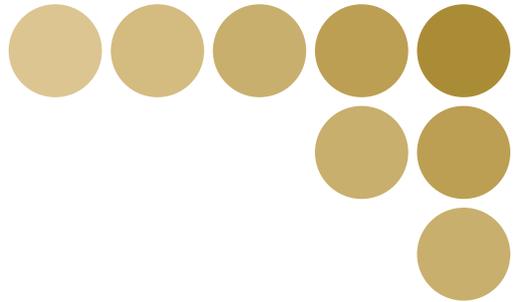


Smart Sensor

NS SmartMonitor

ZS-PSW11



User's Manual



Introduction

This manual provides information regarding functions, performance and operating methods that are required for using the NS SmartMonitor.

When using the NS SmartMonitor, be sure to observe the following:

- The NS SmartMonitor must be operated by personnel knowledgeable in electrical engineering.
- To ensure correct use, please read this manual thoroughly to deepen your understanding of the product.
- Please keep this manual in a safe place so that it can be referred to whenever necessary.

Introduction	Application Considerations (Please read)	Introduction
Contents	Contents	Contents
Section 1	FEATURES	Section 1
Section 2	Startup and End	Section 2
Section 3	Operating Method	Section 3
Section 4	APPENDIX	Section 4

User's Manual

Smart Sensor
NS SmartMonitor
ZS-PSW11

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Precautions for Safe Use

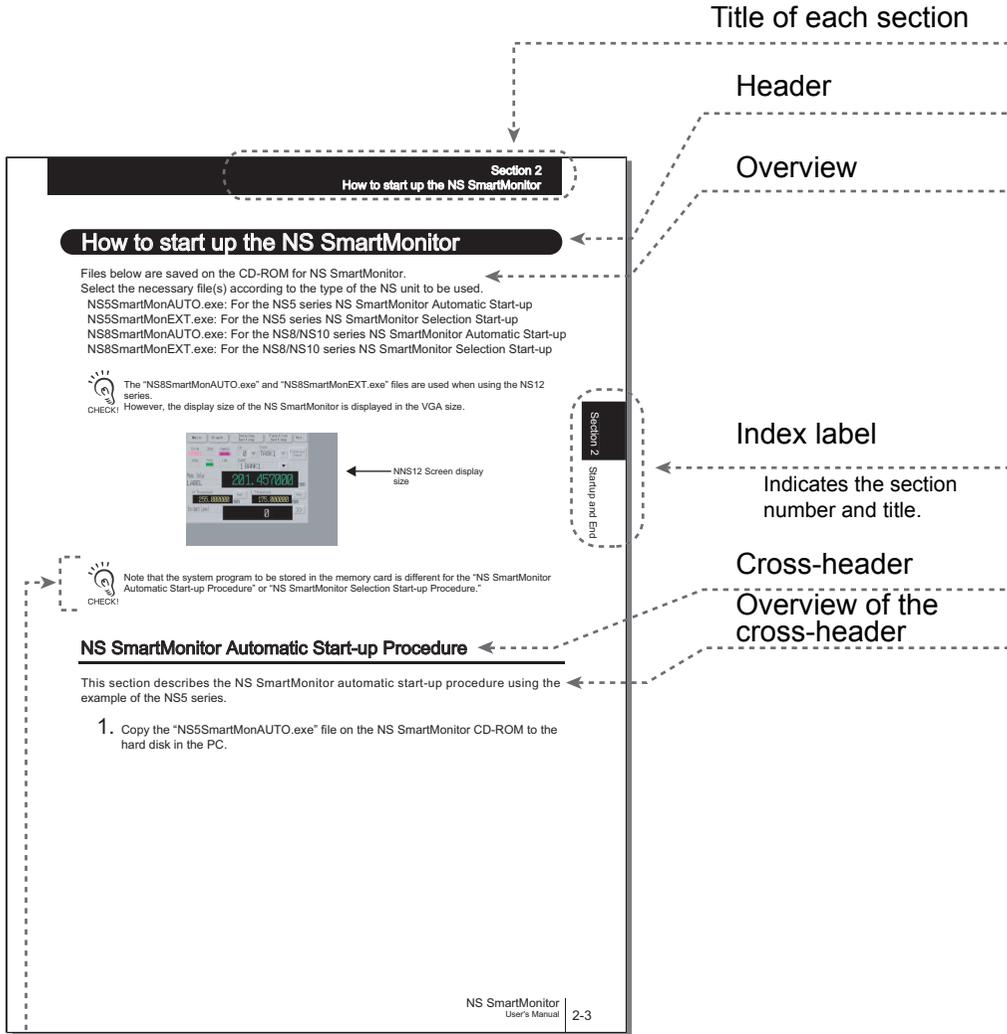
Please use this product according to the manuals of Program Terminal NS Series, ZS-MDC, and ZS-L.

Precautions for Correct Use

Please use this product according to the manuals of Program Terminal NS Series, ZS-MDC, and ZS-L.

Editor's Note

Page Format



Supplementary Explanation

Helpful information regarding operation and reference pages are introduced here using symbols.



*This page has been made purely for explanatory purposes and does not exist.

■ Meaning of Symbols

Windows, dialog boxes, and other GUI elements displayed on the NS SmartMonitor are indicated by brackets [].

■ Visual Aids



CHECK!

Indicates points that are important to ensure full product performance, such as operational precautions and application procedures.



Indicates pages where related information can be found.



Indicates information helpful in operation.

MEMO

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Section 1

FEATURES

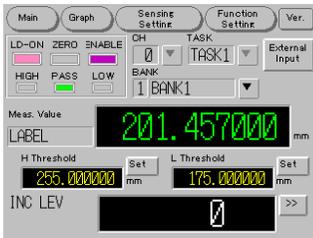
☒ Features of NS SmartMonitor	1-2
☒ System Configuration	1-3
☒ Restrictions of NS SmartMonitor	1-6
☒ Operating Environment for NS SmartMonitor	1-7
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Features of NS SmartMonitor

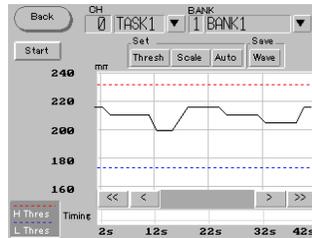
The NS Smart Monitor is the software which is designed to display measured values from the ZS series Smart Sensor, to display these values in graphs, and to read/save the setting data on the programmable terminal NS.

Direct connection between the programmable terminal NS and multi-controller ZS-MDC or sensor controller ZS-LDC via the RS-232C enables setting the Smart Sensor, displaying the measured values, displaying graphs, and other features.

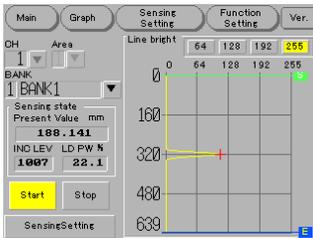
Displaying measured value



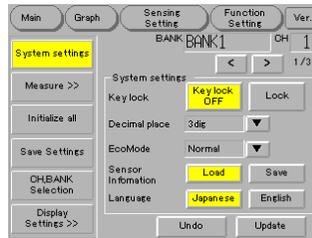
Displaying measured value in graphs



Sensing setting



Function setting



System Configuration

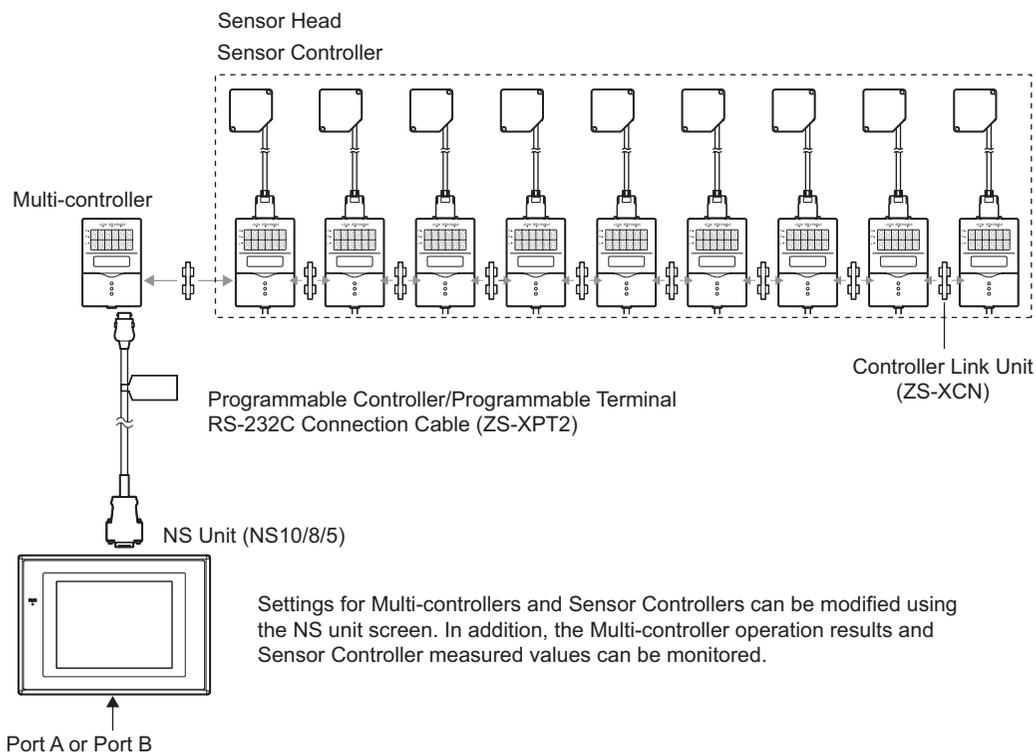
The figure below shows the system configuration.



CHECK!

The NS SmartMonitor and the SmartMonitor ZS for the PC cannot be used simultaneously. Do not connect the SmartMonitor ZS for the PC to the USB of a multi-controller or sensor controller while using the NS SmartMonitor. Simultaneous connections of NS SmartMonitor and SmartMonitor ZS for the PC will cause a communications error and malfunctions of the NS SmartMonitor and SmartMonitor ZS for the PC to occur.

● When connected to a multi-controller ZS-MDC



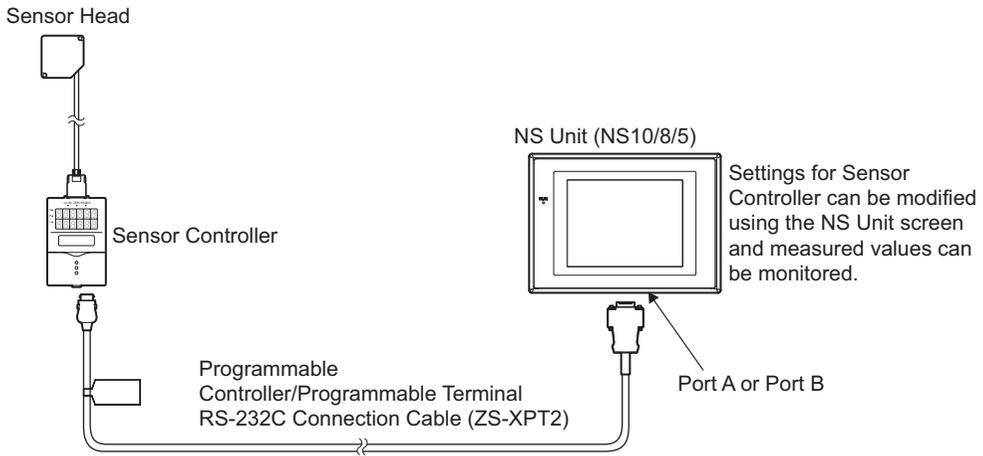
The sensor controller can be directly monitored by selecting the target controller to be monitored when the NS SmartMonitor is connected to the multi-controller.

To select the target controller, specify the channel (CH) number, which is assigned to the target controller.

For more information about the assignment of channel (CH) numbers, refer to the ZS-MDC User's Manual.

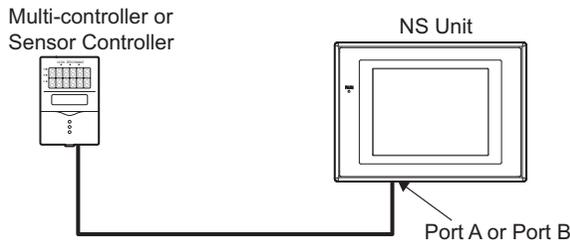
● **When connected to a sensor controller ZS-LDC**

Only the connected sensor controller can be monitored when the NS SmartMonitor is connected to the sensor controller.

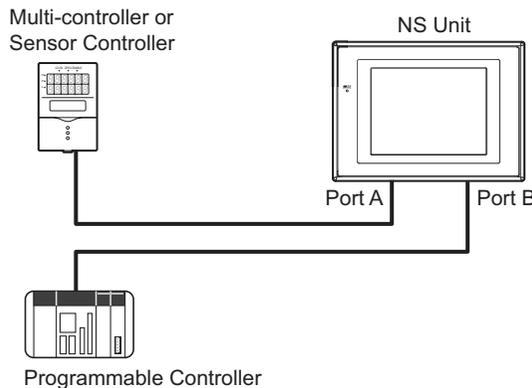


Two ways of using the NS unit are provided: one is the way to use exclusively for the NS SmartMonitor, and the other is the way to use the NS unit by switching between the user creation screen and the NS SmartMonitor when connected to the programmable controller.

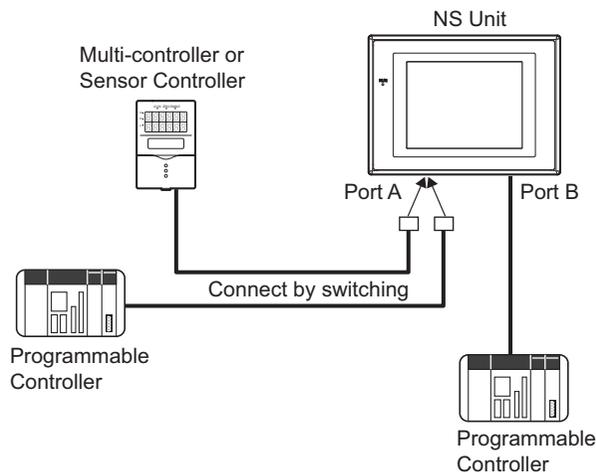
•When using exclusively for the SmartMonitor



•When using by switching between the NS SmartMonitor and the user creation screen (No connections of the controller and programmable controller are changed.)



- When using by switching between the NS SmartMonitor and the user creation screen (Connections of the controller and programmable controller are changed according to the usage.)



Resetting the NS unit once is necessary when switching between the NS SmartMonitor and user creation screen, thus it is not possible to display the user creation screen and the NS SmartMonitor simultaneously.

Communication with a multi-controller or sensor controller is available only when switching to the SmartMonitor.

Communication with a programmable controller is available only when switching to the user creation screen.

Restrictions of NS SmartMonitor

- **The NS SmartMonitor and the SmartMonitor ZS for the PC cannot be used simultaneously.**

Do not connect the SmartMonitor ZS for the PC to the USB of a multi-controller or sensor controller while using the NS SmartMonitor.

Simultaneous connections of NS SmartMonitor and SmartMonitor ZS for the PC will cause a communications error and malfunctions of the NS SmartMonitor and SmartMonitor ZS for the PC.

- **Do not perform the key operations for the multi-controller or sensor controller when using the NS SmartMonitor. Do not perform bank switching by using the external input line.**

The operations above may cause communication errors or may cause a malfunction of the NS SmartMonitor.

Operating Environment for NS SmartMonitor

- The NS unit and its system version where the NS SmartMonitor can be started up are described below:

Check your NS unit model and system version.

Model	System version
NS10-TV0□-V1	6.02 or later
NS8-TV□□-V1	6.02 or later
NS5-SQ0□-V1	6.02 or later
NS5-SQ0□-V2	6.20 or later
NS5-TQ0□-V2	6.20 or later
NS5-MQ0□-V2	6.20 or later

- A memory card (CF) is required to operate the NS SmartMonitor. The memory card shall be separately prepared.

■ Recommended memory card

Model	Memory size	Memory types
HMC-EF172	15M	Flash memory
HMC-EF372	30M	
HMC-EF672	64M	



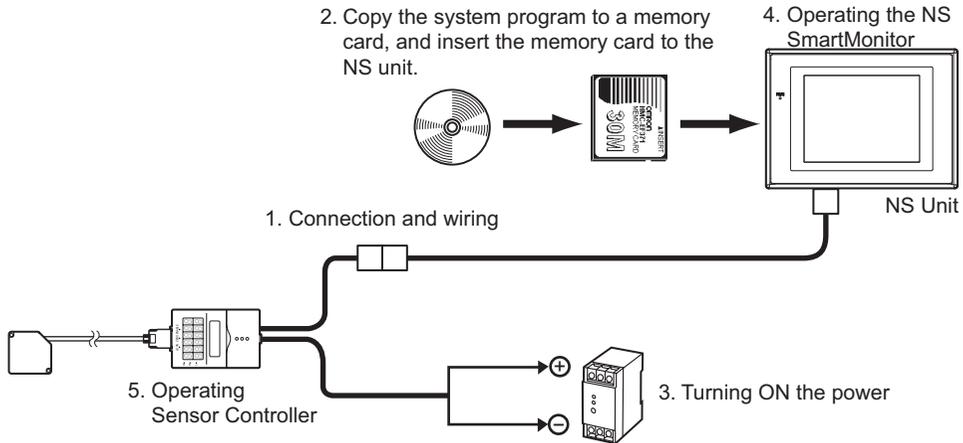
The memory capacity used by the system is approximately 12 M bytes.
About 600 K bytes are required to save the file of graph data.

CHECK!

It is necessary to prepare a memory card by taking into account the number of times graph data is saved.

Operation procedure

This section describes an overall operation procedure.



(1) Connection and wiring

Connect the sensor head/sensor controller/multi-controller, and NS unit.

Refer to "System Configuration" for details on connection between controller and NS unit.



- System Configuration p.1-3
- For details on wiring, refer to the User's Manual for the respective controller.

(2) Copy the system program to a memory card, and insert the memory card to the NS unit.

Copy the system program on the CD of NS SmartMonitor to a memory card, and insert the memory card to the NS unit.



- Copying the system program to a memory card p.2-1
- Recommended memory card p.1-7

(3) Turning ON the power

Turning ON the power of the sensor controller/multi-controller, and NS unit.

The main screen is displayed when the communication with the sensor controller/multi-controller is normally established. The following message is displayed when the communication could not be normally established:

"Time-out occurred during the data reception. Are you sure you wish to continue?"

You can check the communication setting when selecting No."

The "System Menu (Communication Setting)" screen is displayed when No is selected.

Check the communication settings such as the connection port for the sensor controller or multi-controller, baud rate, and data length when the "Communication Setting Screen" is displayed.

 Communication Screen Operation Method (System Menu) p.3-23

(4) Operating the NS SmartMonitor

The NS SmartMonitor is used to display the waveform by converting the displacement data from the respective controllers, and performing the settings related to the measurements.

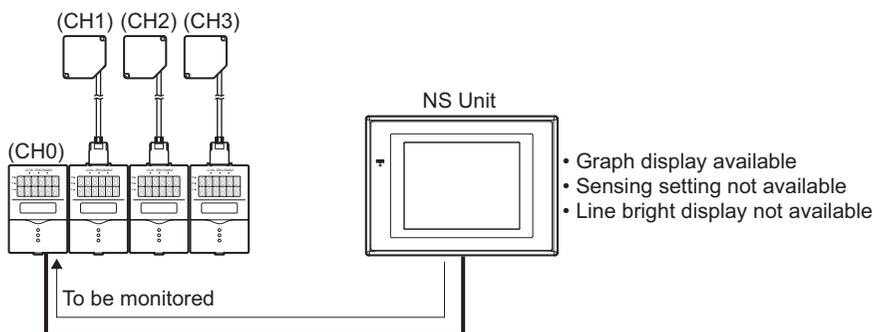
To display the settings or measured value of the sensor controller, which is connected to the multi-controller, change the "CH" column on the display screen of the NS unit and select the channel (CH) number of the target controller.

Setting and displaying the following items can be implemented on the NS SmartMonitor.

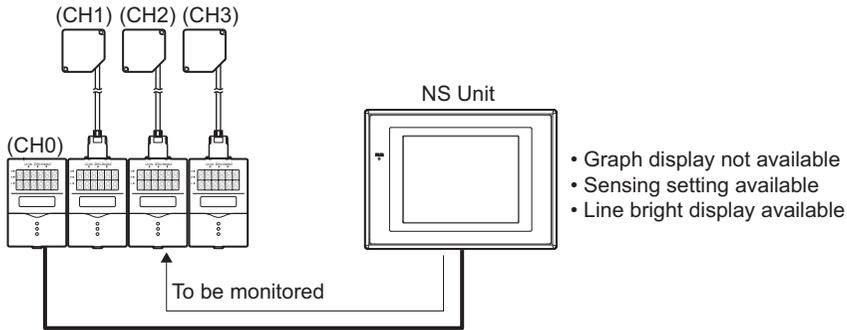
- Displaying measured values
- Displaying measured values by plotting on the graph
- Performing the sensing setting
- Setting functions

The contents of setting or displaying may differ depending on the types of controllers, which monitor the measured values.

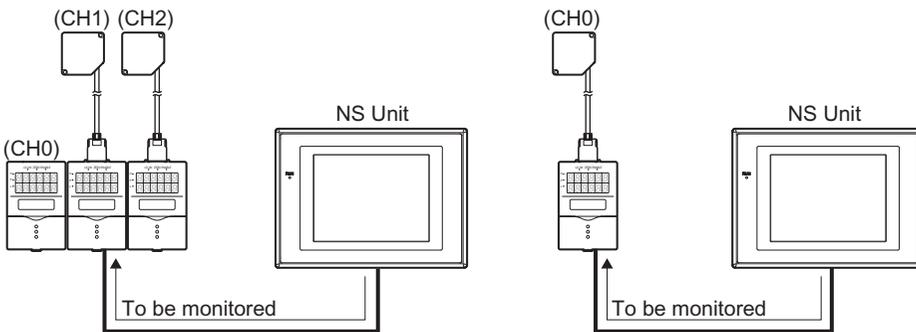
- When the connection destination and monitor target is a multi-controller



- When the connection destination is a multi-controller and monitor target is a sensor controller



- When the connection destination is a sensor controller



- Graph display available
- Sensing setting available
- Line bright display available
- Only connected Sensor Controller can be operated.

(5) Operating multi-controller and sensor controller

Displays the current measured value.

Various types of input related to the setting or measurement of the threshold value to the measured value can be implemented by operating keys on the respective controllers.



CHECK!

Do not perform the key operations for the multi-controller or sensor controller when using the NS SmartMonitor. Do not perform bank switching by using the external input line.

The operations above may cause communication errors or may cause a malfunction of the NS SmartMonitor.

Section 2

Startup and End

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	NS SmartMonitor Automatic Start-up Procedure	2-4
	NS SmartMonitor Selection Start-up Procedure	2-8
☒	How to switch from the NS SmartMonitor to the user creation screen	2-13

Starting up and Ending NS SmartMonitor

There are two methods to start up NS SmartMonitor.

■ Using the NS unit exclusively for the NS SmartMonitor

Starting up the NS unit with the NS SmartMonitor Automatic Start-up Memory Card will start up the NS SmartMonitor.

Starting up the NS unit without the NS SmartMonitor Automatic Start-up Memory Card starts up the user creation screen.



NS SmartMonitor Automatic Start-up Procedure p.2-4

■ Use by switching between the NS SmartMonitor and the user creation screen

Operating the "System Menu" of the NS unit with the NS SmartMonitor Selection Start-up Memory Card can switch between NS SmartMonitor and user creation screen.

Resetting the NS unit or turning OFF and then ON the power when NS SmartMonitor is running, starts up the NS SmartMonitor.



CHECK!

Resetting the NS unit once is necessary when switching between the NS SmartMonitor and user creation screen, thus it is not possible to display the user creation screen and the NS SmartMonitor simultaneously.

Communication with a multi-controller or sensor controller is available only when switching to the SmartMonitor.

Communication with a programmable controller is available only when switching to the user creation screen.



•NS SmartMonitor Selection Start-up Procedure p.2-8

•How to switch from the NS SmartMonitor to the user creation screen p.2-13

How to start up the NS SmartMonitor

Files below are saved on the CD-ROM for NS SmartMonitor.

Select the necessary file(s) according to the type of the NS unit to be used.

NS5SmartMonAUTO.exe: For the NS5 series NS SmartMonitor Automatic Start-up

NS5SmartMonEXT.exe: For the NS5 series NS SmartMonitor Selection Start-up

NS8SmartMonAUTO.exe: For the NS8/NS10 series NS SmartMonitor Automatic Start-up

NS8SmartMonEXT.exe: For the NS8/NS10 series NS SmartMonitor Selection Start-up



The "NS8SmartMonAUTO.exe" and "NS8SmartMonEXT.exe" files are used when using the NS12 series.

CHECK!

However, the display size of the NS SmartMonitor is displayed in the VGA size.



← NS12 Screen display size



Note that the system program to be stored in the memory card is different for the "NS SmartMonitor Automatic Start-up Procedure" or "NS SmartMonitor Selection Start-up Procedure."

CHECK!

NS SmartMonitor Automatic Start-up Procedure

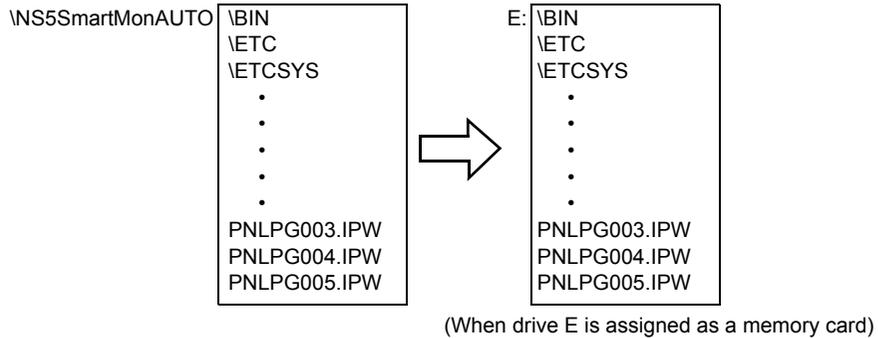
This section describes the NS SmartMonitor automatic start-up procedure using the example of the NS5 series.

1. Copy the "NS5SmartMonAUTO.exe" file on the NS SmartMonitor CD-ROM to the hard disk in the PC.
2. Double click the NS5SmartMonAUTO.exe file, which was copied to the PC.

The following directories and files are created.

```
\NS5SmartMonAUTO \BIN
                    \ETC
                    \ETCSYS
                    \FGW
                    \FONT
                    \OTHER
                    \RUN
                    \SYS
                    BankName.txt
                    datalog.cfg
                    DefBaseLDC.ini
                    DefBaseLDCR.ini
                    DefBaseMDC.ini
                    DefBaseMDCR.ini
                    EXTPROG1.LST
                    Label.txt
                    mm.txt
                    omron.hst
                    print.cfg
                    SmartMon.IPP
                    time.txt
                    unit.txt
                    unitcom.txt
                    unitcom1.txt
                    PNLPG000.IPW
                    PNLPG001.IPW
                    PNLPG002.IPW
                    PNLPG003.IPW
                    PNLPG004.IPW
                    PNLPG005.IPW
                    PNLPG006.IPW
                    PNLPG007.IPW
                    PNLPG00A.IPW
                    PNLPG00B.IPW
                    PNLPG00F.IPW
                    PNLPG010.IPW
                    PNLPGFFE.IPW
                    PNLPGFFF.IPW
```

3. Copy the following folders and files in the "NS5SmartMonAUTO" directory to the root directory of the memory card.



4. Turn OFF the power of the NS unit, and insert the memory card described above to the memory card connector on the side of the NS unit.



- Before inserting/removing the memory card, make sure that the NS unit power is turned OFF.
- Check the system security before performing the operations such as turning ON/OFF the power and pressing the reset switch.
- Do not turn OFF the power of the NS unit or remove the memory card while accessing the memory card.

5. Connect the NS unit to the multi-controller or sensor controller, then turn ON the power of the NS unit.

The following start-up screen is displayed.

Select the language to be displayed on the NS SmartMonitor screens.

After selecting the language, when the ZS series controller has been started up, press the [OK] button according to the instructions displayed on the screen.



- When the NS SmartMonitor starts up, characters are displayed on the screen in the previously selected language.
- When the NS SmartMonitor starts up for the first time the start-up screen is displayed in English. Selecting the [Japanese] button switches the screen display to Japanese.

6. The NS SmartMonitor program is executed and the Main Screen below is displayed.



The following message is displayed when the communication could not be normally established:

"Time-out occurred during the data reception. Are you sure you wish to continue? You can check the communication setting when selecting No."

The [System Menu (Communication Setting)] screen is displayed when [No] is selected.

Communication Setting Screen



[Write] button

Change the communication setting, then reset the NS unit.

When the [System Menu (Communication Setting)] screen is displayed, check the communication settings such as the connection port for the sensor controller or multi-controller, baud rate, and data length.

 Communication Setting Screen Operation Method (System Menu) p.3-23

When the communication returns to normal while the connection stand-by screen is displayed, the screen will automatically switch to the Main Screen.



- Never remove the memory card from the NS unit while the NS SmartMonitor is running. Removing the memory card while the NS SmartMonitor is running will cause malfunctions of the NS SmartMonitor.
- If the memory card is removed from the NS unit during the NS SmartMonitor is running, insert the memory card, then reset the NS unit.
- If the message described below is displayed upon start-up and the system does not start up normally, the version number of the NS unit system may be older than "6.02". In the NS SmartMonitor CD-ROM, the NS unit system with the version number "6.20" is contained. In addition, update the NS unit system version to "6.20" according to the

"procedure for updating the NS unit system to V6.20.pdf", which is contained in the CD-ROM.

"Failed to read host registration. Correct host registration with NS-Designer. Then, press OK and download project data."

Or,

"Could not read project [Data log]. Press OK button and download project data."

NS SmartMonitor Selection Start-up Procedure

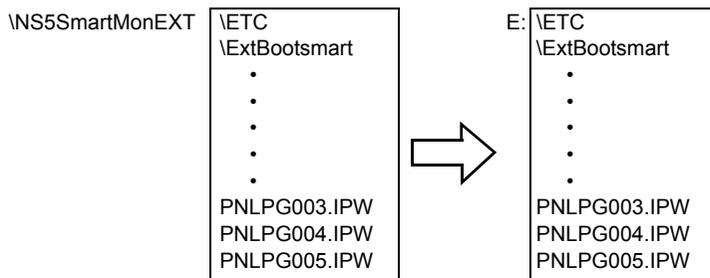
This section describes the procedures for the start-up by switching from the user creation screen to the NS SmartMonitor in the NS unit when the user creation screen is displayed by using the example of the NS5 series.

1. Copy the "NS5SmartMonEXT.exe" file on the NS SmartMonitor CD-ROM to the hard disk in the PC.
2. Double click the NS5SmartMonEXT.exe file, which was copied to the PC.

The following directories and files are created.

```
\NS5SmartMonEXT  \ETC
                  \ExtBootsmart  \BIN
                                      \ETCSYS
                                      \FGW
                                      \FONT
                                      \OTHER
                                      \SYS
\RUN
\sys
datalog.cfg
DefBaseLDC.ini
DefBaseLDCR.ini
DefBaseMDC.ini
DefBaseMDCR.ini
omron.hst
print.cfg
SmartMon.IPP
STARTUP.BAT
BankName.txt
Label.txt
mm.txt
time.txt
unit.txt
unitcom.txt
unitcom1.txt
PNLPG000.IPW
PNLPG001.IPW
PNLPG002.IPW
PNLPG003.IPW
PNLPG004.IPW
PNLPG005.IPW
PNLPG006.IPW
PNLPG007.IPW
PNLPG00A.IPW
PNLPG00B.IPW
PNLPG00F.IPW
PNLPG010.IPW
PNLPGFFE.IPW
PNLPGFFF.IPW
```

- 3.** Copy the folders and files in the "NS5SmartMonEXT" directory to the root directory of the memory card.



(When drive E is assigned as a memory card)

- 4.** Turn OFF the power of the NS unit, and insert the memory card described above to the memory card connector on the side of the NS unit.

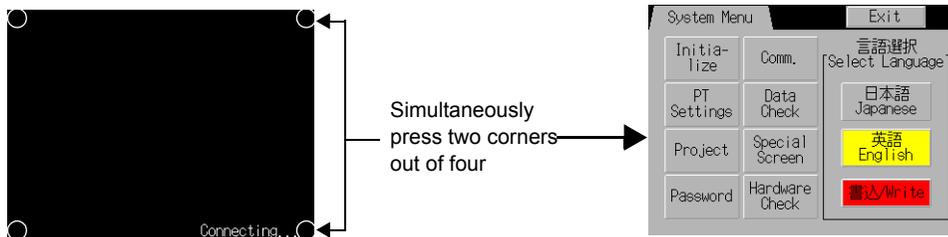


CHECK!

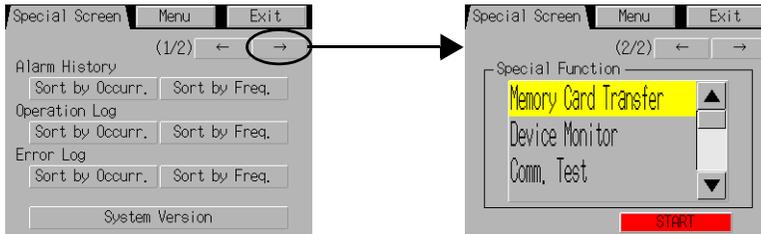
- Before inserting/removing the memory card, make sure that the NS unit power is turned OFF.
- Check the system security before performing the operations such as turning ON/OFF the power and pressing the reset switch.
- Do not turn OFF the power of the NS unit or remove the memory card while accessing the memory card.

- 5.** Connect the NS unit to the multi-controller or sensor controller, then turn ON the power of the NS unit.

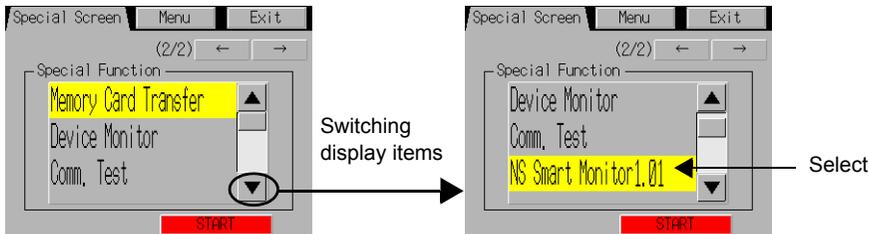
- 6.** Press two corners simultaneously out of four on the touch panel screen when the NS unit is in the operation mode or "Connecting..." is displayed on the bottom right side on the screen.



- 7.** Select [Special Screen] to display the [Special Function] on the second page (2/2) of the Special Screen by using [-->]/[<--] buttons.



- 8.** Select [NS SmartMonitor] in the [Special Function] and press the [START] button.



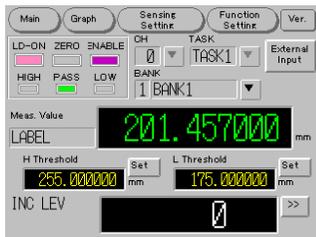
The NS unit is once reset, and the NS SmartMonitor is started up.
 (Check the configuration in the memory card and retry to operate from step 4 described above when "NS SmartMonitor" is not displayed in the [Special Function] menu.)

The following start-up screen is displayed when the NS SmartMonitor is started up.
 Select the language to be displayed on the NS SmartMonitor screens.
 After selecting the language, when the ZS series controller has been started up, press the [OK] button according to the instructions displayed on the screen.



When the NS SmartMonitor starts up, characters are displayed on the screen in the previously selected language.
 When the NS SmartMonitor starts up for the first time the start-up screen is displayed in English. Selecting the [Japanese] button switches the screen display to Japanese.

9. The NS SmartMonitor program is executed and the Main Screen below is displayed.

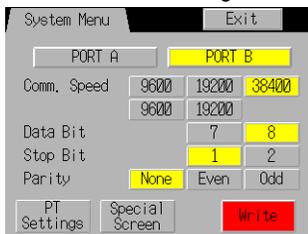


The following message is displayed when the communication could not be normally established:

"Time-out occurred during the data reception. Are you sure you wish to continue? You can check the communication setting when selecting No."

The [System Menu (Communication Setting)] screen is displayed when [No] is selected.

Communication Setting Screen



↓ [Write] button

Change the communication setting, then reset

When the [System Menu (Communication Setting)] screen is displayed, check the communication settings such as the connection port for the sensor controller or multi-controller, baud rate, and data length.

Communication Setting Screen Operation Method (System Menu) p.3-23

When the communication returns to normal while the connection stand-by screen is displayed, the screen will automatically switch to the Main Screen.



- Never remove the memory card from the NS unit while the NS SmartMonitor is running. Removing the memory card while the NS SmartMonitor is running will cause malfunctions of the NS SmartMonitor.
- If the memory card is removed from the NS unit during the NS SmartMonitor is running, insert the memory card, then reset the NS unit.
- If the message described below is displayed upon start-up and the system does not start up normally, the version number of the NS unit system may be older than "6.02". In the NS SmartMonitor CD-ROM, the NS unit system with the version number "6.20" is contained. In addition, update the NS unit system version to "6.20" according to the

Section 2

How to start up the NS SmartMonitor

"procedure for updating the NS unit system to V6.20.pdf", which is contained in the CD-ROM.

"Failed to read host registration. Correct host registration with NS-Designer. Then, press OK and download project data."

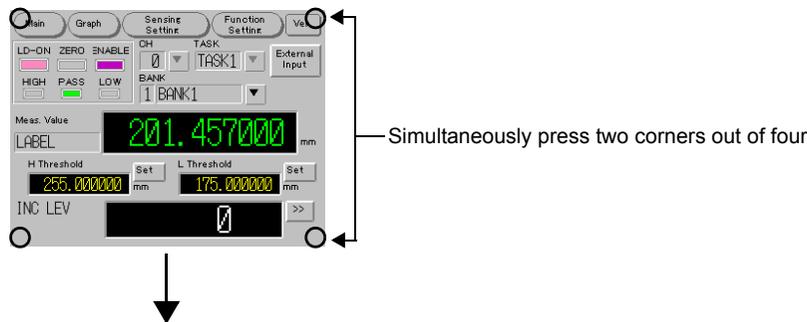
Or,

"Could not read project [Data log]. Press OK button and download project data."

How to switch from the NS SmartMonitor to the user creation screen

The procedure for switching to the user creation screen from the NS SmartMonitor upon the NS SmartMonitor selection start-up is described below:

- 1. Press two corners simultaneously out of four on the touch panel screen of the NS unit to display the [System Menu] screen.**



- 2. Press the [Special Screen] button to display the [System Menu (Special Screen)].**



- 3. Select the [NS SYSTEM] and press the [START] button.**

4. The NS unit is reset and started up with the user creation screen.



To restart the NS SmartMonitor from the user creation screen, perform step 6 and then later in the "NS SmartMonitor Selection Start-up Procedure" of the "How to start up the NS SmartMonitor", perform this with the NS SmartMonitor Selection Start-up Memory Card inserted.

Section 3

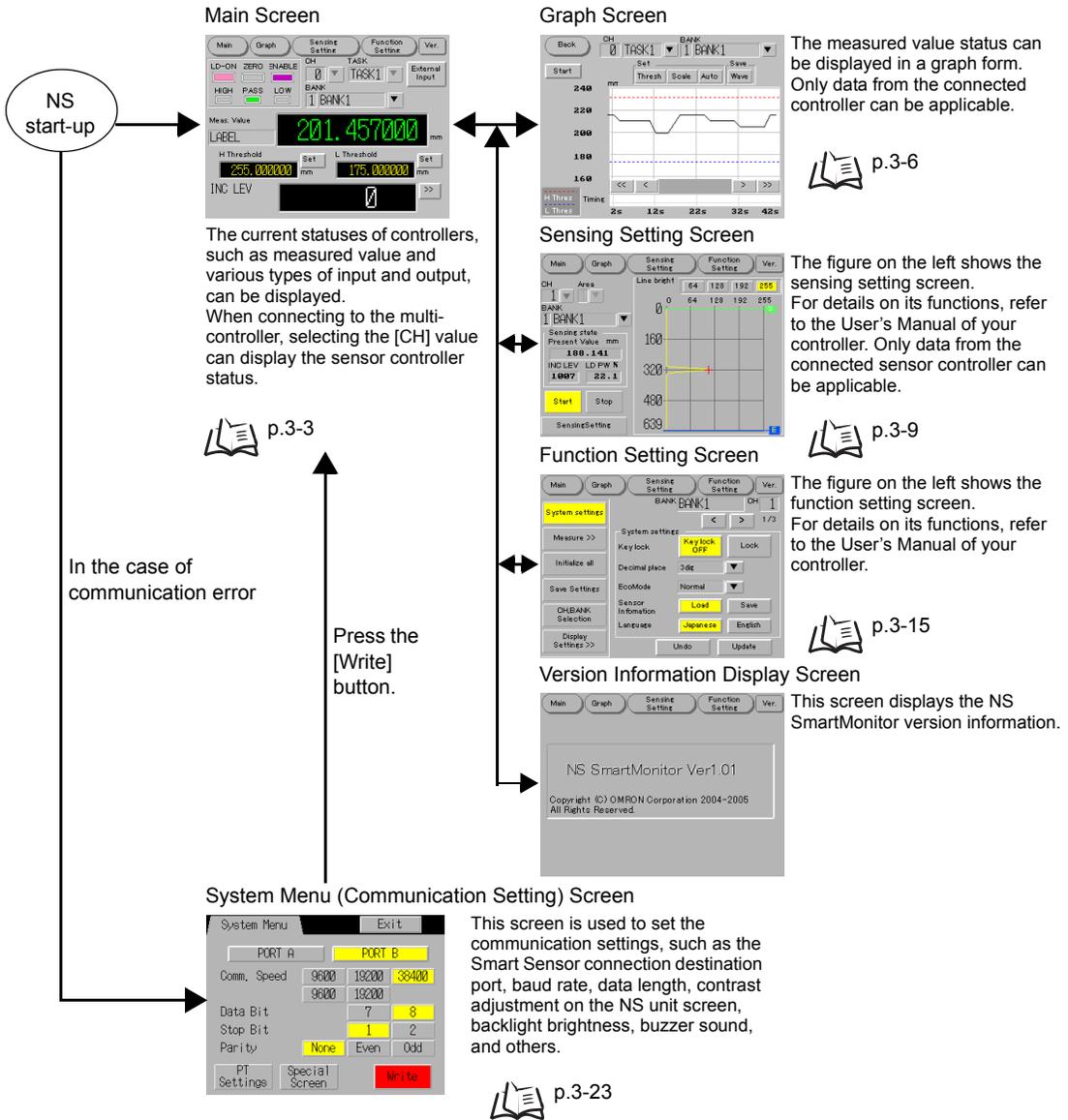
Operating Method

 Screen Layout	3-2
 Monitoring Measured Value (Main Screen)	3-3
 Displaying Measured value on the Graph Form (Graph screen)	3-6
 Setting Sensing Items (Sensing Setting Screen)	3-9
 Setting Controller Conditions (Function Setting Screen)	3-15
 System Menu	3-23

Screen Layout

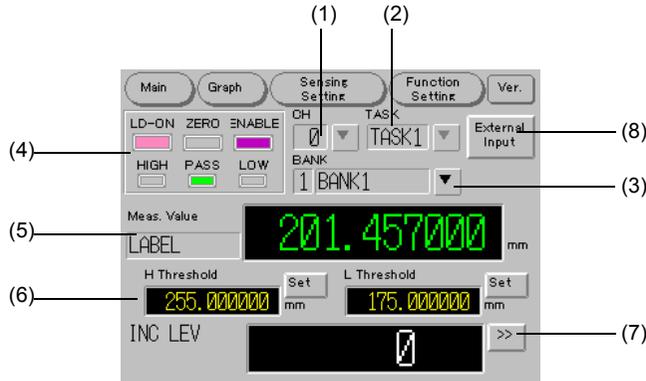
The NS SmartMonitor displays the screens below to display the waveform by converting the displacement data from the ZS series controllers, and performs the settings related to the measurements.

To switch to the respective screen, press the [Main], [Graph], [Sensing Setting], [Function Setting], or [Ver.] button on the upper part of the screen.



Monitoring Measured Value (Main Screen)

The current statuses of controllers, such as measured value and various types of input and output, can be displayed.



(1) CH display and CH switch pull-down menu

This menu is used to select the channel number of the target controller to display the measured value and status.

The selection of target CH is available only when connecting to the multi-controller.

(2) TASK display and TASK switch pull-down menu

This menu is used to select the task number of the controller to display the measured value and status.

The target CH numbers differ between the multi-controller and sensor controller.

•When the target CH is a multi-controller:

The task can be selected from the range between [TASK1] to [TASK4].

•When the target CH is a sensor controller:

The task can be selected from the range between [TASK1] to [TASK3].



CHECK!

With respect to the sensor controller, the settings below perform the 2-area measurement:

- Setting when [Glass material]=[FILM/OTHERS]
- Setting when [Glass thickness measurement mode]=[Move]

TASK result varies as below depending on the 2-area measurement and others:

	When 2-area measurement is performed	When measurement other than 2-area measurement is performed
TASK1	Surface distance	Measurement result (*1)
TASK2	Rear surface distance	Unused (*2)
TASK3	Thickness distance	Unused (*2)

*1: The result is a thickness distance value when the thickness measurement is set.

Other than the above, the result is a surface distance value.

*2: An error always occurs.

(3) BANK switch pull-down menu

This menu is used to select a bank number of the controller to display the measured value and status.

Switching BANK may take some time.

(4) Indicators

Indicators display the current statuses of LD-ON, ZERO, ENABLE, HIGH, PASS, and LOW.

(5) Measured value display

Displays the current measured value.

The display functions the same as the main digital function of the controller.



•[Error] is displayed when an error occurs in the measurement.

• **LABEL** Any characters (5 in 2-byte character and 10 in 1-byte character) can be displayed on the display. Characters to be displayed are set on the [Function Setting (Label setting)] screen.

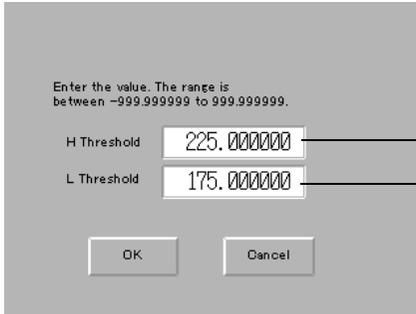


Display setting p.3-22

(6) Threshold value display

Displays the present L Threshold and H Threshold values.

Pressing the [Setting] button switches to the following screen to enable the threshold value setting.



Pressing a column displays the input pad for the value setting.

Setting is available in the range of (H Threshold - Hysteresis) > L Threshold.

(7) Sub-display

Displays Incident Level, Current, Voltage, Resolution, LD power, and Present Value with the switch function.

To switch the display, press the [>>] button.

Displayed items differ according to the target CH controller.

Incident Level: Displayed only when the target CH is a sensor controller.

Current: Displayed only when the target CH controller is set to [Current].

Voltage: Displayed only when the target CH controller is set to [Voltage].

Resolution: Always displayed.

LD power: Displayed only when the target CH is a sensor controller.

Present Value: Always displayed.

Label is also displayed when the Resolution and Present Value are displayed.



CHECK!

- [ERROR] is displayed when an error occurs in the measurement for the respective item display.
- Label can be displayed by setting any characters (5 in 2-byte character and 10 in 1-byte character) on the [Function Setting (Label setting)] screen.



Display setting p.3-22

(8) [External Input] button

This button is used to disable the external input line of the target CH controller and to enable the input buttons.

Care shall be taken when performing measurement using the external input line.

Pressing the [External Input] button switches the display as below:



LD-OFF [Start]/[End] button

Pressing the [Start] button stops the laser emittance and switches to the [End] button.

Pressing the [End] button restarts the laser emittance and switches to the [Start] button.

TIMING [Input] button

Controller enters into the timing-input ON state while pressing the [Input] button.

RESET [Execut] button

Controller enters into the hold reset ON state while pressing the [Execut] button.

ZERO [Execut]/[Cancel] button

Pressing the [Execut] button executes the zero reset process and switches to the [Cancel] button.

Pressing the [Cancel] button cancels the zero reset process and switches to the [Execut] button.

[Back] button

Pressing this button enables the external input line and goes back to the [CH], [TASK], and [BANK] display.

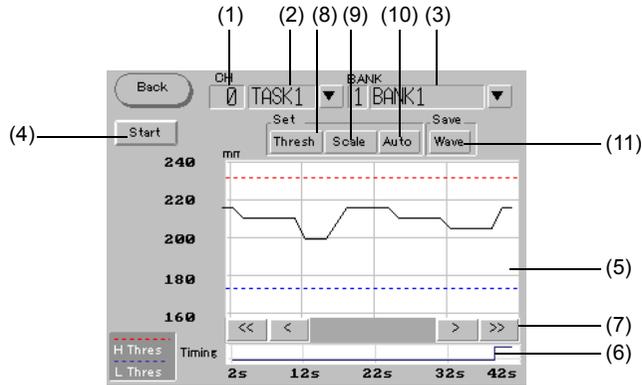


CHECK!

Enabling the external input is necessary when switching to the [Graph], [Sensing Setting], or [Function Setting] screen.

Displaying Measured value on the Graph Form (Graph screen)

The measured value status can be displayed in a graph form.
Only data from the connected controller can be applicable.



(1) CH display

Displays the channel number of the target controller, which is connected, to display the measured value in a graph form.

(2) TASK display and TASK switch pull-down menu

This menu is used to select the task number of the controller to display the measured value in a graph form.

The target CH numbers differ between the multi-controller and sensor controller.

- When the target CH is a multi-controller:

The task can be selected from the ranges between [TASK1] to [TASK4], and between [Input A] to [Input I].

- When the target CH is a sensor controller:

The task can be selected from the range between [TASK1] to [TASK3].

 About TASK p.3-3

(3) BANK switch pull-down menu

This menu is used to select the BANK number of the controller to display the measured value in a graph form.

Switching BANK may take some time.

(4) [Start]/[Stop] button

This button is used to start/stop the graph display.

(5) Displaying Measured Value in a Graph Form

Displays Measured Values by plotting them on the graph.

[Measured Value], [H Threshold], and [L Threshold] are plotted in the black line, red

dotted line, and blue dotted line, respectively, to be displayed.

The graph retains the measured values equivalent for 3 minutes and 20 seconds.

(6) Timing signal

Displays ON/OFF status of timing signal in Timing Chart.

(7) Graph Display Scroll buttons, [<<], [<], [>], and [>>]

These buttons are used to scroll the time axis on the graph display.

[<<] : FBack for one page of the graph display.

[<] : FBack for one scale of the graph display.

Back for two scales when the horizontal axis scale is set to [500ms/div].

[>] : FForward for one scale of the graph display.

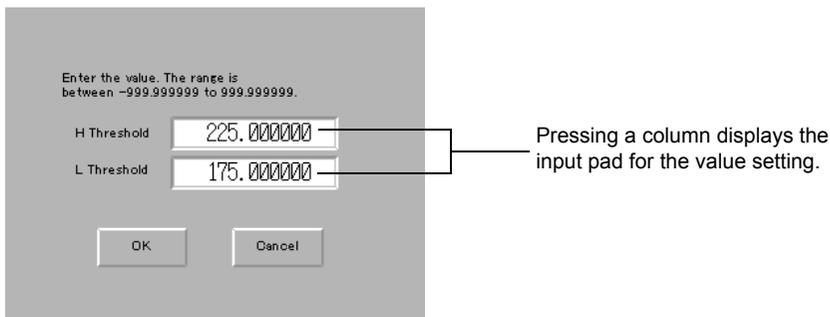
Forward for two scales when the horizontal axis scale is set to [500ms/div].

[>>] : FForward for one page of the graph display.

Operation is disabled when obtaining the measurement data.

(8) [Threshold] button

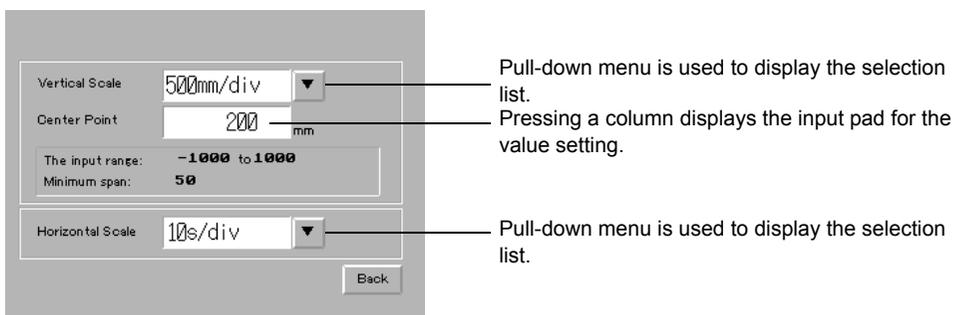
Switches to the following screen and enables the threshold value setting.



Setting is available in the range of (H Threshold - Hysteresis) > L Threshold.

(9) [Scale] button

Switches to the following screen to set the vertical axis (numeric value axis) and horizontal axis (time axis).



Vertical Scale: Sets the scale on the vertical axis in the graph plot section.

Center Point: Sets the center value on the vertical axis in the graph plot section.

Values within the input range can be set.

Setting values are rounded at the value of minimum input range.

Horizontal Scale: Sets the scale on the horizontal axis in the graph plot section.

(10) [Auto] button

Sets the vertical axis on the scale in the graph plot section, where H Threshold and L Threshold can be displayed.

(11) [Waveform] button

Saves the displayed waveform on the graph as a csv file.

Data is saved in the Log folder on the memory card.

The name of the saved file is shown below:

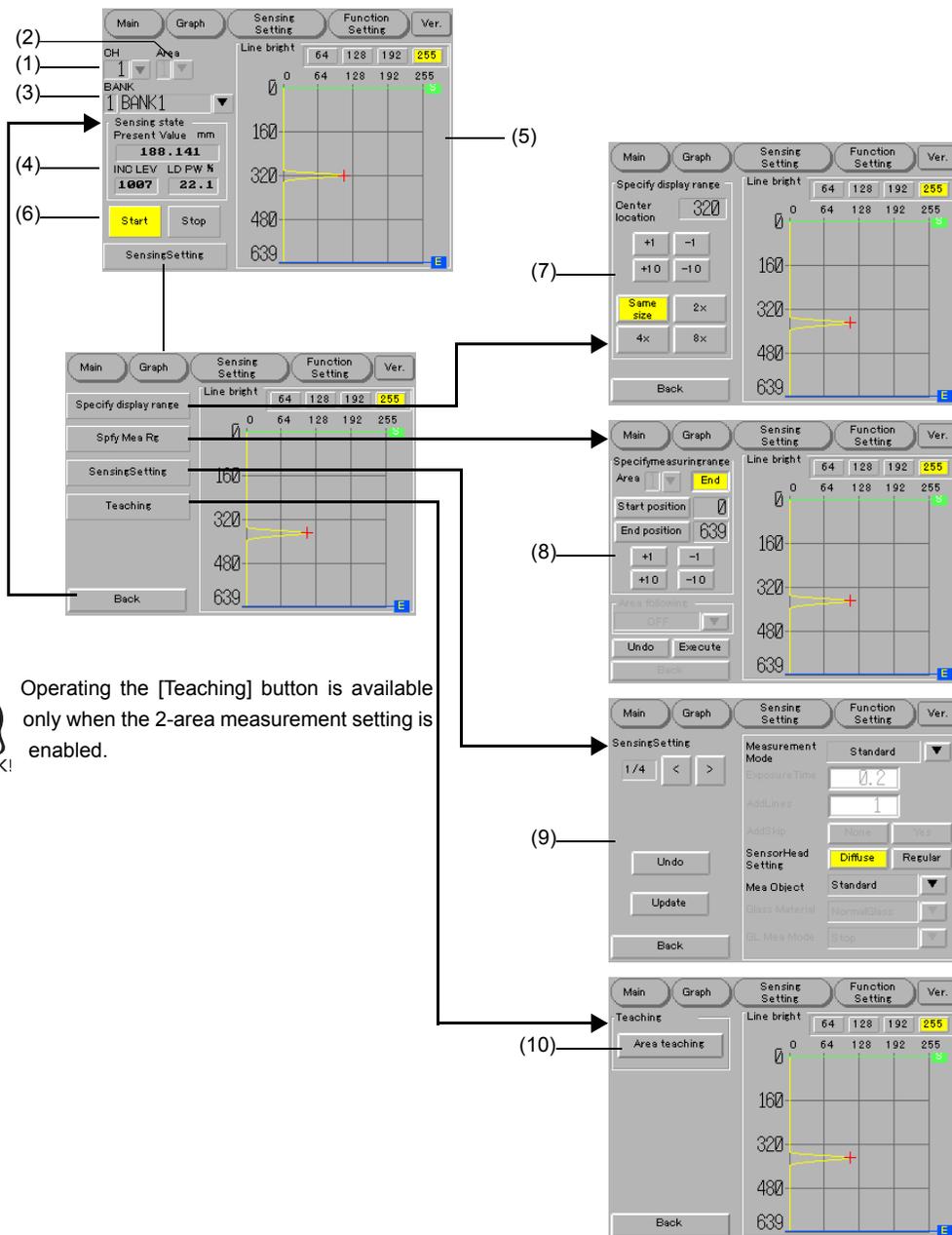
GRAPH***.csv (***)is automatically replaced with serial numbers whose range is between 000 to 999).

Setting Sensing Items (Sensing Setting Screen)

The figure below shows the sensing setting screen.

For details on its functions, refer to the User's Manual of your controller.

Only data from the connected sensor controller can be applicable.



(1) CH display and CH switch pull-down menu

This menu is used to select the channel number of the target controller to display the measured value and status.

The selection of target CH is available only when connecting to the multi-controller.

(2) Area display and area switch pull-down menu

This menu is used to select the display area when performing a 2-area measurement.

The line bright waveform in the specified area is displayed in the line bright display section.

Operation is available only when the 2-area measurement setting is enabled.

(3) BANK switch pull-down menu

This menu is used to select a bank number of the controller to display the measured value and status.

Switching BANK may take some time.

(4) Sensing State Display

Displays the Present Value, Incident Level, and LD Power.

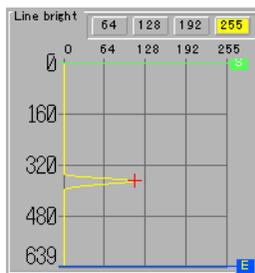
Present Value: Displays the distance of sensing result for the measurement target area.

INC LEV (Incident Level): Displays the received light amount of the sensing result for the measurement target area.

LD PW (LD power): Displays the emitted light intensity of the present sensor head.

(5) Line Bright Display

Displays line bright data by plotting it on a graph.



Switching the graph display range in the horizontal direction by using the [64], [128], [192], and [255] buttons.

[64] button: Displays the graph in the range between 0 and 64 of the Incident Level.

[128] button: Displays the graph in the range between 0 and 128 of the Incident Level.

[192] button: Displays the graph in the range between 0 and 192 of the

Incident Level.

[255] button: Displays the graph in the range between 0 and 255 of the Incident Level.

The [S] bar indicates the start position of an area.

The [E] bar indicates the end position of an area.

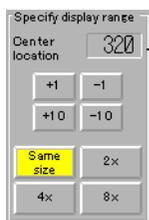
A cross mark indicates the peak value in the line bright display.

(6) [Start] and [Stop] buttons

Pressing the [Start] button starts to monitor the sensing state and the line bright data. Pressing the [Stop] button stops the monitoring of the sensing state and line bright data.

(7) [Specify display range] screen

Sets the display range of the line bright display.



Pressing a column displays the input pad for the value setting.

Center location setting: Sets the vertical axis display center location of the line bright display section.

[+1] button: Increments the vertical axis display center location of the line bright display section by one.

This button is valid when display magnification is two, four, or eight.

[+10] button: Increments the vertical axis display center location of the line bright display section by ten.

This button is valid when display magnification is two, four, or eight.

[-1] button: Decrements the vertical axis display center location of the line bright display section by one.

This button is valid when display magnification is two, four, or eight.

[-10] button: Decrements the vertical axis display center location of the line bright display section by ten.

This button is valid when display magnification is two, four, or eight.

[Same Size] button: Displays the vertical axis of the line bright display section in the same magnification in the range between 0 to 639.

- [2x] button: Displays the vertical axis of the line bright display section in the range between [Center location - 160] to [Center location +160].
- [4x] button: Displays the vertical axis of the line bright display section in the range between [Center location -80] to [Center location +80].
- [8x] button: Displays the vertical axis of the line bright display section in the range between [Center location -40] to [Center location +40].

(8) [Specify measuring range] screen

This screen is used to set the start position and end position of the measurement area.

Measurement is performed only for the area when an area is specified. This is effective when removing the impact from the phase, which is irrelevant with the measurement.



Pressing a column displays the input pad for the value setting.
 The operation above is available only in the area setting mode.

Area: Selects the display area for performing 2-area measurement.
 Operation is available only when the 2-area measurement setting is enabled.

[Set] and [End] buttons: Switches between area setting mode and area monitoring mode.
 When the [Set] button is pressed, the mode is changed to the area setting mode, and the setting area function becomes available. The button display changes to [End].
 When the [End] button is pressed, the mode is changed to the area monitoring mode, and the area bar automatically moves according to the value obtained from the controller. The button display changes to [Set].

[Start Position] button: Pressing the button selects the start position, and press the [+1], [+10], [-1], or [-10] button to increment/decrement the setting value of the start position by [+1], [+10], [-1], or [-10].
 The operation above is available only in the area setting mode.

- Start/End position setting: The area start/end position can be set directly.
The operation above is available only in the area setting mode.
- [End Position] button: Pressing the button selects the end position, and press the [+1], [+10], [-1], or [-10] button to increment/decrement the setting value of the end position by [+1], [+10], [-1], or [-10].
The operation above is available only in the area setting mode.
- [+1] button: Increments the value of the selected position of the [Start position] or [End position] by one.
The operation above is available only in the area setting mode.
- [+10] button: Increments the value of the selected position of the [Start position] or [End position] by ten.
The operation above is available only in the area setting mode.
- [-1] button: Decrements the value of the selected position of the [Start position] or [End position] by one.
The operation above is available only in the area setting mode.
- [-10] button: Decrements the value of the selected position of the [Start position] or [End position] by 10.
The operation above is available only in the area setting mode.
- [Area following] selection: Selects the Area-2 area following method for performing 2-area measurement.
The operation above is available only when Area 2 is selected.
- [Undo] button: Changes back to the previous area setting values.
- [Execute] button: Transmits the contents of the change for area setting, and updates the setting values.



CHECK!



Note that the contents of the change are deleted when turning OFF the sensor controller even if the [Execute] button is pressed and the sensor controller parameters are changed.

Saving contents of the change p.3-20

(9) Sensing Setting

The setting values related to the sensing can be changed on the Sensing Setting Screen. The changed processing items are displayed in a red color.

Pressing the [←]/[→] button switches the setting item page.

Basic setting items are displayed on the first page, and the detailed sensing setting items, such as the noise rejection level setting on the CMOS elemental device and the emitted light intensity control are displayed on the second page.

Detailed setting items for the 2-area measurement setting are displayed on the third and fourth pages.

Operations on the third and fourth pages are available only when the 2-area measurement is valid.

Pressing the [Undo] button returns the respective sensing setting item to the previous state before the change.

Pressing the [Update] button transmits the contents of the change for sensing setting, and updates the setting values.



Note that the contents of the change are deleted when turning OFF the sensor-controller even if the [Update] button is pressed and the sensor-controller parameters are changed.



Save Settings p.3-20

(10) [Area teaching] button

The [Area teaching] button is used by pressing when automatically specifying or readjusting Area 2 for performing 2-area measurement.

Controller finds an optimum area within the adjacent range of the currently specified range.

Perform the manual area setting when specifying any area.

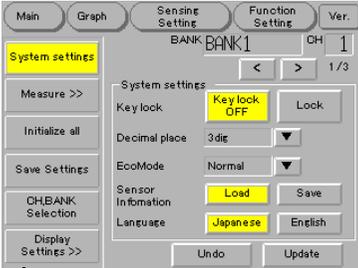
Setting Controller Conditions (Function Setting Screen)

The Function Setting screen is used to display a list of setting values, which are registered in the controller of the target CH.

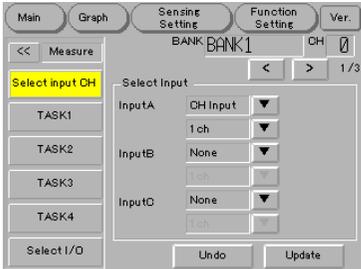
In addition, updating the setting values and transmitting them to the target controller are available.

For details on setting items, refer to the User's Manuals of the multi-controller and sensor controller.

Setting available items may differ between multi-controller and sensor controller, which are selected as [target CH].

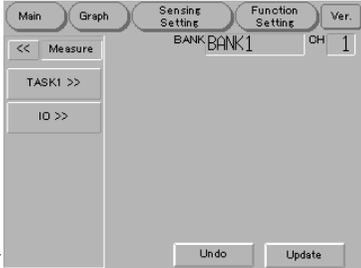


[Measure>>] button
(When the target CH is a multi-controller)



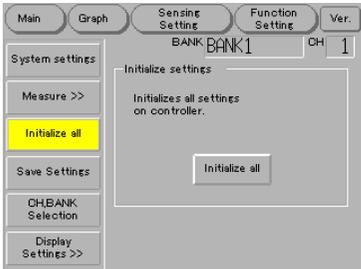
p.3-17

[Measure>>] button
(When the target CH is a sensor controller)



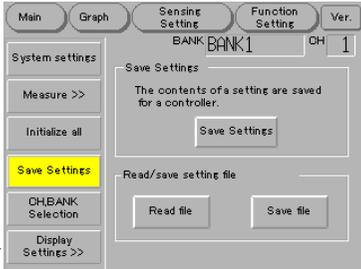
p.3-18

[Initialize all] button



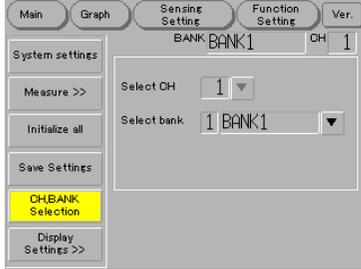
p.3-19

[Save Settings] button



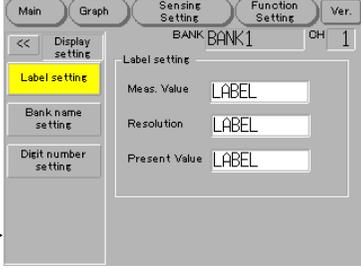
p.3-20

[CH, BANK Selection] button



p.3-21

[Display Settings>>] button

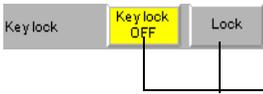


p.3-22

Common Operating Method

Each function setting item is configured with any of the selections by the radio button or from the pull-down menu, or direct input setting column.

● Radio button

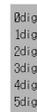


The currently selected setting value is displayed in a yellow color.

● Selection from Pull-down Menu



Pressing the [▼] button displays the pull-down menu. The pull-down menu is used to select a setting value.



● Numeric value input column



Pressing a column displays the input pad for the numeric value.

● Character string input column



Pressing a column displays the virtual keyboard for the character input.

[Undo] button

The [Undo] button is used to cancel the change of the setting contents. Pressing the [Undo] button returns to the state upon opening the Function Setting screen or the final update state.

[Update] button

The [Update] button is used to transmit the changed setting values to the controller of a target CH, and update the setting values.



Note that the contents of the change are deleted when turning OFF the power of a controller even if the [Update] button is pressed and the target CH controller setting values are changed.

CHECK!



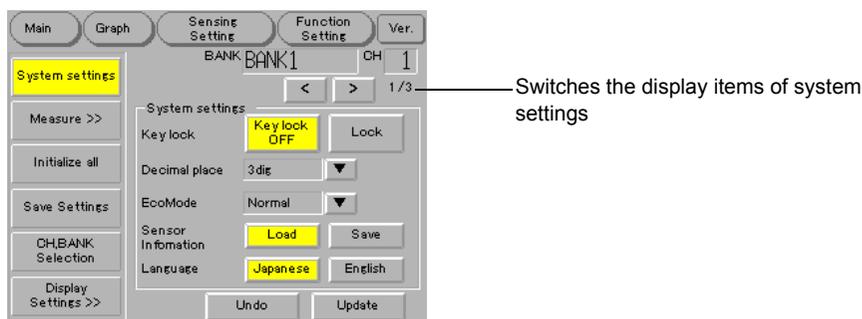
Save Settings p.3-20

■ System Settings

The System Settings screen is used to display a list of system setting values in the controller of the [Target CH].

Changing the setting values and pressing the [Update] button enables the transmission of the contents of the change to the target controller.

The processing items, which were changed from the setting contents in the controller of the [Target CH], are displayed in the red color.



■ Measurement settings

The Measurement Settings screen is used to display a list of setting values related to the controller of the [Target CH].

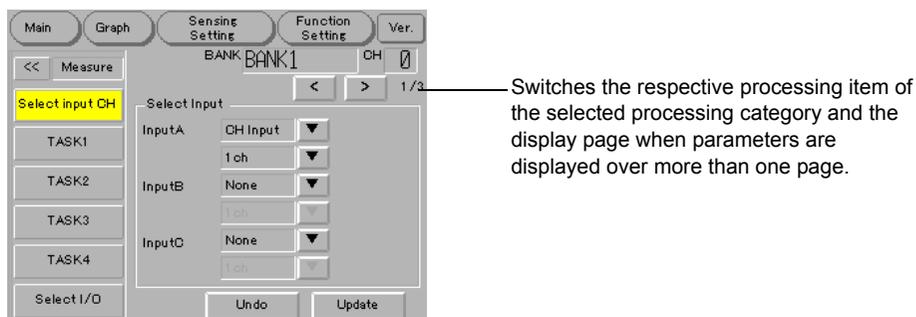
● When the [Target CH] is a multi-controller

The Measurement Settings screen displays the input CH assignment, calculation settings from TASK1 through TASK4, and I/O assignment status.

Changing the setting values and pressing the [Update] button enables the transmission of the contents of the change to the target controller.

The processing items, which were changed from the setting contents in the controller of the [Target CH], are displayed in the red color.

Pressing the [<<] button returns to the [Function Setting (System Settings)] screen.



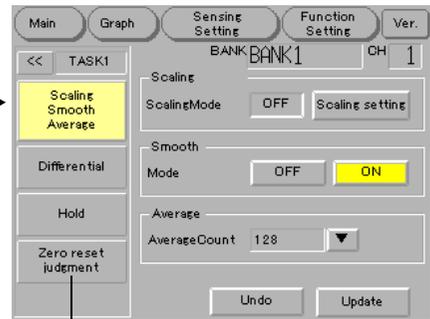
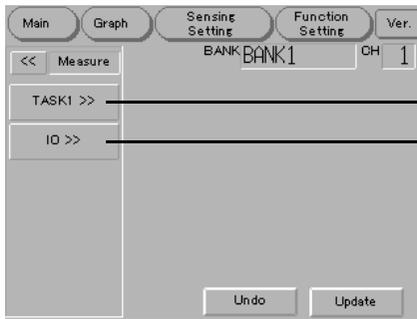
● **When the [Target CH] is a sensor controller**

Displays the status of respective item of function settings.

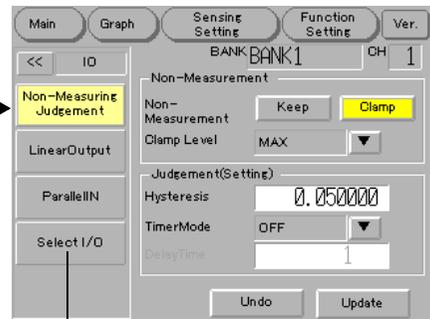
Changing the setting values and pressing the [Update] button enables the transmission of the contents of the change to the target controller.

The processing items, which were changed from the setting contents in the controller of the [Target CH], are displayed in the red color.

Pressing the [<<] button returns to the [Function Setting (System Settings)] screen.



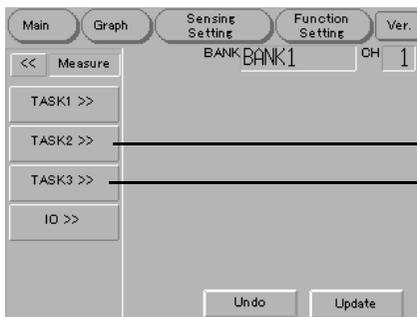
Select the processing item to be displayed.



Select the processing item to be displayed.



Settings TASK2 and TASK3 are available when 2-area measurement is set for the sensing setting.



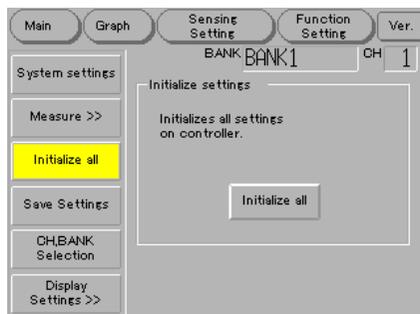
Setting for TASK2

Setting for TASK3

■ Initialize settings

The Initialize settings screen is used to initialize entire settings for the controller of the [Target CH].

Pressing the [Initialize all] button displays a dialog for the confirmation of setting initialization processing as below:



■ **Save Settings**

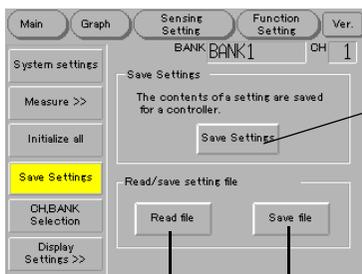
Pressing the [Save Settings] button saves the entire settings of the [Target CH] in the controller.

The contents upon saving are retained even when turning OFF the power of the target controller after saving the settings.

Pressing the [Read file] or [Save file] button enables the reading of the setting values from the file saved in the memory card, or the saving of the setting value data to the memory card.

The setting data is saved in the file with the specified name in the Setting folder on a memory card.

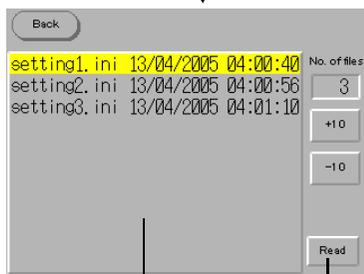
Single-byte alphanumeric characters, underscore (_), dollar mark (\$), and period (.) can be used for the file name.



Saves data to prevent the setting contents from being deleted even when turning OFF the power of the controller.

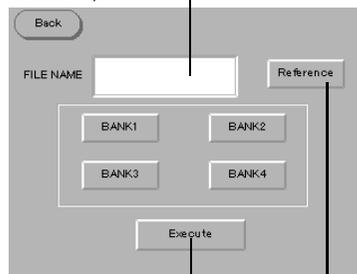
Sets the file name without extension (within eight characters.)

Characters [.ini] are automatically added as an extension. Pressing a column displays the virtual keyboard for the character input.



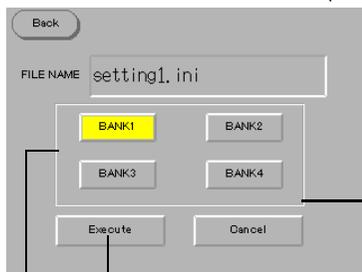
Displays a list of files saved on the Memory Card.

Selecting a file in the list and pressing the [Read] button can select a file to be overwritten.



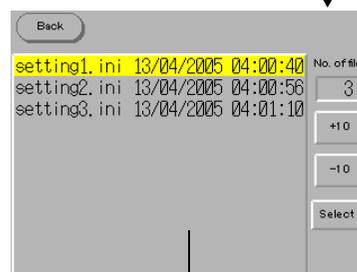
Saves the setting values to the specified file.

Selecting a BANK number is available when saving the setting values.



Reads the setting values of the specified BANK number in the specified file to the currently selected BANK.

Select from which BANK number when reading the setting value if the setting values of more than one BANK numbers are written in a file.

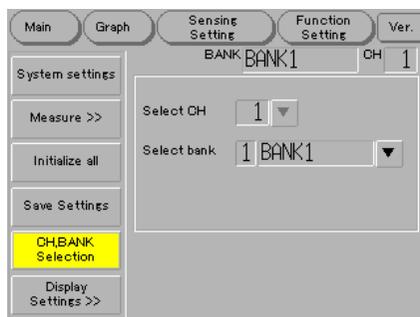


Displays a list of files saved on the Memory Card. Selecting a file in the list and pressing the [Select] button can select a file to be overwritten.

■ CH, BANK Selection

Selects the target CH and BANK for performing the function setting.

Switching between CH and BANK cancels the currently changed contents of CH and BANK.



■ Display setting

Sets the label name, and BANK name which are displayed on the NS SmartMonitor screen, and number of digits of the measured values and threshold value for display. These setting contents are not transmitted to the controller.

Pressing the [<<] button returns to the [Function Setting (System Settings)] screen.

Sets the measured value and resolution on the Main screen, and a label to be displayed on the label display column of the current value.

Pressing a column displays the virtual keyboard for the character input.

Sets names of the respective BANK from 1 to 4.

Pressing a column displays the virtual keyboard for the character input.

Selects the number of digits for the measured value, threshold value, and present value on the Main screen.

Select the number of digits by pressing a button.

[Bank name setting] button

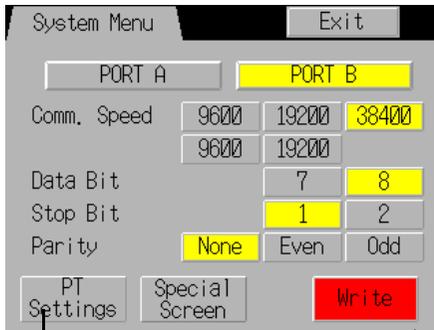
[Digit number setting] button

Number of decimals		
0dig	147	mm
1 dig	147.5	mm
2 dig	147.48	mm
3 dig	147.484	mm
4dig	147.4836	mm
5 dig	147.48365	mm
6 dig	147.483647	mm

System Menu

Communication with controllers and settings related to NS unit hardware, such as touch panel and LCD are performed on the System Menu screen.

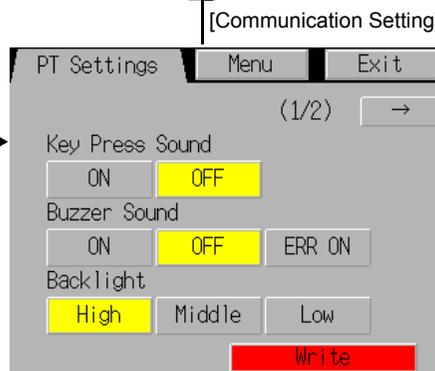
■ Screen Transition on the System Menu Screen



The virtual keyboard is used to set the port, which connects to the multi-controller or sensor controller, and the NS unit RS-232C communication settings.

The [Special Screen] button is not displayed when the system is started up from the [NS SmartMonitor Automatic Start-up Procedure].

p.3-25



[Communication Setting] button

This screen is used to set the contrast adjustment, backlight brightness, buzzer sound, and others.

p.3-26



The NS unit screen is changed to be started up from the user creation screen.

p.3-28

■ System Menu Screen Display Method

The [System Menu] screen is displayed when the communication cannot be established between the NS unit and a multi-controller or sensor controller upon start-up of NS SmartMonitor, or it is displayed by pressing two corners simultaneously out of four on the screen while the respective screen of the NS SmartMonitor is displayed.

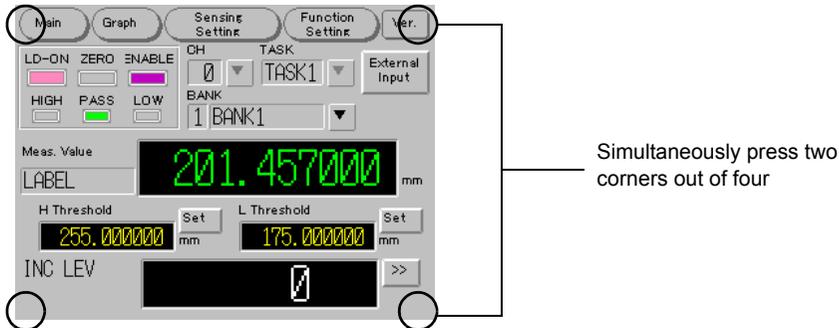
● When communication cannot be established

Check the items below when the [System Menu] screen is displayed upon the start-up of NS SmartMonitor:

- Whether or not an error occurs in the NS unit port, which connects to the multi-controller or sensor controller.
- Whether or not the communication settings are consistent with the controller, which connects to the NS unit.
- Whether or not the cabling is wrong.

● Simultaneously press two corners out of four

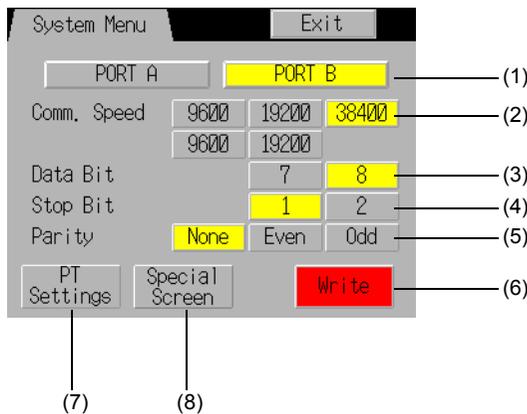
How to display the [System Menu] Screen is shown below:



Note that the corner on the touch panel screen, where nothing is displayed, should be pressed first. Pressing a corner, where any button is displayed, executes the function of the button.

Then, any corner other than the first corner can be pressed. The [System Menu] screen can be displayed even if a button is displayed on the corner.

■ System Menu Screen



(1) [PORT A]/[PORT B] button

The [PORT A] or [PORT B] button is used to select the NS unit port, which connects to the multi-controller or sensor controller.

(2) Comm. Speed [9600], [19200], [38400], [57600], and [115200] buttons

Set the communication speed by selecting from the Comm. Speed buttons according to the RS-232C setting baud rate of the connected multi-controller or sensor controller.

(3) Data Bit [7] and [8] buttons

Set the data bit by selecting from the Data Bit buttons according to the RS-232C setting data length of the connected multi-controller or sensor controller.

(4) Stop Bit [1] and [2] buttons

Set the stop bit by selecting from the Stop Bit buttons according to the RS-232C setting stop bit of the connected multi-controller or sensor controller.

(5) Parity [None], [Even], [Odd] buttons

Set the parity by selecting from the Parity buttons according to the RS-232C setting parity bit of the connected multi-controller or sensor controller.

(6) [Write] button

Pressing the [Write] button sets the changed contents of port setting, communication speed, data bit, stop bit, and parity, and restarts the NS unit.

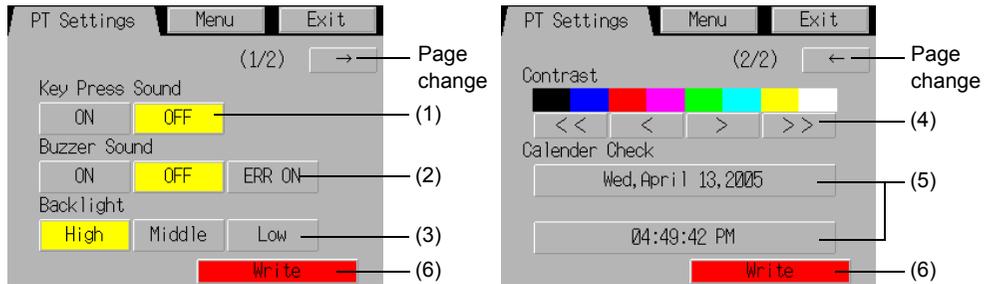
(7) [PT Settings] button

Pressing the [PT Settings] button displays a screen to set the contrast adjustment, backlight brightness, buzzer sound, and others.

(8) [Special Screen] button

Pressing the button displays a screen to change the NS unit to be started up from the user creation screen.

■ PT Settings Screen



(1) Key Press Sound Select [ON]/[OFF] buttons

Setting to turn ON or OFF the key press sound upon pressing the touch switch, which accepts the input to the NS unit, is available.

- ON : Sounds the input sound upon pressing the touch switch, which accepts the input to the unit.
- OFF : Does not sound the input sound upon pressing the touch switch, which accepts the input to the unit.

Default setting is ON.

(2) Buzzer Sound [ON], [OFF], and [ERR ON] buttons

Setting, whether or not to sound the buzzer such when an error occurs in the communication with the controller, is available.

- ON : Sounds buzzer upon instruction from the host or when an error occurs.
- OFF : Does not sound buzzer.
- ERR ON: Sounds buzzer only when an error occurs.

Default setting is ERR ON.

(3) Backlight brightness [High], [Middle], and [Low] buttons

Sets the backlight brightness of NS unit.

Brightness can be set with three levels.

Default setting is High.

(4) Contrast [<<]/[<]/[>]/[>>] buttons

Adjusts the contrast of the screen. Contrast can be adjusted with 100 levels.

- [<<] : Lowers the contrast by 10 levels.
- [<] : Lowers the contrast by 1 level.
- [>] : Raises the contrast by 1 level.
- [>>] : Raises the contrast by 10 levels.

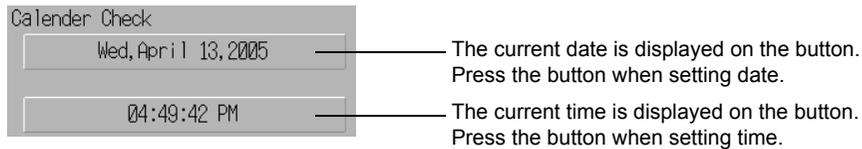
(5) Date setting

Sets and displays date of the system clock in the NS unit.

Date and time are not correctly set at shipment.

Time stamp and others are not correctly written to the saved file when date and time are not correctly set.

How to set is described below.



Pressing the date setting button and time setting button displays the input dialog.

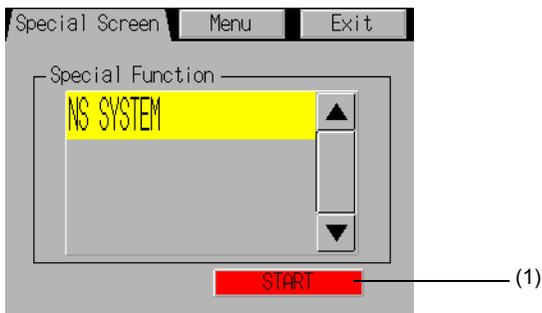


- Follow the input format below to set date:
yyyy.mm.dd (yyyy: Western year, mm: month, dd: day)
Enter a western year by four digits.
Example: To enter January 1st, 2001;
Enter [2001.1.1] (It is not necessary to fill a space by zero.)
- Follow the input format below to set time:
hh.mm.ss (hh: time, mm: minute, ss: second)
Enter a time by the 24-hour format.
Example: To enter 6 o'clock pm, 1 minute, and 1 second;
Enter [18.1.1] (It is not necessary to fill a space by zero.)
- Pressing the [ENTER] button reflects the setting contents.

(6) [Write] button

Pressing the [Write] button enables the setting changes of touch switch input sound, buzzer sound, and backlight brightness.

■ Special Screen



(1) [START] button

The [START] button is used to change the start-up conditions of NS unit and reset it.



The user creation screen can be started up under the state that the memory card, where the NS SmartMonitor for the start-up selection is saved, is inserted to the NS unit when the start-up selection switched to the user creation start-up.

To start up the NS SmartMonitor, selecting [NS SmartMonitor] from the [Special Function] on the [System Menu (Special Screen)] screen of the user creation screen, is necessary.

Section 4

APPENDIX

 Error Messages and Countermeasures	4-2
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Error Messages and Countermeasures

■ [ERROR] Appears on the [Measured Value]

The main digital display section displays [ERROR].

For more information, refer to the User's Manual of the controller.

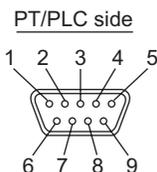
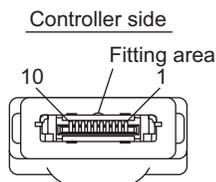
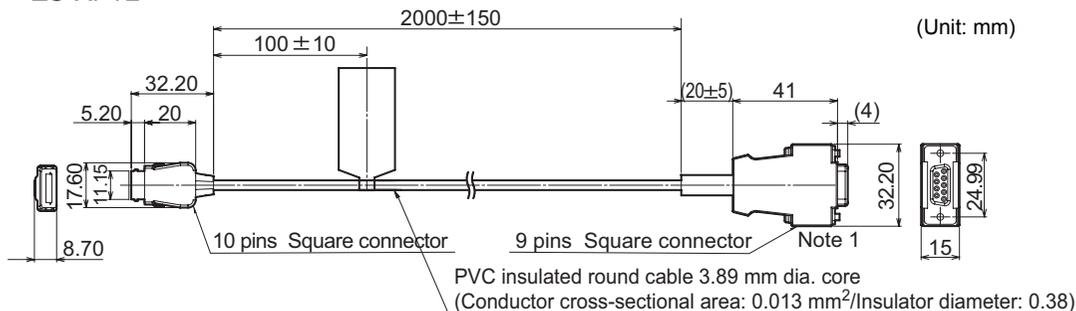
■ Error message list

Display Details	Cause	Countermeasure
Page file load error.	Memory card is detached from the NS unit. Or, memory card is broken.	Check whether or not the memory card for the NS SmartMonitor is inserted to the NS unit. Check whether or not the system file for the NS SmartMonitor is correctly saved on the memory card.
An error occurred during macro execution.	Communication with a controller cannot be established.	Check the items below: <ul style="list-style-type: none"> • Is the cable connected correctly? • Is the controller power turned ON? • Is the controller operating mode set to the RUN mode? • Is the controller state normal? • Is the controller simultaneously used with the SmartMonitor ZS for the PC? • Is any external device other than the NS SmartMonitor connected?
Time-out error occurred	Communication with a controller cannot be established.	
Read error.	Reading the setting data failed.	Check whether the controller is applicable to the NS SmartMonitor, or version number of the controller.
Write error.	Writing the setting data failed.	Check whether the controller is applicable to the NS SmartMonitor, or version number of the controller.
Failed to save to a file.	Incorrect characters are used for the file name. Or there is not enough space in the Memory Card.	Set the file name using correct characters. Delete unnecessary files in the LOG folder and SETTING folder in the memory card.
Failed to read file.	File in the memory card is broken. Or, eight or more characters are used for the file name.	Check the target file in the Memory Card. Change the file name in the Memory Card.
Exceeding maximum limit.	The input data value is outside the range.	Input correct value within the range.
Exceeding minimum limit.	The input data value is outside the range.	Input correct value within the range.
Please check mode of operation.	Operating mode of controller is in the state other than RUN.	Set the controller operating mode to the RUN mode.

Specifications and External Dimensions

RS-232C Cable for Connecting to a programmable controller or programmable terminal

ZS-XPT2



Signal name	Pin No.	Pin No.	Signal name
NC	1	1	NC
SD (TXD)	2	2	SD (TXD)
RD (RXD)	3	3	RD (RXD)
RS (RTS)	4	4	RS (RTS)
CS(CTS)	5	5	CS (CTS)
NC	6	6	NC
NC	7	7	NC
NC	8	8	NC
SG (GND)	9	9	SG (GND)
NC	10		
FG	Shell	Shell	FG

Note 1: Plug type connector

Item	ZS-XPT2
Applicable controllers	ZS Series
Ambient temperature	Operating: 0 to 50°C, Storage: -15 to +60°C (with no icing or condensation)
Ambient humidity	Operating and storage: 35% to 85% (with no condensation)
Dialectic strength	1,000 VAC, 50/60 Hz for 1 min
Insulation resistance	100 MΩ (by 500 VDC megger)
Vibration resistance	10 to 150 Hz, 0.7-mm double amplitude, 80 min each in X, Y, and Z directions
Shock resistance	300 m/s ² 3 times each in six directions (up/down, left/right, forward/backward)
Materials	Cable sheath: PVC
Weight	Approx. 50 g

MEMO

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