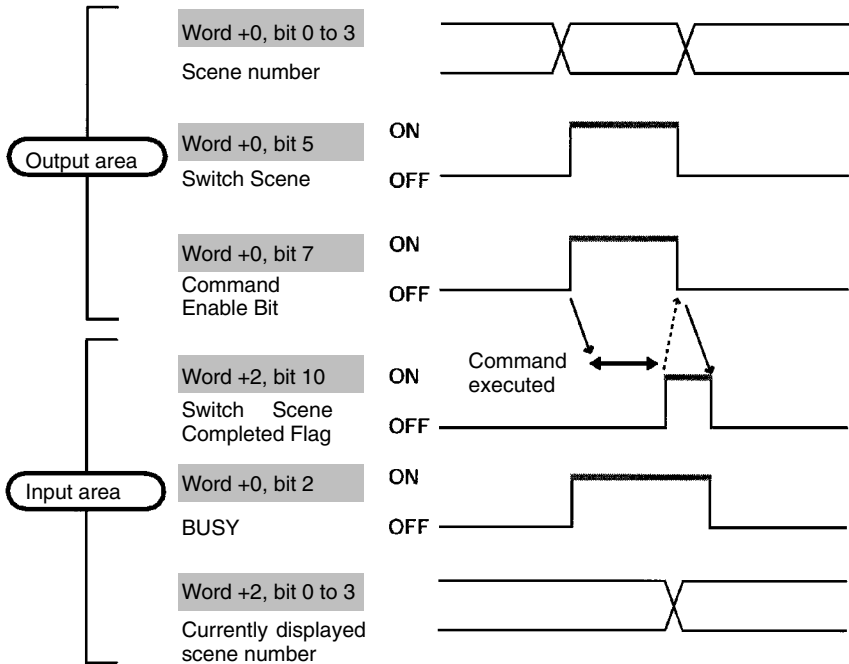
One Measurement



Continuous Measurement



Switching Scenes



5-5 Allocation Charts

This section gives lists of allocations for the input and output area of the Programmable Controller. For details refer to *Input Format* and *Output Format*.

Output Area

For details refer to *Input Format*. → p. 81

Bits	Word +0
0	Scene number/region number
1	
2	
3	
4	Continuous Measurement
5	Scene Switch
6	Empty
7	Enable Flag
8	One Measurement
9	Reset
10	Empty
11	GATE Terminal
12	Empty
13	
14	
15	

Input AreaFor details refer to *Output Format*. → p. 83

Bits	Word +0	Word +1	Word +2
0	ERROR	Judgement	Number of currently displayed scene
1	RUN	Empty	
2	BUSY		
3	Empty		
4	OR		Empty
5	Empty		
6	Empty		
7			
8			JDGFLG
9	Empty		Continuous Measurement Stop Flag
10			Switch Scene Completed Flag
11	TERMSTAT		Empty
12	Empty		One Measurement Completed Flag
13			Empty
14			
15			

SECTION 6

RS-232C Communications Settings

This section describes the communications settings for the RS-232C port when making a backup to a personal computer or operating the F150 menus from a personal computer. For connection methods, refer to the Setup Manual.

The RS-232C port can be used to save data to a personal computer, or to operate the F150 menus from a personal computer. This section describes the settings used for the RS-232C port.

The same communications settings must be used on both the F150 and the external device.

Setting Parameters

Item	Setting	
Baud rate	2,400, 4,800, 9,600, 19,200, 38,400* (bps)	Use the same settings on the IBM Programmable Controller/AT or compatible computer.
Data length	7, 8* (bits)	
Parity	None*, even, odd	
Stop bit	1*, 2 (bits)	
Delimiter	CR*, LF, CR+LF	
Mode	Menu for menu operation Normal* or Host Link for data backup.	

Note The default settings are marked with asterisks.*

RS-232C Input Keys

The following table shows the input keys that are used via the RS-232C. These keys correspond to and have the same functions as the Console keys.

There is no key or code that corresponds to the Console's **SHIFT** Key.

Console key	RS-232C input	
	Key	Code
ESC	CTRL + [(\$1B)
TRIG	CTRL + A	(\$01)
ENT	CTRL + M	(\$0D)
SHIFT + ESC	CTRL +I, Tab	(\$09)
SHIFT + TRIG	CTRL +T	(\$14)
SHIFT + ENT	CTRL +R	(\$12)
Up	CTRL + E	(\$05)
Down	CTRL + X	(\$18)
Left	CTRL + S	(\$13)
Right	CTRL + D	(\$04)
SHIFT + Up	CTRL +W	(\$17)
SHIFT + Down	CTRL +Z	(\$1A)
--- (See note.)	CTRL + Q	(\$11)

Note CTRL + Q changes the RS-232C input to Normal mode. (Can only be input in Monitor or Run mode.)

Procedure

- 1** Go to **SYS/Communications/RS-232C**.
- 2** Set the required items.
- 3** Select **End** to enter the settings and to exit this screen.

Communications(RS-232C)

Baud rate	:	38400 bps▼
Data length	:	8bit▼
Parity bits	:	None▼
Stop bits	:	1bit▼
Delimiter	:	CR▼
Mode	:	Menu▼

End

SECTION 7

Troubleshooting

This section lists the errors that may occur, along with their probable causes and remedies.

Message	Probable Cause and Remedy
Camera is not connected.*	<ul style="list-style-type: none"> The Camera Cable is not connected properly.
Incorrect data format received.*	<p>There is a mistake in the data for which transfer between the F150 and the external device was attempted. Turn OFF the power to the F150, and check for the following items before restarting the F150.</p> <ul style="list-style-type: none"> The RS-232C cable is connected properly. The terminal block is wired correctly. <p>If the same error message appears after restart, it may mean that the F150 is faulty. Contact your OMRON representative.</p>
Insufficient flash memory.	<p>An error has occurred in flash memory. Data cannot be saved because of insufficient available flash memory.</p> <ul style="list-style-type: none"> Either make the region to be registered smaller, or clear unneeded regions from memory. <p>If the same error message appears after the regions have been reduced, it may mean that flash memory is faulty. Contact your OMRON representative.</p>
Insufficient work memory.	<p>No more regions can be registered because of insufficient available work memory.</p> <ul style="list-style-type: none"> Either make the model or region to be registered smaller, or clear unneeded models or regions.
Measurement conditions cannot be set for current images.	<p>Check for one of the following:</p> <ul style="list-style-type: none"> The registered image is unclear. Using one of the optional functions, adjust the images so that the difference between OK objects and NG objects is clear. The differences between OK images and NG images are too few. Register new sample images.
Register at least one OK sample image.	<p>The measurement conditions can only be set automatically if at least one OK image has been registered.</p> <ul style="list-style-type: none"> Register an OK image.
Register images before inspection regions setting.	<p>An image has not been registered.</p> <ul style="list-style-type: none"> Register OK and NG images before using the optional functions.
Set all images to OK or NG.	<p>There is a registered memory image for which an OK or NG judgement has not been made.</p> <ul style="list-style-type: none"> Identify the number of the registered memory image for which ?? is displayed. Move the cursor to that number and set an OK or an NG judgement, or clear the image from memory.

Message	Probable Cause and Remedy
Set all regions to OK or NG.	<p>Check for one of the following:</p> <ul style="list-style-type: none"> • Has an NG image been added as a sample image? When adding an NG image as a sample image and re-performing automatic setting, the scene must be cleared first. Even if the scene is cleared, the registered sample images will be saved. Set OK or NG for those images, and re-perform automatic setting. • An OK or NG judgement has not been set for a measurement region drawn with the optional functions. Move the cursor to number of the region for which ?? is displayed, and set an OK or an NG judgement.
Set parameters so that Output Period \geq Gate ON delay + Gate ON time.	<p>The communications specifications for the terminal block are set incorrectly.</p> <ul style="list-style-type: none"> • Make the settings so that output period \geq GATE ON delay + GATE ON time.
Timeout error.*	<p>Data transfer has been interrupted due to a timeout error in communications between the F150 and an external device. Turn OFF the power to the F150, and check for the following items before restarting the F150.</p> <ul style="list-style-type: none"> • The RS-232C cable is connected properly. • The terminal block is wired correctly. • The communications specifications for the external device and the F150 are the same. <p>If the same error message appears after restart, it may mean that the F150 is faulty. Contact your OMRON representative.</p>

Note When the error messages marked with an asterisk are displayed, the ERR terminal will come ON.

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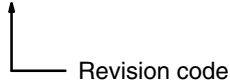
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Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. Z133-E1-01B



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	June 1999	Original production
1A	February 2000	References to model numbers have been changed throughout the manual. In addition the following changes have been made. Page 36: Minor changes to graphics in table. Page 53: Changes made to information on "Through" setting. Page 65: Caution added. Page 77: "PC" changed to "Programmable controller."
01B	February 2004	Page 70: Bottom portion of timing chart changed.