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SECTION 3
Test/Measurement Execution

This section explains how to check if measurements are being correctly performed with the set measurement conditions using Monitor Mode, and how to make actual measurements using Run Mode.

Testing	2
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Testing

1 Entering Monitor Mode

Use the following procedure to check that measurements are being correctly performed with the set measurement conditions.

CHECK! Assignment of console keys can be changed using the [Monitor] or [Run] screen.The description given here is based on the default key assignment. Thus, be careful if the key assignment has been changed.

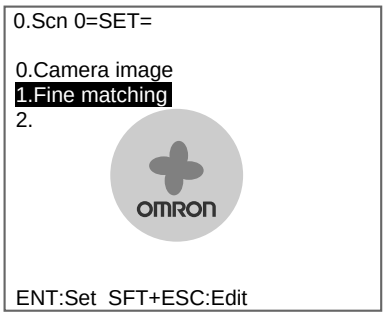
SECTION 5 System Settings, “Customizing Operations”

■ Switching from Setting Mode to Monitor Mode

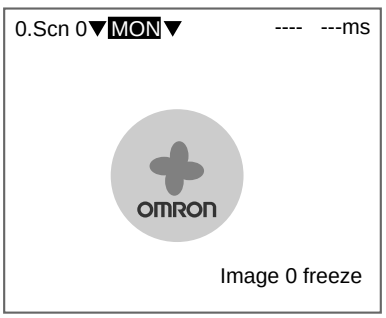
▶ [SET]

1. Display the setting mode screen.

2. Press the ESC Key.



This will exit the setting mode and activate the Monitor mode automatically.



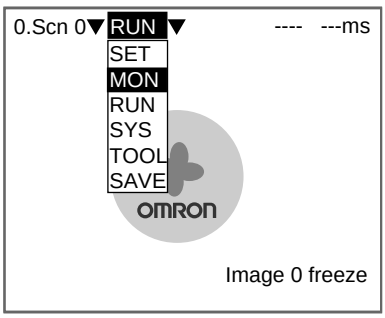
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■ Switching from Run Mode to Monitor Mode

▶ [RUN]

1. Place the cursor on [RUN] and press the ENT Key.

2. Select [OK].



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2 Test Measurement

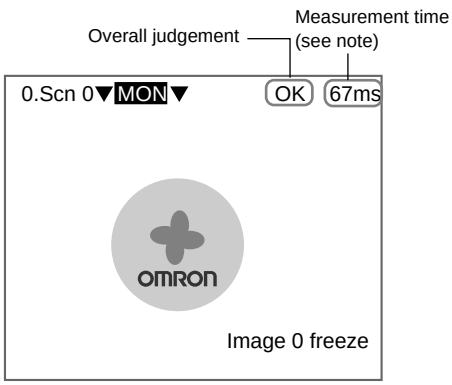
Use the following procedure to execute measurement according to the conditions set for the scene currently displayed. The test is completed internally by the Controller and the measurement results are not output via serial or parallel interfaces.
The measurement commands can be input, however, via serial or parallel interfaces.

SECTION 6 Communicating with External Devices

CHECK! Up to 35 measured images can be stored. If 35 images have already been stored, they will be overwritten when new images are stored, starting from the oldest image.

▶ [MON]

1. Press the TRIG Key on the Console or input the measurement command from an external device.



Note: Through display requires longer measurement time than freeze display.
Frame: approx. 20ms max.
Field: approx. 10 ms max.
(when F160-S2 is used)

▼

Measurement result will be displayed.

Key operation	Details
(Up/Down Keys)	If the image size is set to All and the Camera image or Switch camera settings in the image input-related processing items are set to 2 or more, use the Up and Down Keys to switch between images. Image 0 freeze0 — Shows the number of the image input processing item.
SHIFT+Up/Down Keys	Switches from one image to another (displaying stored images one by one)
SHIFT+TRIG Keys	Performs measurement again (no results are output). If judgement conditions are changed, to check whether the conditions are appropriate can be done by performing measurement again.

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3 Changing Display Results

The contents to be displayed on the screen can be changed. Judgement conditions can also be changed while monitoring detailed measurement values.
This section gives an outline only. For details, refer to SECTION 5.

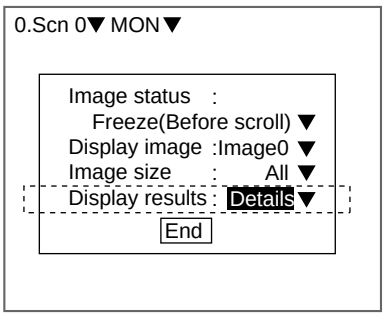
SECTION 5 System Settings, "Screen Display and Monitor"

▶ [MON (or RUN)]

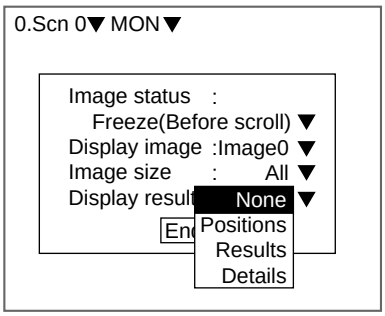
1. Press the SHIFT + ENT Keys.

This takes you to measurement screen setting.

2. Place the cursor on [Display results] and press the ENT Key.



Change the setting.



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Starting Measurements

1 Entering Run Mode

CHECK!

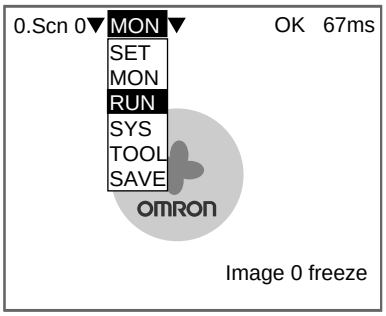
Assignment of console keys can be changed using the [Monitor] or [Run] screen. The description given here is based on the default key assignment. Thus, be careful if the key assignment has been changed.

SECTION 5 System Settings, “Customizing Operations”

▶ [MON]

1. Place the cursor on [MON] and press the ENT Key.

2. Select [RUN].



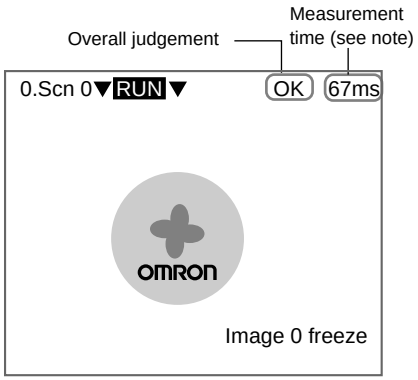
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2 Performing Measurement

Use the following procedure to execute measurement according to the conditions set for the scene currently displayed.
The measurement results will be output to external devices as well.

▶ [RUN]

1. Press the TRIG Key on the Console or input the measurement command from an external device.



Note: Through display requires longer measurement time than freeze display.
- Frame: approx. 20ms max.
- Field: approx. 10 ms max. (when F160-S2 is used)

Measurement result will be displayed.

Key operations are the same as for monitor mode.
p.4

CHECK! The light will gradually lose brightness over time, so the judgement conditions must be adjusted periodically.The light becomes about 20% darker after 1,500 hours of use. (In the case of intelligent lighting)

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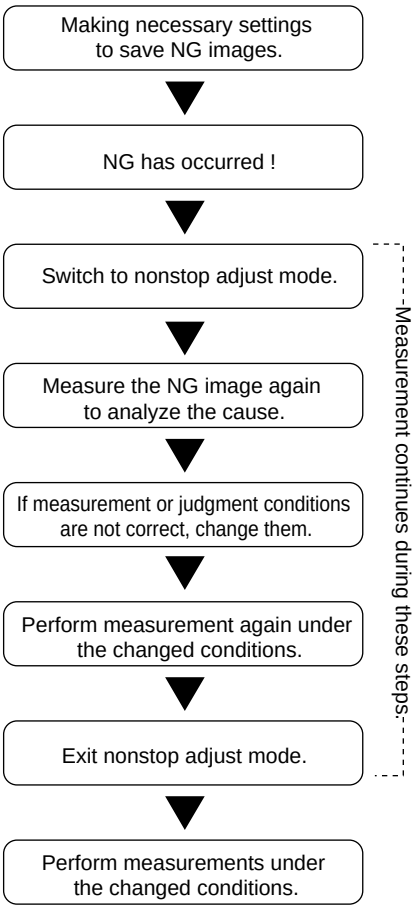
Using Nonstop Adjust Mode

F250 / F270

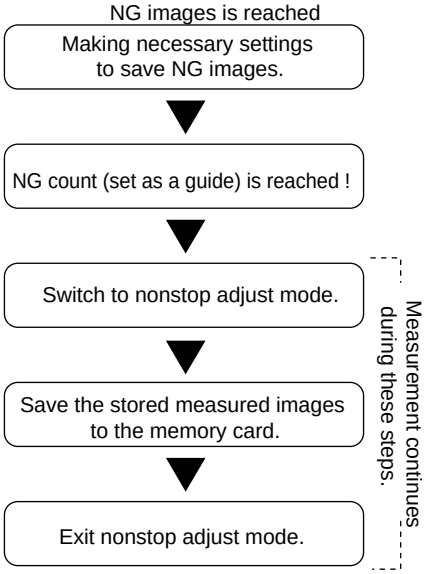
Use of the nonstop adjust mode allows you to observe NG images or change judgement conditions while continuing measurement. This eliminates the need to stop the production line for adjustment of measurement conditions or to wait for the line to stop before adjustment. Measurement conditions can be changed from the console or via the serial interface.

■ Example of Use of Nonstop Adjust Mode

Example 1: Changing measurement conditions



Example 2: Saving to a memory card before the maximum number (i.e. 35) of NG images is reached



* While in nonstop adjust mode, no new images will be saved even if NG occurs.

Nonstop adjust mode can only be performed in the following cases. Use of other input/output interfaces is not guaranteed.

- Input of measurement command: STEP signal, Continuous measurement by parallel (DI)
- Output of measurement results: Parallel interface (DO, OR)

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Settings to be Made In Advance

To use the nonstop adjust mode, [Set key operation] and [Nonstop/Fast] functions need to be set.

■ Key Operation

Specify the key to be used to activate the nonstop adjust mode and the key to be used to transfer data to processing sections.

SECTION 5 System Settings, “Customizing Operations”

■ Nonstop/Fast

The controller has two built-in processing sections. Only one processing section is used for normal measurement. However, for nonstop adjustment, one is used for adjustment while the other is used for measurement. Thus, prior to start of nonstop adjustment, the same settings need to be set for both processing sections.

With [Nonstop/Fast], it is possible to select the timing at which the data is transferred automatically. Normally, select [Normal].

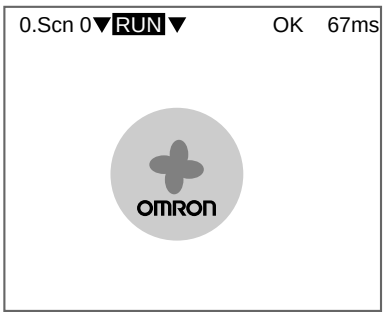
SECTION 5 System Settings, “Customizing Operations”

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Nonstop Adjustment Execution Method

While the controller is in run mode, carry out the following steps.

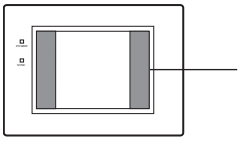
▶ [RUN]



1. Press the console key assigned to [Switch nonstop].

The nonstop adjust mode can also be activated by inputting the NONSTOP command via the serial interface (normal mode).

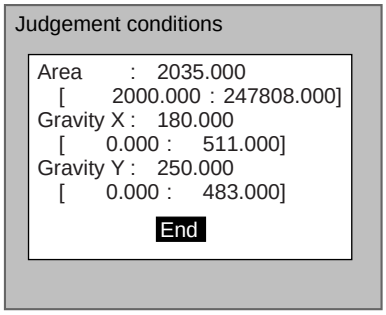
The system will switch to nonstop adjust mode.
The monitor's background color will switch as follows:



Monitor's Background Color
Color monitor: Black to blue
Monochrome monitor: Black to gray

2. Change measurement conditions and save data in the same way as you normally do.

While you are changing measurement conditions or saving data, measurement will still be continued according to the STEP signal or parallel (DI) input, and measurement results are output via the parallel interface.



CHECK!

If measurement conditions are changed, it can be verified whether the conditions are appropriate by measuring the measurement image again. In monitor or run mode, press the following keys.
SHIFT+Up/Down Keys: Switches from one image to another (displaying stored images one by one)
TRIG Key, or SHIFT+ TRIG Keys: Performs measurement again (no results are output).

3. Exit nonstop adjust mode.

Press the console key assigned to [Switch nonstop].

Measurement will start under the new conditions.

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CHECK!

In the following cases, data will not be transferred automatically even if [Auto data transfer] has been set to [Normal]. Data needs to be transferred manually. (If [Each time] is selected, data will be transferred automatically.)

- When activating nonstop adjust mode after measurement has been stopped to change the measurement conditions:

  Press the key assigned to [Proc. data transfer] to transfer the data, then press the key assigned to [Switch nonstop] to activate the nonstop adjust mode.

- When measurement conditions have been changed by a serial interface (normal mode) command:

  Changes made to the conditions by a normal mode command are reflected for the processing section 0 only. If the conditions have been changed, execute the DATATRNS command (data transfer command) to copy the changes to the processing section 1.
  The DATATRNS command will not be accepted during nonstop adjustment, therefore, the command must be executed after exiting the nonstop adjust mode.

Example: Loading scene data from a memory card during nonstop adjustment

SCNLOADM 0 /C0/KENSA.SCN Delimiter Loads scene data.

MEASOUT 1 Delimiter Switches to the run mode.

NONSTOP 0 Delimiter Exits nonstop adjust mode. (See *1.)

DATATRNS Delimiter Transfers the data present in the processing section 0 to the processing section 1. (See *2.)

(*1) The NONSTOP command cannot be accepted during the monitor mode.
Execute the MEASOUT command to switch to the run mode first, and then execute the NONSTOP command.

(*2) Measurement will not be performed during data transfer even if a measurement trigger is input.

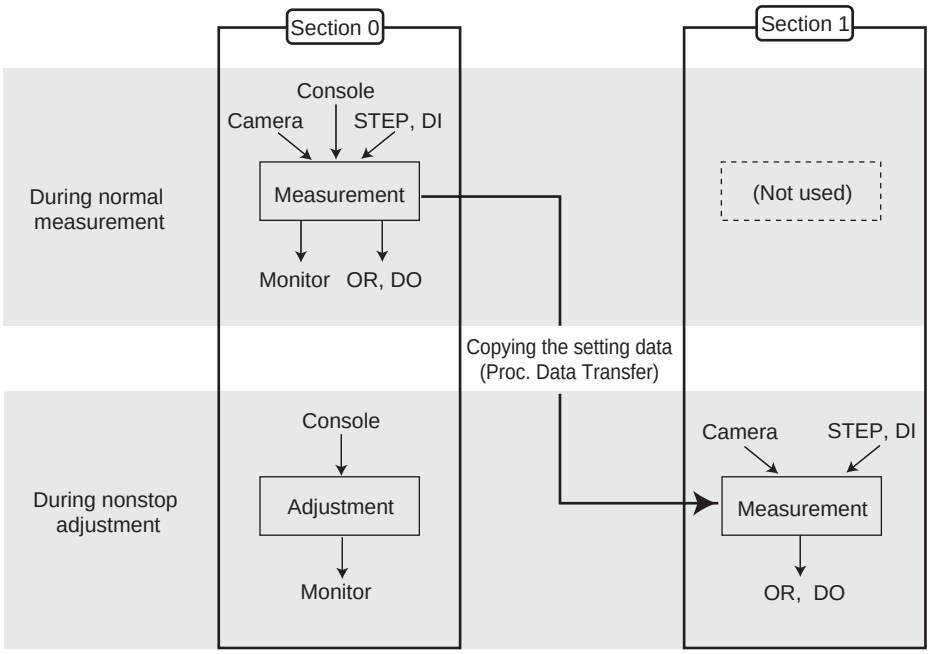
SECTION 6, 2. Serial Interface Menu Operations, “Input Format (Normal)”

What is Proc. Data Transfer?
p.12

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Mechanism of Nonstop Adjustment

The controller has two built-in processing sections, which are called processing section 0 and processing section 1. Only processing section 0 is used for normal measurement. However, during nonstop adjust mode, processing section 0 is used for adjustment while processing section 1 is used for measurement. Thus, to allow measurement to continue during adjustment, the settings made to processing section 0 need to be copied to processing section 1. This copy processing is called “Proc. Data Transfer



Setting [Auto data transfer] to [Normal] or [Each time] will perform Proc. Data Transfer automatically according to the conditions.

SECTION 5 System Settings, “Customizing Operations”

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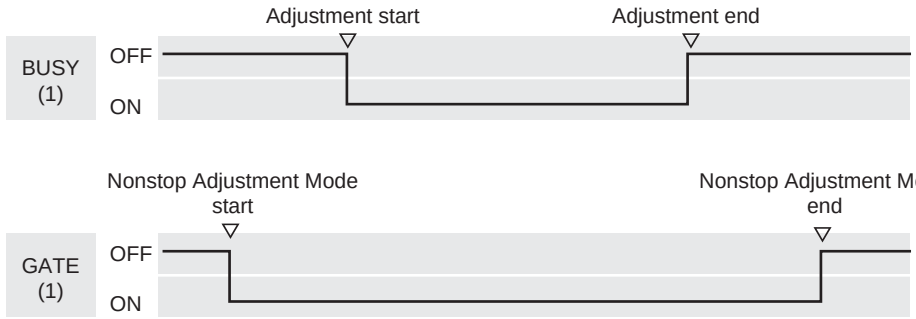
Communication with External Devices

■ Parallel Interface

Control signals are output and commands are input via parallel 0 of the parallel I/O connector.

With the BUSY (1) and GATE (1) signals of parallel 1, the following can be monitored.

signal	Terminal No.	Details
BUSY *1	A10	Allows you to check whether nonstop adjust mode is in progress. This signal is ON during nonstop adjustment.
GATE(1)	B10	Allows you to check whether adjustment is in progress for processing section 0 during nonstop adjustment. This signal is ON during adjustment for processing section 0.



CHECK!

Normal commands are not accepted while nonstop adjustment is performed by the console, so check the state of the parallel interface by monitoring the BUSY (1) signal before performing adjustment.

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Operations Not Allowed During Nonstop Adjustment

- Do not change the following camera and communication related settings. (Do not load system data that contains different camera and communication related settings.) Failure to observe this may result in odd images or measured values or cause communication problems.
  * Do not change the following settings:
    [System/Camera Settings]
    [System/Communication]
    [Shutter speed] under [Camera Image]
    [Lighting Control] under [Camera Image]
    [Frame/Field] under [Camera Image]
- When the processing section 1 is switching the scene group to another, do not allow the processing section 0 to access the data file of the same scene group or shut down power supply. This may cause the controller to stop.
- To change setup by inputting a scene group switch command via the parallel interface, scene group 0 cannot be used. Measurement will be performed with no scene set and measurement results will not be output.

Points to Note during Nonstop Adjustment

The points that are to be noted during nonstop adjust mode are given below.
Make sure that they are observed.

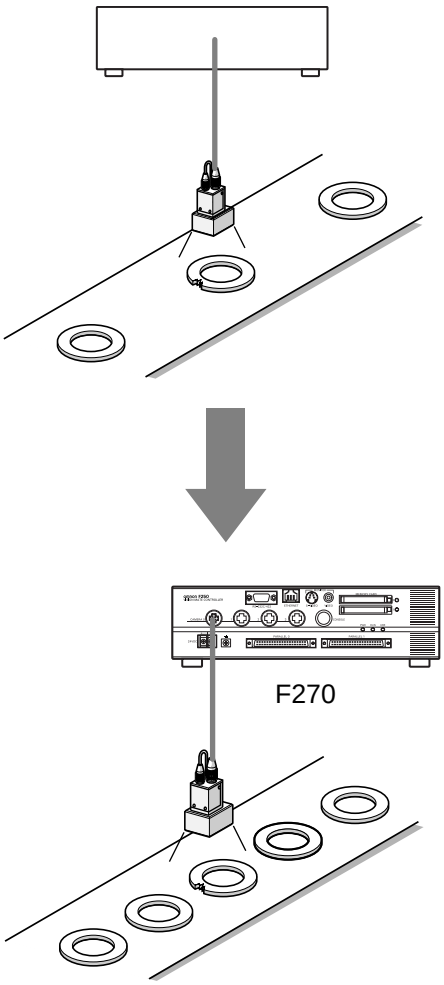
- Since the menu screen for processing section 0 is displayed on the monitor, the measurement status of processing section 1 will not be displayed on the monitor.
- Since camera image cannot be displayed, the image will not be changed even if the through display or last NG display has been selected.
- The following restrictions apply to the parallel interface input for the processing section 1.
  - Even if [Save at switch Scn Group] has been set to ON, the data will not be saved if the scene is switched to another via the parallel interface.
  - It takes time to exit the nonstop adjust mode because of preparation for the next nonstop adjustment. During the preparation, it is not possible to switch a scene or a scene group to another via the parallel interface.
  - If [DI branching] has been set, the system assumes that is input if measurement is performed again by processing section 0, and will not refer to the state of the parallel interface. Processing section 1 operates according to the input state of DI.
- No more new images can be saved.
- Variables cannot be used as a counter for the number of measurements. (Because measurement results obtained prior to nonstop adjustment cannot be used)
- Measurement results on the Trend Monitor are not accumulated.
- It is not possible to use the parallel I/O monitor.
- Measurements performed while the setting data is changed as follows cannot be guaranteed.
  - Performing measurement while re-registering a model
  - Performing measurement while changing conditions using unit data

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Performing Measurement in 1-Line Fast Mode

F270

Use of the 1-line fast mode allows inspections to be performed at a maximum speed of up to twice that of the conventional methods.



Inspections can be performed at a speed of up to a maximum of twice that of the conventional method.

This mode is effective for inspections, such as EC defect inspection, that require long processing time.

Measurement in 1-line fast mode can only be performed in the following cases. Use of other input/output interfaces is not guaranteed.

- Measurement command input: STEP signal
- Output of measurement results: Parallel interface (DO, OR signals)

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Settings to be Made In Advance

To use the 1-line fast mode, [Set key operation] and [Nonstop/Fast] functions need to be set.

■ Key Operation

Specify the key to be used to transfer data to processing sections and the key to be used to switch monitor display.

SECTION 5 System Settings, “Customizing Operations”

Mechanism of 1-Line Fast Mode
p.19

■ Nonstop/Fast

The controller has two built-in processing sections. Only one processing section is used when setting conditions. However, for measurements, both processing sections are used. Thus, prior to start of measurement, the same settings need to be set for both processing sections.

With [Nonstop/Fast], it is possible to select the timing at which the data is transferred automatically. Normally, select [Normal].

SECTION 5 System Settings, “Customizing Operations”

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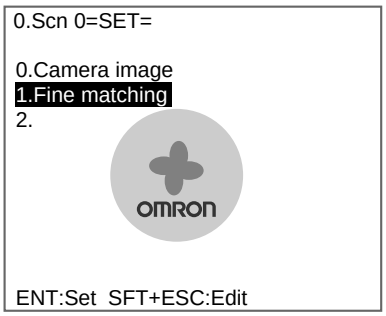
- Manual Data Transfer

  If you have changed the setting data, data transfer between the two processing sections must be performed prior to start of measurement, even if [Yes (Standard)] has been selected.

▶ [SET]

1. Set the desired measurement conditions.

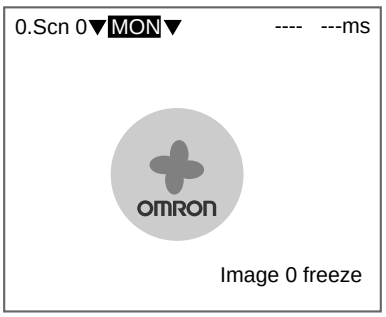
2. After the conditions are set, press the ESC Key.



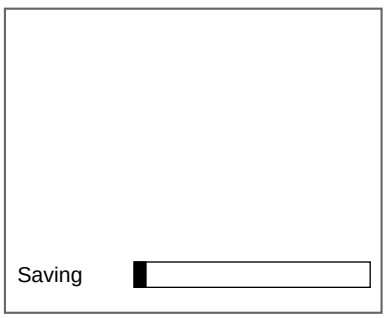
This will activate the monitor mode.

3. Press the console key assigned to [Proc. data transfer].

The data can also be transferred by using the DATATRNS command via the serial interface (normal mode).



The data will be transferred from processing section 0 to processing section 1.

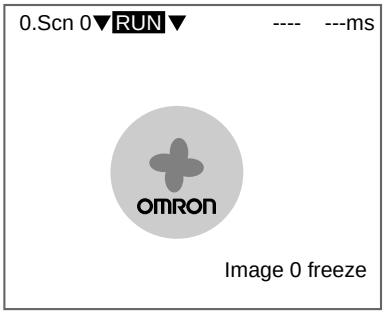


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Starting Measurement

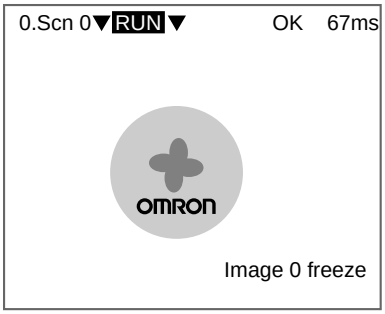
▶ [RUN]

1. Input the STEP signal.



Perform measurement in 1-line fast mode

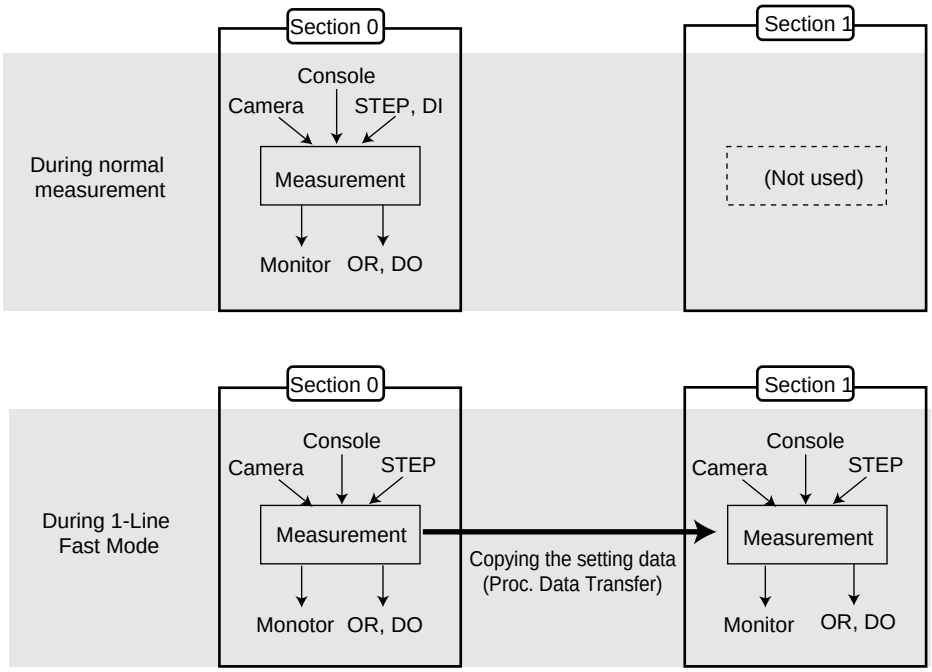
Section 0 screen



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Mechanism of 1-Line Fast Mode

The controller has two built-in processing sections, which are called processing section 0 and processing section 1. In 1-line fast mode, measurement is performed by the two processing sections under the same measurement conditions. Thus, prior to start of measurement, the same data needs to be set for both processing sections 0 and 1. This copy processing is called “Proc. Data Transfer



Setting [Auto data transfer] to [Normal] or [Each time] will perform Proc. Data Transfer automatically according to the conditions.

SECTION 5 System Settings, “Customizing Operations”

CHECK!

Data can only be transferred from processing section 0 to processing section 1. Data cannot be transferred from processing section 1 to processing section 0, so switching of the system data or scene data must be performed by processing section 0.

Switching Monitor Display p.20

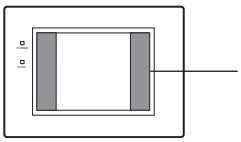
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- Monitor Display

  The state of processing section 0 is normally displayed on the monitor. However, it is possible to monitor the state of processing section 1.
  For this, press the console key assigned to [Switch Proc. monitor] to switch the monitor display.

  SECTION 5 System Settings, “Customizing Operations”

  The monitor's background color changes when the state of processing section 1 is displayed.
  Images are always displayed in freeze mode.



Monitor's Background Color
Color monitor: Black to blue
Monochrome monitor: Black to gray

CHECK!

The screen can also be switched by using the CONMON command via the serial interface (normal mode).

SECTION 6, 2. Serial Interface Menu Operations, “Input Format (Normal)”

- Accumulated Data in Processing Sections

  Saved images and Trend Monitor’s measurement data are stored for each processing section. To do the following, switch the monitor display to the desired processing section first. These operations can be performed via the console or using normal commands.

  • Viewing saved images
  • Performing re-calculation for a saved image (SHIFT + TRIG Keys)
  • Saving a stored image to an external device
  • Saving measurement data of Trend Monitor to an external device

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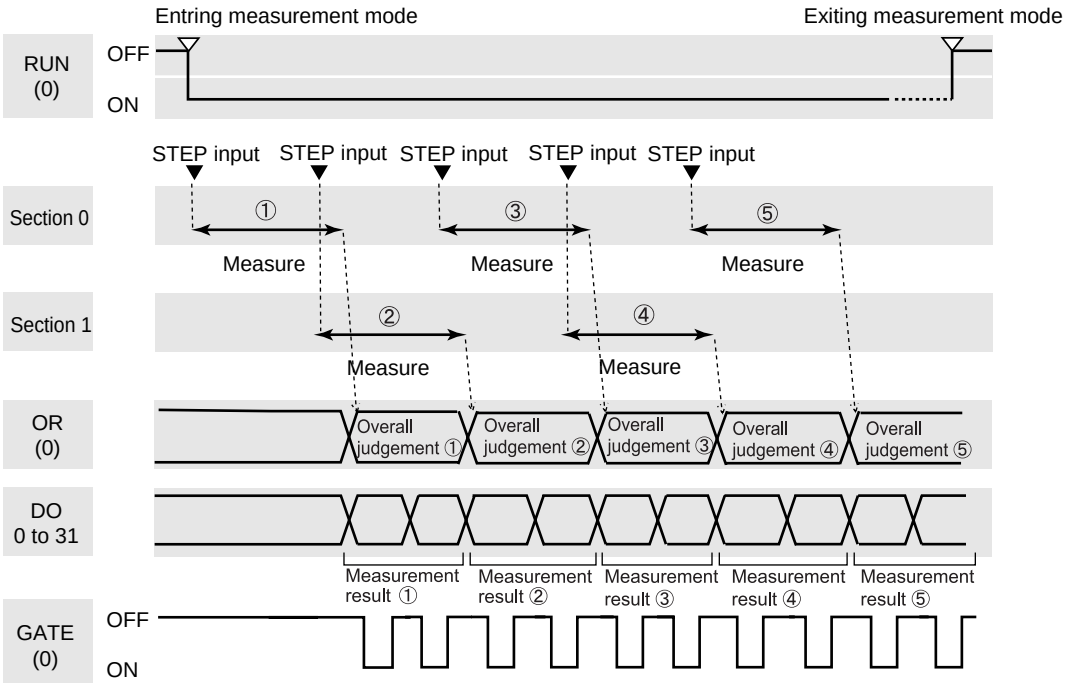
Communication with External Devices

■ Parallel Interface

Control signals are output and commands are input via parallel 0 of the parallel I/O connector. This is done independently of the processing section where measurement is performed.

When the STEP signal is input, the processing section that is in idle state performs measurement.

The measurement results are output in the order they are processed.



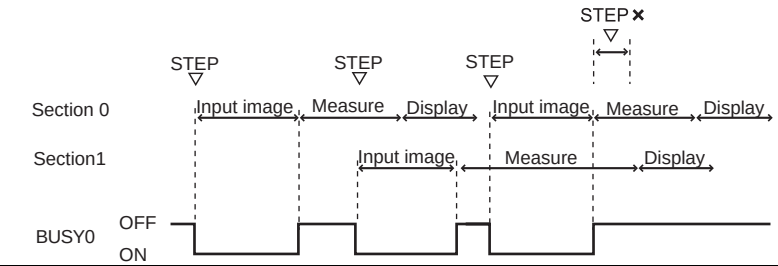
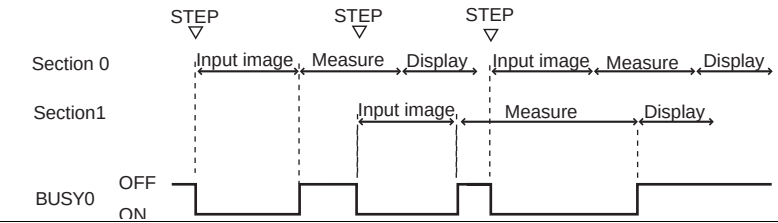
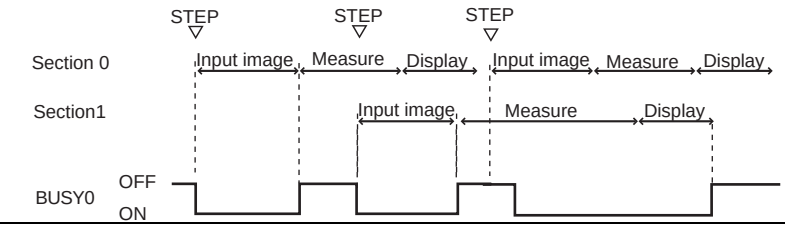
Function of Each Signal
SECTTION 6, 1. Parallel Interface, “Timing Charts”

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• BUSY Signal

The BUSY signal is a control signal used to indicate that processing is in progress by the controller. The ON/OFF timing of this BUSY signal is monitored at the external device to time communications. With the 1-line fast mode, both processing sections 0 and 1 are used for measurement. However, the BUSY signal combines the measurement status of both processing sections, and is output to the BUSY (0) of the parallel I/O connector. The BUSY (0) signal turns ON when an image is input by one of the processing sections. The timing at which the signal is turned OFF can be changed by [System/Measurement control/BUSY range]. The timing can be selected from the following three.

SECTION 5 System Settings, “Using BUSY Signals”

BUSY Range	Details
Input image	When image input is started by either of the processing sections, the BUSY signal will turn ON. It will turn OFF when image input has been completed. This can be used as a guide as to whether or not the workpiece can be moved. However, even if the BUSY (0) signal turns OFF, the STEP input signal will not be accepted if measurement is in progress in both the processing sections. 
End of measurement (default setting.)	If measurement is in progress in the other processing section when image input is completed, the BUSY signal will not turn OFF until the measurement is completed. The BUSY signal will remain ON and the controller considers that measurement is in progress until the end of measurement. The next STEP input can be accepted while the BUSY signal (0) is OFF. 
Display	If measurement is in progress in the other processing section when image input is completed, the signal will not turn OFF until the results of that measurement have been displayed. The BUSY signal will remain ON and the controller considers that measurement continues until the end of display. The next STEP input can be accepted while the BUSY signal (0) is OFF. 

CHECK! The BUSY (1) signal of parallel 1 also remains ON only while measurement is in progress in processing section 1. Using this signal with the BUSY (0) signal of parallel 0 allows you to find which processing section is currently used for measurement.

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• Parallel I/O Monitor

Used to monitor the communication status of the parallel interface.

Run I/O Monitor while the screen for the processing section 0 is displayed.

Only when you want to check the status of the BUSY (1) signal of parallel 1, switch the monitor display to the processing section 1.

SECTION 4 Other Functions, “Checking I/O Status with External Devices”

■ Serial Interface

The serial interface allows input of normal commands only.

[Host link], [Normal data] and [Host link data] are not supported.

Normal commands are executed in the processing section displayed on the monitor.

Switching of the system data or scene data must be done in the processing section 0.

SECTION 6, 2. Serial Interface Menu Operations, “Input Format (Normal)”

CHECK!

When system data or scene data has been changed by a normal command:

If [Auto data transfer] has been set to [Normal], press the key assigned to [Proc. data transfer] or execute the DATATRNS command.

If [Each time] has been selected, data will be transferred automatically.

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Points to Note for 1-Line Fast Mode

- Only one setting can be made for [Camera Image]. (Fixed at unit 0)
- Measurement is performed by both processing sections, but the state of only one processing section is displayed on the monitor. Therefore, measurement results are updated for every two measurements.
- If NG occurs in a processing section other than the one displayed on the monitor even though [Last NG] has been selected, the latest NG image will not be displayed unless you press the key assigned to [Switch Proc. monitor] to switch the monitor display.
- The measurement time displayed on the monitor is the same as that for any run modes except for the 1-line fast mode. Since measurement is performed by both processing sections, double the amount of processing can be performed. However, the time required for each measurement is not shortened.
- The tact time is half the measurement time that is displayed. However, since the image input time is not shortened, consider that it will be the same as the tact time if it is equal or smaller than “half of the displayed time

Guide to image input time

	F160-S1 (Double-speed Camera)	Other Cameras
Frame	16.7ms	33.3ms
Field	17.5ms	16.7ms

* Guideline time for freeze display Strictly speaking, the shutter time needs to be added to the above figures.

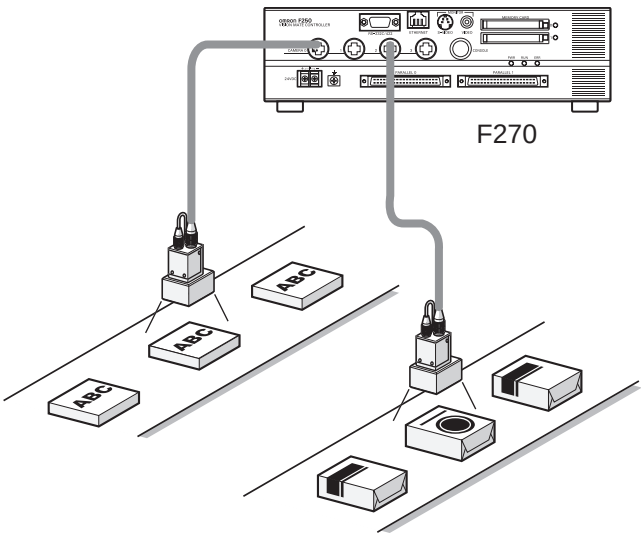
- Variables cannot be used as a counter for the number of measurements, since they are counted by each processing section.
- Saved images and Trend Monitor's measurement data are stored for each processing section.
- Measurements performed while the setting data is changed cannot be guaranteed. (e.g. when performing measurement while changing conditions using unit data)

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Performing Measurement in 2-Line Random Trigger Mode

F270

Two measurement triggers can be input simultaneously. This allows one controller to perform different inspections simultaneously.



2-line random trigger mode can only be performed in the following cases.
Use of other input/output interfaces is not guaranteed.

- Input of measurement command: STEP signal, Continuous measurement by parallel (DI)
- Output of measurement results: Parallel interface (DO, OR signals)

■ Camera Connection

Up to two cameras can be connected to each processing section.
The relationship between processing sections and cameras that can be connected is shown below.

Processing section 0: Camera 0, Camera 1
Processing section 1: Camera 2, Camera 3

CHECK! Internally synchronized cameras cannot be used.

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Settings to be Made In Advance

To perform measurement in 2-line random mode, [Set key operation] function needs to be set.

■ Key Operation

Specify the key to be used to switch the monitor display.

SECTION 5 System Settings, “Customizing Operations”

Mechanism of 2-Line Random Trigger Mode

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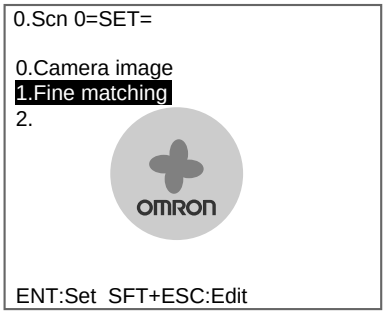
■ Setting Measurement Conditions

Set the measurement conditions for each processing section. After they are set, they must be saved to the flash memory for each processing unit.

▶ [SET]

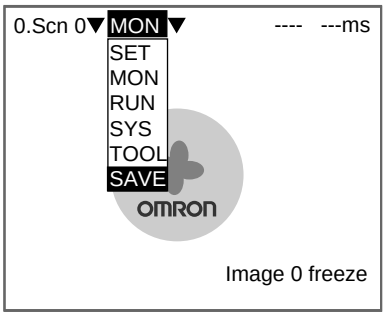
1. Set the measurement conditions for processing section 0.

2. After the conditions are set, press the ESC Key.



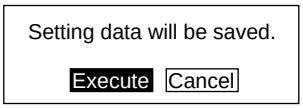
This will activate the monitor mode.

3. Select [Save].



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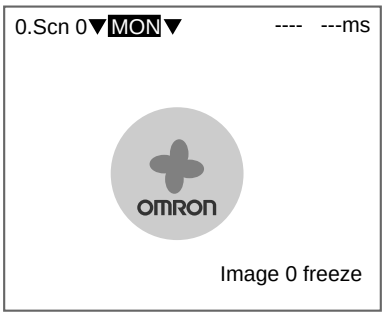
A save confirmation message appears.



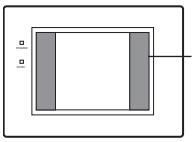
4. Select [Execute].

The settings made for processing section 0 will be saved.

5. Press the console key assigned to [Switch Proc. monitor].



The monitor will switch to processing section 1.
The monitor's background color will switch.

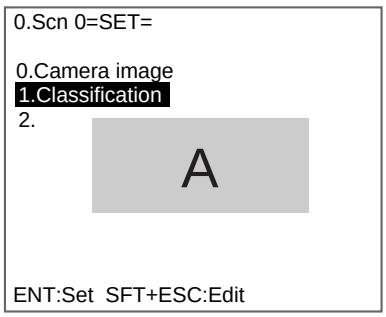


Monitor's Background Color
Color monitor: Black to blue
Monochrome monitor: Black to gray

CHECK! The screen can also be switched by using the CONMON command via the serial interface (normal mode).

6. Repeat steps **1.** to **4.** to complete setting the measurement conditions for the processing section 1.

Actually cameras 2 and 3 are connected to processing section 1. However, when making settings for [Camera Image] and [Switch camera], assume that Cameras 0 and 1 are connected.



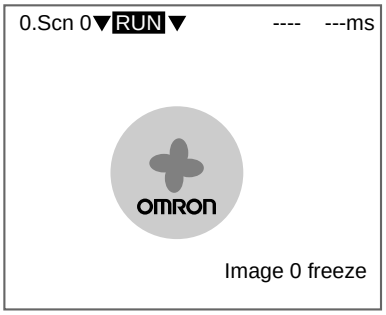
The settings made for processing section 1 will be saved.

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Starting Measurement

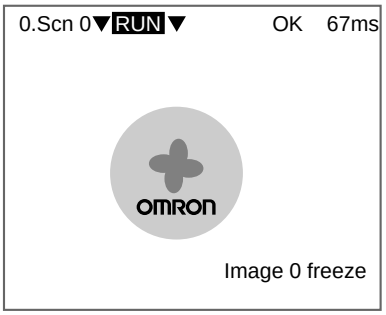
▶ [RUN]

1. Input the SETP signal or parallel DI signal of each processing section.

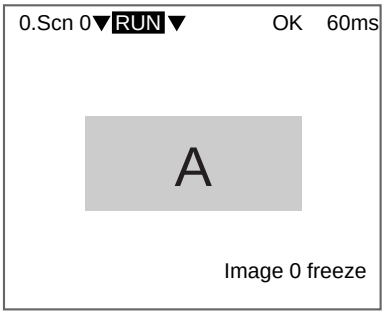


Measurement will be performed in 2-line random trigger mode.

Section 0 screen



Section 1 screen



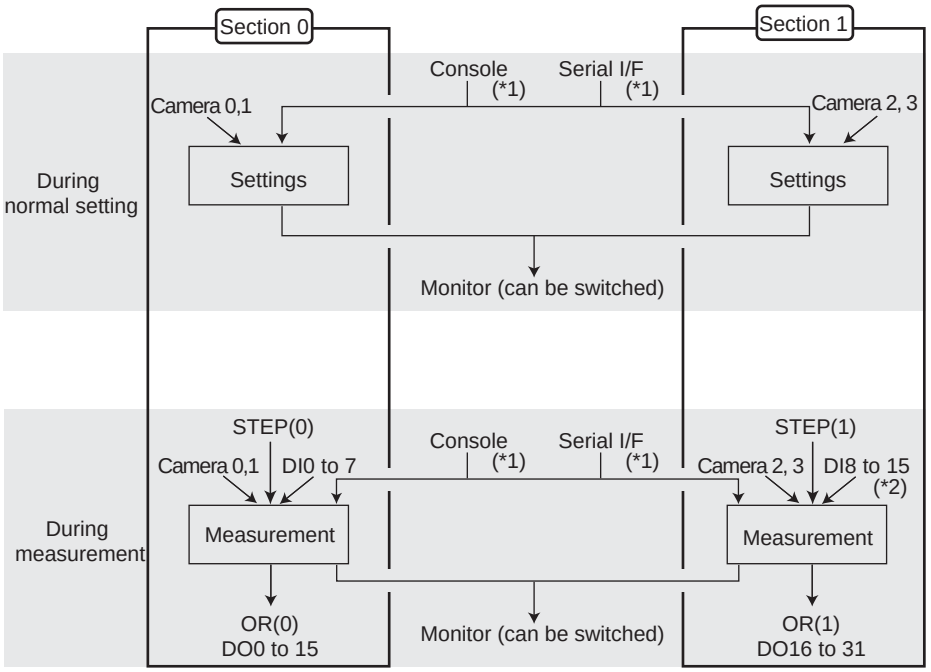
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Mechanism of 2-Line Random Trigger Mode

The controller has two built-in processing sections, which are called processing section 0 and processing section 1. With the 2-line random trigger mode, both processing sections are used.

Each processing section can have its own system data and scene data, allowing simultaneous measurement by both processing sections.

However, only one processing section is displayed on the monitor, so press the console key assigned to [Switch Proc. monitor] if you want to switch to the other processing section.



*1: The processing section currently displayed on the monitor is input.
*2: The command format is the same as that for DI0 to DI7.

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Communication with External Devices

■ Parallel Interface

Parallel 0 of the parallel I/O connector is used for processing section 0, and parallel 1 for processing section 1.

F270 Setup Manual
SECTION 4 Connecting External Devices

• Timing Charts

For details, refer to SECTION 6 Communication with External Devices, “1. Parallel Interface”.

• [DO Data Output]

Both processing sections can output 16-bit data. The output range varies as follows with the data format. Data will not be output correctly if this range is exceeded.

Binary data: -32768 to +32767

BCD data: -999 to +999

SECTION 2, 6.2 DO data output

• [DO Judgement Output]

Both processing sections can output judgement data 0 to 15. No data will be output even if setting is made for judgements 16 to 31.

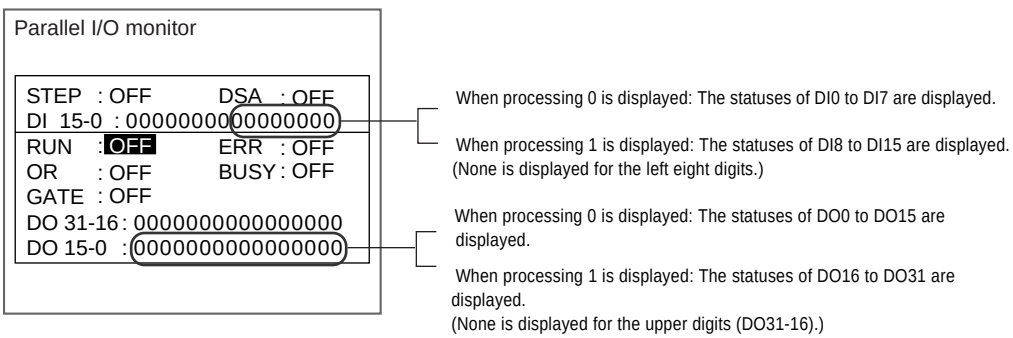
SECTION 2, 6.3 DO judgement output

• Parallel I/O Monitor

Used to monitor the communication status of the parallel interface.

It allows you to monitor the status of parallel 0 while processing section 0 is displayed on the monitor, and parallel 1 while processing section 1 is displayed on the monitor.

Use the following procedure to monitor the DI and DO signals.



SECTION 4 Other Functions, “Checking I/O Status with External Devices”

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■ Serial Interface

The serial interface allows input of normal commands only.
[Host link], [Normal data] and [Host link data] are not supported.
Normal commands are accepted by the processing section that is currently displayed on the monitor, so check the monitor display first and then execute an appropriate command.

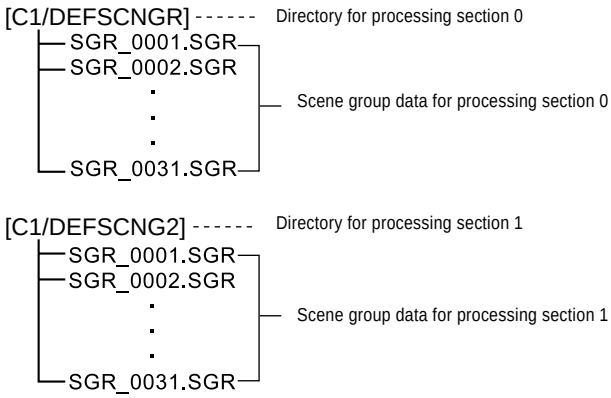
SECTION 6, 2. Serial Interface Menu Operations, “Input Format (Normal)”

Backing Up Data to the Memory Card

■ Backing Up Scene Group Data

The scene group data for each processing section is saved in the following directory.
Data backup must be performed for each processing section.

SECTION 4 Other Functions, “Backing Up Settings”



■ Backing Up Data to the Flash Memory

Data backup must be performed for each processing section.
Once backup has been completed, the following files will be created in the memory card automatically. Do not change the file names.

File Name	Data Content
bkupprog	Installed program
bkupdata	Backup data for processing section 0
bkupdat2	Backup data for processing section 1

SECTION 4 Other Functions “Backing Up Settings”

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SECTION 4
Other Functions

This section explains additional functions such as setup change and data backup.

Setup Change (Scenes and Scene Group Functions)	2
Backing Up Settings	9
Clearing Measurement Values	21
Clearing the Data in the Storage ETN	22
Checking Image Density Distribution (Line Brightness)	23
Checking I/O Status with External Devices	25
Memory Card Operations	29
Macro Programs	37

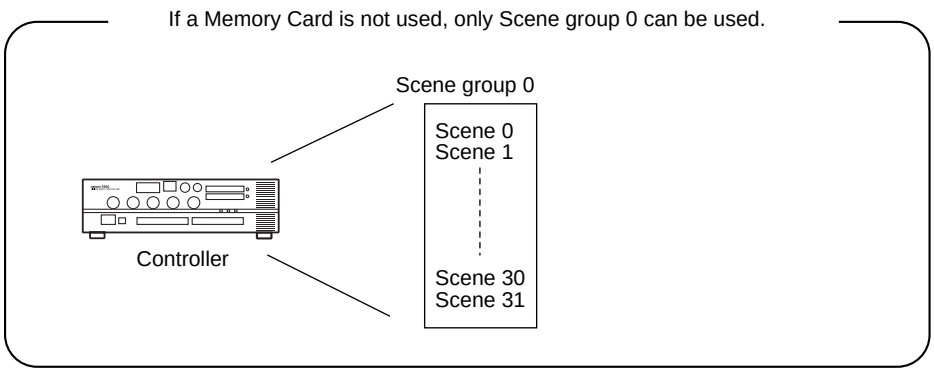
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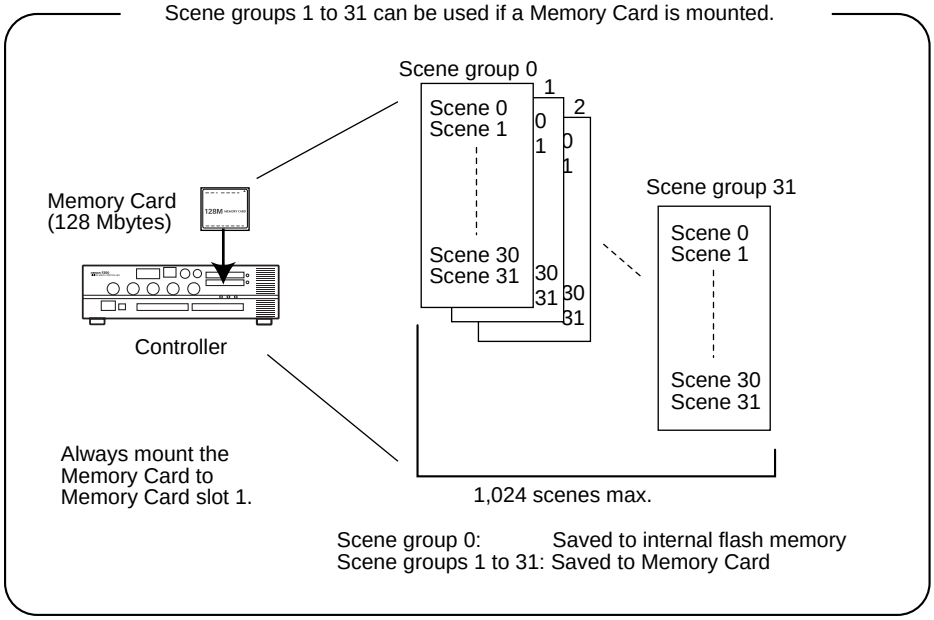
Setup Change (Scenes and Scene Group Functions)

The different situations (types of measurement workpieces and types of inspections required) in which measurements are performed are called “scenes” and the measurement conditions set in the Set mode are called “scene data”. Use of the scene function allows you to set up to 32 types of measurement conditions. When the inspection requirements change, the inspection process can be changed just by changing the scene.
The normal limit of 32 scenes may not be possible for some settings if there is insufficient memory. A message will appear on the screen if there is insufficient memory. Make the region smaller or delete unnecessary regions or models.

CHECK!

Inserting a memory card into a memory card slot can have up to 1,024 scenes (in the case of 128-MB memory card). Up to 32 scene groups (each group consists of 32 scenes) can be set. This means up to 1024 scenes (32 scenes x 32 scene groups) can be set up. Scene group 0 will be saved in the internal flash memory and scene groups 1 to 31 will be saved to the Memory Card.





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Setting Measurement Conditions for Different Models (Changing Scenes)

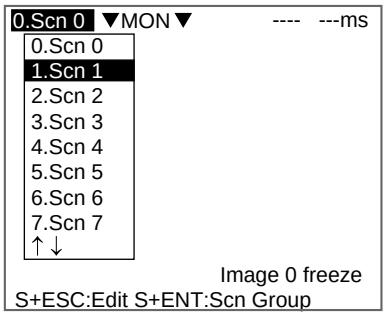
Use the scene changing function to switch between different measurement conditions for different measurement setups or measurement objects. By default, scene 0 is displayed when the power is turned ON. However, scenes 1 to 31 are also available. In addition, inserting a memory card and using it in conjunction with the scene group function will allow you to set up to 1024 scenes.

The command for changing scenes or scene groups can be input from an external device via a parallel or serial interface.

▶ [Scn]

1. Move the cursor to the scene number to be switched to and press the ENT Key.

Down Key: Display scene group numbers 8 to 31.



The selected scene appears.



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■ Using Scene Group Function

Before performing the following operations, make sure that the memory card to be used for storage of scene group data has been inserted.

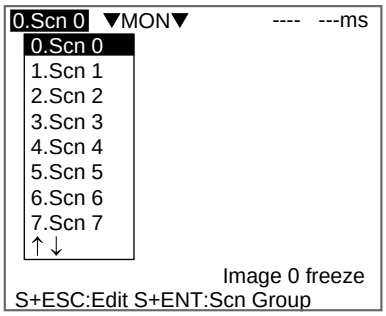
If the controller has two slots, the memory card for storing scene group data must be inserted into slot 1.

CHECK!

If you switch the scene group to another (1 to 31), a directory called “DEFSCNGR” will be created automatically in the root directory of the memory card.
In this directory, the scene group data is stored in a file called “GR_00**.SGR (indicates the scene group no.)”.

▶ [Scn]

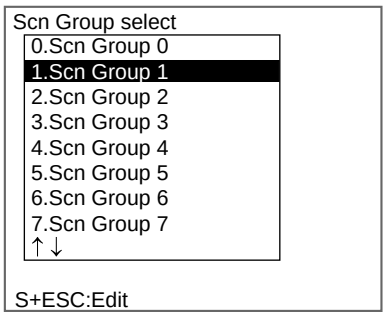
1. Press the SHIFT+ENT Keys.



The Scene 0 to Scene 7 options will be displayed.

2. Move the cursor to the scene group number to be switched to and press the ENT Key.

Down Key: Display scene group numbers 8 to 31.



The selected scene group will be displayed.

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Copying the Specified Measurement Conditions to Another Scene

This function is useful for creating new scenes by copying scene data from another scene and changing some settings to suit the new requirements.

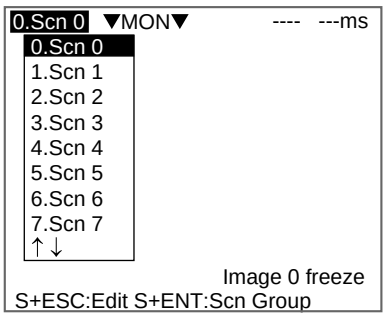
CHECK! Scene data can be copied only within the same scene group. To copy data between scene groups, copy the whole scene group.

p.8

▶ [Scn]

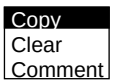
1. Move the cursor to the scene to which the conditions are to be copied.

2. Press the SHIFT + ENT Keys.



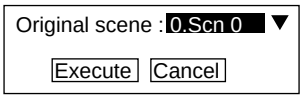
The Copy/Clear/Comment Menu will be displayed.

3. Select [Copy].



The screen for copying will be displayed.

4. Select the scene from which the conditions are to be copied, and select [Execute].



The data will be copied.

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Initializing Measurement Conditions (Clearing Scenes)

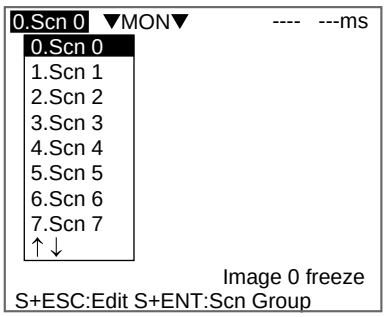
Use the following procedure to clear measurement conditions set in Set Mode, and to return scenes to their default settings. This section explains the procedure performed separately for each scene.

Initializing a Group of Scenes p.8

▶ [Scn]

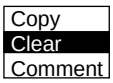
1. Move the cursor to the scene to be cleared.

2. Press the SHIFT + ENT Keys.



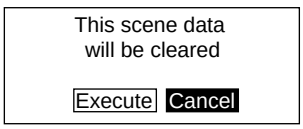
The Copy/Clear/Comment Menu will be displayed.

3. Select [Clear].



A confirmation message will be displayed.

4. Select [Execute].



The scene will be cleared.

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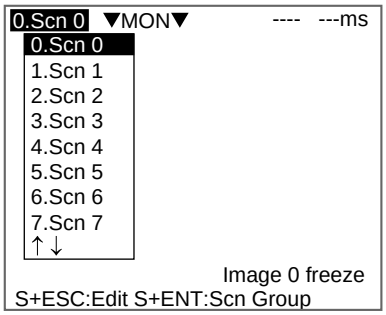
Adding Comments to Scenes

Any comment can be added to each scene. This is useful for understanding settings when many regions have been registered.

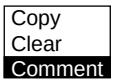
▶ [Scn]

1. Move the cursor to the scene to be renamed.

2. Press the SHIFT + ENT Keys.



The Copy/Clear/Comment Menu will be displayed.

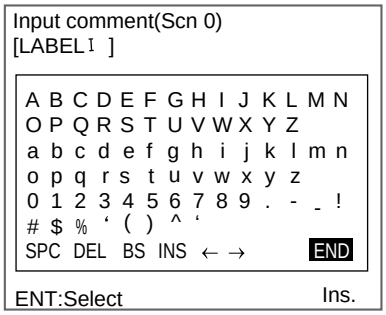


3. Select [Comment].

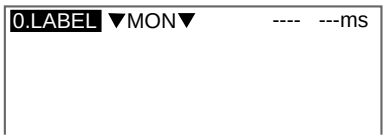
A software keyboard will be displayed.

4. Enter a comment consisting of up to 8 characters.

5. Move the cursor to [END] and press the ENT Key.



The scene name will be changed.



CHECK!

Comments can also be set in Japanese via a serial interface. However, full-size characters are equivalent to two standard size characters. Thus, if the string consists of full-size characters only, only up to 4 characters can be set.

SECTION 6, “4. Serial Interface Menu Operations*

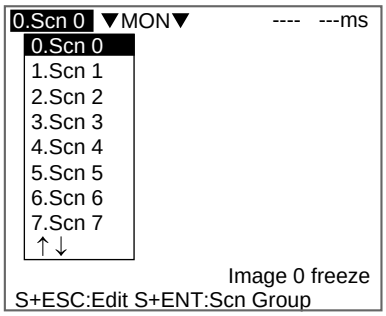
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Using Scene Group Function

Use the scene group function to copy and clear whole scene groups and change the scene group name to any 11 standard characters.
Before performing the following operations, make sure that the memory card has been inserted.

▶ [Scn]

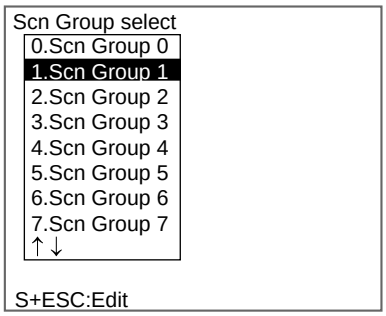
1. Press the SHIFT+ENT Keys.



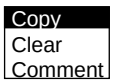
The Scene 0 to Scene 7 options will be displayed.

2. Move the cursor to the desired scene group no.

3. Press the SHIFT + ENT Keys.



The Copy/Clear/Comment Menu will be displayed.
The rest of the operations are the same as when using the scene function.



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Backing Up Settings

The setting data or saved image can also be backed up to the computer or memory card. This function is useful when you want to set the same data to another machine. It is recommended that data is backed up in case data is lost or the Controller malfunctions.

Data	Details	Backup destination	
		Memory Card	Personal computer
System data	Settings under [SYS] are backed up to a computer or memory card. Macro programs are contained in the system data.	OK	OK
Scene group data	Scene data (scenes 0 to 31) for specified scene group are backed up to a computer or Memory Card.	OK	OK
Scene data	Settings under [SET] are backed up to a computer or Memory Card.	OK	OK
System data + Scene group	Both the system data and scene group data (for the scene group currently displayed) are backed up together to a computer or Memory Card. In the case of scene group, the data for the currently displayed scene group is saved.	OK	OK
Image data	Saved measured images are backed up in bitmap format (*.BMP) to a computer or memory card. The bitmap format is often used with Windows, so images backed up in this format can be displayed on a computer.  CHECK! When backing up images saved when [Frame] was selected for the Frame/Field mode, save those images while displaying frame images. When backing up images saved when [Field] was selected for the Frame/Field mode, save those images while displaying field images.	OK	OK
All data in flash memory	The data saved in the flash memory is backed up (the data includes [installed processing items] and [setting data] (system data + scene data of scene group 0). This item must be used when you want to back up [installed processing items].	OK	NG


CHECK!

Backing Up Data to the Memory Card

Some settings may not be backed up to a memory card because of insufficient memory capacity. In this case, a warning message will appear, so delete unnecessary scenes.


CHECK!

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 Controller may not operate correctly the next time it is started.

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Backing Up to a Personal Computer

This section describes the procedure for data transfer using Hyper Terminal, which is standard software in Windows. To back up a data usingVision Conductorrefer to the manual for Vision Conductor. If other communications software is being used, refer to the relevant manual.

- Setting communication specifications

  For the communication specifications, refer to “SECTION 6 Communication Method with External Devices”

  - Controller (serial interface)

    The default communications settings are as shown in the following table. These settings can normally be used.

Setting data	Selection
Interface	RS-232C
Baud rate	38,400 (bps)
Data length	8 (bit)
Parity bits	None
Stop bits	1 (bit)
Protocol	XMODEM (See note.)

* Set the same settings that are set in the personal computer.

  - Personal computer

    Use the protocol that matches the personal computer settings.

RS-232C/422 Connections

Setting data	Selection
Connection	COM* (COM number to which the cable is connected)
bit/sec. (B)	38,400 (bps)
Data bits (D)	8 (bit)
Parity bits	None
Stop bits	1 (bit)
Flow control	None

Ethernet Connection F250 F270

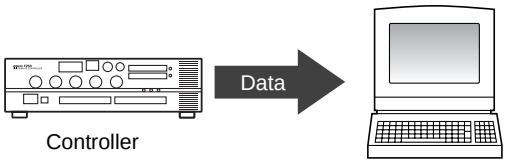
Setting data	Selection
Connection	TCP/IP (Winsock)
Host address	IP address of Controller
Port number	23 (TELNET)

USB Connection

Setting data	Selection
Connection	COM (COM No. by which the USB interface is recognized)

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■ Saving Data to the Computer



Before starting saving data, connect the personal computer to the controller and make their communication settings.

▶ [Tool/System data/Save(Serial)]

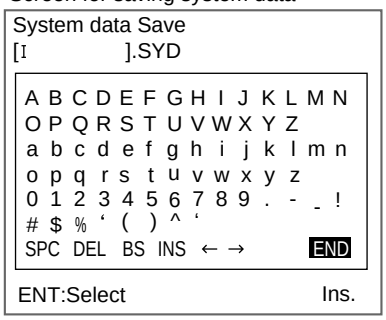
1. Select the desired number for scene group, scene, or image data.

CHECK! When backing up system and scene group data, the currently displayed scene group will be saved.

Communication by [ZMODEM]
Specify the desired file name (up to eight characters).

Scene group data No.	Scene data No.	Image data No.
Scn Group 0	Scn 0	Memory 0
Scn Group 1	Scn 1	Memory 1
Scn Group 2	Scn 2	Memory 2
Scn Group 3	Scn 3	Memory 3
Scn Group 4	Scn 4	Memory 4
Scn Group 5	Scn 5	Memory 5
Scn Group 6	Scn 6	Memory 6
Scn Group 7	Scn 7	Memory 7
↑↓	↑↓	↑↓
(0 to 31)	(0 to 31)	(0 to 35)

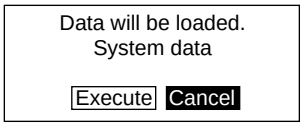
Example:
Screen for saving system data



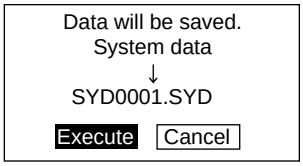
A confirmation message will be displayed.

2. Select [Execute].

For XMODEM communications:

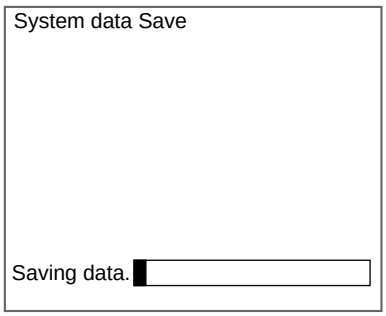


For ZMODEM communications:



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A screen showing the transfer progress appears.





3. Select [Transfer/Receive File] from the Hyper Terminal menu.

4. Specify where the file is to be saved.

5. Set the protocol to [XMODEM] or [ZMODEM].

6. Select [RECEIVE].

When [XMODEM] is selected, enter the file name.

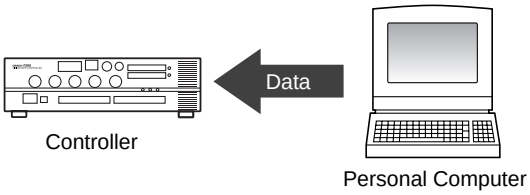
The data will be transferred from the Controller to the computer.



When transferring has been completed, the screen for selecting the load/save destination will reappear.

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■ Loading



Before starting loading data, connect the personal computer to the controller and make their communication settings.

1. Select [Transfer/Send File] from the Hyper Terminal menu.

2. Select the file to be loaded.

3. Set the protocol to [XMODEM] or [ZMODEM].

4. Select [Send].

The data transfer screen will be displayed.

▶ [Tool/System data/Load(Serial)]

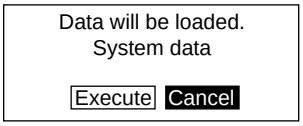
5. Select the desired number for scene group, scene, or image data.

CHECK! When backing up system and scene group data, the currently displayed scene group will be loaded.

Scene group data No.	Scene data No.	Image data No.
Scn Group 0	Scn 0	Memory 0
Scn Group 1	Scn 1	Memory 1
Scn Group 2	Scn 2	Memory 2
Scn Group 3	Scn 3	Memory 3
Scn Group 4	Scn 4	Memory 4
Scn Group 5	Scn 5	Memory 5
Scn Group 6	Scn 6	Memory 6
Scn Group 7	Scn 7	Memory 7
↑↓	↑↓	↑↓
(0 to 31)	(0 to 31)	(0 to 35)

A confirmation message will be displayed.

Example: Screen when loading system data.



6. Select [Execute].

The data will be transferred from the computer to the Controller.

When loading has been completed, the screen for selecting the load/save destination will reappear.

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Backing Up to Memory Cards

This section describes inserting a Memory Card and backing up settings data to the Memory Card.

CHECK!

Data can be backed up to Memory Cards inserted for scene group data.
Data for scene groups 1 to 31 will be saved in the files listed below. Do not overwrite these files.

```
[DEFSCNGR] ---------- Directory for saving scene group data
  ├ SGR_0001.SGR -- Scene group 1 file
  ├ SGR_0002.SGR -- Scene group 2 file
  :                 :
  :                 :
  └ SGR_0031.SGR -- Scene group 31 file
```

CHECK!

If the 2-line random trigger mode is selected as the run mode in the case of F270, directories called "DEFSCNGR" and "DEFSCNG2" will be created for the processing sections 0 and 1, respectively.

For the 2-line random trigger
SECTION 3 Test/Measurement Execution, "Performing Measurement in 2-Line Random Trigger Mode"

CHECK!

Turn OFF the power supply to the memory card before removing the memory card.
p.37

■ Saving from the Controller to the Memory Card

Before saving data, make sure that the memory card is inserted.

▶ [Tool/System data/Save(Memory card)]

1. Select the desired number for scene group, scene, or image data.

CHECK!

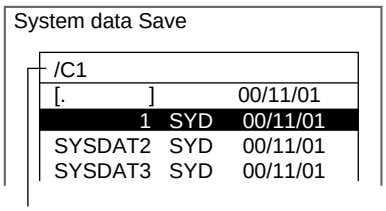
When backing up system and scene group data, the currently displayed scene group will be saved.

Scene group data No.	Scene data No.	Image data No.
Scn Group 0	Scn 0	Memory 0
Scn Group 1	Scn 1	Memory 1
Scn Group 2	Scn 2	Memory 2
Scn Group 3	Scn 3	Memory 3
Scn Group 4	Scn 4	Memory 4
Scn Group 5	Scn 5	Memory 5
Scn Group 6	Scn 6	Memory 6
Scn Group 7	Scn 7	Memory 7
↑↓	↑↓	↑↓
(0 to 31)	(0 to 31)	(0 to 35)

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A list of files in the Memory Card root directory will be displayed.

To change the drive: p.36
Only for controllers equipped with two slots)



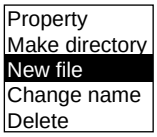
Drive name
Slot 0 Memory Card: /C0
Slot 1 Memory Card: /C1
For controllers equipped with one slot, [/C0] is displayed.

CHECK!
To overwrite an existing file, select that file by pressing the ENT Key and then go to the screen in **5.**
To specify a new file name, perform steps **2.** to **4.**

2. Press the SHIFT + ENT Keys.

The edit menu will be displayed.

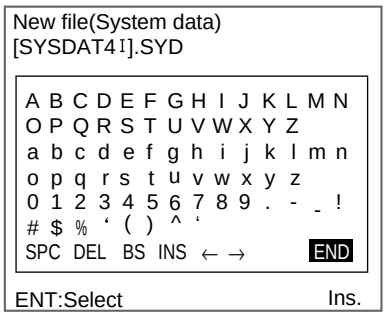
3. Select [New file].



CHECK!
If [Make directory] is selected, the screen for creating new directories will be displayed. Files can be saved in the newly created directory.

A software keyboard will be displayed.

4. Set the file name (up to 8 characters).

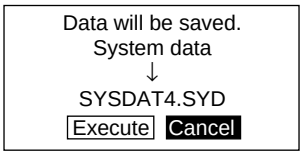


CHECK!
Periods (.) cannot be used in file names.

A confirmation message will be displayed.

5. Select [Execute].

Example:
Confirmation message when saving system data



When saving has been completed, the screen for selecting the load/save destination will reappear.

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■ Loading from the Memory Card to the Controller

Before loading data, make sure that the memory card is inserted.

▶ [Tool/System data/Load(Memory card)]

1. Select the desired number for scene group, scene, or image data.

CHECK! When backing up system and scene group data, the currently displayed scene group will be loaded.

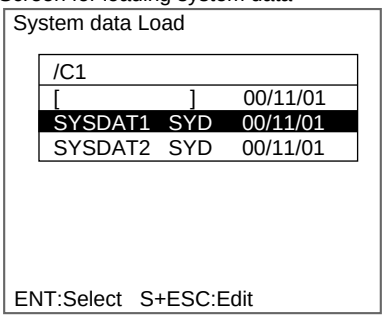
Scene group data No.	Scene data No.	Image data No.
Scn Group 0	Scn 0	Memory 0
Scn Group 1	Scn 1	Memory 1
Scn Group 2	Scn 2	Memory 2
Scn Group 3	Scn 3	Memory 3
Scn Group 4	Scn 4	Memory 4
Scn Group 5	Scn 5	Memory 5
Scn Group 6	Scn 6	Memory 6
Scn Group 7	Scn 7	Memory 7
↑↓	↑↓	↑↓
(0 to 31)	(0 to 31)	(0 to 35)

The screen for selecting files will be displayed.

To change the drive: p.36
(Only for controllers equipped with two slots)

2. Select the file to be loaded.

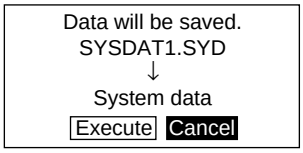
Example:
Screen for loading system data



A confirmation message will be displayed.

3. Select [Execute].

Example:
Screen when loading system data



When loading has been completed, the screen for selecting the load/save destination will reappear.

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Backing Up Flash Memory Data to a Memory Card

This section explains how to back up the data stored in the flash memory to a memory card.

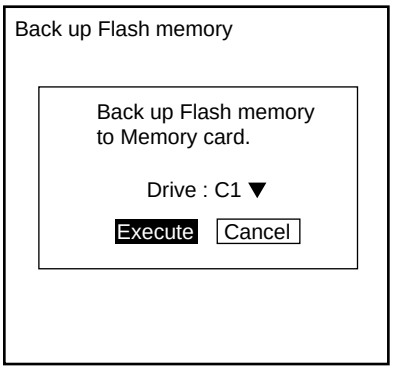
Use of this function allows you to save the installed processing items as well as data (system data, scene data of scene group 1) together to the memory card. This function is useful when you have two controllers and you want to copy the settings made on one of the controllers to the other controller. It is recommended that data is backed up to a memory card in case data is lost or the Controller malfunctions.

■ Saving Data to the Computer

Before saving data, make sure that the memory card is inserted.

▶ [Tool/Back up Flash memory/(Drive)]

1. Select [Execute].



When saving has been completed, the tool screen will reappear.

CHECK!

Once backup has been completed, two files, “bkupdata*” and “bkupprog”, will be created in the root directory of the Memory Card. These files are the flash memory backup data. Do not change the file names.

* If the 2-line random trigger mode is selected as the run function mode in the case of F270, three files named “bkupprog”, “bkupdata (backup data for processing section 0)”, and “bkupdat2 (backup data for processing section 1)” will be created.

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■ Loading

The load operation is performed using the setup menu.

To start the setup menu, the F500-UME Application Software that was used for installation is needed.

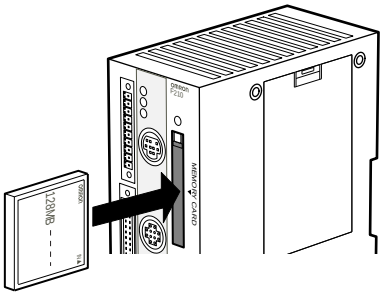
The loading method varies with the number of slots available on the controller.

- When the Controller has Only One Slot:

1. Turn OFF the controller's power supply.

2. Mount the Application Software Memory Card to Memory Card slot 0.

3. Turn ON the controller's power supply.

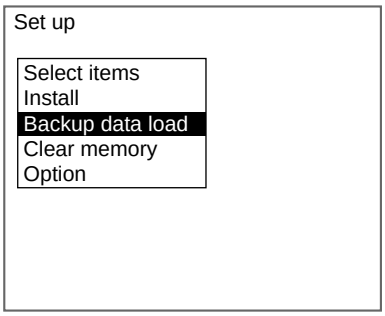


▼

The Setup Menu will be displayed.

4. Remove the Application Software memory card from the slot, and insert the memory card containing the files to be loaded into the slot.

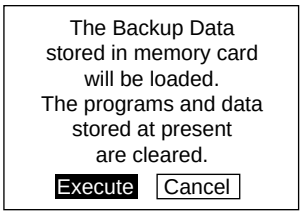
5. Select [Backup data load].



▼

A confirmation message will be displayed.

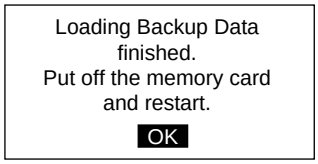
6. Select [Execute].



▼

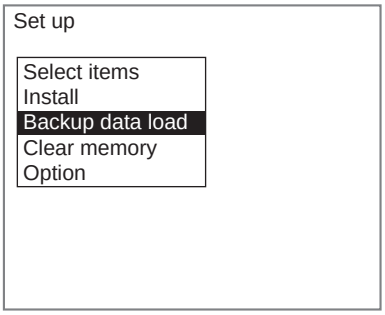
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When saving has been completed, a confirmation message will be displayed.



7. Press the ENT Key.

The display will return to the main setup menu.

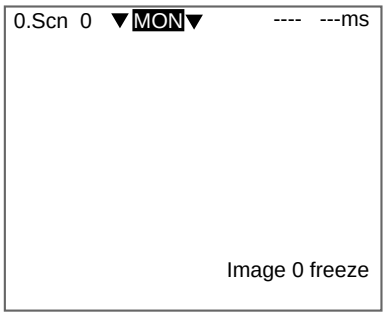


8. Turn OFF the controller's power supply.

9. Remove the memory card from slot 0.

10. Turn ON the controller's power supply.

The Main Menu will start.



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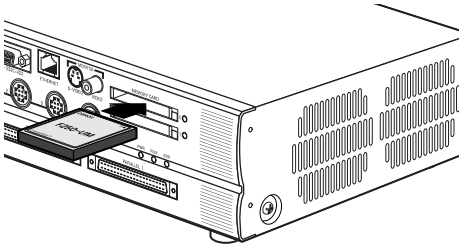
- When the Controller has Two Slots:

1. Turn OFF the controller's power supply.

2. Mount the Application Software Memory Card to Memory Card slot 0.

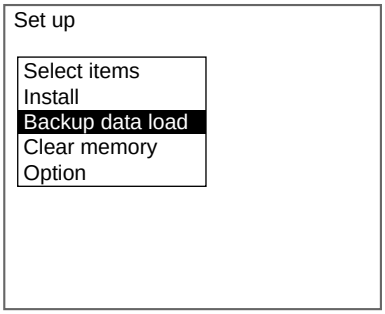
3. Mount the memory card containing the backup data into slot 1.

4. Turn ON the controller's power supply.



The Setup Menu will be displayed.

5. Select [Backup data load].



A confirmation message will be displayed.
The subsequent steps are the same as steps **6.** to **10.** given in “When the Controller has Only One Slot: so perform them to load the data from the flash memory to the memory card.

CHECK!

If the power supply is turned ON while the Application Software Memory Card is still mounted, the Setup Menu will be started again. Always remove the Application Software Memory Card before starting the Controller.

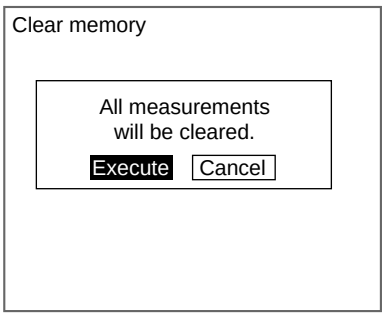
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Clearing Measurement Values

Clears all measurement values for the currently displayed scene.
This function is useful, for example, for clearing the measurement count when setting an expression to count the number of measurements.

▶ [Tool/Clear memory]

1. Select [Execute].



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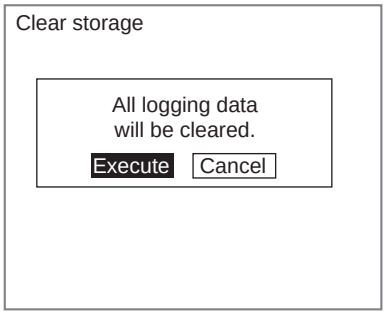
Clearing the Data in the Storage

ETN

All the data (e.g. image data, measured data) that has been logged to the controller's storage can be cleared.
This function is useful when you want to reset the data to be transferred to the personal computer.

▶ [Tool/Storage]

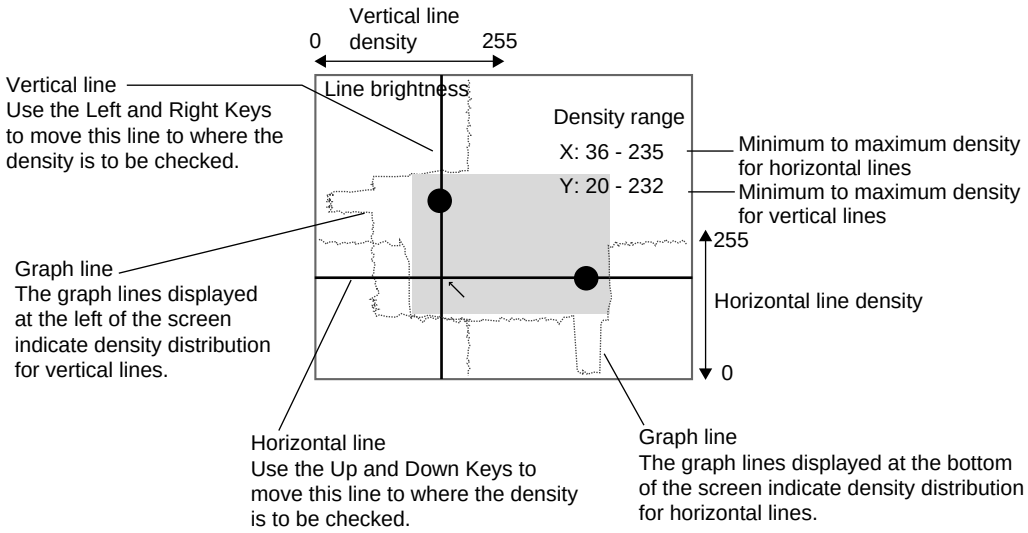
1. Select [Execute].



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Checking Image Density Distribution (Line Brightness)

The graph showing the density distribution for 1 line in an image is called the line brightness graph. The line brightness can be shown for any line in a horizontal or vertical direction.



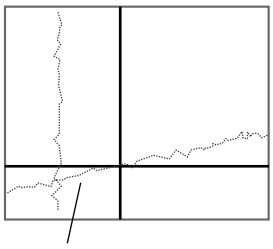
CHECK!

Line brightness cannot be shown in the following circumstances:
When the image is either [Last NG (before scroll)] or [Last NG (after scroll)]

SECTION 5 System Settings, “Screen Display and Monitor”

Using Line Brightness

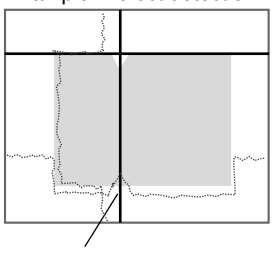
- Use to check if the light distribution is uneven.



If a homogeneous color is being displayed but the graph has an incline, it indicates that the lighting is uneven.

- Use to find how great the density difference is between the location to be measured and the background.

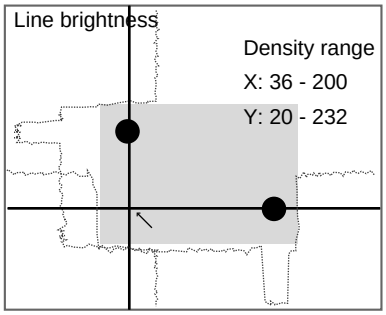
Example: Defect detection



Observe the bumps in the graph line to determine how much difference in density can be detected in what areas.

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▶ [Tool/Line brightness]



1. Move the solid lines to the desired position for observing density distribution.

Use the Up/Down Keys to move the horizontal line.
Use the Right/Left Keys to move the vertical line.

2. Press the ESC Key to exit this screen.

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Checking I/O Status with External Devices

Use the I/O monitor function to check the communications status via serial or parallel interfaces. Wiring and communications settings can be checked to see if they are correct.

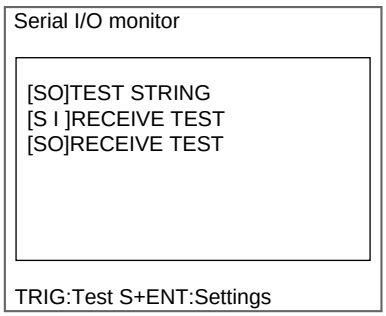
Serial Interface

The communications status via the serial interface can be checked.

▶ [Tool/I/O monitor/Serial]

1. The Parallel I/O Monitor Screen will be displayed.

2. Press the ESC Key to exit this screen.



Display Details

Display	Function
SO	Output to external device. Press the TRIG Key once to send a test character string “TEST STRING” from the controller to the external device. The contents of the test character string can be changed. p.26
SI	Input from external device. If more than 26 characters are received, only the first 26 characters will be displayed. If Echo back is set to [ON], the received data will be returned as is to the external device. p.26

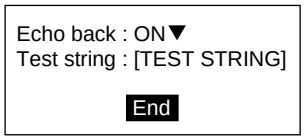
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■ Changing Test Character String and Echo Back

▶ [Tool/I/O monitor/Serial]

1. Press the SHIFT+ENT Keys.

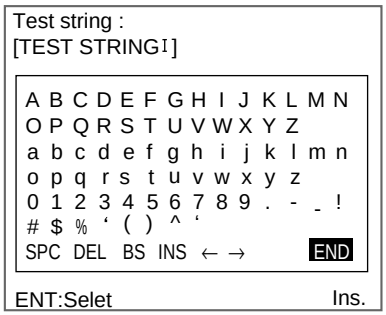
The screen for making detailed settings will be displayed.



2. Select [ON] or [OFF] for Echo back.

3. Move the cursor to the square bracket and press the ENT Key.

A software keyboard will be displayed.



4. Change the test string. Up to 12 characters can be inserted.

5. Select [End] to return to the screen shown at step **2.**

6. Move the cursor to [End] and press the ENT Key.

The Serial I/O Monitor Screen will return.

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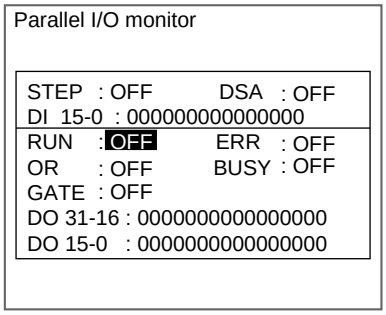
Parallel Interface

The communications status via the parallel interface can be checked.

▶ [Tool/I/O monitor/Parallel]

1. The Parallel I/O Monitor Screen will be displayed.

2. Press the ESC Key to exit this screen.



Display Details

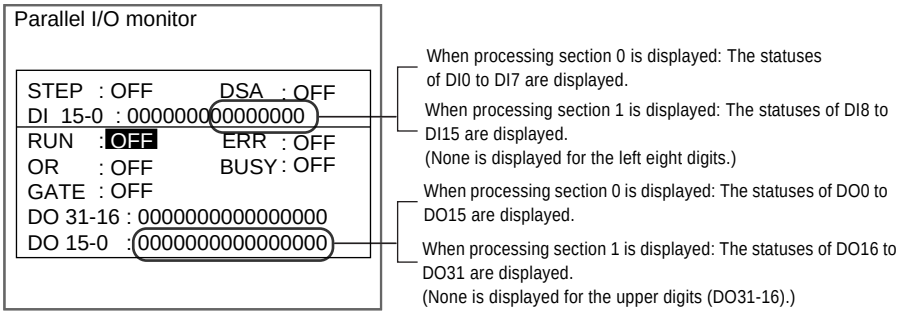
Display	Function
STEP	Displays the input status for each signal from the external device to the Controller.
DSA	
DI	
RUN	Displays the output status for each signal from the Controller to the external device. These displays can be changed to ON/OFF or 0/1 even if measurements are not executed. Move the cursor to the display item. The display will change each time the ENT Key is pressed.
ERR	
OR	
BUSY	
GATE	
DO	

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CHECK!

If the 1-line fast or 2-line random trigger mode is selected as a run function mode in the case of F270, follow the procedure given below.

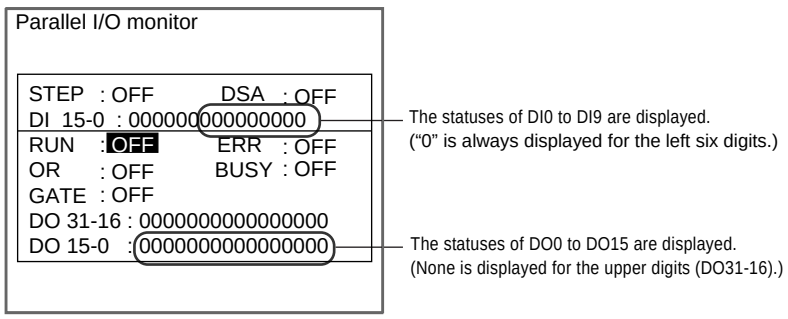
- 1-Line Fast Mode
  Display processing section 0 on the monitor and check the parallel communication status. Only when you want to check the status of the BUSY (1) signal of the parallel I/O connector, use processing section 1.
- 2-Line Random Trigger Mode
  Display the processing section to be checked on the monitor and check the parallel communication status. Use the following procedure to monitor the DI and DO signals.



SECTION 3 Test/Measurement Execution, “Performing Measurement in 1-Line Fast Mode”
SECTION 3 Test/Measurement Execution, “Performing Measurement in 2-Line Random Trigger Mode”

CHECK!

Display Screen for F210-C10



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Memory Card Operations

The controller has a function to save settings and measured images to a memory card.
Files stored on a memory card can be copied or renamed.
This section explains these operations for Memory Cards.

CHECK!

When removing a memory card, always turn OFF the power supply to the memory card first. Removing the memory card without turning OFF the power may result in damage to the memory card or controller.

p.37

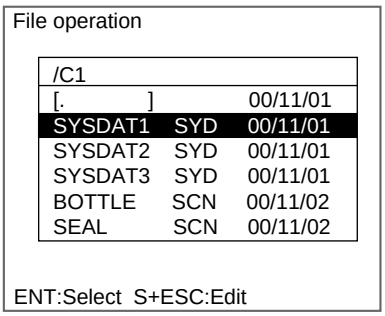
Creating Directories

Directories can be created in the Memory Card and files can be stored in those directories. It is easier to find files if separate directories are created for related files.
Before starting the following operations, make sure that the memory card is inserted.

▶ [Tool/Memory card/File operation]

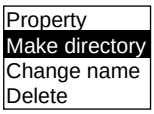
1. A list of files in the Memory Card root directory will be displayed.

To change the drive: p.36
(Only for controllers equipped with two slots)



2. Press the SHIFT + ENT Keys.

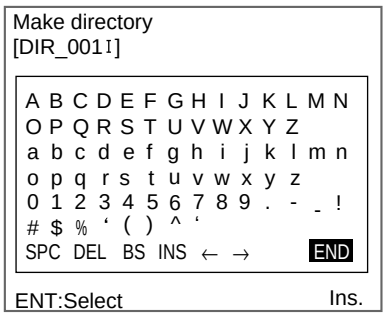
The edit menu will be displayed.



3. Select [Make directory].

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A software keyboard will be displayed.



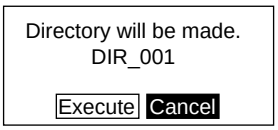
4. Enter the desired directory name (up to 8 characters).

CHECK!

Periods (.) cannot be used in directory names.

5. Move the cursor to [END] and press the ENT Key.

A confirmation message will be displayed.

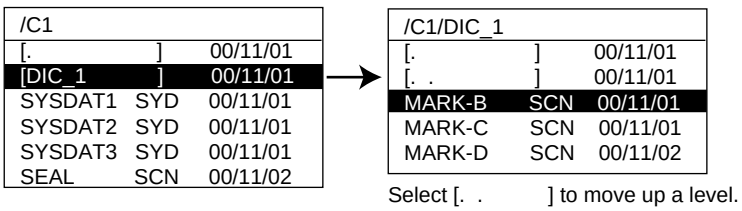


6. Select [Execute].

CHECK!

The directory is displayed in the list of files, encased in square brackets.
Move the cursor to the directory and press the ENT Key to display a list of files in that directory.

Example:
When directory [DIC_1] is selected... The files in [DIC_1] will be displayed.



Select [. .] to move up a level.

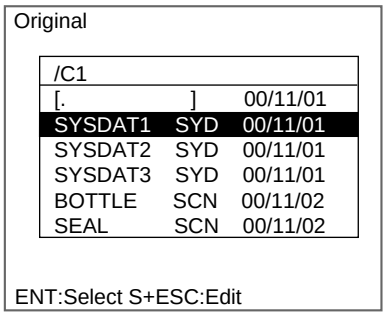
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Copying Files

▶ [Tool/Memory card/Copy file]

1. A list of files in the Memory Card root directory will be displayed.

To change the drive: p.36
(Only for controllers equipped with two slots)

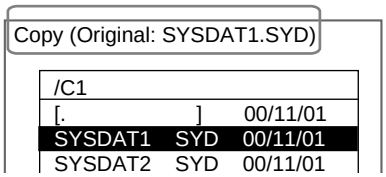


2. Move the cursor to the file to be copied and press the ENT Key.

A screen for specifying the copy destination will be displayed.

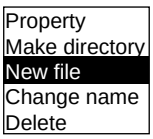
To overwrite an existing file:
Select that file by pressing the ENT Key and then go to step **7.**

To specify a new file name:
Perform steps **3.** to **7.**



3. Press the SHIFT + ENT Keys.

The Memory Capacity/Version Menu will be displayed.

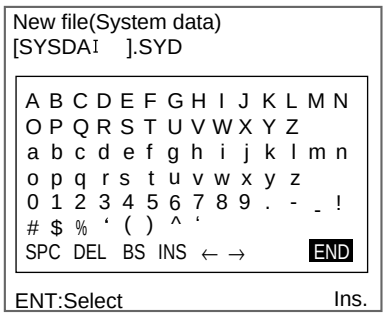


4. Select [New file].

If [Make directory] is selected, the screen for creating new directories will be displayed.
Files can be copied in the newly created directory.

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A software keyboard will be displayed.

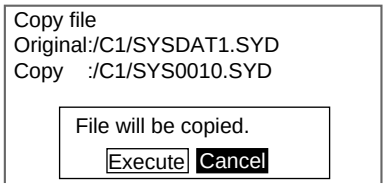


5. Set the file name (up to 8 characters).

CHECK! Periods (.) cannot be used in file names.

6. Move the cursor to [END] and press the ENT Key.

A confirmation message will be displayed.



7. Select [Execute].

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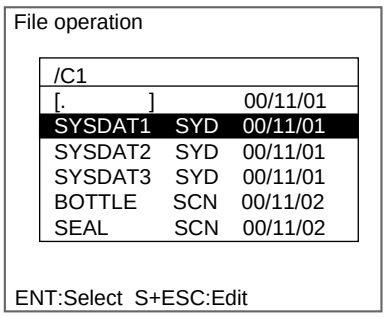
Checking File Properties

The size, type, or date a file was created can be checked.

▶ [Tool/Memory card/File operation]

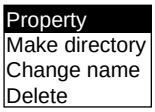
1. A list of files in the Memory Card root directory will be displayed.

To change the drive: p.36
(Only for controllers equipped with two slots)



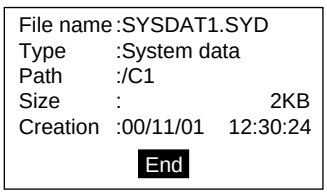
2. Move the cursor to the file for which the information is to be checked and press the SHIFT+ESC Keys.

The edit menu will be displayed.



3. Select [Property].

The properties of the selected file will be displayed.



4. Select [End].

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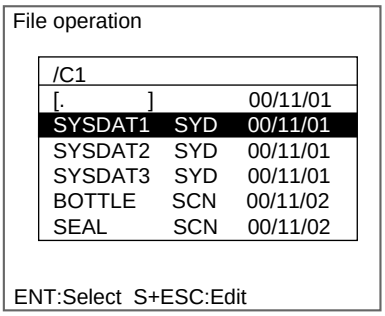
Changing File Names

Only the file name can be changed. The directory name cannot be changed.

▶ [Tool/Memory card/File operation]

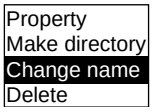
1. A list of files in the Memory Card root directory will be displayed.

To change the drive: p.36
(Only for controllers equipped with two slots)



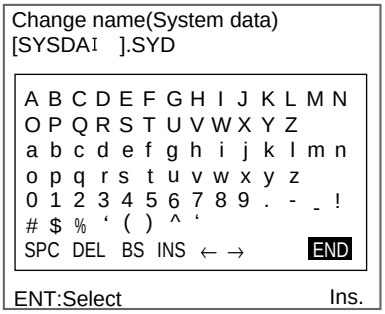
2. Move the cursor to the file to be renamed and press the SHIFT+ESC Keys.

The edit menu will be displayed.



3. Select [Change name].

A software keyboard will be displayed.

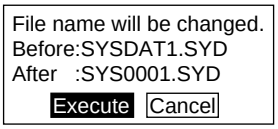


4. Change the file name to the desired one (up to 8 characters).

CHECK! Periods (.) cannot be used in file names.

5. Move the cursor to END and press the ENT Key.

A confirmation message will be displayed.



6. Select [Execute].

CHECK! If the scene group function is used, scene groups 1 to 31 will be saved in the C1 memory card (i.e. memory card mounted in slot 1) under the file names shown below. Do not change these file names. If these file names are changed, measurement setups will no longer be able to be changed by switching scene groups.

[DEFSCNGR] ---------- Directory where scene groups are stored
- SGR_0001.SGR -- Scene group 1 file
- SGR_0002.SGR -- Scene group 2 file
- SGR_0031.SGR -- Scene group 31 file

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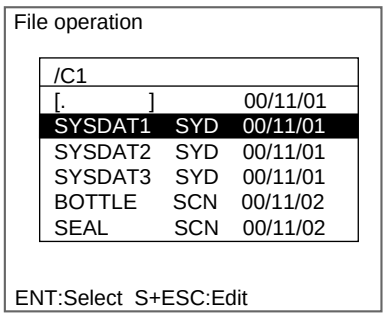
Deleting Files and Directories

A directory can be deleted only when there are no files in that directory.

▶ [Tool/Memory card/File operation]

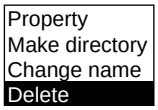
1. A list of files in the Memory Card root directory will be displayed.

To change the drive: p.36
(Only for controllers equipped with two slots)



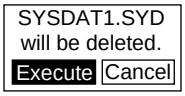
2. Move the cursor to the file or directory to be deleted and press the SHIFT + ESC Keys.

The edit menu will be displayed.



3. Select [Delete].

A confirmation message will be displayed.

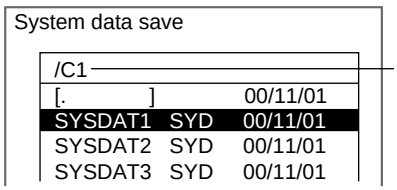


4. Select [Execute].

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Changing Drives (Only for Controllers Equipped with Two Slots)

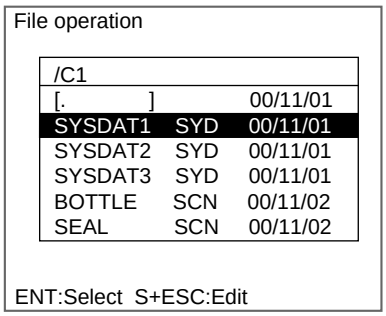
If the controller has two memory card slots, drive names will be displayed as shown below when the list of files is displayed.



If there are Memory Cards mounted in both slots 0 and 1, use the following procedure to switch between drives.

▶ [Tool/Memory card/File operation]

1. Press the SHIFT+ESC Keys on the screen where the list of files is displayed.



The edit menu will be displayed.

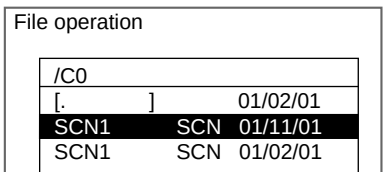
2. Select [Switch Drive].





The [Switch Drive] option will not be displayed if only one memory card is mounted in either slot 0 or slot 1.

1. The drive will switch from the one displayed at step 1 to the other drive.



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Turning OFF the Power Supply to the Memory Card

Before removing a memory card, always turn OFF the power supply. Removing it without turning OFF the power may result in damage to the memory card or controller.

CHECK!

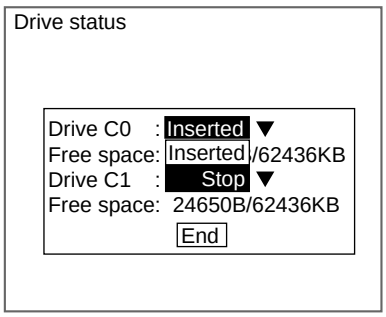
The total space and free space on the Memory Card will be displayed on this screen.

▶ [Tool/Memory card/Drive status]

1. If a memory card is inserted, “Inserted” will be displayed, so change it to “Stop”.

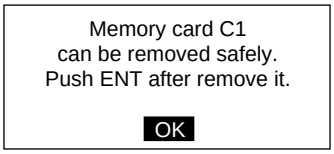
If a Memory Card is not inserted, “Not inserted” will be displayed.

2. Select [End].



A confirmation message will be displayed.

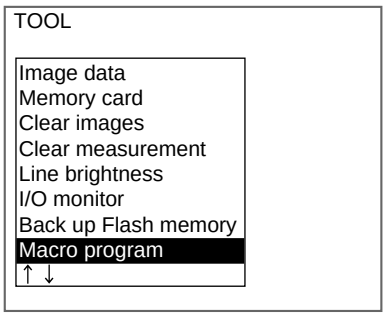
3. Remove the memory card and press the ENT Key.



Macro Programs

To load a macro program to the controller or to check whether any macro program has been loaded, select [TOOL/Macro program].

For details on the function and operation method, refer to the Customize Manual (CD-ROM).



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SECTION 5
System Settings

This section describes how to set conditions related to the system environment.
For the communication specifications, refer to “SECTION 6 Communication Method with External Devices1”.

Camera Settings	2
Strobe Related Settings (Strobe Settings) F500	3
Screen Display and Monitor	4
Customizing Operations	13
Setting Save Conditions for Measurement Images	22
Using BUSY Signals	25
Setting the Logging Conditions (Network Function) ETN	27
Checking the Network Function Information (Network Function) ETN	29
Setting Startup Conditions	30
Setting the Calendar Date and Time (Date/Time)	31
Checking System Information	32

CHECK!

F210-ETN is shown for those items that only relate to F210-C10-ETN/C15-ETN.

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Camera Settings

F210 F250 F270

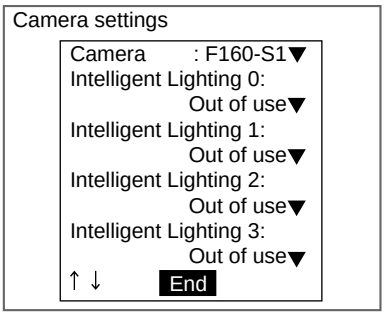
Specify the model of the connected camera and whether to use the intelligent lighting.
The model of each unit (camera, intelligent lighting) must be specified, so refer to the model name written on each unit.
When changing the camera model, save the settings in the flash memory. Set the measurement conditions after starting the controller again.

▶ [SYS/Camera Settings]

1. Select the model of the connected Camera.

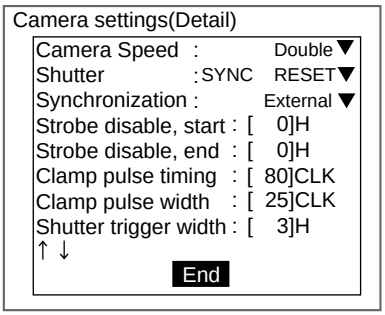
2. If using intelligent lighting, select its model.

3. Select [End].



CHECK!

If [Others] is selected for [Camera], the Camera Settings (Detail) Screen will be displayed.
The settings for F200/F300 cameras are listed in the Setup Manual.



Setting data	Selection	Details
Camera	F150-S1A F160-S1 F160-S2 (default setting) Other	Select the model of the connected camera.
Intelligent Lighting 0 Intelligent Lighting 1 Intelligent Lighting 2 Intelligent Lighting 3	Out of use (default setting) LTC20 LTC50	If a camera with intelligent lighting is connected, select the model of the intelligent lighting. Always set the DIP switch on the intelligent lighting to 0, regardless of the camera number. The DIP switch setting method is described in the Setup Manual.

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Strobe Related Settings (Strobe Settings)

F500

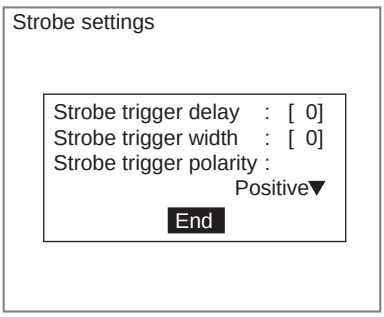
When using a strobe, the strobe trigger output signal (for parallel interface) needs to be set. The setting contents are given for each item in the controller's Setup Manual.

SECTION 4 Connecting External Devices in the Setup Manual

▶ [SYS/Strobe settings]

1. Set each item.

2. Select [End].



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Screen Display and Monitor

Changing Font Sizes

Select the size of the font for screen display.

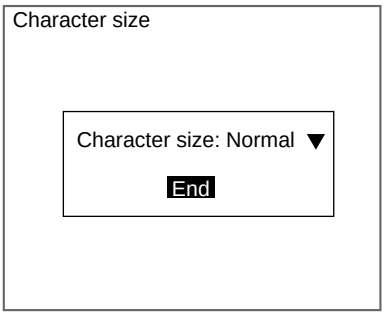
CHECK!

The font sizes set for each results display processing item will be enabled for any results data being displayed under those items.

▶ [System/Display/Character size]

1. Change the setting.

2. Select [End].



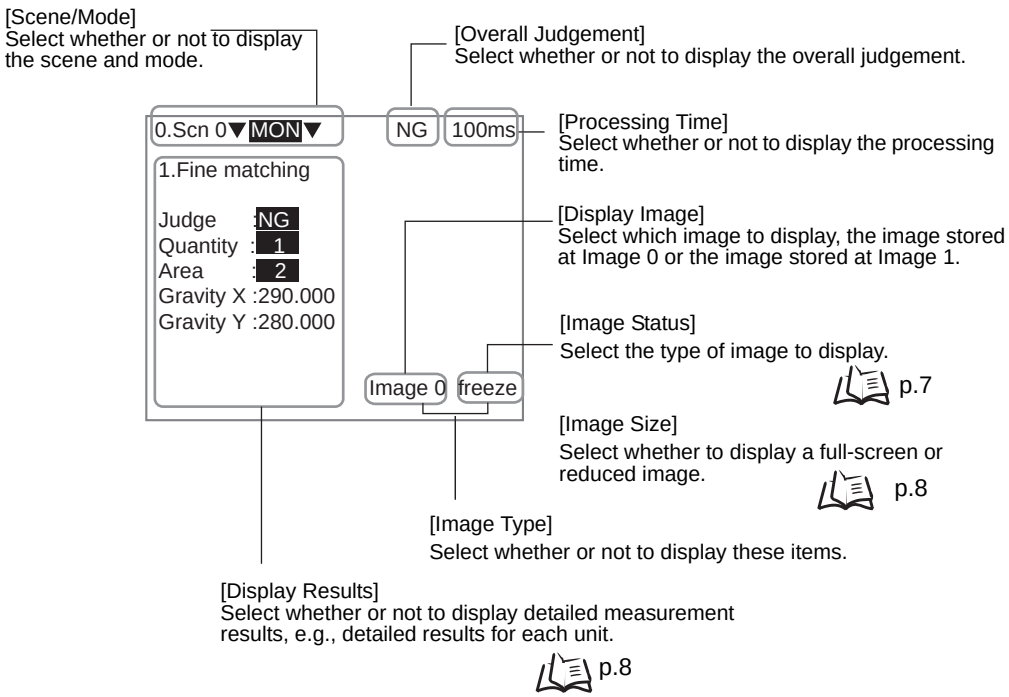
Setting data	Selection	Details
Character size	Normal	Default font size.
	Small	Half the normal font size.

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Measurement Screen Settings

Set the items below to determine the information displayed in Run Mode and Monitor Mode.

The display settings made here will be reflected in all scenes.



CHECK!

Scene/Mode

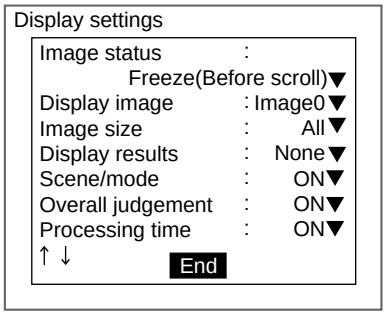
Even if Scene/Mode is set to not be displayed, the scene or mode can be displayed temporarily by pressing the ENT Key. However, measurement cannot be performed while the scene or mode is being displayed this way. Press the ESC Key again to turn OFF the display.

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▶ [System/Display/Display settings]

1. Change the settings for each item.

2. Select [End].

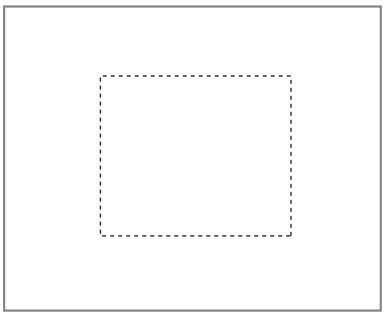


Go to **5.** only when [Image size] is select to [Expanded].
(This function is available with F500 only)

The magnification setting screen appears.

3. Move the frame to the area to be enlarged.

4. Press the ENT Key.



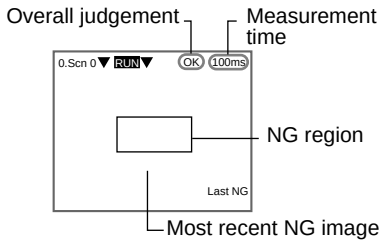
The settings will be registered.
When [Expanded] is selected, the enlarged image will be displayed.

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■ Image Status

Select the type of image to be displayed in the background.

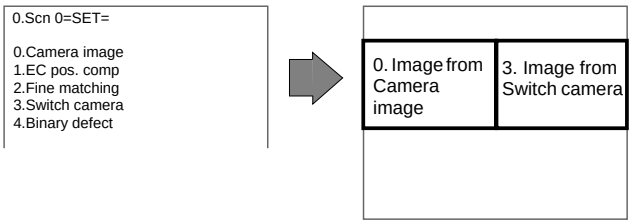
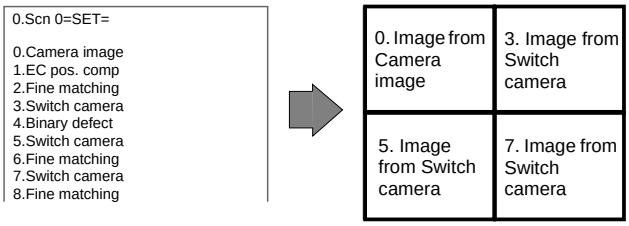
If [After scroll] is selected, the measurement time will be lengthened according to the number of displayed images.

Selection	Details
Through	The latest image taken by the Camera is displayed directly. If measurement is performed using a Through display, the measurement time will be increased by the amount of time from when the measurement command is input until the image input starts. This delay is included in the measurement time shown on the Monitor and Run Mode screens.
Freeze (before scroll) (default setting)	A still of the image taken by the Camera is displayed. This image is updated when measurement is performed. Select Freeze when measuring moving objects. If position displacement compensation is set, an unscrolled image will be displayed. The region will be scrolled the position displacement amount.)
Freeze (after scroll)	A still of the image taken by the Camera is displayed. This image is updated when measurement is performed. Select Freeze when measuring moving objects. If position displacement compensation is set, an image scrolled the position displacement amount will be displayed.
Last NG (before scroll)	The image of the latest image to receive an overall judgement of NG is displayed. If position displacement compensation is set, an unscrolled image will be displayed. The region will be scrolled the position displacement amount.)   The latest measurement results are always displayed for overall judgement and measurement time. Be careful, because the display image and the overall judgement will not match when this image type is selected if the latest measurement gave an OK judgement. The following operations cannot be performed, while the last NG image is being displayed. • Re-measurement • Display capture • Line Brightness display • Stored image display When operations other than measurement are performed, the latest NG image will be cleared and the display will remain clear until the next NG result is returned.
Last NG (after scroll)	The image of the latest image to receive an overall judgement of NG is displayed. If position displacement compensation is set, an image scrolled the position displacement amount will be displayed. All other operations are the same as for [Last NG (before scroll)].

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■ Image Size

Select the size of the image in relation to the screen.

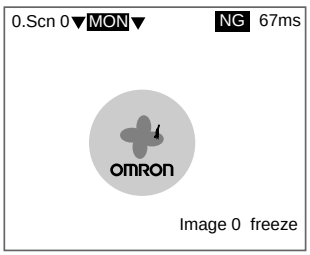
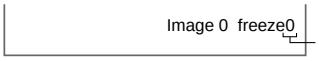
Selection	Details
All (default setting)	One image will cover the whole screen.
Reduced	Depending on the number of units set for the displayed scene under [Camera image] or [Switch camera], 1 to 4 screens will be reduced and displayed. Example: When [Camera image] is set to 1 and [Switch camera] is set to 1  Example: When [Camera image] is set to 1 and [Switch camera] is set to 3 
Expanded (F500 only)	The specified area in the image will be displayed fully in the screen.

■ Display Results

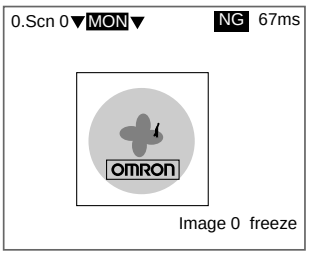
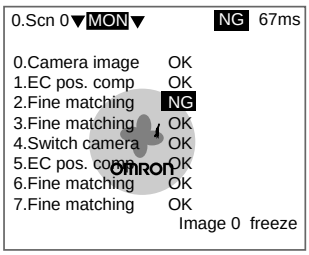
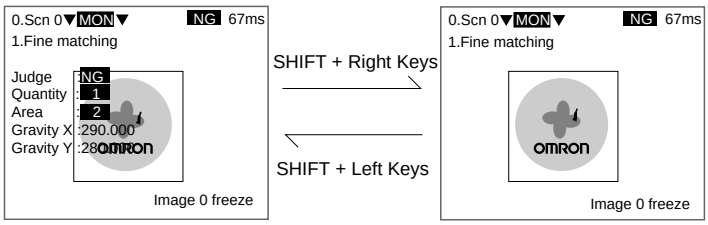
Detailed measurement results can be displayed on the screen.

judgement conditions can also be set while monitoring measurement values.

The description given here is based on default key allocations. Be careful if the key allocations have been changed.

Selection	Details
None (default setting)	Only the overall judgement will be displayed.  CHECK! If the image size is set to [All] and the [Camera image] or [Switch camera] settings in the image input-related processing items are set to 2 or more, use the Up and Down Keys to switch between images.  Indicates the position of the image input processing item in the list of items.

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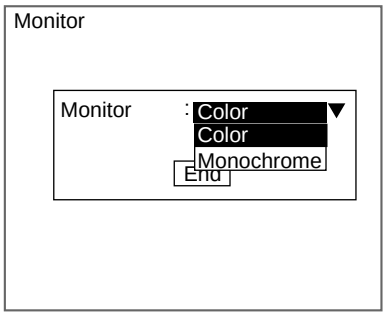
Selection	Details
Positions	Displays all the regions set to the unit that executed the measurement. Figures drawing using OR are shown in solid lines and figures drawn using NOT are shown in dash lines.  CHECK! If the image size is set to All and the Camera image or Switch camera settings in the image input-related processing items are set to 2 or more, use the Up and Down Keys to switch between images.
Results	Displays a list of judgement results for the set unit. If the character size is set to Normal, 8 sets of results will be shown on one screen. If the character size is set to Small, 32 sets of results will be shown on one screen. SHIFT + Right/Left Keys: Scroll through the unit numbers.  CHECK! If the image size is set to All and the Camera image or Switch camera settings in the image input-related processing items are set to 2 or more, use the Up and Down Keys to switch between images.
Detail	Displays detailed information for each unit. Use the Up and Down Keys to switch between units. The displayed data differs depending on the processing item and some processing items have multiple Details Screens. Use the SHIFT + Left/Right Keys to switch between Details Screens. For details, refer to the explanation given for each processing item. SECTION 2 Processing items Setting Procedure Example: Details Screen for fine matching Measurement values Position  CHECK! Press the SHIFT + ENT Keys in the Details Screen to display the menu for changing settings. The measurement conditions can be changed while in Run Mode or Monitor Mode. However, measurement will not be performed while in the screen to change the settings, even if the measurement command is input.

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Selecting Color or Monochrome Monitors

Select the type of monitor to be connected.
When color monitors are used, characters and figures can be color-coded and displayed in color.

▶ [System/Display/Monitor]



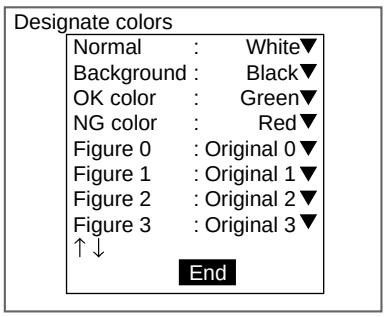
1. Select the desired monitor type.

2. Select [End].

Changing Character or Figure Colors

The color for characters or added figures can be set. Change the color when it is difficult to see the character or figure on the image. The display color set here, however, will be reflected in all scenes.

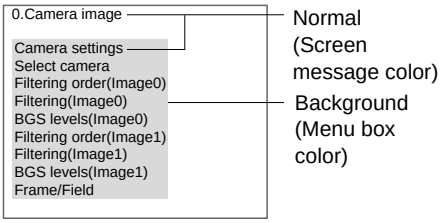
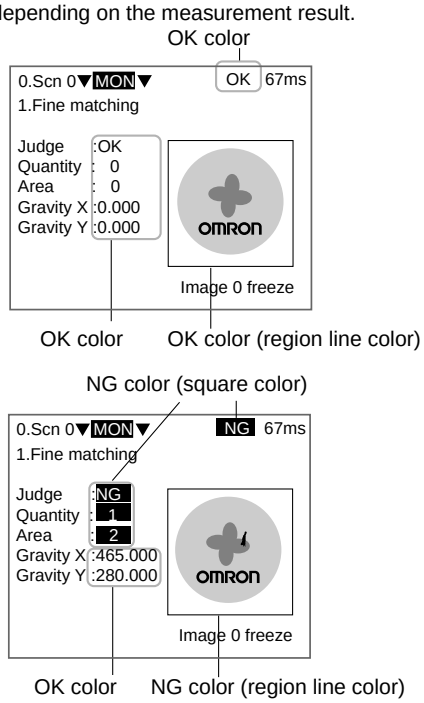
▶ [System/Display/Designate colors]



1. Set each item.

2. Select [End].

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Setting data	Selection	Details
Normal Background	For color monitors: white, black, red, green, blue, yellow, or original For monochrome monitors: white or black	Messages displayed on the screen will be appear in the color set under [Normal]. Menu boxes will shaded in the color set under [Background]. 
OK color NG color		The judgement display, all measurement values, and the measurement region will be displayed in the color set under [OK color] or [NG color], depending on the measurement result. 
Figure Color☐		The figure color is the color for figures or characters displayed on the screen using the results display-related processing items.

Creating Original Colors p.12

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Creating Original Colors

Up to 7 original colors can be created for displaying characters or figures, using a combination of red, green, and blue.

Effectuating Created Colors p.10

The default settings are shown below.

Display item	R (red)	G (green)	B (blue)
Original 0	32	32	32
Original 1	64	64	64
Original 2	96	96	96
Original 3	128	128	128
Original 4	160	160	160
Original 5	196	196	196
Original 6	224	224	224

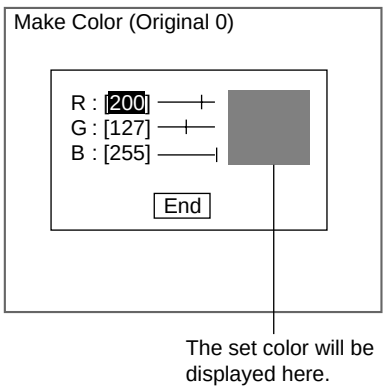
▶ [System/Display/Make color/Original No.]

1. Set each item.

Up and Down Keys: Moves the cursor

Left and Right Keys: Increases or reduces the color at the cursor position by one.

2. Select [End].



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Customizing Operations

Changing Console Key Allocations

It is possible to change the allocations for console key operations.


CHECK!

The set allocations are only enabled in Monitor Mode or Run Mode.

Default Key Allocations

Key	Allocation
ESC	None
SHIFT + ESC	Measurement display
SHIFT + ENT	Judgement conditions
SHIFT + RIGHT	Next sub-display
SHIFT + LEFT	Previous sub-display
SHIFT + UP	Previous image
SHIFT + DOWN	Next image
F1 to F8 (See note 1.)	None

Note 1: Function keys are suppported only for F160-KP.
If the F150-KP is being used, input will not be possible using these keys, even if key allocations are made.

Allocatable functions
None
Measurement display
Previous image
Next image
Judgement conditions
Previous scene
Next scene
Previous scene group
Next scene group
Clear image
Erase characters
Save
Through/Freeze
Measurement control
Monitor
Designate Color
Thumbnail
Drive status
Scene/mode
Line Brightness
Display capture (See note 2.)
Previous sub-display
Next sub-display
Clear measurement
Switch nonstop
Proc. data transfer
Switch Proc. monitor

Roles of Available Functions p.14

Note 2: Changing display capture key allocations

Inputs based on the key allocations made here will be accepted in Monitor or Run Mode, even if [SYS/Operation settings/Display capture] is set to OFF.

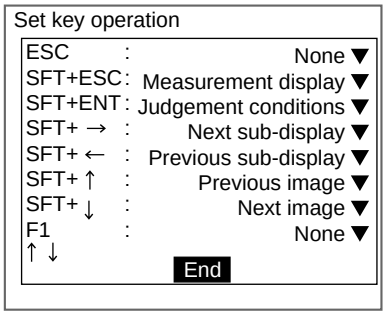
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▶ [System/Operation settings/Set key operation]

1. Set each item.

2. Select [End].



- Roles of Available Functions

Selection	Function
None	Nothing allocated.
Measurement display	Displays the [SYS/Conditions/Display settings] screen.
Previous image (See note 1.)	Displays the previous memory image.
Next image (See note 1.)	Displays the next memory image.
Judge conditions	Displays the screen for setting evaluation criteria.
Previous scene	Displays the previous scene.
Next scene	Displays the next scene.
Previous scene group	Displays the previous scene group. (Scene no. is the same as that in effect before switched)
Next scene group	Displays the next scene group. (Scene no. is the same as that in effect before switched)
Clear image	A message confirming whether all stored images are to be cleared is displayed. Images stored in memory are cleared when power is turned OFF. By allocating this function to a Console Key, stored images can be cleared without turning power OFF.
Erase characters	Displays the menu for character display settings. To prevent scorching of the monitor screen, it is possible to delete screen characters.
Save	Displays a confirmation message for saving to flash memory or Memory Card.
Through/Freeze (See note 1.)	Switches to Freeze (before scroll) display if currently on Through display. Switches to [Through] if currently on [Freeze☐] [Last NG☐] display.
Measurement control	Displays the [SYS/Measurement control] screen.
Monitor type	Displays the [SYS/Display/Monitor] screen.
Designate colors	Displays the [SYS/Display/Designate colors] screen.
Thumbnail (See note 2.)	The saved measurement images are displayed 4 at a time.
Drive status	Displays the [Tool/Memory card/Drive status] screen.
Scene/mode	The scene number and mode display shown at the top left corner of the Basic Screen in Monitor and Run Modes is deleted. Press the ENT Key to display the scene number and mode display temporarily. Measurement cannot be performed, however, during this display. Press the ESC Key to make the display disappear.
Line Brightness	Displays the [Tool/Line brightness] screen. Line brightness cannot be displayed, however, when [Last NG☐] is set for [Image status] or [Image size] is set to [Reduced].

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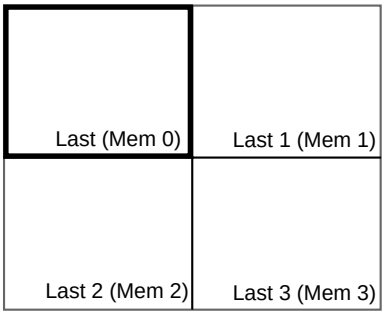
Selection	Function
Display capture	Saves the displayed image to the Memory Card. p.16
Previous sub-display	When results display is set to [Detail], the display will switch to the previous Details Screen for the displayed unit. The unit number will be switched when set to Results.
Next sub-display	When results display is set to [Detail], the display will switch to the next Details Screen for the displayed unit. The unit number will be switched when set to Results.
Clear measurements	Clears all measurement values for the currently displayed scene.
Switch nonstop	Starts/exits nonstop adjust mode.
Proc. data transfer (See note 3.)	Transfers (copies) the data from processing section 0 to processing section 1. This key is used only in nonstop adjust or 1-line fast mode.
Switch Proc. monitor	Switches monitor display to the other processing section. (From processing section 0 to 1, or from processing section 1 to 0) This key is used only in 1-line fast or 2-line random trigger mode.

*1 Previous Image, Next image, Through/Freeze

When the image display is set to [Last NG (before scroll)] or [Last NG (after scroll)], the display will not switch even if this allocated key is input.

*2 Thumbnail

Stored images are displayed 4 at a time, making it faster to find a particular measurement image.



SHIFT+Up/Down Keys: Switches four images at once. (Last four/next four images)
Up/Down and Left/Right Keys: Moves the thick frame for selecting images.
ENT Key: Selects the image inside the thick frame and returns to the previous screen.

CHECK! Measurement cannot be performed during thumbnail display.

*3 Proc. data transfer

To prevent incorrect operations, do not assign this function to any key in the case of 2-line random trigger mode.

Even if the measurement conditions set for processing section 0 are different from those set for processing section 1, pressing the key assigned to this function will copy the data stored in processing section 0 to processing section 1, resulting in the same measurement conditions being set for both processing sections.

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Capturing and Saving Images

Enable this function and press the Execution Key to capture the image displayed on the monitor screen and save it to the memory card.
Stored images can be pasted to documents on a personal computer or loaded to the Controller and re-measured.

CHECK!

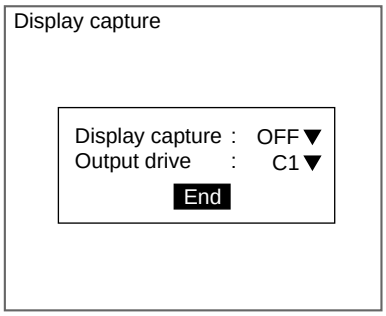
- Capture operation takes several seconds, during which measurement cannot be performed. To prevent incorrect operation, set this function to OFF.
- When the image display is set to [Last NG☐], captured images are not accepted.

▶ [System/Operation settings/Display capture]

1. Select [Display capture].

2. Select the drive of the memory card to which the captured images are to be saved.
(Select either C0 or C1.)

3. Select [End].



Setting data	Selection	Details
Capturing Images	OFF (default setting)	Screen capture is not performed.
	LIVE + CAPT	Captures the screen image and saves it in two files (LIVE***.BMP, CAPT***.BMP). The screen image is saved in a file (LIVE***.BMP) only when this function is executed in Run or Monitor mode.
	CAPT only	Captures the screen image and saves it in a file * (CAPT***.BMP). The screen will not be saved in a file (LIVE***.BMP).

* File Type p.17

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■ Execution Keys

The following keys can be used to perform capture when the display capture function is enabled.

- For F160-KP: F9 Key
- For F150-KP: SHIFT+Left+Right Keys (Press 3 keys at the same time.)

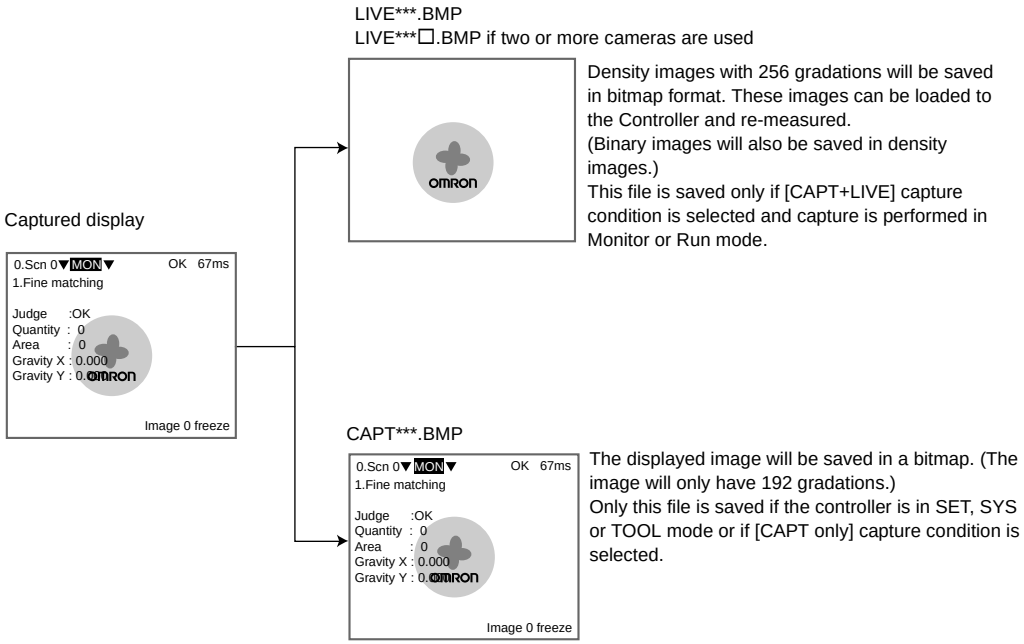
CHECK!

In Monitor and Run Modes only, the display capture function can be allocated to another key. For example, the key allocation can be changed when the F150-KP is being used to enable one-touch operation, rather than having to press three keys at the same time. However, if [Display capture] is set to [OFF] after the display capture function is allocated to another key, the allocation will no longer be effective.

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■ Display Capture Results

When display capture is executed, a directory called IMAGE will automatically be created in the root directory of the Memory Card and the following two types of files will be stored in that directory.



A serial number starting from 000 will be automatically allocated to ***.
The same number is used for both files.

When using two or more cameras, an alphabet corresponding to the processing item ([Camera Image], [Switch Camera]) set to the flowchart will be added to the file name (in ☐ after "***"). This applies for "LIVE***.BMP" image files only. Alphabets A, B, C and D are assigned to processing items in this order, starting from the processing item set for the smallest unit No.

CHECK!

However, if capture is performed in the following cases, images that have not been captured by the specified camera may be saved.

- When the system has just started and no measurements have been made
- When the scene has just been switched to another and no measurements have been made
- When the scene flowchart has just been edited and no measurements have been made

CHECK!

When a camera with virtual scan function is used and the number of lines to be input is specified:
If capture is executed, uncertain image may be captured below the valid image range.

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Shortening Scene Group Switching Time

Normally, settings data is saved to flash memory and the Memory Card when scene groups are changed. The time taken to save is, therefore, added to the time taken to change scene groups.

The time to change scene for changes in measurement setups can be reduced by omitting the save process.

CHECK!

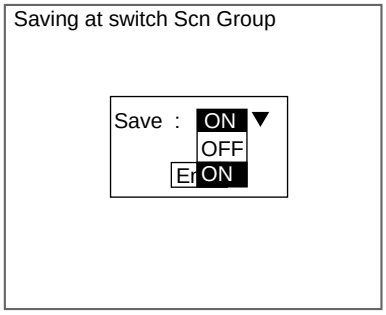
If settings are changed with this function set to OFF, always save the settings before changing scene groups. When scene groups are changed, data from the flash memory or the Memory Card is loaded. So if the changed settings data is not saved, the data will be replaced by the loaded data.

SECTION 4 Other Functions, “Backing Up Settings”

▶ [System/Operation settings/Save at switch Scn Group]

1. Select [ON] or [OFF].

2. Select [End].



Setting data	Selection	Details
Save	ON (default setting)	Saves the data when a scene is switched.
	OFF	Does not save the data when a scene is switched.

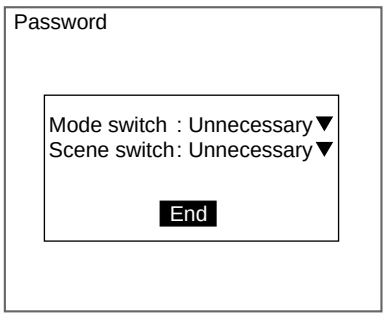
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Setting Passwords

Passwords can be set to prevent settings being changed through incorrect operation.
Set whether or not a password is required for the following two operations.

- When moving from Run Mode to Set, Monitor, or other modes
- When changing scenes in Run Mode

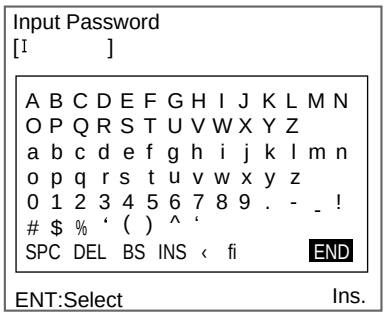
▶ [System/Operation settings/Password]



1. Select [Necessary] or [Unnecessary].

2. Select [End].

If [Necessary] is selected, the Input Password Settings Screen will be displayed.



3. Set the desired password (6 to 8 characters).

4. Select [END].

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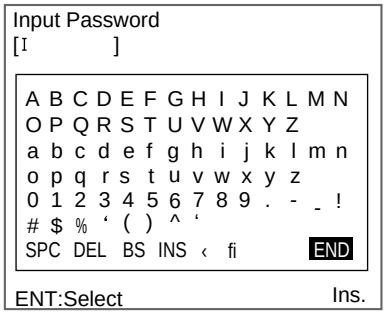
■ Example: Password Set for Mode Switching

1. Move the cursor to the mode selection and press the ENT Key.



▼

The Input Password Settings Screen will be displayed.

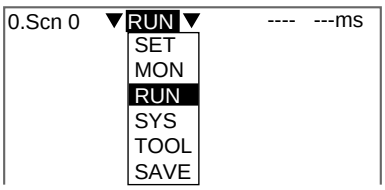


2. Enter the desired password.

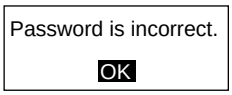
3. Select [END].

▼

If the entered password is correct, the mode selections will be displayed.



If the entered password is incorrect, an error message will be displayed.



CHECK!

If You Have Forgotten the Password:
The password can be checked by inputting a password confirmation command from the serial interface.

SECTION 6, 2. Serial Interface Menu Operations, “Input Format (Normal)”

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Transferring Data from Processing Section 0 to Processing Section 1 Automatically

F250 / F270

In nonstop adjust or 1-line fast mode, the same settings need to be made to both processing sections 0 and 1.
Set this function so that data is transferred from processing section 0 to processing section 1. This prevents loss of data transfer.

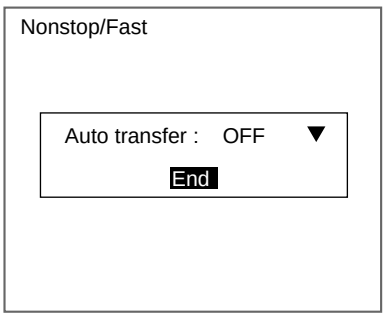
CHECK!
In the case of 2-line random trigger mode, this setting will be ignored.
(Data will not be transferred automatically.)

▶ [System/Operation settings/Nonstop/Fast]

1. Select either [Normal] or [Each time].
Normally, select [Normal].

2. Select [End].

3. Save the settings to the flash memory and restart the controller.



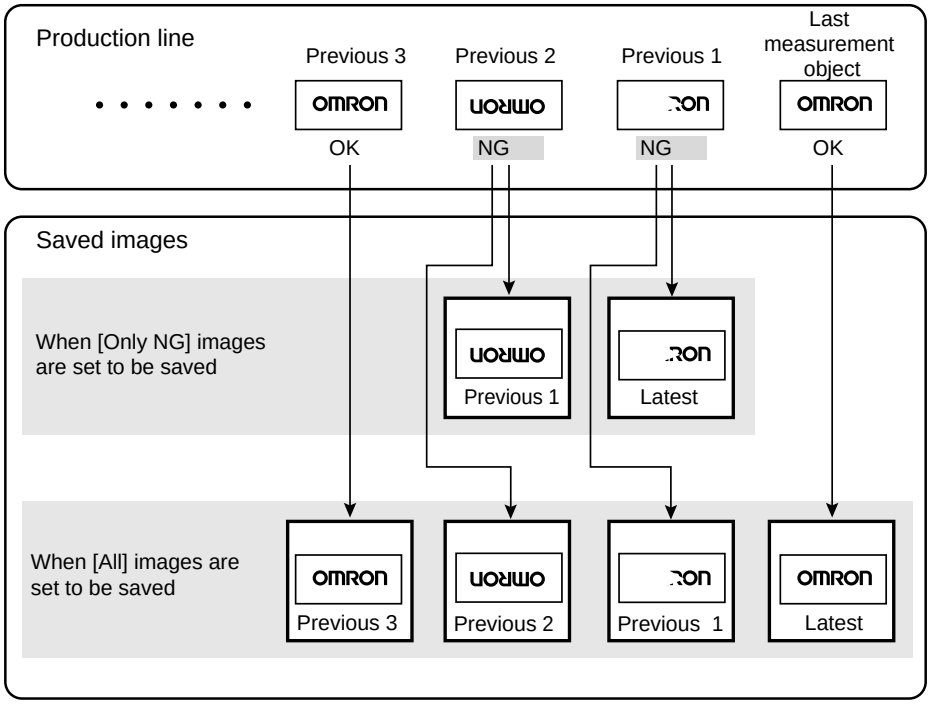
The automatic data transfer setting that has been set will become effective.

Selection	Details
OFF (default setting)	Data is not transferred automatically. To transfer the data, press the data transfer key. Data transfer key p.13 However, data will be transferred when power is turned ON.
Normal	Transfers data from processing section 0 to processing section 1 in the following cases. • When a scene is switched by parallel I/O input • When a scene group is switched by parallel I/O input • When nonstop adjust mode is exited
Each time	Transfers data from processing section 0 to processing section 1 when the BUSY signal switches from ON to OFF, except when measurement is progress. Example: • When the condition setting screen is exited • When the currently displayed image is switched to another by using the Up/Down Keys Since data is transferred frequently, inconsistency in data that may occur if you forget to press the data transfer key can be prevented. However, operation time will increase.

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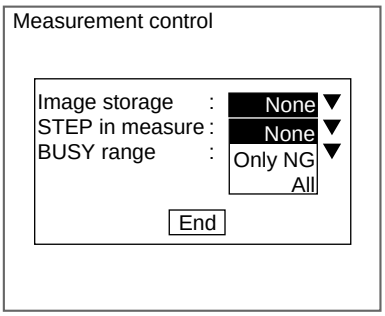
Setting Save Conditions for Measurement Images

The controller provides a function to save measured images. (35 images for 32 scenes)
The condition for saving the images can be selected from saving only when the measurement result is NG or saving all images regardless of the measurement result.
When 35 images have been stored, new images will be stored by overwriting old images, starting with the oldest.



CHECK! Stored images will be cleared when the power is turned OFF.
Images to be kept must be backed up to a personal computer or Memory Card.
SECTION 4 Other Functions, “Backing Up Settings”

▶ [System/Measurement control]



1. Change the current setting made for [Image storage].

2. Select [End].

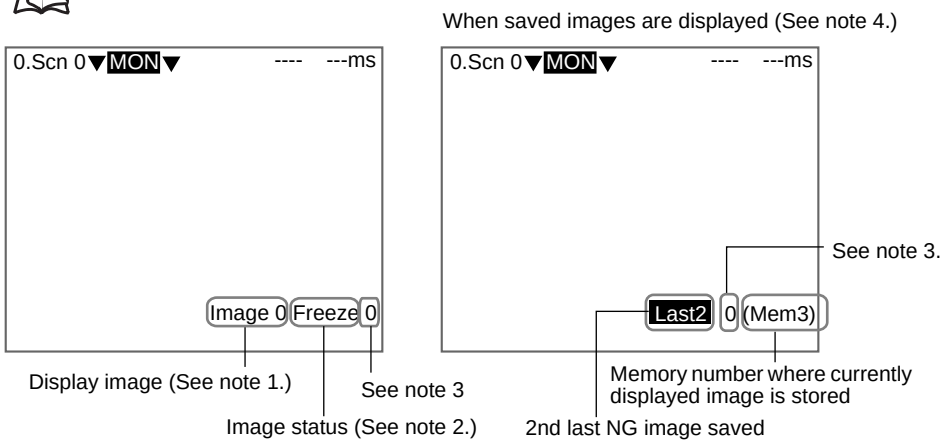
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Displaying Stored Images

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 current image is displayed in the lower-right corner of the screen.
However, the current image will not be displayed if Image type is set to OFF under Conditions.

p.5



	Display	Details
Note 1	Image 0	The image stored at Image 0 is displayed.
	Image 1	The image stored at Image 1 is displayed.
Note 2	Freeze	The image immediately after measurement is displayed.
	Through	
	Last NG	
Note 3	(Number)	If the image input processing items [Camera image] or [Switch camera] are set to 2 or more units, a number will be displayed to show the position of the item in the list. The number will not be shown, however, if the screen size is set to Small.
Note 4	——— (Memory ☐)	Past saved measurement images are displayed. The images that match the image save conditions (Only NG/All) will be stored in Memory 0 to Memory 35. Specify a number for Memory ☐ when backing up saved images to a personal computer or Memory Card.

Types of saved images

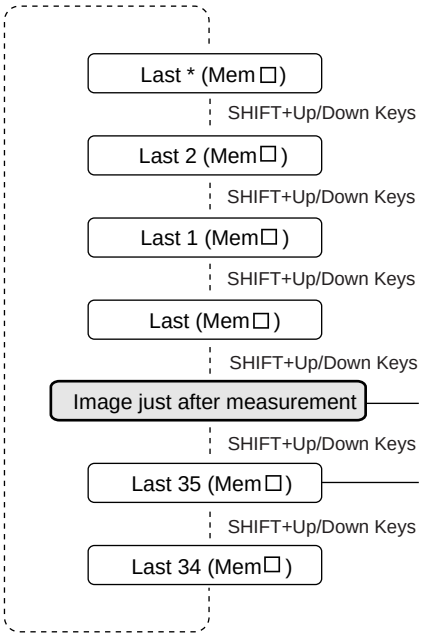
Last	The measured image most recently stored is displayed. If this image had an NG judgement, "Last" will be highlighted.
Last *	The * after "Last" contains the number of screens stored before the image. Up to 35 previous images can be displayed. "Last *" will be highlighted for NG images.
———	Either no image is stored in memory, or an image other than a measurement image (an image loaded from a personal computer) is displayed.

Notes 1 and 2 will change depending on the settings under [SYS/Display/Display] p.5

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■ Switching Method

In Monitor Mode or Run Mode, press the SHIFT+Up/Down Keys to switch between images.



The image display status changes depending on the settings under [SYS/Conditions].

If the following conditions hold, the number of stored images will not exceed 34.

- Image storage: Set to only NG
- Last measurement was OK.

CHECK!

When [Display] is set to [Last NG ☐], the display cannot be switched to stored images. Change the display to Freeze or another display mode and then use the SHIFT+Up/Down Keys to switch between images.

When the image input processing items [Camera image] or [Switch camera] are set to 2 or more units, use the Up and Down Keys to switch between images.

Clearing All Stored Images

All images are automatically cleared when the power is turned OFF, but the images can also be cleared without turning OFF the power by using the following procedure.

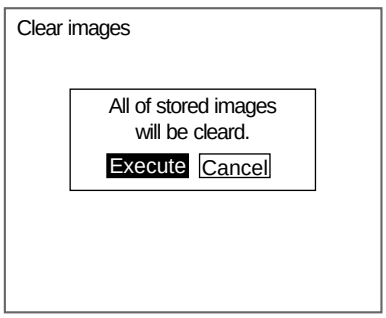
CHECK!

If you assign this function to a console key, you can clear the stored images with a one-touch key operation.

p.13

▶ [Tool/Clear images]

1. Select [Execute].



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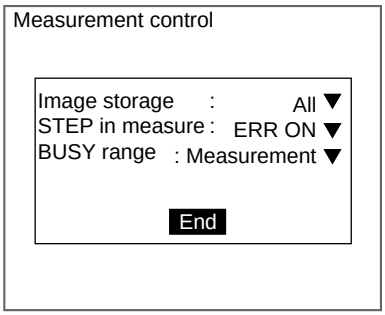
Using BUSY Signals

The BUSY signal is a control signal used to indicate that processing is in progress by the controller. The ON/OFF timing of this BUSY signal is monitored at the external device to time communications. The handling of the BUSY signal can be changed to create a smoother system.

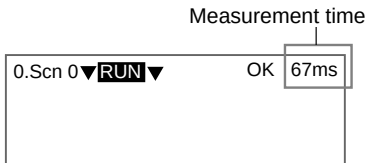
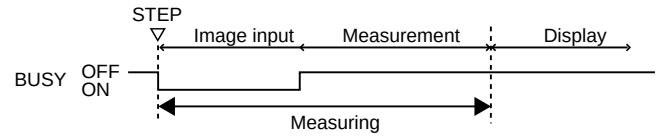
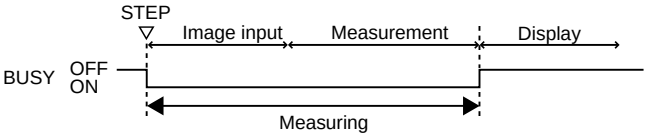
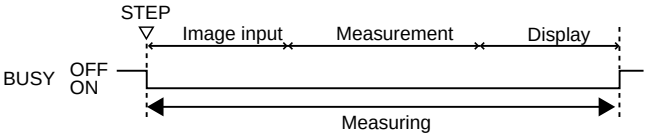
▶ [System/Measurement control]

1. Change the current setting for [STEP in measure] and [BUSY range].

2. Select [End].



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Setting data	Selection	Details
BUSY range		Select at what point in the processing that the BUSY signal will turn OFF. The measurement times shown in Monitor and Run Modes will change depending on the settings for the BUSY range. The time taken for “Measuring” indicated in the following figure is displayed as the measurement time. 
	Input image	The BUSY signal turns OFF when the image input has been completed. This can be used as a guide as to whether or not the measurement object can be moved. If [Camera image] is set to multiple units, the BUSY signal turns OFF when the first Camera image input has been completed.  CHECK! In this case, do not input the next command until measurement is completed, even if the BUSY signal switches to OFF. If another command is input while the BUSY signal is ON, either the operation being performed or the command that was input may not be properly executed.
	End of measurement (default setting)	The BUSY signal turns OFF when the measurement has been completed. 
	Display	The BUSY signal turns OFF when the display of the measurement result has been completed. The BUSY signal will remain ON and the controller considers that measurement continues until the end of display. 
STEP in measure	ERR ON (default setting)	Measurement will not be performed and the ERR signal will turn ON if the STEP signal turns ON during processing. The ERR signal will turn OFF when the next STEP signal is input at the correct timing.
	OFF	The ERR signal will not turn ON even if the STEP signal turns ON during processing. Measurement will not be performed.

CHECK! If the controller supports network connection and is handling a large amount of log data, the BUSY signal may remain ON even if measurement or display processing has been completed.

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Setting the Logging Conditions (Network Function)

ETN

Use of this function enables logging of more images and measured data.
This section describes the storage conditions.

Once data is saved to storage, it can be re-measured or processed from the personal computer using Vision Composer Net.
For the operating method of loading the data to the personal computer, refer to the Operation Manual of Vision Composer Net.

CHECK!

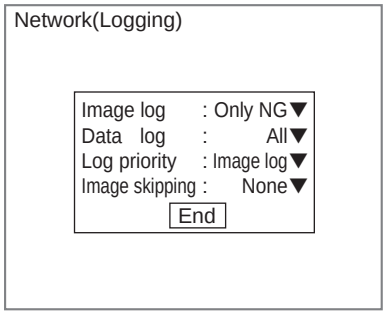
- To log measured data, make “Data log” setting in the flow chart.
- Logged images are saved to the directory that is provided exclusively as storage. The larger the number of files in the directory, the longer the time required to save the images. This can be avoided by using a macro program.
  Avoidance Method
  Customize Manual Reverse Customization Network Functions

▶ [SYS/Network/Logging]

1. Set each item.



[Image log]
The measurement time may be affected depending on the conditions.
SECTION 7 Appendix, “Q & A”



2. Select [End].

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Item	Selection	Description
Image log	None (Default setting) Only NG All	Used to select the save condition for the measured image.
Data log	None (Default setting) Only NG All	Used to select the save condition for the measured data. The data set for [Data log] will be saved.
Log Priority	When the measurement interval is short, select the processing (logging or measurement) to which priority is to be given.	
	Image log (Default setting)	Gives priority to logging. Measurement time may get longer if measurement is performed consecutively.
	Measurement 1	Gives priority to measurement. Measurement time will not get longer even if measurement is performed consecutively. Some images will not be logged irrespective of the selection made for [Image log]. Measurement data will be logged even if image logging is not performed.
	Measurement 2	Gives priority to measurement. Measurement time will not get longer even if measurement is performed consecutively. Some images will not be logged irrespective of the selection made for [Image log]. Measurement data will not be logged either, if image logging is not performed.
Image skipping	None (Default setting) 1/2 1/4 1/8	Used to set the pixel skipping intervals for the image to be logged. If pixel skipping is performed, the image data size will be reduced. Compared to cases where pixel skipping is not performed, logging speed to the storage can be increased and logging can be performed in larger quantities.



It is not possible to re-measure the images for which image skipping has been performed by selecting "Image skipping".

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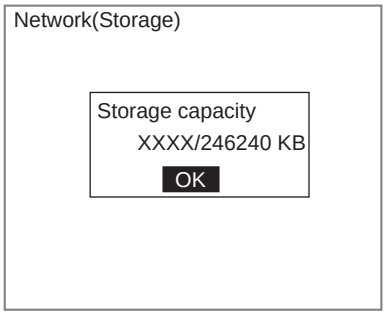
Checking the Network Function Information (Network Function)

ETN

Checking the Remaining Storage Capacity

The remaining storage capacity can be checked.

▶ [SYS/Network/Storage]



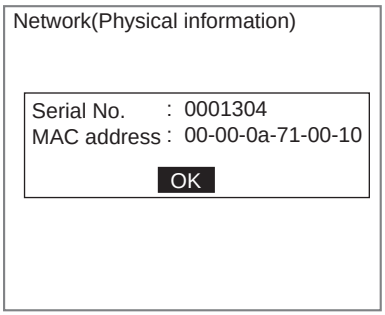
1. The remaining storage capacity will be displayed.

2. Select [OK] to exit this screen.

Checking the Network Device Information

The controller's serial number and MAC address can be checked.

▶ [SYS/Network/Physical information]



1. The controller's serial number and MAC address will be displayed.

2. Select [OK] to exit this screen.

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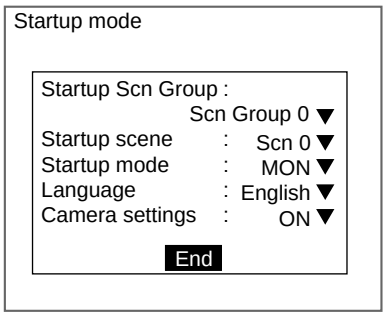
Setting Startup Conditions

Use the following procedure to set the status when the power is turned ON. If the Controller 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.
Also, unnecessary Camera setting screens that are always displayed at startup can be set to not be displayed.

▶ [SYS/Startup mode]

1. Change the setting.

2. Select [End].



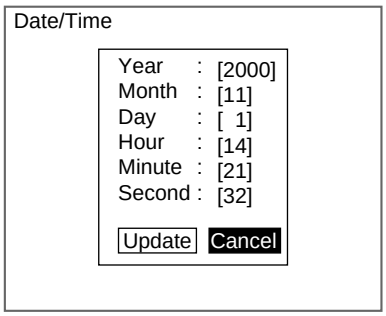
Setting data	Selection	Details
Startup Scn Group	0 to 31 (default setting: 0)	When a scene group between 1 and 31 is selected, make sure the Memory Card where that scene group is stored is inserted.
Startup scene	0 to 31 OFF (default setting: 0)	OFF (scene number when saved to flash memory)
Startup mode	Setting Monitor (default setting) Measurement OFF	OFF (mode when saved to flash memory)
Startup language	Japanese English (default setting)	Select the language for screen messages.
Camera settings	ON (default setting) OFF	Select whether or not to display the Camera Settings Screen. The Camera Settings screen will not be displayed if [OFF] is selected.

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Setting the Calendar Date and Time (Date/Time)

Check if the internal calendar is set to the correct date and time, and adjust if necessary.

▶ [SYS/Date/Time]



- Select [Update] to save changes to the date and time.
- If the date/time settings do not require adjustment, select [Cancel] to exit this screen.

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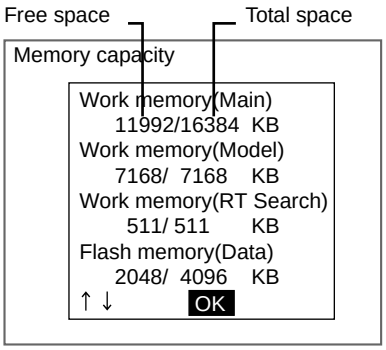
Checking System Information

Checking Remaining Memory Space and Battery Status

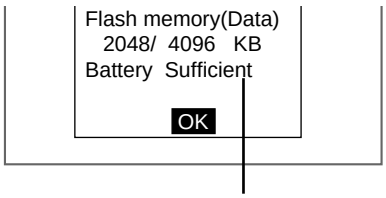
Use the following procedure to check the remaining work memory and internal flash memory and the status of the battery mounted for date and time data backup.

▶ [SYS/System information/Memory capacity]

1. The memory capacity will be displayed.



Press the Down Key to scroll down and display the rest of the information. The battery status will be displayed at the bottom of the list.



2. Select [OK] to exit this screen.

If [Insufficient] is displayed, the battery must be replaced.
Take the Controller to your OMRON representative to replace the battery. The battery must be changed by a professional.

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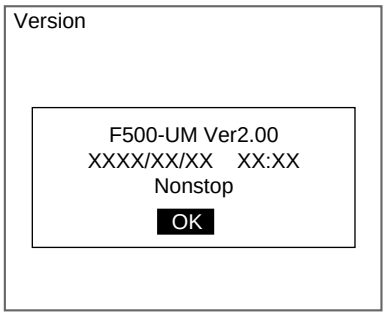
Checking the Software Version

Use the following procedure to check the software system version.

▶ [SYS/System information/Version]

1. The version information appears.

2. Select [OK] to exit this screen.



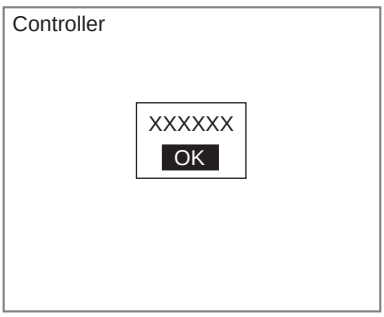
Checking the Controller Model

The model of the controller currently used can be displayed.

▶ [SYS/System information/Controller]

1. The model of the controller will be displayed.

2. Select [OK] to exit this screen.



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SECTION 6
Communication Method with External Devices

This section describes the methods for communications with external devices, such as personal computers and Programmable Controllers, via parallel or serial interfaces.

- Parallel Interface
- Normal Serial Interface
- Host Link Serial Interface
- Serial Interface Menu Operations
- Communication with Vision Composer Net ETN

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Parallel Interface

This section explains the I/O format and the required communications settings when using the Controller's parallel interface to communicate with external devices.

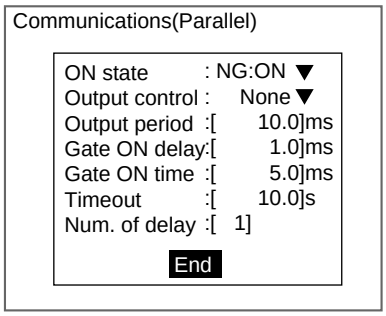
- Setting Communications Specifications 2
- I/O Format 3
  - Input Format 3
  - Output format 4
- Timing Charts 6
  - Output control: None 6
  - Handshaking 9
  - Synchronous Output 10
  - Switching Scenes or Scene Groups 12
  - Re-registering Models 13

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Setting Communications Specifications

This section explains how to set the communications specifications. Set the same communications specifications in the Controller and the external device.

▶ [System/Communications/Parallel]



1. Set each item.

2. Select [End].

- Communication specifications

Setting data	Selection	Setting
ON state	ON for an NG judgement (default setting) ON for an OK judgement	Select whether the OR and DO0 to DO31 signals will go ON when the judgement is OK or NG.
Output control	None (default setting)	The Controller outputs the measurement results without synchronizing with the external device.
	Handshaking	The Controller outputs the measurement results while synchronizing the transmission with the external device.
	Synchronous Output	The Controller outputs the measurement results while synchronizing with processing on the line. The number of STEP signals specified for [Number of delays] is ignored and measurement results are output on the next STEP signal.
Output period	2.0 to 10000.0ms (default setting: 10.0ms)	Effective only when [Output control] is set to [None]. Set the period for outputting the measurement result. A value that is greater than “Gate ON delay + Gate ON time and smaller than the measurement interval must be set. If the output period is longer than the measurement interval, the output will gradually fall behind as measurements are repeated.
Gate ON delay	1.0 to 1000.0ms (default setting: 1.0ms)	Set the time from when the result is output to the parallel interface to when the GATE signal is turned ON. This time is used to wait until the data output becomes stable. A value greater than the delay time of the external device must be set.
Gate ON time	1.0 to 1000.0ms (default setting: 5.0ms)	Effective only when [Output control] is set to [None] or [Sync.output]. Set the length of time that the GATE signal remains ON. Set a value that allows the external device to receive the measurement result.
Timeout	0.5 to 120.0s (default setting: 10.0ms)	Effective only when [Output control] is set to [Handshaking]. A timeout error will occur if there is no response from the external device within the timeout time.
Num. of delays	1 to 16 (default setting: 1)	Effective only when [Output control] is set to [Sync.output]. Set the number of times the STEP signal turning ON will be ignored from the time the STEP signal first turns ON until that measurement result is output.

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I/O Format

Input Format

The following commands can be input when the Controller is in Monitor or Run mode.

- STEP Signal

  A one-time measurement is performed if the STEP signal is turned ON.

- DI Signals

  DI signals can input the following commands.

  After the command information is set, allow at least 1 ms before turning ON DI7 (execution trigger).



The ERR signal will turn ON if the input command was not received correctly.

0 indicates the signal is OFF, and 1 indicates the signal is ON.
An asterisk indicates that the Controller does not read the bit status, so the bit status can be either 0 or 1.

Command	Input command (DI)								Function
	Execute	Command		Information					
	7	6	5	4	3	2	1	0	
Continuous Measurement	1	0	0	*	*	*	*	*	Measurements continue while the command is being input.
Switch scene	1	0	1	Scene number					Switches the scene to measure.
Example:	1	0	1	0	0	0	1	0	In this example, the scene is switched to scene 2.
Switch scene group	1	1	1	Scene group number					Switches the scene group data.
Example:	1	1	1	0	0	0	1	0	This example switches to scene group 2.

- Model Re-registration Command

Command	Input command (DI)								Function
	Execute	Command		Information					
	7	6	5	4	3	2	1	0	
Re-registering Models	1	1	0	Unit number					Registers the models again for all regions for the specified unit number (max 31). (When the through display is being used, the models will be registered based on the last image that was imported.) When using two or more cameras, images will be captured by the cameras and registered for the units except for those specified after the last camera image input.) This command is enabled only if model position compensation, circle position compensation, fine matching, pattern inspection, rotation positioning, or ECM search unit numbers are specified. Any other specified unit numbers will be ignored. Example: Model Position Compensation, Pattern Inspection etc.
Example:	1	1	0	0	0	1	1	0	Re-registers the model of unit 6.

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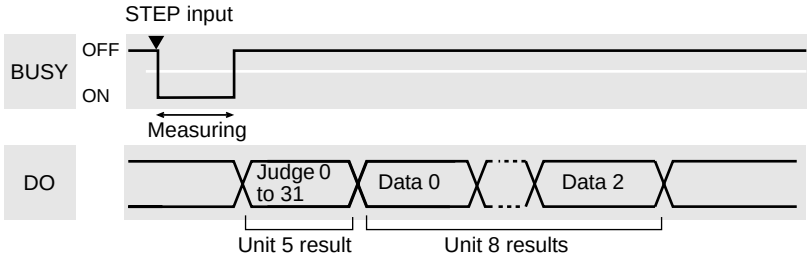
Output format

Measurement results are output each time a measurement is made. They are output only when the system is in Run Mode. They will not be output in Monitor Mode. The user can select whether a signal is output when the judgement result is OK or when it is NG. The default setting is for a signal to be output when the judgement result is NG.

p.2

signal	Output function
OR	Outputs the overall judgement result.
DO0 to DO31	• DO judgement output The judgement results for judgement 0 to 31 set using the results output processing item [DO judgement output] will be output to DO0 to DO31. (DO0 to DO15 will be output to connector 0 and DO16 to DO31 will be output to connector 1.) SECTION 2, 6.3 DO judgement output CHECK! • If the 2-line random trigger is selected as the Run mode in the case of F270, DO0 to DO15 will be used for processing section 0, and DO16 to DO31 for processing section 1. For both processing sections, only judgement results set for Judge 0 to 15 can be output. The settings for Judge 16 to 31 will be ignored. For the 2-line random trigger, refer to SECTION 3 Test/ Measurement Execution • In the case of F210 and F500, the settings for DO 16 to 31 will be ignored and will not be output.
	• DO data output The measured values set for data 0 to 7 for [DO data] are output in 32-bit values. SECTION 2, 6.2 DO data output • Only the integer values will be output. Decimal values will be rounded off. • The value range that can be output is -9,999,999 to 9,999,999. The output for measurement values less than -9,999,999 will be -9,999,999. If 9999999 < Measured value: 9999999 will be output. • Select either 2's complement binary format or BCD format. For 2's complements SECTION 7 Appendix, "Terminology" CHECK! • If the 2-line random trigger is selected as the Run mode in the case of F270, DO0 to DO15 will be used for processing section 0, and DO16 to DO31 for processing section 1. Measurement values are output in 16-bit values, irrespective of whether processing section 0 or 1 is used. For the 2-line random trigger, refer to SECTION 3 Test/ Measurement Execution • The value range that can be output with F210 and F500 are as follows: Binary: -32768 to +32768 BCD: -999 to +999 The following will be output if the measured value is outside the range. Binary: When -32768 > measured value: "-32767" will be output. When measured value > +32768: "+32768" will be output. BCD: When -999 > measured value: "-999" will be output. When measured value > +999: "+999" will be output.

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signal	Output function
DO0 to DO31	• Output order The measurement results will be output in order from the smallest unit number. Example: DO judge set for unit 5 and DO data set for unit 8 

CHECK!

After measurements have been made in Run Mode, the data that is output to the OR and DO signals is retained until new measurements are made in Run Mode. The status of these output is retained even if the Controller is switched from Run Mode to another Mode. Output signals will return to OFF if [TOOL/Clear] measurement is executed.

SECTION 4 Other Functions, “Clearing Measurement Values”

CHECK!

The initial value for output signals is OFF, but the signals may go ON about 0.5 seconds after the power is turned ON. Make sure that these signals are not treated as actual signals by external devices.

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Timing Charts

This section mainly describes signal timings of F250.
If F270 is used, observe the following points.

- 1-line fast mode
  Both processing sections 0 and 1 are used to perform measurement for each set of measurement conditions. Therefore, the state of the BUSY signal varies. For details, refer to the following section.
  The signal timings for the other signals are the same as those given in this section.

SECTION 3 Test/Measurement Execution, “Performing Measurement in 1-Line Fast Mode”

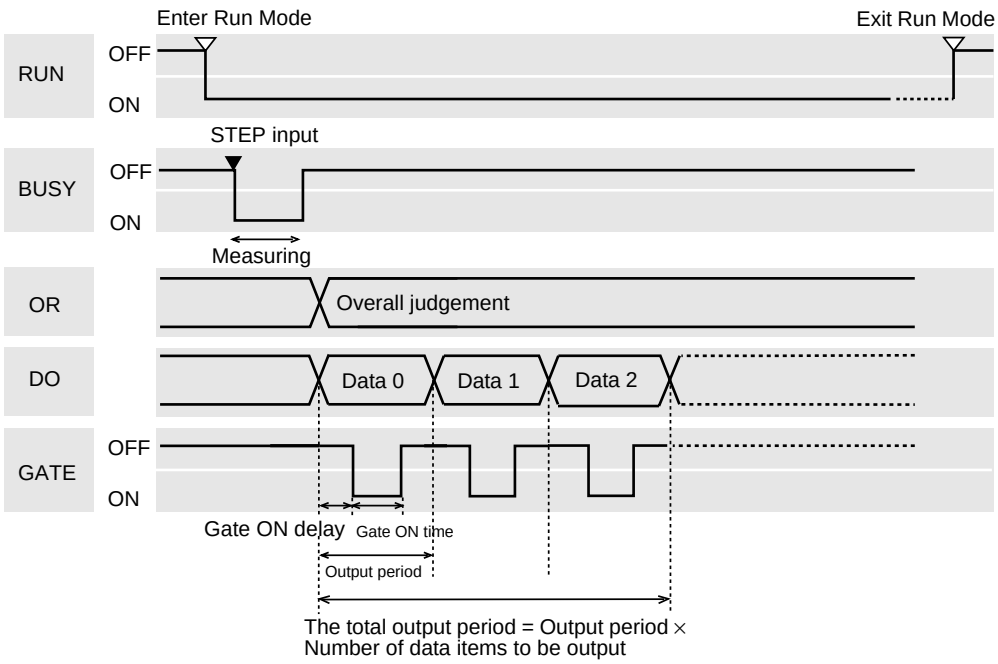
- 2-line random trigger mode
  Both processing sections 0 and 1 allow their own measurement conditions to be set, and measurement is performed independently. Signal timings are the same as those given in this section.

Output control: None

The Controller outputs measurement results to the external device without synchronizing communications. Monitor the Controller's GATE signal from the external device and read the measurement results at the external device while the Controller's GATE signal is ON.

■ Inputting Measurement Triggers to STEP Signal

Example: When 3 Expressions Are Set for [DO data]



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- Output Signals

Signal	Function
RUN	ON while the Controller is in Run Mode.
BUSY	Indicates that the Controller is performing an operation such as measuring or switching scenes. Do not input the next command while the BUSY signal is ON. If another command is input while the BUSY signal is ON, either the operation being performed or the command that was input may not be properly executed.  CHECK! When the BUSY signal's OFF timing is changed to [Image Input Completed], the Controller will continue measuring even though the BUSY signal is OFF. Do not input the next command until the measurement is completed.  SECTION 5 System Settings, “Using BUSY Signals”
OR	Outputs the overall judgement.  CHECK! Whether the ON signal is to be output when the judgement result is OK or NG can be selected in the communications setting window.  p.2
DO	Outputs the results of the expressions that were set in [DO judge] or [DO data].  CHECK! Whether the ON signal is to be output when the judgement result is OK or NG can be selected in the communications setting window.  p.2
GATE	Use the GATE signal to control the timing for the external device to read measurement results. Set a GATE ON time that is long enough for the external device to read the measurement results properly. Set the output period so that the total output time is shorter than the measurement interval (STEP input interval.)

- Input signal

Signal	Function
STEP	Input a measurement trigger from an external source such as a Photoelectric Sensor. Synchronize the STEP signal's rising edge (OFF-to-ON) transition and make one measurement. Keep the STEP signal ON for at least 0.5 ms.


CHECK!

The operation of the BUSY signal can be changed in the [SYS/Measurement control] window.

- Set the point in processing when the BUSY signal is turned OFF.

  Selection: Input image
  End of measurement (default setting)
  Display

- Set whether or not the ERR signal will be turned ON if another STEP signal is input while the Controller is still measuring.


SECTION 5 System Settings, “Using BUSY Signals”

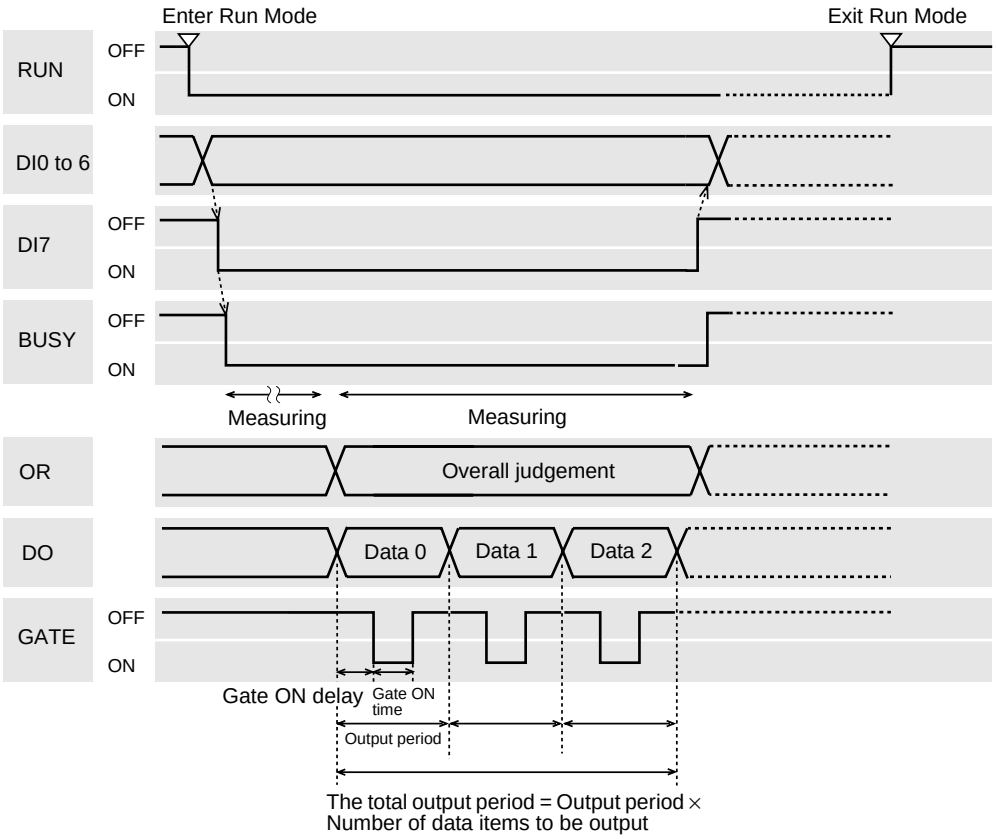
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■ Continuous Measurement

CHECK!

Set the output period so that the total output time is shorter than the measurement interval. If the output cycle is longer than the measurement cycle, the output will gradually fall behind as measurements are repeated.

Example: When 3 Expressions Are Set for [DO data]



- Output Signals

  The functions of the output signals are the same as they are when the STEP signal is used as the measurement trigger.

- Input signal

Signal	Function
DI0 to DI4	OFF
DI5	OFF
DI6	OFF
DI7	DI7 is the execution trigger. After DI0 to DI6 are set, allow at least 1 ms before turning ON DI7.

CHECK!

The ERR signal will turn ON if the input command was not performed correctly.

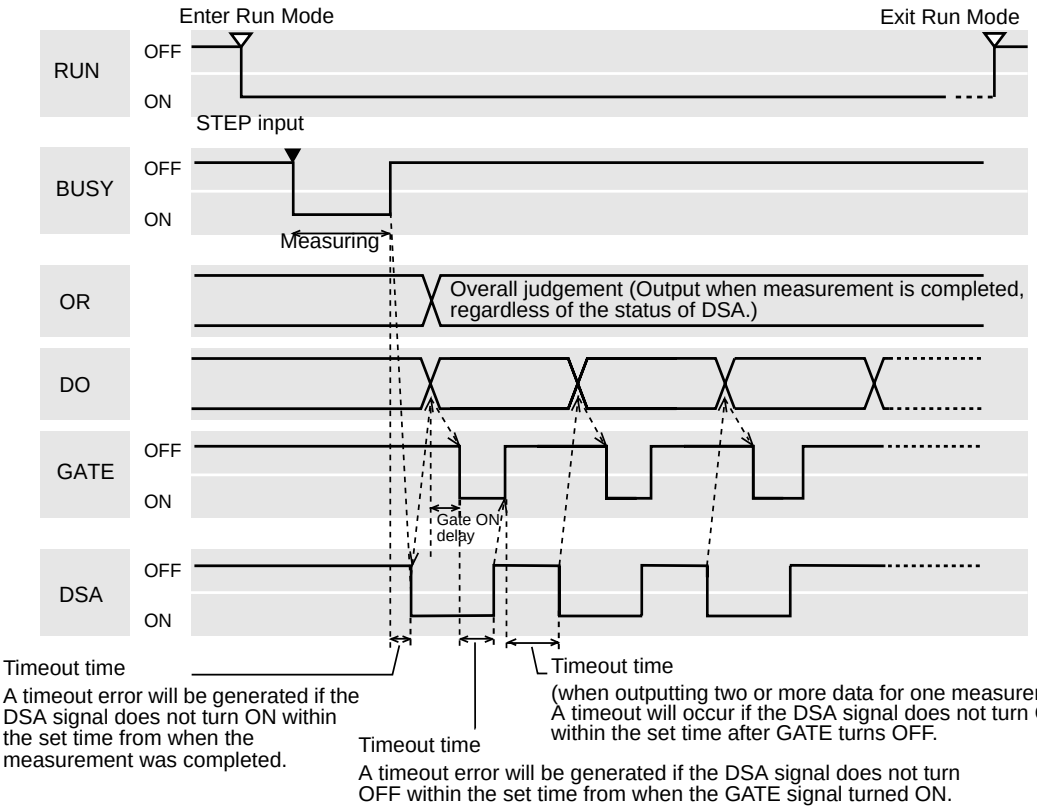
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Handshaking

When handshaking is set, the Controller outputs measurement results to the external device while synchronizing communications. Handshaking is effective when multiple measurement results are output in numerical order and the handshaking function transfers data with more certainty.

■ Inputting Measurement Triggers to STEP Signal

Example: When 3 Expressions Are Set for [DO data]



CHECK! The functions of signals other than DSA are the same as those when [Output control] is set to [None].

- Input signal

Signal	Function
DSA	DSA is the signal from the external device that requests transmission of the next batch of data. The Controller does not output data until DSA goes ON. Turn ON the DSA signal when the following conditions are met: • The external device's data receiving system is ready to receive more data. • The Controller has completed measurements. Generally, the BUSY signal will be ON while the Controller is measuring and the BUSY signal can be used to indicate when measurements are completed. If the BUSY signal's OFF timing has been changed to go OFF when image inputting is completed, the Controller may still be measuring even though the BUSY signal has gone OFF. SECTION 5 System Settings

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Synchronous Output

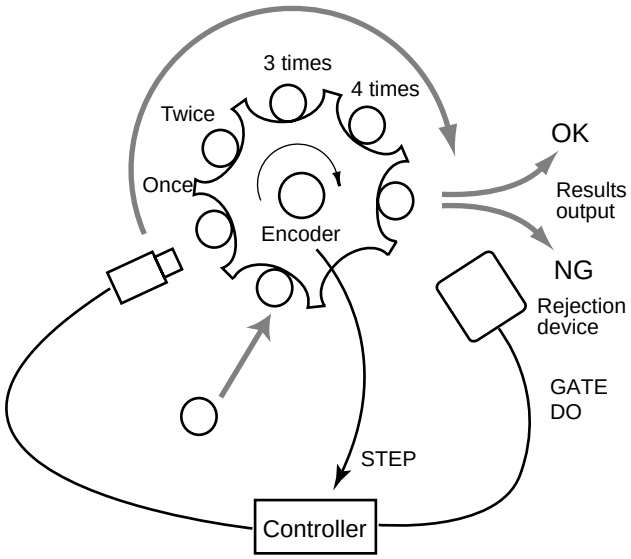
The synchronous output function is used to synchronize the results output timing and the processing timing on the production line. The measurement results are output when the next STEP signal turns ON after the number of STEP signals set under Num. of delays in the communications settings have turned ON.

CHECK!

- When Sync. output is set, the delay is calculated by the number of times the STEP signal turns ON. Therefore, set the measurement results output so that the result is output only once for each measurement. (Set one unit for [DO judge] and one expression for [DO data].)
- Set measurement command input to STEP signals only. (If TRIG Key or serial command measurement or continuous measurement are performed, the output timing will no longer match and the Controller may malfunction.))

Example: For Process-feed Production Lines Using a Star Wheel

The timing of the rejection of NG products and measurement results output can be synchronized.

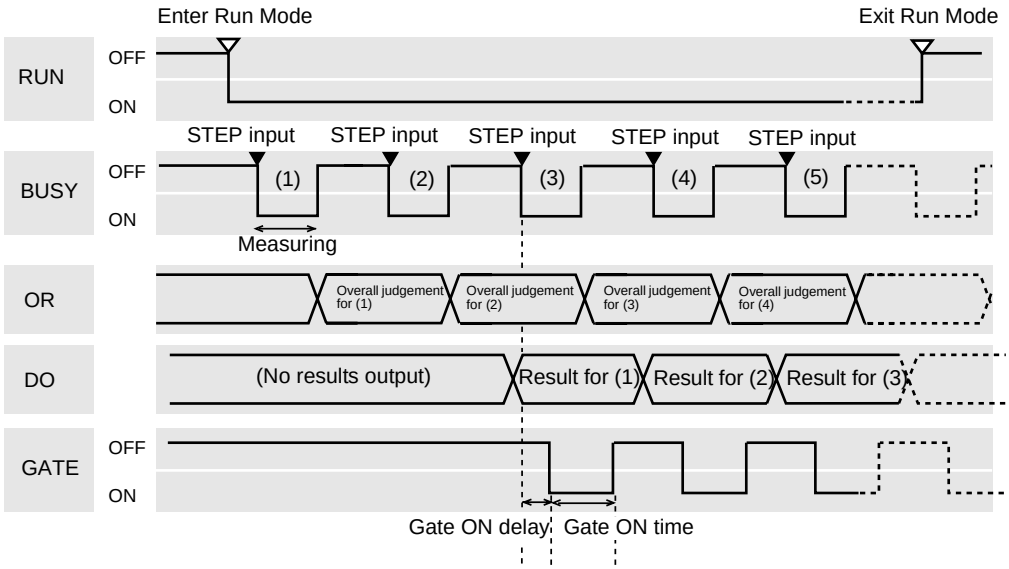


If Num. of delays is set to 4, the measurement result will be output after 4 STEP signals have been detected.

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■ Inputting Measurement Triggers to STEP Signal

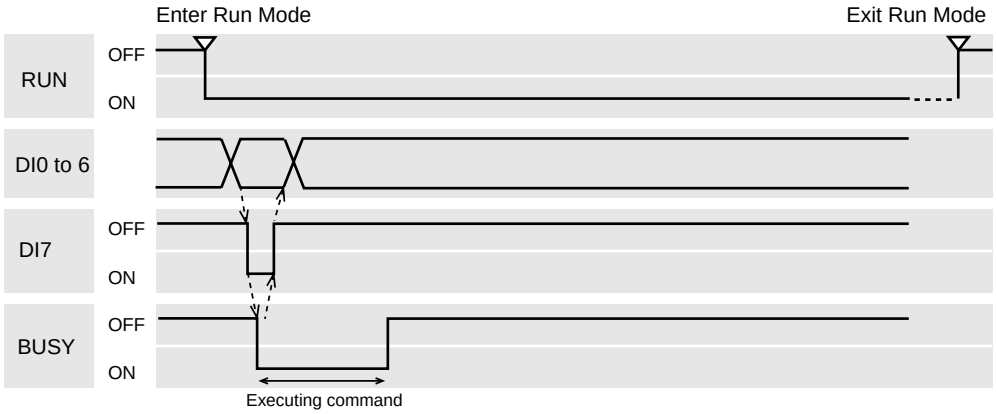
Example: When Num. of delays is Set to 2



CHECK! The functions of the I/O signals are the same as when output control is set to None.

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Switching Scenes or Scene Groups



- Output Signals

Signal	Function
RUN	ON while the Controller is in Run Mode.
BUSY	Indicates that the Controller is switching scenes or scene groups. Do not input the next command while the BUSY signal is ON. If another command is input while the BUSY signal is ON, either the operation being performed or the command that was input may not be properly executed.

- Input Signals: Switching the Scene

Signal	Function
DI0 to DI4	Set the scene number (0 to 31).
DI5	ON
DI6	OFF
DI7	DI7 is the execution trigger. After DI0 to DI6 are set, allow at least 1 ms before turning ON DI7. The BUSY signal will be ON while the command is being executed. After confirming that the BUSY signal is ON, turn OFF DI7, and finally turn OFF DI0 to DI6.

- Input Signals: Switching the Scene Group

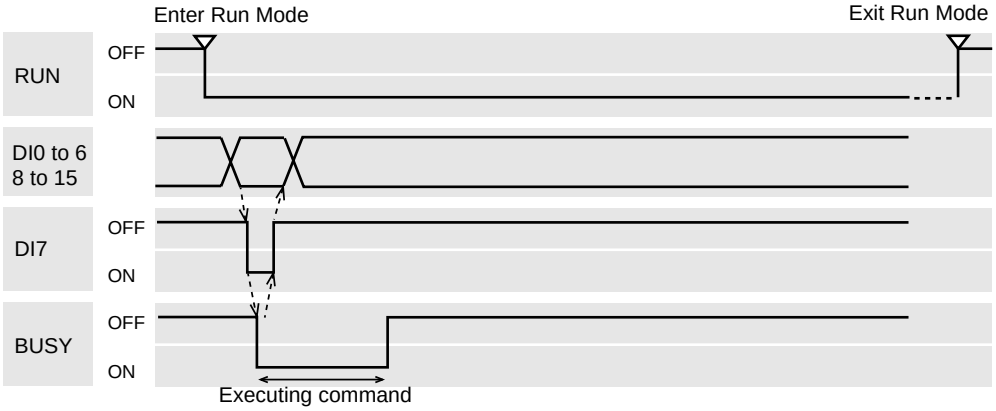
Signal	Function
DI0 to DI4	Set the scene group number (0 to 31).
DI5	ON
DI6	ON
DI7	DI7 is the execution trigger. After DI0 to DI6 are set, allow at least 1 ms before turning ON DI7. The BUSY signal will be ON while the command is being executed. After confirming that the BUSY signal is ON, turn OFF DI7, and finally turn OFF DI0 to DI6.

CHECK!

The ERR signal will turn ON if the command to switch scene groups is input while there is no Memory Card mounted to the Memory Card slot 1.

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Re-registering Models



- Output Signals

Signal	Function
RUN	ON while the Controller is in Run Mode.
BUSY	Indicates that the Controller is re-registering models. Do not input the next command while the BUSY signal is ON. If another command is input while the BUSY signal is ON, either the operation being performed or the command that was input may not be properly executed.

- Input Signals: Registering the Model Again

Signal	Function
DI0 to DI4 DI8 to 15	Set the unit number (0 to 31).*
DI5	OFF
DI6	ON
DI7	DI7 is the execution trigger. After DI0 to DI6 and DI8 to DI15 are set, allow at least 1 ms before turning ON DI7. The BUSY signal will be ON while the command is being executed. After confirming that the BUSY signal is ON, turn OFF DI7, and finally turn OFF DI0 to DI6 and DI8 to DI15.

* Use DI8 to DI15, in addition to DI0 to DI4, when setting re-registration of models for units 31 and later. However, if the 2-line random trigger is selected as the Run mode in the case of F270, unit nos. up to unit 31 are used.

p.3

CHECK!

The ERR signal will turn ON if the input command was not received correctly.

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Normal Serial Interface

This section explains how to set the required communications specifications and the I/O format for using the Controller's serial interface (with a RS-232C/422 connection or Ethernet connection) to communicate with an external device, such as a personal computer.

The interface that can be connected varies with the controller model.

SECTION1 Using This Manual “Functions Available for Each Controller Model”

- List of Commands 2
  - Commands Available for Each Function 2
  - Alphabetical order 3
- Setting Communications Specifications 5
  - RS-232C/422Connections 5
  - Ethernet Connections F250 F270 7
  - USB Connections 9
- Communication Flowcharts 10
- Input Format (Normal) 14
- Output format normal serial interface 42

Wiring Method

Setup Manual (Supplied with the Controller)

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List of Commands

Commands Available for Each Function

■ Commands that Control Controller Operations

Use the following commands to execute operations in the Controller, such as executing measurements and switching scenes.

Command	Function	Page
CLRMEAS	Clears the measurement values for the current scene.	15
CONMON	Switches monitor display between processing sections.	15
DATATRNS	Transfers the system and scene data from processing section 0 to processing section 1.	16
DISPCOND	Reads the current image display conditions.	18
	Changes the current image display conditions.	19
DISPIMG	Reads the memory number containing the image being displayed.	20
	Changes the display image.	20
EXIT	Ends the Ethernet (TELNET) connection and disconnects the line.	21
MEASOUT	Confirms the Controller mode (Monitor/Run).	24
	Changes the Controller mode (Monitor/Run).	24
MEASURE(M)	Executes one measurement.	25
	Executes one measurement on the image being displayed.	25
	Starts continuous measurement.	25
	Stops continuous measurement.	26
MENUKEY	Switches the serial interface input to Menu Operation.	26
MODELSET	Registers the models again for all regions for the specified unit number.	26
NONSTOP	Checks the status of nonstop adjust mode.	27
	Starts/exits nonstop adjustment.	28
RESET	Resets the Controller.	29
SCENE	Reads the scene number currently being used.	30
	Switches the scene number.	30
SCNGROUP	Reads the scene group number currently being used.	33
	Switches the scene group number.	34

■ Commands that Read or Change Current Settings

Controller settings can be changed and operation controlled from the host while accessing the current settings.

Settings conditions can be read or reset and measurement results can be obtained.

Command	Function	Page
DATE	Reads the current date and time.	17
	Sets the date and time.	18
PASSWORD	Reads the password.	29
UNITDATA	Reads or sets data for units set for the current scene.	39
UNITDAT2	Reads or sets character strings for QUEST character verification.	40
VERGET	Reads the system's version information.	41

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■ Commands that Save and Load Data

Use the following commands to backup data set in the Controller and stored images.

Command	Function	Page
DATASAVE	Saves the current scene group data and system data that is being used.	17
IMGLOAD	Loads image data from an external device.	21
IMGLOADM	Loads image data from a Memory Card.	22
IMGSAVE	Saves image data to an external device.	22
IMGSAVEM	Saves image data to a Memory Card.	23
SCNLOAD	Loads scene data from an external device.	31
SCNLOADM	Loads scene data from a Memory Card.	31
SCNSAVE	Saves scene data to an external device.	32
SCNSAVEM	Saves scene data to a Memory Card.	33
SGRLOAD	Loads scene group data from an external device.	34
SGRLOADM	Loads scene group data from a Memory Card.	35
SGRSAVE	Saves scene group data to an external device.	35
SGRSAVEM	Saves scene group data to a Memory Card.	36
SYSLOAD	Loads system data from an external device.	37
SYSLOADM	Loads system data from a Memory Card.	37
SYSSAVE	Saves system data to an external device.	38
SYSSAVEM	Saves system data to a Memory Card.	38

Alphabetical order

	Command	Function	Page
C	CLRMEAS	Clears the measurement values for the current scene.	15
	CONMON	Switches monitor display between processing sections.	15
D	DATASAVE	Saves the current scene group data and system data that is being used.	17
	DATATRNS	Transfers the system and scene data from processing section 0 to processing section 1.	16
	DATE	Reads the current date and time.	17
	DATE	Sets the date and time.	18
	DISPCOND	Reads the current image display conditions.	18
	DISPCOND	Changes the current image display conditions.	19
	DISPIMG	Reads the memory number containing the image being displayed.	20
	DISPIMG	Changes the display image.	20
E	EXIT	Ends the Ethernet (TELNET) connection and disconnects the line.	21
I	IMGLOAD	Loads image data from an external device.	21
	IMGLOADM	Loads image data from a Memory Card.	22
	IMGSAVE	Saves image data to an external device.	22
	IMGSAVEM	Saves image data to a Memory Card.	23

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	Command	Function	Page
M	MEASOUT	Confirms the Controller mode (Monitor/Run).	24
	MEASOUT	Changes the Controller mode (Monitor/Run).	24
	MEASURE(M)	Executes one measurement.	25
	MEASURE(M)	Executes one measurement on the image being displayed.	25
	MEASURE(M)	Starts continuous measurement.	25
	MEASURE(M)	Stops continuous measurement.	26
	MENUKEY	Switches the serial interface input to Menu Operation.	26
	MODELSET	Registers the models again for all regions for the specified unit number.	26
N	NONSTOP	Checks the status of nonstop adjust mode.	27
	NONSTOP	Starts/exits nonstop adjustment.	28
P	PASSWORD	Reads the password.	29
R	RESET	Resets the Controller.	29
S	SCENE	Reads the scene number currently being used.	30
	SCENE	Switches the scene number.	30
	SCNGROUP	Reads the scene group number currently being used.	33
	SCNGROUP	Switches the scene group number.	34
	SCNLOAD	Loads scene data from an external device.	31
	SCNLOADM	Loads scene data from a Memory Card.	31
	SCNSAVE	Saves scene data to an external device.	32
	SCNSAVEM	Saves scene data to a Memory Card.	33
	SGRLOAD	Loads scene group data from an external device.	34
	SGRLOADM	Loads scene group data from a Memory Card.	35
	SGRSAVE	Saves scene group data to an external device.	35
	SGRSAVEM	Saves scene group data to a Memory Card.	36
	SYSLOAD	Loads system data from an external device.	37
	SYSLOADM	Loads system data from a Memory Card.	37
	SYSSAVE	Saves system data to an external device.	38
	SYSSAVEM	Saves system data to a Memory Card.	38
U	UNITDAT2	Reads or sets character strings for QUEST character verification.	40
	UNITDATA	Reads or sets data for units set for the current scene.	39
V	VERGET	Reads the system's version information.	41

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Setting Communications Specifications

Select the RS-232C/422, Ethernet or USB interface to connect the controller to the network and make appropriate communication settings.
It is not possible to use two or more interfaces at the same time.

- RS-232C/422 Connections p.5
- Ethernet Connections p.7
- USB Connections p.9

RS-232C/422Connections

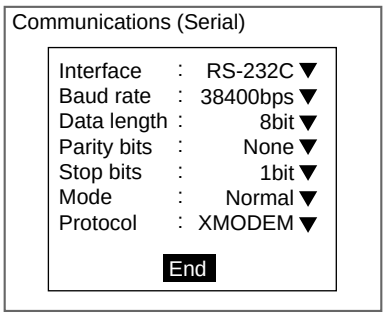
■ Serial Communications

Use the following procedure to set communications specifications such as the baud rate and data length.
Set the same communications specifications in the Controller and the external device.

▶ [System/Communications/Serial]

1. Set each item.

2. Select [End].



Setting data	Selection	
Interface	RS-232C, RS-422 (default setting: RS-232C)	
Baud rate (bps) (See *1.)	2400, 4800, 9600, 19200, 38400, 57600, 115200 (default setting: 38400)	Set the same settings that are set in the personal computer.
Data length	7, 8 (default setting: 8)	
Parity bits	None, Odd, Even (default setting: None)	
Stop bits	1, 2 (default setting: 1)	
Mode	Select [Normal].	
Transfer protocol (See *2.)	XMODEM*, ZMODEM, M-Link	Set the same settings that are set in the personal computer.

*1 RS-232C standards are not defined for speeds over 20 kbps. Depending on the cable length, communications may be unreliable at speeds of 38,400 bps and higher when RS-232C is selected.
If there are problems with communications, a baud rate of [19,200 bps] or below must be used.

*2 XMODEM (-1K) is not supported.

CHECK!

Make the following settings when saving or loading with commands such as SCNLOAD and SCNSAVE.

Setting data	Setting
Data length	8 bit

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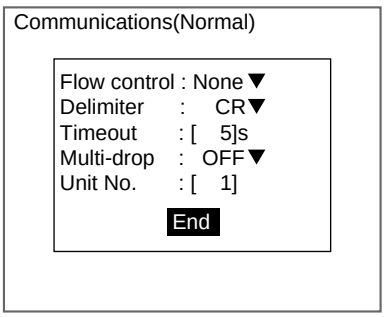
Setting data	Setting
Parity bits	None
Stop bits	1 bit
Flow control	None

p.3

■ Normal Communications

Make the settings for flow control and multi-drop connections.

▶ [System settings/Communications/Normal]



1. Set each item.

2. Select [End].

Setting data		Selection
Flow control	None (default setting)	Flow control is not performed. If a response is not received from the external device within the timeout time, a timeout error is generated and an error message is displayed on the Controller. The parallel interface's ERR signal is also turned ON. CHECK! Use this setting when saving or loading with commands such as SCNLOAD and SCNSAVE.
	Xon/Xoff	Flow control is performed by software. Data is transmitted according to the Xon/Xoff codes sent from the external device.
Delimiter	CR (default setting)	Set the same settings that are set in the personal computer.
	LF	
	CR+LF	
Timeout	Sets the time (in seconds) allowed before a timeout error is generated. 1 to 120s (default setting: 5s)	
Multi-drop	OFF*	Multi-drop connections are not used. If a unit number is set, it will be ignored.
	ON	Multi-drop connections are used. With multi-drop connections, results are not output even in Run Mode. To output measurement results, a command to get the measurement results must be input from the external device. p.11
Unit No.	When multi-drop connections are used, set the Controller's unique unit number. 1 to 31(Default setting: 1)	

[Flow control]
SECTION 7 Appendix, “Terminology”

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Ethernet Connections

F250 F270

When connecting Vision Composer Net, refer to Section 6, “Connecting to Vision Composer Net”.

■ Serial Communications

The operations are the same as for the RS-232C/422 connections. Refer to the explanation of the CAPTURE command.

p.5

Setting data	Selection	
Interface	Cannot be used with Ethernet connections. (Any settings will be ignored.)	
Baud rate		
Data length		
Parity bits		
Stop bits		
Mode	Select [Normal].	
Protocol (See *.)	XMODEM, ZMODEM, M-Link (default setting: XMODEM)	Set the same settings that are set in the personal computer.

* XMODEM (-1K) is not supported.

■ Normal Communications

The operations are the same as for the RS-232C/422 connections. Refer to the explanation of the CAPTURE command.

p.6

Setting data	Selection	
Flow control	Cannot be used with Ethernet connections. (Any settings will be ignored.)	
Delimiter	CR (default setting)	Set the same settings that are set in the personal computer.
	LF	
	CR+LF	
Timeout	Cannot be used with Ethernet connections. Any settings will be ignored.	
Multi-drop	Set to [Off].	
Unit No.	Cannot be used with Ethernet connections. Any settings will be ignored.	

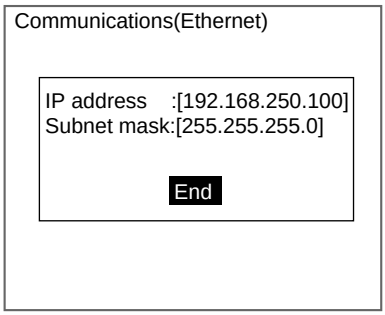
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■ Ethernet Communications

Set the IP address and the subnet mask.

Consult with the network administrator to make sure that the IP addresses are not duplicated in the network.

▶ [SYS/Communications/Ethernet]



1. Set each item.

2. Select [End].

Setting data	Details
IP address	For all except the rightmost part of the address, set the same address as the connected computer. (Set a value for the rightmost part of the address that is unique in the network.)
Subnet mask	Make the same setting as the connected computer.

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USB Connections

■ Serial Communications

The operations are the same as for the RS-232C/422 connections. Refer to the explanation of the CAPTURE command.

p.5

Setting data	Selection	
Interface	Cannot be used with USB connections. (Any settings will be ignored.)	
Baud rate		
Data length		
Parity bits		
Stop bits		
Mode	Select [Normal].	
Protocol (See note.)	XMODEM, ZMODEM, M-Link (default setting: XMODEM)	Set the same settings that are set in the personal computer.

* XMODEM (-1K) is not supported.

■ Normal Communications

The operations are the same as for the RS-232C/422 connections. Refer to the explanation of the CAPTURE command.

p.6

Setting data	Selection	
Flow control	Cannot be used with USB connections. (Any settings will be ignored.)	
Delimiter	CR (default setting)	Set the same settings that are set in the personal computer.
	LF	
	CR+LF	
Timeout	Sets the time (in seconds) allowed before a timeout error is generated. (1 to 120 s, default setting: 5 s)	
Multi-drop	Set to [Off].	
Unit No.	Cannot be used with USB connections. (Any settings will be ignored.)	

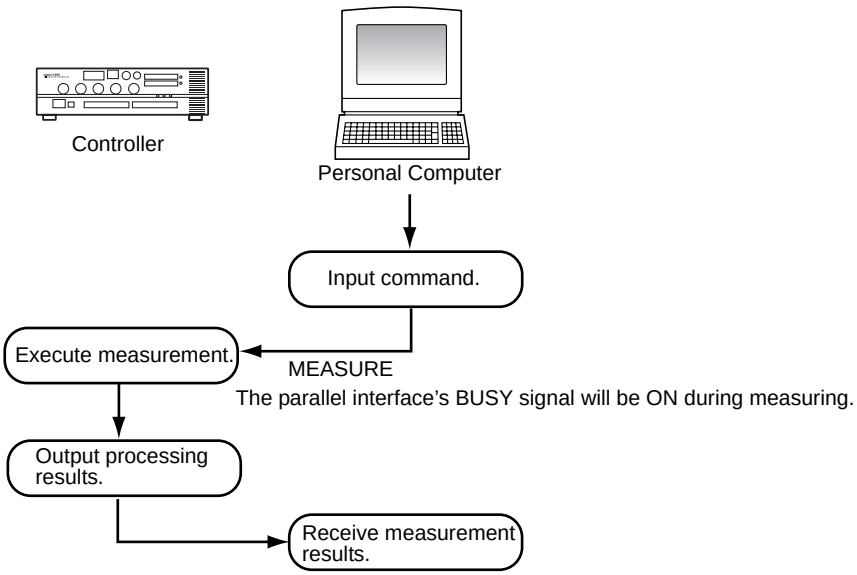
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Communication Flowcharts

RS-232C/422Connections

■1:1 Connection

Example: A measurement command is input and those results are read.



* When the [Flow control] is set to [Xon/off] and a response is not received from the computer within the specified timeout time, a timeout error will occur because the computer may be disconnected or malfunctioning.
An error message will be displayed on the Controller's screen and the parallel interface's ERR signal will be turned ON.

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■ Multi-drop Connection (1:N)

Branching Link Adapters can be used to connect up to 31 Controllers to a single host computer.

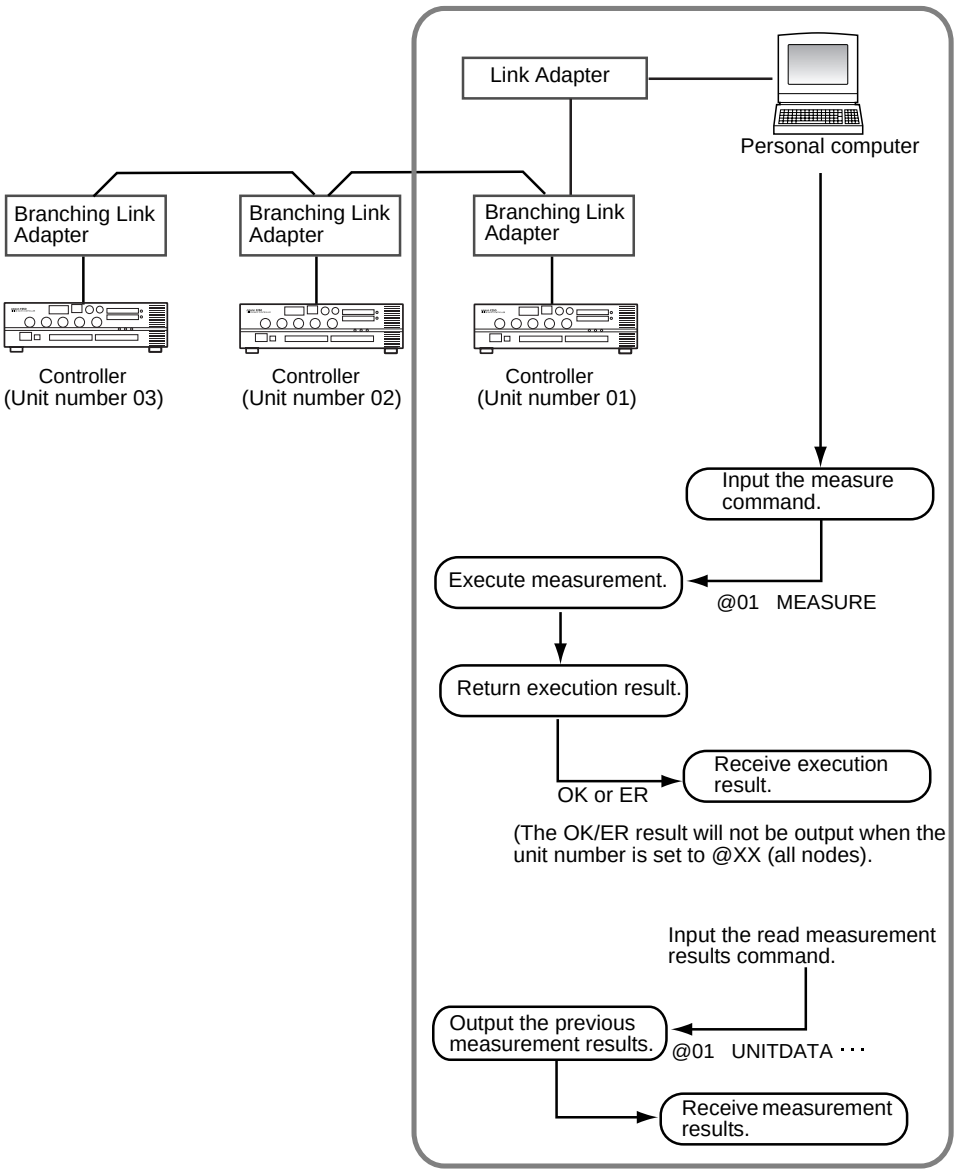
CHECK!

When a multi-drop connection is used, the Controller will not output measurement results until a command to get measurement results is received from the host. Specify the Controller from which data is to be obtained from the host. Use the following communications settings for multi-drop connections.

Setting data	Setting
Multi-drop	ON
Unit No.	1 to 31 (Set a unique number for each Controller.)

p.6

Example: A measurement command is input for the Controller with unit number 01 and those results are read.



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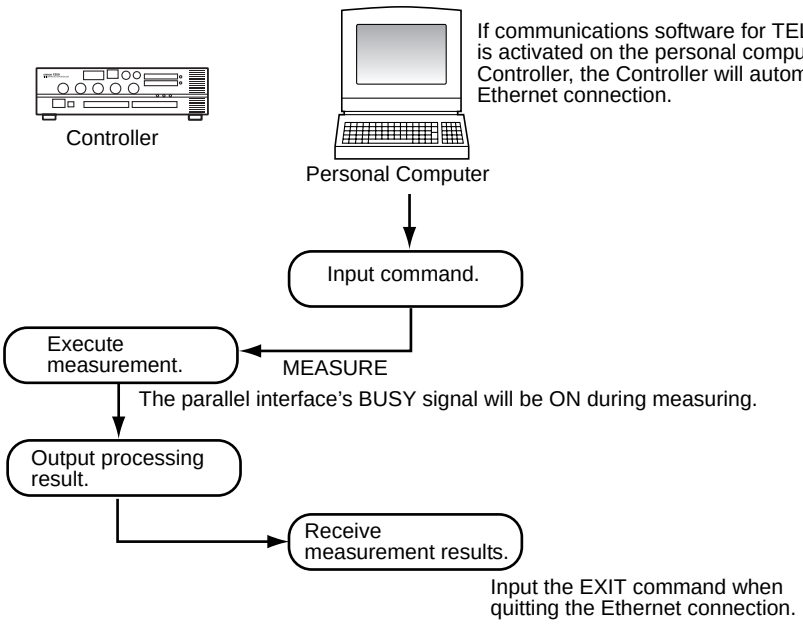
Ethernet Connections

When connecting Vision Composer Net, refer to SECTION 6, “Communication with Vision Composer Net”.

CHECK! Communications with the Controller from outside the LAN and communications between multiple personal computers and the Controller may not function properly. Also, communications cannot be performed between two Controllers or between a Programmable Controller and the Controller.

■ 1:1 Connection

Example: A measurement command is input and those results are read.

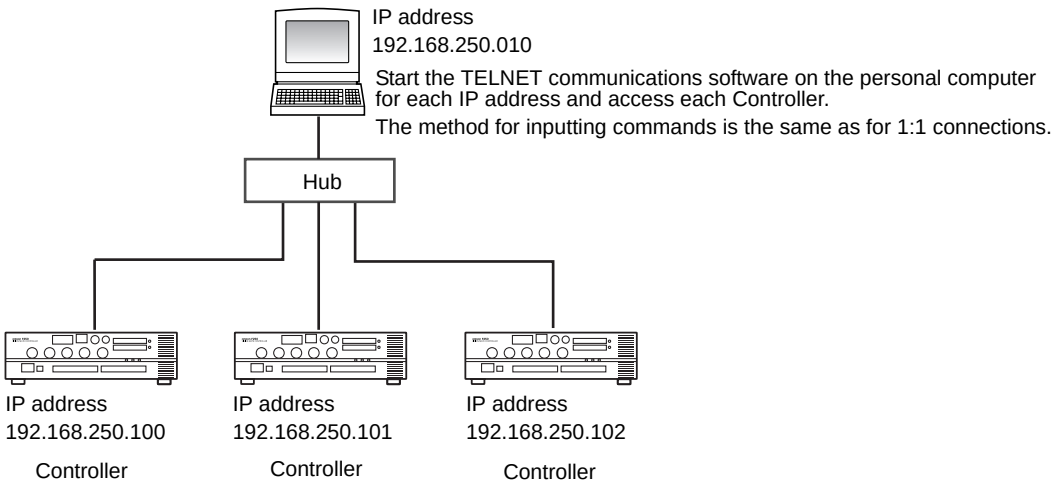


■ 1:N Connection

With this connection format, one personal computer can communicate with multiple Controllers via a hub.

Make sure the IP addresses set for the Controllers are not duplicated.

Example:

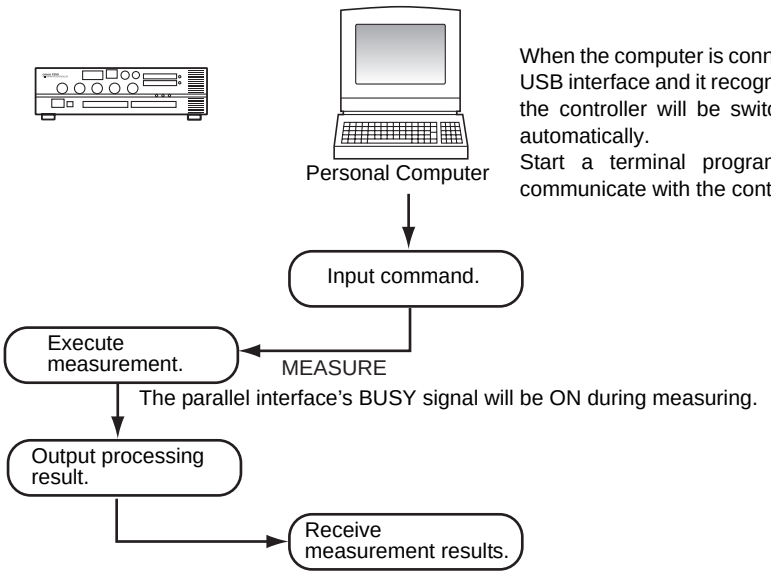


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USB Connections

■ 1:1 Connection

Example: A measurement command is input and those results are read.



When the computer is connected to the controller via USB interface and it recognizes USB as a COM port, the controller will be switched to USB connection automatically.
Start a terminal program on the computer to communicate with the controller.

If the controller is not ready to transfer data to the computer within the specified timeout period, a timeout error will occur because the computer may be disconnected or malfunctioning.
An error message will be displayed on the Controller's screen and the parallel interface's ERR signal will be turned ON.

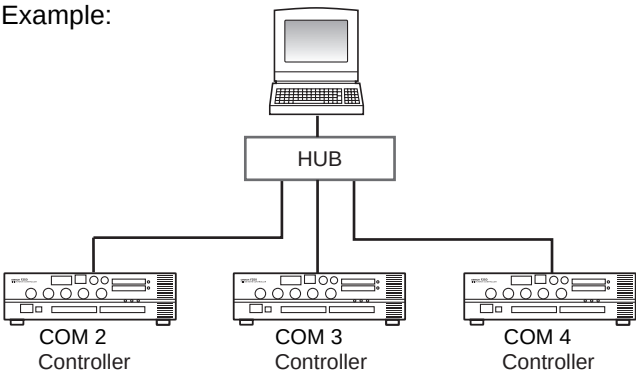
CHECK!
When shutting off communication, adhere to the following procedure.
If communication is not shut off correctly, the computer may malfunction.
1. Shut off the serial port of the serial terminal program.
2. Disconnect the USB cable.
3. Turn OFF the power to the controller.

■ 1:N Connection

With this connection format, one personal computer can communicate with multiple Controllers via a USB hub.
The computer recognizes each controller by its own COM No.

CHECK!
To check the USB's COM No., open Windows [Control Panel] – [System] – [System Property], and check the setting made for [Device Manager/Port (COM and LPT)] in the [Property/Hardware] tab page.

Example:



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Input Format (Normal)

The commands are listed in alphabetical order. Input the commands in ASCII code. Either upper-case or lower-case characters can be input.
The common command format is used for RS-232C/422, Ethernet and USB connection. Commands can be accepted from only one of the connected interfaces. It is not possible to use two or more interfaces at the same time.

Example:



① < Set numerical values for the items enclosed in > brackets.
② Input a space between each parameter. (A space is not needed before the Delimiter .)
③ Input the delimiter Delimiter at the end of the command.

However, in the case of RS-232C/422 multi-dropped connection, commands must begin with a machine No.

@01 UNITDATA <Unit number> <Data type> Delimiter

The response will be returned with the unit number (@01 to @31) at the beginning.
To broadcast a command to all of the connected Controllers, input @XX instead of a unit number. The Controllers will not return responses to a broadcast command.

CHECK!

The command reception method varies with the menu mode.

Mode	Details
SET Mode	Command inputs are not received.
MON Mode	Command inputs are received, but the measurement results are not output to external devices. Only the command execution result (OK or ER) is output. When a command is input to read a set value, the appropriate value will be output.
RUN Mode	Command inputs are received and measurement results are output. After measurements have been made in Run Mode, the data up through the last measurement will be output even if the mode is changed to another mode.

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CLRMEAS --- CLeaR MEASure ---

Function.....Clears the measurement values for the current scene.

Input CLRMEAS Delimiter

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

CONMON --- CONsole and MONitor switch ---

Function.....Switches monitor display between processing sections.

Input CONMON <Processing section No.> Delimiter

For "Processing section No. set either 0 (processing section 0) or 1 (processing section 1).

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

CHECK! This command can be used only when F270 is used. If the 1-line fast or 2-line random trigger mode is selected as a run function mode, use this command. The command must not be used for nonstop adjustment. If monitor display is switched to processing section 1 and the conditions are changed, malfunction may occur.

CHECK! As the monitor display switches, inputs from console and inputs of normal commands for the processing section vary.

Example:

Input : CONMON 1 Delimiter

Monitor display, inputs from console and inputs of normal commands are switched to processing section 1.

Output : OK Delimiter

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DATATRNS --- DATA TRaNSfer ---

Function.....Transfers the system and scene data between processing sections.

Input	DATATRNS Delimiter	
Output	Command executed correctly:	OK Delimiter
	Command not executed correctly:	ER Delimiter



This command cannot be executed during nonstop adjustment. It must be executed after nonstop adjust mode is exited.



If the 1-line fast mode is selected as a run function mode and monitor display is selected for processing section 1 in the case of F270, this command cannot be executed. Before executing the command, switch monitor display to processing section 0. In the case of 2-line random trigger mode, do not use this command. Even if the measurement conditions set for processing section 0 are different from those set for processing section 1, the data stored in processing section 0 will be copied to processing section 1, resulting in the same measurement conditions being set for both processing sections.

Example: Nonstop adjust mode

Input : SCNLOADM 0 /C0/KENSA.SCN Delimiter
Output : OK Delimiter
Input : MEASOUT 1 Delimiter
Output : OK Delimiter
Input : NONSTOP 0 Delimiter
Output : OK Delimiter
Input : DATATRNS Delimiter
This will activate a run mode, exit nonstop adjust mode, and then transfer scene data from processing section 0 to processing section 1.
Output : OK Delimiter

Example) 1-line fast mode

Input : CONMON 0 Delimiter
Output : OK Delimiter
Input : SCNLOADM 0 /C0/KENSA.SCN Delimiter
Output : OK Delimiter
Input : DATATRNS Delimiter
This will switch monitor display to processing section 0, load the system data, and then transfer the data to processing section 1.
Output : OK Delimiter

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DATASAVE

Function.....Saves the current scene group data and system data.
(Data for scene group 0 is saved to flash memory, data for scene groups 1 to 31 is saved to the Memory Card, and the system data is saved to the Memory Card.)

Input	DATASAVE Delimiter	
Output	Command executed correctly:	OK Delimiter
	Command not executed correctly:	ER Delimiter



Do not turn OFF the Controller's power supply until a response has been received.

DATE

Function 1.....Reads the current date and time.

Input	DATE Delimiter	
Output	Command executed correctly:	Month Day Hour Minute Year. Second Delimiter OK Delimiter
	Command not executed correctly:	ER Delimiter

Example:

Input : DATE Delimiter
Output : 083012302000.00 Delimiter
OK Delimiter
12:30:00, August 30, 2000

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Function 2……Sets the date and time.

Input DATE <Month Day Hour Minute Year (first 2 digits) Year (last 2 digits). Second> Delimiter

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

• Meaning of each input item is given below.

Input Item	Setting Range
Month	01 to 12
Day	01 to 31
Hour	00 to 23
Minute	00 to 59
Year (first 2 digits)	19, 20 (can be omitted)
Year (last 2 digits)	00 to 99 (can be omitted)
Second	.00 to .59 (can be omitted)

CHECK!

Either all four digits of the year can be omitted or just the first two digits can be omitted. The last two digits cannot be omitted without omitting the first two as well.

Example:

Input : DATE 0830123020.00 Delimiter
Sets 12:30:00, August 30, 2000.
Output : OK Delimiter

DISPCOND --- DISPlay CONDition ---

Function 1.....Reads the current image display conditions.

Input DISPCOND Delimiter

Output Command executed correctly: Display Code Delimiter

OK Delimiter

Command not executed correctly: ER Delimiter

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• The display status is indicated as follows.

Display Code	Details
0	Through
1	Freeze (before scroll)
2	Freeze (after scroll)
3	Last NG (before scroll)
4	Last NG (after scroll)

Example:

Input : DISPCOND Delimiter
Output : 0 Delimiter
OK Delimiter
This example shows the output response when the display image is in "Through".

Function 2……Changes the image display condition to the specified condition.

Input DISPCOND <DISPlay CONDition> Delimiter
• The condition codes are the same as shown for Function 1 above.

Output Command executed correctly: OK Delimiter
Command not executed correctly: ER Delimiter

Example:

Input : DISPCOND 3 Delimiter
This example shows how to change the display image to the [Last NG] (before scroll).
Output : OK Delimiter

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DISPIMG --- DISPlay IMaGe ---

Function 1……Reads the memory number containing the image that is currently being displayed.

Input DISPIMG Delimiter

Output
Command executed correctly: Memory number Delimiter
OK Delimiter
Command not executed correctly: ER Delimiter



A value of -1 will be output when [Through], [Freeze] or [Last NG] is being displayed.

Example:

Input : DISPIMG Delimiter
Output : 12 Delimiter
OK Delimiter
In this example, the image in memory number 12 is being displayed.

Function 2.....Changes the display image.

Input DISPIMG <Memory number> Delimiter

- Set the memory number between -1 and 35.
- When -1 is specified, the display condition set with DISPCOND or in the [Display settings] window (for example, “Through”, “Freeze” or “Last NG”) will be used.

Output
Command executed correctly: OK Delimiter
Command not executed correctly: ER Delimiter

Example:

Input : DISPIMG 8 Delimiter
This example shows how to display the image in memory number 8.
Output : OK Delimiter

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EXIT

Function.....Ends the TELNET connection for Ethernet communications and disconnects the line.

Input EXIT Delimiter

Output Command executed correctly: None (completed successfully)

Command not executed correctly: ER Delimiter

CHECK! This function can be used only when using an Ethernet connection.

IMGLOAD --- IMaGe LOAD ---

Function.....Loads image data from an external device.

Input IMGLOAD <Memory number> Delimiter

- The memory number specifies the destination for the image data being loaded from the Memory Card.(0 to 35)

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

CHECK! Data transfer is performed with XMODEM (-CRC or SUM) or ZMODEM protocol. (The XMODEM (-1K) protocol is not supported.) The Controller sends the character string “READY” to the external device when the Controller has completed preparations. Wait for the “READY” string to be received at the external device before starting the data transfer.

Example:

Input : IMGLOAD 2 Delimiter
This example loads image data from the external device to memory 2.
Output : OK Delimiter

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IMGLOADM --- IMaGe LOAD Memory card ---

Function.....Loads image data from a Memory Card.

Input IMGLOADM <Memory number> <Filename> Delimiter

- The memory number specifies the destination for the image data being loaded from the Memory Card. (0 to 35)
- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension ".BMP" to the filename.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : IMGSAVEM 2 /C0/DIR01/LABEL1.BMP Delimiter
This example loads the file "LABEL1.BMP" in the Memory Card 0 directory DIR01 to memory 2.
Output : OK Delimiter

IMGSAVE --- IMaGe SAVE ---

Function.....Saves image data to an external device.

Input IMGSAVE <Memory number> Delimiter (For XMODEM transfer)
IMGSAVE <Memory number> <Filename> Delimiter (For ZMODEM transfers)

- For <Memory number>, specify the memory number where the image to be saved is stored. (0 to 35)

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

CHECK! The XMODEM (-1K) protocol is not supported.
The Controller sends the character string "READY" to the external device when the Controller has completed preparations. Wait for the "READY" string to be received at the external device before starting the data transfer.

Example:

Input : IMGSAVE 2 Delimiter
This example saves the image data contained in memory 2 to the external device.
Output : OK Delimiter

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IMGSAVEM --- IMaGe SAVE Memory card ---

Function.....Saves image data to a memory card.

Input IMGSAVEM <Memory number> <File name> Delimiter

- For <Memory number>, specify the memory number where the image to be saved is stored. (0 to 35)
- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension ".BMP" to the filename.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : IMGSAVEM 2 /C0/DIR01/LABEL1.BMP Delimiter

This example saves the image data contained in memory 2 as the file "LABEL1.BMP" in Memory Card 0 directory DIR01.

Output : OK Delimiter

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MEASOUT --- MEASure OUT ---

Confirms the mode of the Controller: Monitor (results not output) or RUN (results output).

Input MEASOUT Delimiter

Output Command executed correctly: Mode number Delimiter
OK Delimiter

Command not executed correctly: ER Delimiter

• Mode numbers are as follows:

Mode number	Mode
0	Monitor (results not output)
1	RUN (results output)

Example:

Input : MEASOUT Delimiter
Output : 1 Delimiter
: OK Delimiter
This example indicates that the Controller is in Run Mode.

Function 2.....Changes the mode of the Controller: Monitor (results not output) or RUN (results output).

Input MEASOUT <Mode number> Delimiter
• Refer to Function 1 for mode numbers.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : MEASOUT 1 Delimiter
This example changes the Controller to Run Mode.
Output : OK Delimiter

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MEASURE (M)

Function 1.....Executes one measurement.

Input MEASURE Delimiter

Output
Command executed correctly: Measurement result
OK Delimiter

Command not executed correctly: ER Delimiter



Set [Normal data] to the unit to output measurement results.
Only the command response will be output if Normal data is not set.
p.42

Function 2.....Executes one measurement on the image being displayed.

Input MEASURE /I Delimiter

Output
Command executed correctly: Measurement result
OK Delimiter

Command not executed correctly: ER Delimiter



Set [Normal data] to the unit to output measurement results.
Only the command response will be output if Normal data is not set.
p.42

Function 3.....Starts continuous measurement.

Input MEASURE /C Delimiter

Output
Command executed correctly: OK Delimiter (One time)
Measurement result Delimiter (for each continuous measurement)

Command not executed correctly: ER Delimiter



Set [Normal data] to the unit to output measurement results.
Only the command response will be output if Normal data is not set.
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Function 4.....Stops continuous measurement.

Input MEASURE /E Delimiter

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

MENUKEY

Function.....Switches the serial interface input to [Menu Operation] mode.

Input MENUKEY Delimiter

Output None



The Controller will revert to Normal mode if the Ctrl + Q Key combination ($11) is input while the Controller is in Menu Operation mode.

MODELSET

Function.....Registers the models again for all regions for the specified unit number.
(When the through display is being used, the models will be registered based on the last image that was measured. When using two or more cameras, images will be captured by the cameras and registered for the units except for those specified after the last camera image input.)

Input MODELSET <Unit number> Delimiter

- Specify the desired unit (0 to 9999).



Model re-registration is valid only if model position compensation, circle position compensation, fine matching, pattern inspection, rotation position, or ECM search unit numbers have been specified. Any other specified unit numbers will be ignored.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

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Example:

Input : MODELSET 2 Delimiter
Output : This example re-registers the unit 2 (pattern inspection) model.
: OK Delimiter

If a unit number other than those for which models are to be re-registered is specified, this command will be ignored, but “OK” will be output.

Example:

When unit 1 for which binary defect detection is set is specified:
Input : MODELSET 1 Delimiter
Output : OK Delimiter
No setting will be made.



Model re-registration is executed for the currently displayed Camera image. Switch to the Camera image for which the model is to be re-registered before executing this command. Use the Up and Down Keys on the Console to switch Camera images. (This is only possible when the image size is set to [All].)

NONSTOP

Function 1.....Checks the status of nonstop adjust mode.

Input NONSTOP Delimiter

• Nonstop adjust mode has the following two statuses.

Status	Details
0	Nonstop adjust mode has not been executed.
1	Nonstop adjust mode is currently in progress.

Output Nonstop adjust mode is currently in progress: 1 Delimiter
OK Delimiter
Nonstop adjust mode is currently in progress: 0 Delimiter
OK Delimiter
Command not executed correctly: ER Delimiter

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Example:

Input : NONSTOP Delimiter
Checks the status of nonstop adjust mode.
Output : 1 Delimiter
: OK Delimiter
Nonstop adjust mode is currently in progress.

Function 2..... Starts/exits nonstop adjust mode.

Input NONSTOP <Status> Delimiter

• Nonstop adjust mode has the following two statuses.

Status	Details
0	Exits nonstop adjust mode.
1	Starts nonstop adjust mode.

Output Command executed correctly: OK Delimiter
Command not executed correctly: ER Delimiter

Example:

Input : NONSTOP 1 Delimiter
Starts nonstop adjust mode.
Output : OK Delimiter

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PASSWORD

Function.....Reads the password.



If the password has been forgotten, it can be obtained using this command.

Input	PASSWORD Delimiter	
Output	Command executed correctly:	Password data Delimiter
		OK Delimiter
	Command not executed correctly:	ER Delimiter

Example:

Input : PASSWORD Delimiter
Output : AAAAAAA Delimiter
OK Delimiter
In this example, the password is set to AAAAAAA.

RESET

Function.....Restarts the Controller.

Input	RESET Delimiter
Output	None

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SCENE

Function 1.....Reads the scene number of the scene being used.

Input SCENE Delimiter

Output
Command executed correctly: Scene number Delimiter
OK Delimiter
Command not executed correctly: ER Delimiter

Example:

Input : SCENE Delimiter
Output : 0 Delimiter
OK Delimiter
In this example, scene 0 is being used.

Function 2..... Switches the scene number.

Input SCENE <Scene number> Delimiter
• Specify a scene number between 0 and 31.

Output
Command executed correctly: OK Delimiter
Command not executed correctly: ER Delimiter

Example:

Input : SCENE 2 Delimiter
In this example, the scene is switched to scene 2.
Output : OK Delimiter

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SCNLOAD --- SCeNe LOAD ---

Function.....Loads scene data from an external device.

Input SCNLOAD<Scene number> Delimiter

- Specify a scene number between 0 and 31.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

CHECK! Data transfer is performed with XMODEM (-CRC or SUM) or ZMODEM protocol. (The XMODEM (-1K) protocol is not supported.) The Controller sends the character string “READY” to the external device when the Controller has completed preparations. Wait for the “READY” string to be received at the external device before starting the data transfer.

Example:

Input : SCNLOAD 2 Delimiter
This example loads scene data from the external device to scene 2.
Output : OK Delimiter

SCNLOADM --- SCeNe LOAD Memory card ---

Function.....Loads scene data from a memory card.

Input SCNLOADM <Scene number> <File name> Delimiter

- Specify a scene number between 0 and 31.
- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension “.SCN” to the filename.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

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Example:

Input : SCNLOADM 2 /C0/DIR01/LABEL.SCN Delimiter
This example loads the file “LABEL.SCN” to scene 2 from Memory Card 0 directory DIR01.
Output : OK Delimiter

SCNSAVE --- SCeNe SAVE ---

Function.....Saves scene data to an external device.

Input SCNSAVE <Scene number> Delimiter (For XMODEM transfer)
SCNSAVE <Scene number> <Filename> Delimiter (For ZMODEM transfers)
• Specify a scene number between 0 and 31.

Output Command executed correctly: OK Delimiter
Command not executed correctly: ER Delimiter

CHECK! The XMODEM (-1K) protocol is not supported.
The Controller sends the character string “READY” to the external device when the Controller has completed preparations. Wait for the "READY" string to be received at the external device before starting the data transfer.

Example:

Input : SCNSAVE 2 Delimiter
This example saves the scene data of scene 2 to the external device.
Output : OK Delimiter

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SCNSAVEM --- SCeNe SAVE Memory card ---

Function.....Saves scene data to a Memory Card.

Input SCNSAVEM<Scene number> <File name> Delimiter

- Specify a scene number between 0 and 31.
- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension ".SCN" to the filename.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : SCNSAVEM 2 /C0/DIR01/LABEL.SCN Delimiter
This example saves the system data of scene 2 in the file called "LABEL.SCN" in Memory Card 0 directory DIR01.
Output : OK Delimiter

SCNGROUP --- SCeNe GROUP ---

Function 1.....Reads the scene group number being used.

Input SCNGROUP Delimiter

Output Command executed correctly: Scene group number Delimiter

OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : SCNGROUP Delimiter
Output : 0 Delimiter
OK Delimiter
In this example, scene group 0 is being used.

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Function 2..... Switches the scene group number.

Input SCNGROUP <Scene group number> Delimiter

• Specify a scene number between 0 and 31.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : SCNGROUP 2 Delimiter

This example switches to scene group 2.

Output : OK Delimiter

SGRLOAD --- Scene GRoup LOAD ---

Function.....Loads scene group data from an external device.

Input SGRLOAD <Scene group number> Delimiter

• Specify a scene number between 0 and 31.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

CHECK!

Data transfer is performed with XMODEM (-CRC or SUM) or ZMODEM protocol. (The XMODEM (-1K) protocol is not supported.)

The Controller sends the character string “READY” to the external device when the Controller has completed preparations. Wait for the “READY” string to be received at the external device before starting the data transfer.

Example:

Input : SGRLOAD 2 Delimiter

This example loads the scene group data from the external device to scene group 2.

Output : OK Delimiter

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SGRLOADM --- Scene GRoup LOAD Memory card ---

Function.....Loads scene group data from a Memory Card.

Input SGRLOADM<Scene group number> <File name> Delimiter

- Specify a scene number between 0 and 31.
- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension ".SGR" to the filename.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : SGRLOADM 2 /C0/DIR01/LABEL.SGR Delimiter
This example loads the file "LABEL.SGR" to scene group 2 from Memory Card 0 directory DIR01.
Output : OK Delimiter

SGRSAVE --- Scene GRoup SAVE ---

Function.....Saves scene group data to an external device.

Input SGRSAVE<Scene group number> Delimiter (For XMODEM transfer)
SGRSAVE <Scene group number> <File name> Delimiter
(For ZMODEM transfer)

- Specify a scene number between 0 and 31.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

CHECK!
The XMODEM (-1K) protocol is not supported.
The Controller sends the character string "READY" to the external device when the Controller has completed preparations. Wait for the "READY" string to be received at the external device before starting the data transfer.

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Example:

Input : SGRSAVE 2 Delimiter
This example saves the scene group data of scene group 2 to the external device.
Output : OK Delimiter

SGRSAVEM --- Scene GRoup SAVE Memory card ---

Function.....Saves scene group data to a Memory Card.

Input SGRSAVEM <Scene group number> <File name> Delimiter

- Specify a scene group number between 0 and 31.
- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension ".SGR" to the filename.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : SGRSAVEM 2 /C0/DIR01/LABEL.SGR Delimiter
This example saves the scene group data of scene group 2 as file "LABEL.SGR" in Memory Card 0 directory DIR01.
Output : OK Delimiter

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SYSLOAD --- SYStem LOAD ---

Function.....Loads system data from an external device.

Input SYSLOAD Delimiter

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter



Data transfer is performed with XMODEM (-CRC or SUM) or ZMODEM protocol. (The XMODEM (-1K) protocol is not supported.)
The Controller sends the character string “READY” to the external device when the Controller has completed preparations. Wait for the “READY” string to be received at the external device before starting the data transfer.

Example:

Input : SYSLOAD Delimiter
This example loads the system data from the external device.
Output : OK Delimiter

SYSLOADM --- SYStem LOAD Memory ---

Function Loads system data from a Memory Card.

Input SYSLOADM <File name> Delimiter

- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension “.SYD” to the filename.

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : SYSLOADM /C0/DIR01/SYSDAT1.SYD Delimiter
This example loads the file “SYSDAT1.SYD” from Memory Card 0 directory DIR01.
Output : OK Delimiter

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SYSSAVE --- SYStem SAVE ---

Function Saves system data to an external device.

Input SYSSAVE Delimiter (For XMODEM transfer)
SYSSAVE <Filename> Delimiter (For ZMODEM transfer)

Output Command executed correctly: OK Delimiter
Command not executed correctly: ER Delimiter

CHECK! The XMODEM (-1K) protocol is not supported.
The Controller sends the character string “READY” to the external device when the Controller has completed preparations. Wait for the "READY" string to be received at the external device before starting the data transfer.

Example:

Input : SYSSAVE Delimiter
This example saves the system data to the external device.
Output : OK Delimiter

SYSSAVEM --- SYStem SAVE Memory card ---

Function Saves system data to a Memory Card.

Input SYSSAVEM <File name> Delimiter
- Specify the drive (C0 or C1) at the beginning of the file name.
- Specify the absolute path from the root directory.
- Add the filename extension “.SYD” to the filename.

Output Command executed correctly: OK Delimiter
Command not executed correctly: ER Delimiter

Example:

Input : SYSSAVEM /C0/DIR01/SYSDAT1.SYD Delimiter
This example saves the system data as the file “SYSDAT1.SYD” in Memory Card 0 directory DIR01.
Output : OK Delimiter

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UNITDATA

Function 1.....Reads settings parameters and measurement values for the unit set to the current scene.

Input UNITDATA <Unit number> <Data type> Delimiter

- Specify the desired unit (0 to 9999).
- The data type will depend on the processing item for the specified unit.

* For details, refer to the “External Reference Table” for the processing item registered for the selected unit.

SECTION 2 Processing items Setting Procedure

Output Command executed correctly: Value Delimiter
OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : UNITDATA 5 0 Delimiter
This example reads the judgement results for pattern inspection.
Output : 0 Delimiter
OK Delimiter

Function 2..... Sets the parameters for the unit set to the current scene.

Input UNITDATA <Unit number> <Data type> <Parameter> Delimiter

- Specify the desired unit (0 to 9999).
- The data type will depend on the processing item for the specified unit.

* For details, refer to the “External Reference Table” for the processing item registered for the selected unit.

SECTION 2 Processing Items Setting Procedures

Output Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : UNITDATA 5 516 100 Delimiter
In this example, the model position upper left X coordinate for region 0 for pattern inspection is set to 100.
Output : OK Delimiter

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UNITDAT2

Function 1..... Reads the character string for QUEST character verification.

Input UNITDAT2 <Unit No.> <Data type> <Parameter> Delimiter

- Specify the desired unit (0 to 9999).
- For information on data type, refer to “External Reference Table” of QUEST Character Verification.

SECTION 2, 3. Measurement, “Quest Character Verification”

Output

Command executed correctly: Value Delimiter

OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : UNITDAT2 7 979 Delimiter

This example shows how to read the inspection character string for QUEST character verification.

Output : AAA Delimiter

OK Delimiter

Function 2..... Sets character string for QUEST character verification.

Input UNITDAT2 <Unit No.> <Data type> <Character string> Delimiter

- Specify the desired unit (0 to 9999).
- For information on data type, refer to “External Reference Table” of QUEST Character Verification.

SECTION 2, 3. Measurement, “Quest Character Verification”

Output

Command executed correctly: OK Delimiter

Command not executed correctly: ER Delimiter

Example:

Input : UNITDAT2 7 979 ABC Delimiter

This example shows how to set the character string “ABC” for QUEST character verification.

Output : OK Delimiter

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VERGET --- VERsion GET ---

Function.....Obtains the system's version information.

Input	VERGET Delimiter	
Output	Command executed correctly:	Version information Delimiter
		OK Delimiter
	Command not executed correctly:	ER Delimiter

Example:

Input : VERGET Delimiter
System version information is read.
Output : F500-UM Ver.1.00 2003/02/01 12:00 Delimiter
: OK Delimiter
In this example, the Application Software is the F500-UME, the software version is 1.00, and the creation date is 01.02.03 at 12 noon.

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Output format normal serial interface

When [Normal data] is set to a unit, the measurement results are output by output number in ascending order.
Measurement results are output using normal communications when the communications mode is set to [Menu operation].

Outputting ASCII Data

■ Output format

<Data 0 measurement>, <Data 1 measurement> ...<Data 7 measurement> Delimiter

CHECK! Settings such as the data format, number of digits, and data delimiter can be changed as necessary. The following table shows the default settings.
SECTION 2, 6.5 Normal data

■ Condition Settings

Setting data	Setting
Output form	ASCII
Digits of integer	8 digits
Digits of decimal	3 digits
Minus	-
Field separator	Comma
Record separator	Delimiter
0 suppress	OFF (Spaces are inserted in empty digits.)

Example: 12345.678 , 567.321 , - 76.912 , ---------- , 65987.165 Delimiter

- Data 0 measurement
- Data 1 measurement
- Data 2 measurement
- Field separator
- Data 7 measurement
- Record separator

CHECK! The field separator is required in order for the output to continue to the next data field.

- Digital Output Range

  -9,999,999.999 ≤measurement ≤9,999,999.999

  The minimum value of 9,999,999.999 will be output for measurements less than -9,999,999.999.

  The maximum value of 9,999,999.999 will be output for measurements greater than 9,999,999.999.

- The following values are output when JG (Judgement) has been set:

  OK: 0

  NG: -1

CHECK! After measurements have been made in Run Mode, the data up through the last measurement will be output even if the mode is changed to another mode. The data output will not be interrupted midway.

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Outputting Binary Data

The measurement data is multiplied by 1,000 and then output consecutively using four bytes for each data element.

Negative numbers are output as 2's complements.

For 2's complements

SECTION 7 Appendix, "Terminology"

■ Output format

<Data 0×1,000> <Data 1×1,000> … <Data 7×1,000>

4 bytes 4 bytes 4 bytes

■ Condition Settings

Setting data	Setting
Output form	Binary
Digits of integer	Setting these conditions is not required. They are for ASCII output only.
Digits of decimal	
Minus	
Field separator	
Record separator	
0 suppress	

Example:

This example shows an example data output when data 0 is 256.324 and data 1 is -1.000.

$00	$03	$E9	$44	$FF	$FF	$FC	$18

Data 0: 256324 (256.324×1,000)

Data 1: -1000 (-1.000×1,000)

CHECK!

Unlike ASCII, no field or record separators are output to separate the data for binary output

SECTION 2, 6.5 Normal data

- Digital Output Range

  -2147483.648 ≤measurement ≤2147483.647

  The minimum value of 2,147,483.648will be output for measurements less than -2,147,483.648.

  The maximum value of "2,147,483.647" will be output for measurements greater than 2,147,483.647.

- The following values are output when JG (Judgement) has been set:

  OK: 0

  NG: -1000 (-1 × 1000)

CHECK!

After measurements have been made in Run Mode, the data up through the last measurement will be output even if the mode is changed to another mode. The data output will not be interrupted midway.

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Host Link Serial Interface

This section explains the required communications specifications settings and I/O format when using the Controller's serial interface (RS-232C/RS-422) to communicate with an external device, such as a Programmable Controller (PLC).
Ethernet connections cannot be used.

- List of Commands 2
- Setting Communications Specifications 3
  - Setting Method 4
  - Operational Flowcharts 6
- Input Format (Host Link) 9
- Output Format (Host Link) 14
- Sample Ladder Program 17

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List of Commands

The following commands can be input from the host computer to the Controller.
Specify the command to be executed in the Programmable Controller's Read Area.

- Commands that Control Controller Operations

  Use the following commands to execute operations in the Controller, such as executing measurements and switching scenes.

Command code	Function	Page
0010	Executes one measurement.	9
0011	Starts continuous measurement.	9
0012	Stops continuous measurement.	9
0020	Switches the scene number to the specified scene number.	10
0021	Increments (+1) the scene number being used.	10
0022	Decrements (-1) the scene number being used.	10
0030	Switches the scene group number to the specified scene group number.	11
0031	Increments (+1) the scene group number being used.	11
0032	Decrements (-1) the scene group number being used.	11
0040	Registers the model again.	12
0066	Saves the current scene group data and system data that is being used.	12
0092	Resets the Controller.	12

- Commands that Read Current Controller Settings

  The Controller settings data can be obtained.

Command code	Function	Page
0023	Reads the scene number currently being used.	10
0033	Reads the scene group number currently being used.	11
1070	Reads the specified unit data.	13

- Commands that Change Controller Current Settings

  Controller settings can be changed and operation controlled from the host while accessing the current settings.

  Measurement region data and expression conditions can be set.

Command code	Function	Page
1060	Sets the specified unit data.	13

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Setting Communications Specifications

If the communications mode is set to [Host link], the Controller can communicate with a host device such as a Programmable Controller (PLC) through its serial interface using the host link protocol.



Host link allows 1:1 connection only. 1:N connection is not supported.
Set the output data using the Host Link data output processing item.
SECTION 2, 6. Host link data

The command reception method varies with the menu mode.

Mode	Details
SET Mode	Command onputs are not received.
MON Mode	Command inputs are received, but the measurement results are not output to external devices. When a command is input to read a set value, the appropriate value will be output.
RUN Mode	Command inputs are received and measurement results are output. After measurements have been made in Run Mode, the data up through the last measurement will be output even if the mode is changed to another mode. The data output will not be interrupted midway.

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Setting Method

■ Setting Communications Speed and Communications Mode

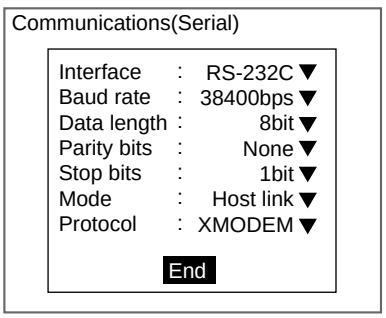
Use the following procedure to set communications specifications such as the baud rate and data length.

Set the same communications specifications in the Controller and the external device.

▶ [System/Communications/Serial]

1. Set each item.

2. Select [End].



Setting data	Selection	
Interface	Select RS-232C. (RS-232C, RS-422 default setting: RS-232C)	
Baud rate (See * 1.)	2400, 4800, 9600, 19200, 38400, 57600, 115200 (default setting: 38400)	Set the same settings that are set in the Programmable Controller.
Data length	7, 8 (default setting: 8)	
Parity bits	None, Odd, Even (default setting: None)	
Stop bits	1, 2 (default setting: 1)	
Mode	Select Host link.	
Protocol (See * 2.)	XMODEM, ZMODEM, M-Link (default setting: XMODEM)	

*1 RS-232C standards are not defined for speeds over 20 kbps. Depending on the cable length, communications may be unreliable at speeds of 38,400 bps and higher when RS-232C is selected. If there are problems with communications, a baud rate of [19,200 bps] or below must be used.

*2 XMODEM (-1K) is not supported.

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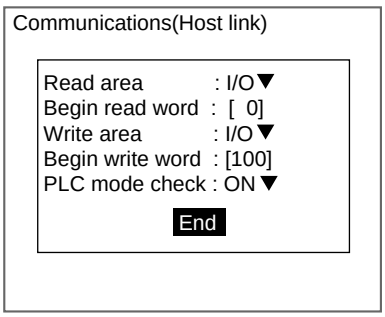
■ Settings Related to the Programmable Controller

Specify the location of the Read Area where the Controller reads commands and the location of the Write Area where the Controller outputs the execution results.

▶ [System/Communications/Host link]

1. Set each item.

2. Select [End].



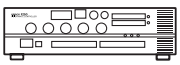
Setting data	Selection	Details
Read area	I/O relay (default setting) HR (hold relay), LR (link relay) DM (data memory) None	The Controller checks the Read Area for commands. If [None] is set, the Controller won't read commands but will receive commands transmitted with the TXD instruction.
Begin read word	0 to 9995 (default setting: 0)	Specify the Read Area's starting word address.
Write area	I/O relay (default setting) HR (hold relay), LR (link relay) DM (data memory) None	The Controller outputs execution results to the Write Area. If [None] is set, the Controller won't write commands.
Begin write word	0 to 9996 (default setting: 100)	Specify the Write Area's starting word address.
PLC mode check	ON (default setting)	The Programmable Controller's operating mode is checked when the Controller enters Monitor Mode or Run Mode. Measurements won't start unless the Programmable Controller is in MONITOR mode. (An error message will be displayed at the Controller.)
	None	When the Controller enters Monitor Mode or Run Mode, a mode change command is sent to the Programmable Controller to switch it to MONITOR mode.

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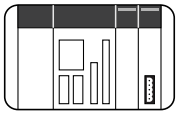
Operational Flowcharts

■ Serial Interface with I/O

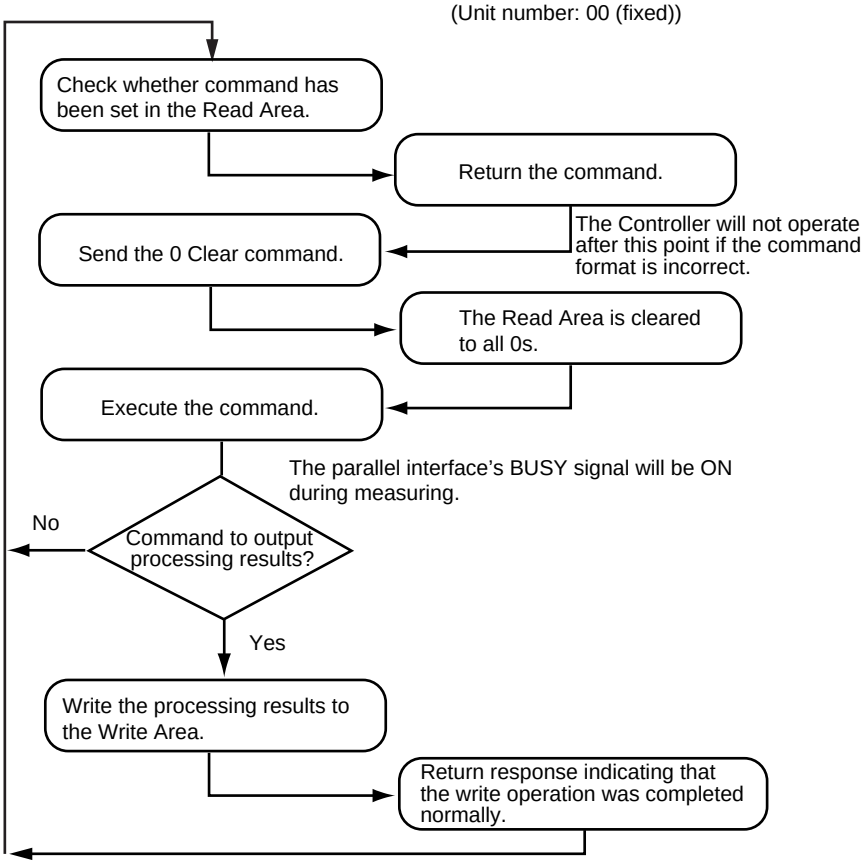
Set the commands in the read area of the Programmable Controller.
The Controller will read the commands directly from the read area.



Controller



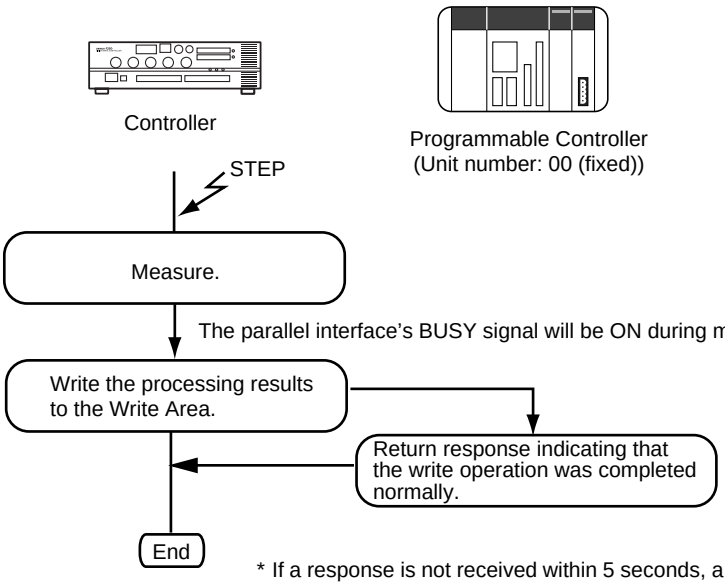
Programmable Controller
(Unit number: 00 (fixed))



* If a response is not received within 5 seconds, a timeout error will occur in the Controller because the Programmable Controller may be disconnected or malfunctioning.
An error message will be displayed on the Controller's screen and the parallel interface's ERR signal will be turned ON.

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■ Inputting the Measurement Trigger from the STEP Signal



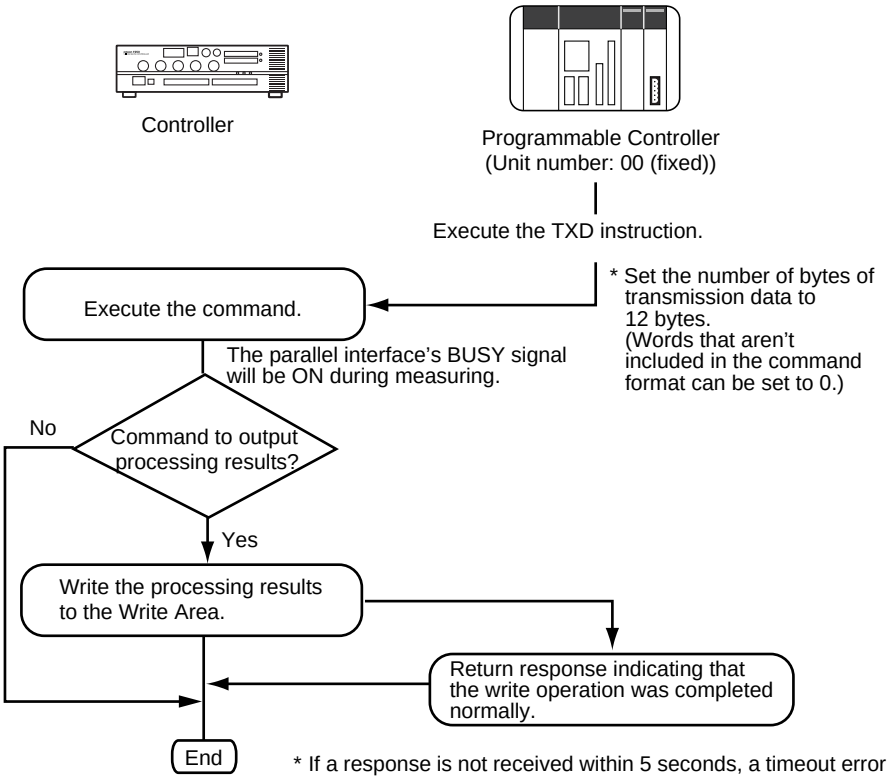
* If a response is not received within 5 seconds, a timeout error will occur in the Controller because the Programmable Controller may be disconnected or malfunctioning.
An error message will be displayed on the Controller's screen and the parallel interface's ERR signal will be turned ON.

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■ Using the TXD Instruction

With this method, the command is not set in the Read Area, it is actively transmitted from the Programmable Controller to the Controller.

Set the [Read area] to [None] in the Communications (Host link) window.



* If a response is not received within 5 seconds, a timeout error will occur in the Controller because the Programmable Controller may be disconnected or malfunctioning.
An error message will be displayed on the Controller's screen and the parallel interface's ERR signal will be turned ON.

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Input Format (Host Link)

The commands are listed in order based on their command code. Commands must be input in BCD code, and set in the Read Area.

0010: One-time Measurement

Executes one measurement.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0001	0000	Command code

For all the bits +1 to +5, set “0”.

Output: The measurement results are output.



Set [Host link data output] to the unit to output measurement results.

SECTION 2, 6.4 Host link data

0011: Start Continuous Measurement

Starts continuous measurement.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0001	0001	Command code

For all the bits +1 to +5, set “0”.

Output: The measurement results are output.



Set [Host link data output] to the unit to output measurement results.

SECTION 2, “6.4 Host link data”

0012: Stop Continuous Measurement

Stops continuous measurement.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0001	0010	Command code

For all the bits +1 to +5, set “0”.

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0020: Switch Scene (Specific Scene Number)

Switches the scene number to the specified scene number.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0010	0000	Command code
+1	0000	0000	1 digit	0 digit	Scene number (00 to 31)

For all the bits +2 to +5, set “0”.

0021: Switch Scene (Increment Scene Number by 1)

Increments the scene number currently being used.

If the current scene number is 31, the scene number will switch to 0.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0010	0001	Command code

For all the bits +1 to +5, set “0”.

0022: Switch Scene (Decrement Scene Number by 1)

Decrements the scene number currently being used.

If the current scene number is 0, the scene number will switch to 31.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0010	0010	Command code

For all the bits +1 to +5, set “0”.

0023: Read Scene Number

Reads the scene number currently being used.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0010	0011	Command code

For all the bits +1 to +5, set “0”.

Write Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	Write flags	0000	0000	0000	Write flag
+1	0000	0000	1 digit	0 digit	Scene number (00 to 31)



Write Flags: Each time data is output, the write flags are switched between “0000” and “1111”.
The status of these bits can be monitored to see when data has been written.

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0030: Switch Scene Group (Specific Scene Group Number)

Switches the scene group number to the specified scene group number.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0011	0000	Command code
+1	0000	0000	1 digit	0 digit	Scene group number (00 to 31)

For all the bits +2 to +5, set “0”.

0031: Switch Scene Group (Increment Scene Group Number by 1)

Increments the scene group number currently being used.

If the current scene group number is 31, the number will switch to scene group 0.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0011	0001	Command code

For all the bits +1 to +5, set “0”.

0032: Switch Scene Group (Decrement Scene Number by 1)

Decrements the scene group number currently being used.

If the current scene group number is 0, the number will switch to scene group 31.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0011	0010	Command code

For all the bits +1 to +5, set “0”.

0033: Read Scene Group Number

Reads the scene group number currently being used.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0011	0011	Command code

For all the bits +1 to +5, set “0”.

Write Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	Write flags	0000	0000	0000	Write flag
+1	0000	0000	1 digit	0 digit	Scene group number (00 to 31)



Write Flags: Each time data is output, the write flags are switched between “0000” and “1111”.

The status of these bits can be monitored to see when data has been written.

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0040: Re-register Model

Re-registers models based on the displayed image. (When the through display is being used, the models will be registered based on the last image that was measured. When using two or more cameras, images will be captured by the cameras and registered for the units except for those specified after the last camera image input.) Re-registers all region models for the relevant unit.



Model re-registration is valid only if model position compensation, circle position compensation, fine matching, pattern inspection, rotation position, or ECM search unit numbers have been specified. Any other specified unit numbers will be ignored.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0100	0000	Command code
+1	0000	0000	1 digit	0 digit	Unit number (00 to 9999)

For all the bits +2 to +5, set “0”.



The model is re-registered for the current Camera image.
If the Camera image or Switch cameras image processing items are set to 2 or more units, use the Up and Down Keys to switch between each input image.
This is only possible when the image size is set to All.

0066: Data Save

Saves the current scene group data and system data that is being used. System data is saved to flash memory, if scene group 0 is the current scene group, scene group data is saved to flash memory. The scene group data is saved to the Memory Card if the current scene group number is between 1 and 31.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	0110	0110	Command code

For all the bits +1 to +5, set “0”.

0092: Reset

Resets the Controller.

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0000	0000	1001	0010	Command code

For all the bits +1 to +5, set “0”.

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1060: Set Unit Data

Sets the specified unit's parameters.

The data type will depend on the processing item for the specified unit. For details, refer to the “External Reference Table” for the processing item registered for the selected unit.

SECTION 2 Processing items Setting Procedure

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0001	0000	0110	0000	Command code
+1	3 digit	2 digit	1 digit	0 digit	Unit number (00 to 9999)
+2	3 digit	2 digit	1 digit	0 digit	Data type (0 to 9999)
+3	3 digit	2 digit	1 digit	0 digit	Setting Data
+4	Sign	10^{6} digit	10^{5} digit	10^{4} digit	
+5	0000	10^{-1} digit	10^{-2} digit	10^{-3} digit	

CHECK!

Sign: Positive (0000) or negative (1111)

1070: Read Unit Data

Reads the parameters and measurement values for the specified unit.

The data type will depend on the processing item for the specified unit. For details, refer to the “External Reference Table” for the processing item registered for the selected unit.

SECTION 2 Processing items Setting Procedure

Read Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	0001	0000	0111	0000	Command code
+1	3 digit	2 digit	1 digit	0 digit	Unit number (00 to 9999)
+2	3 digit	2 digit	1 digit	0 digit	Data type (0 to 9999)

For all the bits +3 to +5, set “0”.

Write Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	Write flags	0000	0000	0000	Write flag
+1	3 digit	2 digit	1 digit	0 digit	Acquired data
+2	Sign	10^{6} digit	10^{5} digit	10^{4} digit	
+3	0000	10^{-1} digit	10^{-2} digit	10^{-3} digit	

CHECK!

Write Flags: Each time data is output, the write flags are switched between “0000” and “1111”.

The status of these bits can be monitored to see when data has been written.

Sign: Positive (0000) or negative (1111)

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Output Format (Host Link)

When Host link data output is set for a unit, the measurement results are output in order from the smallest output number.

The measurement results are output in BCD code to the Write Area in the Programmable Controller.

Each time that data is output, these bits (write flags) are switched between “0000” and “1111”.
If you monitor the status of these bits, you can check whether the measurement results have been written.
Since these bits are set to “1111” after the first measurement, set “0000” and save them as the default settings.

Write Start CH	Bits				Setting
	15 to 12	11 to 8	7 to 4	3 to 0	
+0	Write flags	0000	0000	0000	Write flag
+1	3 digit	2 digit	1 digit	0 digit	Measurement result
+2	Sign	10^6 digit	10^5 digit	10^4 digit	
+3	0000	10^{-1} digit	10^{-2} digit	10^{-3} digit	

0000: Positive
1111: Negative

Digital Output Range

-9,999,999.999 ≤measurement ≤9,999,999.999

The minimum value of 9,999,999.999 will be output for measurements less than -9,999,999.999.

The maximum value of 9,999,999.999 will be output for measurements greater than 9,999,999.999.

The following values are output when JG (Judgement) has been set:

OK: 0.000

NG: -1,000

CHECK!

After measurements have been made in Run Mode, the data up through the last measurement will be output even if the mode is changed to another mode. The data output will not be interrupted midway.

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Example 1: This example shows the data output when the data 0 measurement is 143.250, data 1 is not set, and the data 2 measurement is -6,943.298.

	Write start CH	Bits				Setting
		15 to 12	11 to 8	7 to 4	3 to 0	
Data 0	+0	0000	0000	0000	0000	Write flags (0000)
	+1	0000	0001	0100	0011	Four lowest integer digits
	+2	0000	0000	0000	0000	Sign and two highest integer digits
	+3	0000	0010	0101	0000	Decimal point
Data 2	+4	0000	0000	0000	0000	Write flags (0000)
	+5	0110	1001	0100	0011	Four lowest integer digits
	+6	1111	0000	0000	0000	Sign and two highest integer digits
	+7	0000	0010	1001	1000	Decimal point



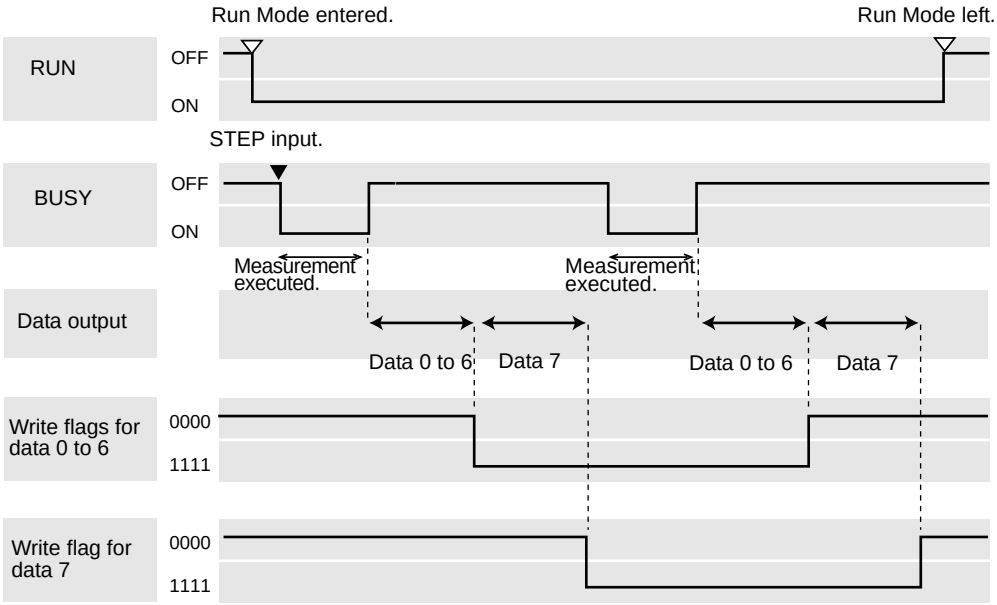
Output numbers that have not been set, such as data 1 in the example above, are omitted from the data output.

Example 2: This example shows the data output when expressions are set for data 0 to 7.
The results for up to 7 data elements can be output at one time.
If 8 or more output numbers have been set, the data will be output in groups of 7 elements max.
The results for data 0 to data 6 are output the first time and the results for data 7 are output the second time.

	Write Start CH	Bits				Setting
		15 to 12	11 to 8	7 to 4	3 to 0	
First Time (Data 0 to 6)	+0	0000	0000	0000	0000	Write flags (0000)
	+1	0000	0001	0100	0011	Measurement result
	+2	0000	0000	0000	0000	
	+3	0000	0010	0101	0000	
	. . .					
	+(4×n)+0	0000	0000	0000	0000	Write flags (0000)
	+(4×n)+1	0110	1001	0100	0011	Measurement result
	+(4×n)+2	1111	0000	0000	0000	
	+(4×n)+3	0000	0010	1001	1000	
	. . .					
Second Time (Data 7)	+28	1111	0000	0000	0000	Write flags (1111)
	+29	0000	0001	0110	0011	Measurement result
	+30	0000	0000	0000	0000	
	+31	0000	0010	0101	0000	

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The data and write flags are output at the timing shown in the following time chart. The write flags are updated when the corresponding data is output.



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Sample Ladder Program

This sample program is compatible with OMRON C200H, C200HS, and CQM1 Programmable Controllers.
The Controller inputs a measurement command from the Programmable Controller's Read Area and outputs the judgement results to the Programmable Controller's Write Area.

Programmable Controller Settings

The following communications conditions are set for the Programmable Controller's host link port. This port may be in the Programmable Controller's CPU Unit or a Host Link Unit.
Refer to the Programmable Controller's Operation Manual for details on setting the host link communications parameters.

Setting data	Setting
Communications mode	SYSWAY (Host Link)
Connection (1:1 or 1:N)	1:N connection
Unit number	00
Baud rate	Same as the settings in the Controller.
Data length	
Parity bits	
Stop bits	

Controller Settings

- Setting communication specifications

Setting data	Setting
Baud rate	Same as the settings in the Programmable Controller
Data length	
Parity bits	
Stop bits	
Read area	DM
Begin read word	0100
Write area	DM
Begin write word	0106

- Host Link Data Output Settings

If the following is set for the unit,

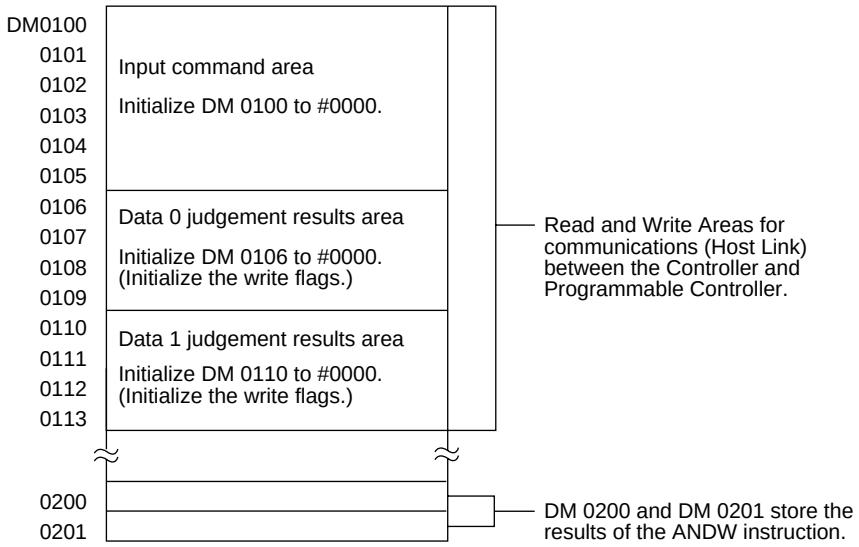
0. Camera image
1. Pattern inspection
2. Host link data

make sure that the following expressions are set for data 0 and 1 of [Host link data].

Data 0: U1.R00JG
Data 1: U1.R01JG

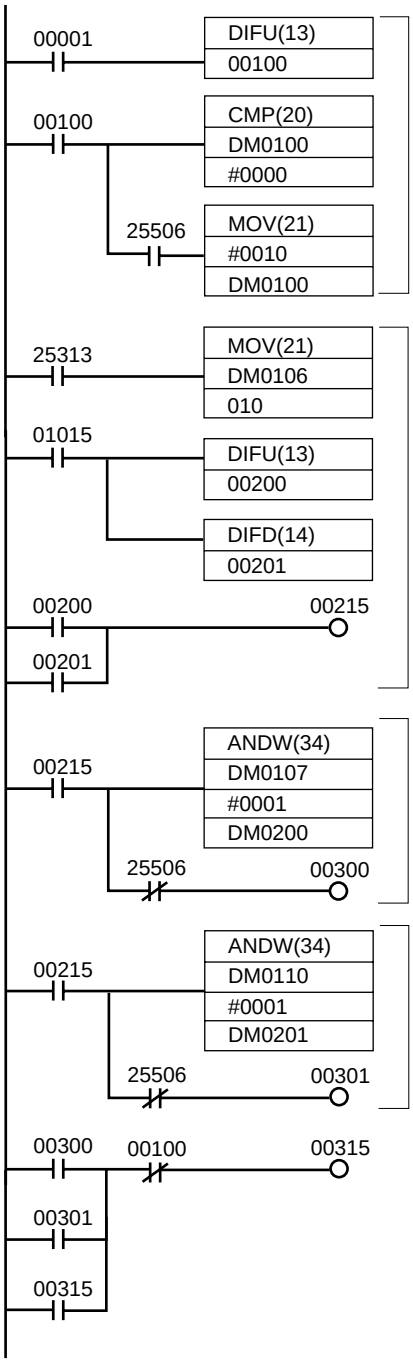
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DM Area Allocation in the Programmable Controller



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Ladder Program



When the external switch (IR 00001) goes from OFF to ON, the measurement command (0010) is written to the input command area if the area was cleared to 0000.

Detects a change in the status of the data 0 write flags.

If the first digit of the data 0 judgement result is equal to 1, IR 00300 is turned ON to indicate an NG (no good) result.

If the first digit of the data 1 judgement result is equal to 1, IR 00301 is turned ON to indicate an NG (no good) result.

The NG results for data 0 and data 1 are ORed and the result is output to IR 00315. This result is maintained until the next measurement.

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Serial Interface Menu Operations

This section describes how to operate controller's menus via a computer. Codes and keys that correspond to console keys can be entered via a serial interface (RS-232C/422 or Ethernet).

The interface that can be connected varies with the controller model.



Using This Manual, "Functions Available for Each Controller Model"

Setting Communications Specifications 2

- Setting Method 2
- Key Input and Console Key Correspondence 4
- Inputting Characters from the Computer 4

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Setting Communications Specifications

Set the same communications specifications in the Controller and the external device. If the Normal data processing item has been set for a unit, the measurement results will be output in normal (no-protocol) format even if Menu Operation has been selected for the mode. Xon/Xoff flow control cannot be used because the codes for the Ctrl + S and Ctrl + Q key inputs are the same as those for Xon/Xoff.

CHECK!

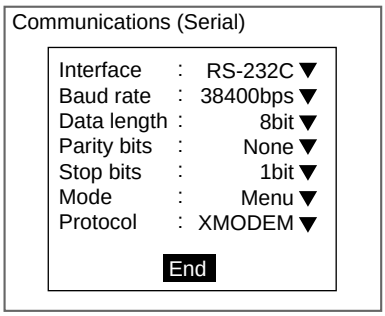
Menu operations allow 1: 1 connection only. 1: N connection is not supported.

Setting Method

▶ [System/Communications/Serial]

1. Set each item.

2. Select [End].



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- Communication Settings (for RS-232C/422)

Setting data	Selection	
Interface	Select RS-232C. (RS-232C, RS-422 default setting: RS-232C)	
Baud rate (See note 1.)	2400, 4800, 9600, 19200, 38400, 57600, 115200 (default setting: 38400)	Set the same settings that are set in the personal computer.
Data length	7, 8 (default setting: 8)	
Parity bits	None, Odd, Even (default setting: None)	
Stop bits	1, 2 (default setting: 1)	
Mode	Select Menu.	
Protocol	This item is not used during the Menu Operation mode.	

*1: RS-232C standards are not defined for speeds over 20 kbps. Depending on the cable length, communications may be unreliable at speeds of [38,400 bps] and higher when RS-232C is selected.If there are problems with communications, a baud rate of [19,200 bps] or below must be used.

- Communication Settings (for Ethernet*/USB)

* F250 F270

Setting data	Selection
Interface	Not used. (Any settings will be ignored.)
Baud rate	
Data length	
Parity bits	
Stop bits	
Mode	Select [Menu].
Protocol	This item is not used during the [Menu] mode.

CHECK!

To exit an Ethernet connection, set [Mode] to [Normal] and use the normal command to enter [EXIT].

SECTION 6, 2. Serial Interface Menu Operations, “Input Format (Normal)”

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Key Input and Console Key Correspondence

Console Key	Input from RS-232C	
	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)
←	CTRL+S	($13)
↑	CTRL+E	($05)
→	CTRL+D	($04)
↓	CTRL+X	($18)
SHIFT + ←	CTRL+F	($06)
SHIFT + ↑	CTRL+W	($17)
SHIFT + →	CTRL+H	($08)
SHIFT + ↓	CTRL+Z	($1A)

Console Key	Input from RS-232C		
	Key	Code	
F1	CTRL+C	($03)	
F2	CTRL+V	($16)	
F3	CTRL+B	($02)	
F4	CTRL+N	($0E)	
F5	CTRL+J	($0A)	
F6	CTRL+K	($0B)	
F7	CTRL+L	($0C)	
F8	CTRL+O	($0F)	
F9	CTRL+P	($10)	
–	CTRL+Q	($11)	*

* Changes the serial interface input to normal (no-protocol) mode. This input is valid only in Monitor Mode and Run Mode.

Inputting Characters from the Computer

The computer can be used to input filenames and comments that will be displayed on-screen. Japanese characters can be input as comment. (Only characters of JIS level-1 can be input.)

Characters can be input only when the software keyboard is being displayed on the Controller's screen.

Enclose the input characters within double quotation marks.

Example: "LABEL"

CHECK! Characters can be input in normal (no-protocol) mode.

CHECK! The following characters cannot be used:
\ / : , ; * ? " < > | &

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Communication with Vision Composer Net

ETN

This section describes how to make communication settings required to operate the controller from Vision Composer Net.

Ethernet Connections 2

- Setting the Network Properties 2
- Checking the Connection Status 3
- Changing the Displayed Image Quality 4

Wiring Method

Setup Manual (Supplied with the Controller)

Network Configuration Setting Procedure and Controller Connecting Method

Vision Composer Net Operation Manual (Supplied with Vision Composer Net)

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Ethernet Connections

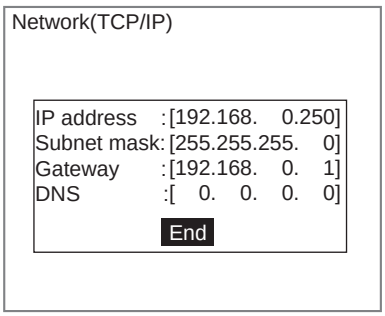
Setting the Network Properties

This section describes how to make settings (e.g. IP address assignment method) required to make connection with the network.

▶ [SYS/Network/TCP/IP]

1. Set each item.

2. Select [End].



Setting data	Selection
IP address	Make sure to set an IP address that is not used for any other devices within the network. Use of a Class C private IP address (192.168.0.1/16) enables connection of up to 254 devices (192.168.0.1 to 192.168.0.254) to the network. The default IP address is “192.168.0.250”.
Subnet mask	Set the same subnet mask as that for the network. If a Class C private IP address is used, set “255.255.255.0” as the subnet mask.
Gateway	Set the default gateway. For the gateway address, check with the network administrator.
DNS	Set the address for the DNS server. For the DNS server address, check with the network administrator.

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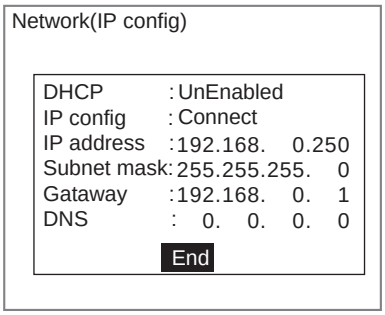
Checking the Connection Status

This section describes how to check the network connection status.

▶ [SYS/Network/IP config]

1. The setting items will be displayed.

2. Select [OK] to exit this screen.



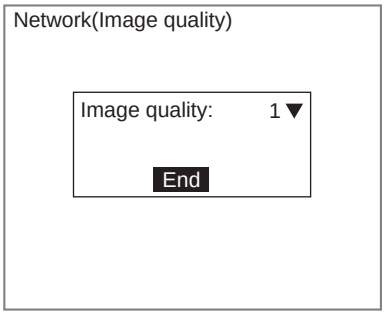
Setting data	Details
DHCP	Unenabled
IP status	Connect: The controller is connected to the network and communications are carried out correctly. Disconnect: The controller is not connected to the network. Collision: Another device with the same IP address as that of the controller exists on the network.
IP address	The IP address set for [Network(TCP/IP)] is displayed.
Subnet mask	The subnet mask set for [Network(TCP/IP)] is displayed.
Gateway	The IP address set for [Network(TCP/IP)] is displayed.
DNS	The address set for [Network(TCP/IP)] is displayed.

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Changing the Displayed Image Quality

This section describes how to set the quality of the monitor image displayed on Vision Composer Net.

▶ [SYS/Network/Image quality]



1. Set each item.

2. Select [End].

Setting data	Selection	Details
Image quality	0 Best 1 2 3 4 Fast	Set the quality of the image displayed on Vision Composer Net. The relationship between display speed and quality of the monitor image is given below. Fast — Best Speed: Fast ⟷ Slow Quality: Coarse ⟷ Fine

CHECK! Select [Fast] if the network is under excessive load and Vision Composer Net does not respond fast enough.

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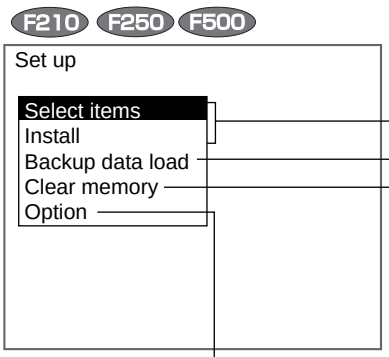
SECTION 7
Appendix

- Set Up Menu 2
- Measuring Mechanism 5
  - Density Image Measurement 5
  - Binary Image Measurement 9
  - EC (Edge Code) Image Measurement 11
  - Coordinate Handling Method 15
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- Version-up Information (Ver.2.1 to Ver.3.0) 37
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Set Up Menu

This section gives a general description of the Setup menu of the Application Software. For detailed information, refer to the pages in this manual where a detailed description of each item can be found.



This section describes how to install the processing items in the Application Software to the Controller.

SECTION 1 Basic Operating Procedures, "Installing the Application Software"

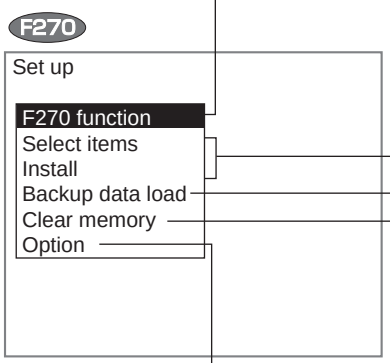
Loads flash memory backup data saved on the Memory Card.

SECTION 4 Other Functions, "Backing Up Settings"

Clears all Controller settings and returns to default settings.

Selects which you use the macro function.

SECTION 1 Basic Operating Procedures, "Installing the Application Software"



When F270 is used, the functions that can be used vary with controller model: 1-line fast mode, 2-line random trigger mode, Nonstop adjust mode
It is possible to select a mode suitable for your purpose from the three modes.

SECTION 1 Basic Operating Procedures, "Installing the Application Software"

This section describes how to install the processing items in the Application Software to the Controller.

SECTION 1 Basic Operating Procedures, "Installing the Application Software"

Loads flash memory backup data saved on the Memory Card.

SECTION 4 Other Functions, "Backing Up Settings"

Clears all Controller settings and returns to default settings.

Selects which you use the macro function.

SECTION 1 Basic Operating Procedures, "Installing the Application Software"

CHECK!

Installs processing items in the F500-UME to the Controller.

SECTION 1 Basic Operating Procedures, "Installing the Application Software"

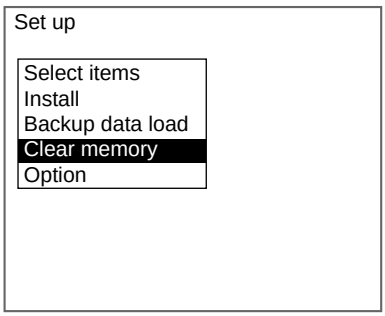
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Clearing Memory

The Clear Memory processing item clears all Controller settings and returns to the default settings. Any installed processing items will also be cleared.

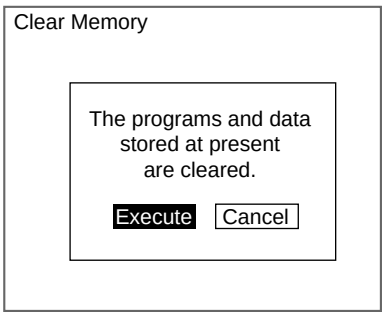
▶ Setup menu

1. Start the setup menu and select [Clear memory].



A confirmation message will be displayed.

2. Select [Execute].



CHECK! Do not turn OFF the power or input a RESET signal while a message indicating that processing is in progress is being displayed. Data in memory will be destroyed, and the Controller may not operate correctly the next time it is started.

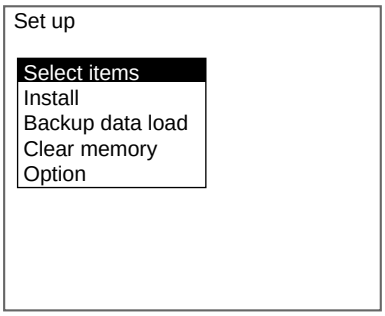
All settings will be cleared and the screen in **1.** will return.

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Checking the Setup Menu Version

▶ Setup menu

1. Press the SHIFT+ESC Keys at the basic Setup Menu Screen.



The Setup Menu version information will be displayed.

2. Press the ENT Key.



The screen in **1.** will return.

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Measuring Mechanism

This software provides various processing items so that you can choose according to your application. The processing mechanism and parameters that are common to some processing items are described in this section.

CHECK!

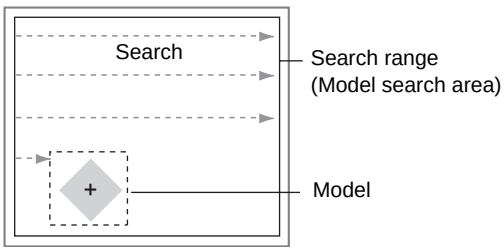
Parameters that can be set vary with processing items. To check whether parameters can be set or not, refer to “SECTION 2 Processing items Setting Procedure”.

Density Image Measurement

Density images are the gray images of 256 gradations read by the Camera. This section describes the measurement method for these density images. Typical processing items include Density Defect Inspection, Pattern Inspection, Gray Search and Rotation Search.

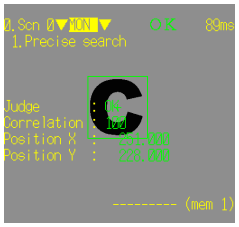
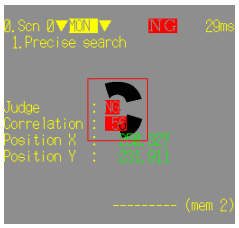
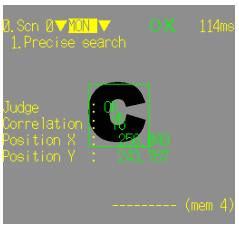
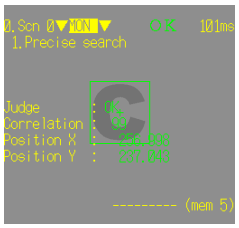
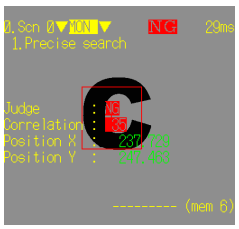
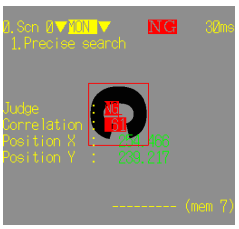
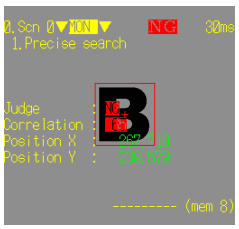
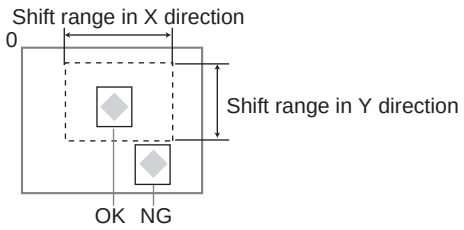
■ Search

This search function searches that part of the input image which most resembles the reference image pattern that has been registered as a model. Since the degree of similarity is indicated by a correlation value, inspection of chipping and foreign matter can be performed. Furthermore, the position (X, Y) where the model is found is output, enabling this function to be used for positioning purposes.



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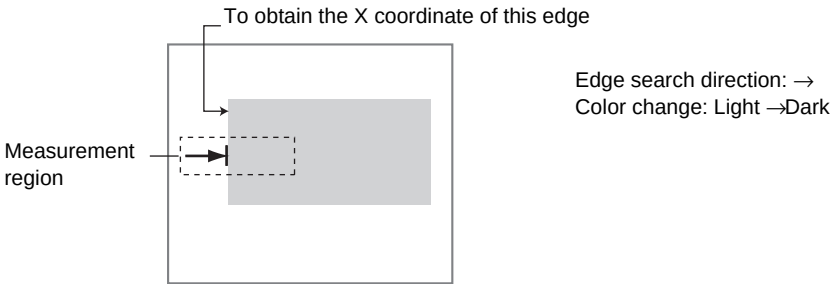
Related parameters

Item	Details
Correlation value	The correlation value decreases if the searched image is partially chipping or it is deformed. Example: Model image  When the image is chipping partially  Correlation: 56 When the pattern line is thick  Correlation: 76 When the image is not dark enough  Correlation: 99 When the image is slightly larger than the model image  Correlation: 35 When the image is rotated by 90 degrees  Correlation: 61 When the shape is different  Correlation: 65 * The above are judgement examples when “70” is set.
Position X, Y	Set the acceptable shift range. 

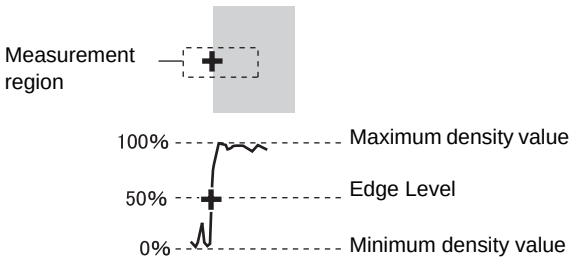
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■ Edge Detection

Edges can be detected using density change in the measurement region. Set the edge detection direction and the color change as the detection conditions.



Related parameters

Item	Details
Edge Level	Set the density change level that will indicate the edge. If edges cannot be detected, adjust this level. Edges are normally detected as follows: 1. The density distribution of the whole measurement region is calculated. 2. The density difference between the lowest and highest density values becomes 100% The point where the edge level density change is detected becomes the edge. 

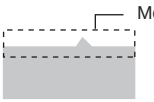
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■ Defect Detection

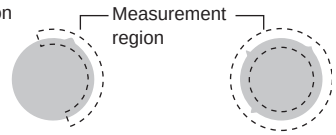
The controller inspects density variations to detect defects (scratches and dirt).

For this, the background must be uniform. Scratches and dirt on patterns or marks cannot be detected.

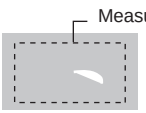
Detection of chipping and burr on straight lines



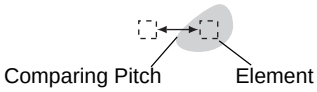
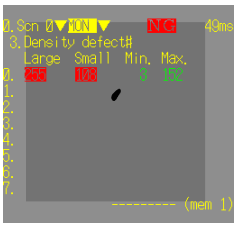
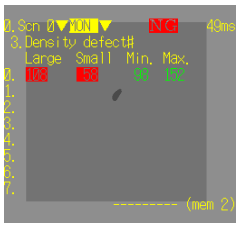
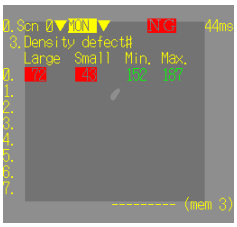
Detection of chipping and burr on the circumference



Detection of scratches and dirt inside the measurement region



Related parameters

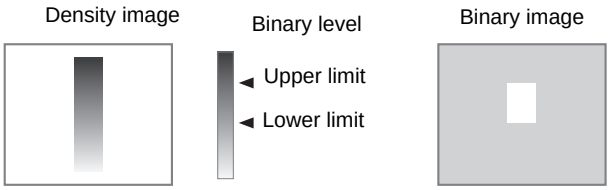
Item	Details
Defect level	Boxes that are created automatically inside the measurement region are called elements. The average density is calculated for each element. The positions of defects are detected by comparing the average density of the element with those of surrounding elements and by judging the differences in densities.  Example: Strong dirt  Large defect level: 255 Small defect level: 108 Weak dirt  Large defect level: 108 Small defect level: 58 White dirt  Large defect level: 72 Small defect level: 43 * The above are judgement examples when “30” is set.

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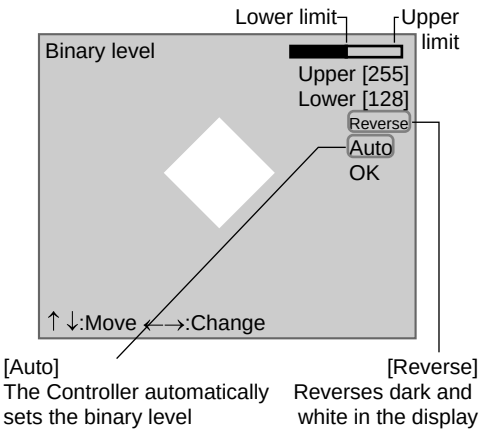
Binary Image Measurement

256-gradation images read by the camera are converted into binary black-and-white images and measurement is performed on the white pixels only.

Upper and lower threshold values (binary levels) are set and the parts of the density image that fall within that gradation range are converted to white pixels and the rest are converted to black pixels. Typical processing items include Binary Defect Inspection and Labeling.



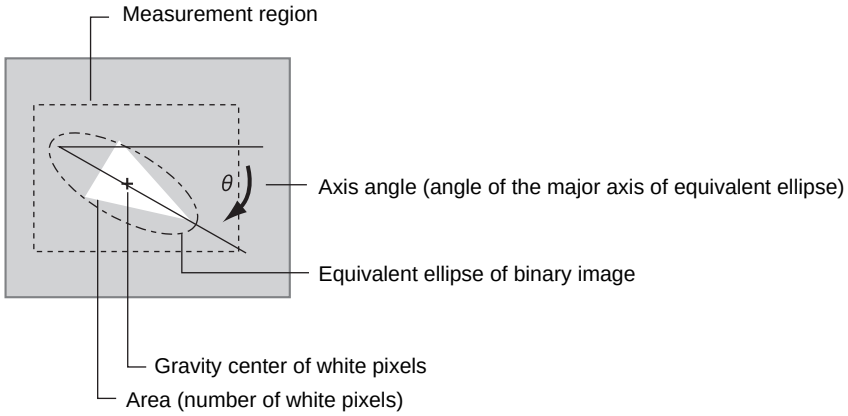
Related parameters

Item	Details
Binary level	Set the level for converting 256-gradation images into binary images. Adjust the binary level so that the object is displayed as white pixels. It is also possible to set the binary level so that measurement is performed only for an intermediate density range. 

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■ Center of Gravity, Area, Axis Angle

The gravity center, area and axis angle of the white pixel area inside the measurement region are measured.

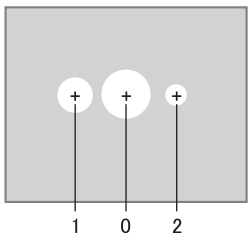


■ Labeling

The processing that assigns a label (0, 1, 2, ...) to each block of white pixels on binary images is called labeling.

The Labeling processing item counts how many labels there are in a measurement region and calculates the area and center of gravity for the specified label number.

Example: Sorting in area descending order

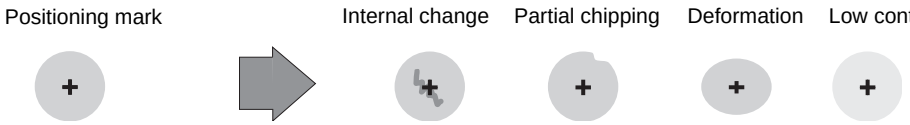


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EC (Edge Code) Image Measurement

The positions where the brightness changes are extracted as edges and the directions of the changes in brightness are found. These edges are called edge codes. This section describes the measurement method for these EC images.
This method reduces influences of deformation and dirt since shapes (circle, box) are searched according to blocks of edges codes. Typical processing items include EC Positioning and EC Defect Inspection.

Shapes can be detected even in the cases given below.



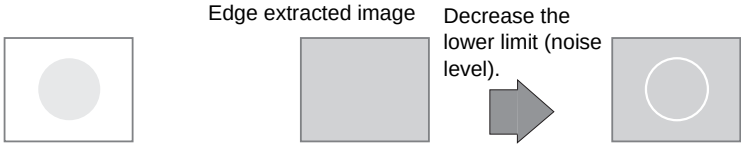
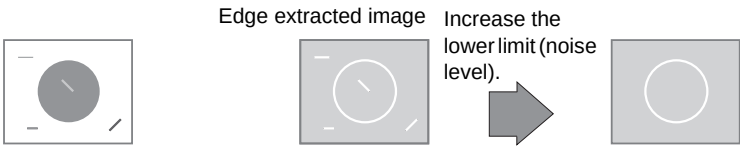
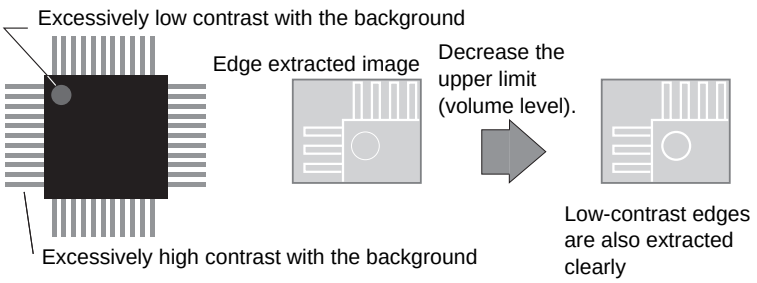
■ Edge detection level

EC image measurement is performed for images for which the edges have been extracted.

Adjust the upper and lower levels for edge extraction if there is low contrast between the measurement object and the background and to remove noise. Edges above the upper limit (volume level) are processed as the maximum density (255), and those below the lower limit (noise level) are eliminated as noise (minimum density: 0). Edges between the upper and lower limits are normalized to density levels 0 to 255.

CHECK!

Density levels 0 to 255 for edge detection level express “edge strength”. They do not correspond to densities of the row image.

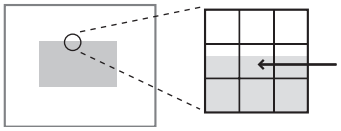
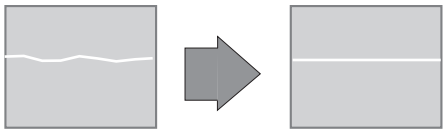
Example:	Details
When no edges can be detected due to excessively low contrast	
When you want to eliminate noise	
When the edges of the desired mark cannot be detected stably, though the other edges are extracted clearly	

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CHECK!

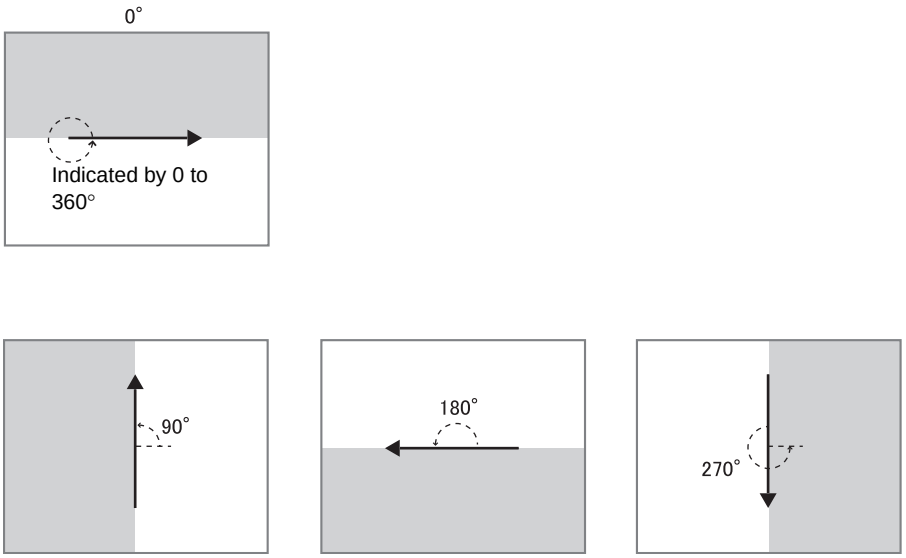
If the lower limit is too low, low-level noise may remain even if the image appears noise-free on the screen. If unwanted edges are displayed when the upper limit is decreased to the lower limit, the lower limit is too low. Increase the lower limit, or use smoothing or median filtering. (Return the upper limit to its original value after completing this check.)

Related parameters

Item	Details
Mask Size	The mask size function is used when searching for edges to judge edges using peripheral information. Example: 3 × 3  Judgement as to whether or not the center coordinate is an edge is made based on the information of its surrounding nine pixels. (1 block = 1 pixel) The greater the mask size, the more the variations in surrounding pixels can be absorbed. 

■ Edge Code Angle

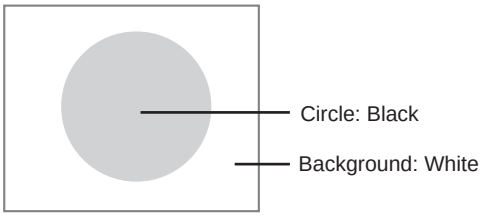
The way in which black and white meet determines the direction of an edge code, and the angle is calculated as shown below.



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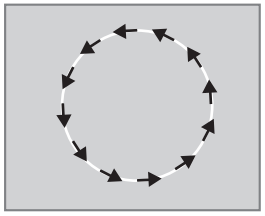
■ Circle Extracting Algorithms Using Edge Codes

Original image



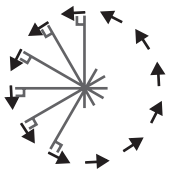
① An edge code image is created.

Edge codes indicate the directions of edges (arrows in the following diagram).
If the circle is white and the background is black, the arrows will be in the opposite direction.



② The center of the circle is found.

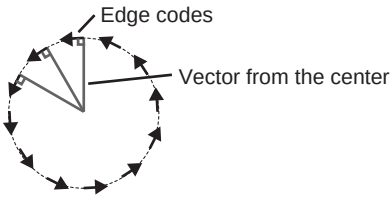
The center of the circle is located at 90° to the left of each edge code. Since the center of the circle is found by projection from each edge code, the approximate center of the circle can be found even if the shape is not a perfect circle (e.g. distorted or chipped).



③ Edge points on the circumference are found.

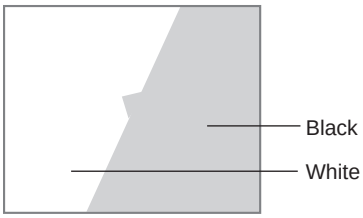
Points that fulfill the following two conditions are assumed to be edges on the circumference.

- The point is within a fixed distance range from the center.
- The edge code is at 90° from a vector from the center. Thus, edge codes where noise is present will be ignored.



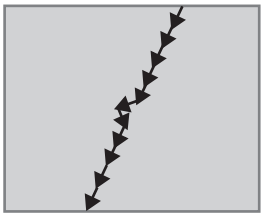
■ Line Extracting Algorithm Using Edge Codes

Original image



① An edge code image is created.

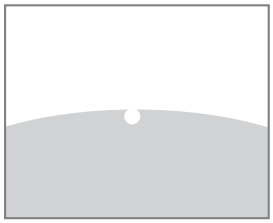
Edge codes indicate the directions of edges (arrows in the following diagram).
The arrows will be in the opposite direction if the colors (white, black) are reversed.



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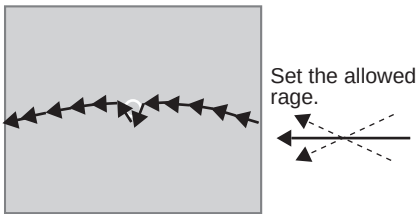
■ Oriented Line Extracting Algorithm Using Edge Codes

Original image



① An edge code image is created.

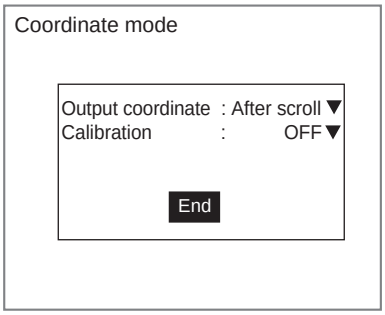
Points whose edge codes are within the allowed rage will be assumed to be edges on a straight line.



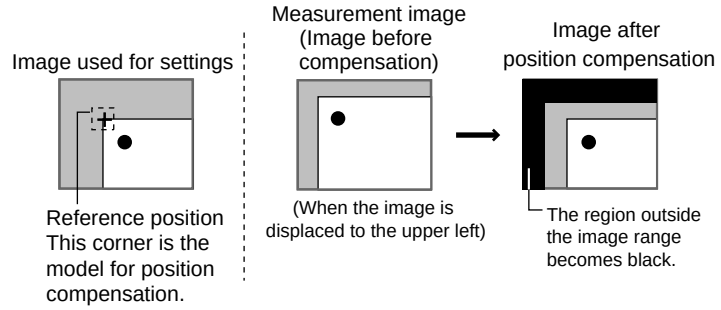
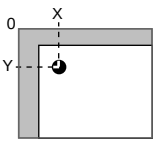
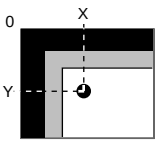
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Coordinate Handling Method

The processing which outputs the coordinate values as measurement results offers “coordinate mode” that allows selection of coordinate handling method.



Related parameters

Item	Selection	Details
Output coordinates		Select the type of coordinates to be output to external devices. Example: 
	Before scroll	Outputs the coordinates in effect before position compensation. (The display set under [SYS/ Conditions/Display settings] will be effective.) 
	After scroll (default setting)	Outputs the coordinates in effect after position compensation. (The display set under [SYS/ Conditions/Display settings] will be effective.) 
Calibration	ON	Outputs the coordinates that have been set by calibration.
	OFF (default setting)	Outputs the camera’s coordinates.

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Troubleshooting

This section lists the errors that may be displayed on the screen, along with their probable causes and remedies.

ERR When the error messages marked with an asterisk are displayed, the ERR signal will come ON at the parallel interface.

Error message	Causes and remedies
A part of the region is outside the screen.	Draw the region so that it fits on the screen.
APPLICATION ERROR	Flash memory backup data saved on a higher-level model was loaded. Restart the setup menu and either load backup data suitable for the Controller that is being used or reinstall the software.
Background must not be same color as Normal.	Change one of the colors. SECTION 5 System Settings Screen Display and Monitor
BATTERY LOW	The battery volume (for date and time data backup) is low. The battery must be replaced. Contact your OMRON representative.
Calculated magnification highers. Correct magnification range: 0.01 to 9.999	Change the magnification (unit) of the actual coordinates to be entered by points or sampling. Reason: The Camera magnification is not between 0.00100 and 9.99999. SECTION 2, 1.1 Inputting Camera Images, “Inputting Camera Images”
Calculated magnification lowers.	
Calibration failed.	Perform sampling in at least 2 places. Reason: Sampling or specifying points has only been performed once. SECTION 2, 1 Inputting Camera Images, “Camera Settings”
	Perform sampling in 3 places, including X and Y directions or specify a point. Reason: 3 places are specified in a solid line in one direction, X or Y. SECTION 2, 1 Inputting Camera Images, “Camera Settings”
Camera connection is incorrect.* ERR	• Are the Camera Cables connected to the Controller? • Is the Camera Cable disconnected from the Camera? • Is the setting correct under [Camera image/Camera settings] or [Switch camera/Camera settings]? SECTION 2, 1 Inputting Camera Images, “Selecting the Camera” SECTION 2, 2 Switch Camera, “Selecting the Camera” Check the settings under [SYS/Camera settings] then restart the Controller. SECTION 5 System Settings, “Camera Settings”
Cannot access this file.	Check the following points and re-select a file. • Is the file read-only? • Is Japanese used in the file name? • Does the Memory Card have sufficient space to save the file?

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Error message	Causes and remedies
Cannot capture display during last NG display.	Check the image status setting under [SYS/Conditions/Display setting]. Reason: Either [Last NG (before scroll)] or [Last NG (after scroll)] is selected under Image status. SECTION 5 System Settings, “Screen Display and Monitor”
Cannot change shutter speed of this camera.	Check the [Camera settings] under [SYS/Camera settings]. Reason: With cameras other than F160-S2 and F150-S1A, it is not possible to change the shutter speed using the menu. SECTION 5 System Settings, “Camera Settings”
Cannot delete directory having files.	Delete the files in the directory to be deleted or move the files to another directory. Reason: Only empty directories can be deleted. SECTION 4 Other Functions, “Memory Card Operations”
Cannot operate display capture during last NG display.	Check the image status setting under [SYS/Conditions/Display setting]. Reason: Either [Last NG (before scroll)] or [Last NG (after scroll)] is selected under Image status. SECTION 5 System Settings, “Screen Display and Monitor”
Cannot perform during nonstop adjustment.	Make settings after exiting nonstop adjust mode. Reason: Camera setting, communication parameter setting and parallel I/O monitor cannot be performed. SECTION 3 Test/Measurement Execution, “Using Nonstop Adjust Mode”
Cannot register Defect (Deviation) when image 1 is selected.	If density defect is set, select [Image 0] under [Measurement image]. SECTION 2, 3. Density Defect Inspection
Cannot register the model with the specified figure.	Part of the drawn circle or circumference is outside the range. Draw it again so that the entire figure is displayed on the monitor.
Cannot select image 1 when Defect (Deviation) is registered.	To use Image 1 for measurement, delete the region to which density deviation is set. SECTION 2, 3.3 Density Defect Inspection/Density Defect Inspection #
Cannot select this direction.	Combine upper, lower, left, and right edge search directions that will surround the area to be measured. Reason: The selected directions do not surround the region to be searched. SECTION 2, 3.1 Binary Defect, “Area (Var. Box)” SECTION 2, 3.1 Density Defect, “Defect (Variable Box)”

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Error message	Causes and remedies
Communications error. <Data transfer>	Turn OFF the power to the Controller and check for the following items before restarting the Controller. • Is the cable wired correctly? • The communications specifications for the external device and the Controller are the same. • Is the external device operated correctly? Reason: Data transfer between the Controller and an external device was interrupted because a communication error occurred. If the same error message appears after restart, it may mean that the Controller is faulty. Contact your OMRON representative. Setup Manual SECTION 6, Normal Serial Interface(Normal) Setting Communications Specifications SECTION 6, Host Link Serial Interface Setting Communications Specifications SECTION 6, Serial Interface Menu Operations Setting Communications Specifications
Communications error. <Normal> ERR	
Communications error. <Host Link> ERR	
Contents of memory card is incorrect. Cannot execute Select items and Install.	Turn OFF the Controller power supply, re-install the Application Software, and restart the Controller. If the error remains even after the Controller is restarted again, the Application Software may be malfunctioning. Consult your OMRON representative.
Data are too large. Cannot save by serial communication.	Save the data to a Memory Card or delete surplus data and then save. Reason: Data 2MB and over cannot be saved via serial communications. SECTION 4 Other Functions, “Backing Up Settings”
Date/time settings error.	Set the correct date and time. Reason: A date not in the calendar or an invalid time has been input. SECTION 5 System Settings Setting the Calendar Date and Time (Date/Time)
Detailed settings of camera is incorrect.	Correct the settings. Setup Manual
Direction settings are not appropriate.	• Select midpoint for X and Y when relative angle selected for θ • Select the same region number for X and Y when region 0 or region 1 selected for θ. Reason: Position cannot be compensated with the current combination.
Directory name contains unusable character.	Check the directory name. The following characters cannot be used: /, ,, :, ;, *, ?, <, >, SPC(space)
Directory name is not specified.	Specify the directory name and press the ENT Key.
Draw at least one OR figure.	Draw diagrams in OR mode. Reason NOT mode is used to delete part of a drawn diagram. SECTION 1 Basic Operating Procedures, “Menu Operations”
Failed to load data.	Mount the Memory Card properly and re-execute.

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Error message	Causes and remedies
Failure of DIC deployment.	Delete the unused models or processing items that are set to other units. Reason: There is insufficient disk space so the selected dictionary cannot be opened.
Fan error.*  ERR	Turn OFF the Controller power supply and check that nothing is obstructing the fan operation. If the error message continues to be displayed when the Controller is restarted, the Controller itself may be malfunctioning. Contact your OMRON representative.
File name contains unusable characters.	Check the file name. The following characters cannot be used: /, ,, :, ;, *, ?, <, >, SPC(space)
File name is not specified.	Specify the file name and then press the ENT Key.
HMILIB ERROR	The Controller has a failure. Contact your OMRON representative.
Host link error. Changing for normal mode.*  ERR	After checking for the following items, either change the communications mode under [SYS/Communications/Serial] to [Host Link] mode (See note.), or restart the Controller: • Is the cable wired correctly? • The communications specifications for the external device and the Controller are the same. • The Programmable Controller is ON. * The communications mode will automatically return to normal mode when this error occurs.  Setup Manual Section 6, Host Link Serial Interface Setting Communications Specifications
Illegal expression.	Check the following for the expression: There are the same number of right and left parentheses. • There is not more than one operator in a row without a variable in between them. • There is not more than one region number in a row. • There is not more than one function in a row without a variable in between them. • There is not more than one constant in a row. • There are not too many, or too few arguments for a function.
Inappropriate data	Change the setting for [Reference registration/Package Data]. Reason: Incorrect correlation between [Peripheral Rows], [Row Size] and [Column Size]  Section 2, 3.34 BGA Inspection
Incorrect data format received.	Select the correct transfer file and re-execute the data transfer. Reason: The wrong file has been selected.
	Reinstall the processing item. Reason: The scene data or scene group data that was to be loaded includes processing item(s) that are not currently installed to the Controller.  SECTION 1 Basic Operating Procedures, Installing the Application Software

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Error message	Causes and remedies
Installation failed.	Mount the Application Software memory card correctly into slot 0 and restart installation.  SECTION 1 Basic Operating Procedures, “Installing the Application Software”
Insufficient flash memory. <Flash memory>	• Reduce the size of regions to be registered. • Delete unnecessary scenes and units.  SECTION 1 Basic Operating Procedures, Operational Flow SECTION 4 Other Functions Setup Change (Scenes and Scene Group Functions)
Insufficient flash memory. <Model memory>	• Reduce the size of regions to be registered. • Delete unnecessary models.
Insufficient flash memory. <Work memory>	• Reduce the size of the registered model. • Delete unnecessary models. • Reduce the size of regions to be registered. • Delete unnecessary scenes and units.  SECTION 1 Basic Operating Procedures, “Operational Flow” SECTION 4 Other Functions Setup Change (Scenes and Scene Group Functions)
Insufficient free space of memory card	• Delete unnecessary files to create free space. • Replace the Memory Card with a bigger capacity card.  SECTION 4 Other Functions, “Memory Card Operations
Intelligent Lighting is not selected.	Check the settings under [SYS/Camera settings].  SECTION 5 System Settings, “Camera Settings”
Label unit isn't set up.	Set a label unit. Reason: The label unit is set to [No].
Limits of warning exceed limits of judgement.	Re-set the upper and lower limits for the warning so that they fall within the judgement upper and lower limits.  SECTION 2, 4. Trend Monitor ”Setting Warning Ranges and judgement Conditions”
Loaded file error.	Specify the correct file and reload. Reason A formatting error may have occurred during data or program file load. • Data 2MG or greater cannot be loaded using serial communications. Data 2MG or greater must be loaded via the memory card.  SECTION 4 Other Functions, “Backing Up Settings”
Log Error	There is insufficient free space in the storage. Delete data from the storage.  SECTION 4 Other Functions, “Clearing the Data in the Storage”
Memory card access error.	The recommended Memory Card has not been inserted. • Use another Memory Card. The Memory Card has not been formatted.  Setup Manual
Memory card is not inserted.	Insert the recommended Memory Card.  Setup Manual

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Error message	Causes and remedies
Memory error	There is insufficient work memory. Delete unnecessary scenes and units. SECTION 1 Basic Operating Procedures Menu Operations SECTION 4 Other Functions, “Memory Card Operations”
	Labeling was not completed since there were too many labels.
	Measurement was not completed since there was an excessive amount of noise on EC images.
Model is not appropriate.	For classification, pattern inspections, and rotation position: • Register an image with high contrast as the model. • Increase the model size. (15 x 9 pixels min.)
	For density defect inspections: • Reduce the element size or increase the inspection region.
	For fine matching: • Surrounding six pixels cannot be registered as a model. Registration must be performed excluding this area.
	For model position compensation: • Register an image with high contrast as the model.
	For circle position compensation: • Register an image with high contrast as the model. The rotation direction reference position will be registered, so use an image with a defect and register a model.
	For ECM searches: • Adjust the edge extraction level so that the edges of the section to be registered as the model will be extracted. • Adjust the edge extraction level so that fine edges appear thicker. Reason: No edge-extracted image exists in the region.
Model is not registered.	Specify the region to be registered as the model.
Model is too large.	Reduce the size of the region to be registered as the model.
No Backup Data in memory card.	Mount the Memory Card on which the backup data was saved to Memory Card slot 1 (C1). SECTION 4 Other Functions, “Backing Up Settings”
Number of lines to be read is fixed. Image is always displayed in full screen.	Check the [Camera settings] under [SYS/Camera settings]. Reason: With cameras other than F160-S2 and F500-S1, it is not possible to change the number of lines to be read. SECTION 5 System Settings, “Camera Settings”
Password is incorrect.	Enter the correct password. SECTION 5 System Settings Customizing Operations SECTION 6 Normal Serial Interface (Normal) Input Format (Normal)
PLC is not in MONITOR Mode.	Change the mode of the Programmable Controller to MONITOR Mode.
Portion of region is off screen.	The region is not drawn properly. Draw the region again.

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Error message	Causes and remedies
Process item cannot be registered.	There is insufficient work memory. Delete unnecessary scenes and units. SECTION 1 Basic Operating Menu Operations SECTION 4 Other Functions Setup Change (Scenes and Scene Group Functions)
	The following processing items cannot be registered before the first Camera image unit. [Switch camera] [Changing Filtering] Filtering again.
	The selected processing item cannot be used with this controller. Check the processing items that can be used with this controller. INTRODUCTION, Using This Manual Processing Item Selection Guide
Registration is failure.	Display a good package on the monitor, and re-register the reference position. SECTION 2, 3.34 BGA Inspection
Same directory name has already existed.	Specify a directory name that is not being used.
Same file name has already existed.	Specify a file name that is not being used in the directory.
Scn Group file cannot be written in.	• Delete unnecessary scenes or save scenes individually. Also make sure that processing items that will not be used are not installed to the controller. Reason: Failed to write since the scene group size is excessively large. SECTION 4 Other Functions Setup Change (Scenes and Scene Group Functions) • Is the file read-only? Change the file attributes so that it is write enabled.
Scroll error	• The measured value exceeds the allowable scroll range. Check the scroll amount and re-register the reference position. • The “position displacement compensation + perturbation” exceeds the allowable scroll range. Check the scroll amount and re-register the reference position for position displacement compensation. p.26

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Error message	Causes and remedies
Search coordinates are not appropriate.	For ECM searches: The search coordinates must be specified within the screen.
	For processing items other than ECM searches: The search coordinates must be specified within the box circumscribing the model.
Set address is not available.	Check the Controller address and enter the correct address. SECTION 6 Normal Serial Interface (Normal) Setting Communications Specifications
Set measurement in advance.	Select the measurement to be displayed on the Trend Monitor. SECTION 2, 4. Trend Monitor “Selecting Measurement Values to be Displayed”
String must be set within 20 characters.	Set the character string to within 20 characters. The “m” and “v” that precede production dates and expiration dates will not be counted in the number of characters. E.g., “mYY” will be counted as 2 characters.
SYSTEM ERROR	The Controller has a failure. Contact your OMRON representative.
The backup data is not correct.	This backup data is damaged and cannot be loaded.
This camera cannot use with Intelligent Lighting.	Check the settings under [SYS/Camera settings]. Reason Cameras other than F160-S2 and F150-S1A cannot use Intelligent Lighting. SECTION 5 System Settings, “Camera Settings”
Timeout error. (Data transmission)	Turn OFF the power to the Controller and check for the following items before restarting the Controller. • Is the cable wired correctly? • The communications specifications for the external device and the Controller are the same. • Is the external device operated correctly? Reason: Data transfer has been interrupted due to a timeout in communications between the Controller and an external device. If the same error message appears after restart, it may mean that the Controller is faulty. Contact your OMRON representative. Setup Manual SECTION 6, Normal Serial Interface (Normal) Setting Communications Specifications SECTION 6, Host Link Serial Interface Setting Communications Specifications SECTION 6, Serial Interface Menu Operations Setting Communications Specifications
Timeout error. <Normal> ERR	
Timeout error. <Host Link> ERR	

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Q& A

F500

Question	Answer
Does the measurement time get longer due to increased number of pixels? If so, how much longer does it get?	When compared to full-screen measurement of F210, the number of pixels to be measured will increase about four times, therefore, the measurement time will also increase four times (maximum). (However, this varies slightly depending on processing items.)
Can scene data obtained from other controllers be used?	Not possible.

Controller Operation

Question	Answer
When units are added to or deleted from a flowchart, what happens to expressions in processing items (calculations, branching, etc.) referencing other unit data?	Unit numbers are automatically incremented or decremented in expressions or for branching. If a unit that is being reference is deleted, however, an error will occur and ERR will be displayed.
What data is saved to flash memory or the Memory Card when the save operation is executed?	System data and scene data for scene group 0 will be saved to flash memory. Scene data for scene groups 1 to 31 will be overwritten on the Memory Card.
Why can scene group data sometimes not be saved even though there is sufficient space on the Memory Card?	When saving scene groups, work memory in the Controller is required in addition to Memory Card space. If there is not sufficient work memory, scene groups containing a lot of data cannot be saved. Try deleting unnecessary data and saving again.
Does processing time depend on the type of images being displayed on the monitor?	Processing time varies with the type of images displayed on the monitor. When a [through] image is used, measurement starts only after completing the previous image input, making processing slower than with [Freeze ☐] images. Processing time is also different depending on when scrolling is performed (before or after). SECTION 5 System Settings “Screen Display and Monitor”
Why is a memory image not display even when the Shift+Up/Down Keys are pressed when [Last NG ☐ is displayed on the screen?	Memory images cannot be displayed when the image status is set to [Last NG☐]. Change the image status to display [through] or [Freeze☐] images to display memory images. SECTION 5 System Settings “Screen Display and Monitor”

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Controller Operation (Continued)

Can characters displayed on the screen be deleted?	Yes. The information displayed on the screen can be set under the system settings. SECTION 5 System Settings “Screen Display and Monitor”
Are there any conditions to be set to load BMP image files to the controller?	Images to be loaded must satisfy the following requirements. • Gray-scale images • 256-gradation images If the image to be loaded is larger than the controller’s allowed image size, the extra part exceeding that allowed image size cannot be displayed. In addition, images saved by a device other than OMRON’s vision sensor may appear with different gradations from those of the actual images.

Input image Items

Question	Answer
Why are the Camera coordinates output to the external device when calibration is set?	Check whether or not [Coordinate mode]-[Calibration] is set to [ON] for each unit. If set to [OFF], the Camera coordinate values will be output.
What happens to the display when 5 or more processing items ([Camera image] or [Switch camera]) are set?	If the image status is set to [Through] [☐☐ (Before scroll)], the first 4 images at image input are displayed. If the image status is set to Through (☐☐) (After scroll), the first 3 images and the last image are displayed. SECTION 5 System Settings “Screen Display and Monitor”
Can the image be viewed after filtering when [Change filtering] or [Filtering again] have been executed?	If the image status is set to ☐☐ (After scroll)], the image can be viewed after filtering when [Change filtering] or [Filtering again] have been executed. SECTION 5 System Settings “Screen Display and Monitor”

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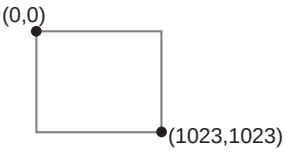
Position Compensation Items

Question	Answer
“Scroll error” message is displayed. Why?	In the case of F500, the reference position (x,y) will be restricted depending on the scroll amount (X,Y, θ). The reference position setting ranges for scroll amounts are shown below. Check the scroll amount and register the reference position within the allowed range. (When performing position compensation twice or more, the total scroll amount must be used.)

Scroll amount X, Y / Scroll amount θ	Up to ±128pix	Up to ±256pix
Up to ±30°	0 ≤x ≤1023 0 ≤x ≤1023	0 ≤x ≤1023 0 ≤x ≤1023
Up to ±45°	0 ≤x ≤895 0 ≤y ≤895	0 ≤x ≤767 0 ≤y ≤767
Up to ±60°	0 ≤x ≤639 0 ≤y ≤639	0 ≤x ≤559 0 ≤y ≤559

CHECK!

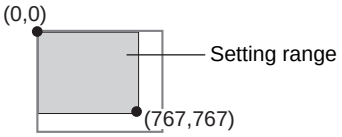
The origin is always at the upper left corner, irrespective of the calibration settings.



Example 1: When position compensation is performed once

Scroll amount of the object
|X| ≤200pix. |Y| ≤100pix, |θ| ≤40°

The reference position must be registered within 0 ≤x ≤767 and 0 ≤y ≤767.



Example 2: When position compensation is performed twice

1st position compensation

Scroll amount of the object
|X| ≤200pix. |Y| ≤100pix, |θ| ≤40°

2nd position compensation

Scroll amount from the end of 1st position compensation
(The same reference position as that for 1st position compensation is used.)
X=0pix, Y=0pix, |θ| ≤20°

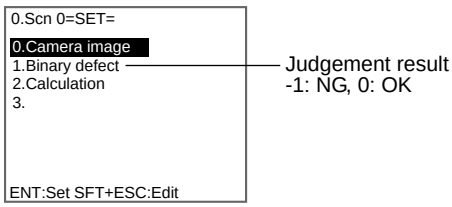
Total scroll amount
The total scroll amount will be |X| ≤200pix, |Y| ≤ 100pix, |θ| 60°.
The reference position must be registered within 0 ≤x ≤559 and 0 ≤y ≤559.

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Measurement Items

Question	Answer
QUEST Character Verification Can the characters that are read (A to Z, 0 to 9, :, /, _ (space)) be output directly as text strings to an external divide?	Turn [ON] the Output results under the [Measurement conditions]. The text strings will be output through the serial port. SECTION 2, 3.10 Quest Character Verification
EC Positioning Can an edge-extracted image be captured?	No. Edge-extracted images are produced by processing camera buffer images, so they cannot be captured. Only images input through the [Camera Image] processing item can be captured.

Measurement Support Items

Question	Answer
How do I set a formula with more than 64 characters in an expression?	Set up an additional expression and an expression that will reference the additional expression. SECTION 2, 4. Measurement, “Calculation”
Is there any way to count NG images?	Yes, by using the [Calculation] processing item. Use the following procedure. Example: Counted NG images for [Binary Defect] 1. Set a [Calculation] unit after the [Binary Defect] unit.  2. Set the following expression for [Calculation 0] in the Calculation unit: U2.D00-U1.JG SECTION 2, 4. Measurement, “Calculation” CHECK! To output the count to an external device, change [Calculation] processing item to [DO Data] or [Normal Data] processing item (depending on where the data is to be output.) SECTION 2, 6.2 DO data output SECTION 2, 6.5 Normal data

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Results Display Items

Question	Answer
Can figures display with the [Display Figure] processing item be changed through serial communications?	Position of the figures set by [Display Figure] processing item cannot be changed by serial commands. Change them from the console. SECTION 6, Normal Serial Interface

I/O

Question	Answer
Will the RUN signal be output during scene switching?	• The RUN signal will remain ON during scene switching in Run Mode. • The RUN signal will remain OFF during scene switching in Monitor Mode.
Will the RUN signal turn OFF when the ERROR signal turns ON with Camera or other errors in Run Mode?	The RUN signal will remain ON even if the ERROR signal turns ON.
Why does the ERR signal turn ON when no error message has been displayed?	The ERR signal turns ON when STEP is input while the BUSY signal is ON. Select whether or not the ERR signal will turn ON under [SYS/ Measurement control]. SECTION 5 System Settings Using BUSY Signals The ERR signal turns ON when a command input via parallel interface has not been received correctly. Example: The switch scene group command was input but there is no Memory Card mounted in Memory Card slot 1 so the current scene group data was unable to be saved. The ERR signal turns ON.
In what format is data output for “normal output”?	The [Output format] can be changed under the [Condition settings] for normal data output. [ASCII]: Output in ASCII format. [Binary]: Output in binary format. SECTION 2, 6.5 Normal data
A command to switch the scene group was executed through the parallel interface when a Memory Card was not inserted, preventing returning to the previous scene group. How can this be fixed?	• Using a Memory Card Place the Memory Card into slot 1 and execute the command to switch the scene group again. • Without a Memory Card Perform the following. Example: When returning to scene group 0 (1) Turn [OFF] the Save at switch Scn Group setting under the [System settings/Operation settings]. (2) Execute a command to switch to scene group 0 through the parallel interface.

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Ethernet Communication Items

Question	Answer
Can Vision Conductor be used with F250/F270 via Ethernet?	Not possible. The Ethernet communication method differs between F250/F270 and Ethernet models (i.e. models whose model name contains “ETN”).
Is the measurement time affected if logging is performed in the case of Ethernet-compatible models (i.e. models whose model name contains "ETN")?	When performing image logging continuously, the measurement time will get longer in the following cases depending on the conditions set by [SYS/Network/Logging]. • When the quantity of data to be logged is too much • When image logging is performed with “Image log” set in [Log Priority]

1-Line Fast Mode

Question	Answer
NG occurs once every two measurements even if the work is good.What can I do?	There is a possibility that the scene data for processing section 0 does not match that for processing section 1. If the scene data has been changed, press the key assigned to [Proc. data transfer] to copy (transfer) the data from processing section 0 to processing section 1. In the case of normal serial interface, this can be done by executing the DATATRNS command. CHECK! Setting [Auto data transfer] to [Each time] will prevent data transfer being forgotten. SECTION 5 System Settings
Data has been saved to the flash memory, but the previous data will be effective when the system is restarted.Why?	The data was saved while processing section 1 was being displayed. Before saving data to the flash memory, make sure that processing section 0 is displayed.
The key assigned to [Proc. data transfer] was pressed after the scene data was changed, but measurement was performed under the conditions in effect before the change.Why?	There is a possibility that processing section 1 was being displayed when the scene data was changed. [Proc. data transfer] copies data from processing section 0 to processing section 1, so make sure that processing section 0 is displayed before changing the scene data.

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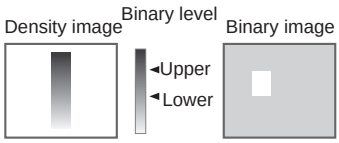
2-Line Random Trigger

Questions	Answer
Is the same system data shared by processing sections 0 and 1?	System data can be set for each processing section. With the 2-line random trigger mode, scene data and system data (*) can be set independently for each processing section.
	* Only the communication parameters set for processing section 0 are effective for processing section 1.
How can I set measurement conditions for processing section 0 and 1, respectively?	Display the processing section for which you want to set measurement conditions. Use the following procedure to set measurement conditions.
	1. Select [SYS/Operation setting/Key operation], and assign [Switch Proc. monitor] to the desired key. 2. Press this key in monitor or run mode. Each time the key is pressed, the display switches to processing section 0 and 1 alternately. The processing section that is currently displayed can be found by the background color at the both edges on the monitor. For background color, refer to SECTION 3 Test/ Measurement Execution. 3. Enter the setting mode and set the desired measurement conditions.
Data has been saved to the flash memory, but the data in one of the processing sections disappears when the system is restarted.Why?	Only the data in the processing section that is displayed during operation can be saved. Execute [Save] for each processing section.
Measured values for one of the processing sections are not output via the parallel interface.Why?	There is a possibility that the processing section from which no measured values are output is in [Monitor] mode. Switch both processing sections to the [Run] mode.
The flash memory backup function is used to load data, but the data in processing section 1 is not loaded.Why?	Only the data in the processing section displayed during backup operation can be saved. Execute [Flash memory backup] for each processing section. To load backup data, the memory card containing the following three files is required. • bkupprog (Installed program) • bkupdata (Backup data for processing section 0) • bkupdata2 (Backup data for processing section 1)

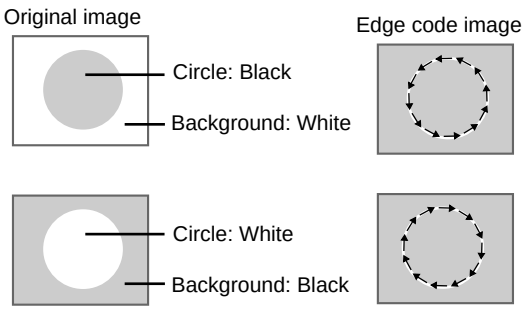
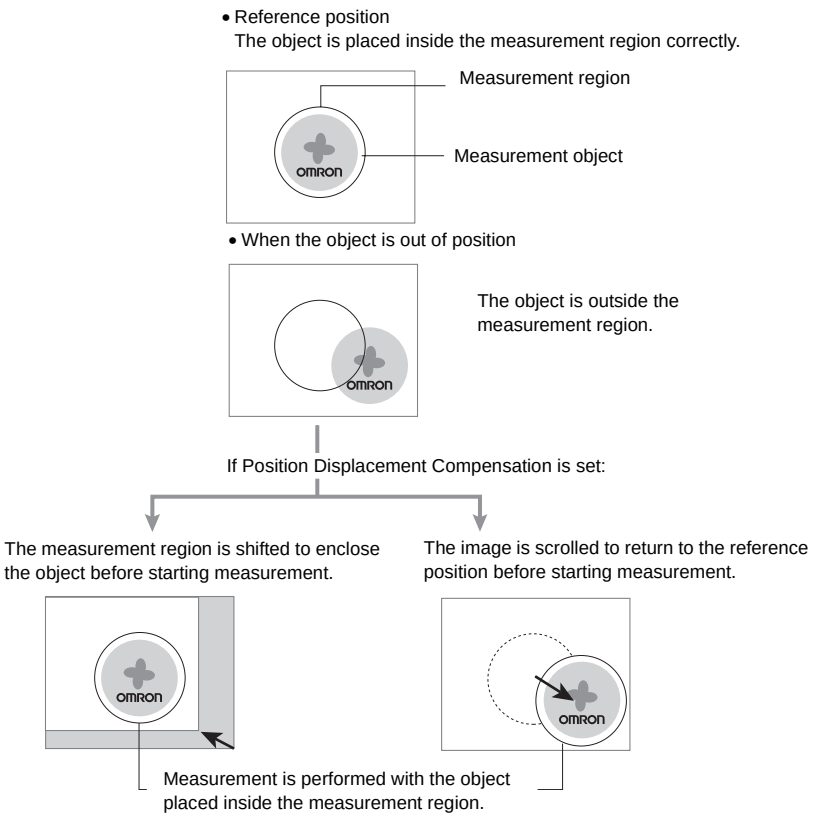
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Terminology

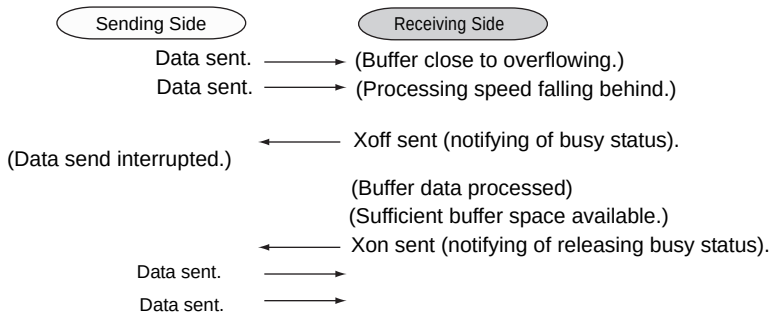
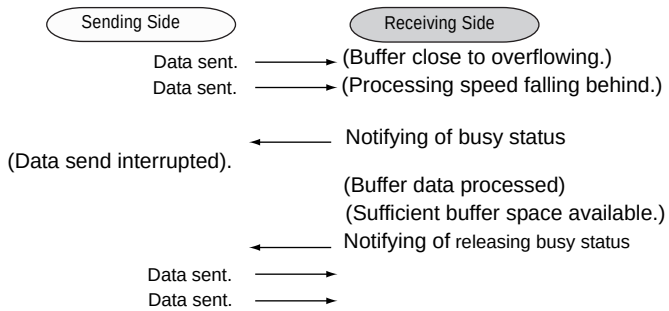
This section explains terms listed beside the HELP icons.

Terms	Explanation
Binary	Binary refers to the separation of the density images with 256 gradations read by the Camera into black pixels and white pixels. Upper and lower threshold values (binary levels) are set and the parts of the density image that fall within that gradation range are converted to white pixels and the rest are converted to black pixels. The Controller uses the white pixels to measure the object. 
2's complement	A common method used to express negative numbers in binary format. The 2's complement method expresses a negative number by inverting all of the bits of the positive value and then adding 1. Example: The 2's complement of -1 is expressed as follows: The value -1 can be derived from 0 - 1. (Subtract -1 from 0 assuming there is a 1 in this place.) 00000000 (= 0) -) 00000001 (= 1) 11111111 (=-1) ⇐ The 2's complement of -1 (in 8 digits) The following gives a simpler way. The 2's complement of -1 can be obtained by inverting all of the bits of the negative 00000001 (= 1) ↓ Invert all bits. 11111110 ↓ Add 1. 11111111 (=-1) value = positive value and then adding 1. The MSB can be used to determine whether a number is positive or negative. If the MSB is 0, the number is positive (or zero). If the MSB is 1, the number is negative. Numbers expressed in the 2's complement method are convenient in that they can be used in calculations without further conversion. Example: -1 + 10 = 9 11111111 (= -1) +) 00001010 (= 10) 00001001 (= 9)

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Terms	Explanation
Edge Code (EC)	An edge code indicates the direction of an edge. The directions are indicated by arrows in the following diagram. The positions where the brightness changes are extracted as edges and the directions of the changes in brightness are found. The direction of the arrows is determined by whether the measurement image and the background are black or white.  The edge codes can still be used for low contrast images if image light difference and change direction (edge code) processing items are used.
Position compensation	When the position or direction of the object is not constant, the displacement between the reference and current positions is obtained, and this displacement is compensated for in measurements. Select the position compensation processing items suitable for the measurement object. 

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Terms	Explanation
Calibration	Calibration means to convert measured dimensions (in units of pixels) to actual dimensions (mm, mm, cm, m). By setting the relationship between the physical coordinates and the camera coordinates, the measurement results are converted from pixels to physical units. To output calibrated measurement results to an external device, set [Coordinate mode/Calibration] to [ON] for each unit.
Center of gravity	The center of gravity is calculated by regarding the white pixels as a sheet of thick paper of uniform thickness. The center of gravity is the point at which the sheet of paper would balance when placed on a sharp point. For example, the center of gravity for a circular object would be the center of the circle. The center of gravity of a rectangular object would be the intersection of lines drawn from diagonally opposite corners.
Correlation value	Indicates the similarity (0 to 100) to a good work. The more similar it is, the larger the value.
Software flow control (Xon/ Xoff control)	A flow control method. Flow is controlled using Xon and Xoff signals. 
Density image	Density images are the gray images of 256 gradations read by the Camera.
Flow control	Flow control is used to adjust the rate of data transfer. The receiving side notifies the sending side when it cannot keep up with the processing speed, causing the sending side to interrupt the transmission, and then the receiving side notifies the sending side when it wants the transmission to be restarted.  Flow control methods include both hardware and software methods. The Controller uses software flow control.
Model	The model is the image pattern used for detection.

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Character Codes

When [QUEST OCV] or [Single character] is used to recognize 1st and 2nd candidate characters, the recognized characters are output to external devices as decimal character codes. When no pattern is detected, an underscore (_) is output.

Method for Calculating Decimal Outputs

(For Recognized Characters)

(Numeric value of the leftmost digit of the recognized character) × 16 + (Numeric value of the rightmost digit) = output value

Example: When the recognized character is “2”, the output will be 50.

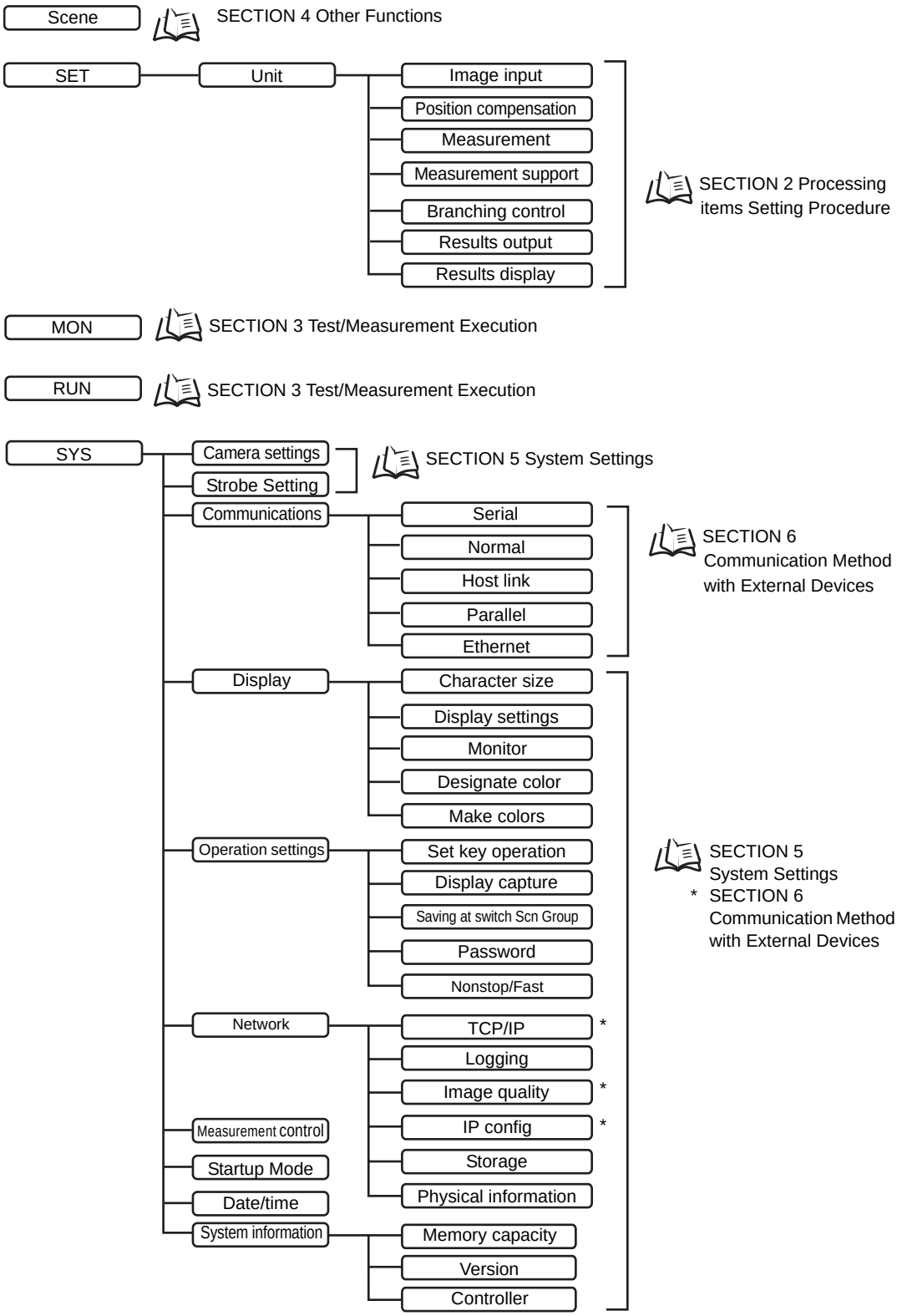
When the recognized character is “C”, the output will be “67”.

Leftmost digit

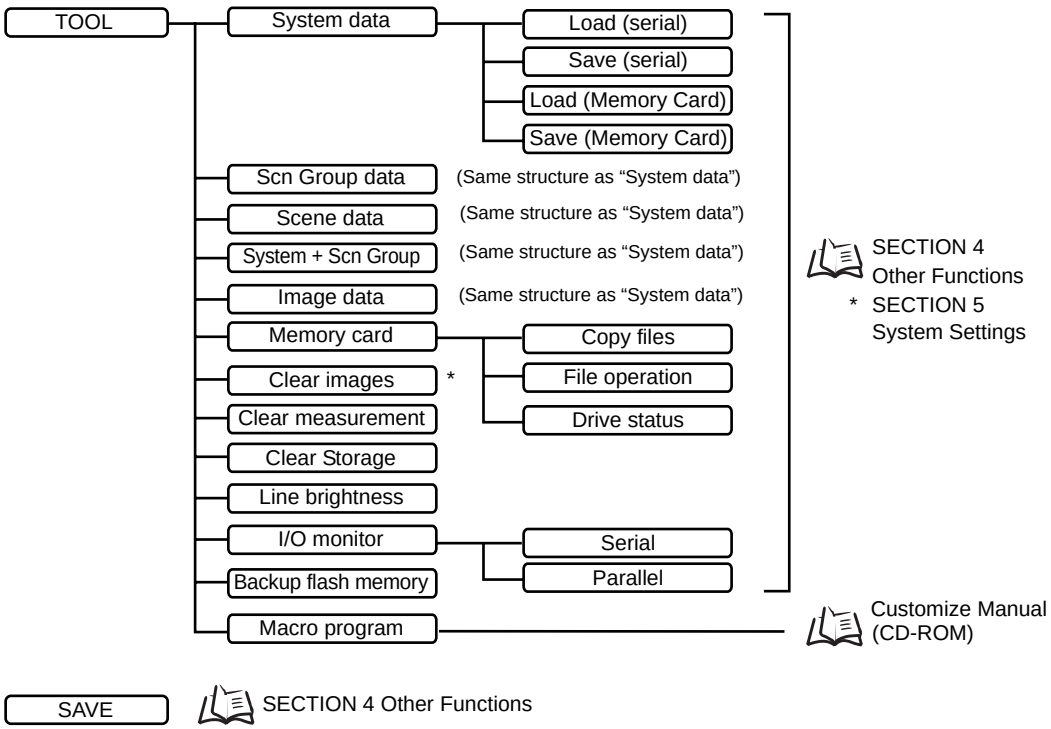
Rightmost digit	0	1	2	3	4	5	6	7
0		DE		0	@	P	`	p
1	SH	D1	!	1	A	Q	a	q
2	SX	D2	”	2	B	R	b	r
3	EX	D3	#	3	C	S	c	s
4	ET	D4	$	4	D	T	d	t
5	EQ	NK	%	5	E	U	e	u
6	AK	SN	&	6	F	V	f	v
7	BL	EB	’	7	G	W	g	w
8	BS	CN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SB	*	:	J	Z	j	z
B	HM	EC	+	;	K	[	k	{
C	CL	→	,	<	L	\	l	¦
D	CR	←	-	=	M	]	m	}
E	SO	↑	.	>	N	^	n	~
F	SI	↓	/	?	O	_	o	

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Menu Hierarchy



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Version-up Information (Ver.2.1 to Ver.3.0)

Contents of version-up from F500-UM2M/F500-UM2F to F500-UM3M/F500-UM3F are shown below.

■ Controller items

Changes	Details
More controller models can install F500-UM.	F210-C10-ETN has been added. Please note that functions that can be used vary with controller model.  Using This Manual

■ Processing items

Changes	Details
More processing items can be used with F500.	The following processing items can be used with F500-C10/C10-ETN. • Relative Position • Classification #  Using This Manual

■ Other items

Changes	Details
Logging conditions can be set in detail.	It is possible to skip pixels of the image to be logged and select the processing (measurement or logging) to which priority is to be given.  SECTION5 System Settings

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Version-up Information (Ver.2.0 to Ver.2.1)

The items that have been upgraded are shown below.

■ Processing items

Changes	Details
Operation of the EC circle defect inspection function has been improved.	Window switching method for circle defect inspection has been changed. SECTION 2, 3. Mesurement, “EC Circle Defect Inspection”

■ Communication items

Changes	Details
Supports Vision Composer Net (Ver. 2). ETN	Using with Vision Composer Net Ver. 2 (sold separately) enables use of a function that displays a list of security, setting change history and operation status. Vision Composer Net User's Manual

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Version-up Information (Ver.1 to Ver.2)

Contents of version-up from F500-UM1M/F500-UM1F to F500-UM2M/F500-UM2 are shown below.

■ Controller

Changes	Details
More controller models can install F500-UM.	These are F500, F250, F270 and F210. Functions that can be used vary with controller model. Using This Manual

■ Processing items

Changes	Details
New processing items have been added. ETN	(General measurement items) • Data logging SECTION 2, 4. Measurement Support Items

■ Communication Items

Changes	Details
The controller can communicate with external devices in more ways. ETN	Use of Vision Conductor (optional) enables operation of the controller from the personal computer via Ethernet. SECTION 2, 3. Measurement Items

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Version-up information (From F250-UM)

F500-UM also offers the functions provided by F250-UM.
Contents of version-up from F250-UM3M/F250-UM3F are shown below.

■ Controller

Changes	Details
More controller models can install F500-UM.	These are F500, F250, F270 and F210. Functions that can be used vary with controller model. Using This Manual
More camera types can be connected.	F160-S2 and F500-S1* cameras can be connected. * The F500-S1 camera can be used for F500 only. Setup Manual

■ Processing items

Changes	Details
4 processing items have been added.	(General measurement items) • BGA Inspection • EC Circle Defect Inspection • Density Defect Inspection • T-Edge Position SECTION 2, 3. Measurement Items
The image range to be captured by the camera can be specified. (Only when F160-S2 or F500-S1 camera is connected.)	Image capture time can be reduced by setting the capture range. SECTION 2, 1. Input Image Items
A part of the camera raw image can be enlarged to check it	Since the image can be enlarged at any point, it is possible to check whether the area to be measured is focused. SECTION 2, 1. Input Image Items
The result display functions (line, box, circle, cursor) have been improved.	Results can be displayed at the correct positions (camera coordinates) even if calibration ON data is used for the expression of figure coordinate position. SECTION 2, 7. Results Display Items Display Line, Display Box, Display Circle, and Display Cursor

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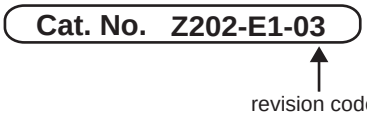
■ Other

Changes	Details
The image can be enlarged while the measurement region is displayed.	Enlarge the image if it is not clear or if you want to draw in detailed areas.  SECTION 1 Basic operating procedures
Image capture options have been changed.	The conventional option [ON/OFF] has been changed to [OFF/CAPT only/CAPT + LIVE].  SECTION 5 System Settings
F500 [Zoom] has been added to image size selections for the image displayed during MON/RUN mode.	The specified area in the image can be enlarged and displayed fully in the screen.  SECTION 5 System Settings
More image types can display line brightness.	The line brightness can be displayed while the screen is zoomed in (*) or out, allowing the user to check density distribution. * The screen can be zoomed in with F500-C10 only.  SECTION 4 Other Functions

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Revision History

The manual revision code is provided at the end of the catalog number on the CD-ROM.



Revision code	Date	Revised content
01	May 2004	Original production
02	September 2004	Rivised production of English version
03	January 2005	Rivised production of English version

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