WT5000
Precision Power Analyzer
USER'S MANUAL

YOKOGAWA
Yokogawa Test & Measurement Corporation

IM WT5000-02EN
4th Edition

List of Manuals

Thank you for purchasing the WT5000 Precision Power Analyzer. This User's Manual explains how to use the WT5000. To ensure correct use, please read this manual thoroughly before operation. After reading this manual, keep it in a safe place. The following manuals, including this one, are provided as manuals for the WT5000. Please read all manuals.

Manual Title	Manual No.	Description
WT5000 Precision Power Analyzer Features Guide	IM WT5000-01EN	The supplied CD contains the PDF file of this manual. This manual explains all the instrument's features other than the communication interface features.
WT5000 Precision Power Analyzer User's Manual	IM WT5000-02EN	This document. The supplied CD contains the PDF file of this manual. The manual explains how to operate this instrument.
WT5000 Precision Power Analyzer Getting Started Guide	IM WT5000-03EN	This guide explains the handling precautions and basic operations of this instrument.
WT5000 Precision Power Analyzer Communication Interface User's Manual	IM WT5000-17EN	The supplied CD contains the PDF file of this manual. The manual explains the instrument's communication interface features and instructions on how to use them.
Model WT5000 Precision Power Analyzer	IM WT5000-92Z1	Document for China

The "EN" and "Z1" in the manual numbers are the language codes.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

Document No.	Description
PIM 113-01Z2	List of worldwide contacts

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions. The figures given in this manual may differ from those that actually appear on your screen.
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Conventions Used in This Manual

Notes

The notes and cautions in this manual are categorized using the following symbols.

Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

French

AVERTISSEMENT Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

ATTENTION Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

Note Calls attention to information that is important for the proper operation of the instrument.

Character Notations

Menu Names and Panel Keys in Bold Characters
Indicate controls such as menu commands, tabs, and buttons that appear on the screen and front panel keys

Prefixes k and K

Prefixes k and K used before units are distinguished as follows:

k	Denotes 1000. Example: 100 kHz
K	Denotes 1024. Example: 720 KB (file size)

Menu Icons

Menu Icon Types

You can control all the settings of this instrument using the *setup menu*, which is explained in chapter 1. Separate from the setup menu, dedicated icons are displayed for settings that are particularly used often. These icons are referred to as *menu icons* in this manual.
When you tap a menu icon, related settings are displayed in the sub menu area (Small menu*). Therefore, when you use a menu icon, you can change the settings while viewing the measurement.

* The Small menu is displayed on the right side of the screen. It can be used to configure or execute operations while viewing the measurement results on the screen.

Setup icon
Use this icon to display the setup menu.
This is the same operation as the SETUP key. (See chapter 1.)

Display icon
Use this icon to change the display format of the screen.

Range icon
Use this icon to set the voltage range and current range (including the external current sensor).

Update Rate/Averaging icon
Use this icon to set the data update interval and averaging.

Filter icon
Use this icon to set the line filter and frequency filter.

Store/Data Save icon
Use this icon to store data and save data.

Integration icon
Use this icon to control the integration feature and set the integration conditions. When you set the measurement mode (see section 1.1) to “IEC Flicker (voltage fluctuation/flicker measurement),” the icon changes to Flicker.

Misc icon
Use this icon to execute measurement hold, single measurement, null feature, and zero-level compensation. For the null feature and sensor correction, you can set the conditions.

Note

Some features are disabled when the measurement mode (see section 1.1) is set to IEC harmonic measurement (IEC Harmonic) or voltage fluctuation/flicker measurement (IEC Flicker). The menu icons of disabled features appear dimmed. Menus will not appear even if you tap dimmed icons.

Display Icon

Use this icon to change the display format of the screen.

Display Menu

Closes the menu

Selects the screen display
Shows only the numeric or graphic screen in a single screen or splits the screen into top and bottom halves and shows the selected screen in each half. (See sections 3.1 or 6.1.)

Set the numeric display format (All Items, 4 Items, 8 Items, 16 Items, Matrix, Hrm List Single, Hrm List Dual, User).
Set how many measurement results to display in a single screen. Hrm List Single and Hrm List Dual are harmonic list displays (see section 5.2). If you select User, set the numeric value position, color, and so on according to the loaded background

Switches the displayed page (Page Up/Page Down)
Switches the numeric data screen shown in each display format. This is the same as tapping ▲ and ▼ on the measurement display screen (see section 3.2).

Switches the displayed items
Switch the measured values (measurement function) shown in the screen.

Selects the display page to switch (Hrm List Single or Hrm List Dual)
Header: Switches the pages in the measurement function display area
List: Switches the pages in the harmonic data display area (See section 3.1.)

Set the graph display format (Wave, Trend, Bar, Vector) (see sections 6.2 to 6.5).

Switch the displayed group (Group1 to Group4)(see sections 6.2 to 6.5).

Switches the graph display items (see sections 6.2 to 6.5)
Select the voltage, current, or other graph to show on the screen.

Set the display format (see sections 6.2 to 6.5).
Set the divisions and time scale of the graph screen.

Displays trend values (see section 6.3)
Displays the current trend values. You can set this when the graph display format is Trend.

Cursor measurement (see chapter 12)

Register the custom display (see section 3.8).

Switching the Displayed Items (Item)

On the All Items Display

Closes the menu

Set the harmonic order (Total, 0-500).
You can set this setting only when you have selected the page of a measurement function that includes a harmonic order (pages 9 and 10).
For details on how to switch pages, see page 3-1.

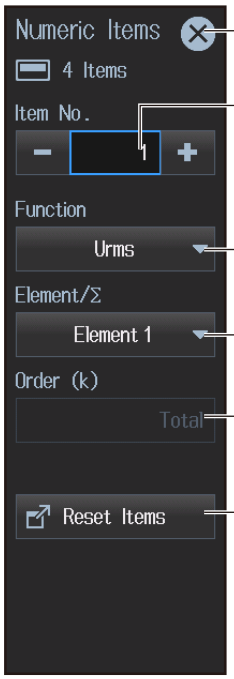
Turns the display of numeric data of all elements or all wiring units on and off
If the total number of elements or wiring units is 8 or more, set this to ON when you want to display the numeric data of all elements or all wiring units.

Turns the display frame on and off
Scroll the screen horizontally to change the displayed element or wiring unit. You can use these when Display All Elements is set to OFF.

Note

On the All Items display, you cannot select individual displayed items and change their measurement function, element, or wiring unit. If you switch to the Matrix display, you can change the measurement functions, elements, and wiring units using the displayed table (see the previous page).

On the 4-, 8-, and 16-Value Displays



Closes the menu

Select the displayed item number.
On the 4-, 8-, and 16-value displays, the number increases from the upper left to the lower right of the screen.
You can also tap the measurement display screen (see page vii).

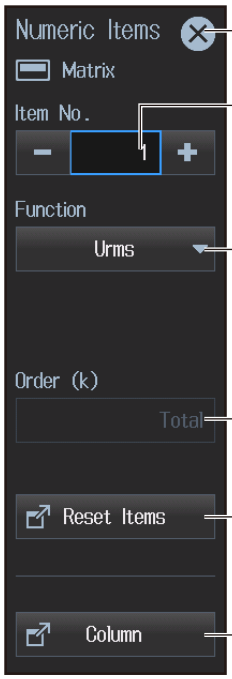
Set the displayed item.
Set the displayed measurement function (see section 3.1).

Selects the input element or wiring unit to be configured

Selects the harmonic order to be set
This is for the harmonic display (see section 5.2).

Resets the displayed items.
(See page vii.)

On the Matrix Display



Closes the menu

Select the displayed item number (displayed row).
The number increases from top to bottom on the matrix display.
Example: If you select 3, the third row from the top is displayed.
You can also tap the measurement display screen (see page vii).

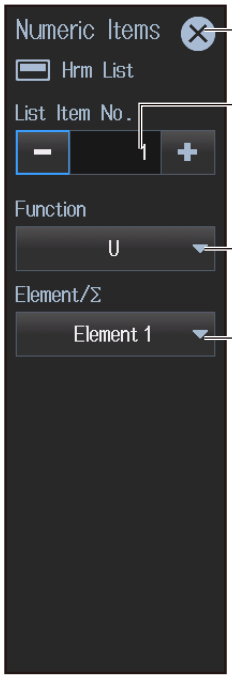
Set the displayed item.
Set the displayed measurement function (see section 3.1).

Selects the harmonic order to be set
This is for the harmonic display (see section 5.2).

Resets the displayed items.
(See page vii.)

Configure the columns to display.
Set the number of columns to display the matrix. (See section 3.1.)

On the Hrm List Single or Hrm List Dual Display



Closes the menu

Select the displayed harmonic data column.
This is for Hrm List Dual.
Select 1 (left column) or 2 (right column).
You can also tap the measurement display screen (see page vii).

Set the displayed item.
Set the displayed measurement function (see section 3.1).

Selects the input element (Element1 to Element7) or wiring unit (ΣA, ΣB, ΣC) to be configured

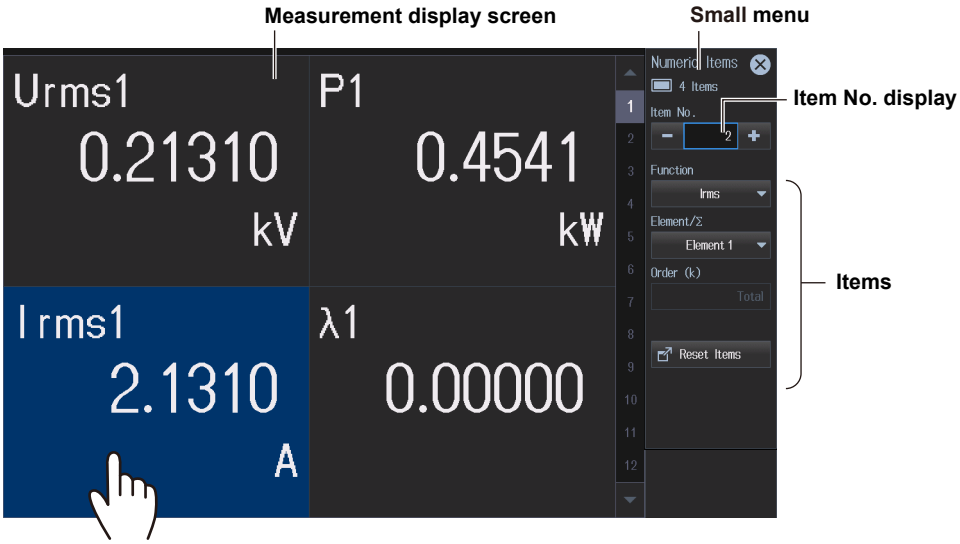
Note

On the harmonics list displays, you can change the measurement function, element, and wiring unit for the selected list, but you cannot change these settings for each individual displayed item.

Selecting the Displayed Item Number or Displayed Harmonic Data Column

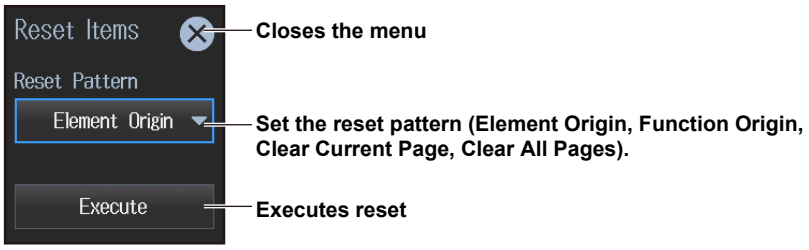
While you are changing the displayed items, you can select the displayed item or displayed harmonic data column you want shown by tapping the measurement display screen directly with an Small menu shown.

This is the same operation as selecting the displayed item number (on the 4-, 8-, and 16-value displays and matrix display) and selecting the displayed harmonic data column (on the Hrm List Single or Hrm List Dual display).



1. Tap the Item No.2 area. The Item No. display changes to 2.
2. Set the items (e.g., function).

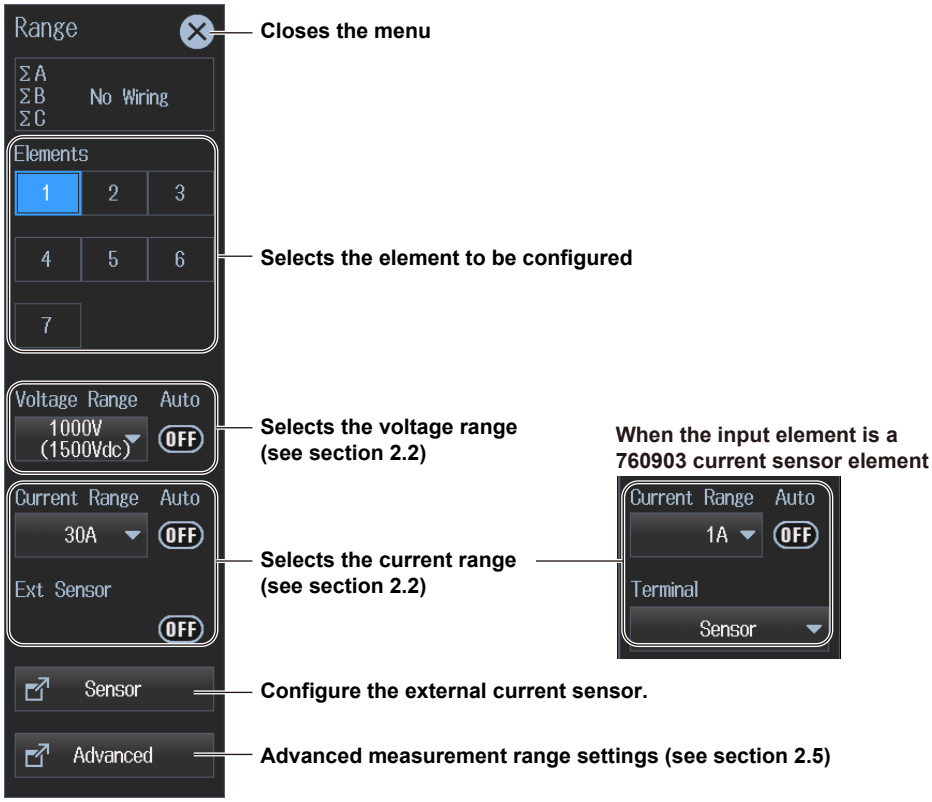
Resetting the Displayed Items



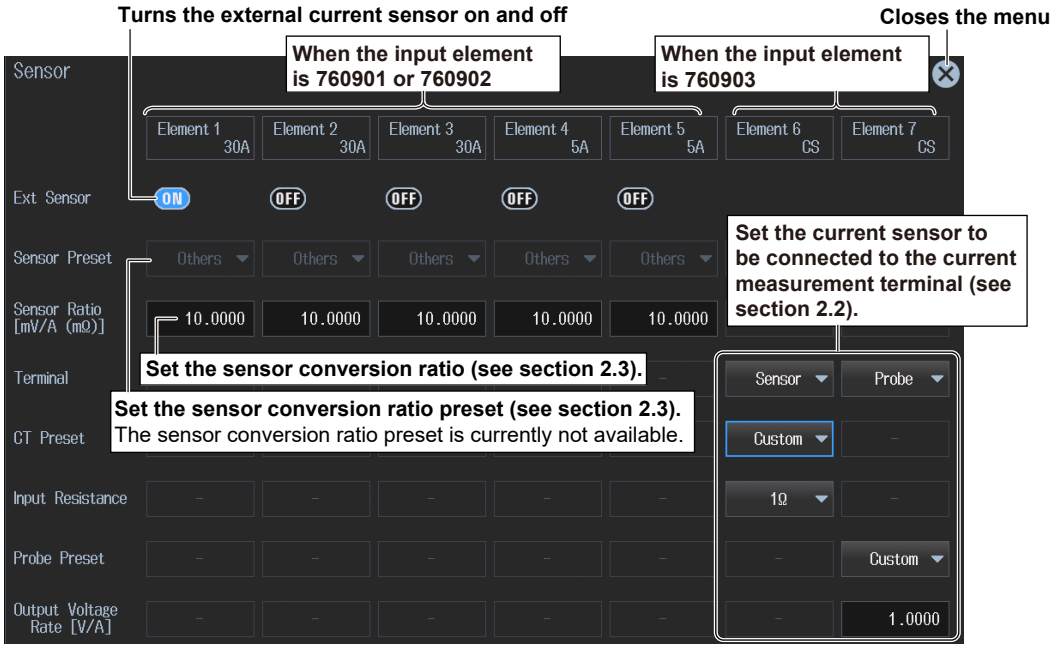
Range Icon

Use this icon to set the voltage range and current range (including the external current sensor).

Range Menu



Configuring the External Current Sensor

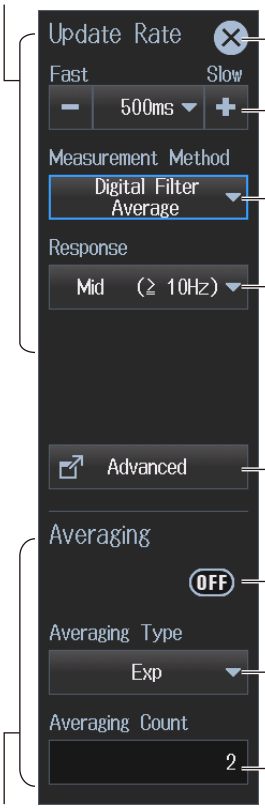


Update Rate/Averaging Icon

Use this icon to set the data update interval and averaging.

Update Rate/Averaging Menu

Update Rate menu



Closes the menu

Set the data update interval (for the parameters, see section 2.10).

Set the measurement method (for the parameters, see section 2.10).

Set the response (for the parameters, see section 2.10).
You can use this when the computing method is set to digital filter average.

Advanced data update interval and averaging settings
For details on the data update interval, see section 2.10.
For details on averaging, see section 2.13.

Turns averaging on and off

Set the averaging type (for the parameters, see section 2.13).

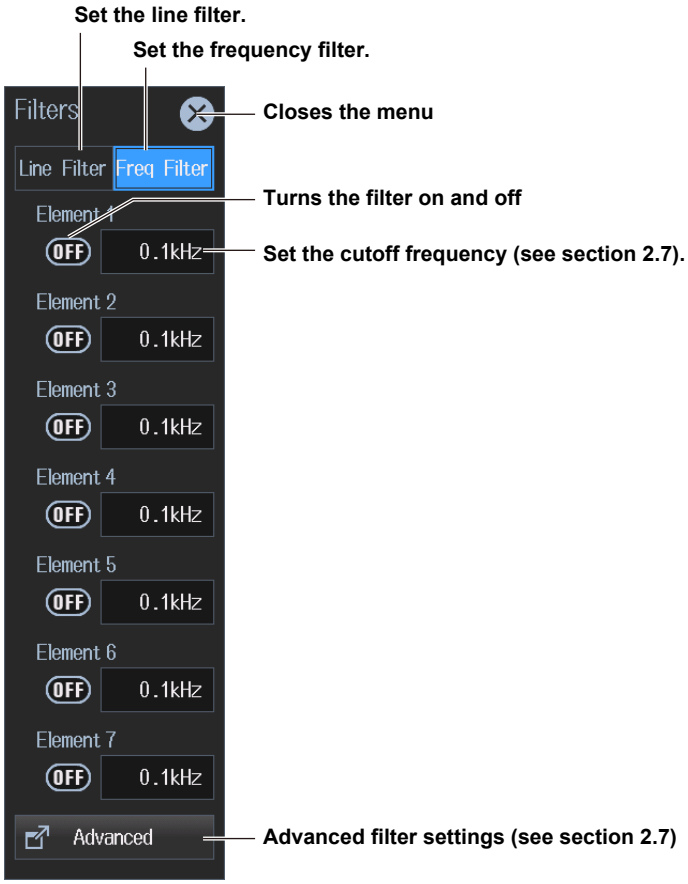
Set the attenuation constant or average count (for the parameters, see section 2.13).

Averaging menu

Filter Icon

Use this icon to set the line filter and frequency filter.

Filter Menu

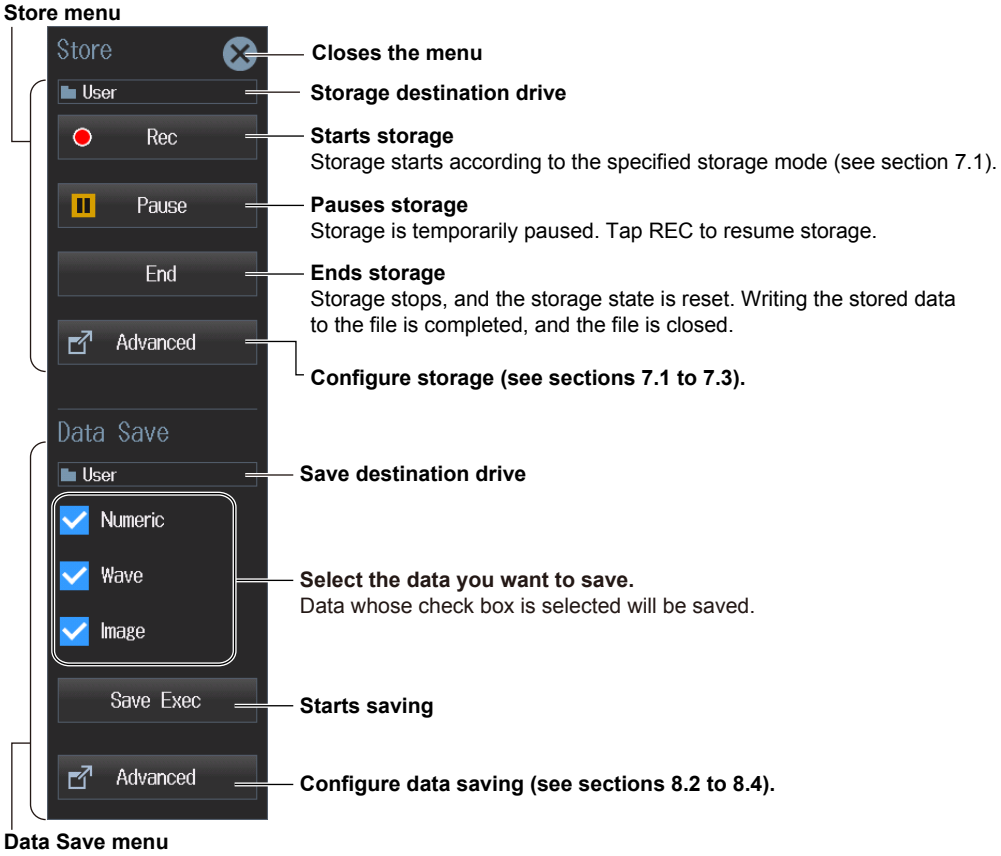


This instrument has three measurement modes (see section 1.1). A filter menu is displayed according to the measurement mode. Shown above is the menu for normal measurement mode.

Store/Data Save Icon

Use this icon to store data and save data.

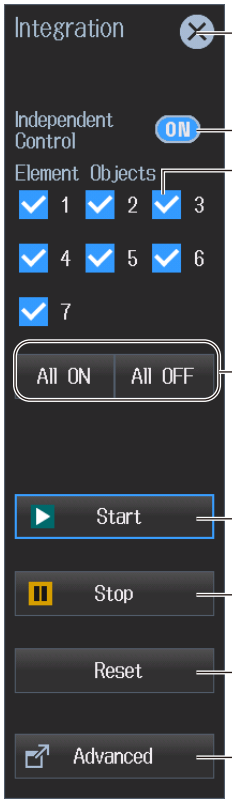
Store/Data Save Menu



Integration Icon

Use this icon to set integration conditions.

Integration Menu



Closes the menu

Turns independent computation on and off

Select the input elements that you want independent computation to be performed on.
You can set this when independent computation is set to on.

Collectively selects input elements to perform independent computation on.
All ON: All input elements will be selected.
All OFF: All input elements will be unselected.

Starts integration
Integration starts according to the specified integration conditions (see section 4.1).
The START key in the INTEGRATION area turns on.

Stops integration
Integration stops automatically according to the specified integration conditions.
The START key in the INTEGRATION area turns off, and the STOP key turns on.

Resets the integration time and integrated value.
All integration data is deleted, and the no-data display, "-------," appears. The STOP key in the INTEGRATION area turns off.

Set integration conditions (see section 4.1).

When you set the measurement mode (see section 1.1) to "IEC Flicker," the Integration icon changes to the Flicker icon. See the next page.

Flicker Icon

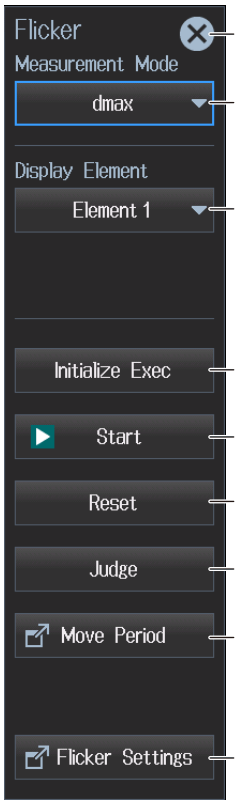
Use this icon to execute voltage fluctuations/flicker measurements.

Flicker Menu

Normal voltage fluctuation/flicker measurement

- **Closes the menu**
- **Set the measurement mode to Flicker.**
- **Switch the element you want to display the measurement data of.**
- **Scrolls the screen page**
- **Executes initialization**
- **Starts a measurement**
- **Reset**
- **Set the measurement conditions and judgment conditions (see section 14.1).**

Measurement of dmax caused by manual switching

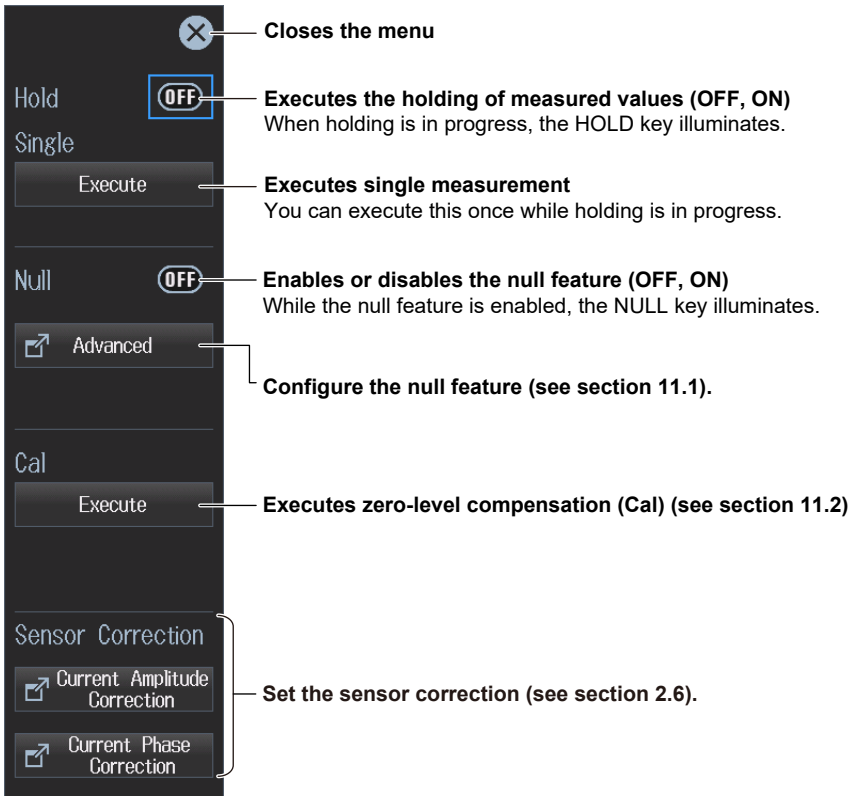


- **Closes the menu**
- **Set the measurement mode to dmax.**
- **Switch the element you want to display the measurement data of.**
- **Executes initialization**
- **Starts a measurement**
- **Reset**
- **Completes the measurement and displays the judgment**
- **Changes the observation period and measures again**
- **Set the measurement conditions and judgment conditions (see section 14.1).**

Misc Icon

Use this icon to execute measurement hold, single measurement, null feature, and zero-level compensation. For the null feature and sensor correction, you can set the conditions.

Misc Menu



Closes the menu

Executes the holding of measured values (OFF, ON)
When holding is in progress, the HOLD key illuminates.

Executes single measurement
You can execute this once while holding is in progress.

Enables or disables the null feature (OFF, ON)
While the null feature is enabled, the NULL key illuminates.

Configure the null feature (see section 11.1).

Executes zero-level compensation (Cal) (see section 11.2)

Set the sensor correction (see section 2.6).

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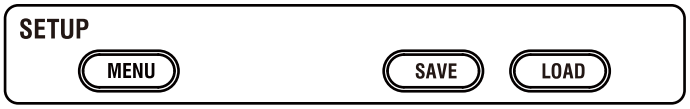
1.1 Setting the Measurement Mode

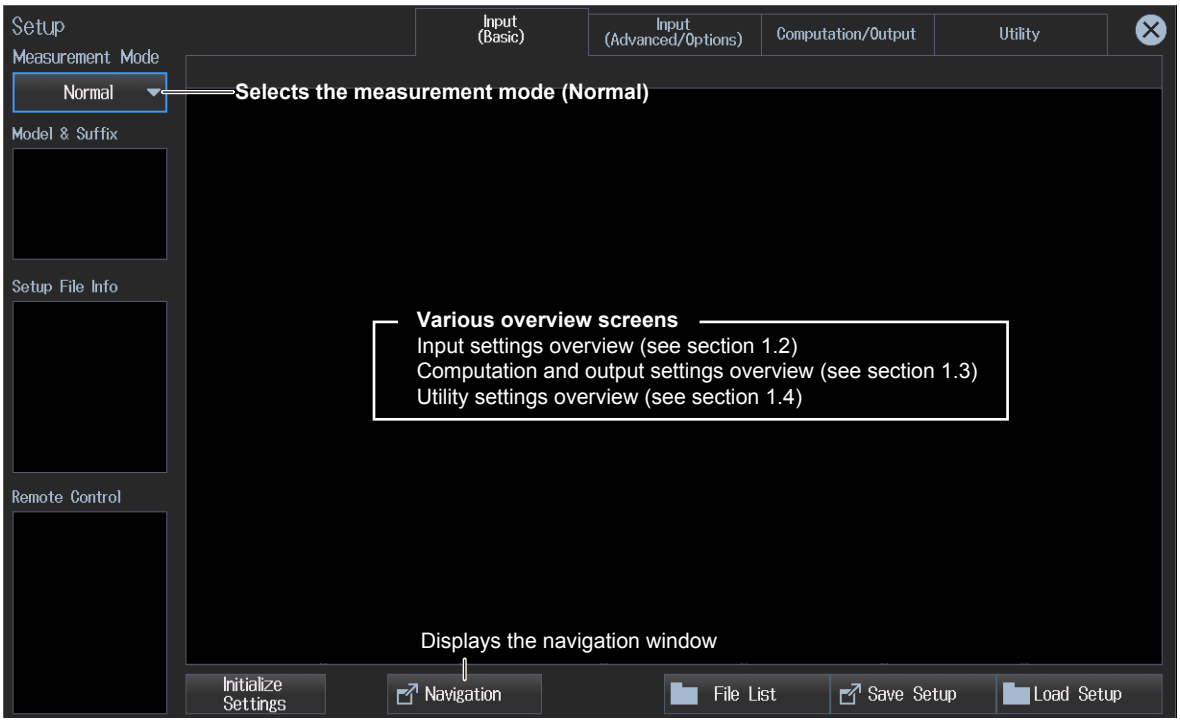
This instrument has the following measurement modes. Configure various settings according to the measurement mode.

- **Normal measurement (Normal)**
  This mode has settings required for normal power measurements and a setup menu for common features. The settings required for power measurements are also used in IEC harmonic and voltage fluctuations/flicker measurements when necessary.
- **IEC Harmonic measurement (IEC Harmonic)**
  This mode has a setup menu for IEC harmonic measurements. See chapter 13.
- **IEC Voltage fluctuation/flicker measurement (Flicker)**
  This mode has a setup menu for IEC voltage fluctuation/flicker measurements. See chapter 14.



Measurement Mode (Measurement Mode)

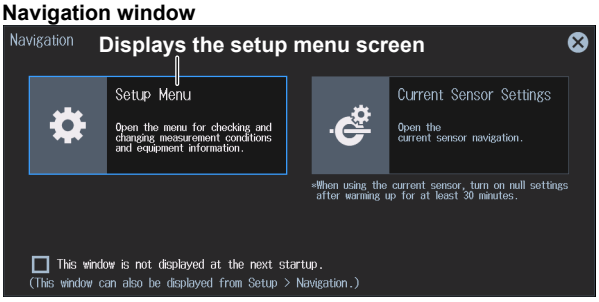
1. Tap the **Setup** icon, or press **MENU** under SETUP. The setup menu screen appears.



Note

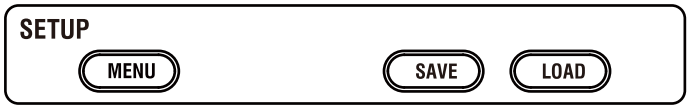
You can also display the setup menu screen from the navigation window that appears immediately after power-on.

Navigation window



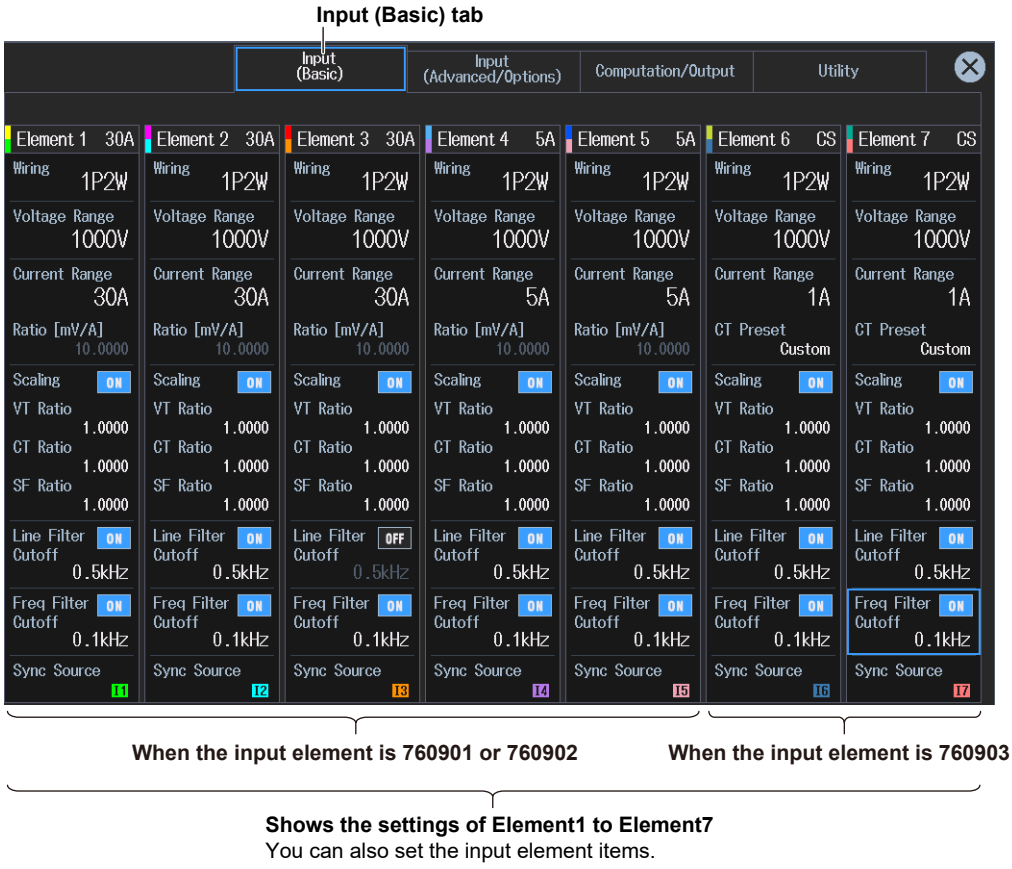
1.2 Input Settings Overview

The settings applied to the input elements and wiring units that are installed in this instrument are shown in table format. You can control all the settings from this overview screen.



Input Settings (Basic) Overview (Input (Basic))

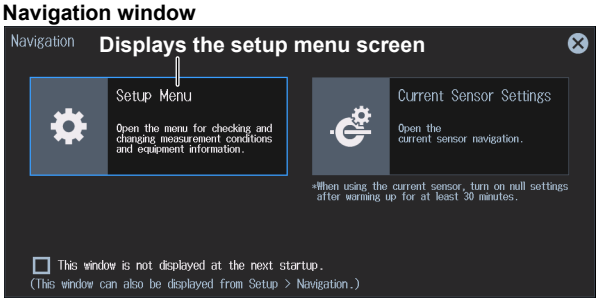
1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap the **Input (Basic)** tab. An input settings (basic measurement conditions) overview screen appears.
   Pressing **ESC** closes the overview screen.



Note

- You can also display the input settings overview screen by moving the cursor on the Input (Basic) tab using the arrow keys and then pressing SET.
- You can also display the setup menu screen from the navigation window that appears immediately after power-on.

Navigation window



Configuring Input Elements

You can edit settings by tapping the setting buttons in each input element area of the overview screen.

When the input element is 760901 or 760902

Set the wiring system (see section 2.1).
► **"Wiring System (Wiring)" in the features guide**

Set the voltage range (see section 2.2).
► **"Voltage Range (Voltage)" in the features guide**

Set the current range (see section 2.2).
► **"Current Range (Current)" in the features guide**

Configure the current sensor (see section 2.2).
► **"Current Measurement Terminal (Terminal)" in the features guide**

Configure the external current sensor (see section 2.3).
► **"External Current Sensor On/Off (Ext Sensor)" in the features guide**

Set the voltage transformer (VT) and current transformer (CT) ratios (see section 2.4). ► **"Scaling (Scaling)" in the features guide**

Configure the line filter and frequency filter settings (see section 2.7).
► **"Line Filter (Line Filter)" in the features guide**

Configure the line filter and frequency filter settings (see section 2.7).
► **"Frequency Filter (Freq Filter)" in the features guide**

Set the sync source (see section 2.8).
► **"Measurement Period (Sync Source)" in the features guide**

When the input element is 760903

Note

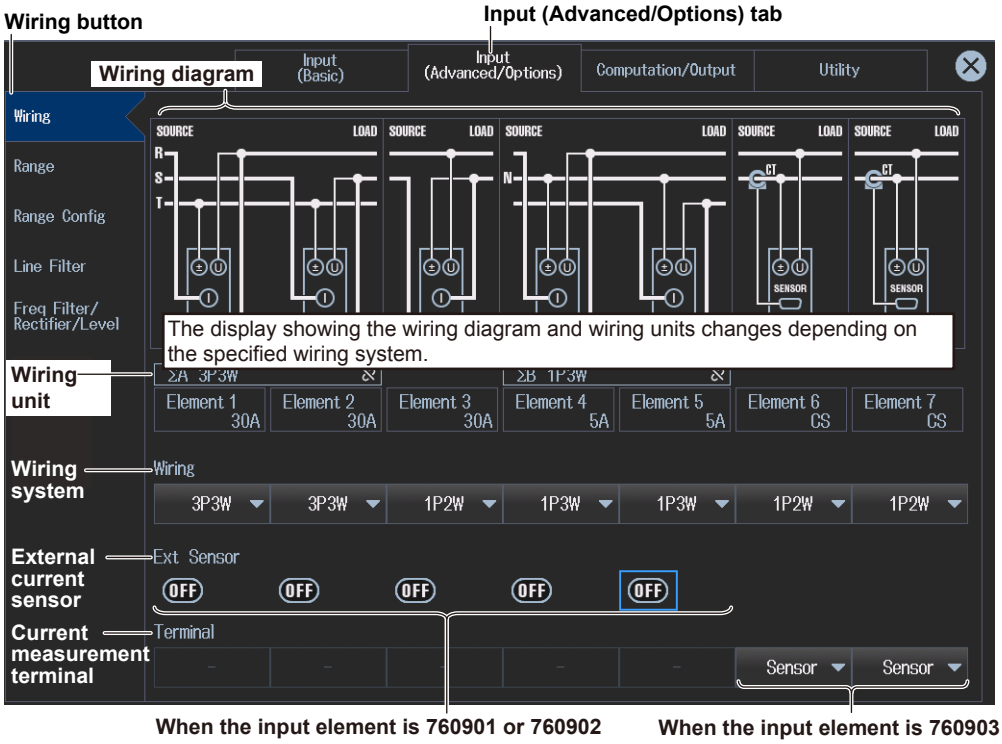
You can also edit the settings by moving the cursor on each setting button using the arrow keys and then pressing SET.

Input Settings (Advanced) Overview (Input (Advanced/Options))

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
   Pressing **ESC** closes the overview screen.

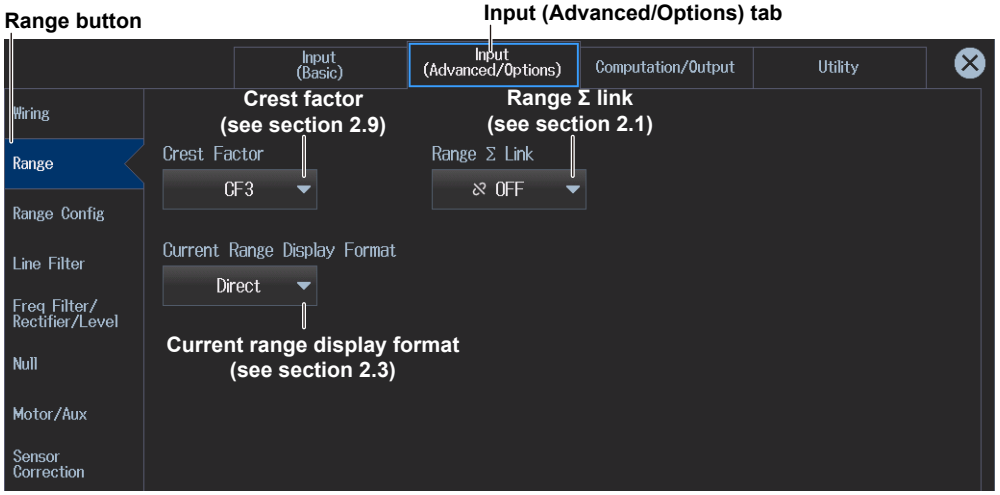
Advanced Wiring System Settings (Wiring) ► section 2.1

3. Tap **Wiring**. An advanced wiring system setup screen appears.



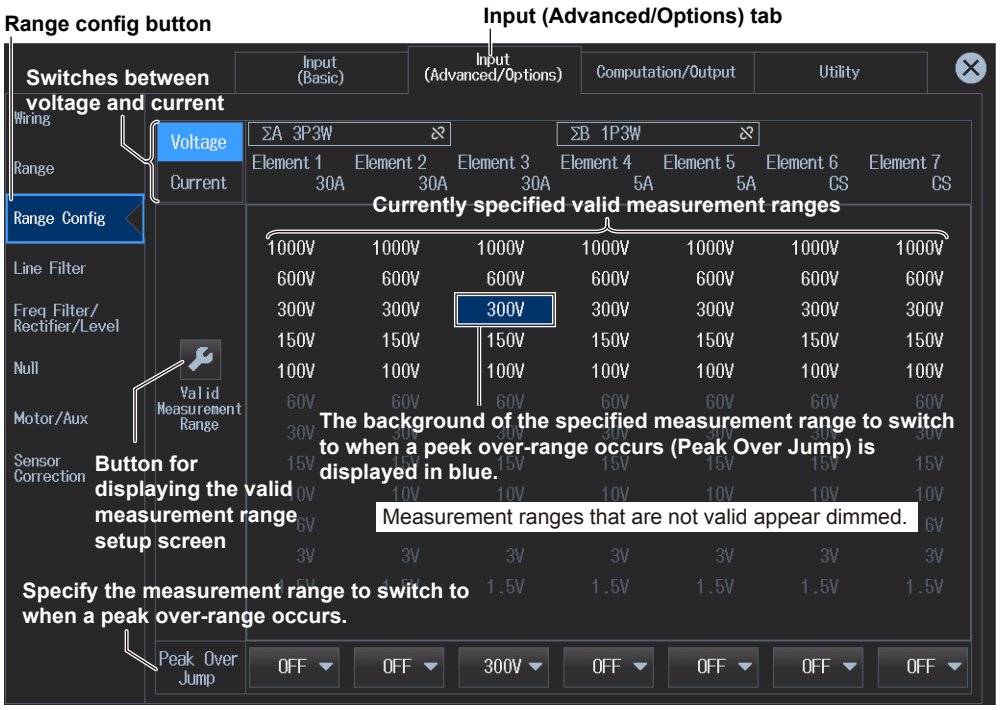
Common Measurement Range Settings (Range) ► section 2.1, 2.3, 2.9

3. Tap **Range**. A setup screen appears for common measurement range items.



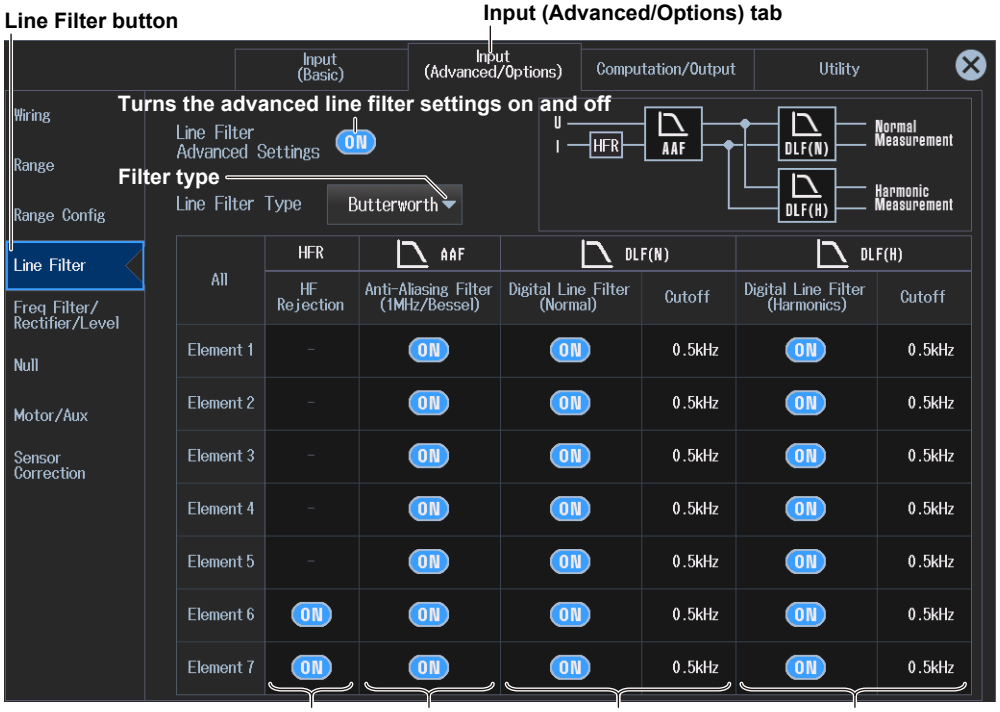
Measurement Range Configuration Settings (Range Config) ► section 2.5

3. Tap **Range Config**. A measurement range configuration setup screen appears.



Line Filter Settings (Line Filter) ► section 2.7

3. Tap **Line Filter**. A line filter setup screen appears. The following screen is an example when Advanced Settings are on. You can set the HFR, AAF, DLF (N) and DLF (H) filters separately.

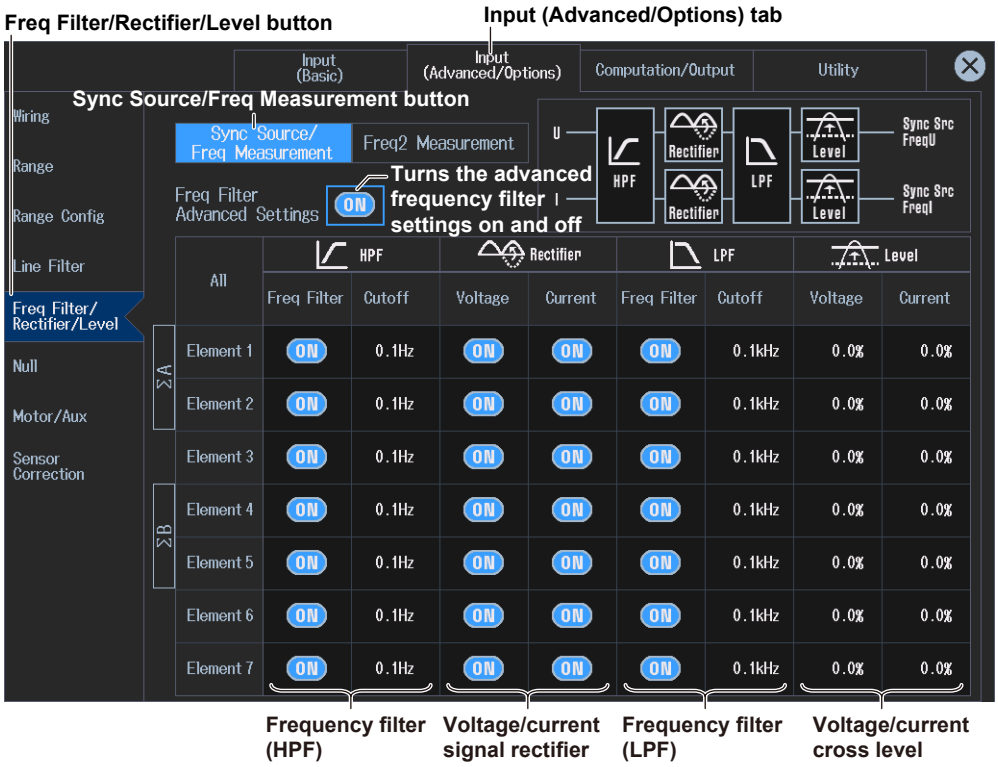


Frequency Filter, Rectifier, and Cross Level Settings (Freq Filter/Rectifier/Level) ► sections 2.7, 2.8

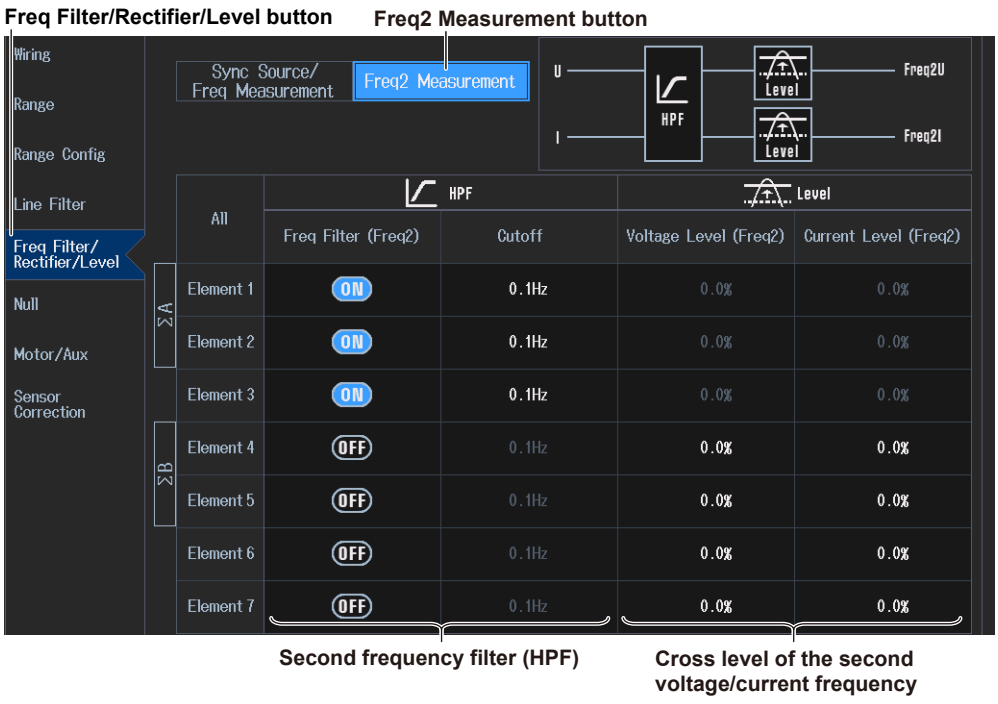
3. Tap **Freq Filter/Rectifier/Level**. A frequency filter setup screen appears.

Frequency Measurement Filter Settings for the Sync Source (Voltage/Current Signal) (Sync Source/Freq Measurement)

The following screen is an example when Freq Filter Advanced Settings are on. You can set the HPF, Rectifier, LPF, and Level separately.

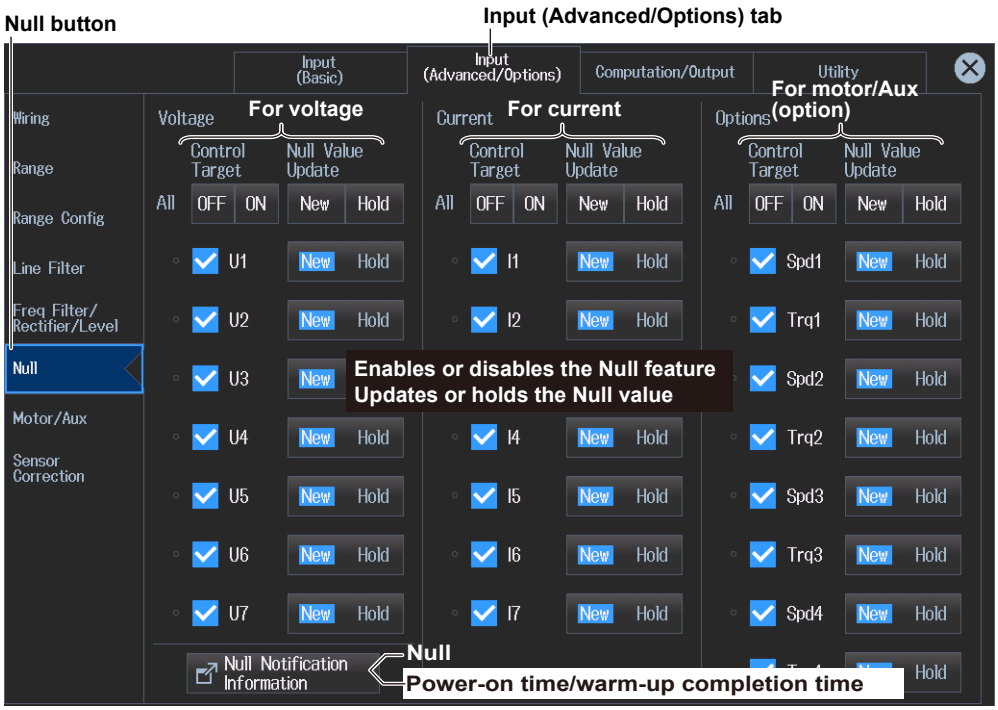


Second Frequency Measurement Filter Settings (Freq2 Measurement)



Null Feature Settings (Null) ► section 11.1

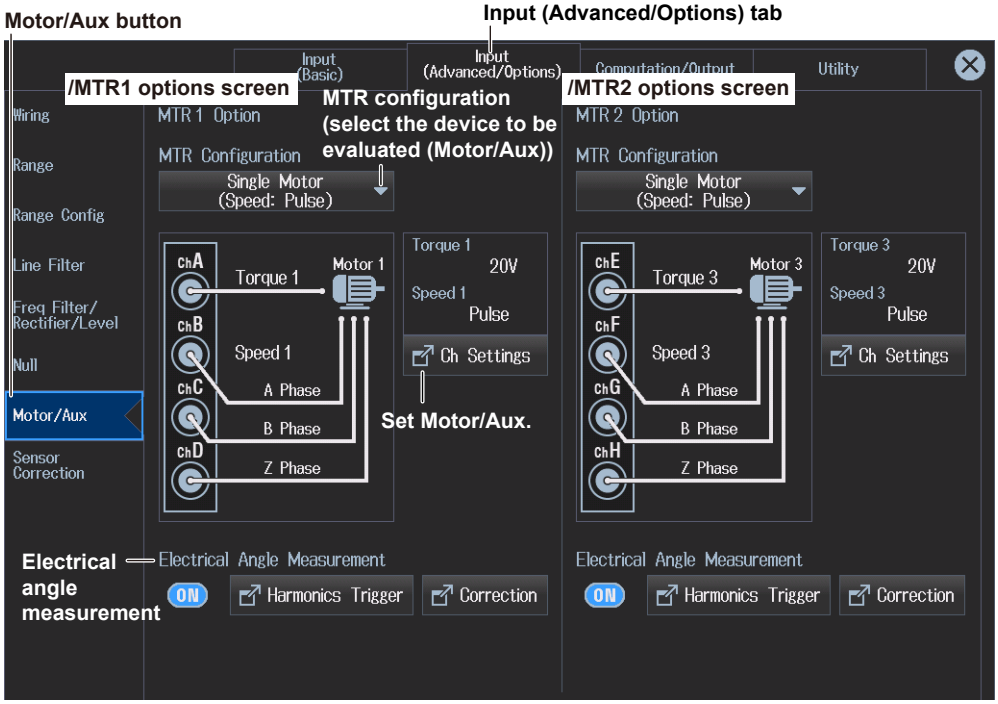
3. Tap **Null**. A null feature setup screen appears.



Motor Evaluation and Auxiliary Input Settings (Motor/Aux) ► section 9.1

3. Tap **Motor/Aux**. A Motor/Aux screen (MTR1/MTR2) appears.

The following screen is an example for a model with both the /MTR1 and /MTR2 options.

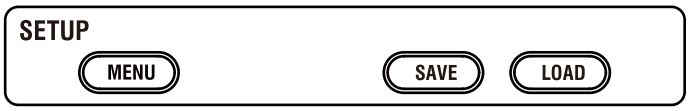


Sensor Correction Settings (Sensor Correction) ► section 2.6

3. Tap **Sensor Correction**. A sensor correction screen appears.

1.3 Computation and Output Settings Overview

The overview screen shows in a table the various settings related to the input signal computing method, harmonic measurement, integration conditions, numeric and graphic screen displays, data saving, DA output, and so on. You can control all the settings from this overview screen.

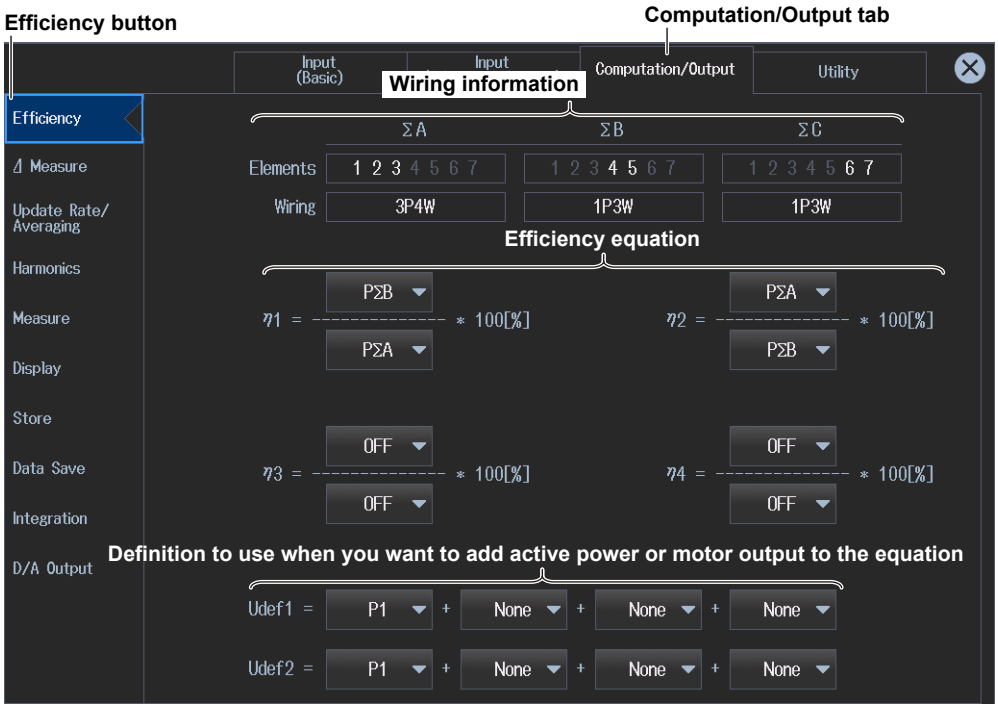


Computation and Output Settings Overview (Computation/Output)

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Efficiency Equation (Efficiency) ► section 2.11

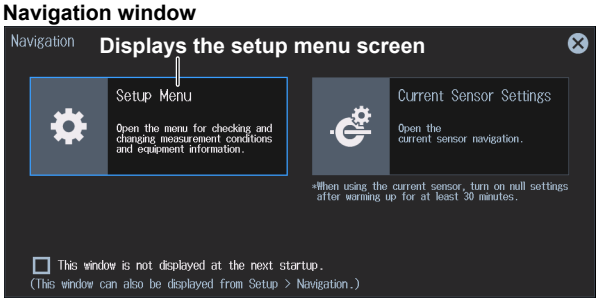
3. Tap **Efficiency**. An efficiency equation setup screen appears.



Note

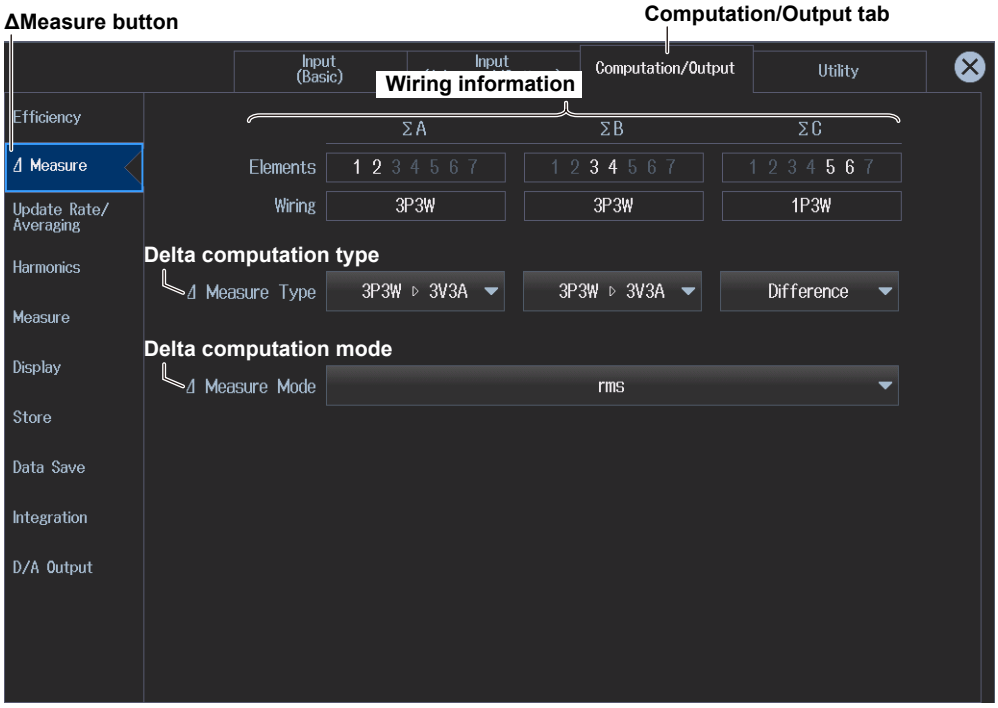
- You can also display the input settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.
- You can also display the setup menu screen from the navigation window that appears immediately after power-on.

Navigation window



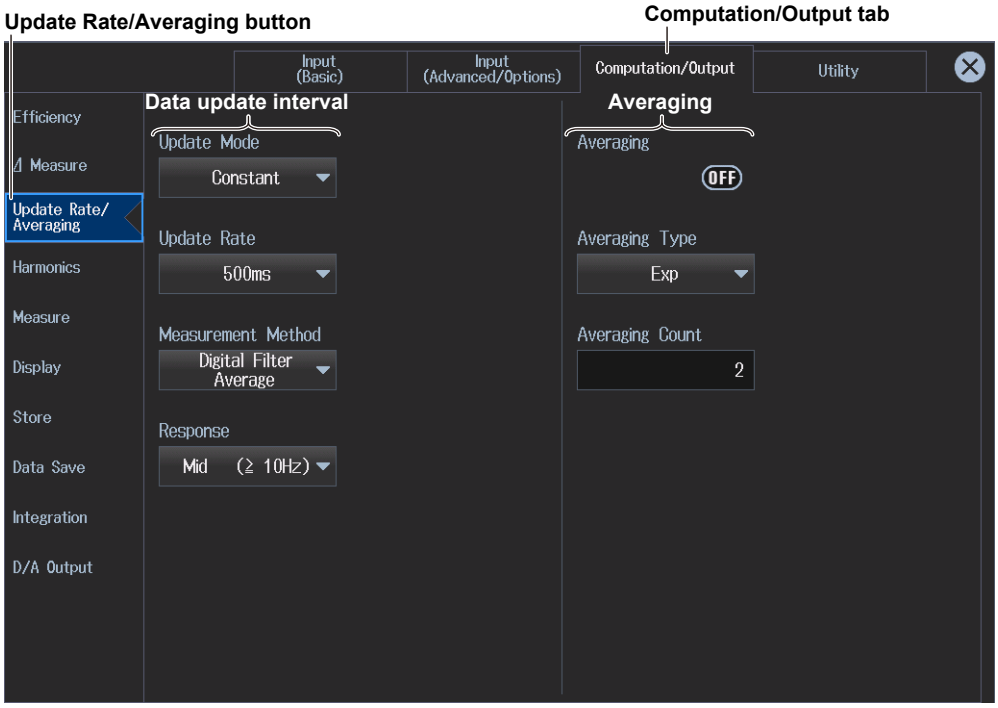
Setting the Delta Computation (ΔMeasure) ► section 2.12

3. Tap **ΔMeasure**. A delta computation setup screen appears.



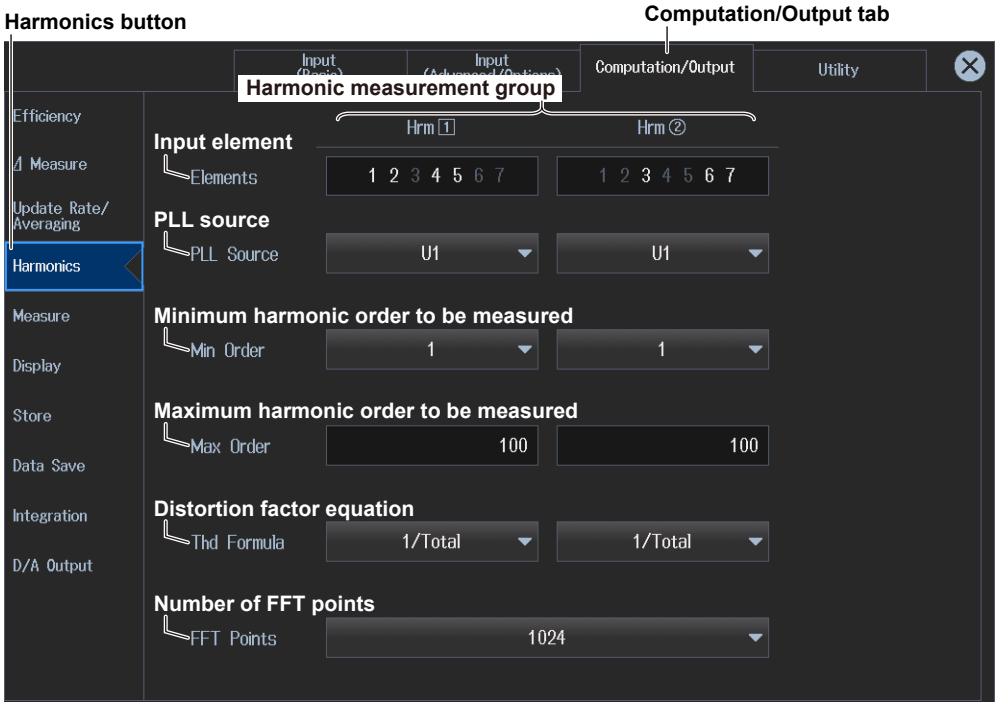
Setting the Data Update Interval and Averaging (Update Rate/Averaging) ► sections 2.10, 2.13

3. Tap **Update Rate/Averaging**. A data update interval/averaging setup screen appears.



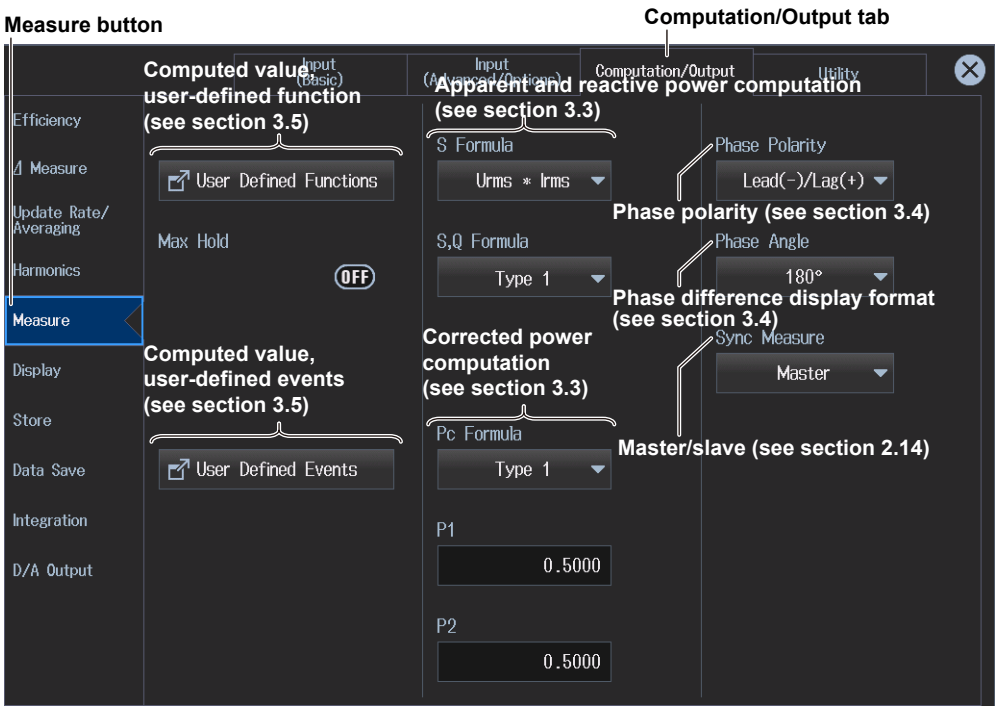
Setting the Harmonic Measurement (Harmonics) ► section 5.1

3. Tap **Harmonics**. A harmonic measurement setup screen appears.



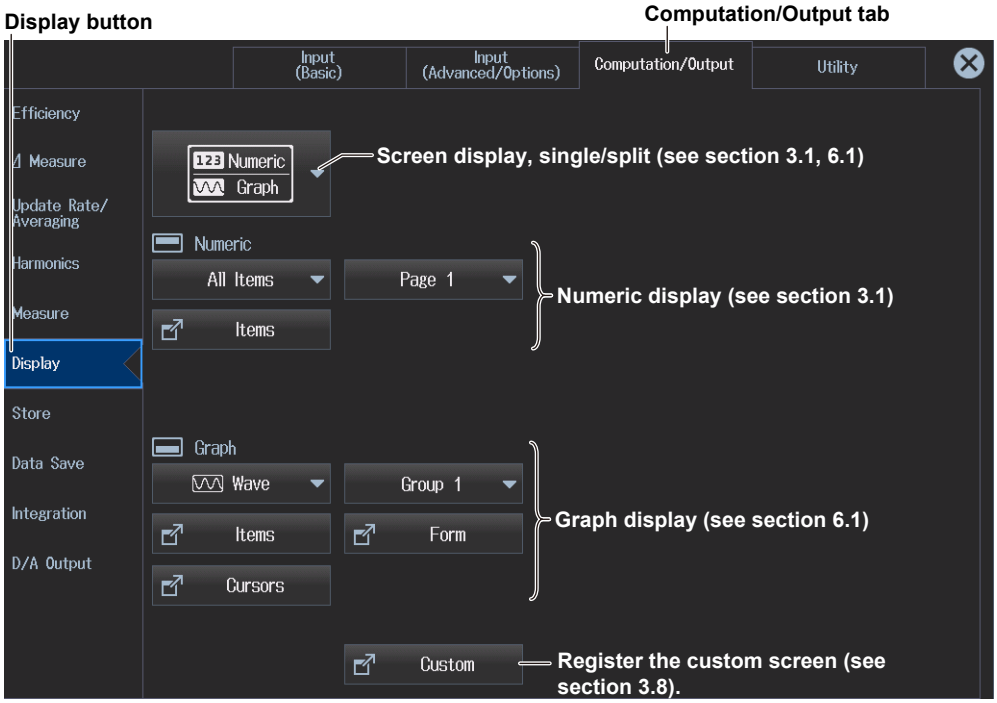
Setting the measurement (Measure) ► sections 2.14, 3.3, 3.4, 3.5

3. Tap **Measure**. A setup screen appears for the user-defined functions, apparent power formula, master/slave, and phase difference.



Configuring the Numeric, Custom, and Graphic Displays (Display) ► sections 3.1, 3.8, 6.1

3. Tap **Display**. A setup screen appears for the screen display format.

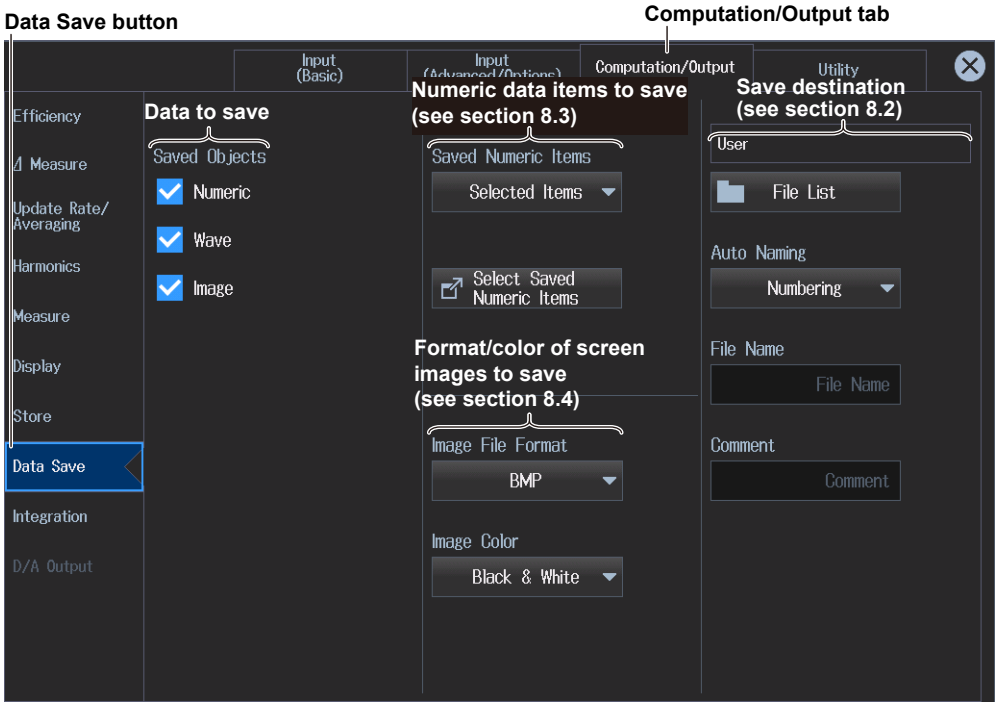


Configuring the Storage (Store) ► section 7.1, 7.2, 7.3

3. Tap **Store**. A storage setup screen appears.

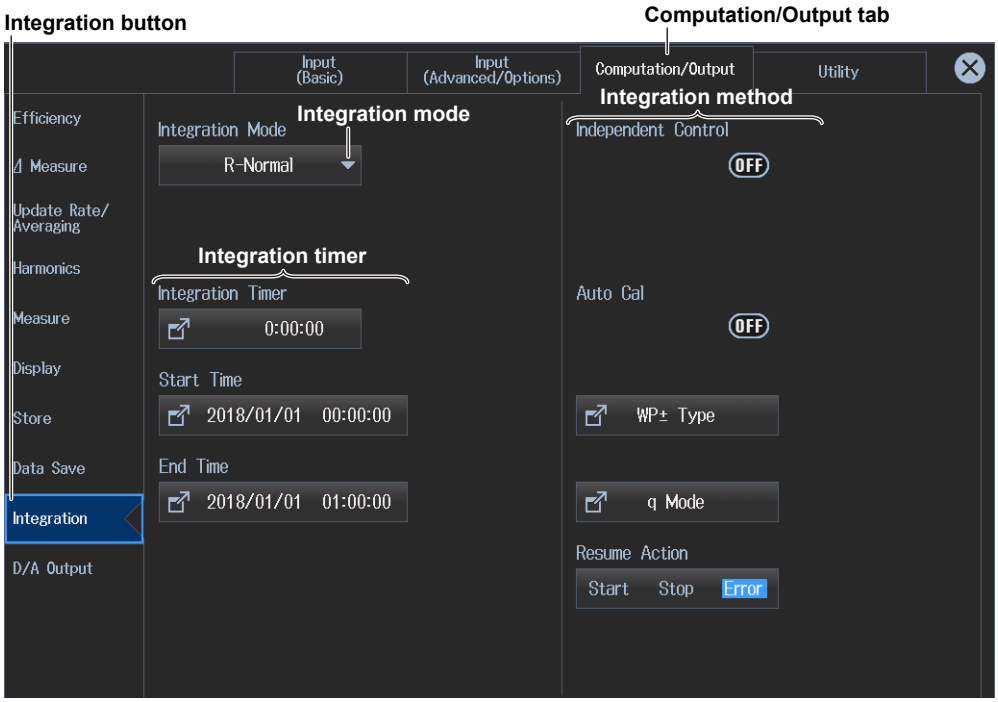
Configuring the Data Save Feature (Data Save) ► section 8.2, 8.3, 8.4, 8.5

3. Tap **Data Save**. A data save setup screen appears.



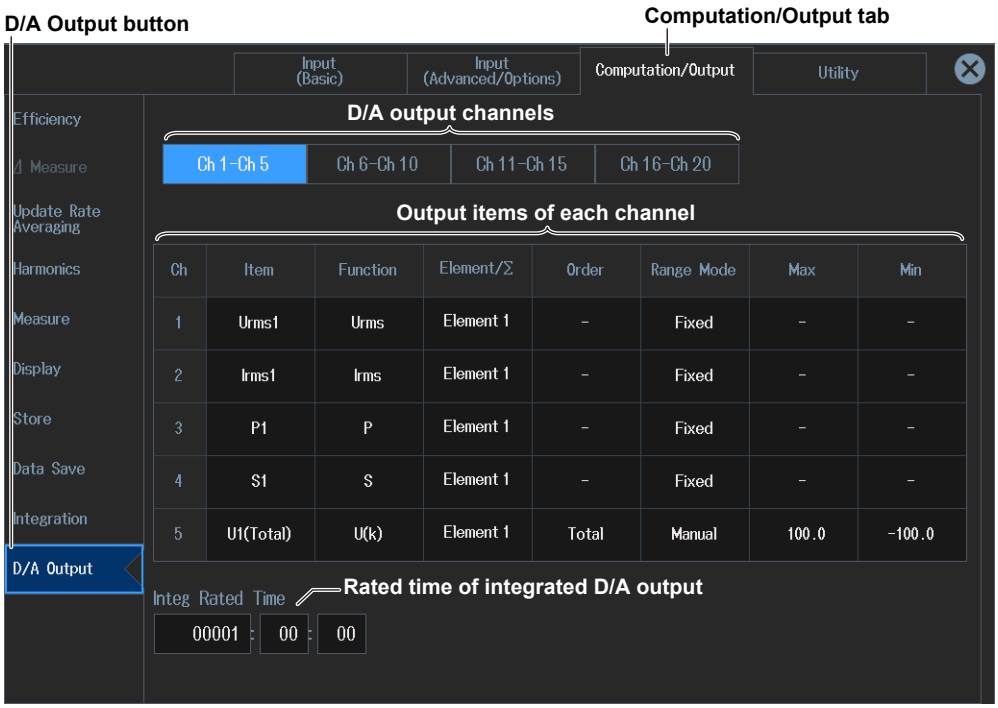
Setting the Integration Conditions (Integration) ► section 4.1

3. Tap **Integration**. An integration condition setup screen appears.



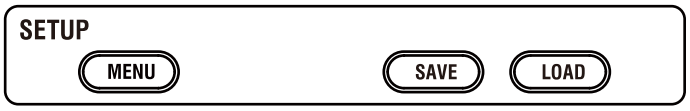
Configuring the D/A Output (D/A Output) ► section 16.2

3. Tap **D/A Output**. A D/A output setup screen appears.



1.4 Utility Settings Overview

The system settings of this instrument are displayed in table format. You can control all the settings from this overview screen.



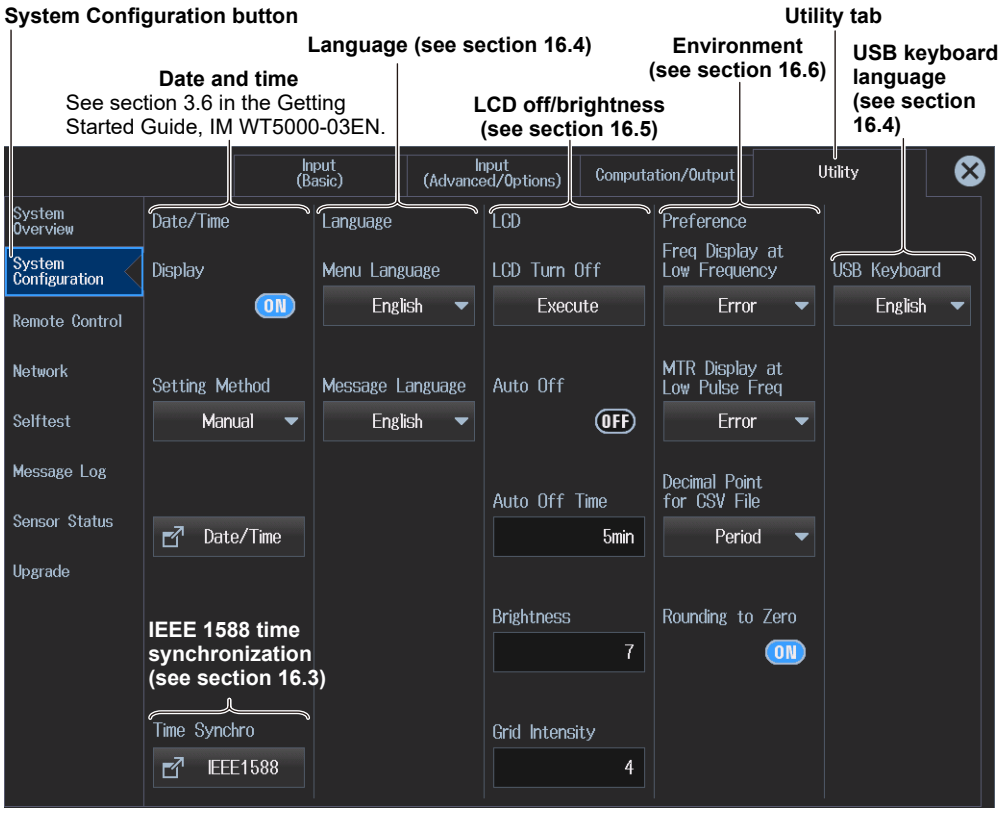
Utility Settings Overview (Utility)

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

System Configuration (System Configuration)

►section 16.3, 16.4, 16.5, 16.6

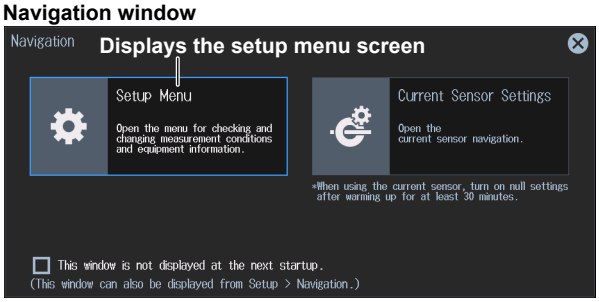
3. Tap **System Configuration**. A system settings overview appears.



Note

- You can also display the input settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.
- You can also display the setup menu screen from the navigation window that appears immediately after power-on.

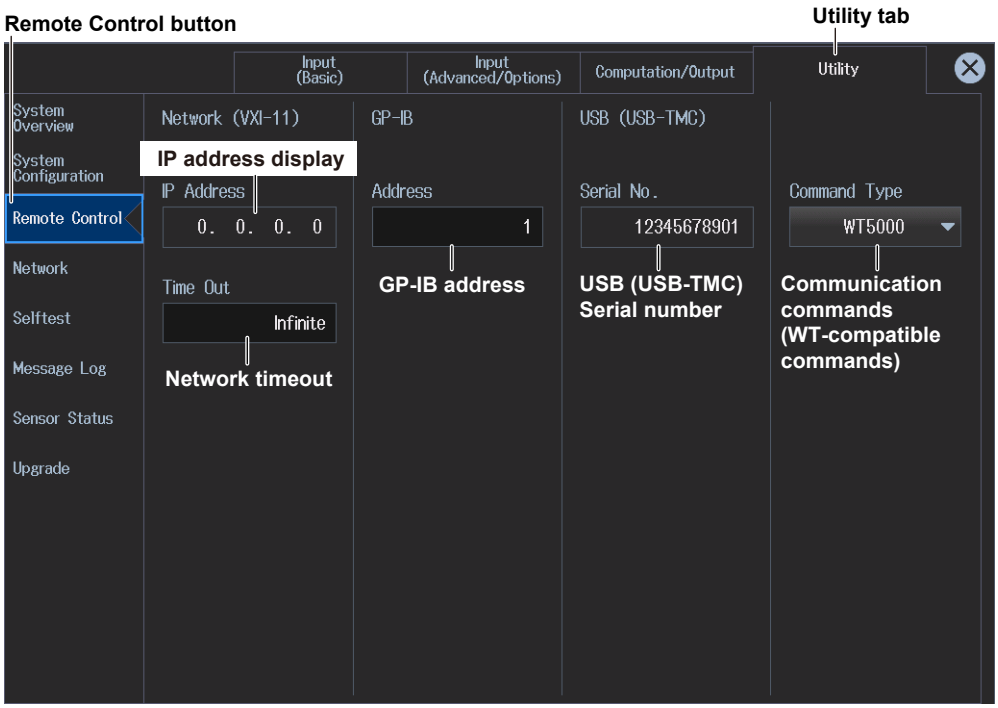
Navigation window



Remote Control Settings (Remote Control) ►section 16.1

3. Tap **Remote Control**.

A remote control setup screen (Network(VXI-11/GP-IB/USB(USB-TMC)) appears.

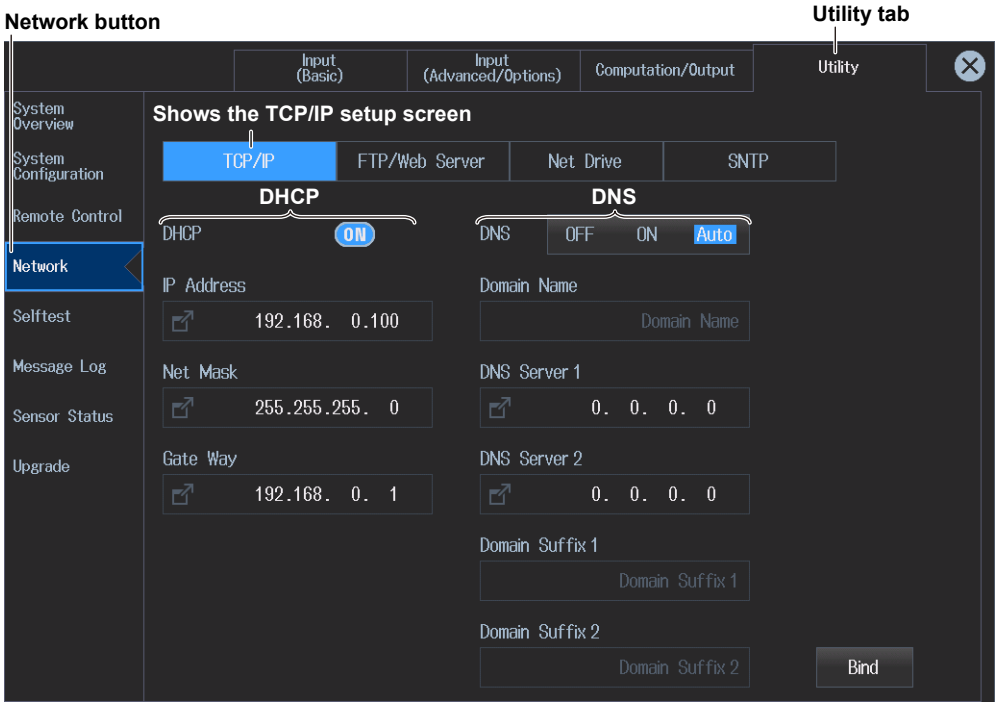


Ethernet Communication Settings (Network)

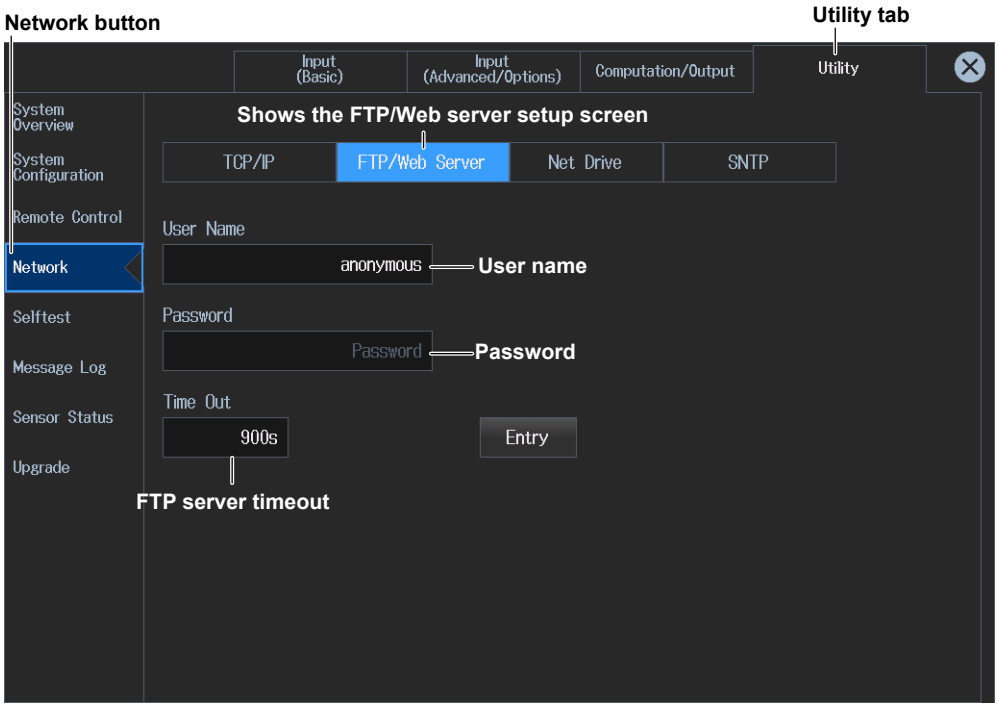
► section 15.2, 15.3, 15.4, 15.5, 15.6

3. Tap **Network**. A network setup screen appears.

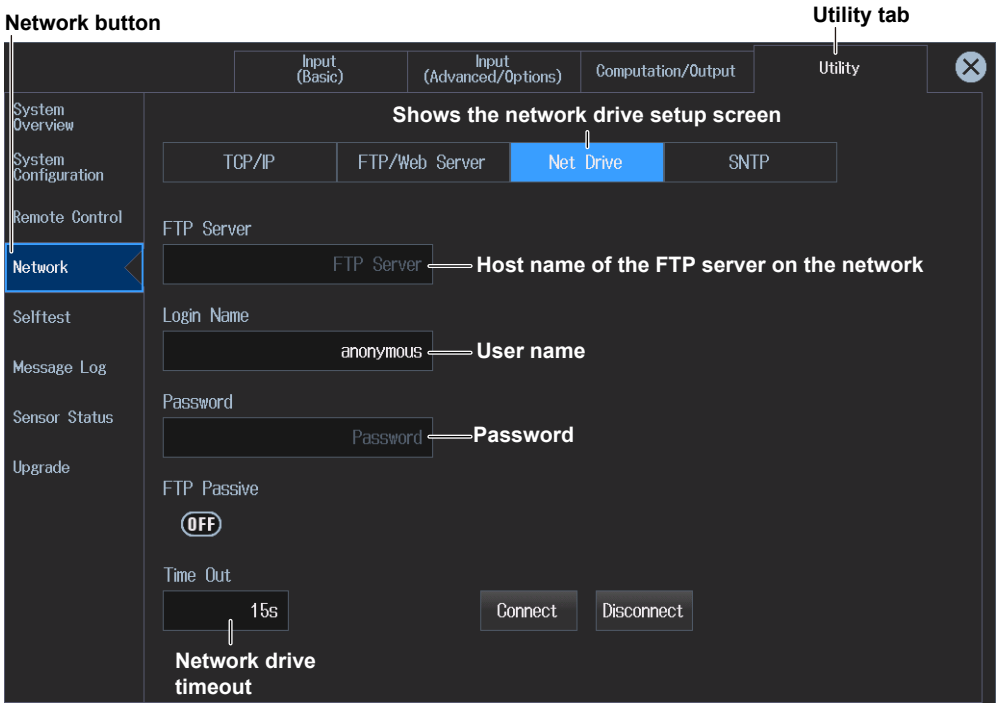
- **TCP/IP Settings (see section 15.2)**



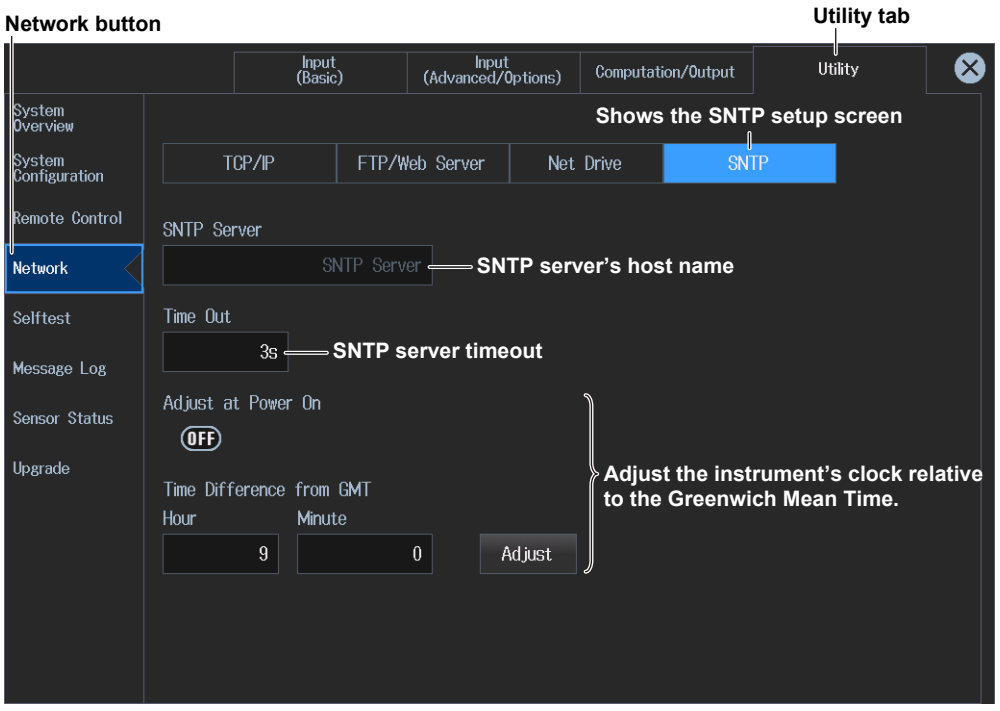
- **FTP Server Settings (see section 15.3), Web Server Settings (see section 15.4)**



- **Network Drive Settings (see section 15.5)**

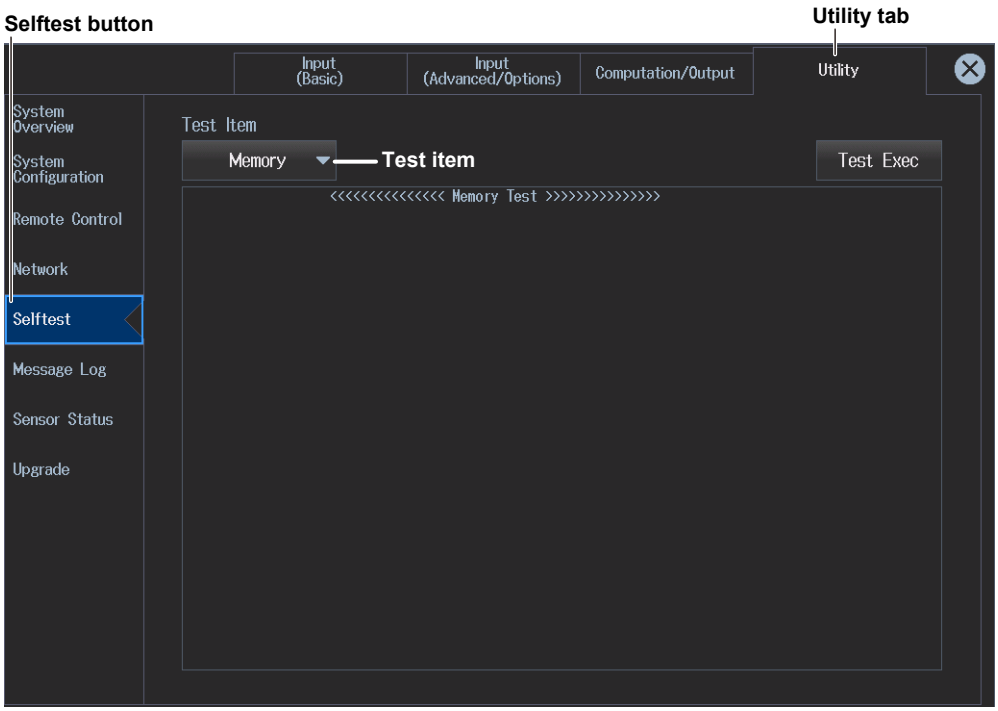


- **SNTP (date and time) settings (see section 15.6)**



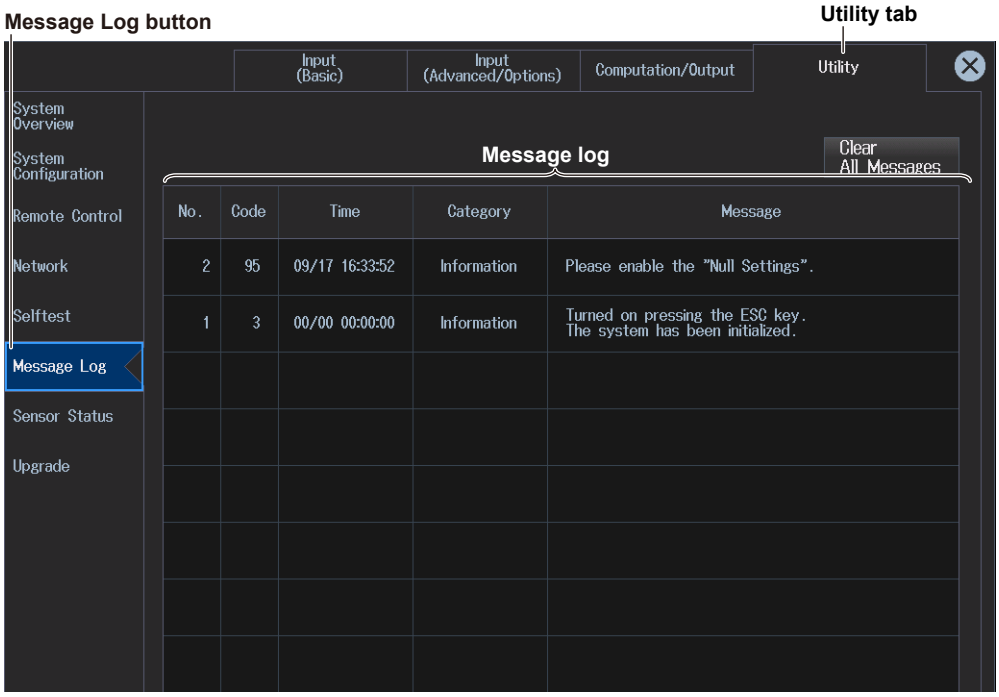
Self-test (Selftest) ► section 16.7

3. Tap **Selftest**. A self-test setup screen appears.



Message Log Display(Message Log) ► section 16.8

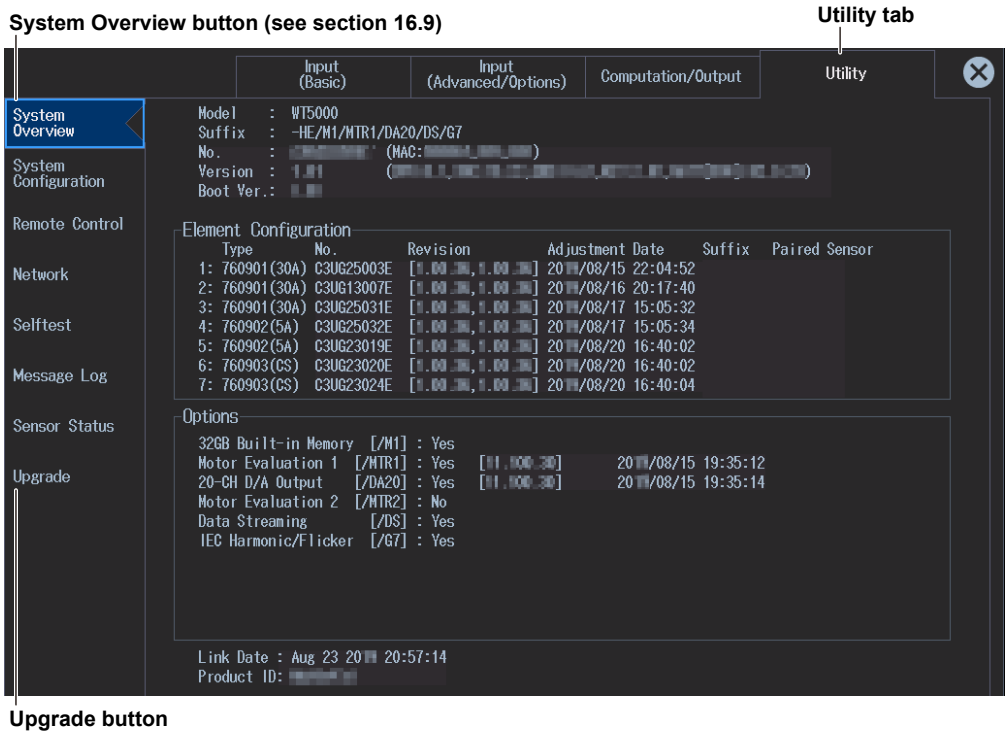
3. Tap **Message Log**. A message log screen appears.



System Overview and Upgrade (System Overview/Upgrade) ► section 16.9

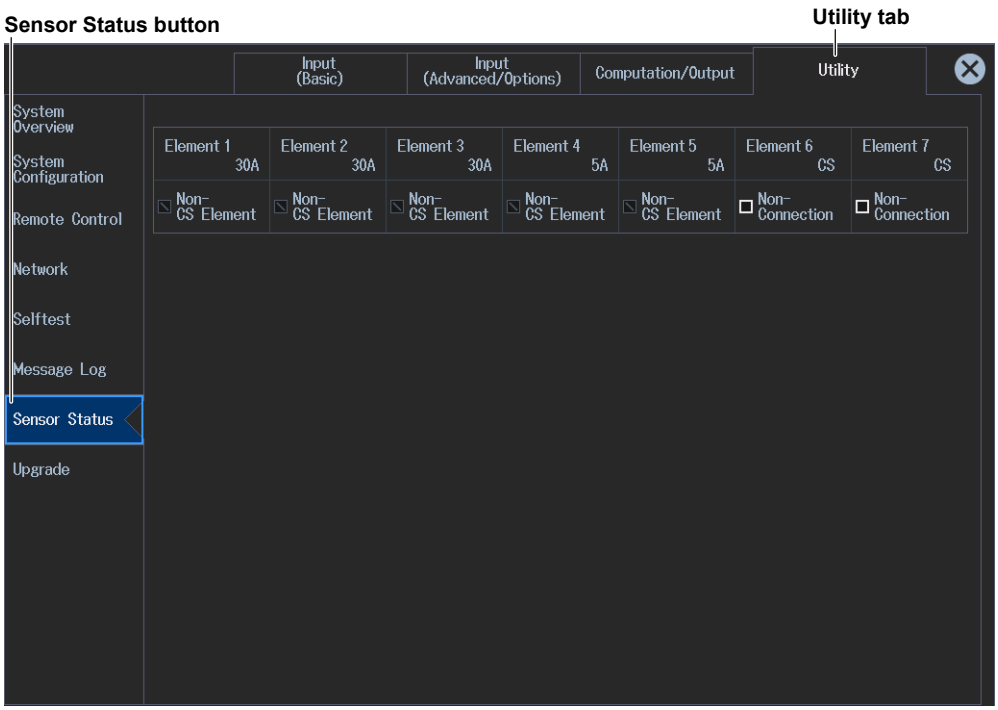
3. Tap **System Overview** to display a table of instrument information.

   Tap **Upgrade** to display the Upgrade screen.



Current Sensor Status Display (Sensor Status) ► section 16.9

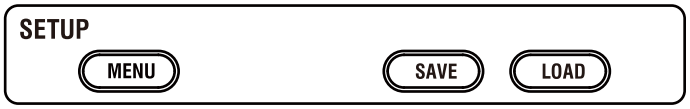
3. Tap **Sensor Status**. The current sensor statuses are listed.



1.5 Saving, Loading, and Initializing Setup Data

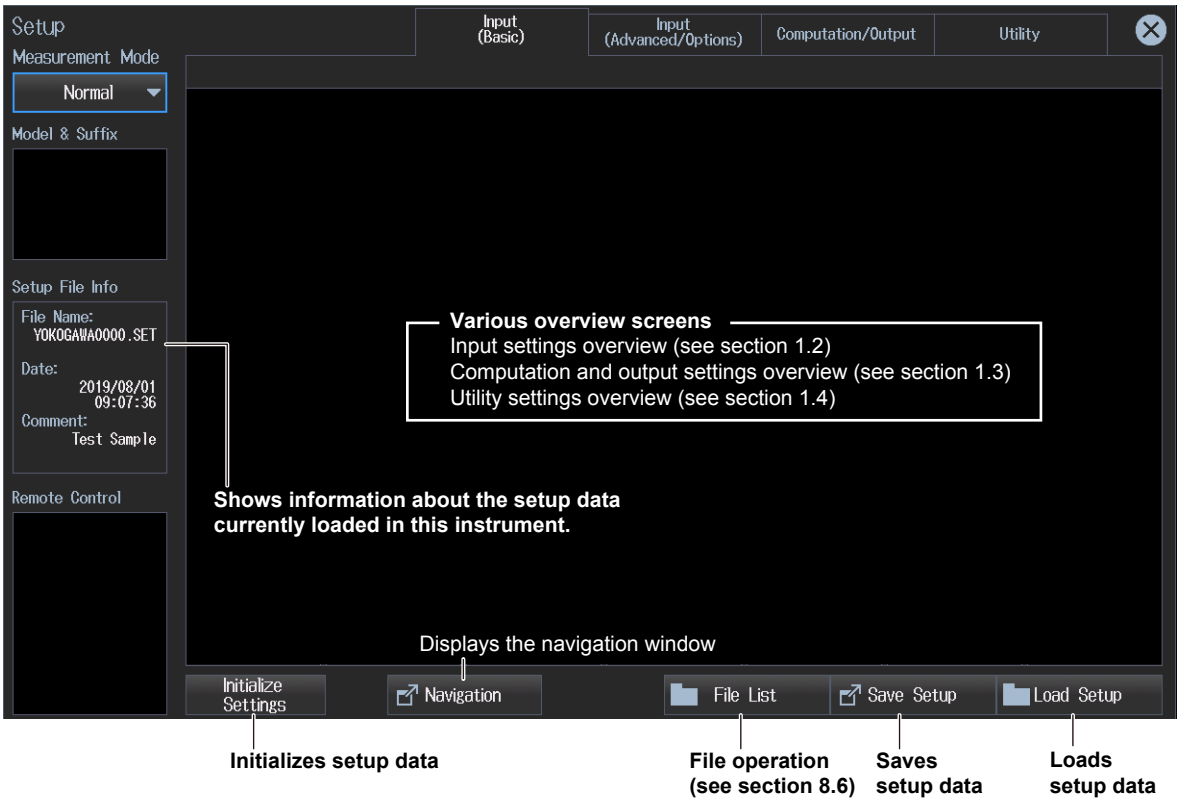
► “Saving Setup Data (Save Setup)” in the features guide
► “Loading Setup Data (Load Setup)” in the features guide
► “Initialize Settings (Initialize Settings)” in the features guide

You can load, save, and initialize the system settings of this instrument.



Saving, Loading, and Initializing Setup Data (Save Setup/Load Setup/Initialize Settings))

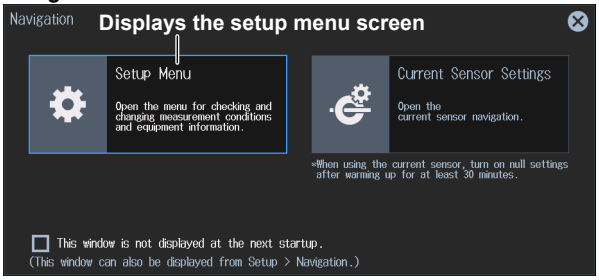
1. Tap the **Setup** icon , or press **MENU** under SETUP. The setup menu screen appears.



Note

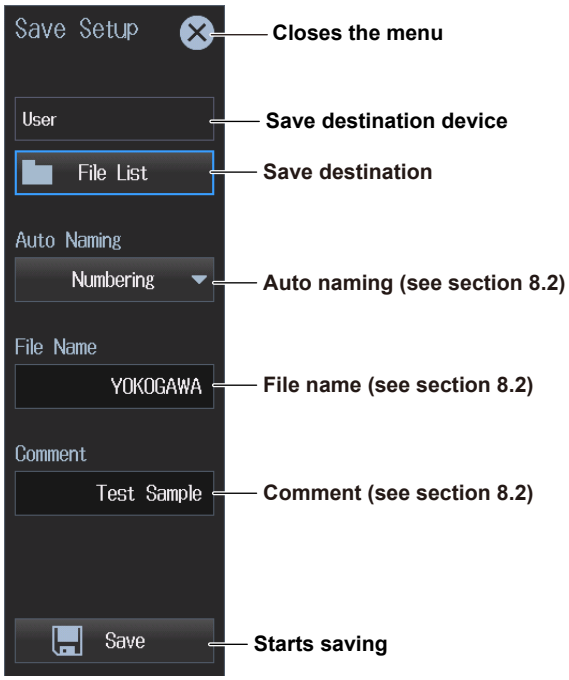
You can also display the setup menu screen from the navigation window that appears immediately after power-on.

Navigation window



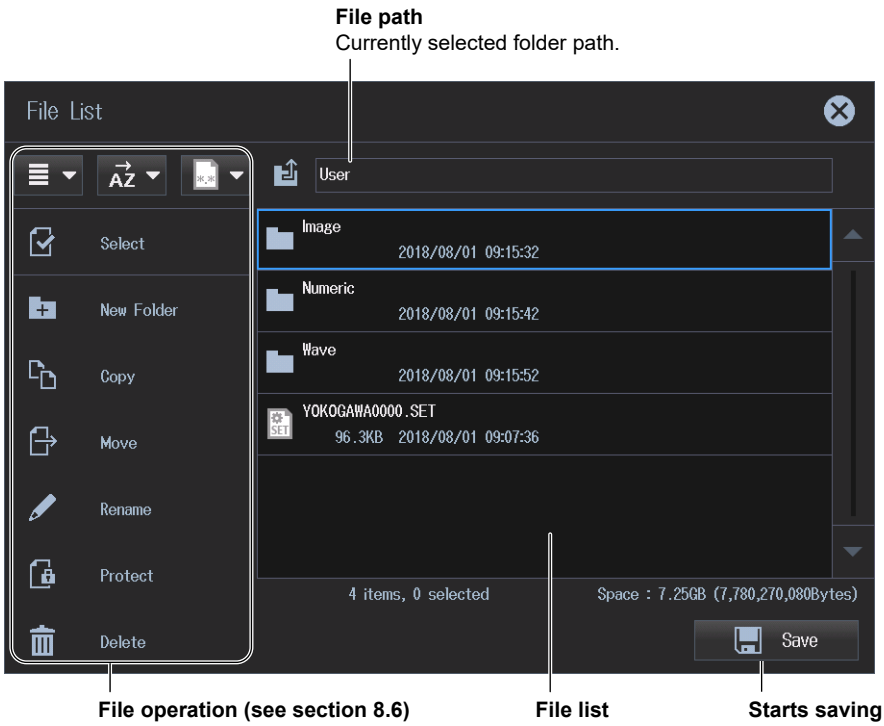
Saving Setup Data

2. Tap **Save Setup**. A Save Setup screen appears.
   Pressing **ESC** closes the Save Setup screen.



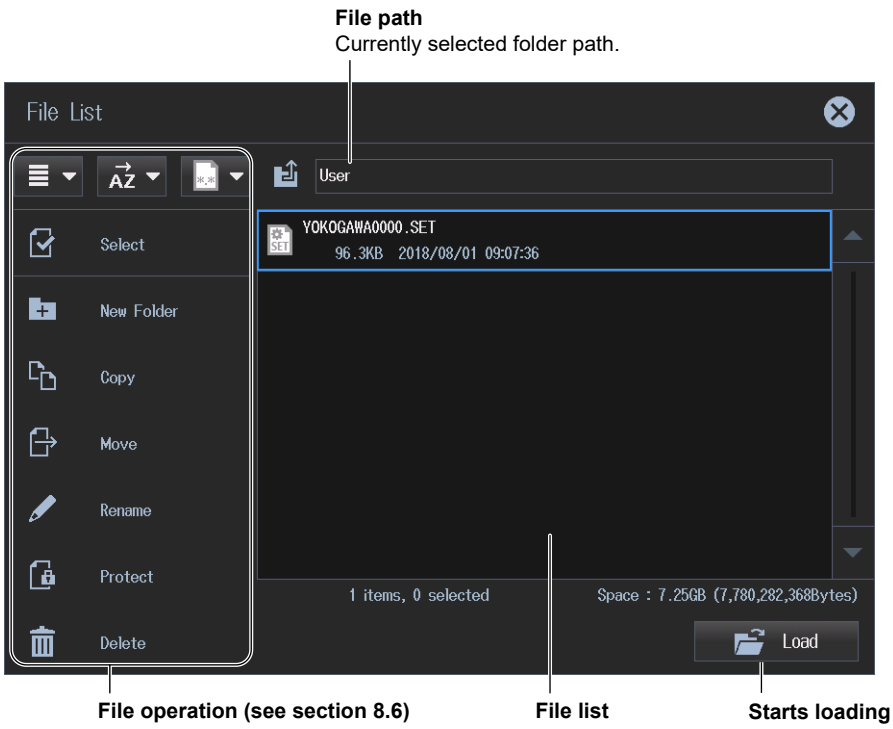
Setting the Save Destination

3. Tap **File List**. A file list appears.
   Pressing **ESC** closes the file list.
4. Select the save destination from the file list.
5. Tap **Save**. The setup data is saved in the save destination folder.



Loading Setup Data

2. Tap **Load Setup**. A file list appears.
   Pressing **ESC** closes the file list.
3. Select the setup data you want to load from the file list. The extension for setup data is .set.
4. Tap **Load**. The setup data is loaded into the instrument.



Initializing the Setup Data

2. Tap **Initialize Settings**. A confirmation screen appears for executing the initialization.
3. Tap **OK**. The setup data of this instrument will be initialized.

1.6 Current Sensor Setup Menu

► “Current Sensor Menu (Current Sensor Settings)” in the features guide

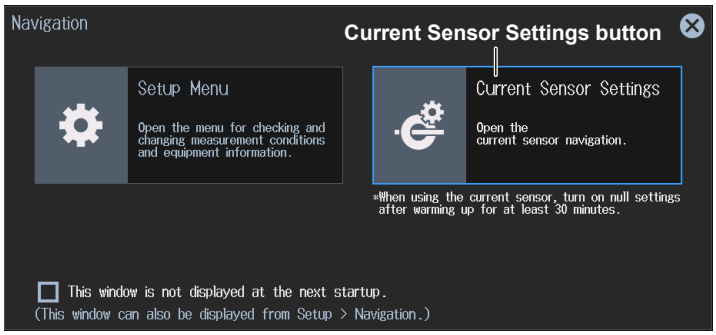
This section explains how to display only the current sensor settings and how to use the menu screen for specifying the settings.

Displaying the Current Sensor Setup Menu

You can display the current sensor setup menu by performing the following procedure.

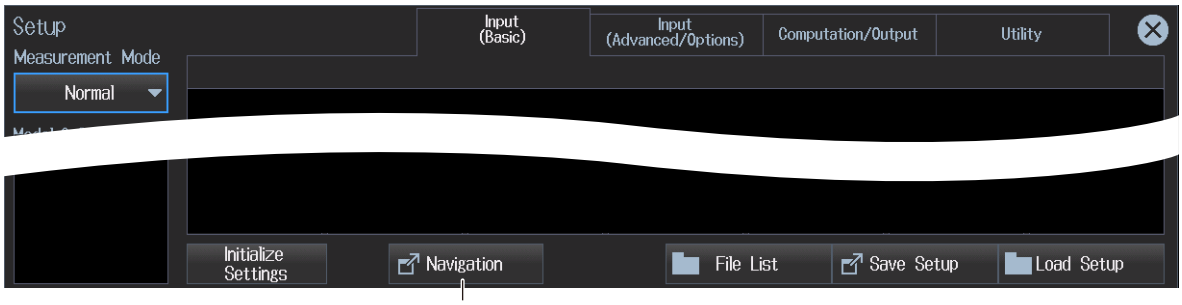
At Instrument Startup

1. On the navigation window that appears when the instrument starts, tap **Current Sensor Settings**. The current sensor setup menu screen appears.

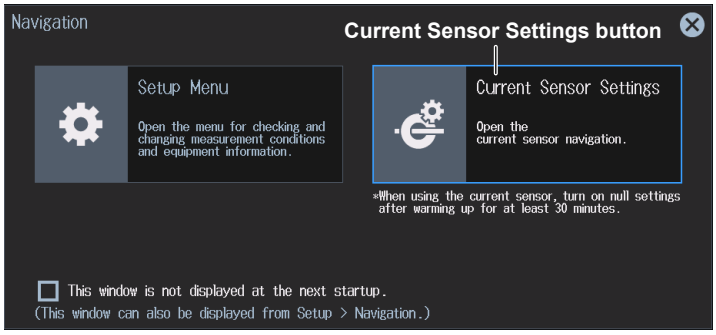


From the Setup Menu after Instrument Startup

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP. The setup menu screen appears.
2. Tap **Navigation** at the bottom of the setup menu screen. A navigation window appears.



3. Tap **Current Sensor Settings**. The current sensor setup menu screen appears.

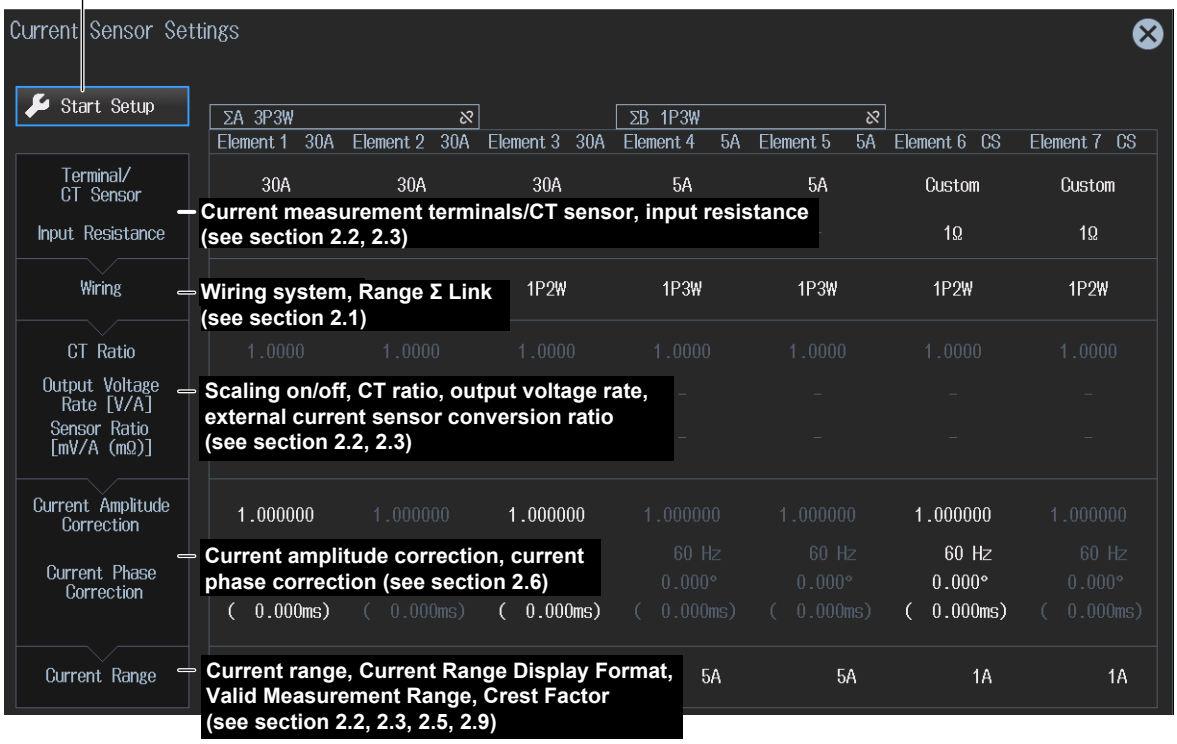


Configuring the Current Sensor

► section 2.1, 2.2, 2.3, 2.5, 2.6, 2.9

1. Tap **Start Setup** on the current sensor setup menu screen. The button changes to “View Settings”, and a screen appears for setting the Terminal/CT Sensor items.
   Tapping **View Settings**, which changed from the Start Setup button, causes the screen to return to the first setup menu screen.

Start Setup button



For details on the individual settings, see the respective references.

2. Tap **Next** or **Back** that appears at the bottom of the Terminal/CT Sensor and subsequent setup screens. The screen will switch to the next setup screen or previous setup screen.

You can also tap each setting (Terminal/CT Sensor, Wiring, CT Ratio, etc.) to switch to the corresponding setup screen.

3. On the screen that you switched to, set the items.
4. Tap **Close** at the bottom of the Current Range setup screen to switch from the current sensor setup menu screen to the measurement result display screen.
   To display the first screen of the current sensor setup menu again, perform steps 1 to 3 on the previous page.

2.1 Setting the Wiring System

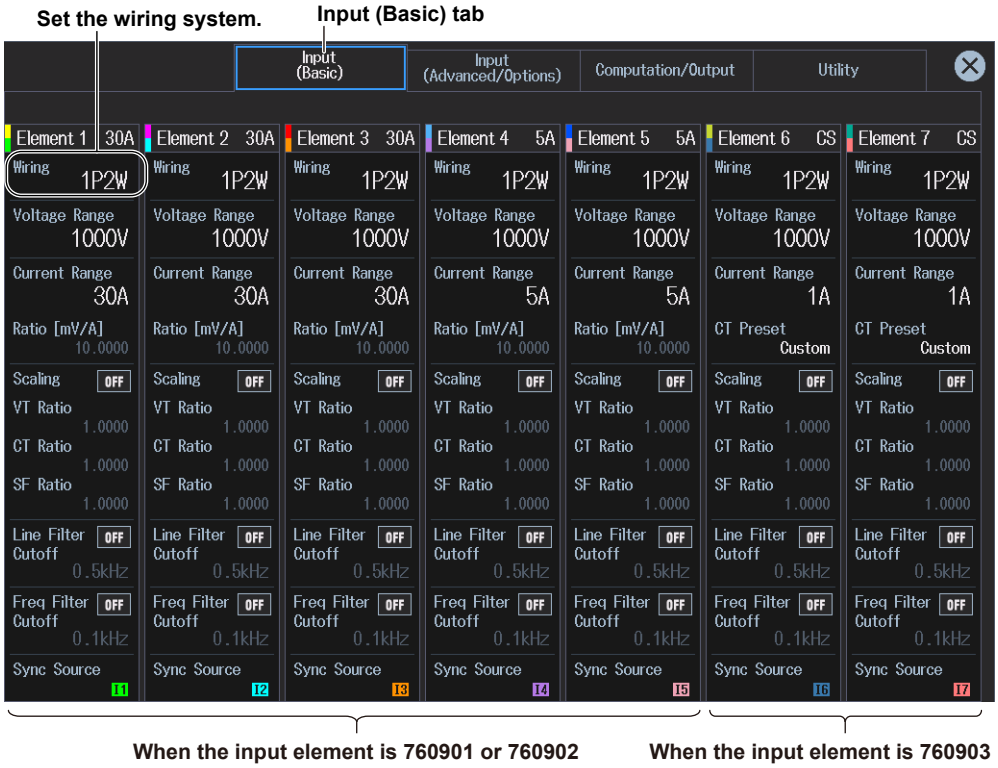
This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

► “Wiring System (Wiring)” in the features guide
► “Range Σ link (Range Σ Link)” in the features guide

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Input (Basic)** tab. An input settings (basic measurement conditions) overview screen appears.
   Pressing **ESC** closes the overview screen.



Note

You can also display the input settings (basic measurement conditions) overview screen by moving the cursor on the Input (Basic) tab using the arrow keys and then pressing SET.

Setting the Wiring System

3. Tap **Wiring** of the input element number you want to configure. A wiring system setup menu appears.

Wiring system (example of element 1)

Select the wiring system (1P2W, 1P3W, 3P3W, 3P4W, 3P3W(3V3A), 3P3W(3V3AR)).
When you select an input element, the wiring systems that you can select are displayed. Select the wiring system from those displayed.

Shows the advanced wiring system setup screen
Displays a screen containing wiring system selection buttons, wiring diagram, wiring units, etc. (see section 1.2)

Wiring System Combination

- If you select 1P3W, 3P3W, 3P4W, 3P3W(3V3A), or 3P3W(3V3AR) for the wiring system, the wiring unit is set with the two or three input elements adjacent to the selected element whose element numbers are larger than the selected element.
- On models that have six or more input elements installed, up to three wiring units (ΣA, ΣB, and ΣC) are automatically set. The wiring unit symbols ΣA, ΣB, and ΣC are attached to the element numbers in order, starting with the smallest number.

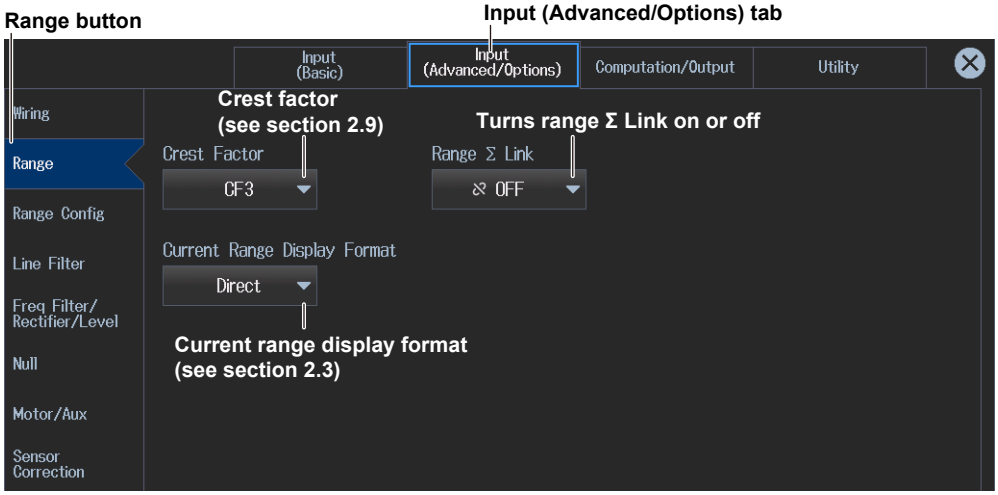
Note

- You cannot set the wiring units for larger element numbers before the wiring units for smaller element numbers.
- You cannot assign different types of input element to a wiring unit.
- For the 760903 current sensor input element, when Range Σ Link is set to ON, the wiring unit cannot be set among elements whose CT Type or Input Resistance setting is different.

Range Σ Link Settings (Range Σ Link)

2. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
Pressing **ESC** closes the overview screen.

3. Tap **Range**. A setup screen appears for common measurement range items.



Note

- When range Σ link is set to on, the measurement ranges of the input elements assigned to the same wiring unit are set to the same range. When range Σ link is set to off, the measurement ranges of the input elements can be set independently even when they are assigned to the same wiring unit.
- For the 760903 current sensor input element, when any of the wiring units is set among the elements whose CT Type or Input Resistance setting is different, Range Σ Link cannot be set to ON.

2.2 Setting the Voltage Range and Current Range

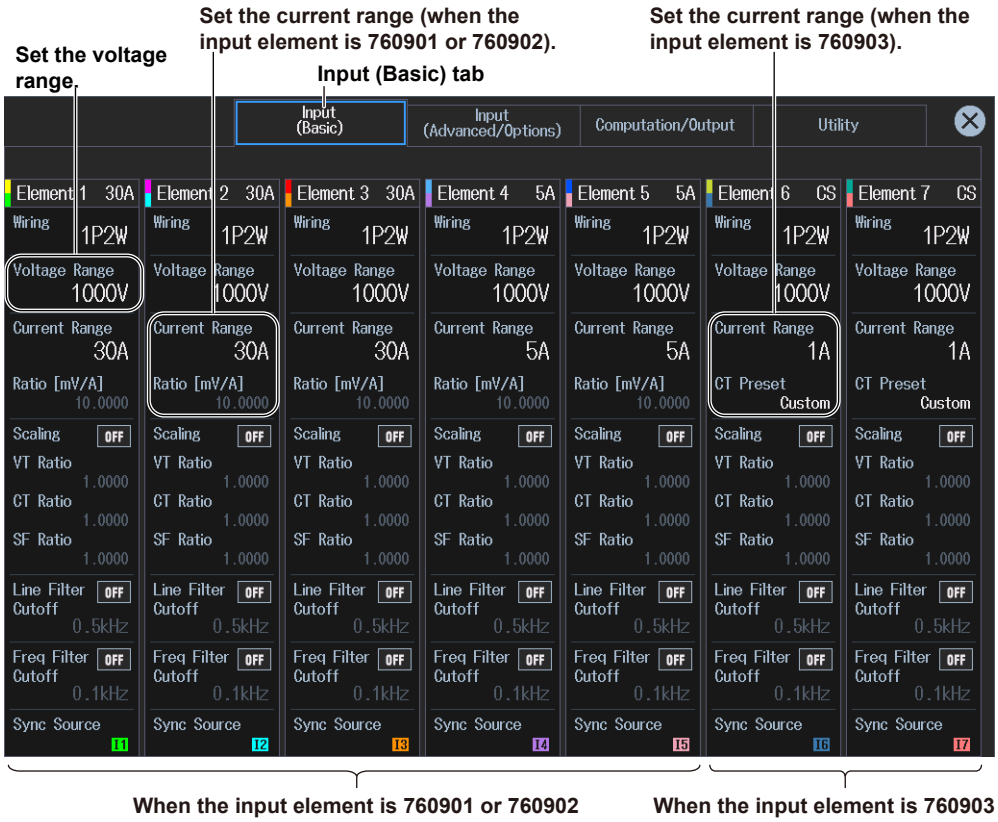
► “Voltage Range (Voltage, VOLTAGE RANGE)” in the features guide
► “Auto Voltage Range (Auto (Voltage), AUTO)” in the features guide
► “Current Range (Current, CURRENT RANGE)” in the features guide
► “Auto Current Range (Auto (Current), AUTO)” in the features guide
► “Current Measurement Terminal (Terminal)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Input (Basic)** tab. An input settings (basic measurement conditions) overview screen appears.
   Pressing **ESC** closes the overview screen.



Note

You can also display the input settings (basic measurement conditions) overview screen by moving the cursor on the Input (Basic) tab using the arrow keys and then pressing SET.

Setting the Voltage Range (Voltage Range)

3. Tap **Voltage Range** of the input element number you want to configure. A voltage range setup menu appears.
4. Follow the instructions below to set the voltage range.

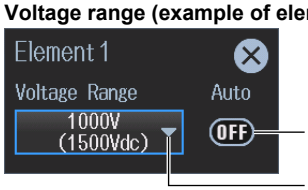
- **Sets auto range mode**

  3. Tap **Auto**. The AUTO key illuminates.

- **Setting the Fixed Range**

  Tap **Voltage Range**. A voltage menu appears.
  Tap a voltage range on the menu to set the voltage range.

Voltage range (example of element 1)



Set the voltage range to auto.

Select the voltage range (1000V, 600V, 300V, 150V, 100V, 60V, 30V, 15V, 10V, 6V, 3V, 1.5V).

Operations in the Input Information Area

See page 2-8.

Available voltage range options

When the Crest Factor Is Set to CF3	When the Crest Factor Is Set to CF6 or CF6A
1.5 V, 3 V, 6 V, 10 V, 15 V, 30 V, 60 V, 100 V, 150 V, 300 V, 600 V, 1000 V	0.75 V, 1.5 V, 3 V, 5 V, 7.5 V, 15 V, 30 V, 50 V, 75 V, 150 V, 300 V, 500 V

Note

- When range Σ link (see section 2.1) is set to on, the voltage ranges of the input elements assigned to the same wiring unit are set to the same range. When range Σ link is set to off, the voltage ranges of the input elements can be set independently even when they are assigned to the same wiring unit.
- When the setup menu screen is overlapped on the range display of each element, press ESC. The setup menu screen will close.

Setting the Current Range (Current Range) When the Input Element Is 760901 or 760902

3. Tap **Current Range** of the input element number you want to configure. A current range setup menu appears.

4. Follow the instructions below to set the current range.

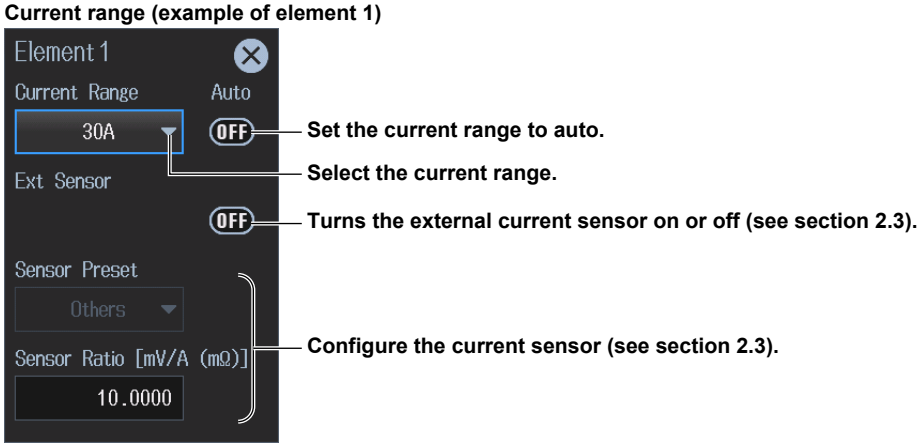
- **Sets auto range mode**

  Tap **Auto**. The AUTO key illuminates.

- **Setting the Fixed Range**

  Tap **Current Range**. A current range menu appears.
  Tap a current range on the menu to set the current range.

Current range (example of element 1)



Operations in the Input Information Area

See page 2-8.

Available current range options

- **30 A Input Element 760901**

When the Crest Factor Is Set to CF3	When the Crest Factor Is Set to CF6 or CF6A
500 mA, 1 A, 2 A, 5 A, 10 A, 20 A, 30 A	250 mA, 500 mA, 1 A, 2.5 A, 5 A, 10 A, 15 A

- **5 A Input Element 760902**

When the Crest Factor Is Set to CF3	When the Crest Factor Is Set to CF6 or CF6A
5 mA, 10 mA, 20 mA, 50 mA, 100 mA, 200 mA, 500 mA, 1 A, 2 A, 5 A	2.5 mA, 5 mA, 10 mA, 25 mA, 50 mA, 100 mA, 250 mA, 500 mA, 1 A, 2.5 A

Note

When range Σ link (see section 2.1) is set to on, the current ranges of the input elements assigned to the same wiring unit are set to the same range. When range Σ link is set to off, the current ranges of the input elements can be set independently even when they are assigned to the same wiring unit.

Setting the Current Range (Current Range) When the Input Element Is 760903

3. Tap **Current Range** of the input element number you want to configure. A current range setup menu appears.

Current Measurement Terminal (Terminal)

4. Tap **Terminal**. The Terminal menu appears.
5. Tap **CT Series** or **Probe** to select Terminal.

If Terminal is set to CT Series, proceed to step 6. If it is set to Probe, proceed to step 11 on the next page.

Current Range (Current Range) When Terminal Is Set to CT Series

When Terminal is set to Sensor, Scaling is set to ON, and CT Ratio is set to the default value according to CT Type. Change these settings if necessary.
After selecting CT Type and input resistance, set the current range. Then, in step 16, set the CT ratio.

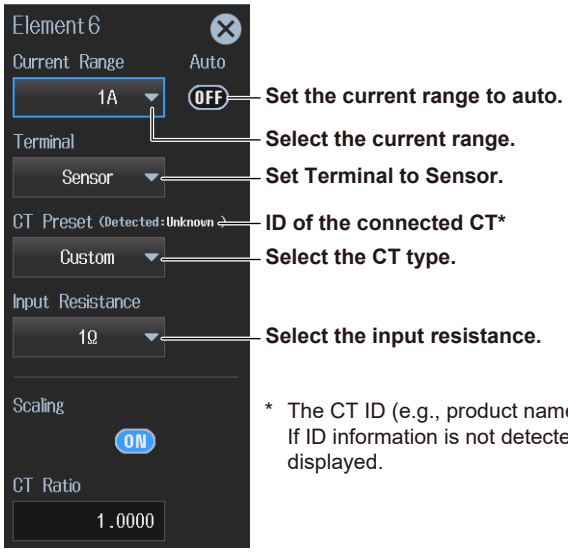
6. Tap **CT Preset**. The CT Preset menu appears.
7. Select the CT type.
   When you change the CT type, the input resistance is set accordingly. Further, Scaling is set to ON, and CT Ratio is set to the default value according to CT Type. Change these settings if necessary.

If CT Type is set to Custom, proceed to step 8. If you do not want to change the input resistance, proceed to step 10.

8. Tap **Input Resistance**. The Input Resistance menu appears.
9. Select the input resistance.
10. Follow the instructions below to set the current range.

- **Enabling Auto Range**
  Tap **Auto**. The AUTO key illuminates.
- **Setting a Fixed Range**
  Tap **Current Range**. A current range menu appears.
  Tap a current range on the menu to set the current range.

Current range (example of element 6)



* The CT ID (e.g., product name) is displayed. If ID information is not detected, “Unknown” is displayed.

Main Current Range Options

The options vary depending on the CT type. For the current range options, see “Current Range (Current, CURRENT RANGE)” in the features guide.

Current Range (Current Range) When Terminal Is Set to Probe

When Terminal is set to Probe, the CT ratio is set to 1.0000. The scaling setting will not change. Change it if necessary.

11. Follow the instructions below to set the current range.

- **Enabling Auto Range**
  Tap **Auto**. The AUTO key illuminates.
- **Setting a Fixed Range**
  Tap **Current Range**. A current range menu appears.
  Tap a current range on the menu to set the current range.

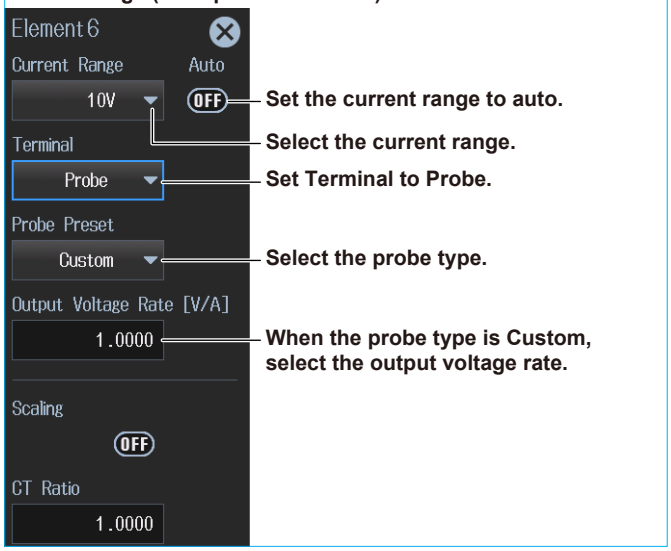
12. Tap **Probe Preset**. A Probe Preset menu appears.

13. Select the probe type.

If you change the probe type, the output voltage rate is set to its default value according to the probe type. If necessary, change the settings in step 14.

14. Tap **Output Voltage Rate [V/A]**, and set the output voltage rate.

Current range (example of element 6)



Available current range options

For the current range options, see “Current Range (Current, CURRENT RANGE)” in the features guide.

Note

When range Σ link (see section 2.1) is set to on, the current ranges and current measurement terminal settings of the input elements assigned to the same wiring unit are set to the same settings. When range Σ link is set to off, the current ranges and current measurement terminal settings of the input elements can be set independently even when they are assigned to the same wiring unit.

Operations in the Input Information Area

See page 2-8.

Scaling Feature

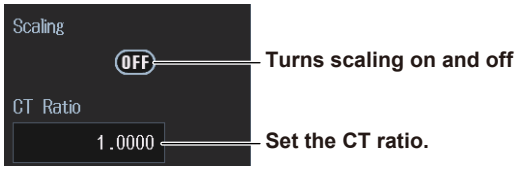
This setting is linked to the scaling setting of section 2.4.

Turning Scaling On or Off

15. Tap **Scaling** to select ON or OFF.

Setting the CT Ratio

16. Tap **CT Ratio** to set the CT ratio (or the conversion ratio of the current sensor that produces current).



Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the voltage range and current range.

1. Tap the **Range** menu icon

. A Range menu appears in the sub menu area on the right side of the screen.

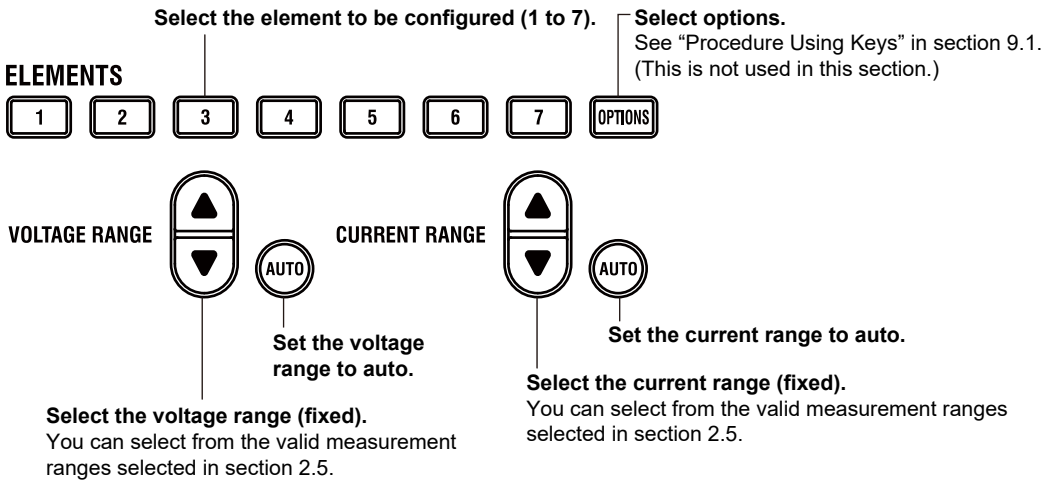
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Range menu, see page viii.

Procedure Using Keys

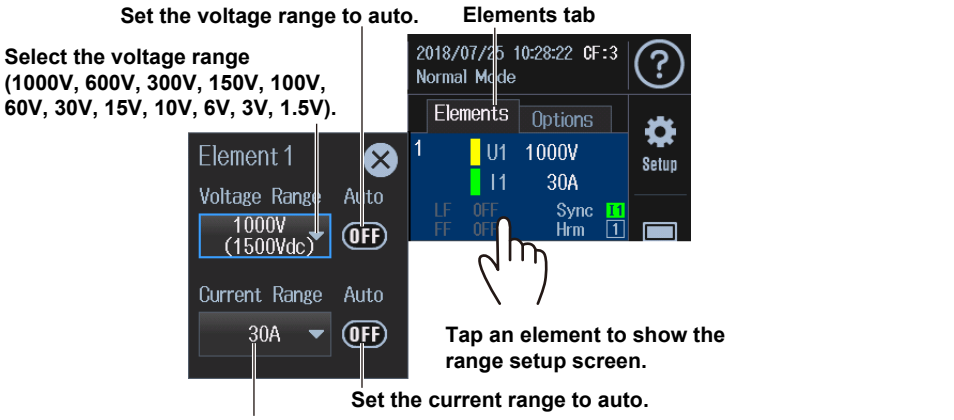
You can also use the front panel keys to set the voltage range and current range.



Procedure Using the Input Information Area (Elements tab)

If you use the input information area shown on the right side of the screen, you can set the voltage range and current range while viewing the measurements. The input information area is displayed when you close the overview screen.

1. Tap the **Elements** tab. An Elements menu appears in the input information area.
2. Tap the element (1 to 7) you want to configure. A range setup screen for the element appears.



Depending on the external current sensor on/off state, the current range or external current sensor range appears automatically, and you can set the range.
For the selectable values, see “Setting the Current Range (Current Range)” or “Setting the External Current Sensor Range (Ext Sensor).”

2.3 Configuring the Current Sensor

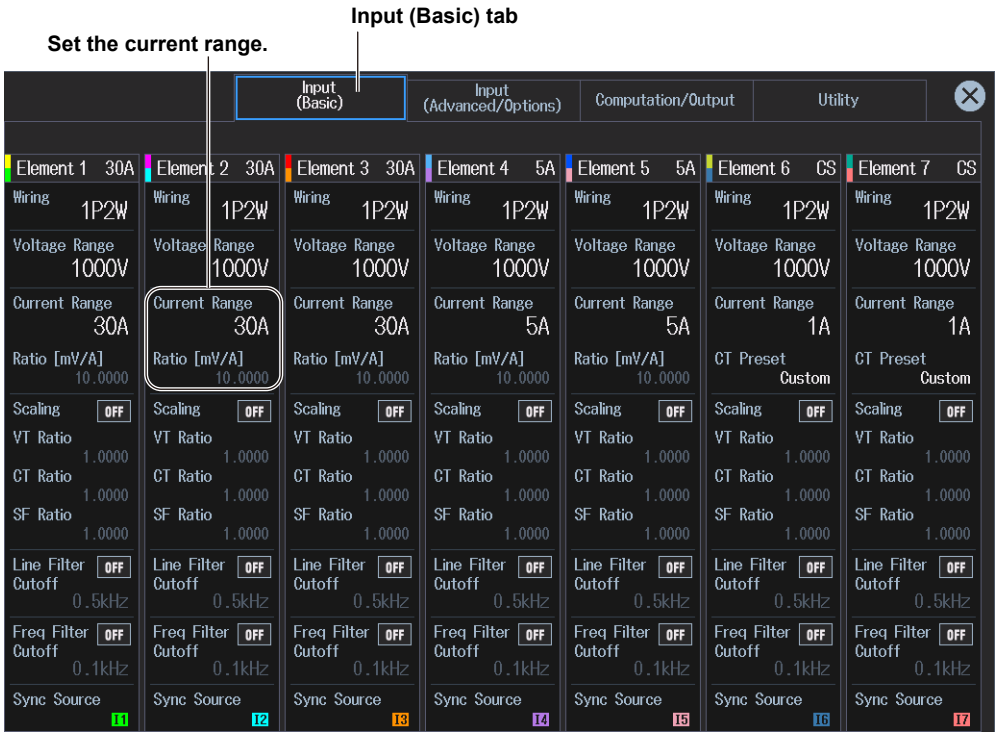
► “External Current Sensor On/Off (Ext Sensor)” in the features guide
► “External Current Sensor Conversion Ratio (Sensor Ratio)” in the features guide
► “Display Format of Current Range (Current Range Display Format)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP. 2. Tap the **Input (Basic)** tab. An input settings (basic measurement conditions) overview screen appears.
   Pressing **ESC** closes the overview screen.



Note

You can also display the input settings (basic measurement conditions) overview screen by moving the cursor on the Input (Basic) tab using the arrow keys and then pressing SET.

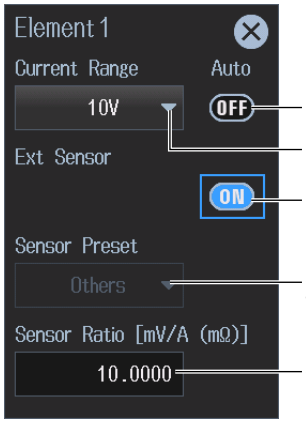
Setting the External Current Sensor Range (Ext Sensor)

3. Tap **Current Range** of the input element number you want to configure. An current range setup menu appears.
4. Tap **Ext Sensor** to select ON. The current range display changes to the external current sensor range display.
5. Follow the instructions below to set the external current sensor range.

- **Sets auto range mode**
  Tap **Auto**. The AUTO key illuminates.

- **Setting the Fixed Range**
  Tap **Current Range**. An external current sensor range menu appears. Tap the external current sensor range on the menu, and set the range.

Current range (example of element 1)



Set the external current sensor range to auto.

Select the external current sensor range.

Set the external current sensor to ON.

Set the sensor conversion ratio preset.
The sensor conversion ratio preset is currently not available.

Set the sensor conversion ratio (0.0001 to 99999.9999).

Operations in the Input Information Area

As explained in “Current Range” of section 2.2, the external current sensor range can also be set in the input information area (see page 2-8).

Available External Current Sensor Range Options

When the display format of the external current sensor range is set to Direct (see the next page), you can select the range from the available options shown in the following table (the unit is mV or V). When the display format is set to Measure, the setup range is set to the value from the following table divided by the external current sensor conversion ratio (the unit is A).

When the Crest Factor Is Set to CF3	When the Crest Factor Is Set to CF6 or CF6A
50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V	25 mV, 50 mV, 100 mV, 250 mV, 500 mV, 1 V, 2.5 V, 5 V

Note

When range Σ link (see section 2.1) is set to on, the external current sensor ranges of the input elements assigned to the same wiring unit are set to the same range. When range Σ link is set to off, the external current sensor ranges of the input elements can be set independently even when they are assigned to the same wiring unit.

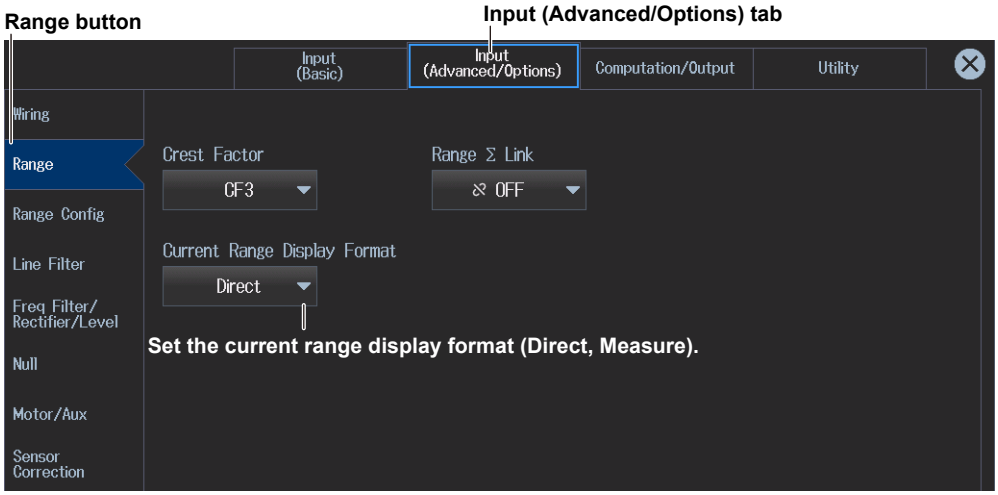
External Current Sensor Range and Conversion Ratio Configuration Example

When you measure a current with a maximum value of 100 A using a current sensor that produces 10 mV when 1 A of current is flowing, the maximum voltage that the current sensor produces is 10 mV/A × 100 A = 1 V. Therefore, configure the settings as indicated below.

- External current sensor range: 1 V
- External current sensor conversion ratio: 10 mV/A

Setting the Current Range Display Format (Current Range Display Format)

3. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
   Pressing **ESC** closes the overview screen.
4. Tap **Range**. A setup screen appears for common measurement range items.



Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the external current sensor range.

1. Tap the **Range** menu icon

. A Range menu appears in the sub menu area on the right side of the screen.

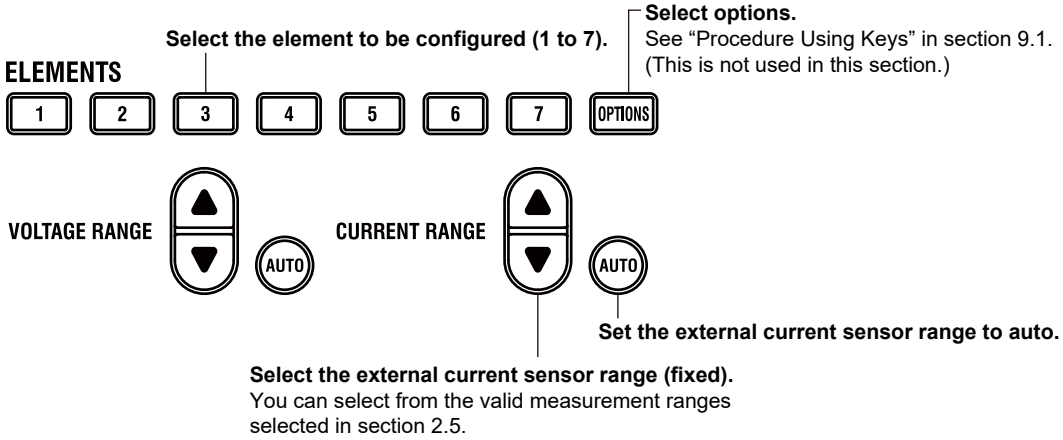
   By tapping the displayed items, you can specify the same settings as when using the keys explained earlier.

Note

For details on the Range menu, see page viii.

Procedure Using Keys

You can also use the front panel keys to set the external current sensor range.



Note

To turn the external current sensor on and off or set the sensor conversion ratio and other details, use the Setup menu.

2.4 Setting the Voltage Transformer (VT) and Current Transformer (CT) Ratios

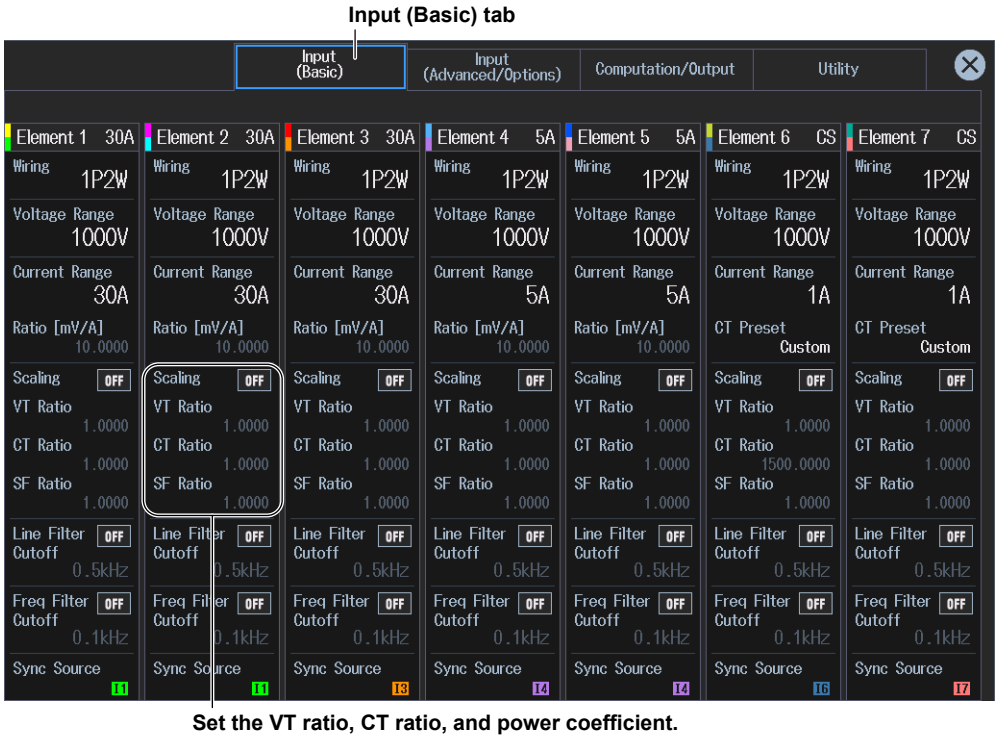
► “Scaling (Scaling)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Input (Basic)** tab. An input settings (basic measurement conditions) overview screen appears.
   Pressing **ESC** closes the overview screen.



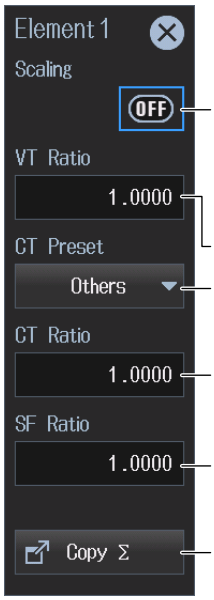
Note

You can also display the input settings (basic measurement conditions) overview screen by moving the cursor on the Input (Basic) tab using the arrow keys and then pressing SET.

Setting the VT Ratio, CT Ratio, and Power Coefficient (Scaling)

3. Tap **Scaling** of the input element number you want to configure. A scaling setup menu appears.

VT ratio, CT ratio, and power coefficient
Input element 760901 or 760902



Turns scaling on or off
When you want to multiply the external current sensor output by the conversion ratio and read the current of the circuit under measurement directly, turn the VT/CT scaling feature off. If it is turned on, the value will be further multiplied by the CT ratio.

Set the VT ratio (0.0001 to 99999.9999).

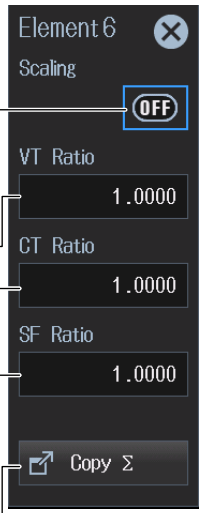
Set the CT ratio preset (CT2000A, CT1000A, CT1000, CT200, CT60, Others).
Set this when using the dedicated CT.

Set the CT ratio (0.0001 to 99999.9999).

Set the power coefficient (scaling factor) (0.0001 to 99999.9999).

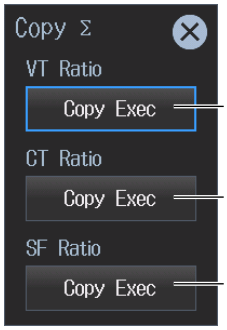
Copies the coefficients

Input element 760903



Copying VT Ratio, CT Ratio, and Power Coefficient (Exec Copy Σ)

You can copy the ratio or coefficient of the input element that is indicated by the cursor to all the input elements in that element's wiring unit.



Copies the VT ratio

Copies the CT ratio

Copies the power coefficients

2.5 Setting the Valid Measurement Range

► “Range Configuration (Range Config)” in the features guide
► “Valid Measurement Range (Valid Measurement Range)” in the features guide

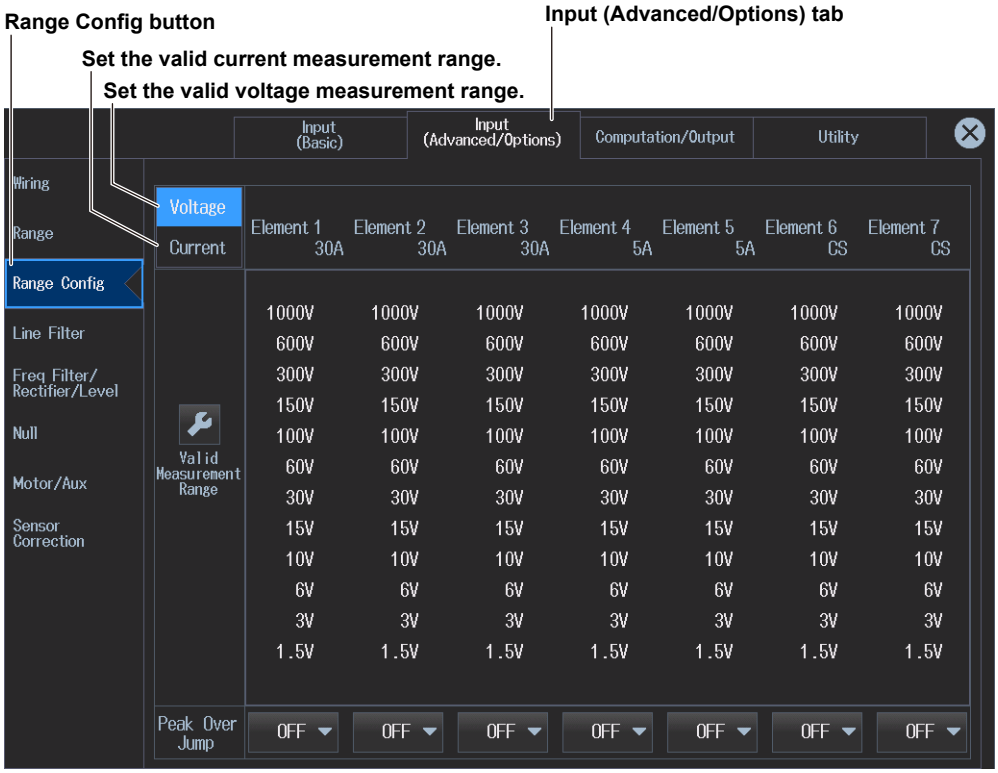
This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

This section explains how to set the measurement range when the crest factor (see section 2.9) is set to CF3. When the crest factor is CF6 or CF6A, set the valid measurement ranges from the available options.

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Range Config**. A measurement range configuration setup screen appears.

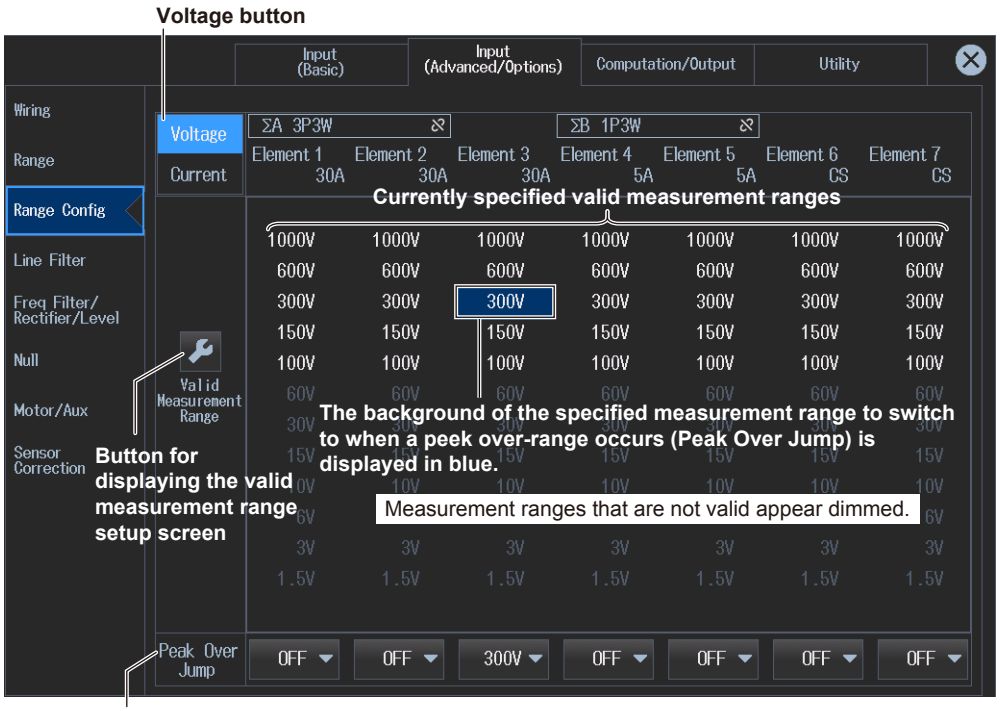


Note

You can also display the input settings (advanced/options) overview screen by moving the cursor on the Input (Advanced/Options) tab using the arrow keys and then pressing SET.

Setting the Valid Voltage Measurement Range (Voltage)

4. Tap **Voltage**. A valid voltage measurement range setup screen appears.



Specify the measurement range to switch to when a peak over-range occurs.
(OFF, 1000V, 600V, 300V, 150V, 100V, 60V, 30V, 15V, 10V, 6V, 3V, 1.5V)

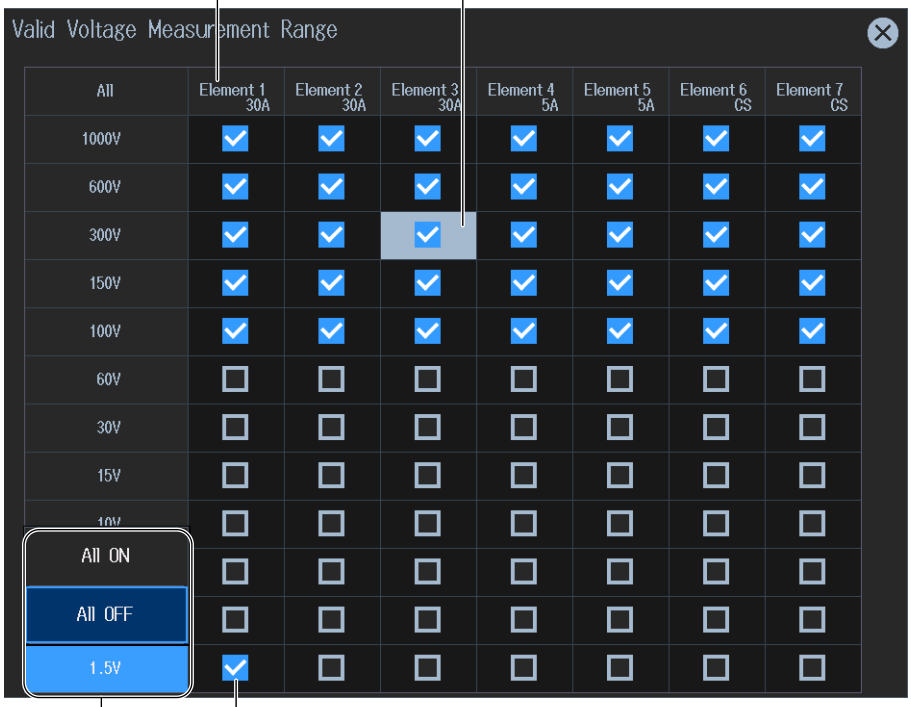
- When Range Σ Link is set to on (see section 2.1), the input elements that are assigned to the same wiring unit are set to the same range.
- If auto range is on (you can turn it on by pressing AUTO), the instrument operates as follows:
  - When a peak over-range occurs, the measurement range increases to the range specified here, skipping the ranges in between.
  - When the measurement range to switch to when a peak over-range occurs has not been selected, the measurement range increases in the order of the specified valid measurement ranges.

Setting a Valid Measurement Range for Voltage

5. Tap **Valid Measurement Range**. A valid voltage range setup screen appears.

By tapping an input element or wiring unit, you can set all ranges as valid measurement ranges (All ON).

If the measurement range to switch to when a peak over-range occurs has been selected, the range background is displayed in gray.



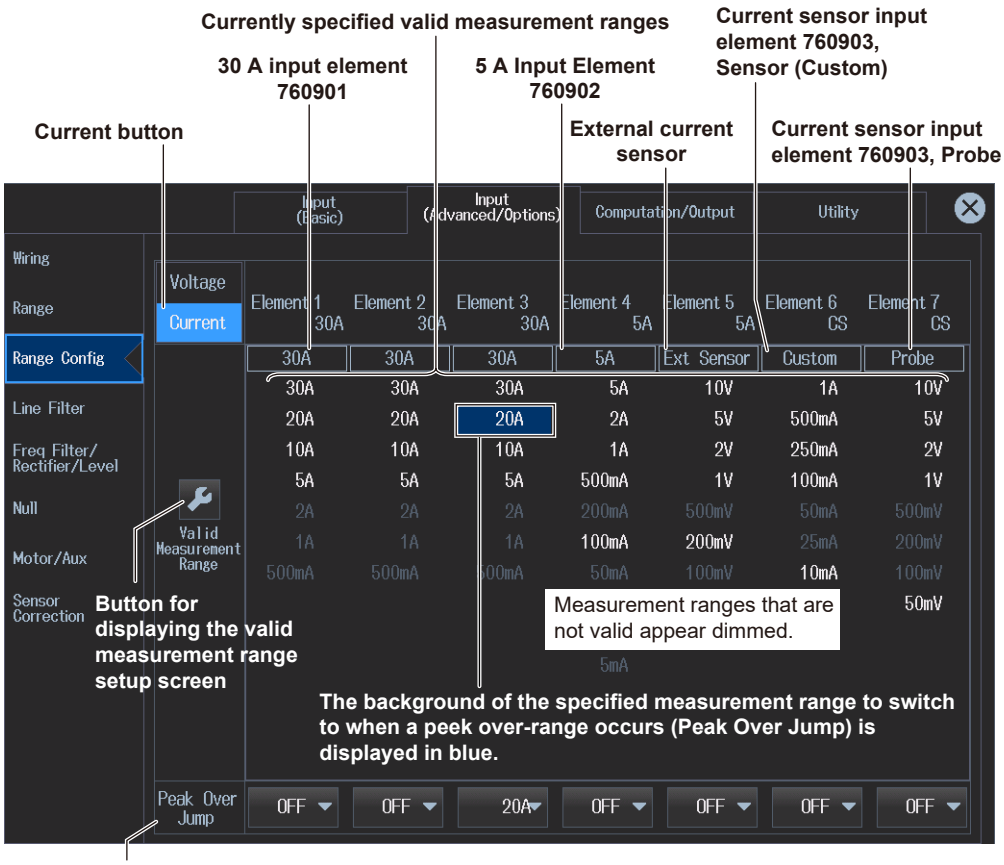
Valid measurement range

- The measurement range switches (in order) between the selected ranges.
- Ranges that are not selected are skipped.
- When Range Σ Link (see section 2.1) is set to ON, the input elements that are assigned to the same wiring unit are set to the same status.

By tapping each range display, you can collectively set or not set the applicable ranges of all input elements or wiring units as valid measurement ranges (All ON or All OFF).

Setting the Valid Current Measurement Range (Current)

4. Tap **Current**. A valid current measurement range setup screen appears.



Specify the measurement range to switch to when a peak over-range occurs.
30 A input element 760901
(OFF, 30A, 20A, 10A, 5A, 2A, 1A, 500mA)
5 A input element 760902
(OFF, 5A, 2A, 1A, 500mA, 200mA, 100mA, 50mA, 20mA, 10mA, 5mA)
Input element 760901 or 760902 with external current sensor:
(OFF, 10V, 5V, 2V, 1V, 500mV, 200mV, 100mV, 50mV)
Current sensor input element 760903:
When Terminal (see section 2.2) is set to Sensor, the options vary depending on the CT type.
For the current range options, see "Current Range (Current, CURRENT RANGE)" in the features guide.
When Terminal is set to Probe,
(OFF, 10V, 5V, 2V, 1V, 500mV, 200mV, 100mV, 50mV)

- When Range Σ Link is set to on (see section 2.1), the input elements that are assigned to the same wiring unit are set to the same range.
- If auto range is on (you can turn it on by pressing AUTO), the instrument operates as follows:
  - When a peak over-range occurs, the measurement range increases to the range specified here, skipping the ranges in between.
  - When the measurement range to switch to when a peak over-range occurs has not been selected, the measurement range increases in the order of the specified valid measurement ranges.

Setting Valid Measurement Ranges for Current (30 A input element example)

5. Tap **Valid Measurement Range**. A valid current range setup screen appears.

Select the item to set the current range of (Terminal in Use, Direct/Sensor, Ext Sensor/Probe).

If the measurement range to switch to when a peak over-range occurs has been selected, the range background is displayed in gray.

Valid measurement range

- The measurement range switches (in order) between the selected ranges.
- Ranges that are not selected are skipped.
- When Range Σ Link (see section 2.1) is set to ON, the input elements that are assigned to the same wiring unit are set to the same status.

By tapping the asterisk of each range, you can collectively set or not set the applicable ranges of all input elements or wiring units as valid measurement ranges (All ON or All OFF).

2.6 Setting the Sensor Correction

► “Sensor Correction (Sensor Correction)” in the features guide

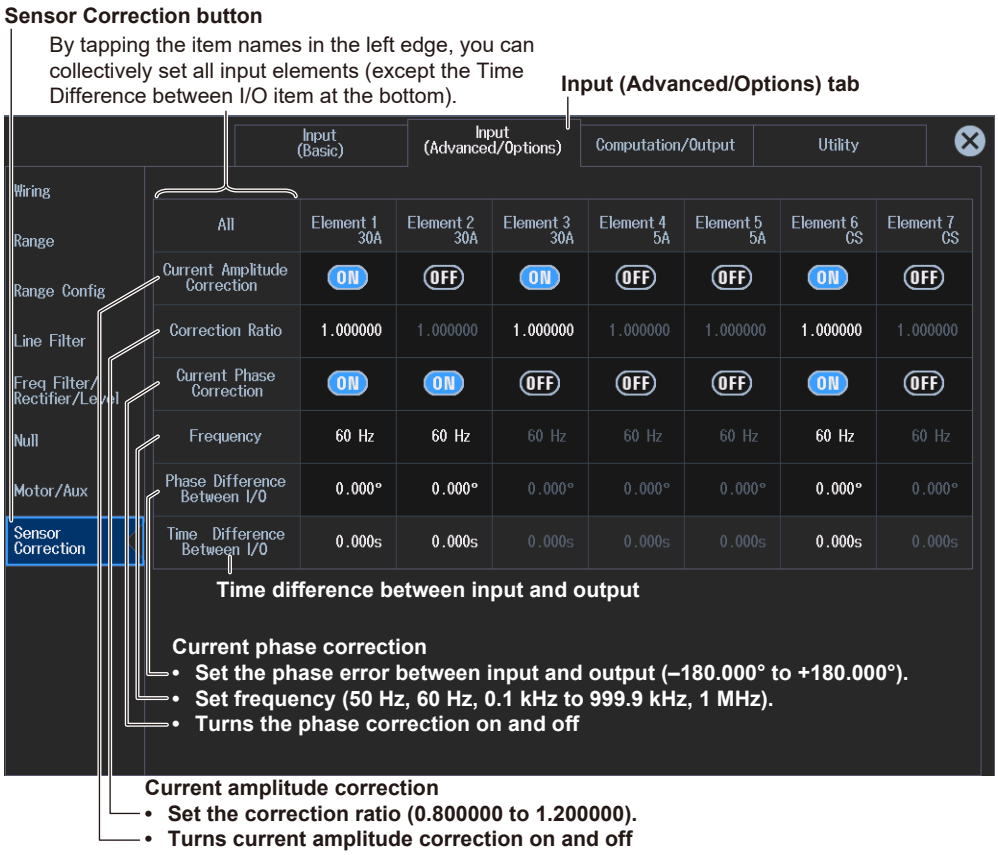
This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page xiv)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.

   Pressing **ESC** closes the overview screen.
3. Tap **Sensor Correction**. A sensor correction setup screen appears.



Note

You can also display the input settings (advanced/options) overview screen by moving the cursor on the Input (Advanced/Options) tab using the arrow keys and then pressing SET.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the sensor correction.

1. Tap the **Misc** menu icon . A Misc menu appears in the sub menu area on the right side of the screen.

   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Misc menu, see page xiv.

2.7 Setting the Line Filter and Frequency Filter

► “Line Filter (Line Filter)” in the features guide
► “Frequency Filter, Rectifier, Level (Freq Filter/Rectifier/Level)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Depending on the measurement mode or the method of computing measurement values (computing method), the settings may be different from the description in this section, the settings may be invalid, or the settings may not be configurable. For details, see the features guide.

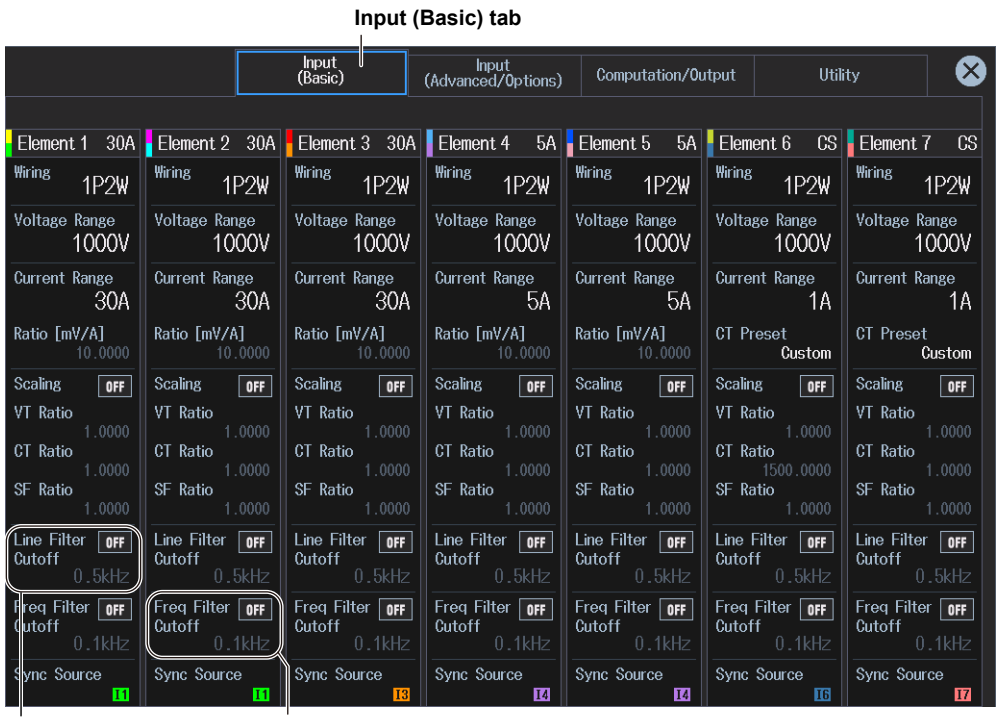
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.

Setting the Line Filter and Frequency Filter (Cutoff)

2. Tap the **Input (Basic)** tab. An input settings (basic measurement conditions) overview screen appears.

   Pressing **ESC** closes the overview screen.

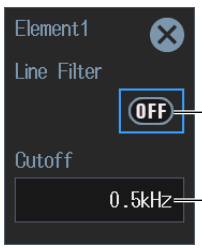


Note

You can also display the input settings (basic measurement conditions) overview screen by moving the cursor on the Input (Basic) tab using the arrow keys and then pressing SET.

Setting the Line Filter (Line Filter)

3. Tap **Line Filter**. A line filter setup screen appears.



Line filter (example of element 1)

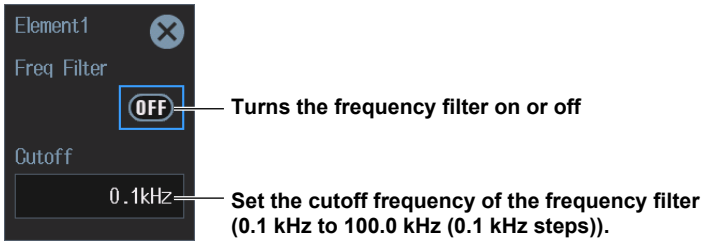
Turns the line filter on or off

Set the cutoff frequency of the line filter (0.1 kHz to 100.0 kHz (0.1 kHz steps), 1 MHz).

Setting the Frequency Filter (Freq Filter)

3. Tap **Freq Filter**. A frequency filter setup screen appears.

Frequency filter (example of element 1)



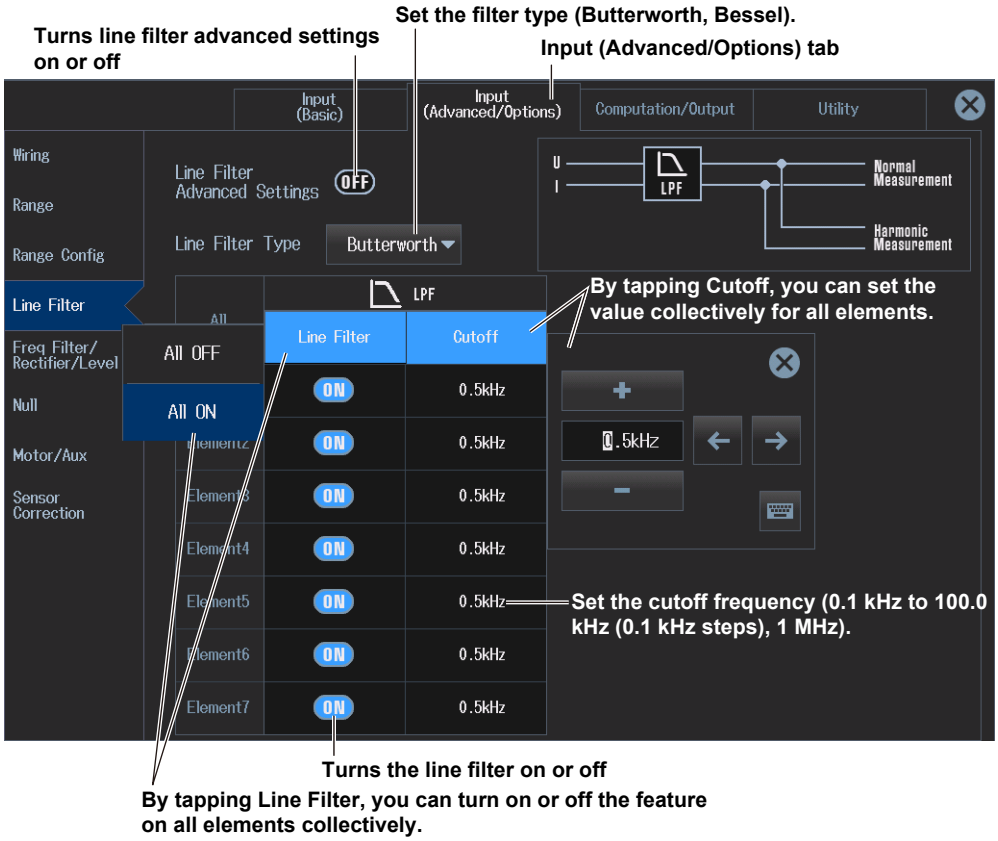
Setting the Line Filter and Frequency Filter (Advanced Settings)

2. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
Pressing **ESC** closes the overview screen.

Setting the Line Filter (Line Filter)

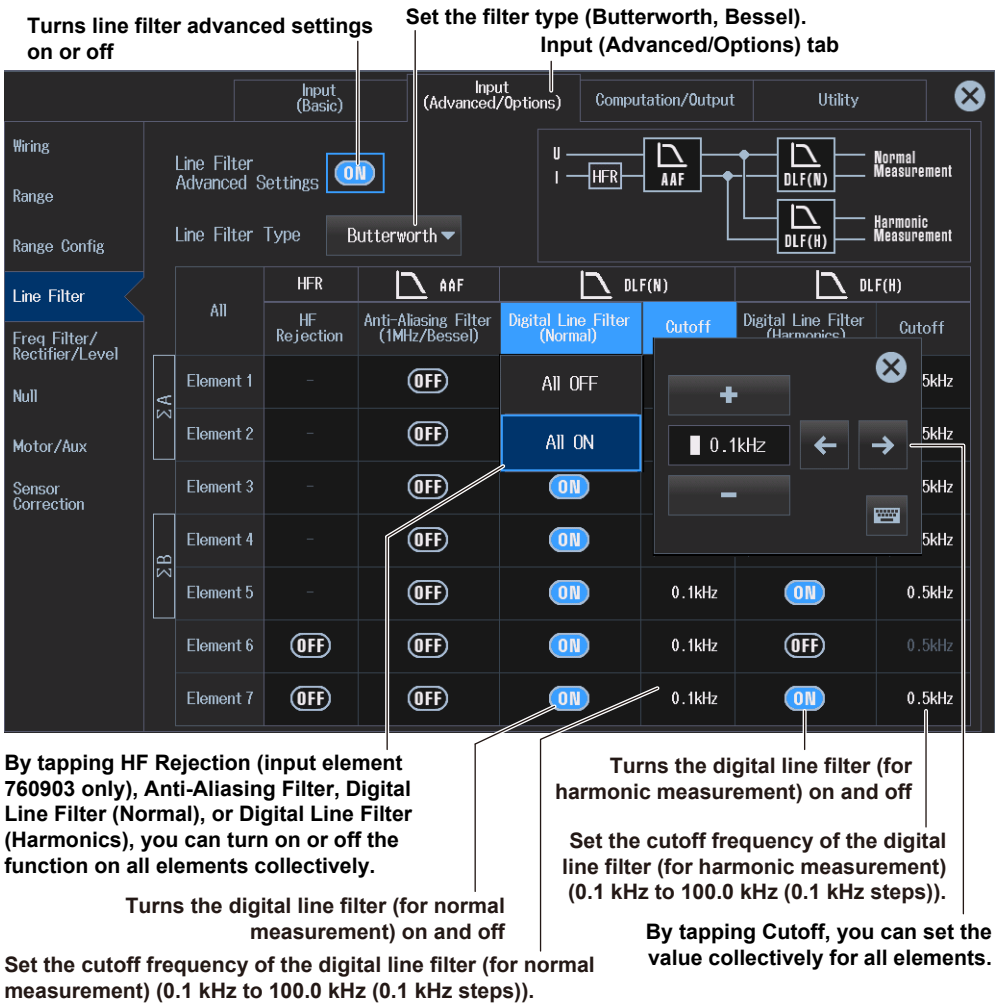
3. Tap **Line Filter**. A line filter setup screen appears.

- **When Line Filter Advanced Settings Is Set to OFF**
  You can set the cutoff frequency and filter type.



- **When Line Filter Advanced Settings Is Set to ON**

  You can set the following filters separately.
  - AAF (anti-aliasing filter)
  - DLF (N) (normal measurement line filter)
  - DLF(H) (harmonics line filter)

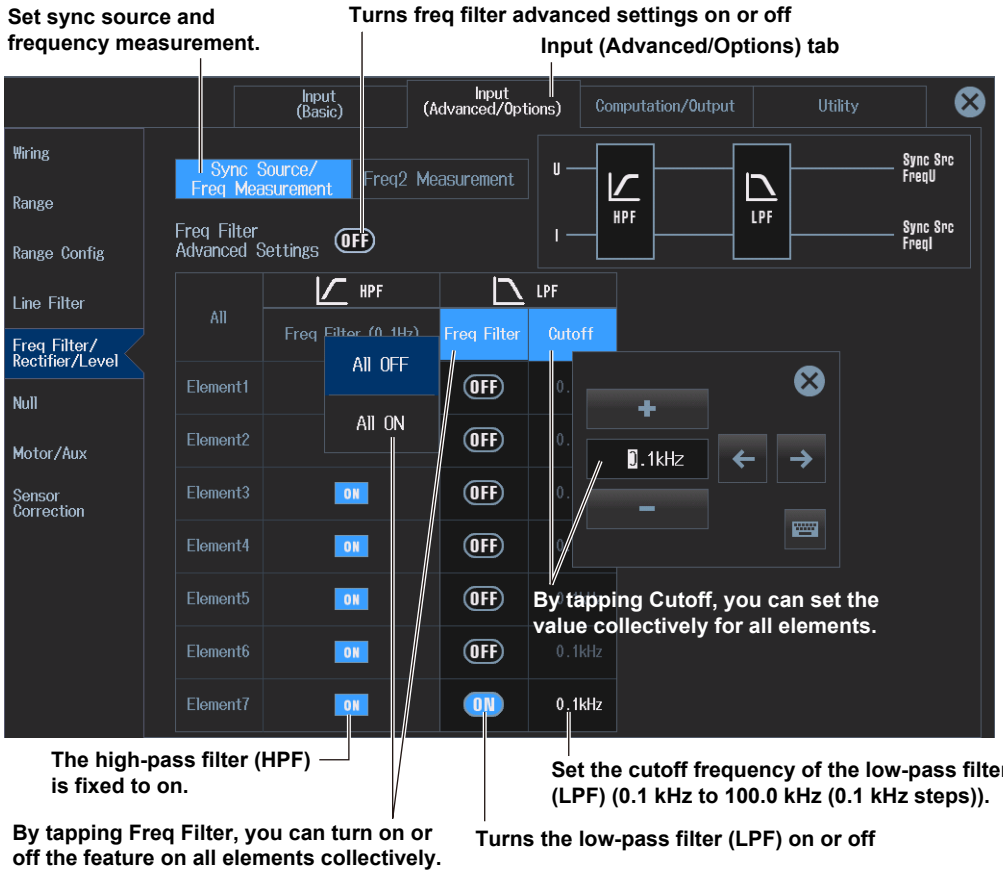


Setting the Frequency Filter (Sync Source/Freq Measurement)

3. Tap **Freq Filter/Rectifier/Level**. A frequency filter setup screen appears.
4. Tap **Sync Source/Freq Measurement**. A Sync Source/Freq Measurement (sync source/frequency measurement) screen appears.

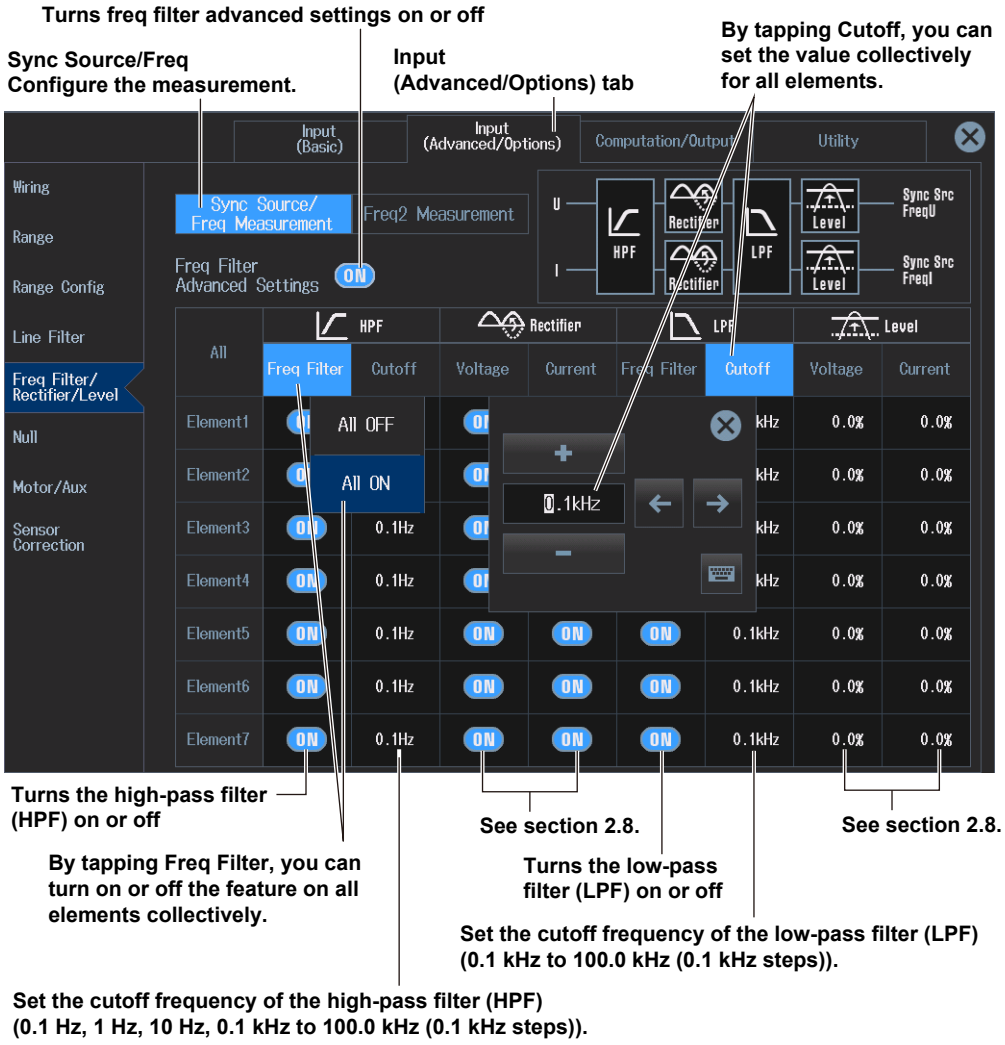
- **When Freq Filter Advanced Settings Is Set to OFF**

  You can set the cutoff frequency of the low-pass filter (LPF).



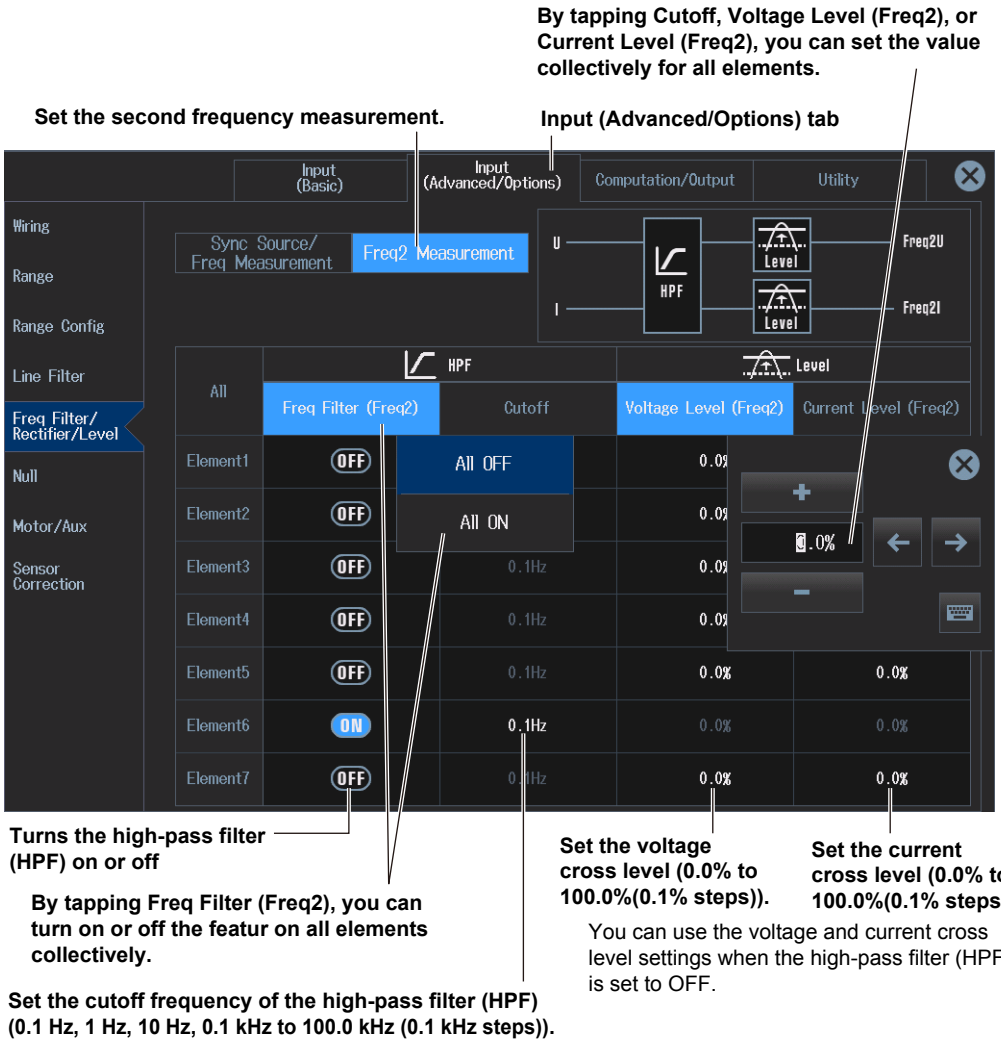
- **When Freq Filter Advanced Settings Is Set to ON**

  You can set the following filters and items separately.
  - High-pass filter (HPF)
  - Rectifier (Rectifier)
  - Low-pass filter (LPF)
  - Cross level (Level)



Second Frequency Measurement Settings (Freq2 Measurement)

3. Tap **Freq Filter/Rectifier/Level**. A frequency filter setup screen appears.
4. Tap **Freq2 Measurement**. A Freq2 Measurement (second frequency measurement) screen appears.



Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the line filter and frequency filter.

1. Tap the **Filter** menu icon

. A Filter menu appears in the sub menu area on the right side of the screen.

   By tapping the displayed items, you can specify the same settings as when using the keys explained earlier.

Note

For details on the Filter menu, see page x.

2.8 Set the Measurement Period

► “Measurement Period (Sync Source)” in the features guide

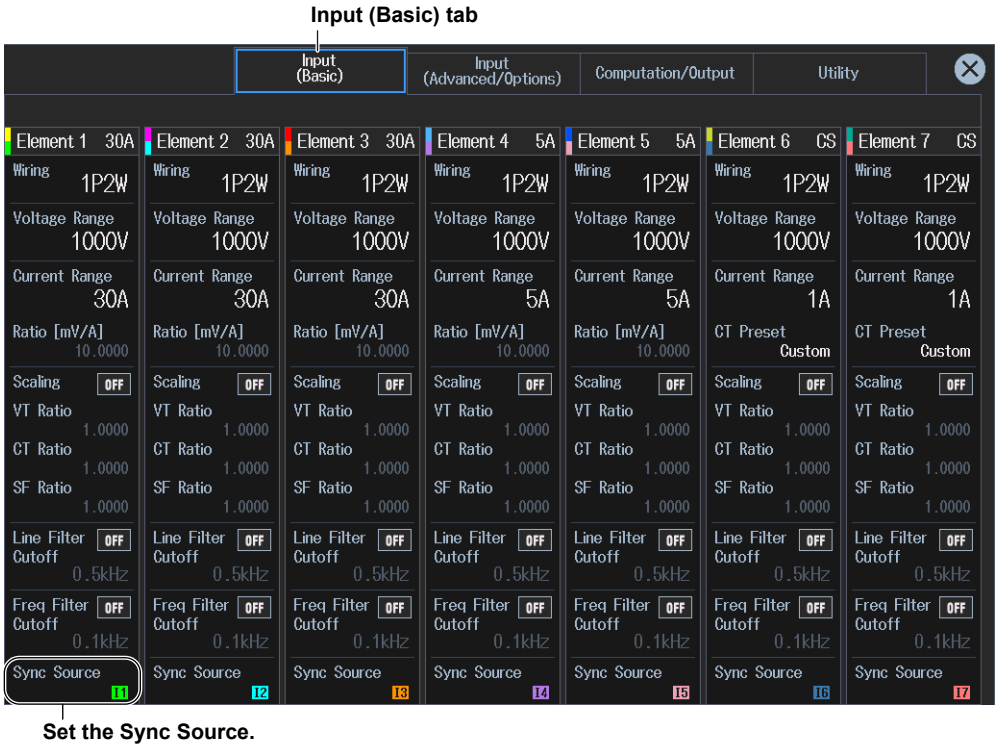
This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

Depending on the measurement mode or the method of computing measurement values (computing method), the settings may be different from the description in this section, the settings may be invalid, or the settings may not be configurable. For details, see the features guide.

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Input (Basic)** tab. An input settings (basic measurement conditions) overview screen appears.
   Pressing **ESC** closes the overview screen.



If the computing method (Measurement Method) of the data update interval setup screen (see section 2.10) is set to Digital Filter Average, the menu appears dimmed as shown in the following figure and cannot be used.

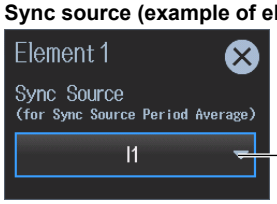
Note

You can also display the input settings (basic measurement conditions) overview screen by moving the cursor on the Input (Basic) tab using the arrow keys and then pressing SET.

Setting the Sync Source (Sync Source)

3. Tap **Sync Source**. A sync source setup screen appears.

Sync source (example of element 1)



Set the sync source (U1 to U7, I1 to I7, Ext Clk, Z Phase1 (Ch D), Z Phase3 (Ch H), None).

Setting the Cross Level (Level)

4. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.

Pressing **ESC** closes the overview screen.

5. Tap **Freq Filter/Rectifier/Level**. A frequency filter setup screen appears.

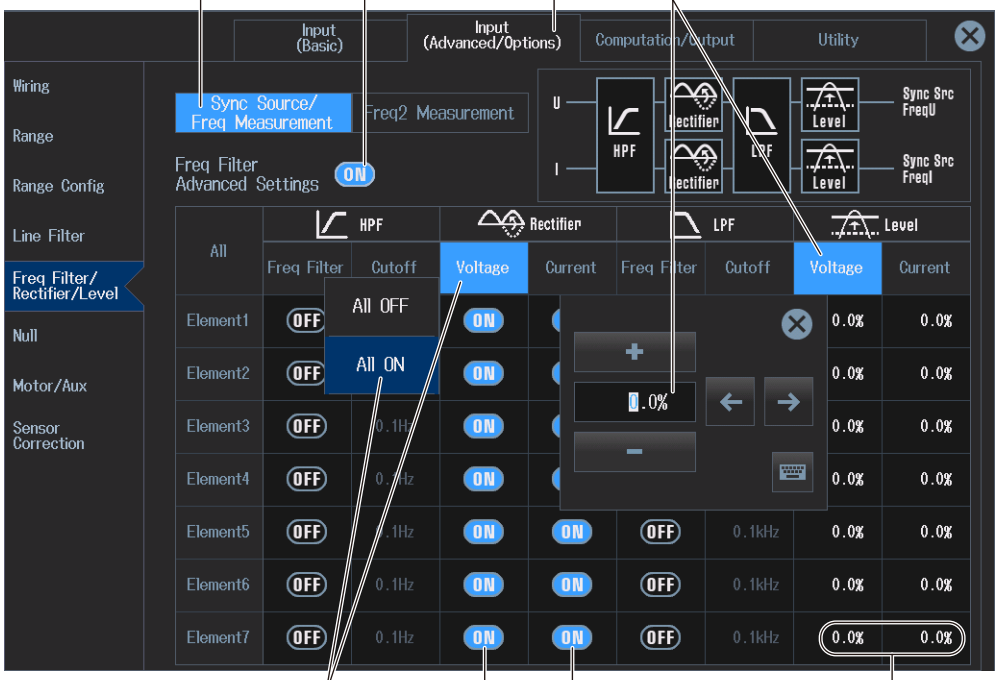
6. Tap **Sync Source/Freq Measurement**. A Sync Source/Freq Measurement (sync source/frequency measurement) screen appears.

Turns freq filter advanced settings on or off

Sync Source/Freq Configure the measurement.

Input (Advanced/Options) tab

By tapping Voltage or Current, you can set the value collectively for all elements.



By tapping Voltage or Current, you can turn on or off the feature on all elements collectively.

Turns the voltage rectifier on or off

Turns the current rectifier on or off

Set the voltage or current cross level.

When the rectifier feature is off: -100.0% to 100.0%, in 0.1% steps

When the rectifier feature is on: 0.0% to 100.0%, in 0.1% steps

You can use the voltage and current cross level settings when the high-pass filter (HPF) is set to OFF or when the rectifier feature is set to ON.

2.9 Setting the Crest Factor

► “Crest Factor (Crest Factor)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

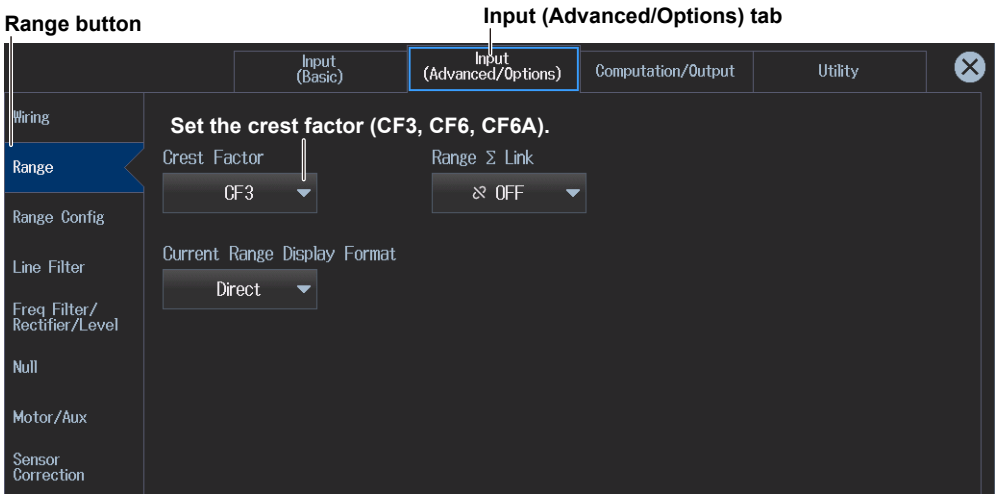
Procedure Using the Setup Menu

1. Tap the **Setup** icon

, or press **MENU** under SETUP.
2. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
   Pressing **ESC** closes the overview screen.

Crest factor (Crest Factor)

3. Tap **Range**. A setup screen appears for common measurement range items.



Note

You can also display the input settings (advanced/options) overview screen by moving the cursor on the Input (Advanced/Options) tab using the arrow keys and then pressing SET.

2.10 Setting the Data Update Interval

► “Data Update Interval (Update Rate)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Depending on the measurement mode or the method of computing measurement values (computing method), the settings may be different from the description in this section, the settings may be invalid, or the settings may not be configurable. For details, see the features guide.

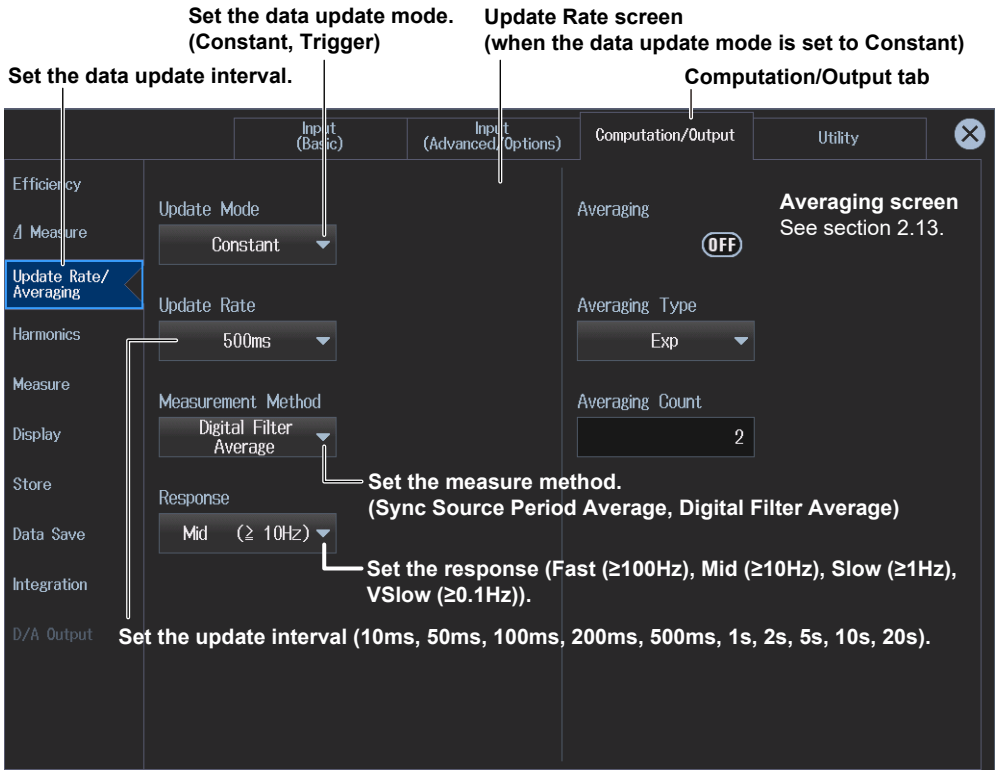
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Data Update Interval (Update Rate)

3. Tap **Update Rate/Averaging**. A drop-down list for setting the interval appears.

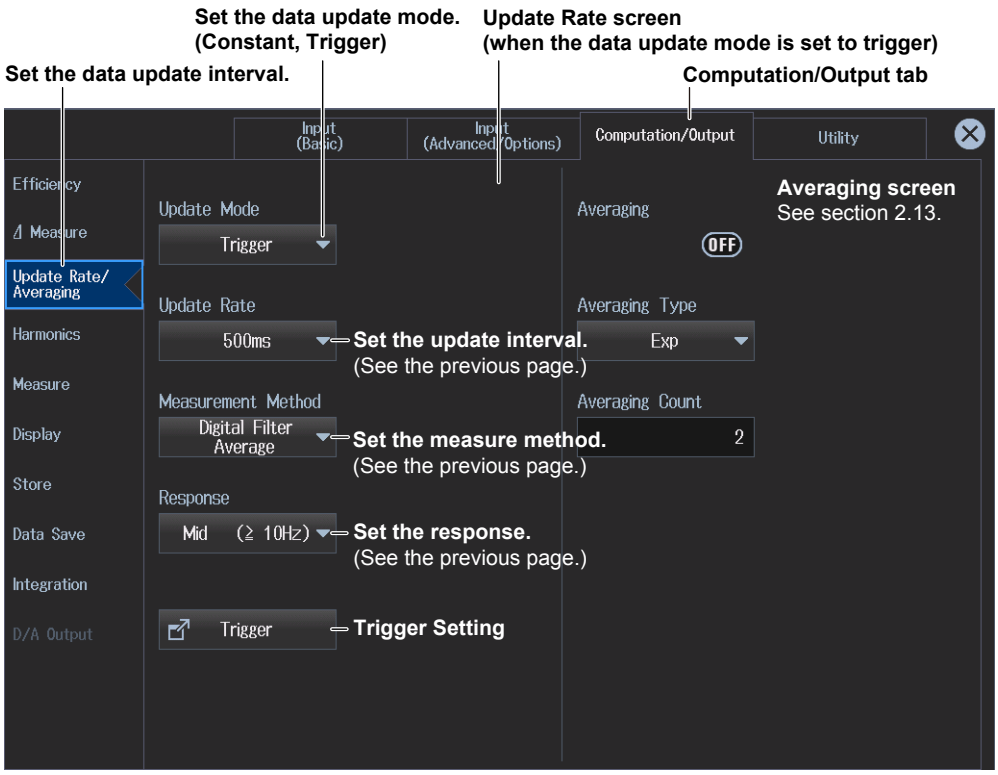
- **When the Data Update Mode Is Set to Constant**



Note

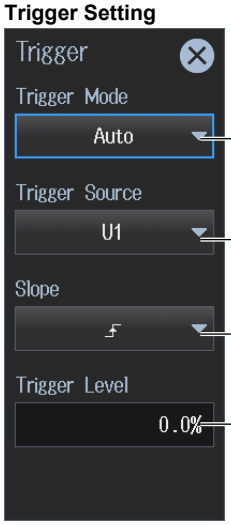
You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

- **When the Data Update Mode Is Set to Trigger**



Trigger Setting

Trigger Setting



Set the trigger mode (Auto, Normal).

Set the trigger source (U1 to U7, I1 to I7, Ext Clk).

Set the trigger slope (, ,).
You cannot use this when the trigger source is set to Ext Clk.

Set the trigger level (0.0% to ±100.0%).
You cannot use this when the trigger source is set to Ext Clk.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the data update interval.

1. Tap the **Update Rate/Averaging** menu icon. An Update Rate./Averaging menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the keys explained earlier.

Note

- For details on the Update Rate/Averaging menu, see page ix.
- When the trigger source is set to Ext Clk, you cannot set the trigger slope (fixed to falling).

2.11 Setting the Efficiency Equation

► “Efficiency Equation (Efficiency)” in the features guide

This section explains operating procedures using the following setup methods.

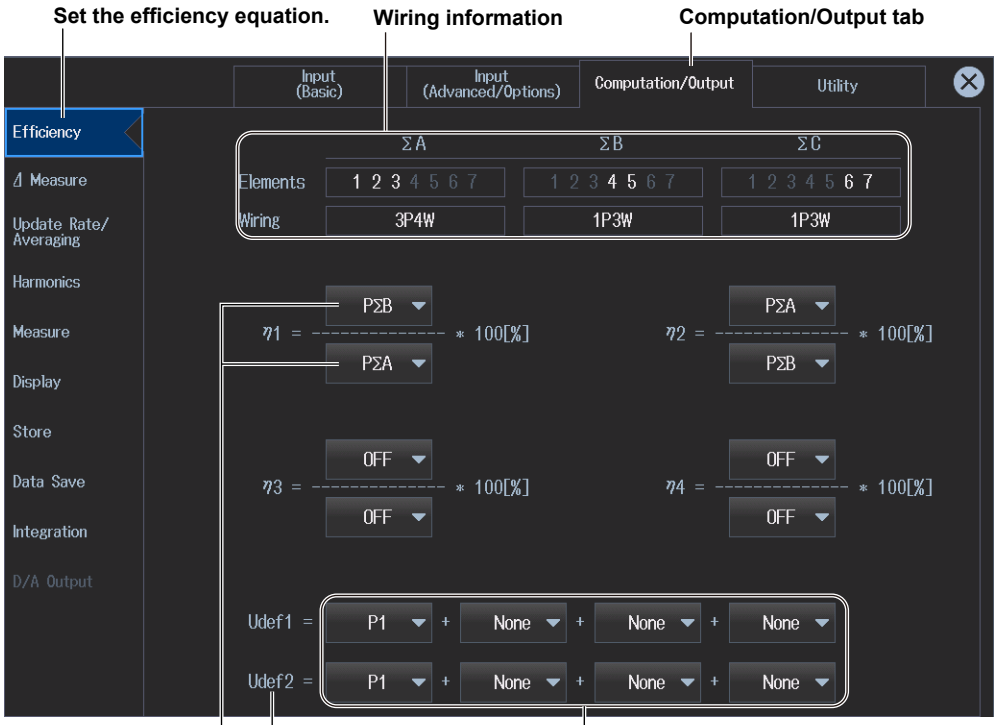
- Procedure Using the Setup Menu (see chapter 1)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Efficiency Equation (Efficiency)

3. Tap **Efficiency**. An efficiency equation setup screen appears.



1 Can be set within the range of the installed input elements.
2 Can be set within the range of the wiring unit that is automatically determined by the installed input elements.
3 You can set this on models with the /MTR1 or /MTR2 option.

Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

2.12 Setting the Delta Computation

► “Delta Computation (Δ Measure)” in the features guide

This section explains operating procedures using the following setup methods.

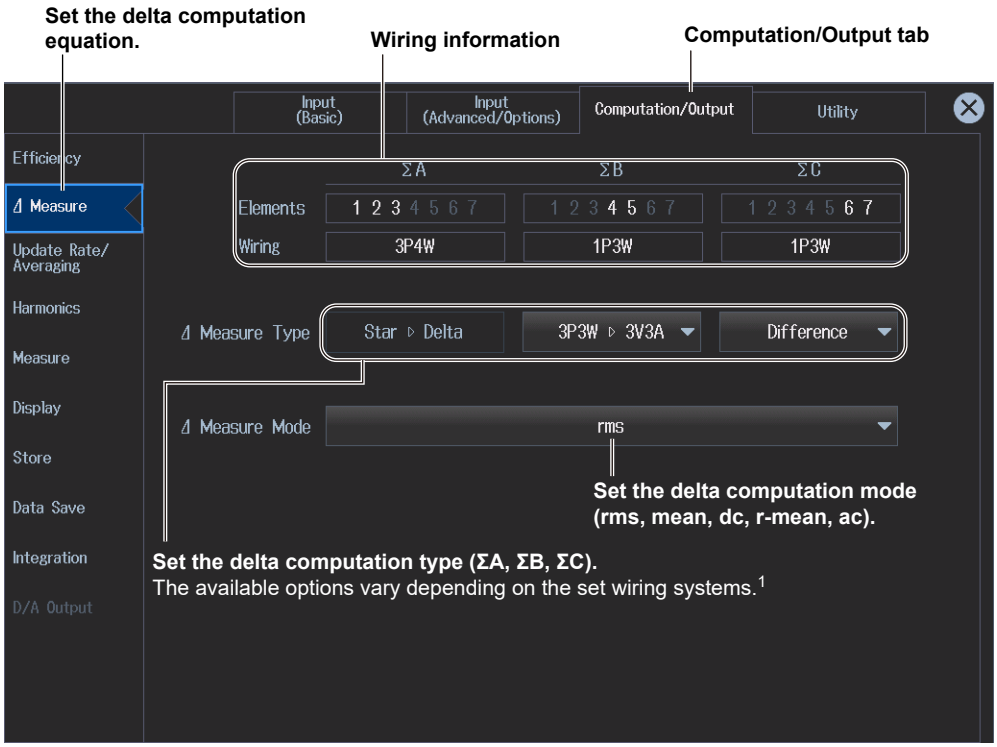
- Procedure Using the Setup Menu (see chapter 1)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting Delta Computation (ΔMeasure)

3. Tap **ΔMeasure**. A delta computation setup screen appears.



1 Delta computation type

Wiring System	Delta Computation Type
1P3W	Difference, 3P3W>3V3A
3P3W	Difference, 3P3W>3V3A
3P4W	Star>Delta
3P3W(3V3A)	Delta>Star
3P3W(3V3AR)	Delta>Star

Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

2.13 Setting Averaging

► “Averaging (Averaging)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

Depending on the measurement mode or the method of computing measurement values (computing method), the settings may be different from the description in this section, the settings may be invalid, or the settings may not be configurable. For details, see the features guide.

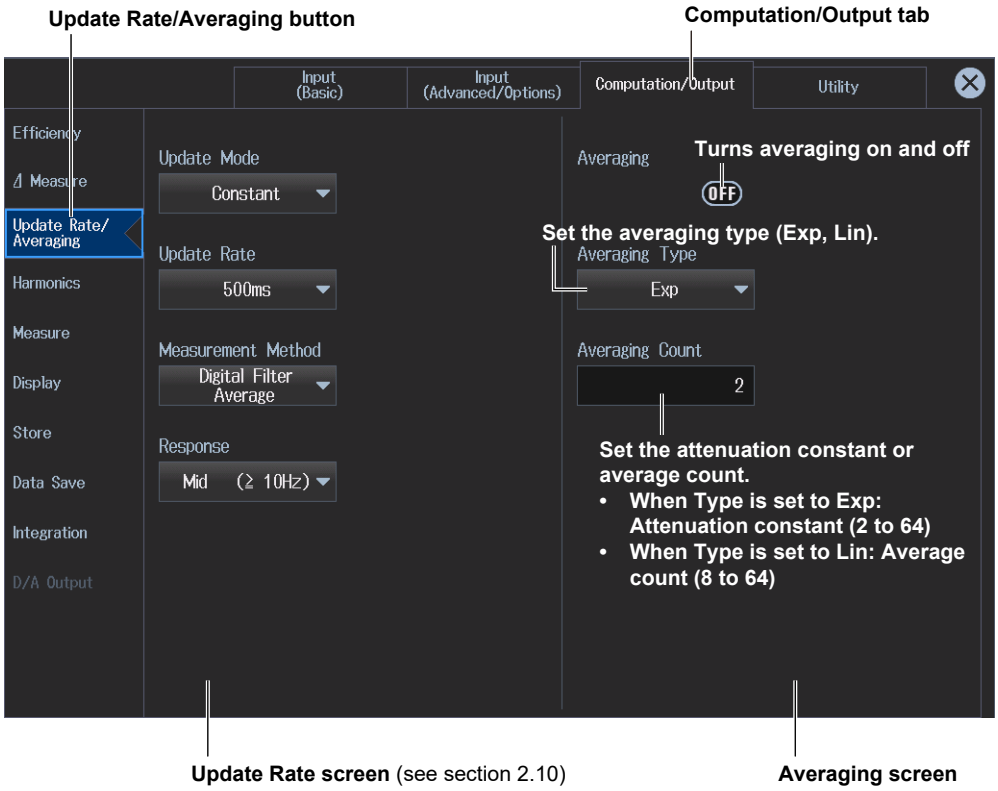
Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting Averaging (Averaging)

3. Tap **Update Rate/Averaging**.

   A data update interval/averaging setup screen appears.



Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

2.14 Master/slave Synchronous Measurement

► “Master/Slave Synchronous Measurement (Sync Measure)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

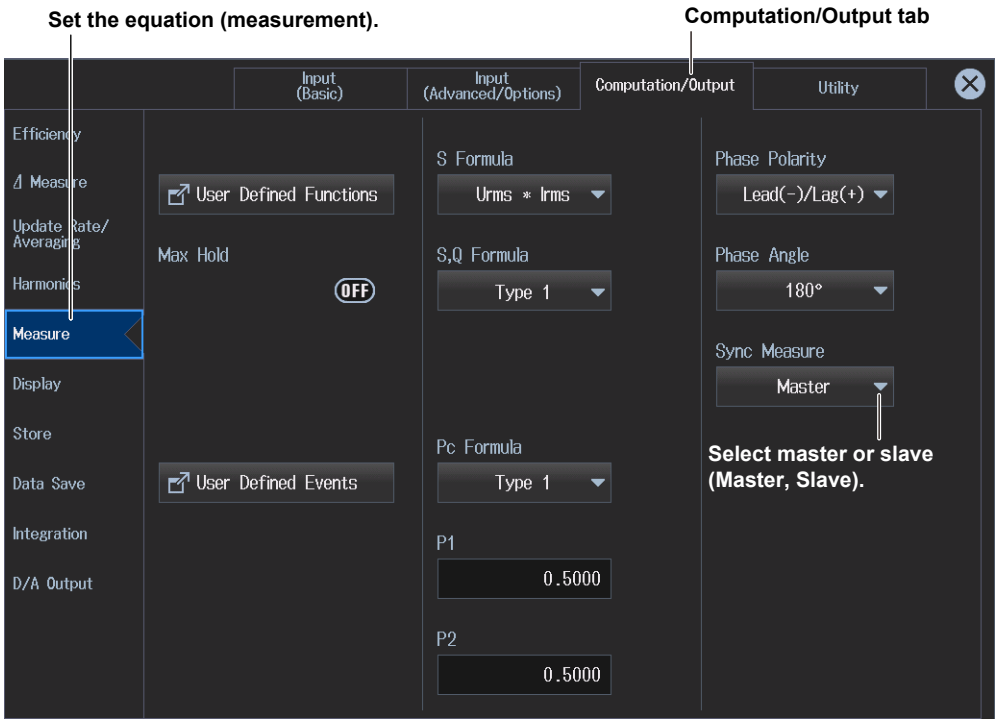
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Master and Slave (Sync Measure)

3. Tap **Measure**.

   An equation (computation) setup screen appears.



Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

3.1 Setting the Display Format

► “Display (Display)” in the features guide
► “Numeric Data Display (NUMERIC)” in the features guide
► “Switching the Displayed Page (Page Scroll)” in the features guide
► “All display (All Items)” in the features guide
► “4-, 8-, and 16-Value Displays (4 Items/8 Items/16 Items)” in the features guide
► “Matrix display (Matrix)” in the features guide
► “Display Items (Items, Numeric)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

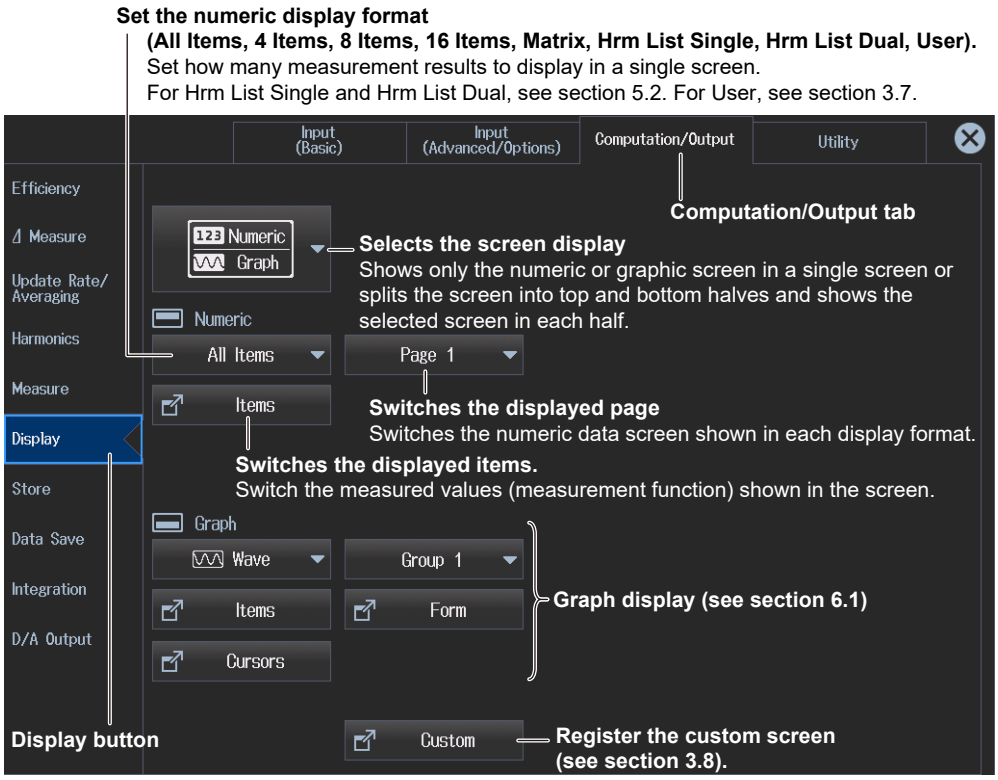
Depending on the measurement mode or the method of computing measurement values (computing method), the settings may be different from the description in this section, the settings may be invalid, or the settings may not be configurable. For details, see the features guide.

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Display Format (Display)

3. Tap **Display**.
   A display format setup screen appears.

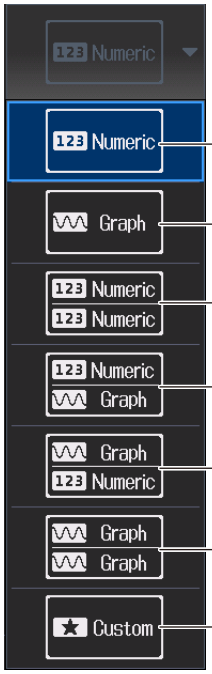


Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Setting the Screen Display

You can switch the display format of the Numeric (numeric display) and Graph (graph display) screens.



Numeric (numeric display)
Shows only numeric data in a single screen

Graph (graph display)
Shows only graphs in a single screen For details on the graph display, see chapter 6.

Numeric (numeric display)/Numeric (numeric display)
Shows numeric data in the top and bottom halves of the screen

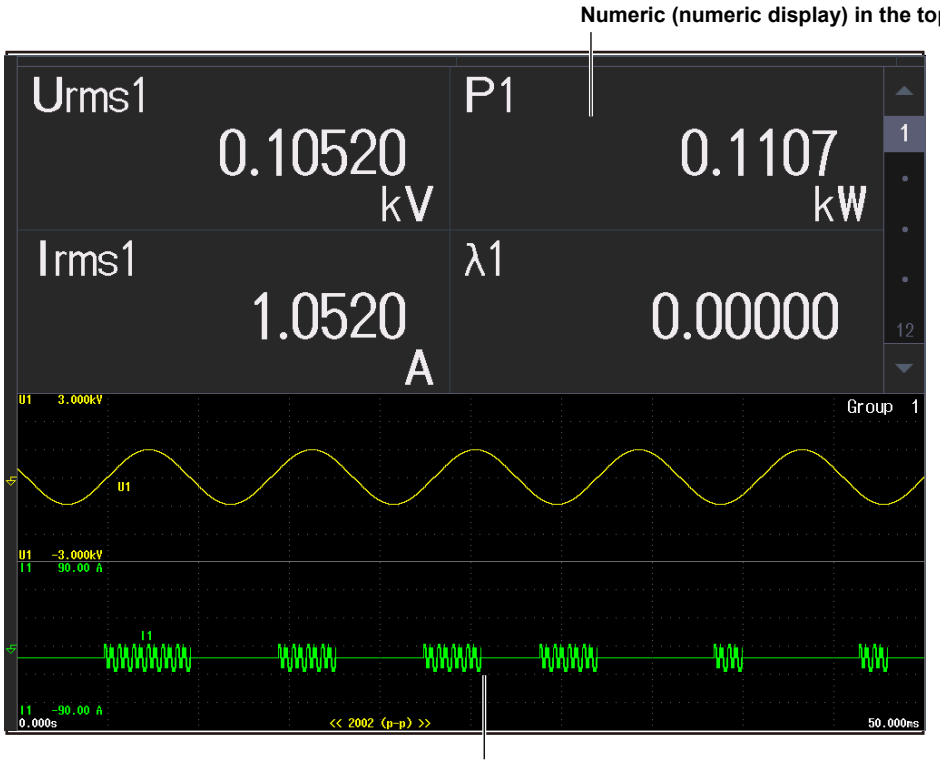
Numeric (numeric display)/Graph(graph display)
Show numeric data in the top half of the screen and graphs (see chapter 6) in the bottom half

Graph (graph display)/Numeric (numeric display)
Shows graphs (see chapter 6) in the top half of the screen and numeric data in the bottom half

Graph (graph display)/Graph (graph display)
Shows graphs (see chapter 6) in the top and bottom halves of the screen

Custom (custom display, see section 3.8)
Select one of the registered screen configurations (up to five configurations) to display the screen.

Example of Numeric (numeric display)/Graph(graph display)

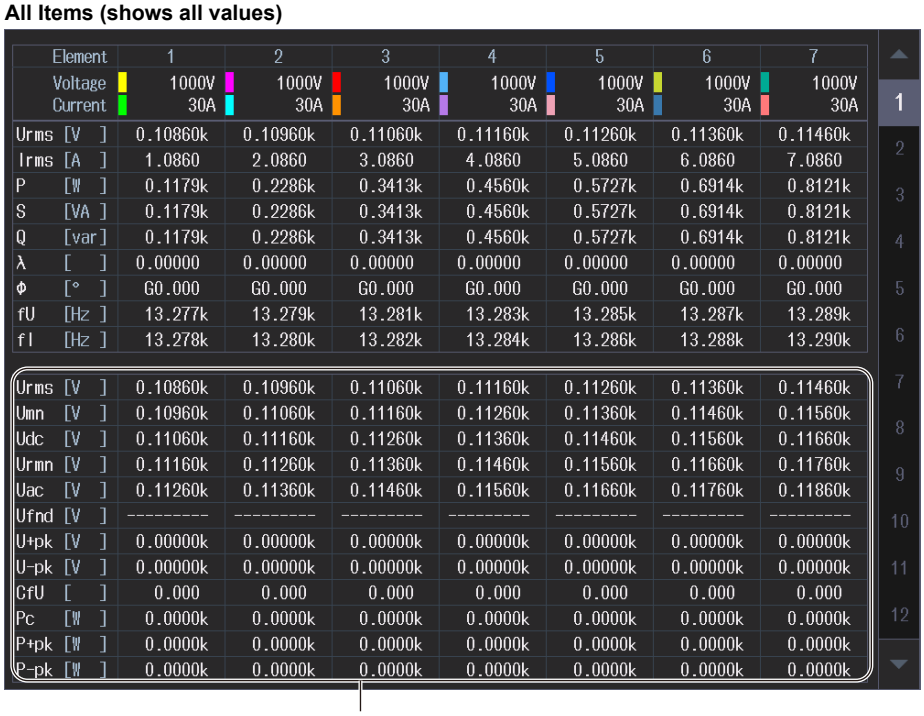


For display formats, see section 6.2.

Setting the Numeric Display Format

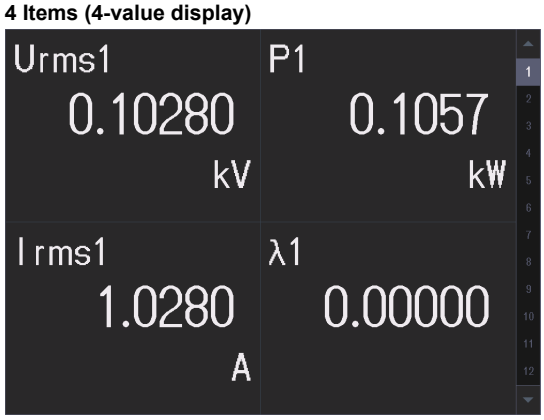
Set how to display the measurement items on a single screen.

All Items (shows all values)

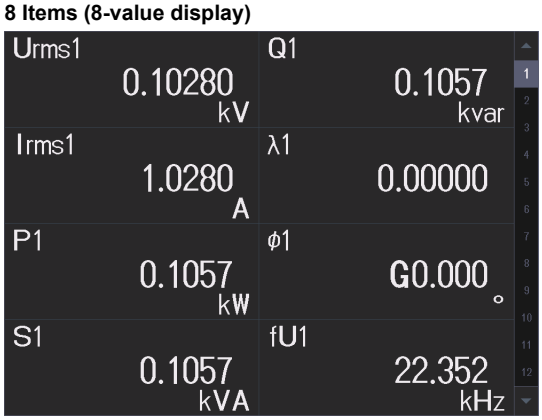


Switching the displayed page shows other items in this display area.

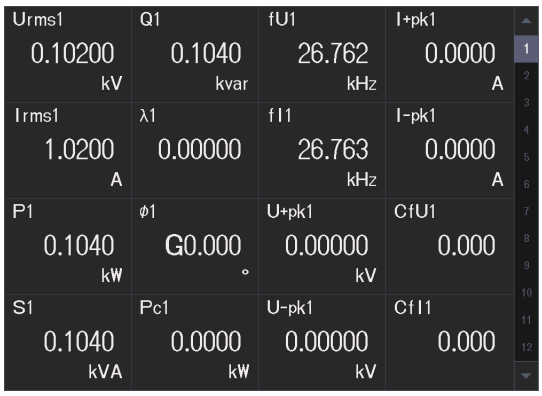
4 Items (4-value display)



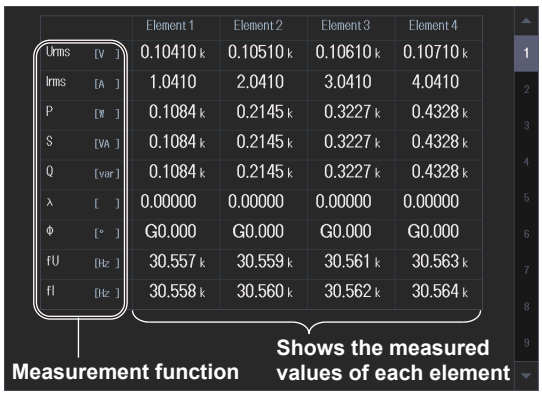
8 Items (8-value display)



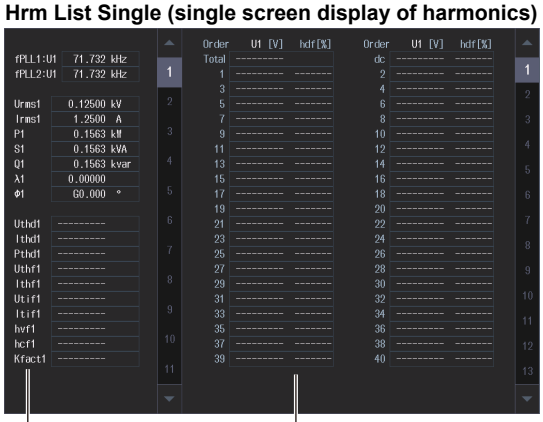
16 Items (16-value display)



Matrix (matrix display)



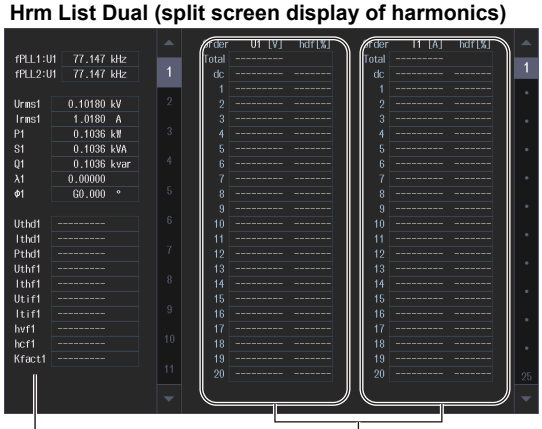
Hrm List Single (single screen display of harmonics)



Function display of each element and Σ

Shows harmonic data
Shows the harmonics (Total, DC, 1 to 500) of an item. Shows 40 harmonics per page.

Hrm List Dual (split screen display of harmonics)



Function display of each element and Σ

Shows harmonic data
Shows the harmonics (Total, DC, 1 to 500) of two items. Shows 20 harmonics per page.

Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

On the All Items Display

Closes the menu

Set the harmonic order (Total, 0-500).
You can set this setting only when you have selected the page of a measurement function that includes a harmonic order. For details on how to switch pages, see page 3-1.

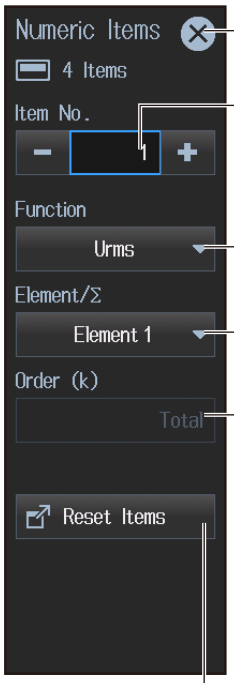
Turns the display of numeric data of all elements or all wiring units on and off
If the total number of elements or wiring units is 8 or more, set this to ON when you want to display the numeric data of all elements or all wiring units.

Turns the display frame on and off
Scroll the screen horizontally to change the displayed element or wiring unit. You can use these when Display All Elements is set to OFF.

Note

On the All Items display, you cannot select individual display items and change their measurement function, element, or wiring unit. If you switch to the Matrix display, you can change the measurement functions, elements, and wiring units using the displayed table (see the previous page).

On the 4-, 8-, and 16-Value Displays



Closes the menu

Select the displayed item number.
The number increases from the upper left to the lower right of the screen.

Set the displayed items.
You can set the following items for displaying measurement functions.
- Voltage, current, active power, power factor: See section 3.2
- Apparent power, reactive power, corrected power: See section 3.3
- Phase difference, frequency (voltage, current): See section 3.4
- Computed values (numeric, event): See section 3.5
- Integrated value: See section 4.2
- Harmonics: See section 5.2
- Motor evaluation: See section 9.2
- External signal: See section 10.2

Selects the input element or wiring unit to be configured
- Input element options
  When the displayed item is set to something other than motor evaluation: Element1 to Element7
  When the displayed item is set to motor evaluation: Motor1 to Motor4
- Wiring unit options: ΣA, ΣB, ΣC

Selects the harmonic order to be set
This is for the harmonic orders display (see section 5.2).

Resets the displayed items.

On the Matrix Display

Closes the menu

Select the displayed item number (displayed row).
The number increases from top to bottom on the matrix display.
Example: If you select 3, the third row from the top is displayed.

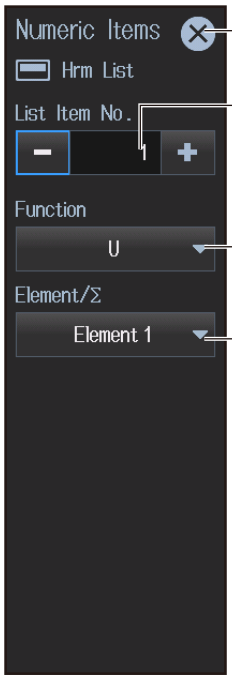
Set the displayed item.
See “On the 4-, 8-, and 16-Value Displays.”

Selects the harmonic order to be set
This is for the harmonic orders display (see section 5.2).

Resets the displayed items.

Configure the columns to display.

On the Hrm List Single or Hrm List Dual Display



Closes the menu

Select the displayed harmonic data column.
This is for Hrm List Dual.
Select 1 (left column) or 2 (right column).

Set the displayed items.
You can set the following items for displaying measurement functions.
• Harmonics: See section 5.2

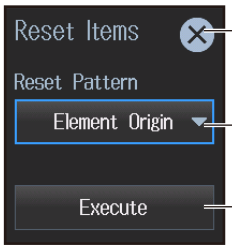
Selects the input element or wiring unit to be configured
• Input element options
When the displayed item is set to something other than motor evaluation: Element1 to Element7
When the displayed item is set to motor evaluation: Motor1 to Motor4
• Wiring unit options: ΣA, ΣB, ΣC

Note

On the harmonics list displays, you can change the measurement function, element, and wiring unit for the selected list, but you cannot change these settings for each individual display item.

Resetting the Displayed Items

You can clear the displayed items (no data "----") or return them to the preset displayed items.



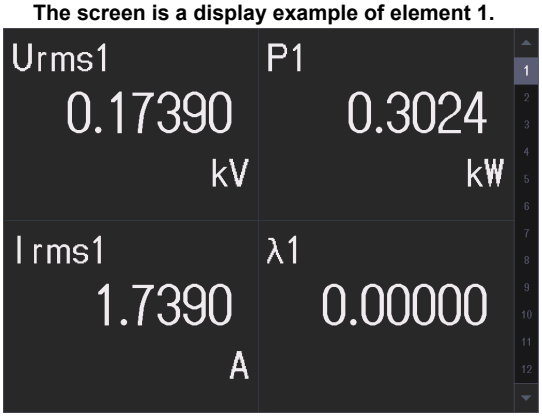
Closes the menu

Set the reset pattern (Element Origin, Function Origin, Clear Current Page, Clear All Pages).

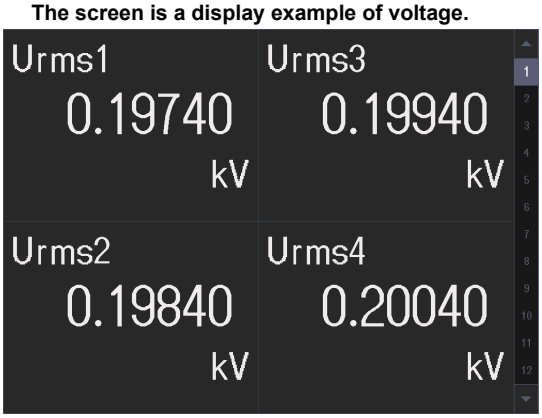
Executes reset

Reset Patterns

Element Origin pattern (1 element on 1 page)
The screen is a display example of element 1.

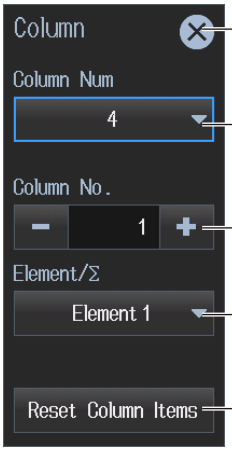


Function Origin pattern (1 function on 1 page)
The screen is a display example of voltage.



Configuring the Columns to Display

You can configure this on the Matrix display.



Closes the menu

Set the number of columns (4, 7).

Select the displayed item number (displayed column).
The number increases from left to right on the matrix display.
Example: If you select 3, the third column from the left is displayed.

Selects the input element (Element1 to Element7) or wiring unit (ΣA, ΣB, ΣC) to be configured

Resets displayed items

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the display format.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

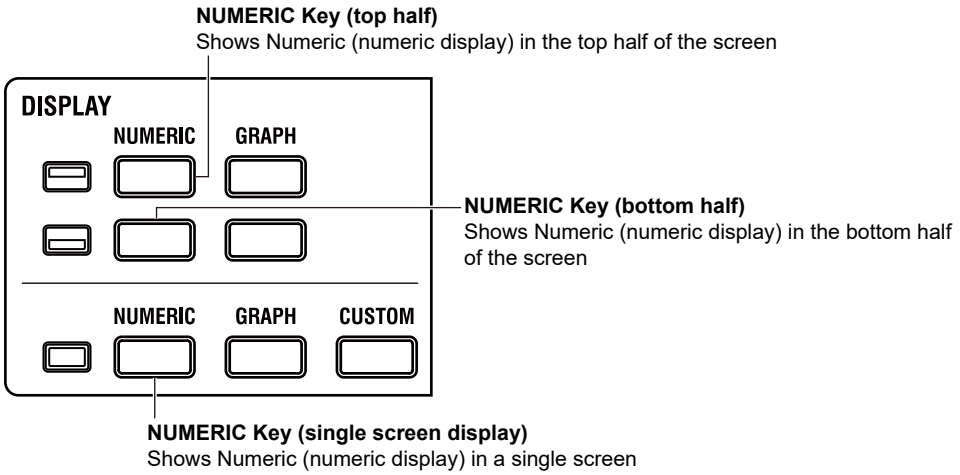
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

Switching the Display Format (NUMERIC key)

You can also use keys to perform “Setting the Screen Display” and “Setting the Numeric Display Format” described earlier.



Each time you press NUMERIC, the display format switches, in order, between All Items, 4 Items, 8 Items, 16 Items, Matrix, Hrm List Single, Hrm List Dual, and User.

3.2 Displaying the Voltage, Current, Active Power, and Power Factor

This instrument shows on the screen the measurements (measurement functions) of the voltage and current applied to the input elements or wiring units.

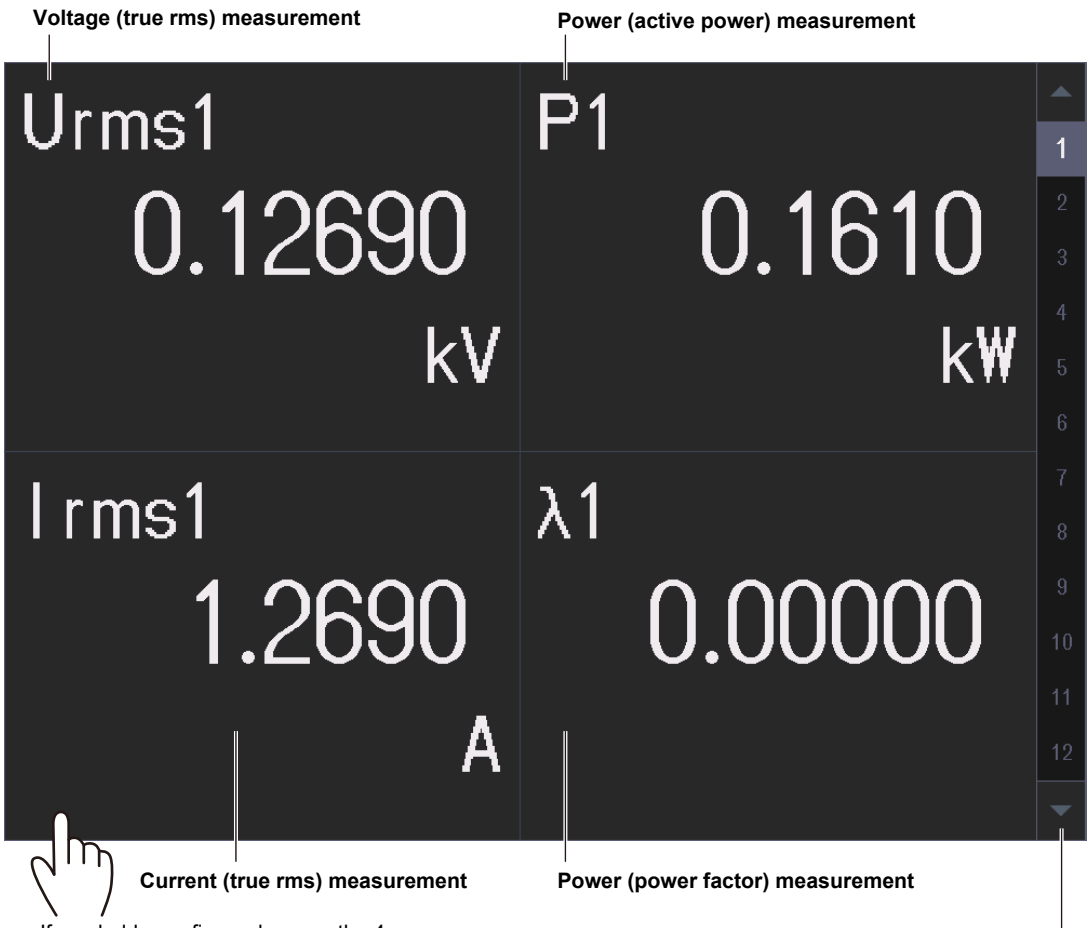
► “Measurement Functions Used in Normal Measurement” in the features guide

The measurements of voltage, current, active power, and power factor do not require you to set equations. The measurements are simply shown on the screen. Using an example, this section explains how to display measurement results numerically.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Measurement Display Screen (Example of a 4 items display)

Measurement display of input element 1



If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in “Switching the Displayed Items (Items),” provided later.

Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Note

Voltage, current, active power, and power factor values can be shown graphically.

- The waveform display feature (see section 6.2) shows voltage and current waveforms.
- The trend display (see section 6.3) shows voltage, current, active power, and power factor values graphically.

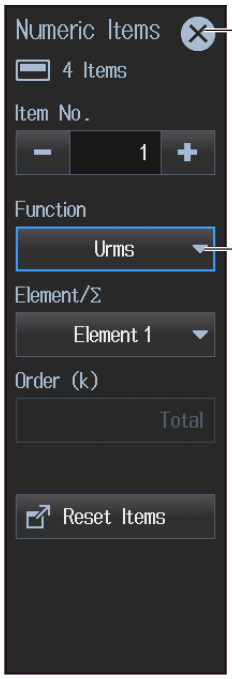
Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.
   A display format setup screen (Numeric/Graph) appears. For details, see section 3.1.
4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
You can set the following items for displaying voltage, current, power, and power factor.
Voltage measurement (Voltage group):
Urms (true rms value), **Umn** (rectified mean value calibrated to the rms value), **Udc** (simple average), **Urmn** (current rectified mean value), **Uac** (AC component), **Ufnd** (fundamental component), **U+peak** (maximum value), **U-peak** (minimum value), **CfU** (crest factor)
Current measurement (Current group):
Irms (true rms value), **Imn** (rectified mean value calibrated to the rms value), **Idc** (simple average), **Irmn** (current rectified mean value), **Iac** (AC component), **Ifnd** (fundamental component), **I+peak** (maximum value), **I-peak** (minimum value), **CfU** (crest factor)
Measured power and power factor (Power group):
P (active power), **Pfnd** (fundamental active power), **P+peak** (maximum value), **P-peak** (minimum value),
λ (power factor), **λfnd** (fundamental power factor)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon . A Display menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

3.3 Displaying Apparent Power, Reactive Power, and Corrected Power

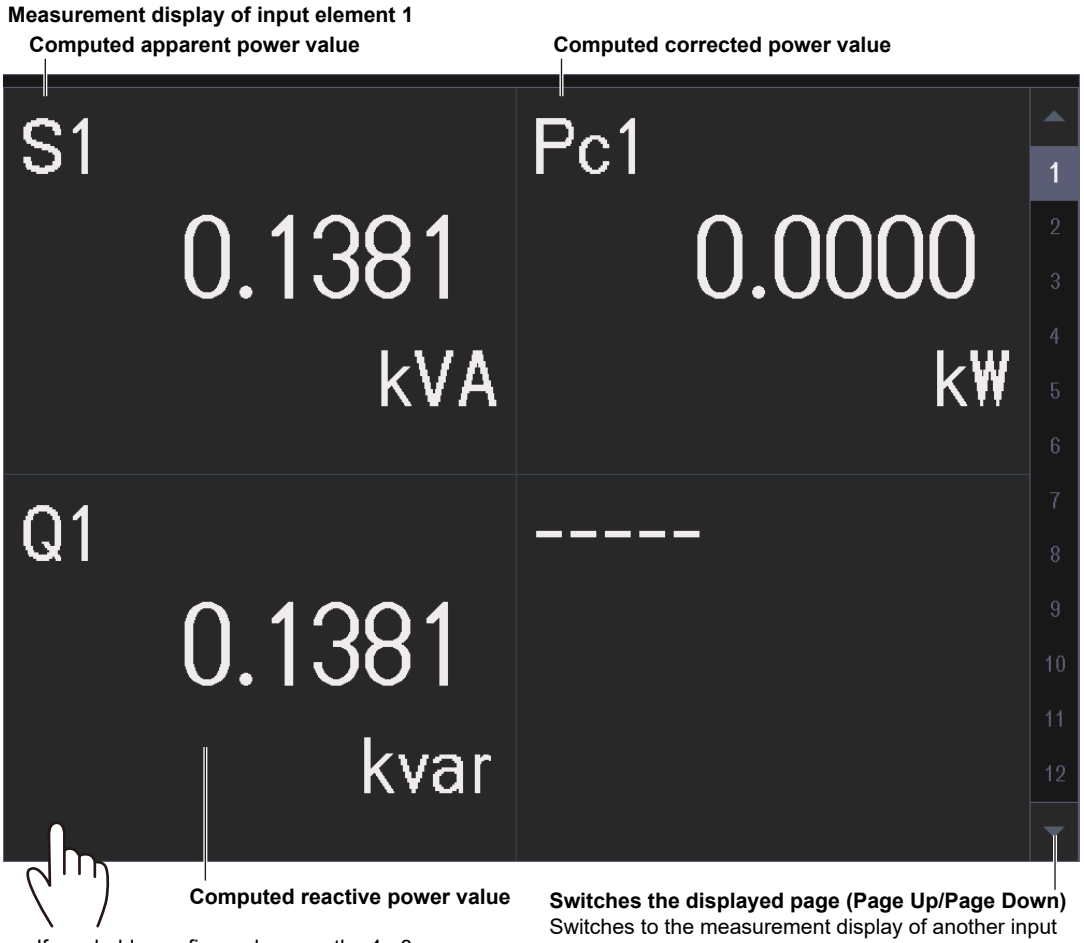
This instrument calculates, based on equations that are defined, apparent power (S), reactive power (Q), and corrected power (Pc) from the measurements of the voltage and current applied to the input elements or wiring units and shows calculated results on the screen.

► “Equation for Apparent Power (S Formula)” in the features guide
► “Apparent Power and Reactive Power Computation Types (S,Q Formula)” in the features guide
► “Equation for Corrected Power (Pc Formula)” in the features guide

To determine apparent power (S), reactive power (Q), and corrected power (Pc) values, you need to set equations.
Using an example, this section explains how to display computation results numerically.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Measurement Display Screen (Example of a 4 items display)



Computed reactive power value

If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in “Switching the Displayed Items (Items),” provided later.

Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element. Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Note

Apparent power, reactive power, and corrected power values can be shown graphically.

- The trend display(see section 6.3) shows apparent power, reactive power, and corrected power values graphically.

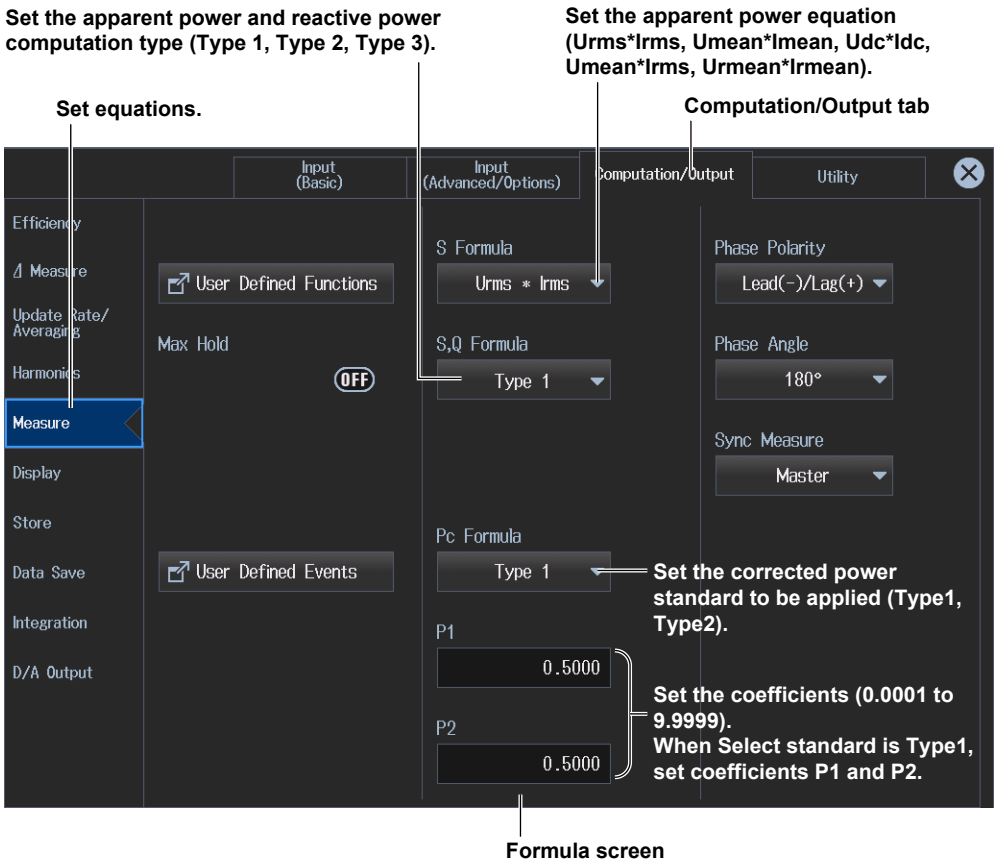
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting Measurement Equations (Measure)

3. Tap **Measure**.

   An equation setup screen appears.



Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

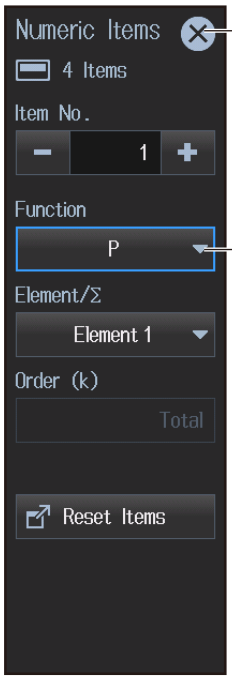
Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 3.1.

4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
You can set the following items for displaying apparent power, reactive power, and corrected power.
Computed apparent power value (Power group):
S (apparent power), **Sfnd** (fundamental apparent power)
Computed reactive power value (Power group):
Q (reactive power), **Qfnd** (fundamental reactive power)
Computed corrected power value (Power group):
Pc (Corrected Power)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

   By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

3.4 Displaying the Phase Difference And Frequency (Voltage and Current)

This instrument shows on the screen the measurements of the phase differences and frequencies of the voltage and current applied to the input elements or wiring units.

► "Phase Difference Polarity (Phase Polarity)" in the features guide
► "Phase Difference Display Format (Phase Angle)" in the features guide

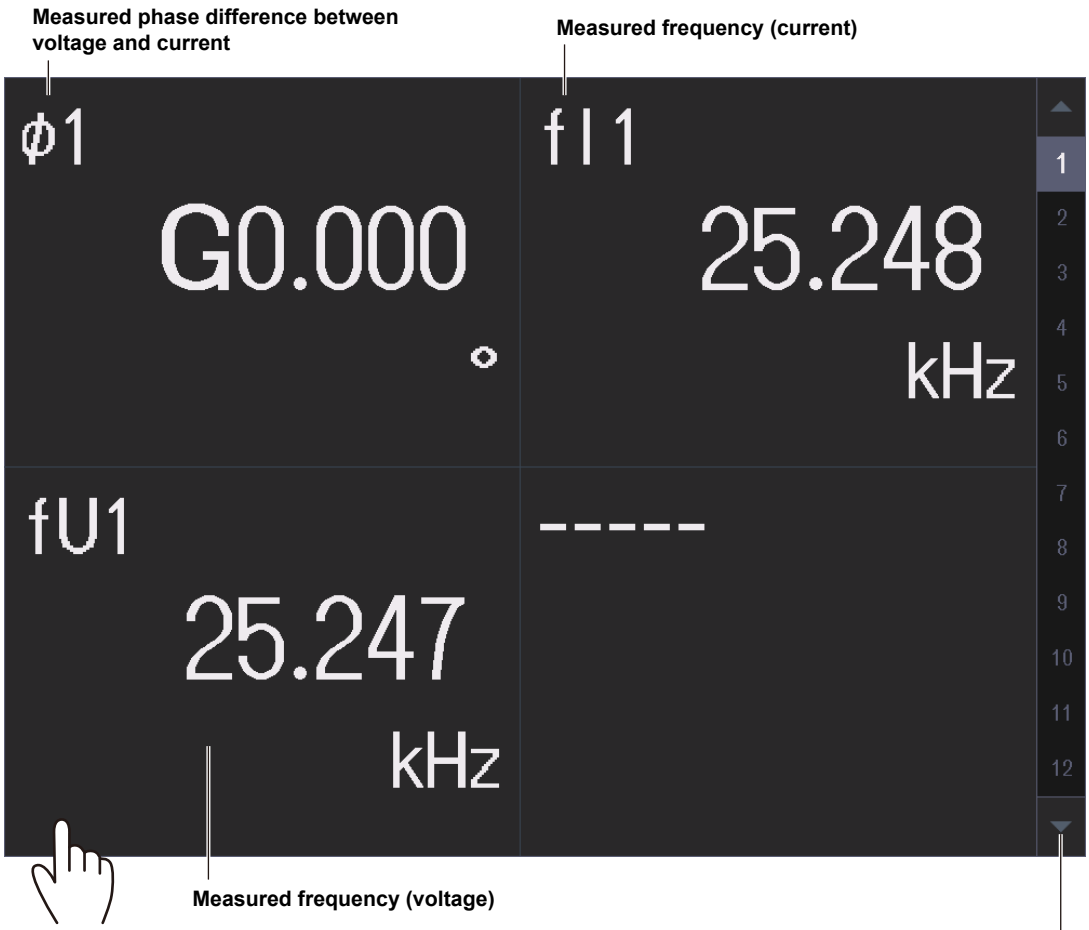
The measurements of phase difference and frequency do not require you to set equations. The measurements are simply shown on the screen. Using an example, this section explains how to display measurement results numerically.

In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Measurement Display Screen (Example of a 4 items display)

Measurement display of input element 1



If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in "Switching the Displayed Items (Items)," provided later.

Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Note

Phase difference and frequency (voltage and current) values can be shown graphically.

- The trend display (see section 6.3) shows phase difference and frequency (voltage and current) values graphically.

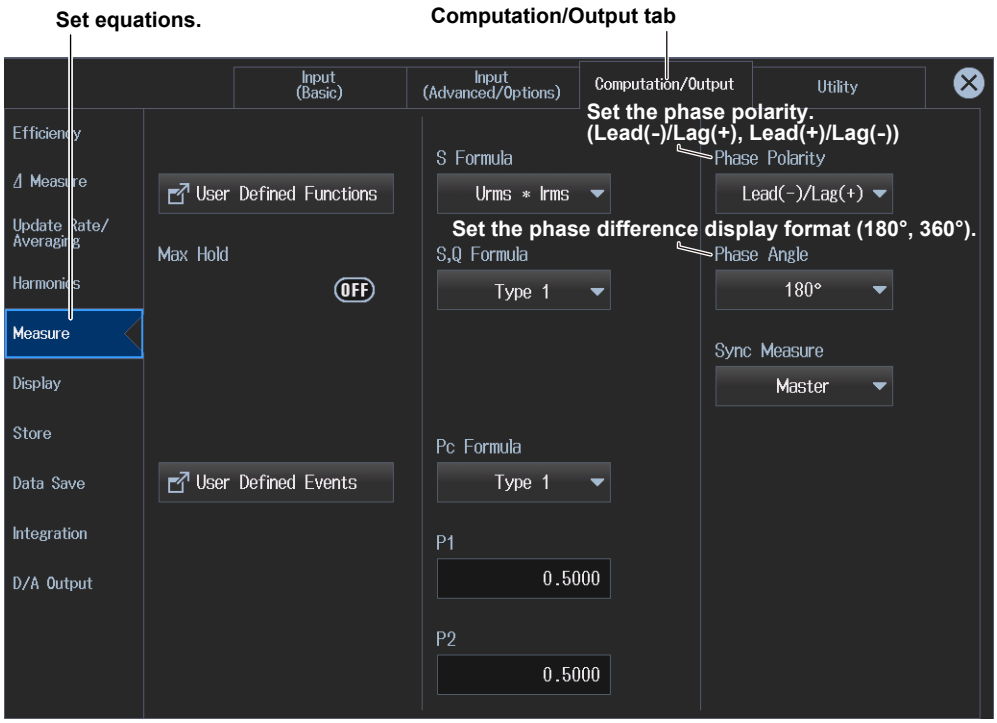
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Phase Difference Display Mode (Phase)

3. Tap **Measure**.

   An equation setup screen appears.



Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

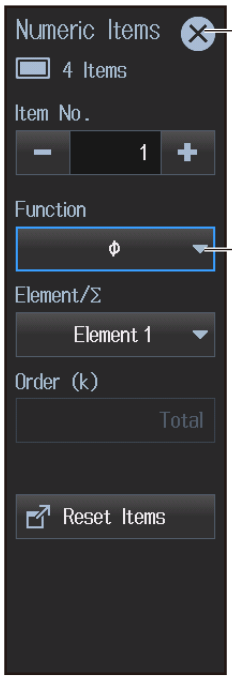
Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 3.1.

4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
You can set the following items for displaying the phase difference, frequency (voltage), and frequency (current).
Measured phase difference (Power group):
Φ (phase difference), **Φfnd** (fundamental phase difference)
Measured frequency (voltage) (Frequency group):
FreqU (voltage frequency), **Freq2U** (current frequency)
Measured frequency (current) (Frequency group):
Freql (current frequency), **Freq2l** (current frequency)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

   By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

3.5 Displaying Computed Values (Values and Events)

You can combine function symbols to create equations and use the numeric data of the combined functions to determine the numeric data (value) of the equation. You can also define events that are used to make judgments when measurement values are compared to the range or reference value. These numeric data and the judgment results of events (true or false) are shown on the screen.

► **"User-Defined Functions (User Defined Functions)" in the features guide**
► **"Measuring the Average Active Power" in the features guide**
► **"User-Defined Events (User Defined Event)" in the features guide**

Using an example, this section explains how to display computation results.
The following computed values are displayed as an example.

- Average active power measurement (Avg-W) and power loss (P-loss): Value example (user-defined function)
- Power measurement range (Ev1) and voltage measurement range (Ev2): Event example (user-defined event)

In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

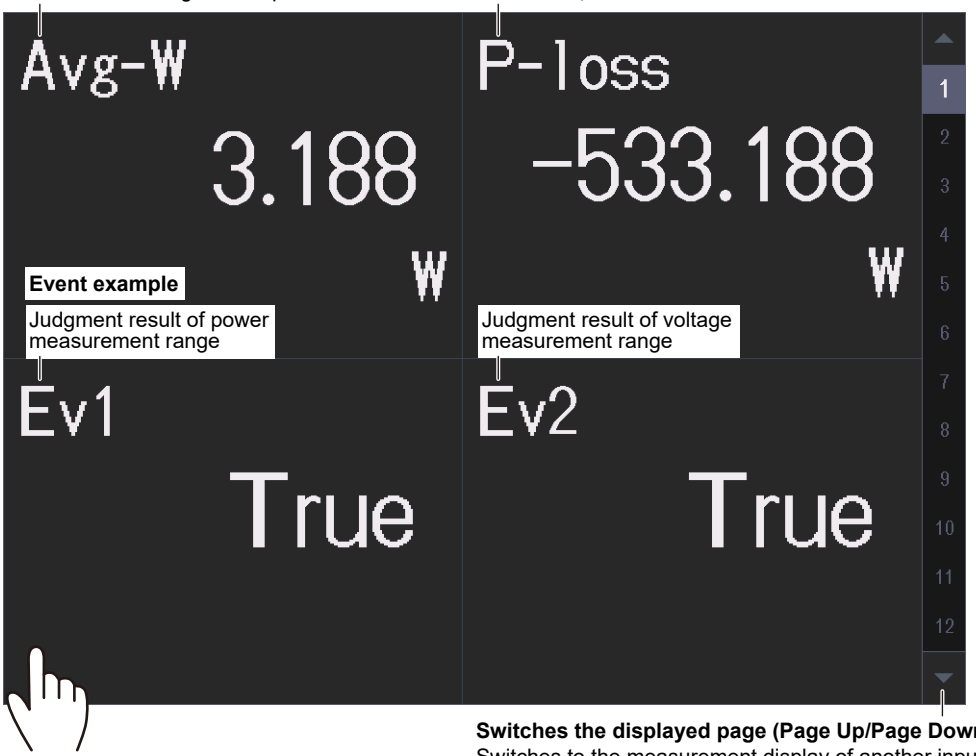
Measurement Display Screen (Example of a 4 items display)

Measurement display of input element

Numeric example

Measured average active power

Measured power loss



If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in "Switching the Displayed Items (Items)," provided later.

Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element. Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Note

Computed values (values and events) can be shown graphically.

- The trend display (see section 6.3) shows computed values (values and events) graphically.

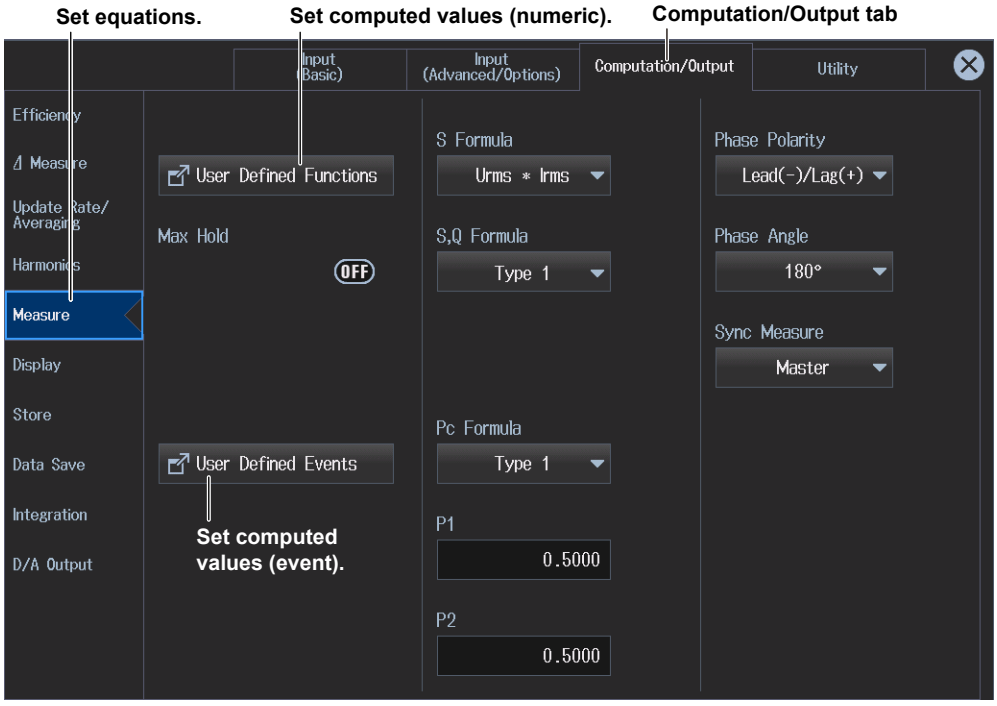
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

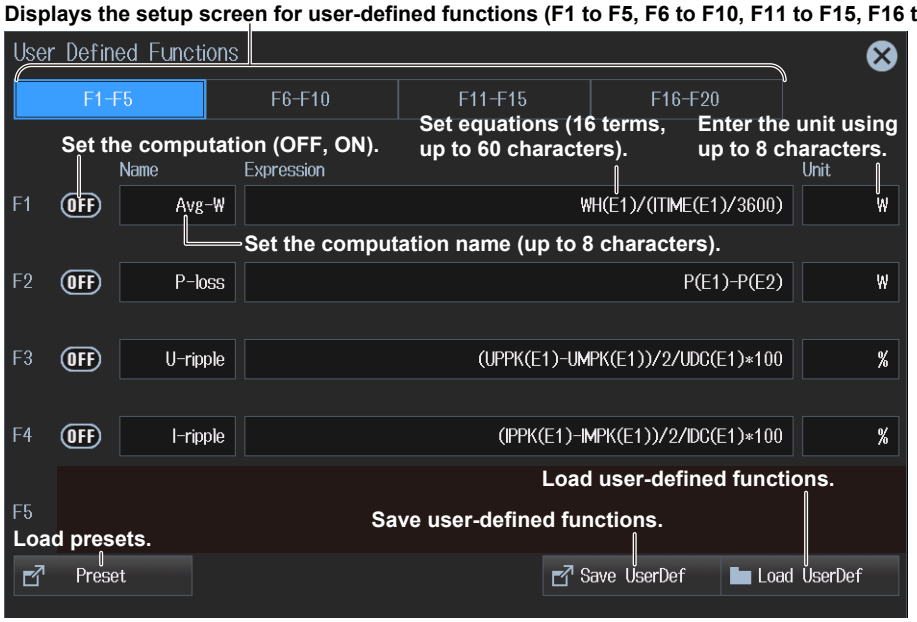
Computed Value (Value) Display Mode (User Defined Function Settings)

3. Tap **Measure**.

   An equation setup screen appears.



4. Tap **User Defined Functions**.
   The following screen appears.



The user-defined function setup screen shows five functions per screen. Up to 20 functions can be defined. In the setup example, the computed value of average active power is set in F1 and the computed value of power loss is set in F2.

F1: Average active power Avg-W =
Integrated power of element 1 WH(E1)/Elapsed integration time of element 1 ITIME(E1)/3600

F2: Power loss P-loss = Active power of element 1 P(E1) – Active power of element 2 P(E2)

If you set the computation setting to on, computed values are shown on the measurement display screen.

Note

- By default, the computed values of user definitions contain samples. Change them as necessary.
- You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

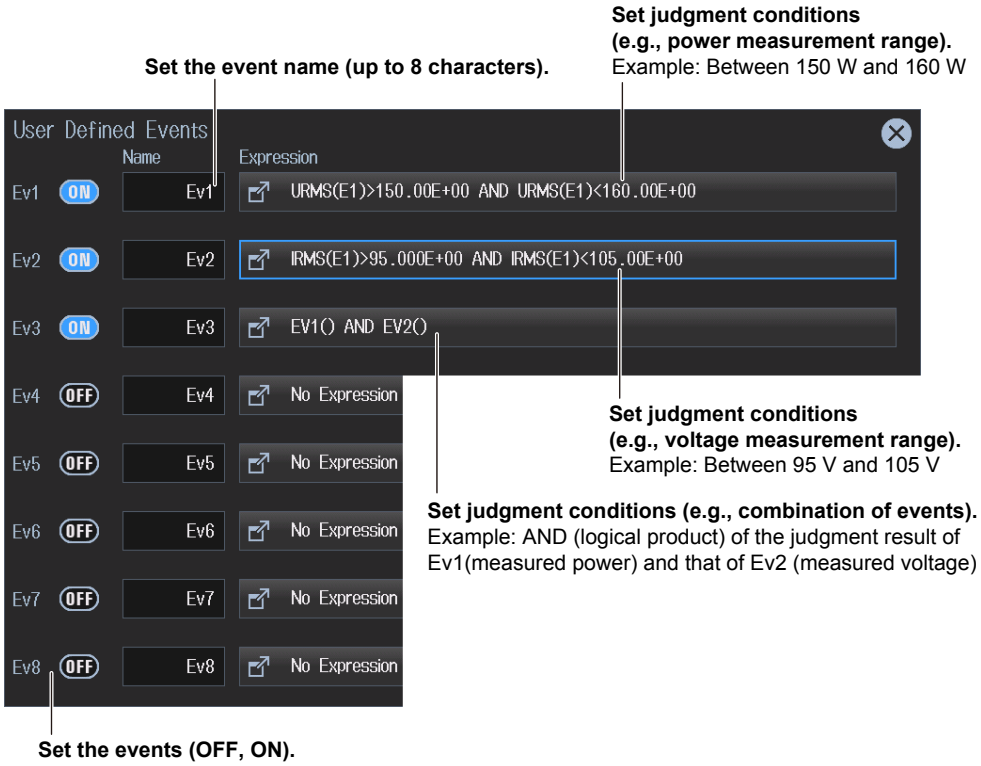
Computed Value (Event) Display Mode (User Defined Event)

3. Tap **Measure**.

An equation setup screen appears.

4. Tap **User Defined Events**.

The following screen appears.



Set the judgment conditions.

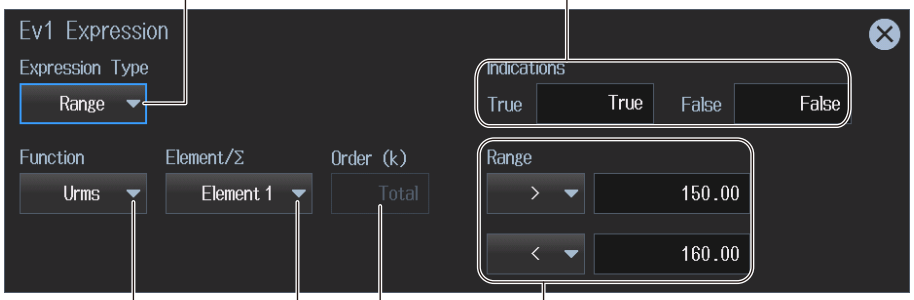
5. Tap **Expression**. The following screen appears.

- **Setting Judgment Conditions (example: power measurement range)**

  This is an explanation for defining judgment conditions using a measurement range.

Select the judgment method (Range, Condition).
To define using a range, select Range.

Set the characters (up to 6 characters) to show on the measurement display screen when the judgment conditions are met (True) and when they are not met (False).



Set the numeric range (Range) (–9.9999T to 9.9999T).
The "T" attached to the number is tera ($\times 10^{12}$).
Screen setting example: Between 150 and 160 (inclusive)

Set the harmonic order (Total, 0 to 500).

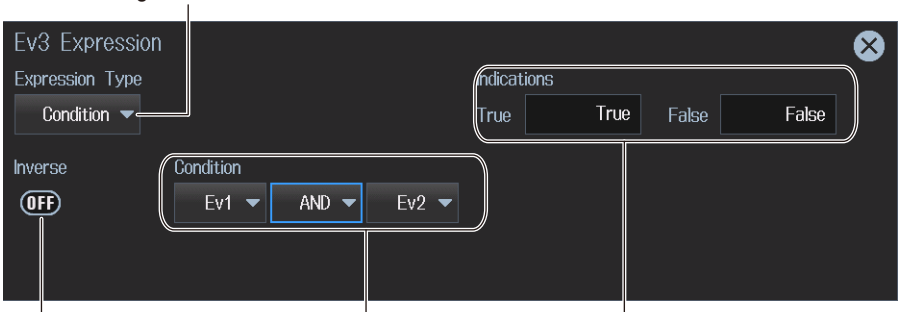
Selects the input element or wiring unit to be configured
- Input element options
  When the displayed item is set to something other than motor evaluation: Element1 to Element7
  When the displayed item is set to motor evaluation: Motor1 to Motor4
- Wiring unit options: ΣA, ΣB, ΣC

Set the measurement function.
(For details on the various measurement functions, see "Items That This Instrument Can Measure" in the features guide.)
Example: Urms

- **Setting Judgment Conditions (example: combination of events)**

  This is an explanation for defining judgment conditions using a combination of events.

Select the judgment method (Range, Condition).
To define using a combination of events, select Condition.



Inverts the judgment results (True and False) (OFF, ON)
OFF: Not inverted
ON: Inverted

Set the event combination condition.

Set the characters (up to 6 characters) to show on the measurement display screen when the judgment conditions are met (True) and when they are not met (False).

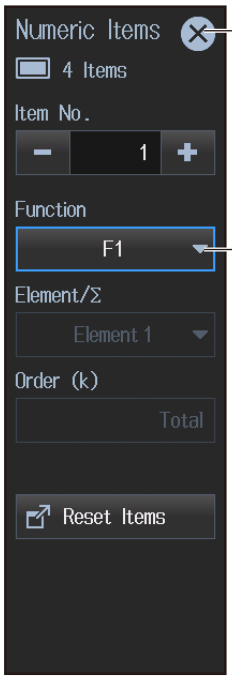
Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.

A display format setup screen (Numeric/Graph) appears. For details, see section 3.1.

4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
You can set the following items for displaying computed values (numeric, event).
Computed value (numeric) (User Func group):
F1 to F20 (user-defined function)
Computed value (event) (User Event group):
Ev1 to Ev8 (user-defined event)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

3.6 Holding the Maximum Values

This instrument shows on the screen the maximum values of measurements (measurement functions) of the voltage, current, power, and the like applied to the input elements or wiring units.

► “MAX Hold (Max Hold)” in the features guide

Using an example, this section explains how to display the maximum values of measurements.
The following maximum values are displayed as an example.

- Maximum value of the true rms voltage (Max Urms)
- Maximum value of the true rms current (Max Irms)
- Maximum value of the active power (Max P)

In addition, this section explains operating procedures using the following setup methods.

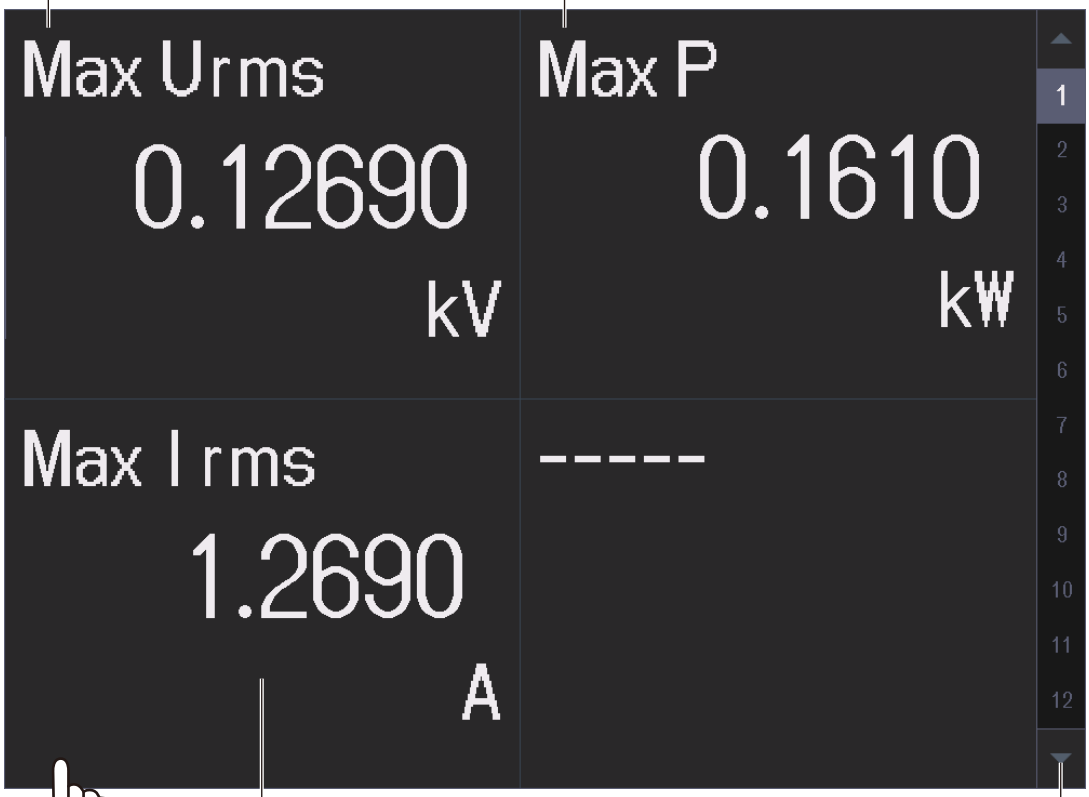
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Measurement Display Screen (Example of a 4 items display)

Measurement display of input element 1

Maximum voltage (true rms)

Maximum power (active power)



Maximum current (true rms)

If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in “Switching the Displayed Items (Items),” provided later.

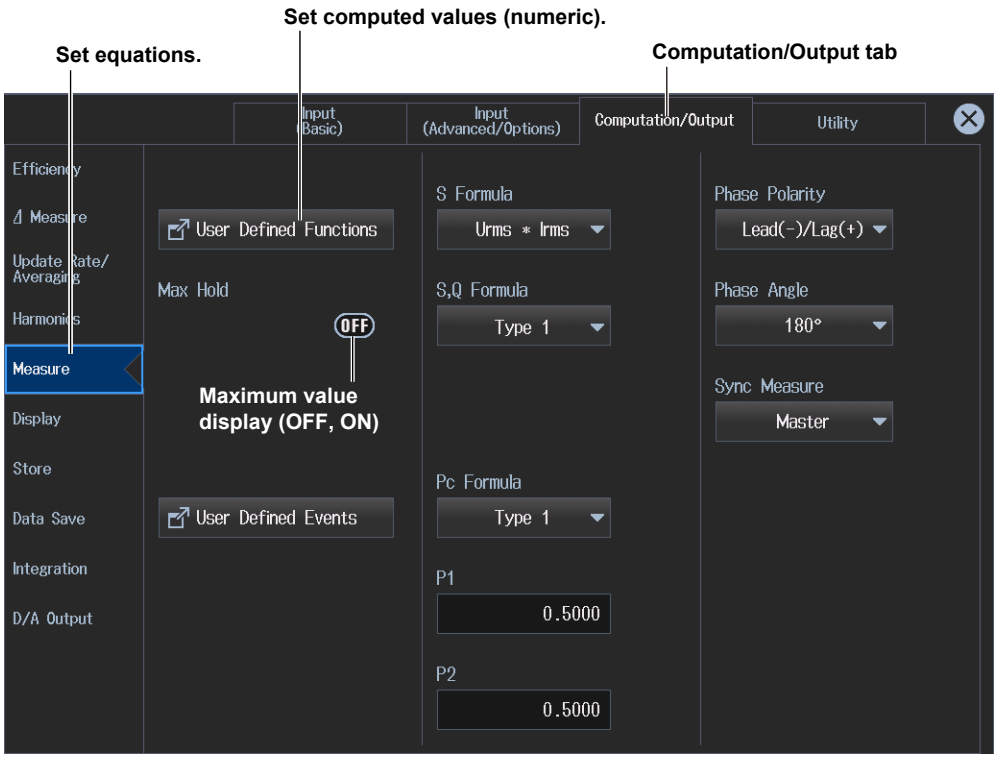
Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Procedure Using the Setup Menu

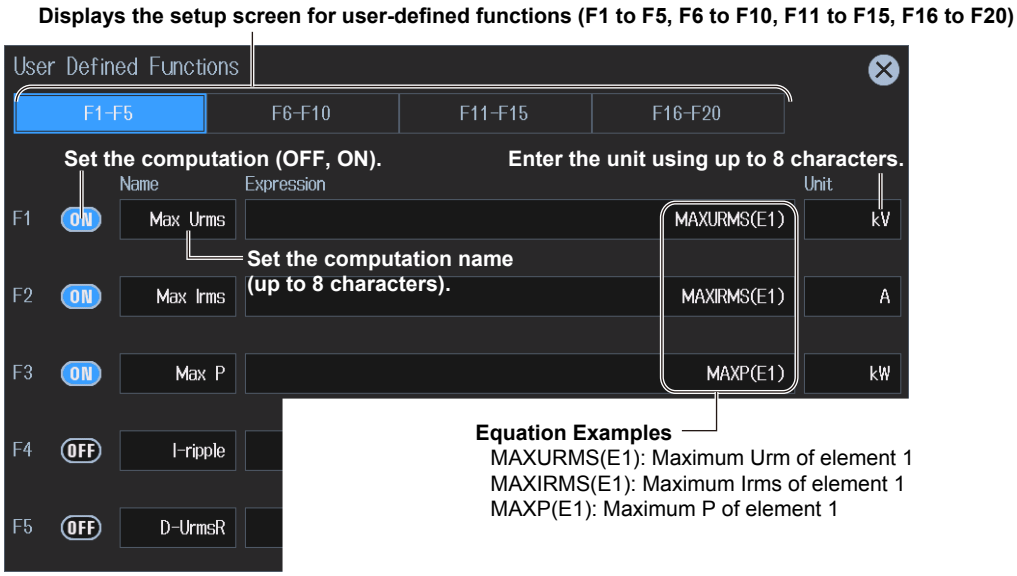
1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Maximum Value Display Mode (Max Hold)

3. Tap **Measure**.
   An equation setup screen appears.
4. Tap **Max Hold** to select ON.



5. Tap **User Defined Functions**.
   The following screen appears.



The user-defined function setup screen shows five functions per screen. Up to 20 functions can be defined. In the setup example, the maximum value of the true rms voltage is set in F1, the maximum value of the true rms current is set in F2, and the maximum value of the active power is set in F3.

F1: Maximum value of the true rms voltage (element 1) Max Urms1 = MAXURMS(E1)
F2: Maximum value of the true rms current (element 1) Max Irms1 = MAXIRMS(E1)
F3: Maximum value of the active power (element 1) Max P1 = MAXP(E1)

If you set the computation setting to on, maximum values are shown on the measurement display screen.

Note

- By default, the computed values of user definitions contain samples. Change them as necessary.
- You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

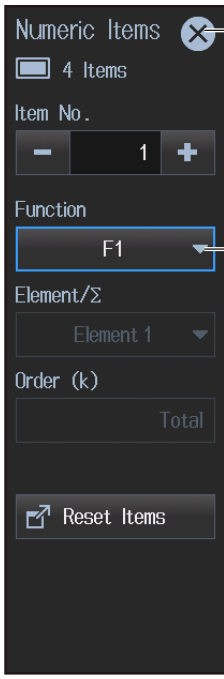
Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.

A display format setup screen (Display/Numeric/Graph) appears. For details, see section 3.1.

4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
You can set the following items for displaying maximum values (MAX hold).
Maximum value (User Func group):
F1 to F20 (user-defined function)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

3.7 User Display

You can display an illustration (.bmp) that you created on a PC or the like or a photo (.bmp) as a background of the screen and arrange numeric data boxes on top of the background to configure the screen.

► “User Display (User)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

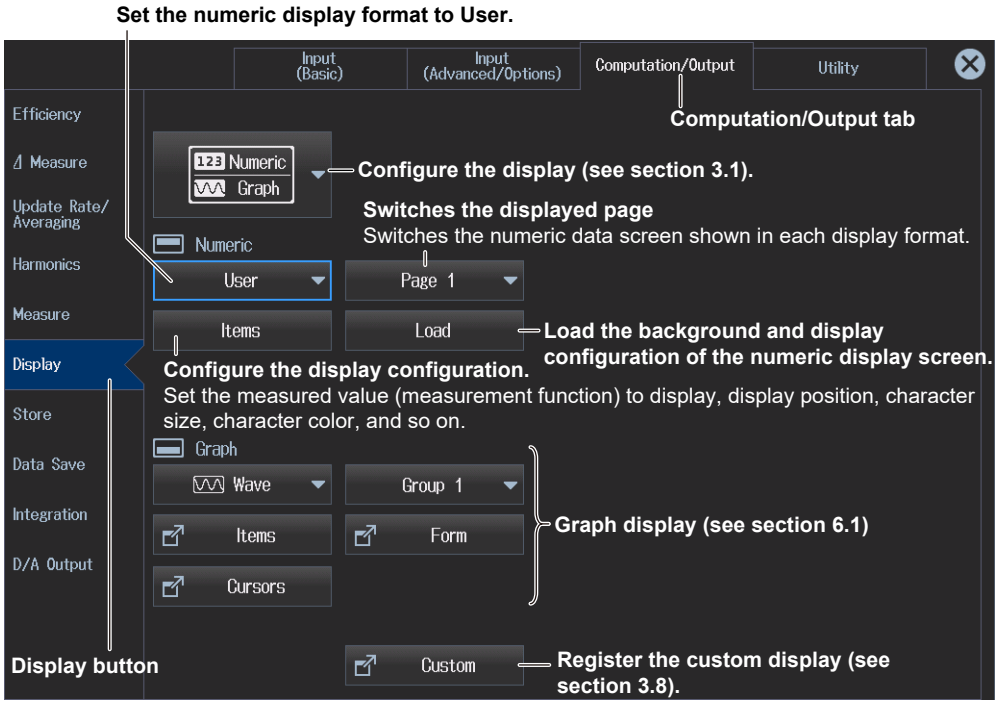
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Display Format (Display)

3. Tap **Display**.

   A display format setting screen appears.



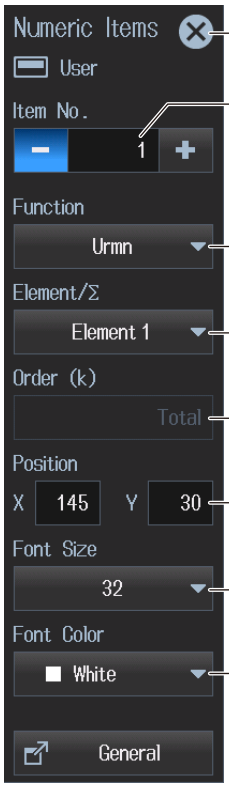
Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Setting and Saving the Display Configuration (Items)

4. Tap **Item**. A Numeric Item menu appears.

Set the title, measured value (measurement function), display position, character size, character color, and so on.



Closes the menu

Select the displayed item number.
The number increases from the upper left to the right and lower of the screen. Use Position to change the display position.

Set the displayed item (function).
Set the items of the measurement function. See “On the 4-, 8-, and 16-Value Displays” in section 3.1.

Selects the input element or wiring unit to be configured
See “On the 4-, 8-, and 16-Value Displays” in section 3.1. When Function is set to None, set the text to display in the numeric data box.

Harmonic to be configured
Use this to specify the harmonic (see section 5.2).

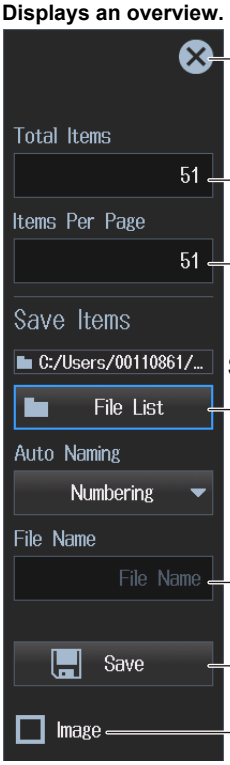
Set the X and Y display positions.
Set the horizontal (X) position and vertical (Y) position of the displayed item.

Selects the character size
Select the character size to display.

Selects the text color
Select the text color to display.

Tap General.

Displays an overview. Save the display configuration.



Closes the menu

Total number of items
Set the total number of numeric data boxes to display.

Number of items per page
Set the number of numeric data boxes to display per page.

Save the display configuration.

Displays the file list. Set the save destination and file name.
Set where to save the display configuration. For information about how to configure the file list display and how to operate files and folders, see section 8.2.

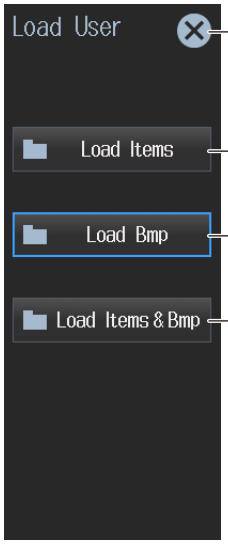
Saves data

Saves the background file simultaneously.
Select whether to save the background file at the same time when the display configuration is saved.

Loading the Background and Display Configuration of the Numeric Display Screen (Load)

4. Tap **Load**. A Load User menu appears.

You can load a display configuration data file or background file that you specify on the file list. For information about how to configure the file list display and how to operate files and folders, see section 8.2.



Closes the menu

Loads a numeric display configuration file (.txt).

Loads a numeric display screen background file (.bmp)

Loads the numeric display configuration file and background file simultaneously.
If you select and load a display configuration file (.txt) from the file list, a background file with the same name as the display configuration file but with a .bmp extension will be loaded at the same time.

* An error will occur if a background file that has the same name as the display configuration file is not present in the save destination folder of the display configuration file.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the display format.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

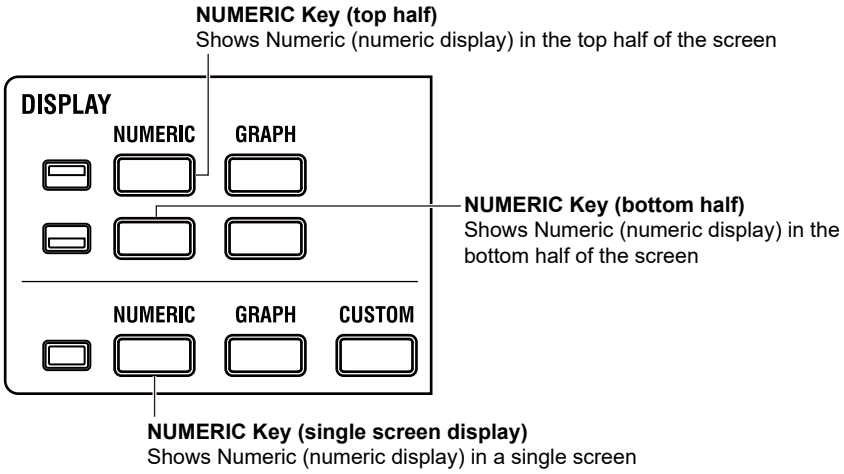
By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

Switching the Display Format (NUMERIC key)

You can also use keys to perform “Setting the Screen Display” and “Setting the Numeric Display Format” described in section 3.1.



Each time you press **NUMERIC**, the display format switches, in order, between All Items, 4 Items, 8 Items, 16 Items, Matrix, Hrm List Single, Hrm List Dual, and User.

3.8 Custom Display

You can register up to five screen configurations in advance and use them as you like.

► “Custom Display (CUSTOM)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Depending on the measurement mode, the settings may be different from the description in this section, the settings may be invalid, or the settings may not be configurable. For details, see the features guide.

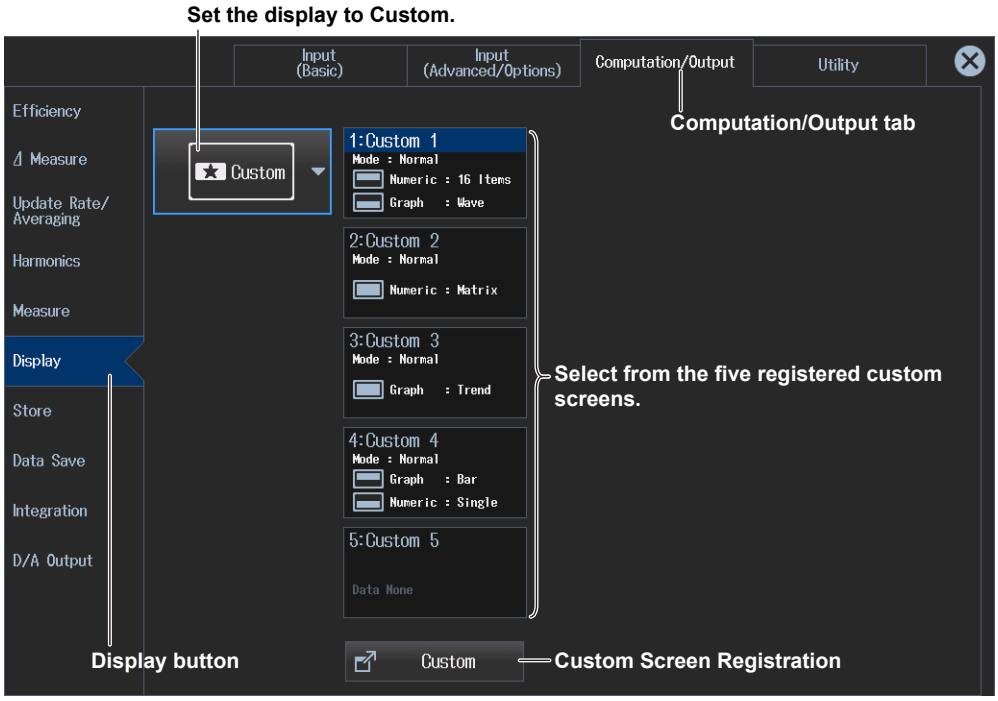
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Display Format (Display)

3. Tap **Display**.

   A display format setting screen appears.

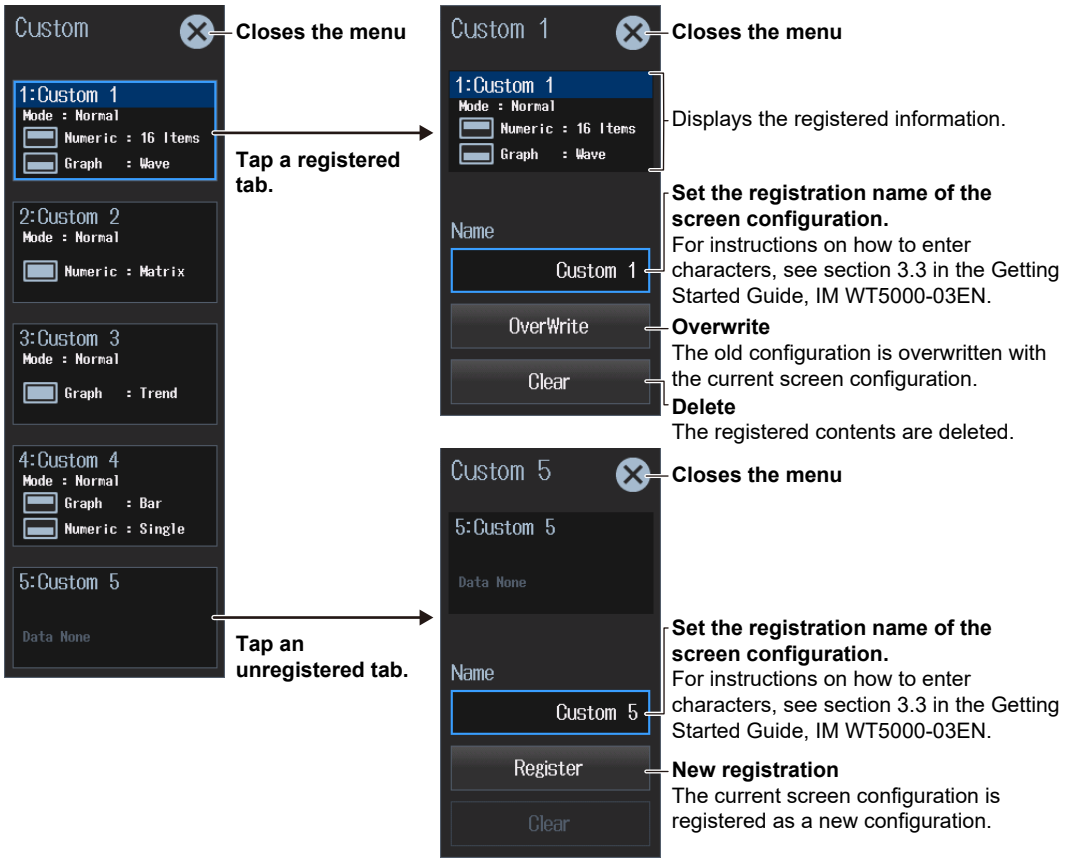


Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Registering Custom Screens (Custom)

4. Tap **Custom**. A CUSTOM menu appears.
5. Select a registration tab. The setup menu is display for the selected tab.



Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the display.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

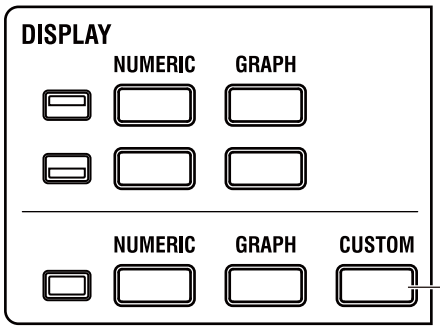
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

Switching the Custom Screen (CUSTOM key)

You can also use keys to switch the custom screen.



Each time you press **CUSTOM**, the screen configuration changes in order between registration tabs 1, 2, 3, 4, and 5. Unregistered tabs are skipped. If there are no screen configurations registered in any of the registration tabs, the screen does not switch to the custom screen.

4.1 Setting Integration Conditions

► "Enabling or Disabling Independent Integration (Independent Control)" in the features guide
► "Integration Auto Calibration On/Off (Auto Cal)" in the features guide
► "Integration Mode (Integration Mode)" in the features guide
► "Integration Timer (Integration Timer)" in the features guide
► "Scheduled Times for Real-Time Integration (Start Time/End Time)" in the features guide
► "Watt Hour Integration Method for Each Polarity (WP ± Type)" in the features guide
► "Current Mode for Current Integration (q Mode)" in the features guide
► "Rated Time for Integrated D/A Output (Integration Rated Time)" in the features guide
► "Integration resume action at power failure recovery (Resume Action)" in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

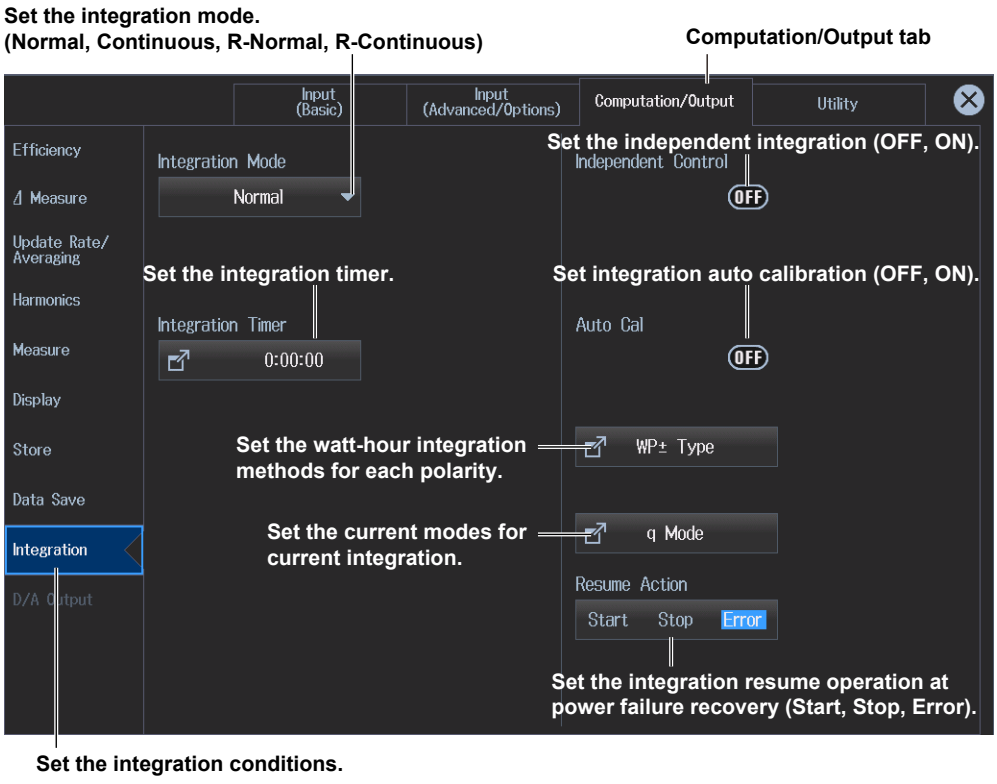
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

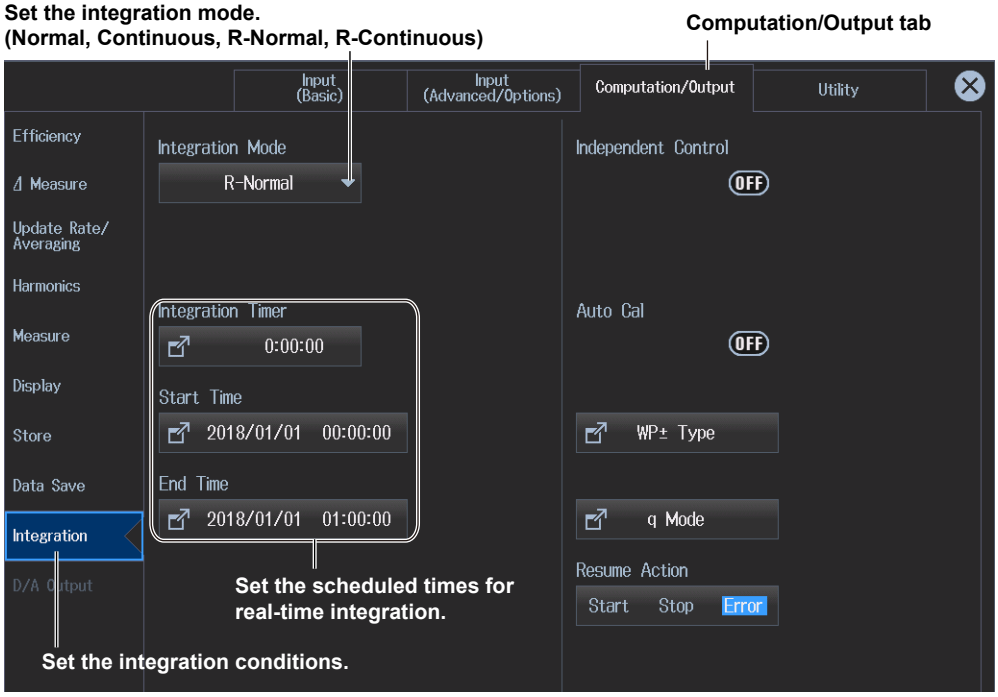
Setting Integration Conditions (Integration)

3. Tap **Integration**. An integration condition setup screen appears.

- **When the Integration Mode Is Set to Normal or Continuous**



- **When the Integration Mode Is Set to R-Normal or R-Continuous**



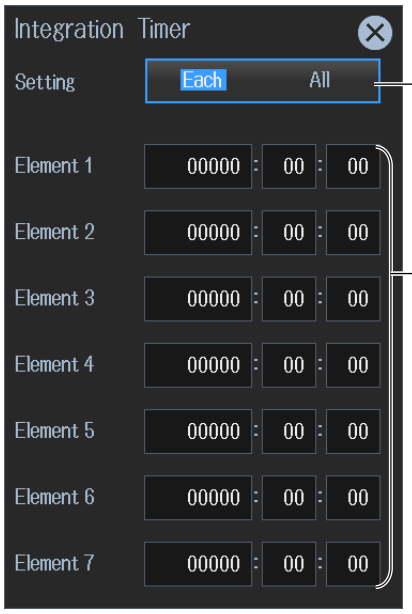
Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Setting the Integration Timer (Timer)

4. Tap **Integration Timer**. The following screen appears.

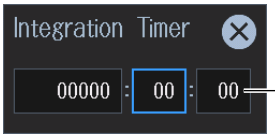
When independent computation is on



Select the integration timer's setup method (Each, All).
When you select Each, you can set the integration timer for each input element.

Set the integration timer.
(00000 hours : 00 minutes : 00 seconds to 10000 hours : 00 minutes : 00 seconds).
When Mode is set to Normal and the integration timer is 00000 : 00 : 00, the instrument is in manual integration mode.

When independent computation is off



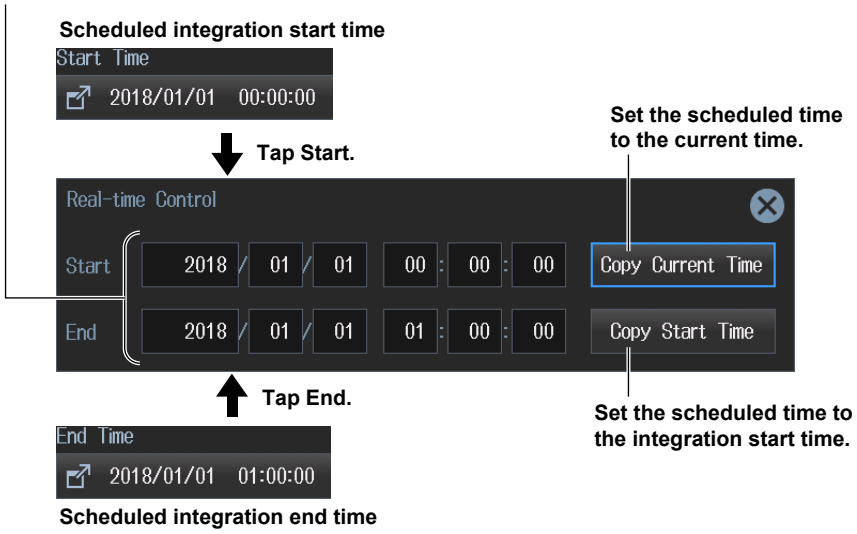
Setting Scheduled Times for Real-Time Integration (Real-time Control)

4. Tap **Real-time Control**. The following screen appears.

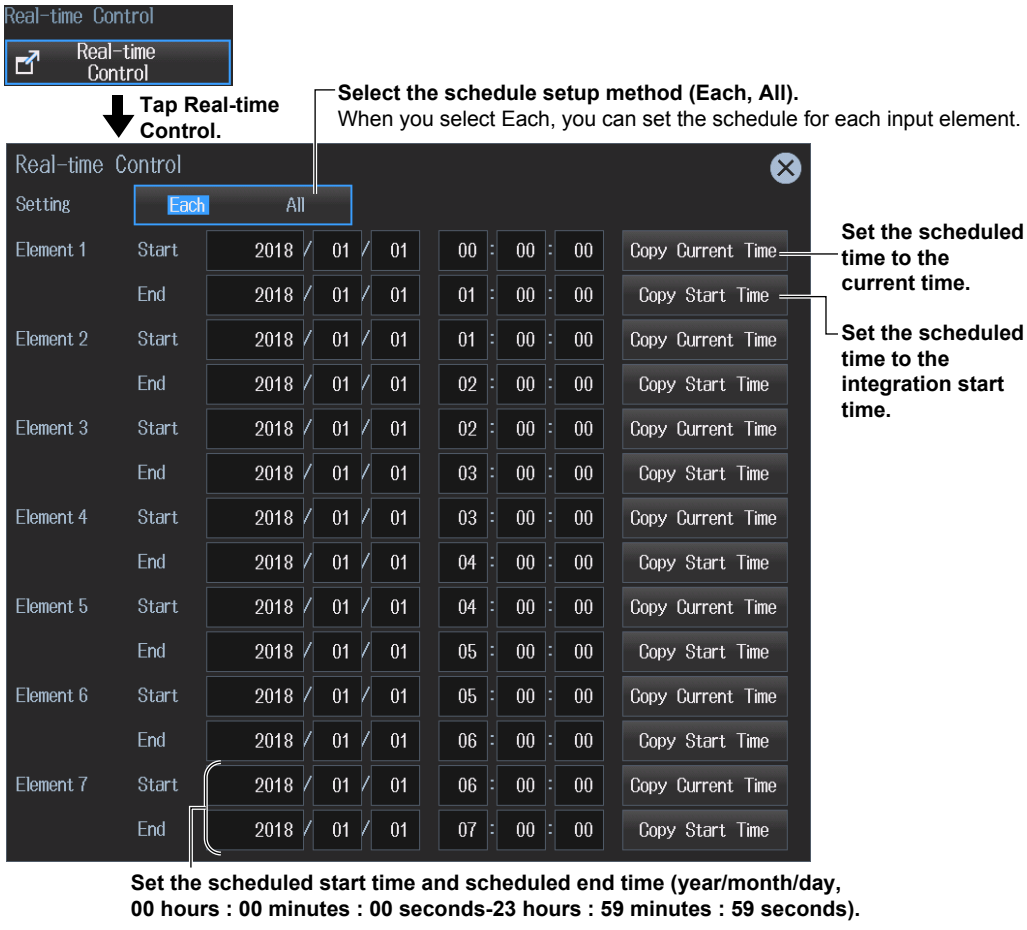
The Real-time Control button appears when the integration mode is set to R-Normal or R-Continuous.

- **When Independent Integration Is Disabled**

Set the scheduled start and stop times (Year/month/day, 00 hours : 00 minutes : 00 seconds to 23 hours : 59 minutes : 59 seconds).

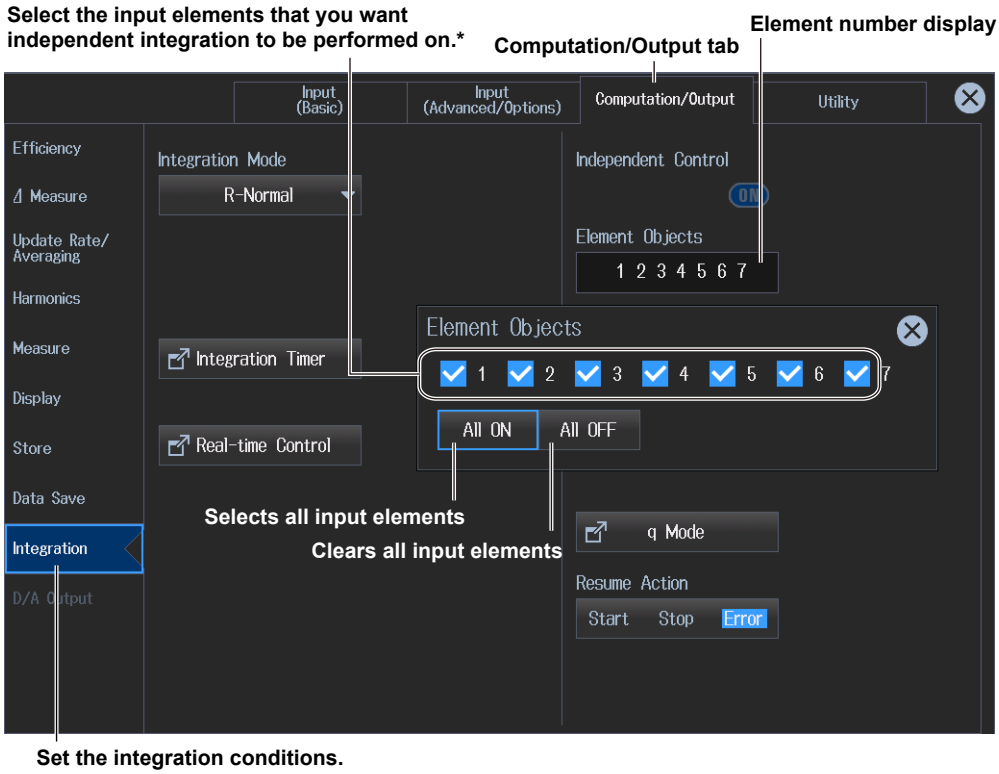


- **When Independent Integration Is Enabled**



Setting Independent Integration (Independent Control)

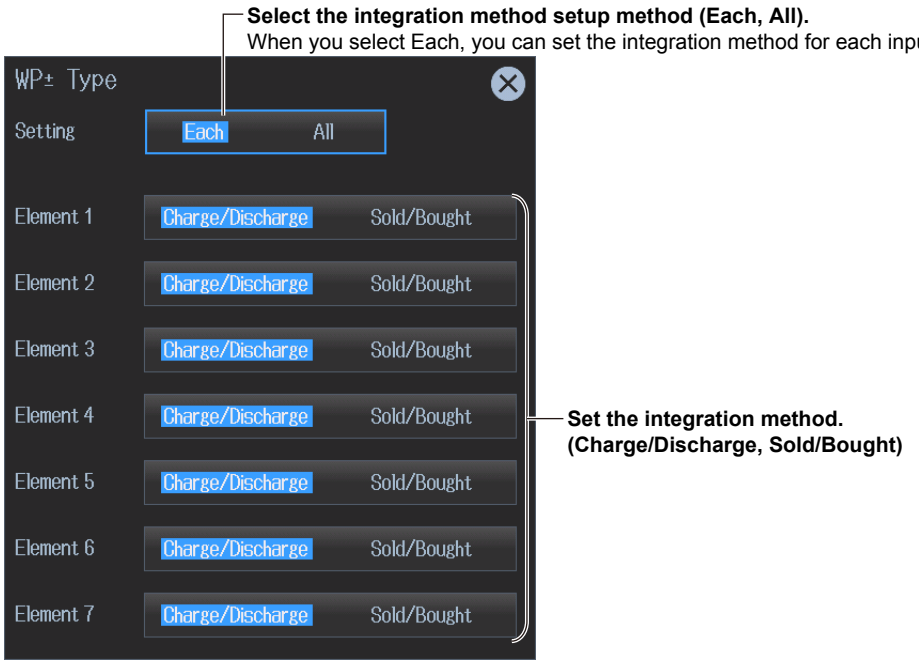
4. Tap **Independent Control**. Element numbers appear.
5. Tap within the element number display frame. The following screen appears.



* Even if you select input elements that independent integration will be performed on, independent integration may not be performed due to the wiring system setting or the independent input element configuration (see the features guide).

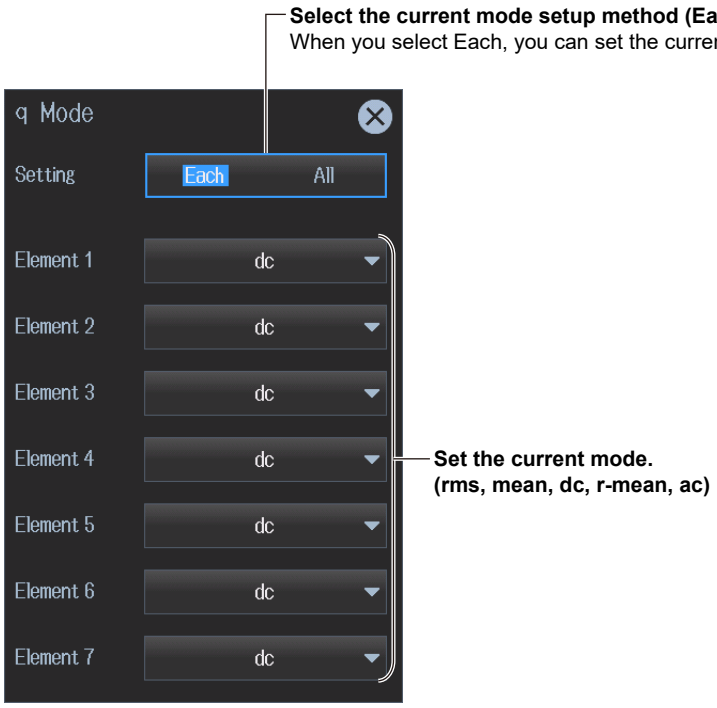
Setting the Watt-Hour Integration Method for Each Polarity (WP± Type)

4. Tap **WP± Type**. The following screen appears.



Setting the Current Mode for Current Integration (q Mode)

4. Tap **q Mode.** The following screen appears.



Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the integration conditions.

1. Tap the **Integration** menu icon . An Integration menu appears in the sub menu area on the right side of the screen.

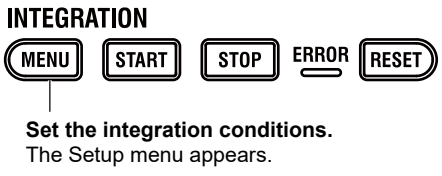
By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Integration menu, see page xii.

Procedure Using Keys

You can also use the front panel keys to set integration.



4.2 Displaying Integrated Values (numeric display)

This instrument calculates the integrated value of power (watt hours) and the integrated value of current (ampere hours) from the voltage and current applied to the input elements or wiring units and shows the measurements (measurement functions) on the screen.

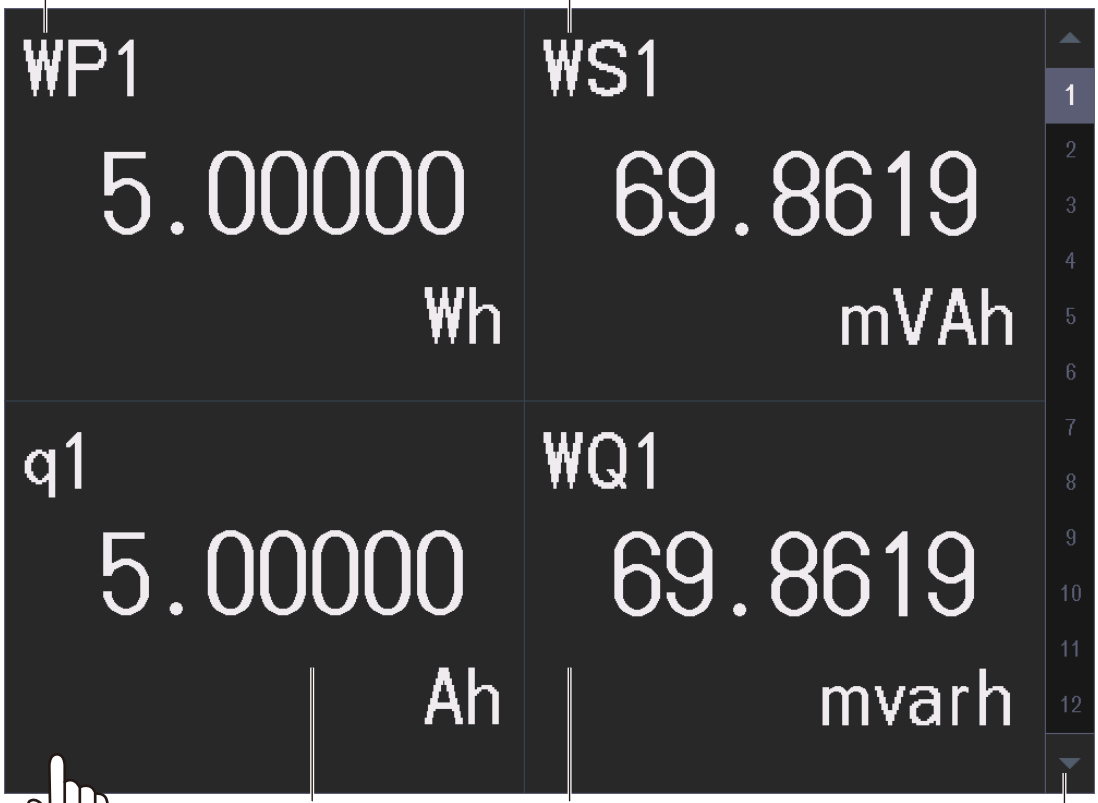
► “Starting, Stopping, and Resetting Integration” in the features guide

Watt hours (WP, WP+, WP-) and ampere hours (q, q+, q-) do not require you to set equations. The values are simply shown on the screen when integration is started.
To determine the volt-ampere hours (WS) and var hours (WQ), you need to set the equations for apparent power (S) and reactive power (Q). For the setup procedure, see section 3.3.
Using an example, this section explains how to display integrated values numerically.

In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Measurement Display Screen (Example of a 4 items display)



If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in “Switching the Displayed Items (Items),” provided later.

Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element. Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Note

Integrated values can be shown graphically.

- The trend display (see section 6.3) shows integrated values graphically.

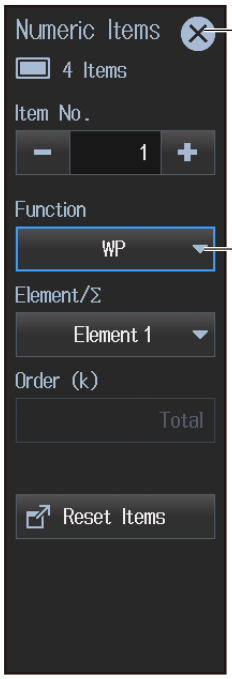
Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Switching the Displayed Items (Item)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.
   A display format setup screen (Numeric/Graph) appears. For details, see section 3.1.
4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
You can set the following items for displaying integration.
Integrated value (Integration group):
ITime (integration time), **WP** (sum of positive and negative watt hours),
WP+(sum of positive P values), **WP–** (sum of negative P values),
q (sum of positive and negative ampere hours), **q+** (sum of positive I values),
q– (sum of negative I values), **WS** (volt-ampere hour), **WQ** (var hours)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

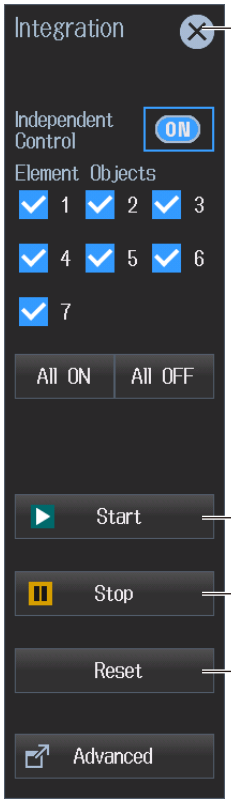
1. Tap the **Display** menu icon . A Display menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

Starting, Stopping, and Resetting Integration (Start/Stop/Reset)

1. Tap the **Integration** menu icon . An Integration menu appears in the sub menu area on the right side of the screen.



Closes the menu

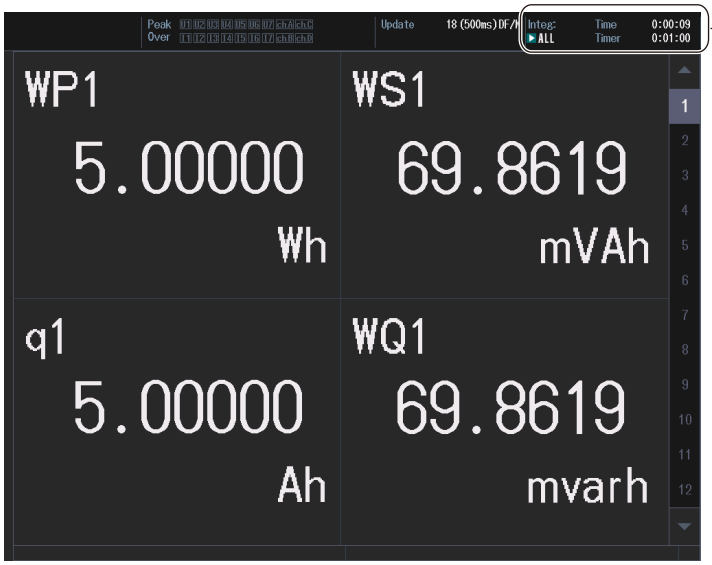
Starts integration.
Integration starts according to the specified integration conditions (see section 4.1).
The START key in the INTEGRATION area turns on.

Stops integration.
Integration stops automatically according to the specified integration conditions.
The START key in the INTEGRATION area turns off, and the STOP key turns on.

Resets the integration time and integrated value.
All integration data is deleted, and the no-data display, "-------," appears. The STOP key in the INTEGRATION area turns off.

Integration Status Display

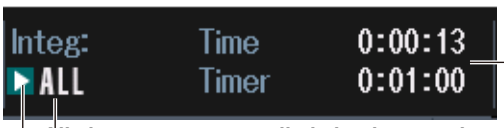
The integration status (running, paused, end), independent integration on/off state, integration time, and so on are shown at the top of the screen.



Integration Information

Integration Information

When Independent Integration Is Disabled

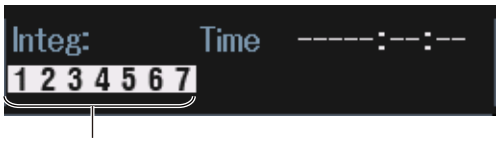


Elapsed time, timer ,etc.

All elements are controlled simultaneously, and shared information (e.g., elapsed time, timer) are shown.

Integration status display (running, paused, ended)
This is the same display as when independent integration is off (see below).

When independent integration is enabled



Selected elements are controlled independently (e.g., elapsed time, start time), and integration information (e.g., elapsed time, timer) is shown for each element. Press ELEMENTS (appropriate number) in the ELEMENTS/RANGE area to switch the displayed integration information of each element.

Example: Integration running on elements 1 to 3

When integration starts, the elements selected for integration execution show START icons.

Example: Integration paused on elements 1 to 3

When integration stops, the elements selected for integration execution show STOP icons. If you start it again, the icons change to START, and integration resumes.

Example: Integration ended on elements 1 to 3

When integration ends after the specified timer value elapses or when the scheduled real-time integration time is reached, the elements selected for integration execution show STOP icons. Unlike pausing, you need to reset the integration after it ends to start the integration again.

When you execute reset, the integration information is cleared, and the STOP icons return to displaying numbers.

Procedure Using Keys

You can also use the front panel keys to start, end, and reset integration.

Resets the integration status

ERROR indicator
Lights when an integration error occurs. In this situation, an error message appears at the top of the screen. For more information about how to handle error messages, see appendix 1.

Stops integration.

Starts integration.

5.1 Setting Harmonic Measurement Conditions

► “Input Element Group (Elements)” in the features guide
► “PLL Source (PLL Source)” in the features guide
► “Measured Harmonic Orders (Min Order/Max Order)” in the features guide
► “Distortion Factor Equation (Thd Formula)” in the features guide
► “Number of FFT Points (FFT Points)” in the features guide
► “Anti-Aliasing Filter” in the features guide

This section explains operating procedures using the following setup methods.

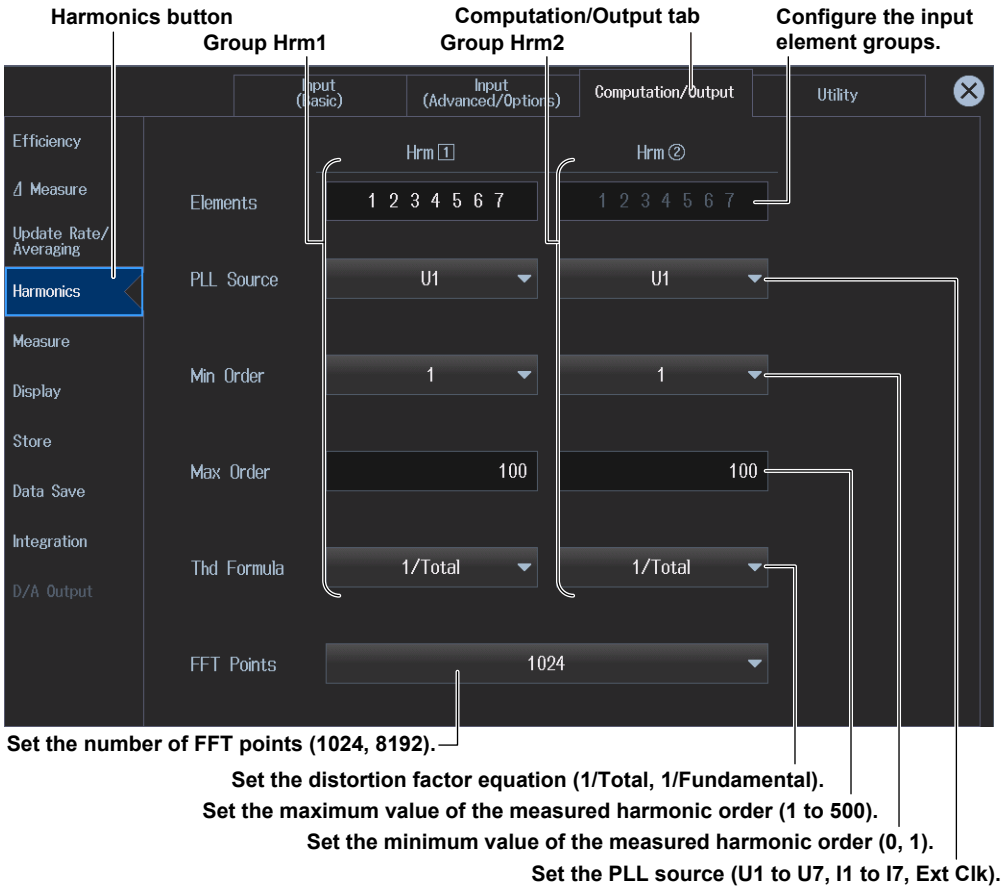
- Procedure Using the Setup Menu (see chapter 1)
  - * For the operation to perform harmonic measurements in accordance with IEC 61000-4-7, see chapter 13. In IEC Harmonic measurement, there is a limitation on the measurement functions that can be measured. See the appendix in the Getting Started Guide, IM WT5000-03EN.

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears. Pressing **ESC** closes the overview screen.

Setting the Harmonic Measurement (Harmonics)

3. Tap **Harmonics**. A harmonic measurement setup screen appears.

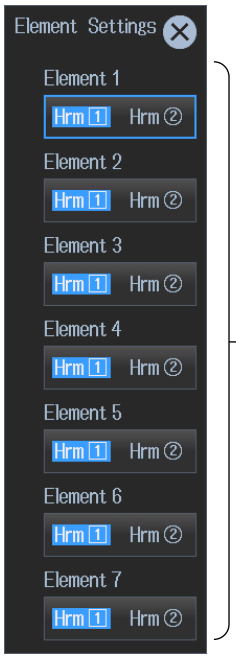


Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Setting the Input Element Group (Element Set)

4. Tap **Elements**. The Element Settings screen appears.



Configure the input element groups (Hrm 1, Hrm 2).
Input elements that are assigned to the same wiring unit are set to the same group.

5.2 Displaying Harmonic Measurements (numeric display)

This instrument shows on the screen the harmonic measurements (measurement functions) of the voltage and current applied to the input elements or wiring units.
Using an example, this section explains how to display harmonic measurements numerically.

In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Measurement Display Screen (Example of a 4 items display)

Measurement display of input element 1

Measured harmonic voltage (50th harmonic)

Measured harmonic power (50th harmonic)

Measured harmonic current (50th harmonic)

Measured harmonic power factor (50th harmonic)

If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in "Switching the Displayed Items (Items)," provided later.

Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Note

Harmonic measurements can be shown graphically.

- The trend display (see section 6.3) shows harmonic measurements graphically.
- The bar graph display (see section 6.4) shows the magnitude of each harmonic graphically.
- The vector display (see section 6.5) shows the phase difference and the magnitude relationship between fundamental waves U(1) and I(1) of each element in the wiring unit.

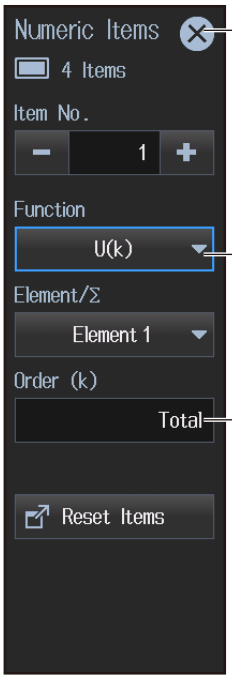
Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.
   A display format setup screen (Numeric/Graph) appears. For details, see section 3.1.
4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
Set the displayed harmonic items. Scroll the display list, and select the displayed items from the following available items.

- Harmonic order k (Harmonics(k) Group):
  U (k) (rms voltage of harmonic order k), **I (k)** (rms current of harmonic order k),
  P (k) (active power of harmonic order k), **S (k)** (apparent power of harmonic orderk),
  Q (k) (reactive power of harmonic order k), **λ(k)** (power factor of harmonic order k),
  Φ(k) (phase difference between the voltage and current of harmonic order k),
  ΦU(k) (phase difference between harmonic voltage U(k) and the fundamental wave U(1)),
  ΦI(k) (phase difference between harmonic current I(k) and the fundamental wave I(1)),
  Z (k) (load circuit impedance), **Rs (k)** (load circuit series resistance),
  Xs (k) (load circuit series reactance), **Rp (k)** (load circuit parallel resistance),
  Xp (k) (load circuit parallel reactance), **Uhdf (k)** (harmonic voltage distortion factor),
  Ihdf (k) (harmonic current distortion factor),
  Phdf (k) (harmonic active power distortion factor),
- Harmonics (Harmonics Group):
  Uthd (total harmonic voltage distortion), **Ithd** (total harmonic current distortion),
  Pthd (total harmonic active power distortion),
  Uthf (voltage telephone harmonic factor),
  Ithf (current telephone harmonic factor)
  Utif (voltage telephone influence factor), **Itif** (current telephone influence factor),
  hvf (harmonic voltage factor), **hcf** (harmonic current factor),
  K-factor (K factor),
  ΦUi-Uj (phase difference between the fundamental voltage of element i, Ui(1), and the fundamental voltage of element j, Uj(1)),
  ΦUi-Uk (phase difference between Ui(1) and the fundamental voltage of element k, Uk(1)),
  ΦUi-Ii (phase difference between Ui(1) and the fundamental current of element i, Ii(1)),
  ΦUj-Ij (phase difference between Uj(1) and the fundamental current of element j, Ij(1)),
  ΦUk-Ik (phase difference between Uk(1) and the fundamental current of element k, Ik(1)),
- PLL source frequency (Frequency group):
  FreqPLL1 (PLL1 frequency), **FreqPLL2** (PLL2 frequency)

Set the harmonic order (Total, 0, 1 to 500).

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon . A Display menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

6.1 Setting the Display Format

► “Switching the Displayed Page (Page Scroll)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

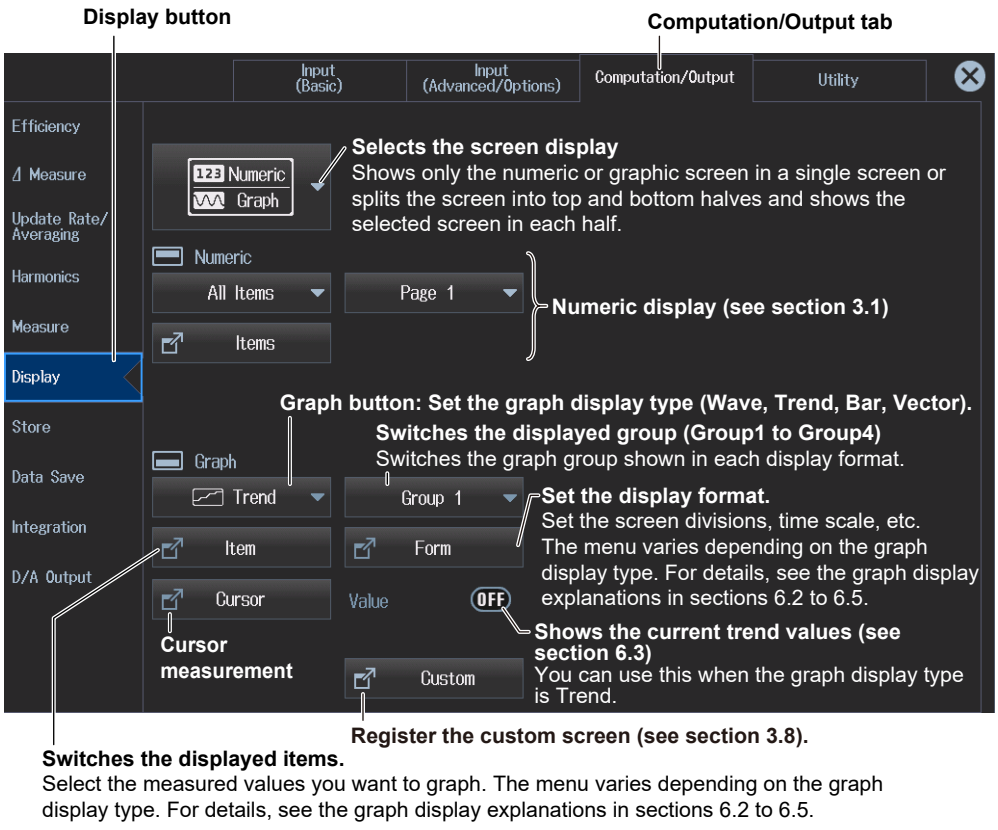
Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Display Format (Display)

3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears.

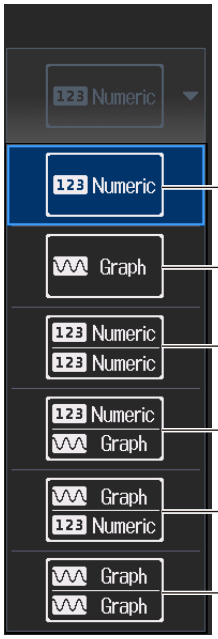


Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Display settings

You can switch the display format of the Numeric (numeric display) and Graph (graph display) screens.



Numeric (numeric display)
Shows only numeric data in a single screen For details on the numeric display, see chapter 3.

Graph (graph display)
Shows only graphs in a single screen

Numeric (numeric display)/Numeric (numeric display)
Shows numeric data (see chapter 3) in the top and bottom halves of the screen

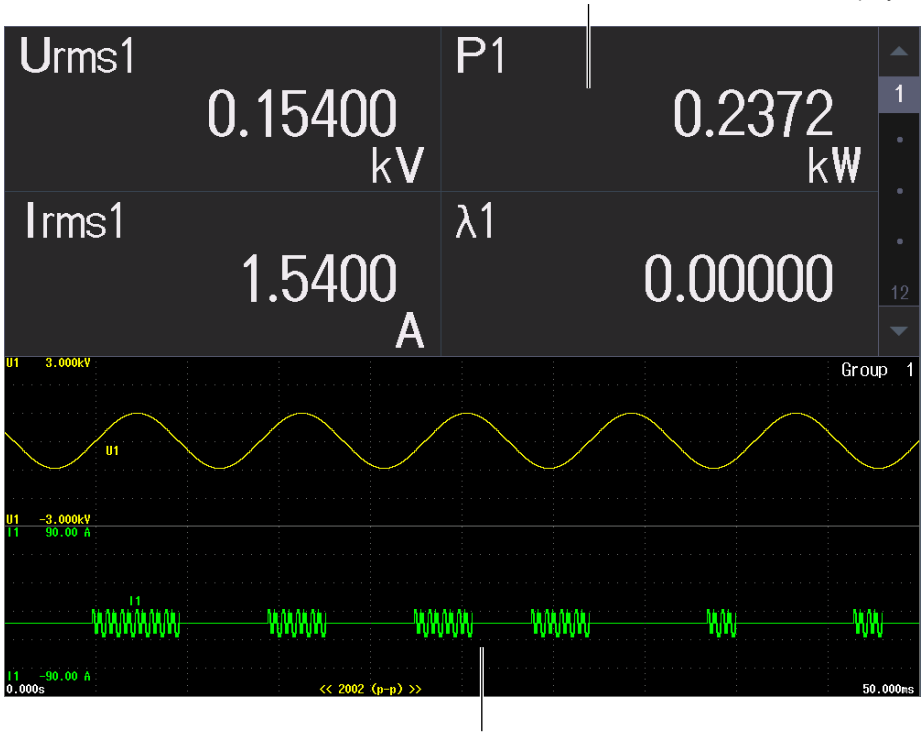
Numeric (numeric display)/Graph(graph display)
Shows numeric data (see chapter 3) in the top half of the screen and graphs in the bottom half

Graph (graph display)/Numeric (numeric display)
Show graphs in the top half of the screen and numeric data (see chapter 3) in the bottom half

Graph (graph display)/Graph (graph display)
Shows graphs in the top and bottom halves of the screen

Example of Numeric (numeric display)/Graph(graph display)

Numeric (numeric display) in the top half
For details on the numeric display, see chapter 3.



Graph (waveform display) in the bottom half

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the voltage range and current range.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

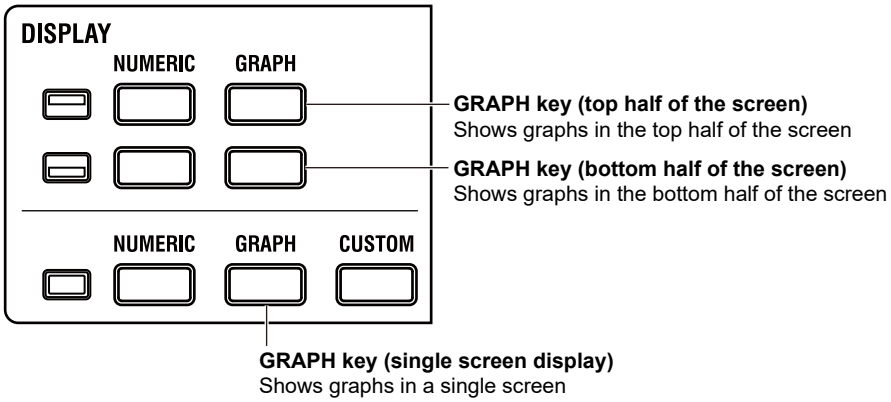
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

Switching the Display Format (GRAPH key)

You can also use keys to perform “Setting the Screen Display” described earlier and “Setting the Graph Display Type.”



Each time you press GRAPH, the graph type switches, in order, between waveform, trend, bar graph, and vector.

6.2 Waveform Display

This instrument shows on the screen the waveforms of the voltage and current applied to the input elements or wiring units.

► “Waveform Display (Wave)” in the features guide
► “Display Format (Form, Wave)” in the features guide
► “Number of Windows (Format)” in the features guide
► “Time Axis (Time/div)” in the features guide
► “Vertical Axis (Amplitude)” in the features guide
► “Advanced Waveform Display Settings (Advanced)” in the features guide
► “Display Items (Items, Wave)” in the features guide

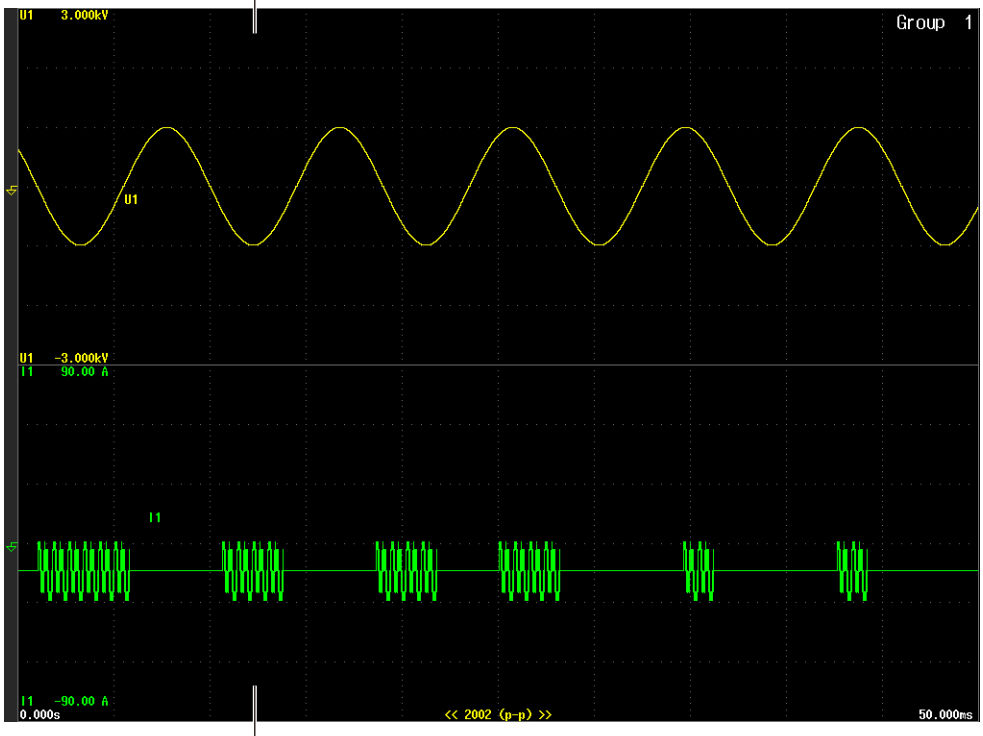
Using an example, this section explains how to display measurement results with waveforms.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Waveform Display Screen (Example of group1 dual display)

Waveform display of input element 1

Voltage waveform



Current waveform

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 6.1.

Setting the Graph Display Type (Graph)

4. Tap **Graph** to select Wave.

Switching the Displayed Group (Group)

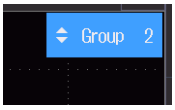
5. Tap **Group** to select a group from Group1 to Group4.

You can select up to four groups. The Item and Form settings, explained later, are applied to the group numbers you select in this step.

Switching the Display Group When Displaying Graphs

Flick the Graph screen up or down to switch the display group.

The group number after switching is shown highlighted for a few seconds in the group display area in the upper right of the Graph screen.

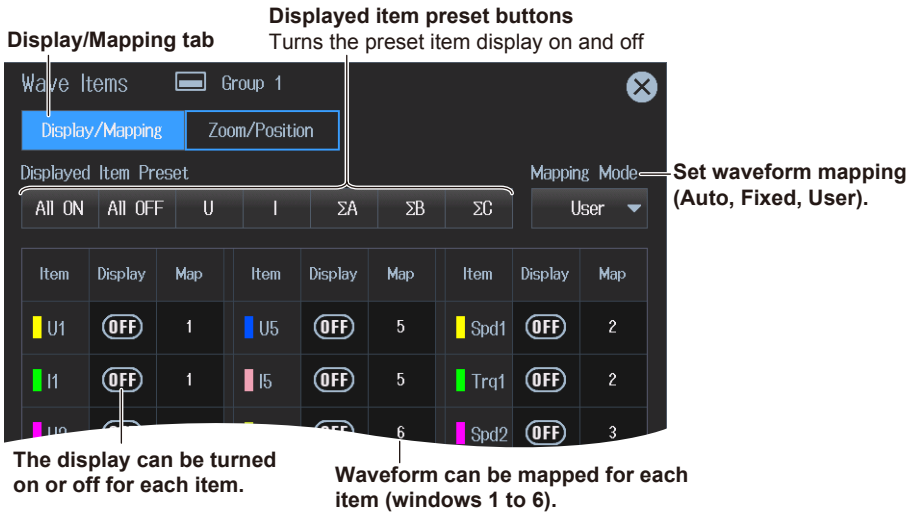


Switching the Displayed Items (Items)

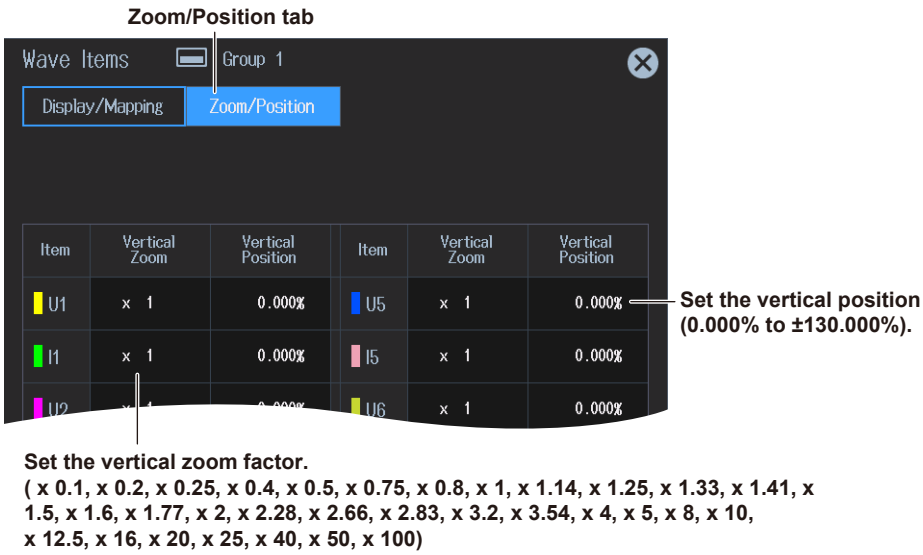
Select the voltages and currents of the input elements to be displayed with waveforms.

6. Tap **Items**. A Wave Items screen appears.

7. Tap the **Display/Mapping** tab. Turn the display on or off, and map waveforms.



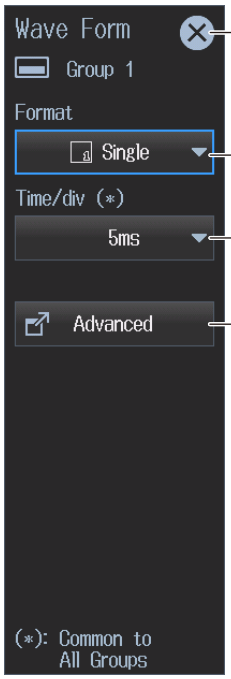
7. Tap the **Zoom/Position** tab. Set the vertical zoom factor and vertical position.



Setting the Display Format (Form)

Set the division of the waveform display screen and time scale (Time/div).

6. Tap **Form**. A Wave Form screen appears.



Closes the menu

Set the number of divisions of the waveform screen (Single, Dual, Triad, Quad, Hexa).

Set the time scale (0.01 ms to $\frac{\text{specified data update interval}^{1}}{10}$).

If you pinch in or pinched out on the Graph screen, the time scale setting changes stepwise according to the amount of pinching. The time scale after switching is shown highlighted for a few seconds in the group display area in the upper right of the Graph screen.

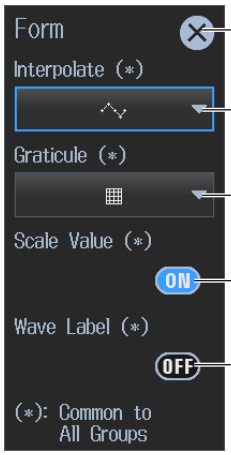
Configure the detailed settings of the waveform display.

1 For information on how to set the data update interval, see section 2.10.

Items that are marked with (*) are shared among all groups.

Advanced Waveform Display (Advanced)

7. Tap **Advanced**. A Form screen appears.



Closes the menu

Set the display interpolation (⋰⋱⋰ , ⋀⋁).

Set the grid (▦,□,⊞).

Set the scale value display (OFF, ON).

Set the waveform label display (OFF, ON).

Items that are marked with (*) are shared among all groups.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

6.3 Trend display

This instrument shows on the screen the trend graphs of the voltage, current, and the like applied to the input elements or wiring units.

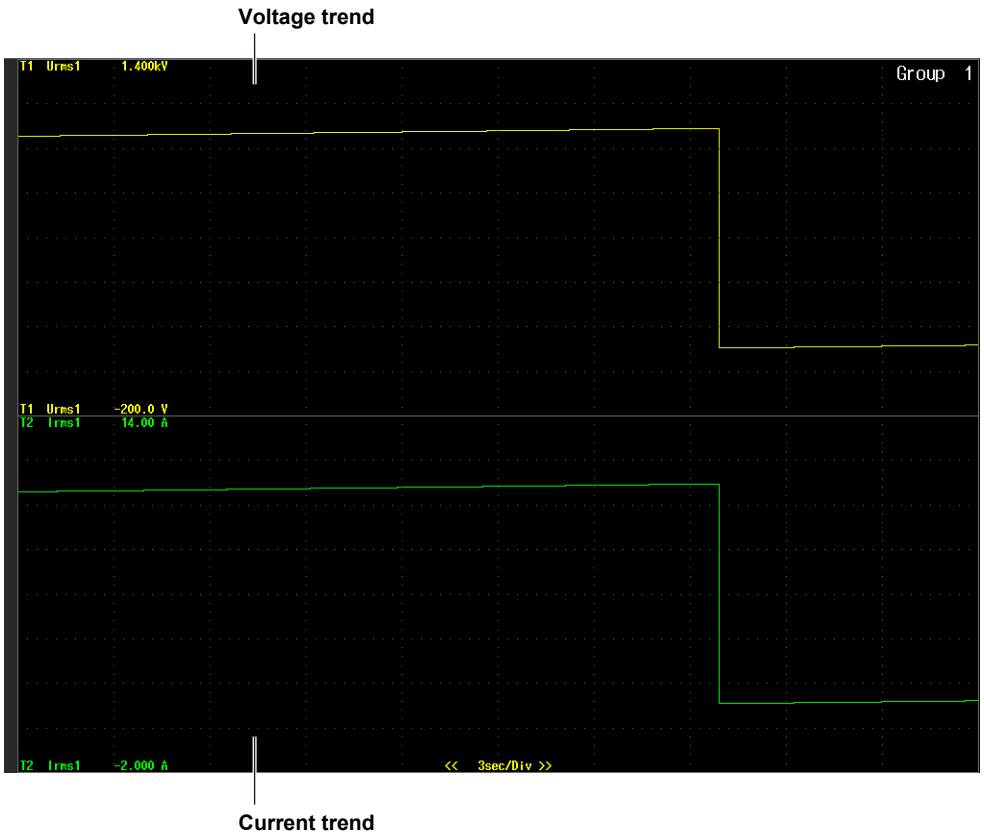
► “Trend Display (Trend)” in the features guide
► “Display Format (Form, Trend)” in the features guide
► “Display Items (Items, Trend)” in the features guide

Using an example, this section explains how to display measurement results with trend graphs.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Trend Display Screen (Example of group1 dual display)

Trend display of input element 1



Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 6.1.

Setting the Graph Display Type (Graph)

4. Tap **Graph** to select Trend.

Switching the Displayed Group (Group)

5. Tap **Group** to select a group from Group1 to Group4.

You can select up to four groups. The Item and Form settings, explained later, are applied to the group numbers you select in this step.

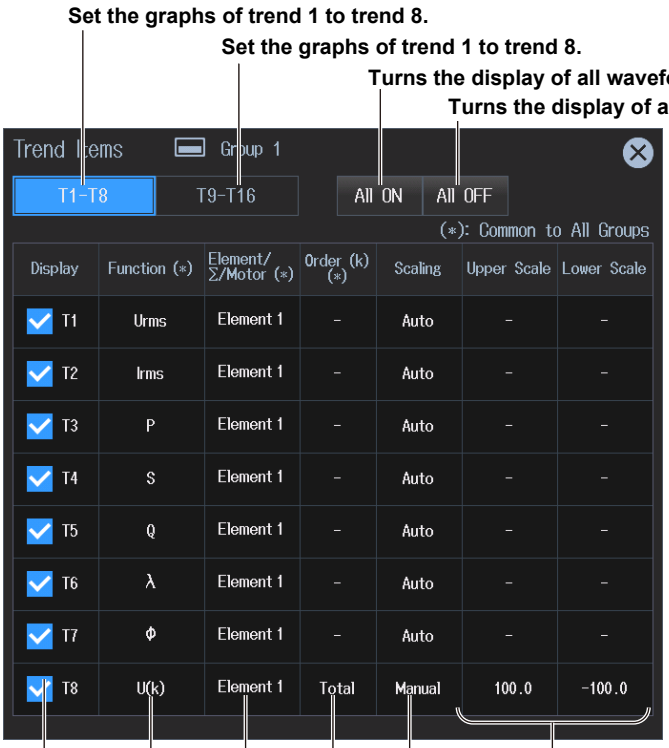
Switching the Display Group When Displaying Trends

Like the graph display, flick to switch the display group (see section 6.2).

Switching the Displayed Items (Items)

Select the voltages and currents of the input elements to be displayed with trends.

6. Tap **Items**. A Trend Items screen appears.



Set the graphs of trend 1 to trend 8.

Set the graphs of trend 1 to trend 8.

Turns the display of all waveforms on

Turns the display of all waveforms off

Items that are marked with (*) are shared among all groups.

Set the upper and lower limits (–9.999 T to 9.999 T).
These settings can be set when vertical scale mode is set to Manual.

Select the vertical scale's setup method (Auto, Manual).

Set the harmonic order (Total, 0 to 500).
You can set this setting when the measurement function includes a harmonic order.

Selects the input element or wiring unit to be configured
- Input element options
  When the displayed item is set to something other than motor evaluation: Element1 to Element7
  When the displayed item is set to motor evaluation: Motor1 to Motor4
- Wiring unit options: ΣA, ΣB, ΣC

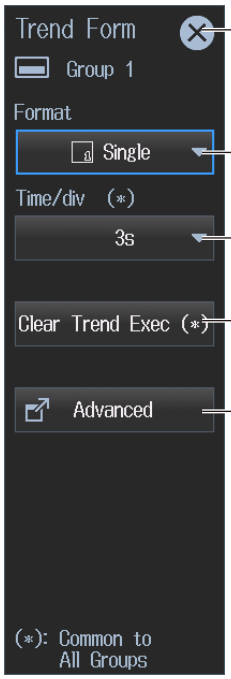
Set the measurement function (for details on the various measurement functions, see "Items That This Instrument Can Measure" in the features guide).

Select the trends that you want to display.

Setting the Display Format (Form)

Set the division of the trend display screen and time scale (Time/div).

6. Tap **Form**. A Trend Form screen appears.



Closes the menu

Set the number of divisions of the waveform screen (Single, Dual, Triad, Quad).

Set the time scale (3s, 6s, 10s, 30s, 1min, 3min, 6min, 10min, 30min, 1hour, 3hour, 6hour, 12hour, 1day).
Like the graph display, pinch in or pinch out to switch the time scale (see section 6.2).

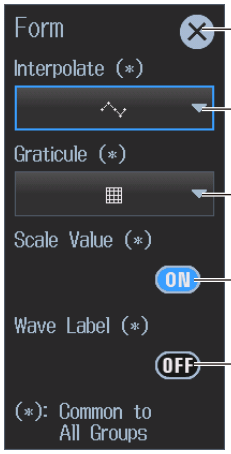
Restarts the trend

Configure the trend display's detailed settings.

Items that are marked with (*) are shared among all groups.

Advanced Waveform Display (Advanced)

7. Tap **Advanced**. A Form screen appears.



Closes the menu

Set the display interpolation (,).

Set the grid (, ,).

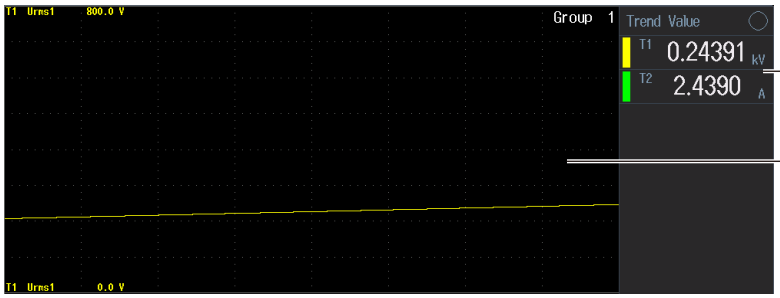
Set the scale value display (OFF, ON).

Set the waveform label display (OFF, ON).

Items that are marked with (*) are shared among all groups.

Displaying the Current Trend Values (Value)

6. Tap **Value**. The current value is displayed on the trend display.
Tapping Value again clears the Value display.



Value display

Trend screen

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

   By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

6.4 Bar Graph Display

This instrument shows on the screen the harmonic orders and magnitudes of the voltage, current, and the like applied to the input elements with bar graphs.

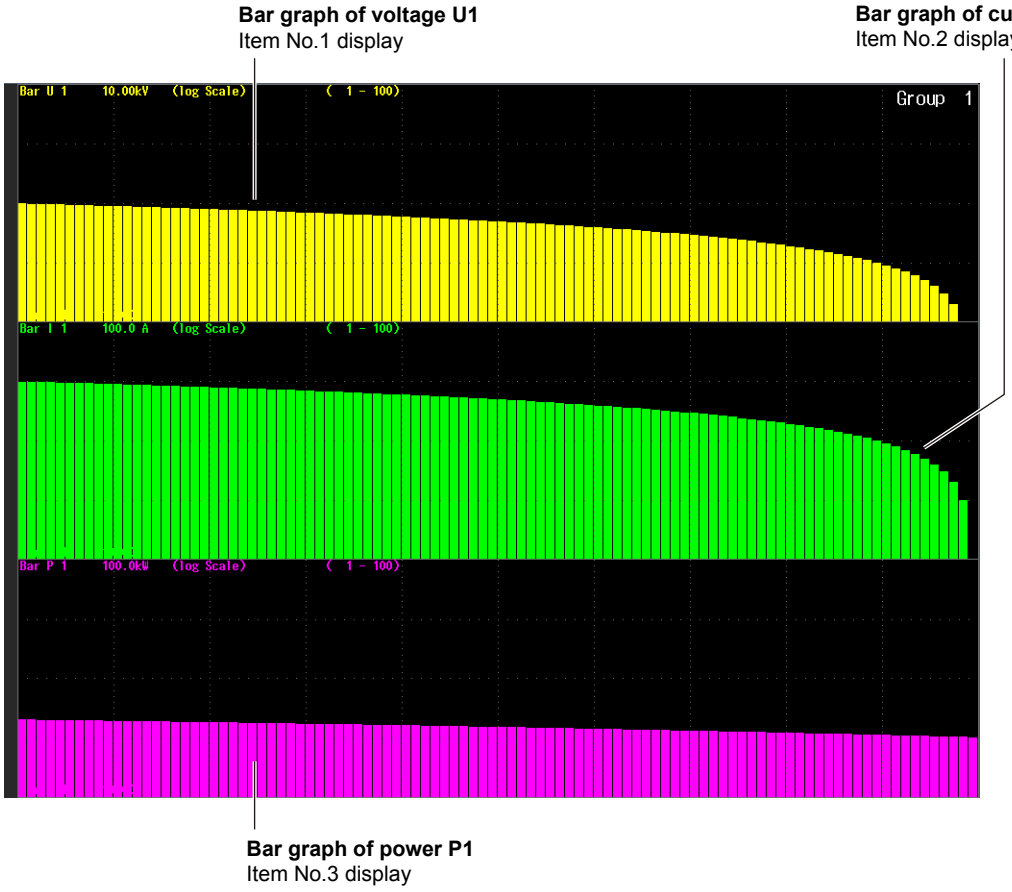
► “Bar Graph Display (Bar)” in the features guide
► “Display Format (Form, Bar)” in the features guide
► “Display Items (Items, Bar)” in the features guide

Using an example, this section explains how to display measurement results with bar graphs.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Bar Graph Display Screen (example of Group1 Triad display)

Bar graph display of input element 1



Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Display**.
   A display format setup screen (Numeric/Graph) appears. For details, see section 6.1.

Setting the Bar Graph Display Type (Graph)

4. Tap **Graph** to select Bar.

Switching the Displayed Group (Group)

5. Tap **Group** to select a group from Group1 to Group4.

You can select up to four groups. The Item and Form settings, explained later, are applied to the group numbers you select in this step.

Switching the Display Group When Displaying Bar Graphs

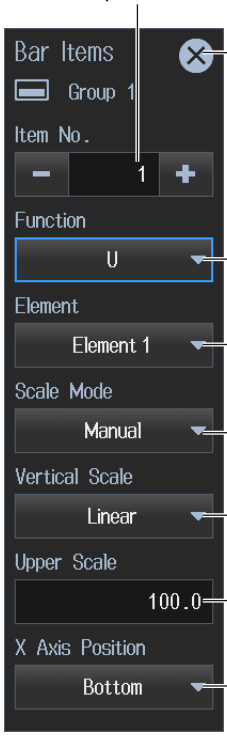
Like the graph display, flick to switch the display group (see section 6.2).

Switching the Displayed Items (Items)

Select the voltages and currents of the input elements to be displayed with bar graphs.

6. Tap **Items**. The following screen appears.

Select the displayed item number.
The number increases from top to bottom on the bar graph screen. To show the No.2 and No.3 item numbers on the bar graph display, set the screen division to Dual or triad in the display format settings explained later.



Closes the menu

Set the displayed item.
You can set the following items for displaying measurement functions.
U (harmonic voltage), **I** (harmonic current), **P** (harmonic active power),
S (harmonic apparent power), **Q** (harmonic reactive power),
λ (harmonic power factor),
Φ (phase difference between harmonic voltage and harmonic current),
ΦU (phase difference between each harmonic voltage and the fundamental wave),
ΦI (phase difference between each harmonic current and the fundamental wave),
Z (load circuit impedance), **Rs** (load circuit series resistance),
Xs (load circuit series reactance), **Rp** (load circuit parallel resistance),
Xp (load circuit parallel reactance)

Input element to be configured (Element1 to Element7)

Select the vertical scale's setup method (Fixed, Manual).

Set the vertical scale type (Linear, Log).
This soft key is displayed when you set the vertical scale mode to Manual.

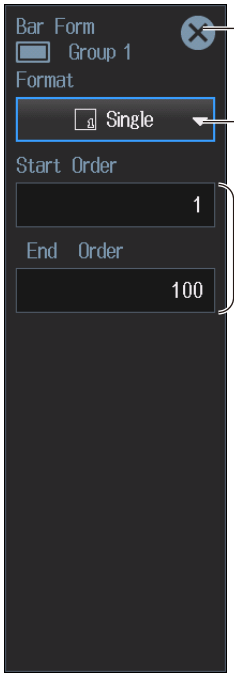
Set the upper limit (0 to 9.999 T).
This soft key is displayed when you set the vertical scale mode to Manual.

Set the X-axis position (Bottom, Center).
This soft key is displayed when you set Scale Mode to Manual and Vertical Scale to Linear.

Setting the Display Format (Form)

Set the divisions of the bar graph screen and the range of harmonic orders to display (Start Order, End Order).

6. Tap **Form**. A Bar Form screen appears.



Closes the menu

Set the number of divisions on the bar graph screen (Single, Dual, Triad).

Set the bar graph display range.
• The display’ s starting harmonic order (0 to 490)
• The display’ s ending harmonic order (10 to 500)
You can set the range to any value provided that the end harmonic order is larger than the start harmonic order by 10 or more.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

6.5 Vector Display

This instrument shows on the vector screen the phase difference and the magnitude relationship between fundamental waves and harmonic waves of the voltage, current, and the like applied to wiring units.

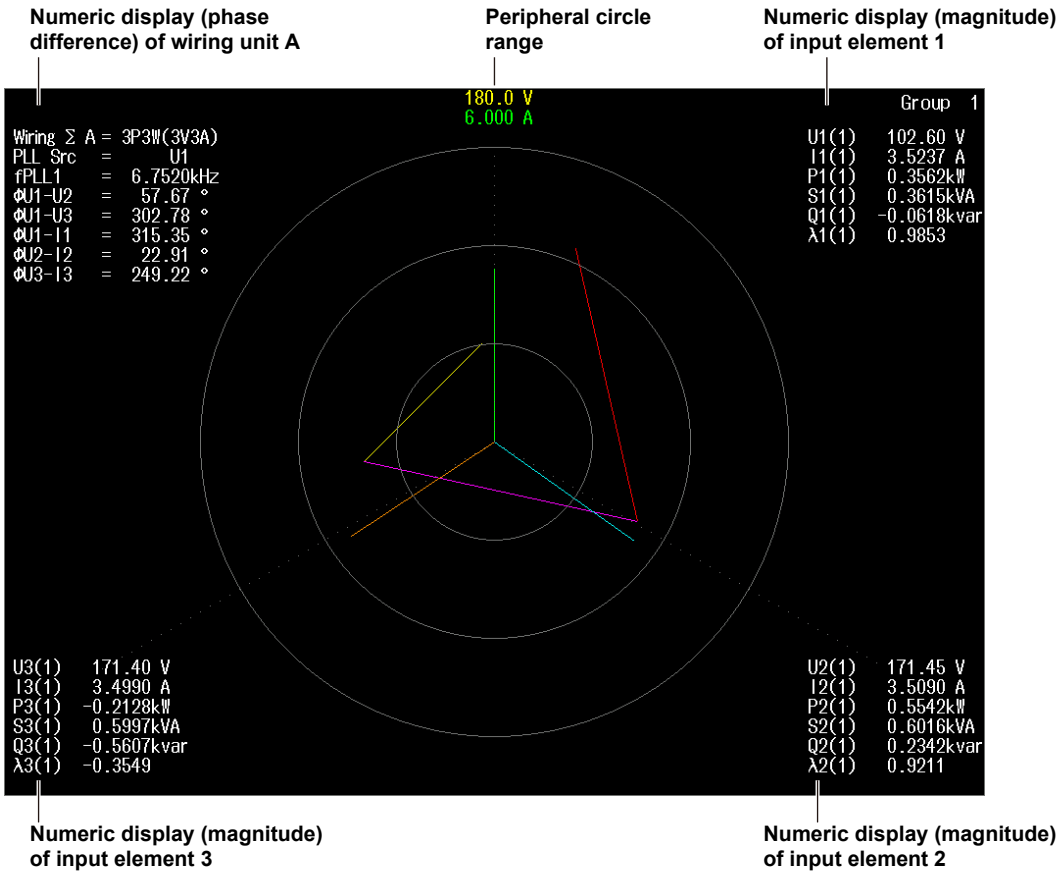
► “Vector Display (Vector)” in the features guide
► “Display Format (Form, Vector)” in the features guide
► “Display Items (Items, Vector)” in the features guide

Using an example, this section explains how to display measurement results with vectors.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Vector Display Screen (example of Group1 ΣA display)

Vector display of wiring unit A



Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Display**.
   A display format setup screen (Numeric/Graph) appears. For details, see section 6.1.

Setting the Graph Display Type (Graph)

4. Tap **Graph** to select Vector.

Switching the Displayed Page (Group)

5. Tap **Group** to select a group from Group1 to Group4.

You can select up to four groups. The Item and Form settings, explained later, are applied to the group numbers you select in this step.

Switching the Display Group When Displaying Vectors

Like the graph display, flick to switch the display group (see section 6.2).

Switching the Displayed Items (Items)

Select the input element or wiring unit to display the vectors of.

6. Tap **Items**. A Vector Items screen appears.

Closes the menu

Set the element and wiring unit (Element 1-Element 7, ΣA-ΣC).

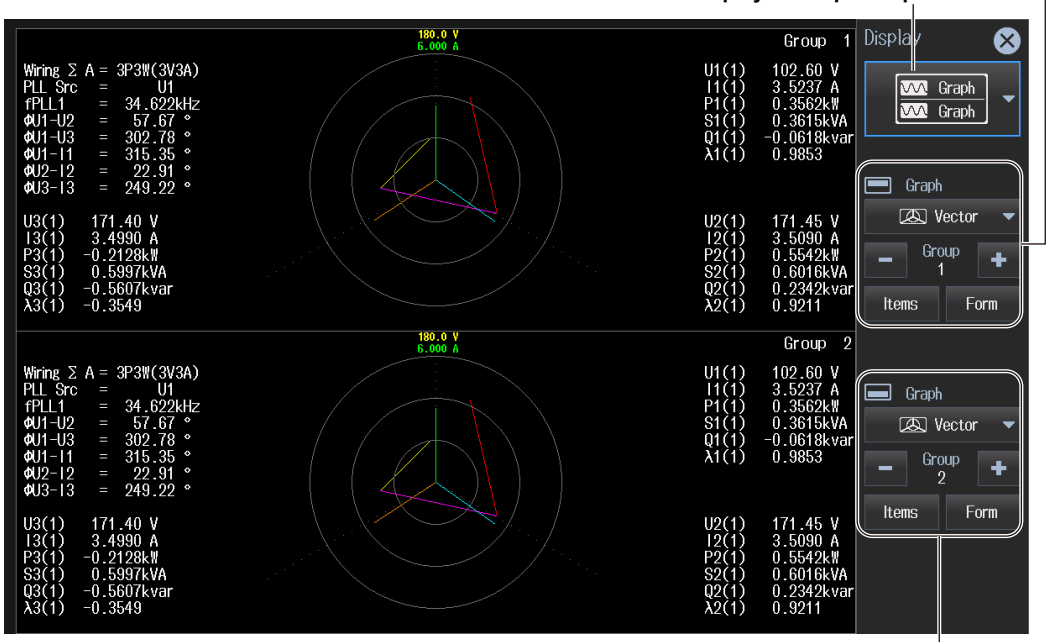
Set the zoom factor (0.100 to 100,000).
Set the zoom factor of fundamental wave U(1) or I(1).
The value that indicates the size of the vector display' s peripheral circle changes according to the zoom factor, and the size of the vectors that indicate U (1) and I (1) change accordingly as well.

Example of a Vector Split Display

Select Graph/Graph according to “Setting the Screen Display” in section 6.1. On the split display, only the vectors of Item No.1 are displayed, so select the vectors to show in the second screen according to the group settings described earlier. If you select single screen display for Graph in “Setting the Screen Display” in section 6.1, you can also show the same split display by performing the procedure in “Setting the Display Format (Form)” described below.

Set Graph of Group1 to Vector.
Example of Item No. set to 1 and Object set to ΣA
(see “Switching the Displayed Items (Items)” on the previous page)

Set the display to Graph/Graph.

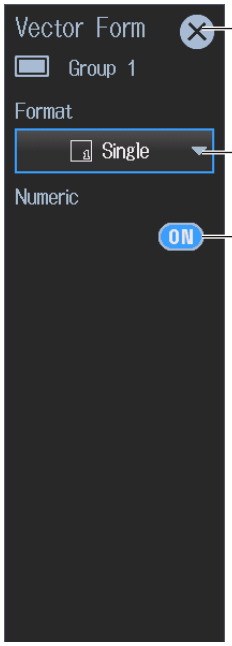


Set Graph of Group2 to Vector.
Example of Item No. set to 1 and Object set to ΣB
(see “Switching the Displayed Items (Items)” on the previous page)

Setting the Display Format (Form)

Set whether to show numeric data on the Graph screen.

6. Tap **Form**. A Vector Form screen appears.



Closes the menu

Set the number of divisions on the vector screen (Single, Dual).

Set the numeric data display (OFF, ON).

To divide the vector screen, in “Switching the Displayed Items (Items)” on page 6-15, set the object each Item No. to the item you want to show.

Setup example

Set this to 1. **Set this to 2.**

Set this to ΣA. **Set this to ΣB.**

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

   By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

7.1 Setting the Storage Operation

► “Data Storage (Store, MENU (STORE))” in the features guide
► “Storage Control” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

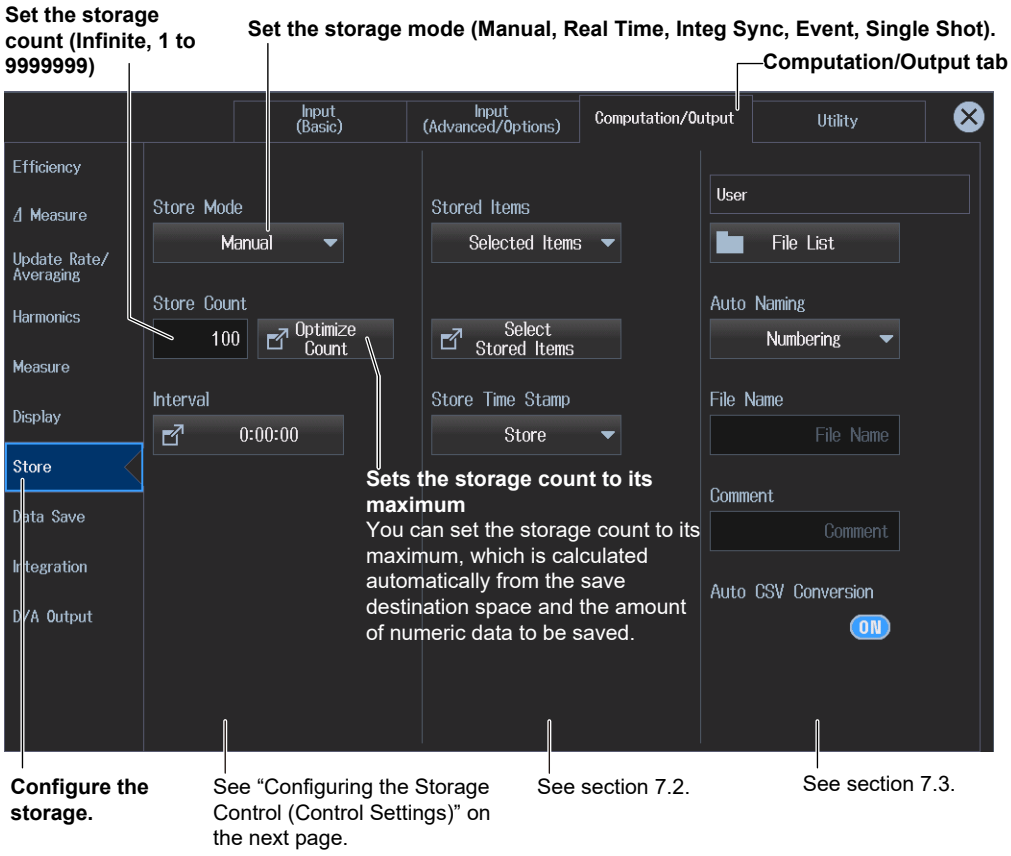
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Configuring the Storage (Store)

3. Tap **Store**.

   A Store screen appears.



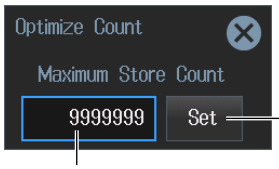
Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Setting the Maximum Storage Count

Tap **Optimize Count**, which is used to set the maximum storage count. An Optimize Count screen appears.

Confirms and optimizes the maximum storage count



Sets the storage count
The storage count is set to the maximum storage count displayed to the left.

Maximum storage count (0-the maximum number of times that data can be stored to the save destination)
If the save destination is set to a USB memory device (drive) and you remove it, the save destination automatically changes to internal memory. If you close this screen, tap Optimize Count, and reopen this screen, the maximum storage count is changed to a value determined from the free space of the internal memory.

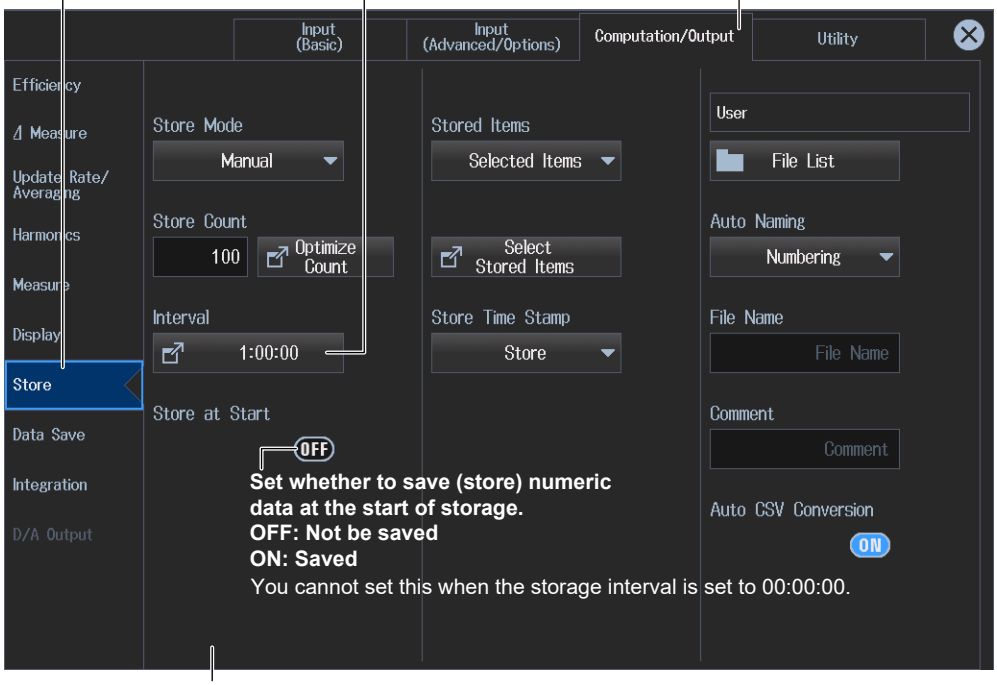
Note

The maximum number of times that storage can be performed depends on the number of stored items that you have set and the free space at the save destination.
For details on how to set the stored items, see section 7.2. For details on how to set the save destination, see section 7.3.

Setting the Storage Control

- **When the Storage Mode Is Manual**

Set the storage interval (00 hours : 00 minutes : 00 seconds-99 hours : 59 minutes : 59 seconds).
Configure the storage.
Computation/Output tab

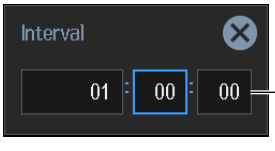


Set whether to save (store) numeric data at the start of storage.
OFF: Not be saved
ON: Saved
You cannot set this when the storage interval is set to 00:00:00.

Storage control setup screen (when the storage mode is Manual)

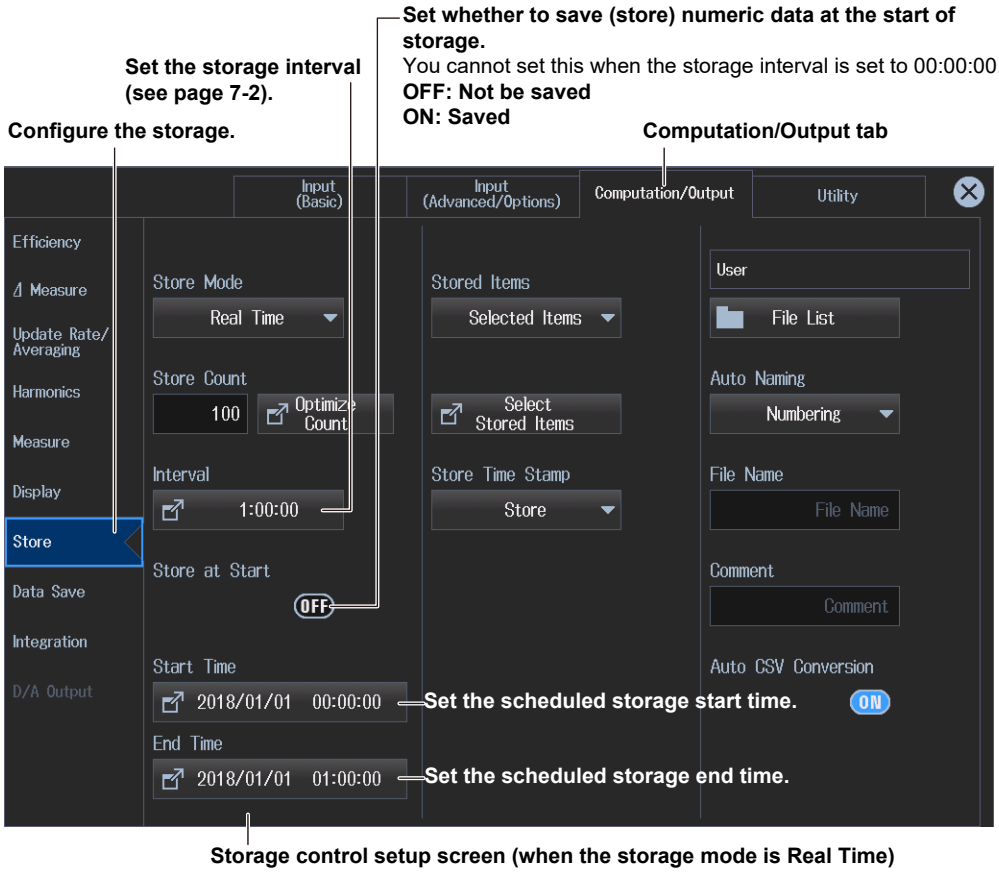
Setting the Storage Interval

Tap **Interval**. An Interval screen appears.



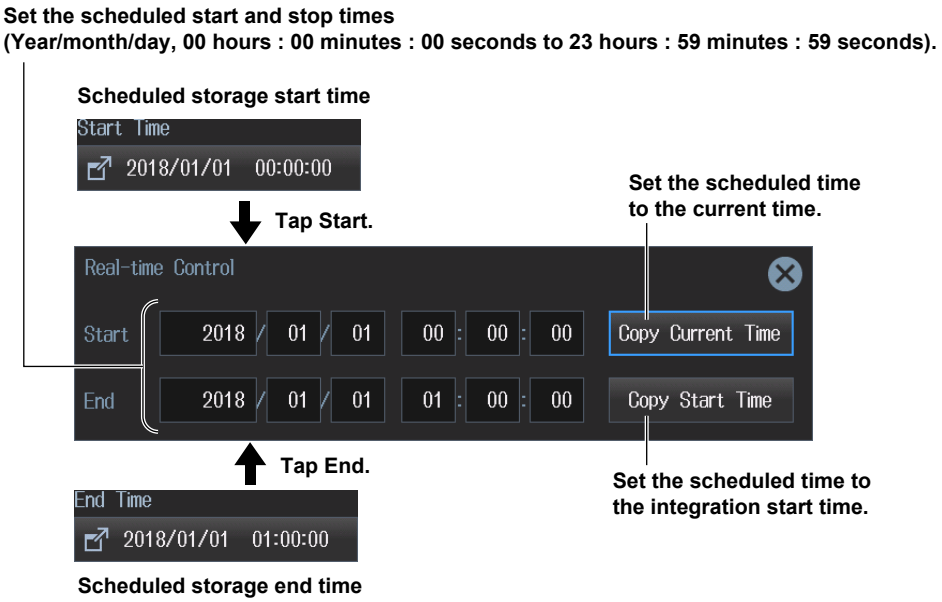
Set the storage interval (00 hours : 00 minutes : 00 seconds-99 hours : 59 minutes : 59 seconds).

- **When the Storage Mode Is Real Time**

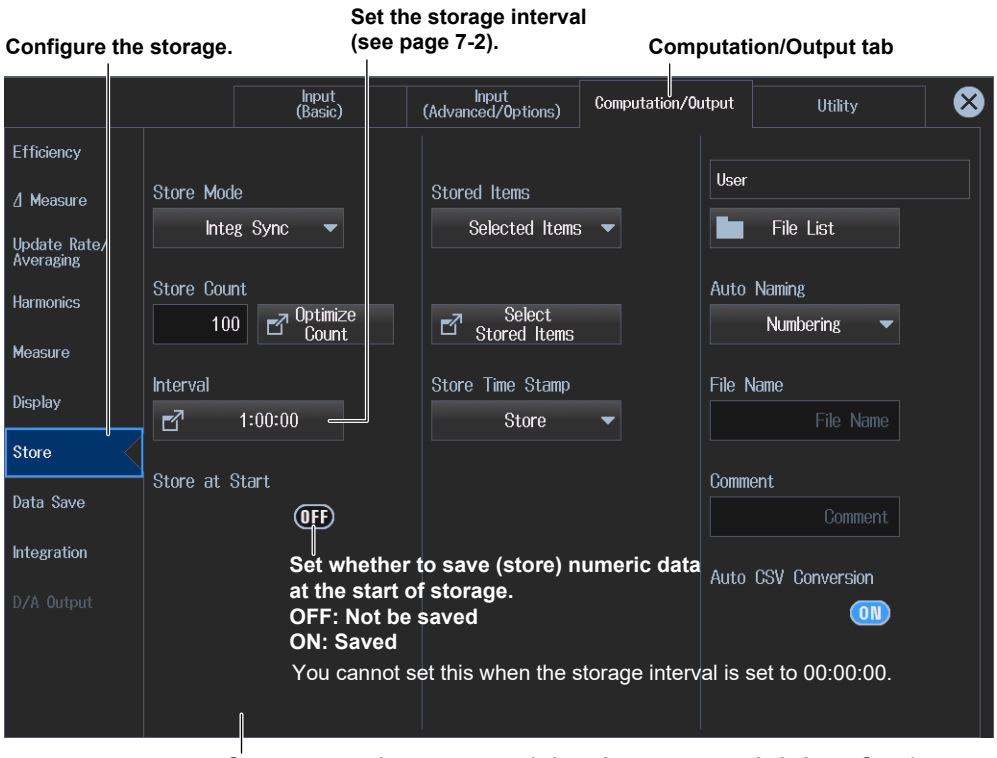


Setting the Scheduled Start Time

Tap **Start Time** or **End Time**. A Real-time Control screen appears.

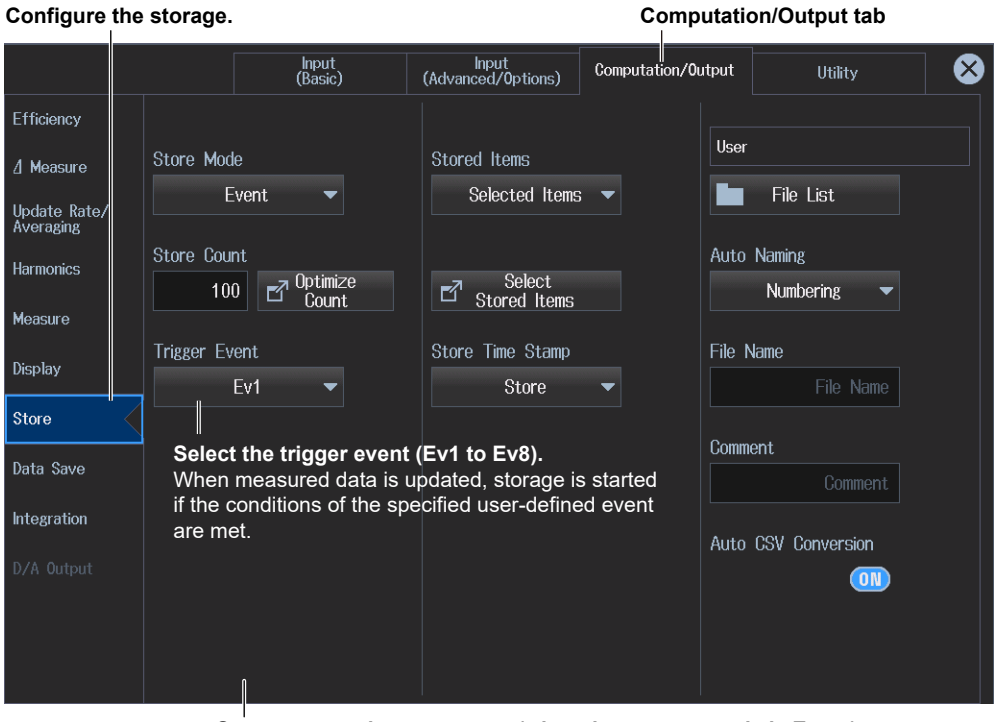


- **When the Storage Mode Is Integ Sync (integration synchronization)**



Storage control setup screen (when the storage mode is Integ Sync)

- **When the Storage Mode Is Event**



Storage control setup screen (when the storage mode is Event)

Note

When the storage mode is set to Single Shot, there are no storage control settings.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the storage.

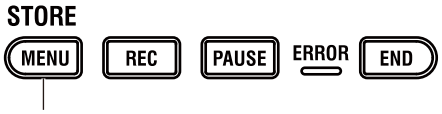
1. Tap the **Store Data Save** menu icon . A Store-Save menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Store/Data Save menu, see page xi.

Procedure Using Keys

You can also use the front panel keys to set storage.



Configure the storage.
The Setup menu appears.

7.2 Setting Stored Items

► “Stored Items” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

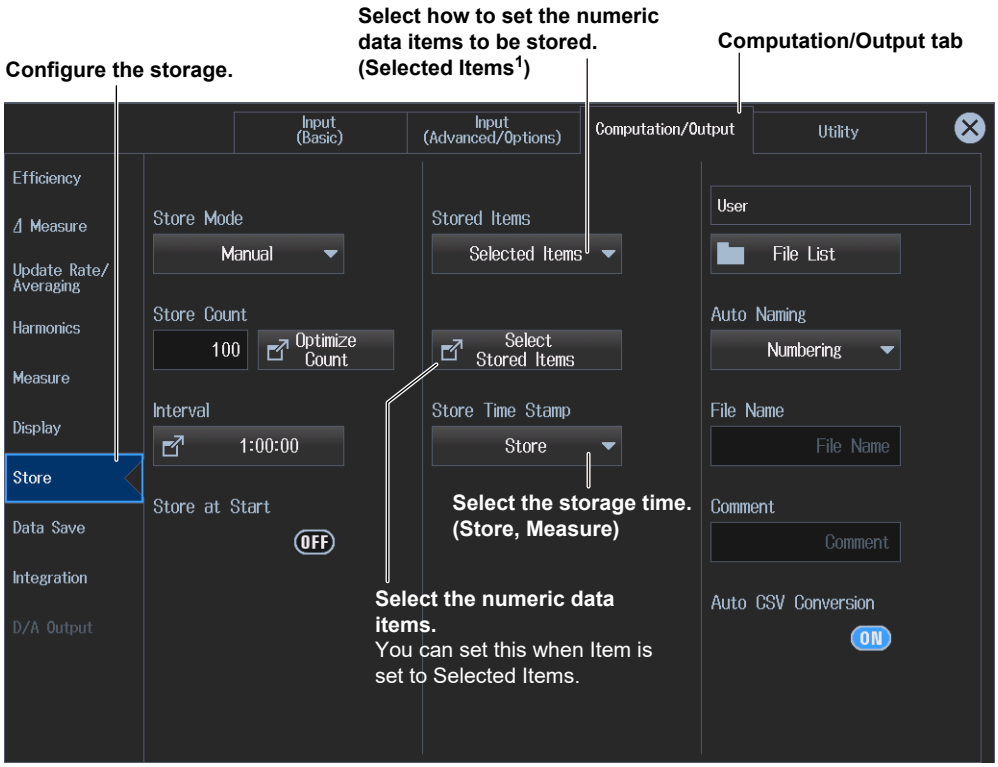
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Configuring the Storage (Store)

3. Tap **Store**.

   A storage setup screen appears.



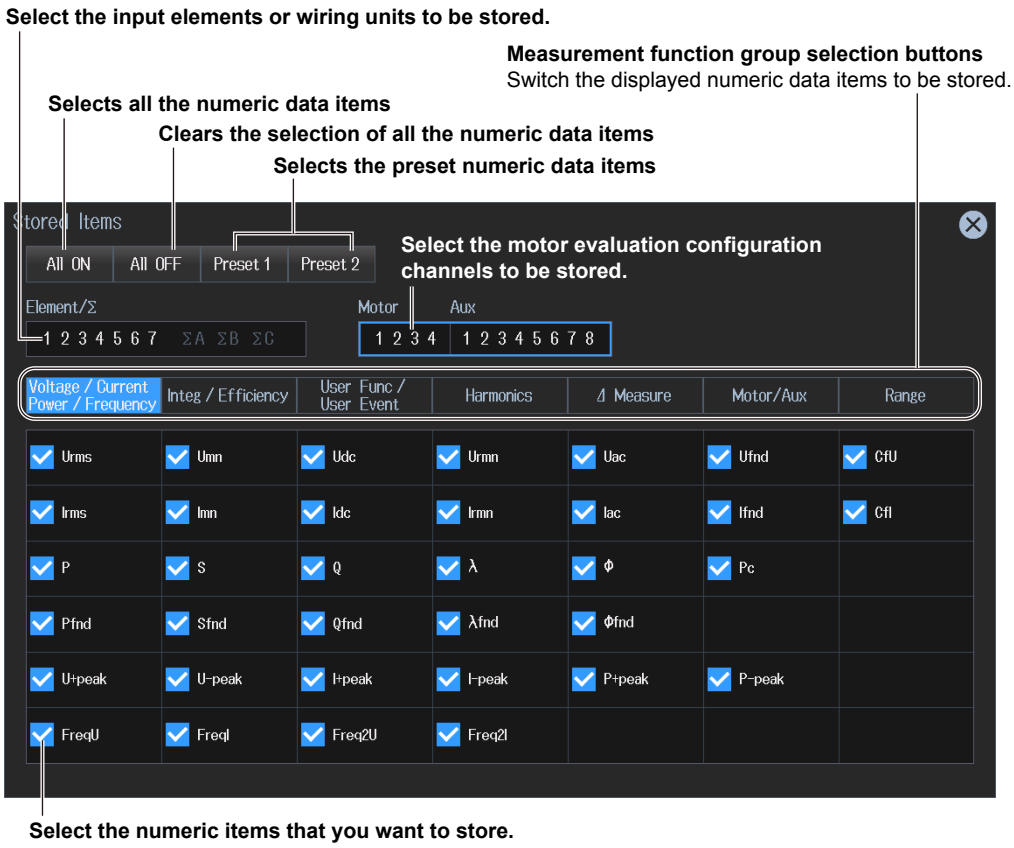
1 The selected numeric data items are stored.

Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Selecting the Numeric Data Items (Selected Stored Items)

Tap **Selected Stored Items** for selecting the numeric data items. A Stored Items screen appears.



Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the storage.

1. Tap the **Store Data Save** menu icon . A Store-Save menu appears in the sub menu area on the right side of the screen.

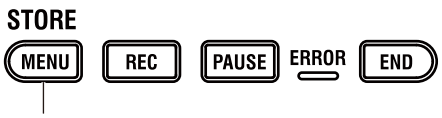
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Store/Data Save menu, see page xi.

Procedure Using Keys

You can also use the front panel keys to set storage.



Configure the storage.
The Setup menu appears.

7.3 Setting the Data Storage Destination

► “File Save Conditions” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

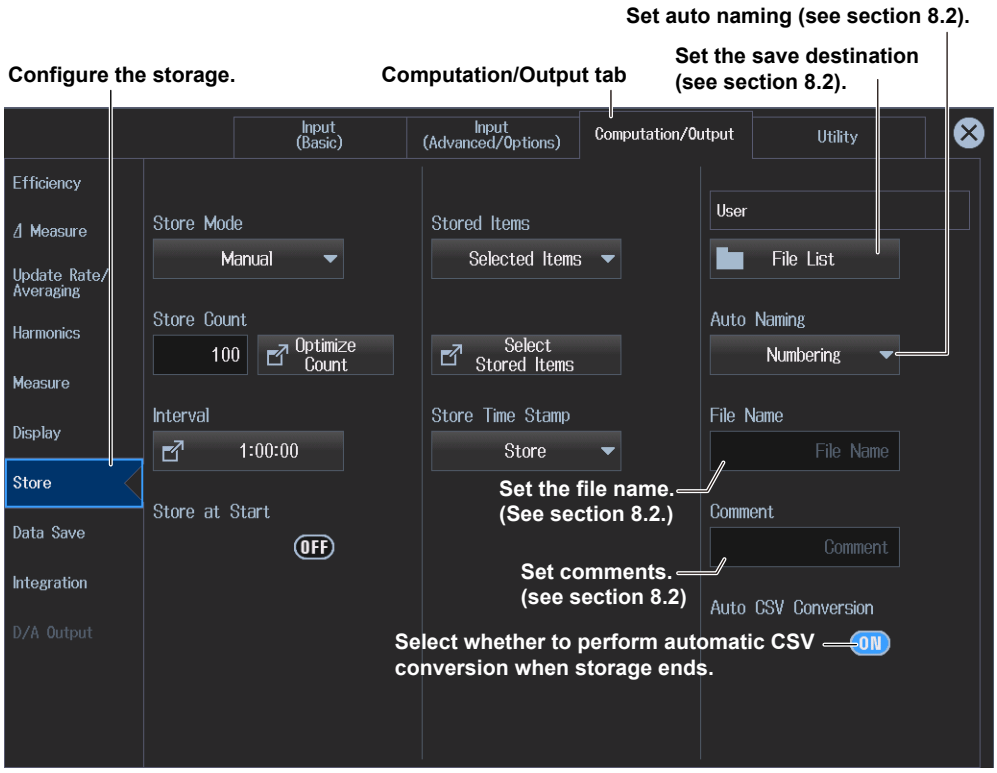
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Configuring the Storage (Store)

3. Tap **Store**.

   A storage setup screen appears.



Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set the storage.

1. Tap the **Store/Data Save** menu icon . A Store/Data Save menu appears in the sub menu area on the right side of the screen.

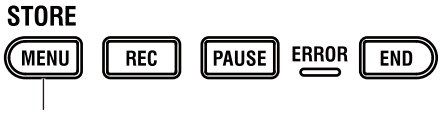
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Store/Data Save menu, see page xi.

Procedure Using Keys

You can also use the front panel keys to set storage.



Configure the storage.
The Setup menu appears.

7.4 Starting (Rec), Pausing (Pause), and Ending (End) Storage

► “Starting, Pausing, and Ending Storage Recording” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

CAUTION

During storage, the storage device is constantly being accessed, even though the icon that indicates this is not displayed. Do not remove the USB memory device or turn the power off. Doing so may damage the storage device or corrupt its data.

Storage in progress: While the REC key or PAUSE key is illuminated

French

ATTENTION

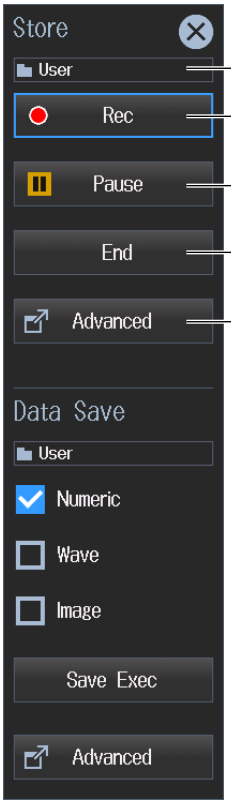
Pendant la collecte, le système a constamment accès au support de stockage, même si l’icône qui l’indique n’est pas affichée. Ne retirez pas le support de stockage USB et ne coupez pas l’alimentation. Vous risqueriez d’endommager le support de stockage ou les données qu’il contient.

Le stockage est en cours quand la touche STORE START est éclairée ou quand elle clignote, ou bien quand la touche STORE STOP clignote.

Procedure Using the Menu Icons

1. Tap the **Store/Data Save** menu icon . A Store/Data Save menu appears in the sub menu area on the right side of the screen.

Store/Data Save menu



Store destination path

Starts the storage operation
The instrument starts storage using the storage mode that you have specified (see section 7.1).

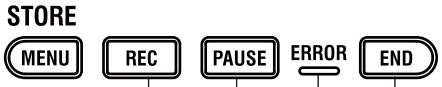
Pauses the storage operation.
Storage is temporarily stopped. Tap REC to resume storage.

Ends the storage operation
Storage stops, and the storage state is reset. Writing the stored data to the file is completed, and the file is closed.

Configure storage (see sections 7.1 to 7.3).

Procedure Using Keys

You can also use the front panel keys to start, pause, and end storage.



Ends storage
The storage state is reset.

ERROR indicator
Blinks when storage error occurs. In this situation, an error message appears at the top of the screen. For more information about how to handle error messages, see appendix 1.

Pauses storage
The PAUSE LED blinks, and the storage operation is paused.

Starts storage
The REC LED illuminates, and the storage operation starts.

8.1 Connecting a USB Memory Device

This section explains how to connect USB memory devices to save and load data.

If you want to use a storage device on your network (a network drive), you have to use an Ethernet cable to connect the instrument to the network. For details, see section 15.5.

► “Storage Device” in the features guide

CAUTION

- Do not remove the USB storage device or turn off the power when the device is being accessed. Doing so may damage the storage device or corrupt its data.
- When the USB memory device is being accessed, an access indicator is displayed in the top center the screen and the USB memory device indicator blinks.

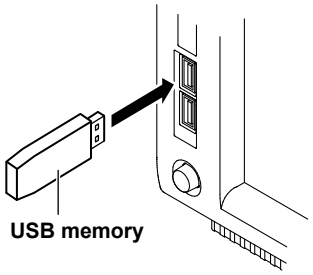
French

ATTENTION

- Lorsque le dispositif accède au support de stockage USB, ne retirez pas ce dernier et ne mettez pas l’alimentation hors tension. Vous risqueriez d’endommager le support de stockage ou les données qu’il contient.
- Quand le système accède au support de stockage USB, s’affiche au centre, dans la partie supérieure de l’écran, et le voyant du support de stockage USB clignote.

USB Memory Devices That Can Be Used and How to Connect USB Memory Devices

Use portable USB memory devices that are compatible with USB Mass Storage Class version 1.1.
Connect USB memory devices directly to the USB ports (type A) for connecting peripheral devices on the instrument's front panel.
Hot-plugging is supported: you can connect or disconnect the USB device at any time, regardless of whether the instrument is on or off. When the power is on, the instrument automatically detects the USB memory device after it is connected.
This instrument has two USB ports: USB-0 and USB-1. The port numbers are not fixed. The port at which the first USB memory device is detected becomes USB-0. The port at which the second USB memory device is detected becomes USB-1.



Note

- Connect USB memory devices directly to the USB ports (type A) for connecting peripheral devices. Do not connect them through a hub.
- Use portable USB memory devices that are compatible with USB Mass Storage Class version 1.1. Do not connect incompatible USB memory devices.
- You cannot use protected USB memory devices (such as those that contain encrypted content).
- Do not connect and disconnect the two USB devices repetitively. Provide at least a 10-second interval between removal and connection.

General USB Memory Handling Precautions

Follow the general handling precautions that are included with your USB memory.

8.2 Setting the Save Destination for Numeric Data, Waveform Data, and Screen Images

► "File Save Conditions" in the features guide
► "Conditions for Saving Numeric Data" in the features guide
► "Conditions for Saving Screen Images" in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

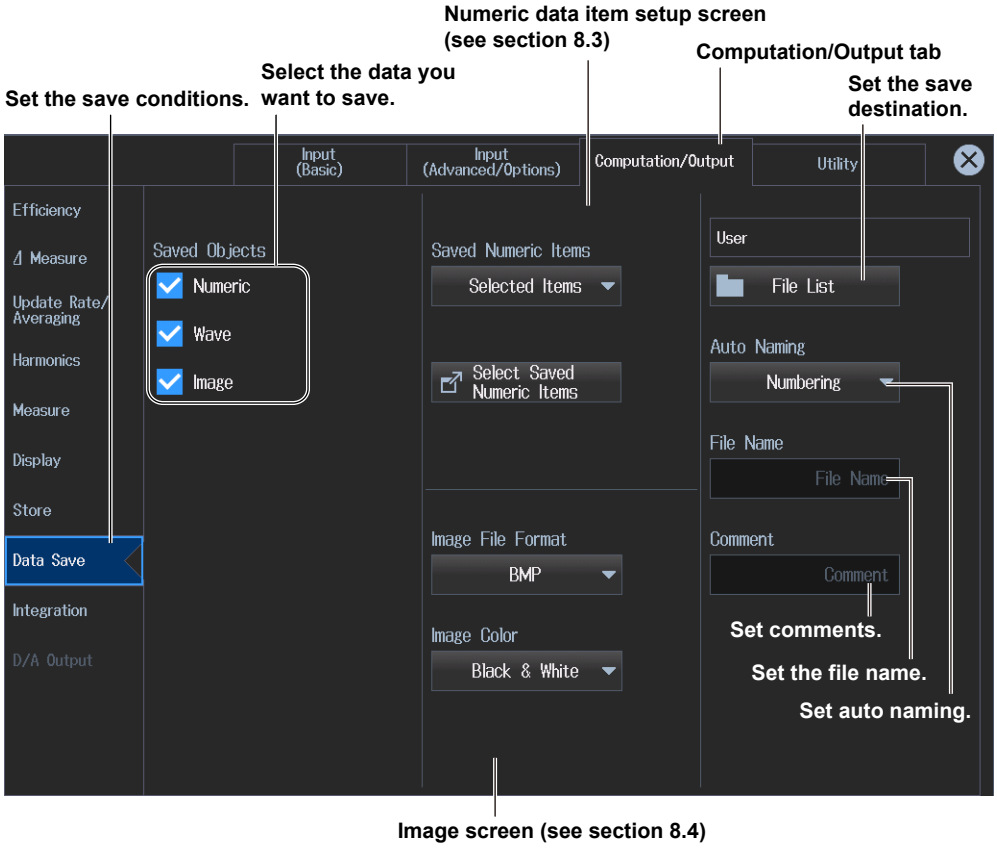
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Save Conditions (Data Save)

3. Tap **Data Save**.

   An save condition setup screen appears.

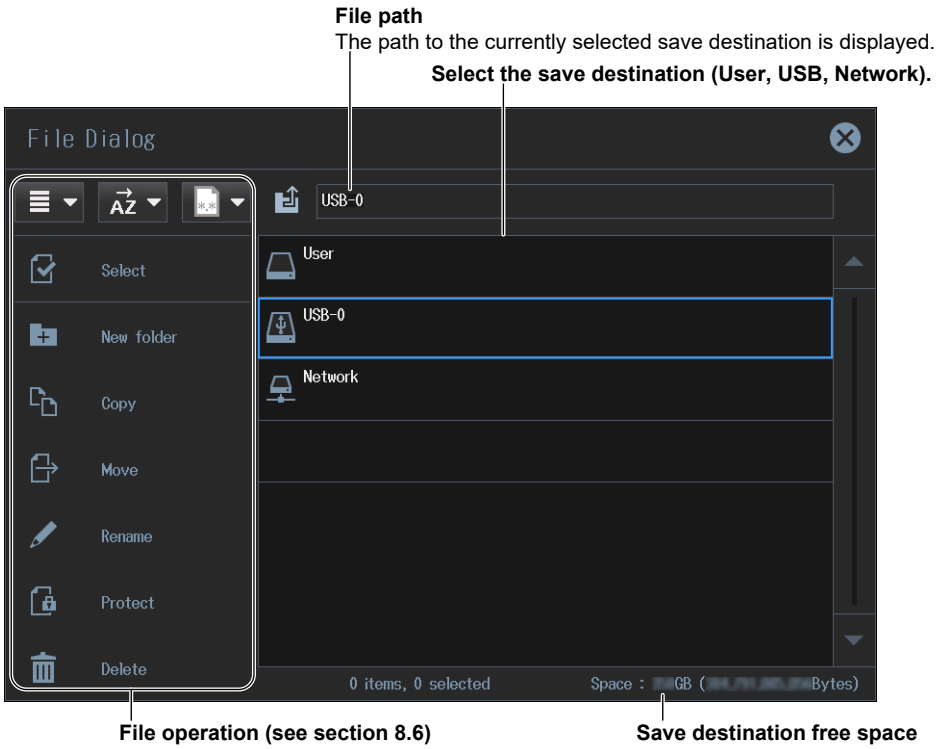


Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Setting the Save Destination

4. Tap **File List**. A file list appears.



Setting Auto Naming (Auto Naming)

OFF: The auto naming feature is disabled. The name that you specified for the File Name setting is used. If there is a file with the same name in the save destination folder, you cannot save the data.

Numbering: The instrument automatically adds a four-digit number from 0000 to 0999 after the common name that you specified for the File Name setting and saves the file.

Date: The file name is the date and time (down to seconds) when the file is saved. The file name that you specified for the File Name setting is ignored.

20170930_121530_0 **(2017/09/30 12:15:30)**

Y M D H Min S The sequence number (0-9, A-Z) that is appended if a file name with the exact same date and time (down to seconds) exists.

The sequence number that comes after the date and time is appended if a file name with the exact same date and time (down to seconds) exists.

The sequence number is incremented by one (0 to 9 and then A to Z) each time a file is added.

Assigning File Names (File Name)

You can set the file name that is used when Auto Naming is set to OFF. This is also used as the common file name when Auto Naming is set to Numbering. The maximum number of characters that you can use for file names and folder names is 32 characters. However, there are limitations on the type of characters and the character strings that you can use.

For instructions on how to enter text, see section 3.3 in the *Getting Started Guide*, IM WT5000-03EN.

Setting a Comment (Comment)

You can add a comment that consists of up to 30 characters when you save a file. You do not have to enter a comment.

All characters, including spaces, can be used in comments.

For instructions on how to enter text, see section 3.3 in the *Getting Started Guide*, IM WT5000-03EN.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set data saving.

1. Tap the **Store/Data Save** menu icon

. A Store/Data Save menu appears in the sub menu area on the right side of the screen.

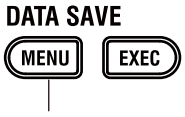
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Store/Data Save menu, see page xi.

Procedure Using Keys

You can also use the front panel keys to set data saving.



Set the save destination.
The Setup menu appears.

8.3 Setting the Numeric Data Items to Save

► “Saved Numeric Items (Saved Numeric Items)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

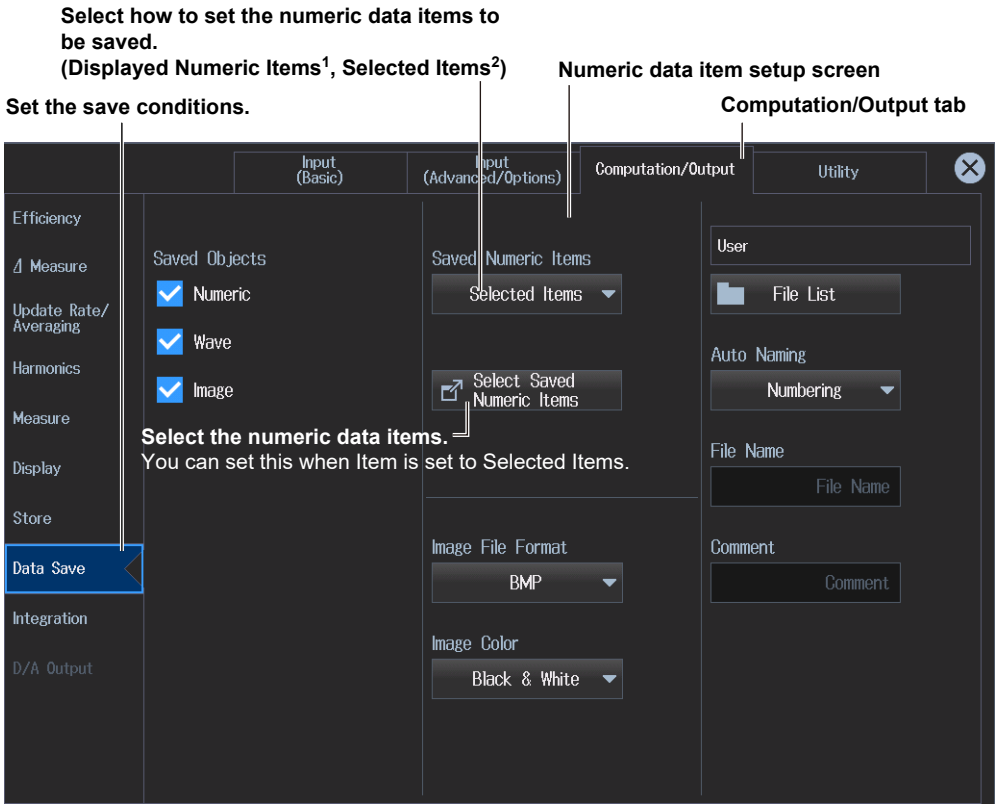
1. Tap the **Setup** icon

, or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Save Conditions (Data Save)

3. Tap **Data Save**.

   An save condition setup screen appears.



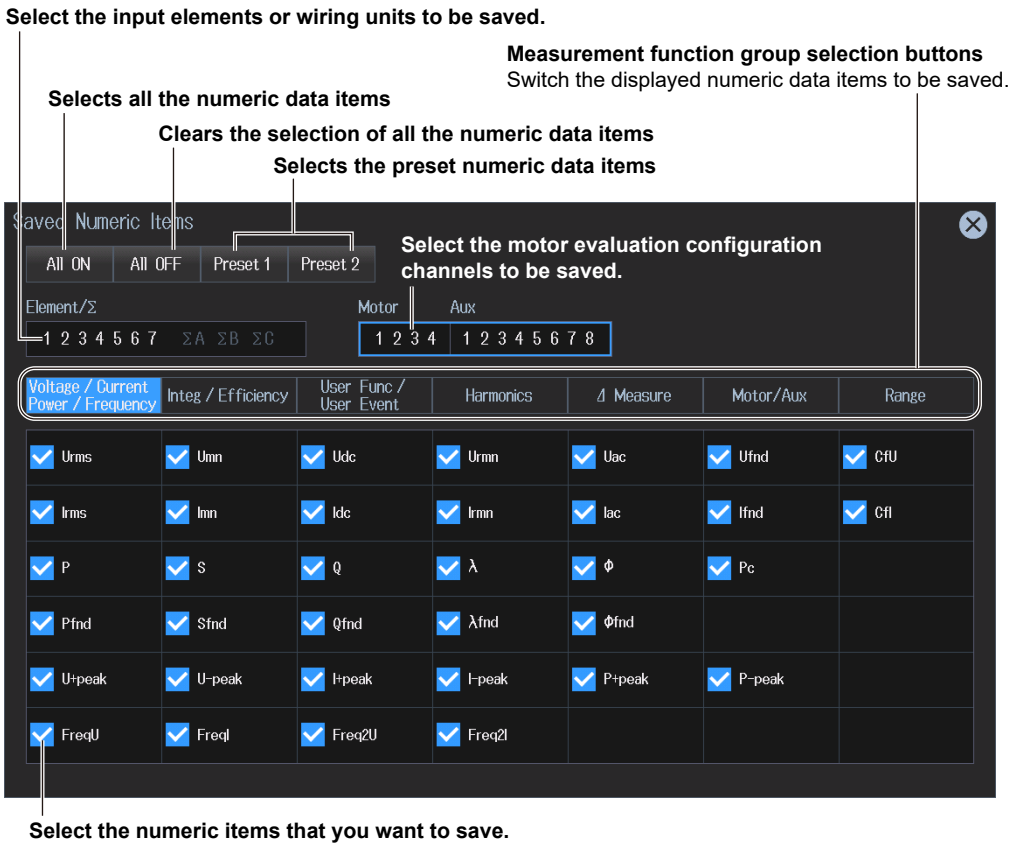
1 The numeric data items shown on the screen are saved.
2 The selected numeric data items are saved.

Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Selecting Numeric Data Items (Select Saved Numeric Items)

Tap **Select Saved Numeric Items** for selecting the numeric data items. A Saved Numeric Items screen appears.



Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set numeric data saving.

1. Tap the **Store/Data Save** menu icon . A Store/Data Save menu appears in the sub menu area on the right side of the screen.

   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Store/Data Save menu, see page xi.

Procedure Using Keys

You can also use the front panel keys to set numeric data saving.

Set the save destination.
The Setup menu appears.

8.4 Setting the Format of Saved Screen Images

► “Conditions for Saving Screen Images” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

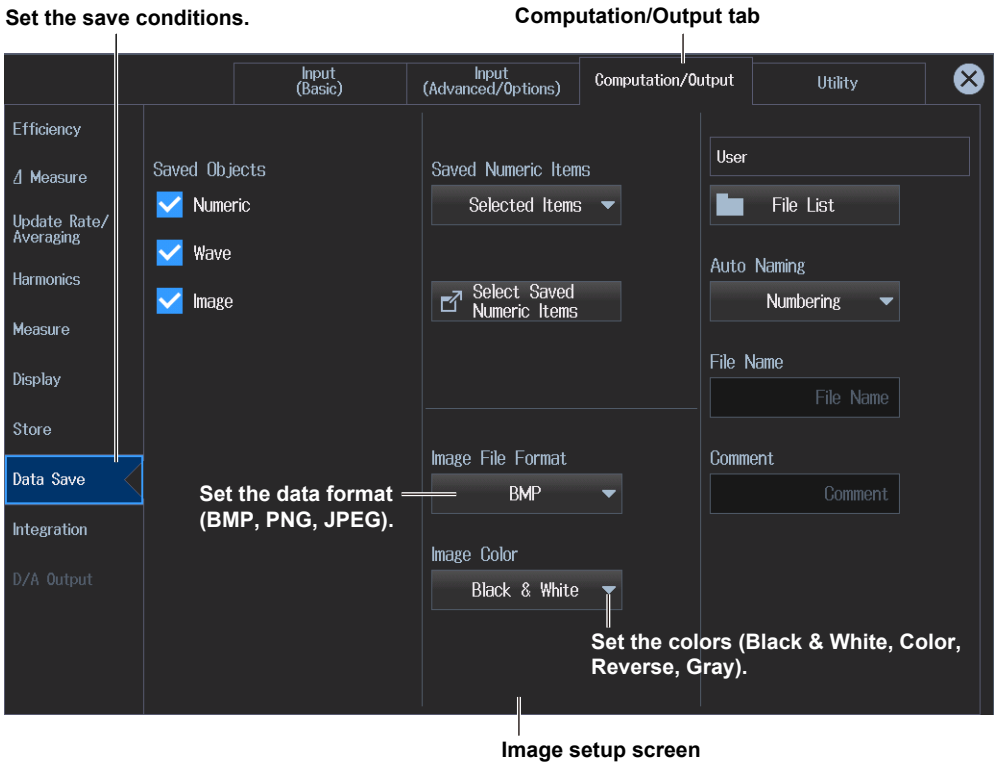
Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Save Conditions (Data Save)

3. Tap **Data Save**.

   An save condition setup screen appears.



Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to set screen image saving.

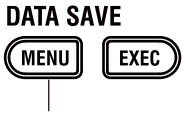
1. Tap the **Store/Data Save** menu icon . A Store/Data Save menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Store/Data Save menu, see page xi.

Procedure Using Keys

You can also use the front panel keys to set screen image saving.



Set the save destination.
The Setup menu appears.

8.5 Saving Numeric Data, Waveform Data, and Screen Images

► “Conditions for Saving Numeric Data” in the features guide
► “Conditions for Saving Screen Images” in the features guide
► “Saving (Save Exec, EXEC)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

CAUTION

While data is being save, the storage device is constantly being accessed, even though the icon that indicates this is not displayed. Do not remove the USB memory device or turn the power off. Doing so may damage the storage device or corrupt its data.

French

ATTENTION

Pendant la collecte, le système a constamment accès au support de stockage, même si l’icône qui l’indique n’est pas affichée. Ne retirez pas le support de stockage USB et ne coupez pas l’alimentation. Vous risqueriez d’endommager le support de stockage ou les données qu’il contient.

Procedure Using the Menu Icons

1. Tap the **Store/Data Save** menu icon . A Store/Data Save menu appears in the sub menu area on the right side of the screen.

Store-Save menu

Save destination path

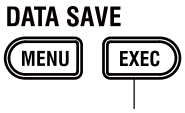
Select the data you want to save.
Selected data types will be saved.

Starts saving

Configure data saving (see sections 8.2 to 8.4).

Procedure Using Keys

You can also use the front panel keys to save data.



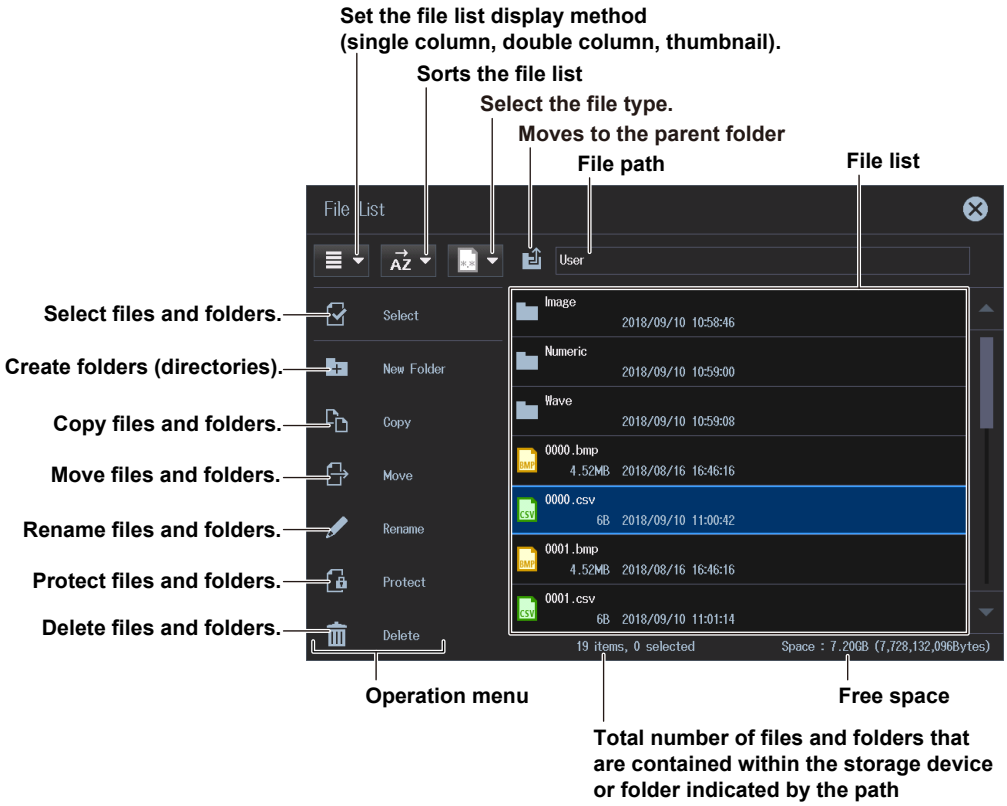
Starts saving

8.6 File Operations

► “File List (File List)” in the features guide

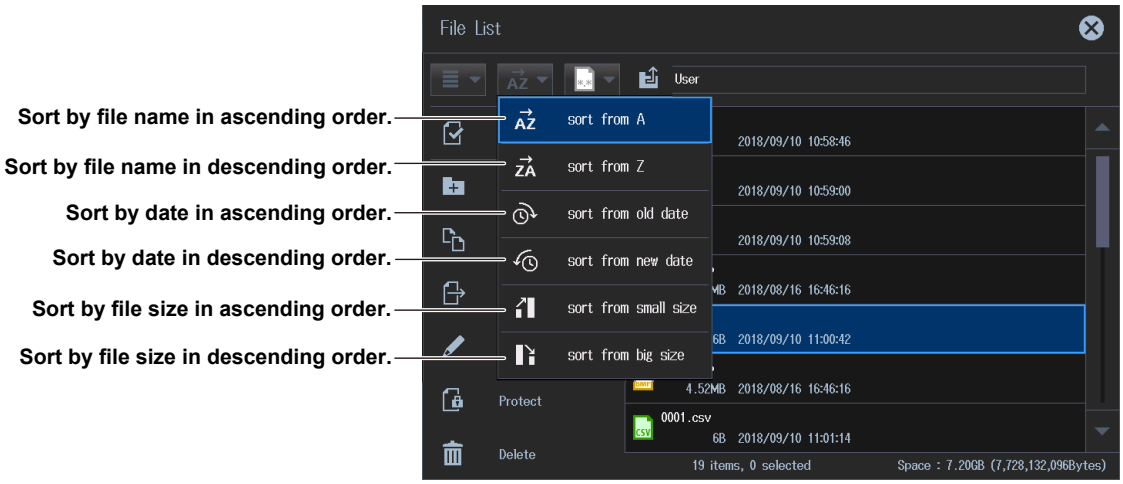
This section will explain how to operate the file list.
The file list is a feature used to manage files as explained in chapter 7, “Storing Numeric Data,” and section 8.2.

File List (File List)



Sorting the File List (AZ)

Tap AZ on the operation menu. The following screen appears.



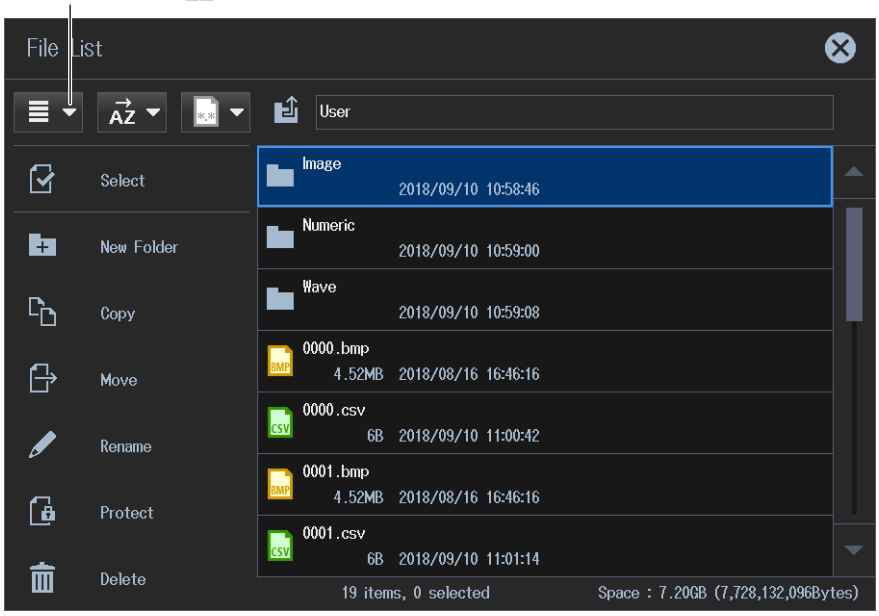
Setting the Display Format (, ,)

Tap , , or on the operation menu. The following screen appears.

Single Column Display ( )

The file list is shown in a single column.

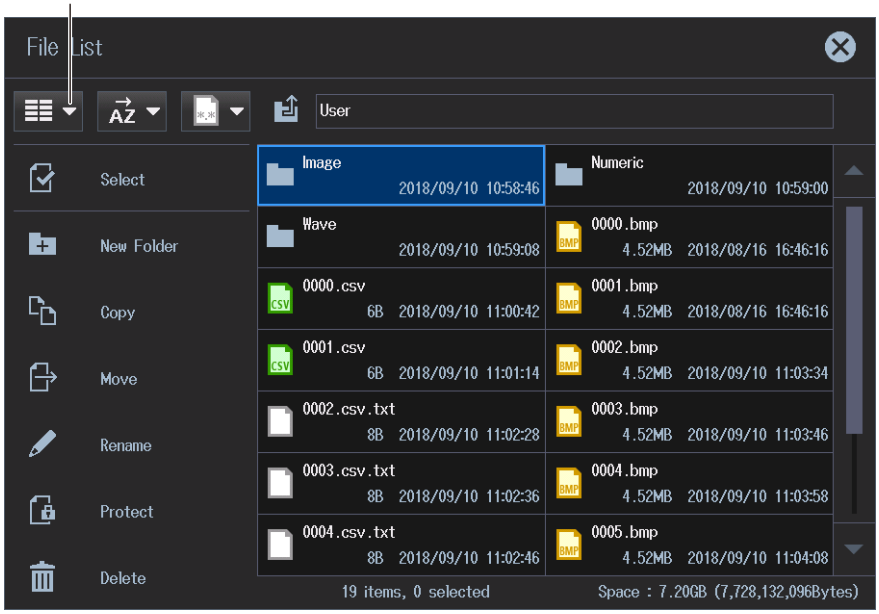
Set the file list display method (, ,)



Double Column Display ( )

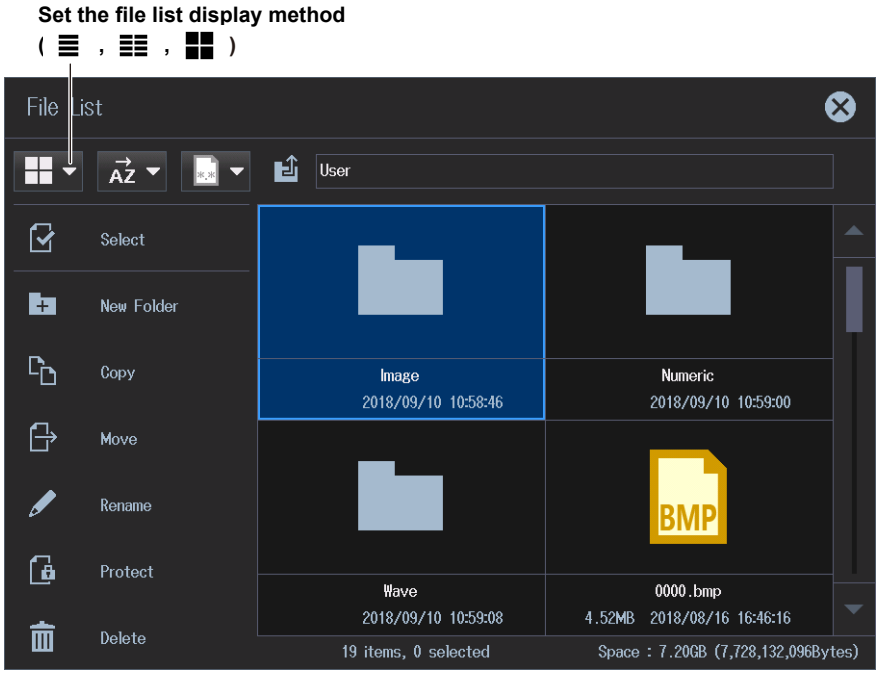
The file list is shown in two columns.

Set the file list display method (, ,)



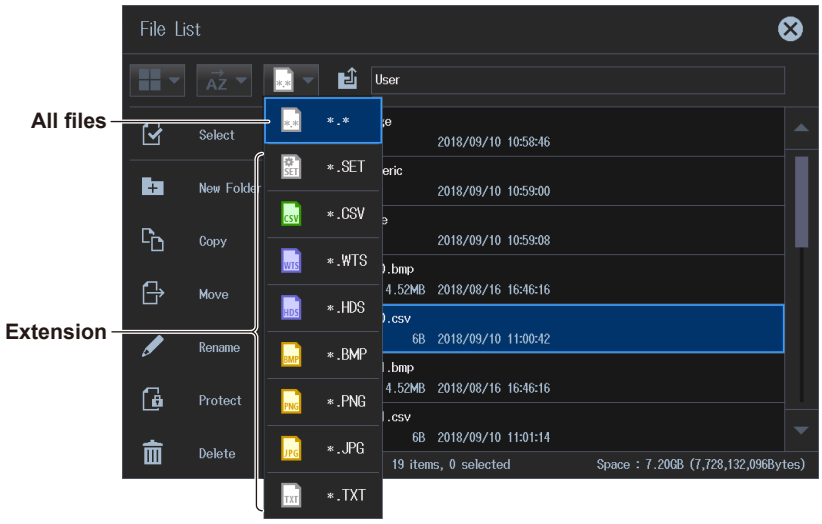
Thumbnail Display ( )

The file list is shown as thumbnails.



Selecting the File Type

Select the type of files to display in the file list.



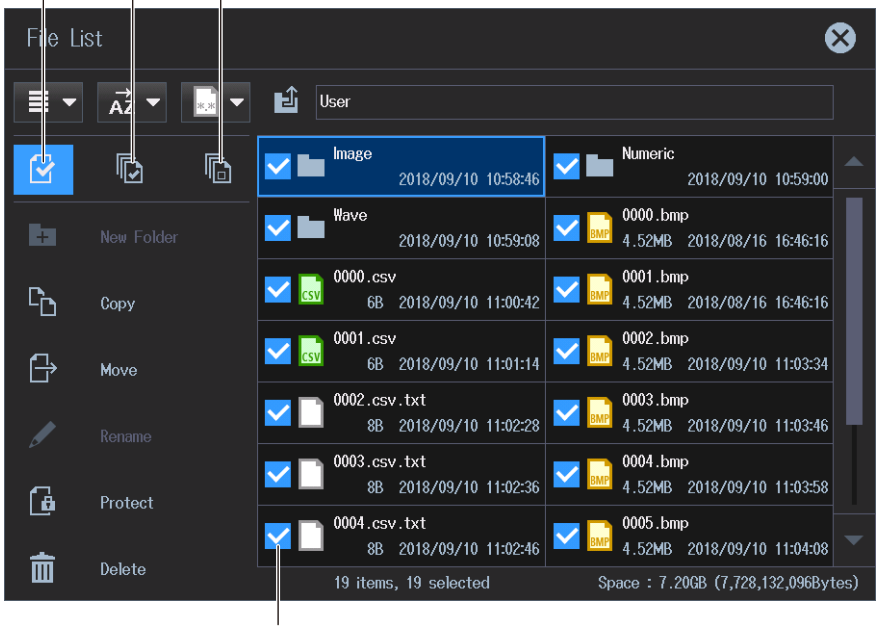
Selecting Files and Folders (Select)

To select multiple files or folders, tap **Select** on the operation menu. The following screen appears. You can return to the original screen by tapping Select again.

Select files and folders.

Selects all check boxes (selects all).

Clears all check boxes (unselects all).



A check mark appears when you tap the check box. Tap it again to clear it.

Making Folders (New folder)

Tap **New folder** on the operation menu. The following screen appears.

To make a new folder within a folder, tap the appropriate folder on the file list, and then tap New folder.

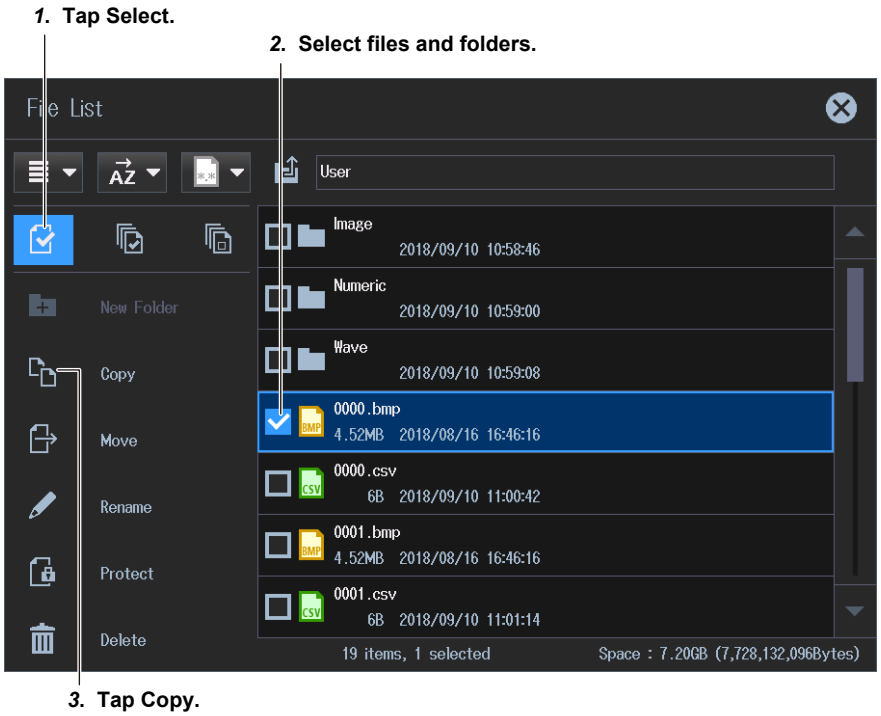
Create folders (directories).

Use the keyboard to enter the new folder name (up to 32 characters).

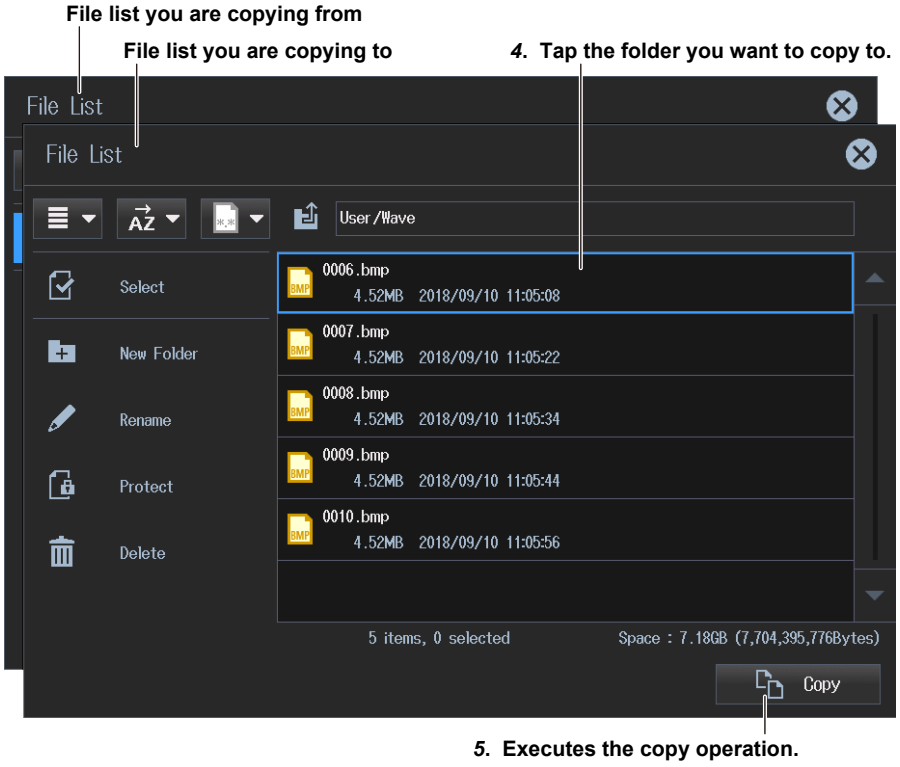
Confirms the folder name you entered.

Copying Files and Folders (Copy)

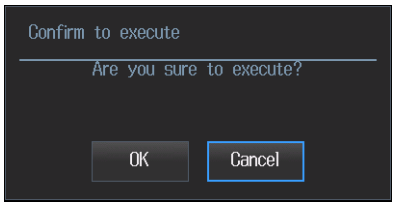
1. Tap **Select** on the operation menu.
   This menu is used when copying multiple files or folders.
2. Tap the files and folders in the file list that you want to copy.
   For the selection procedure, see “Selecting Files and Folders (Select)” on the previous page.
3. Tap **Copy** on the operation menu. A copy destination file list appears.



4. On this list, tap the copy destination folder.
   The contents of the folder appear.

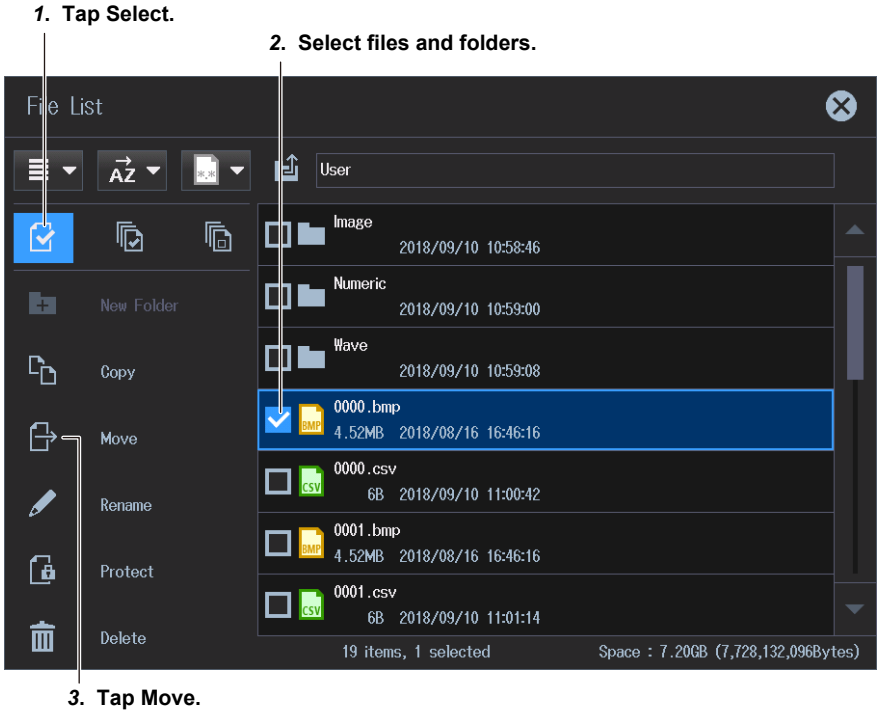


5. Tap **Copy** in the lower right of the screen. The following screen appears.
   Tap OK to copy the files and folders.

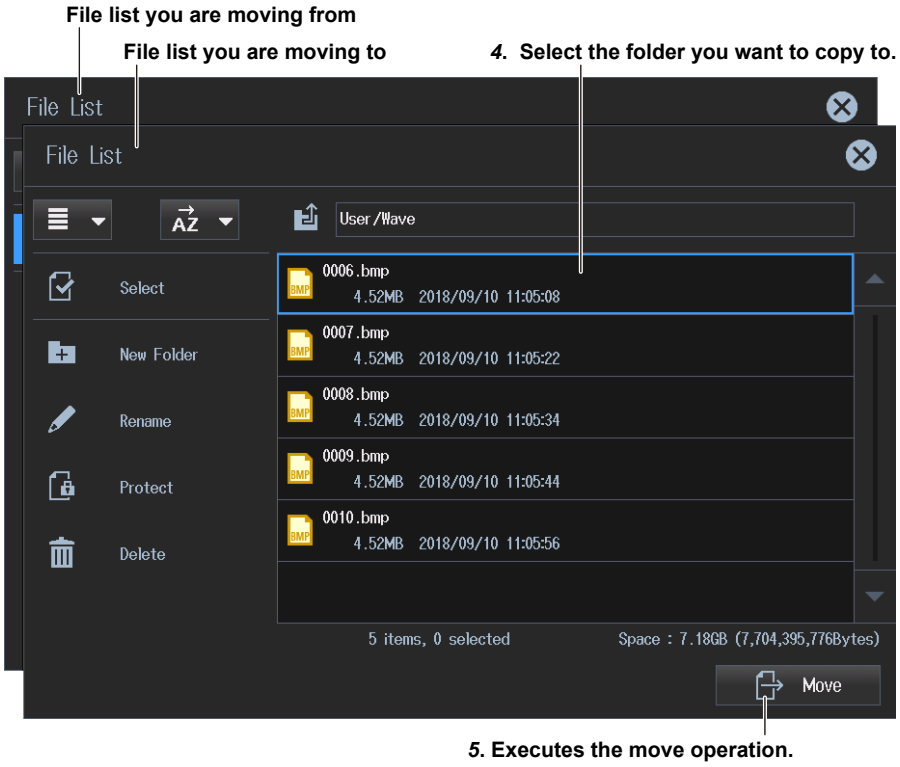


Moving Files and Folders (Move)

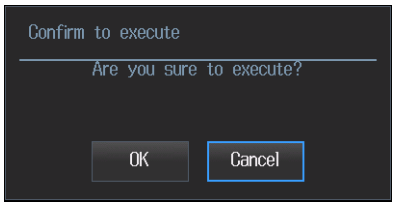
1. Tap **Select** on the operation menu.
   This menu is used when moving multiple files or folders.
2. Tap the files and folders in the file list that you want to move.
   For the selection procedure, see “Selecting Files and Folders (Select)” on the previous page.
3. Tap **Move** on the operation menu. A move destination file list appears.



4. On this list, tap the move destination folder.
The contents of the folder appear.

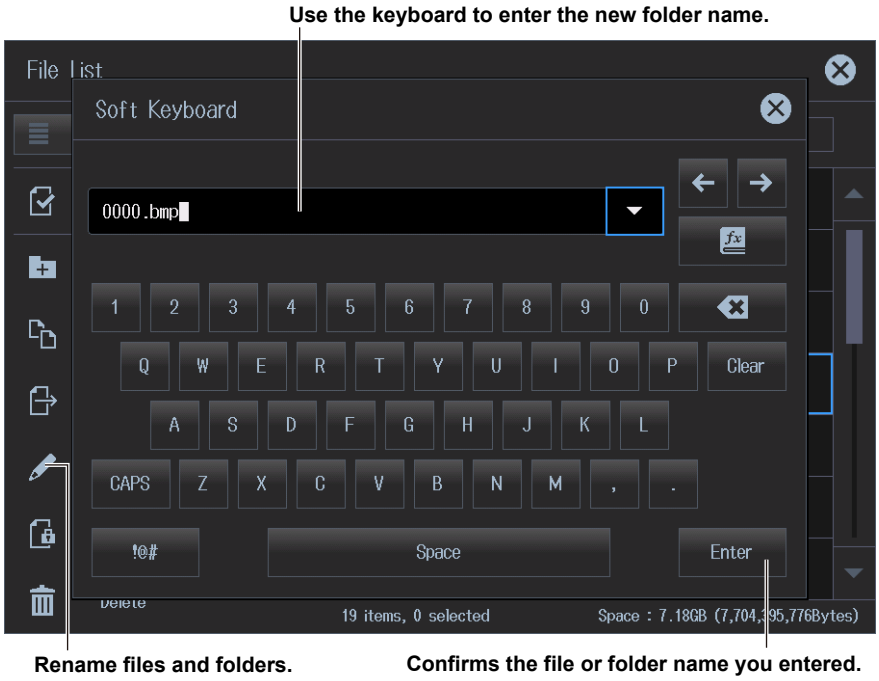


5. Tap **Move** in the lower right of the screen. The following screen appears.
Tap OK to move the files and folders.



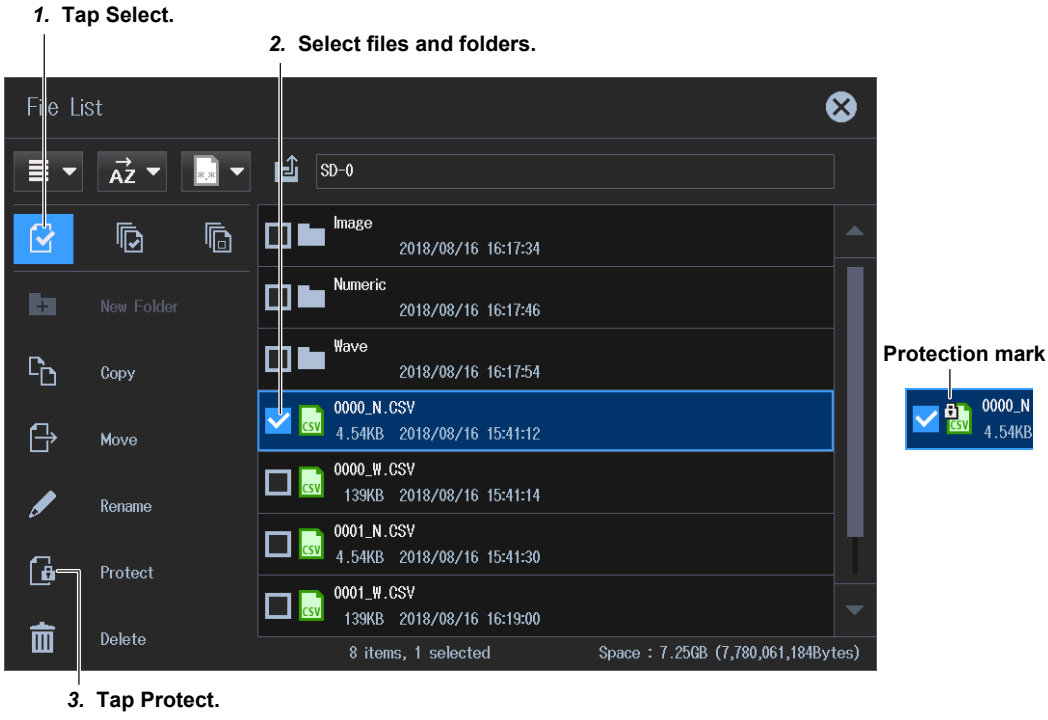
Renaming Files and Folders (Rename)

1. Tap the file or folder in the file list that you want to rename.
2. Tap **Rename** on the operation menu. The following screen appears.



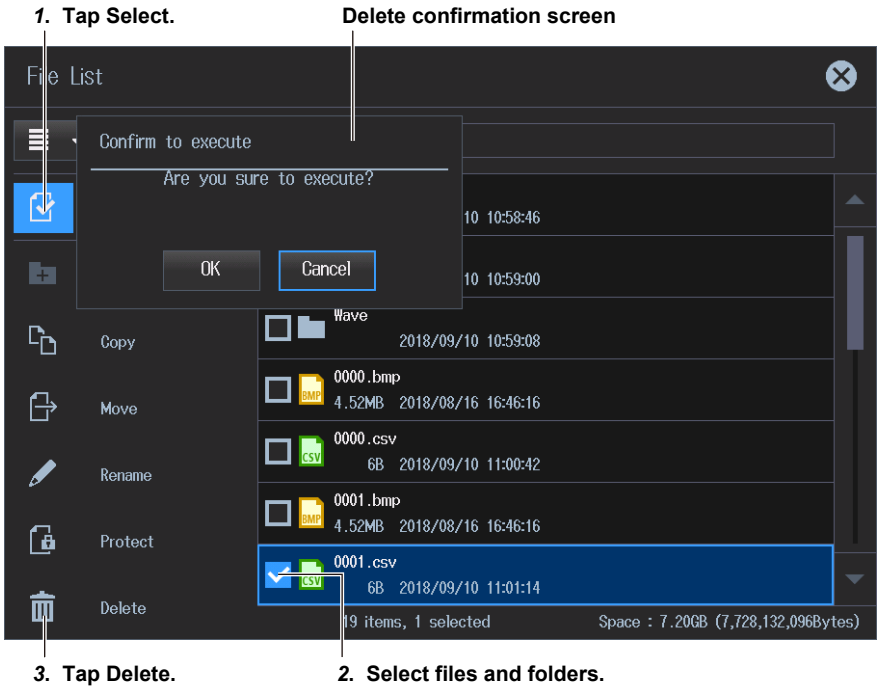
Protecting Files and Folders (Protect)

1. Tap **Select** on the operation menu.
   This menu is used when moving multiple files or folders.
2. Tap the files and folders that you want to protect on the file list.
   For the selection procedure, see “Selecting Files and Folders (Select)” on page 8-14.
3. Tap **Protect** on the operation menu. Protection appears on the file or folder icons.



Deleting Files and Folders (Delete)

1. Tap Select on the operation menu.
   This menu is used when deleting multiple files or folders.
2. Tap the files and folders that you want to delete on the file list.
   For the selection procedure, see “Selecting Files and Folders (Select)” on the previous page.
3. Tap **Delete** on the operation menu. A delete confirmation screen appears.
   Tap OK to delete the files and folders.



9.1 Configuring Motor Evaluation and Auxiliary Input Settings

► "Motor Evaluation/Auxiliary Inputs (Motor/Aux)" in the features guide

This section explains operating procedures using the following setup methods.

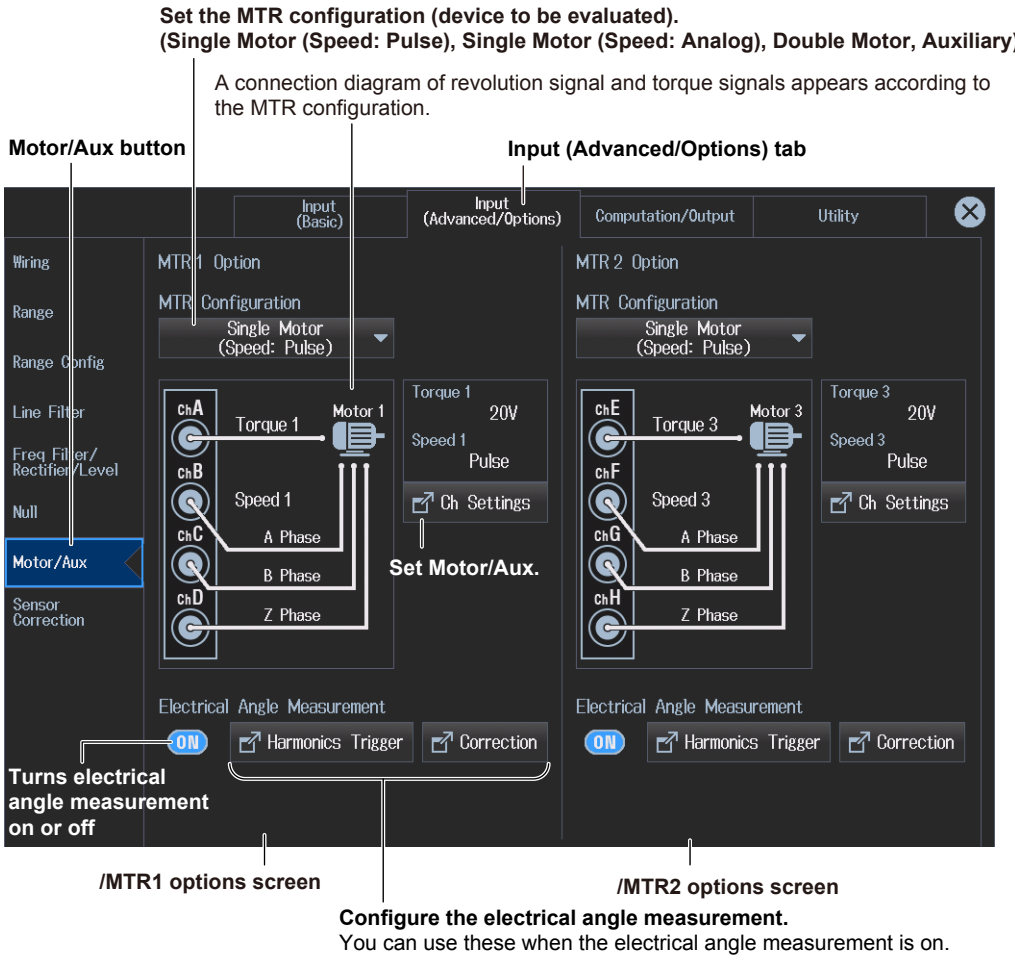
- Procedure Using the Setup Menu (see chapter 1)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **the Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
   Pressing **ESC** closes the overview screen.

Configuring Motor Evaluation and Auxiliary Input Settings (Motor/Aux)

3. Tap **Motor/Aux**. A motor evaluation/auxiliary input setup screen appears.
   The following screen is an example for a model with the /MTR2 option.



Note

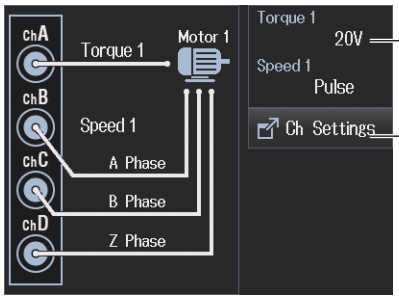
- You can configure the Motor1 and Motor2 settings on models with the /MTR1 option and the Motor1 to Motor4 settings on models with the /MTR2 option.
- You can also display the input settings overview screen by moving the cursor on the Input (Advanced/Options) tab using the arrow keys and then pressing SET.

Configuring Motor/Aux Settings (Ch Settings)

The following four types of setup screens are available depending on the motor evaluation configuration setting.

Single Motor (Speed:Pulse)

4. Tap **Ch Settings**. A single motor (revolution signal: pulse) setup screen appears.



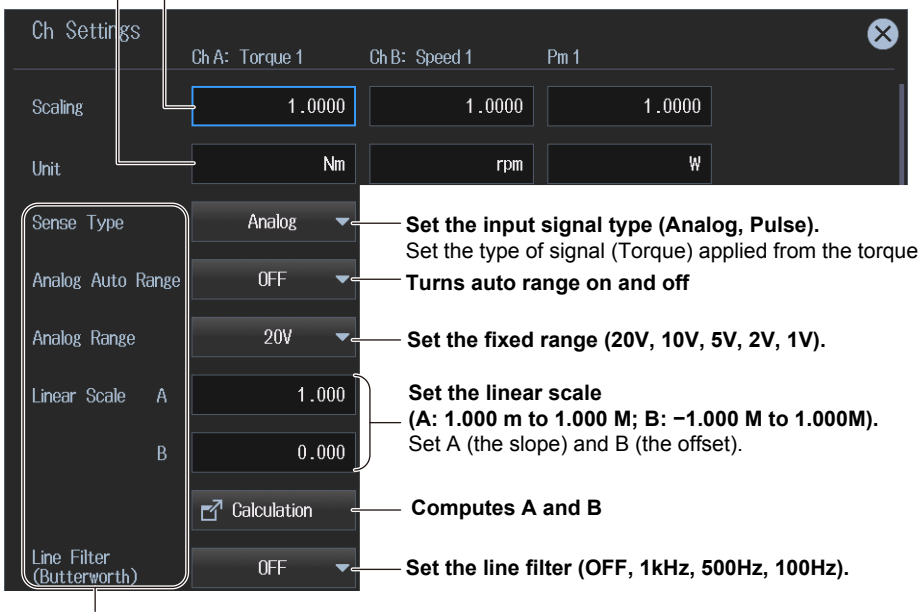
Shows the torque signal input range.
This appears when Sense Type is set to Analog.

Ch Settings button

Single motor (revolution signal: pulse) setup screen

Set the unit (up to 8 characters).
Set the speed, torque, and Pm units.

Set the scaling factor (0.0001 to 99999.9999).
Set the scaling factor that is used to convert the signal from the revolution sensor or torque meter to speed (rotating speed), torque, and Pm (motor output).



Set the input signal type (Analog, Pulse).
Set the type of signal (Torque) applied from the torque meter.

Turns auto range on and off

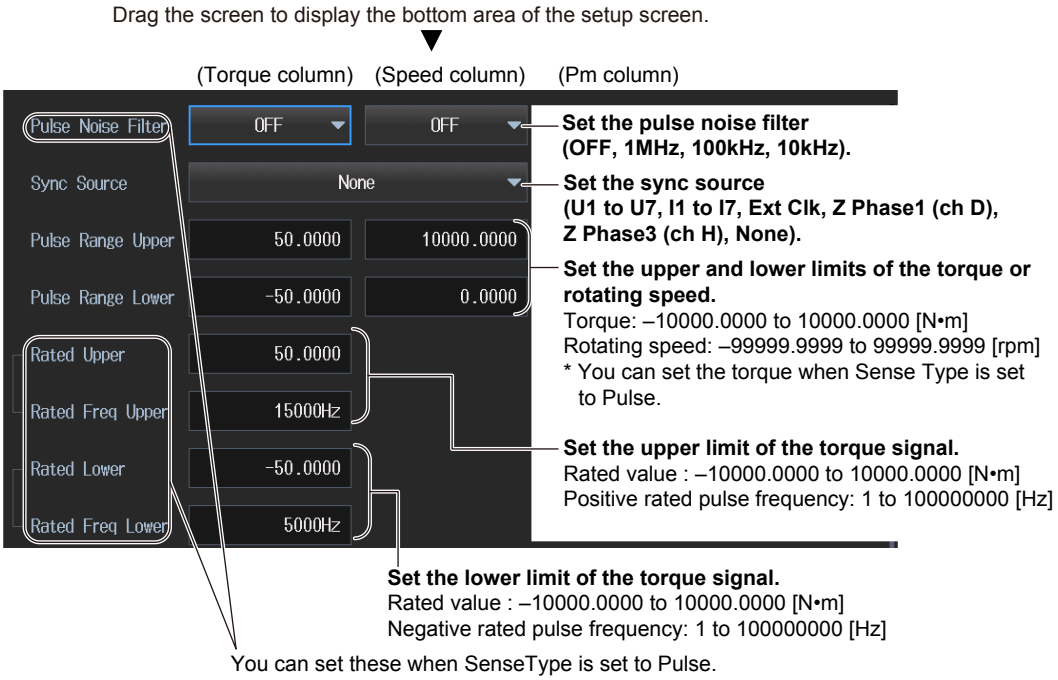
Set the fixed range (20V, 10V, 5V, 2V, 1V).

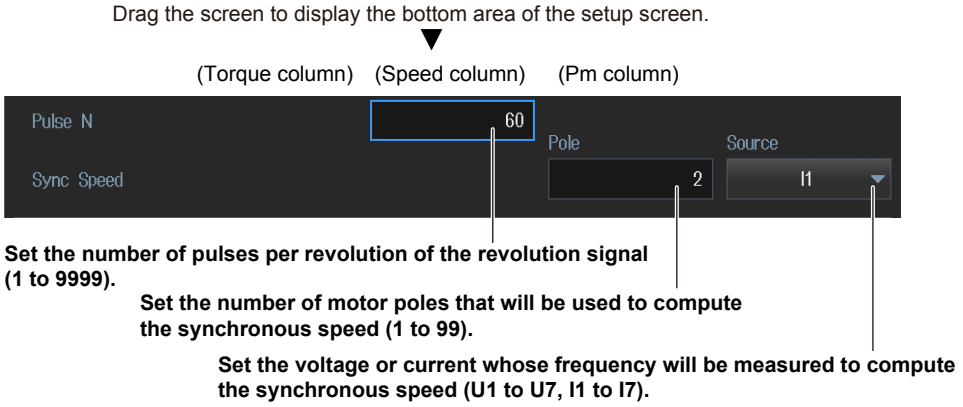
Set the linear scale
(A: 1.000 m to 1.000 M; B: −1.000 M to 1.000M).
Set A (the slope) and B (the offset).

Computes A and B

Set the line filter (OFF, 1kHz, 500Hz, 100Hz).

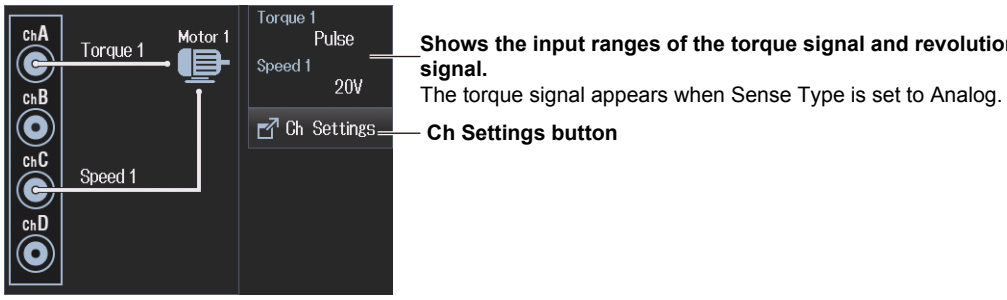
You can set these when Sense Type is set to Analog.





Single Motor (Speed:Analog)

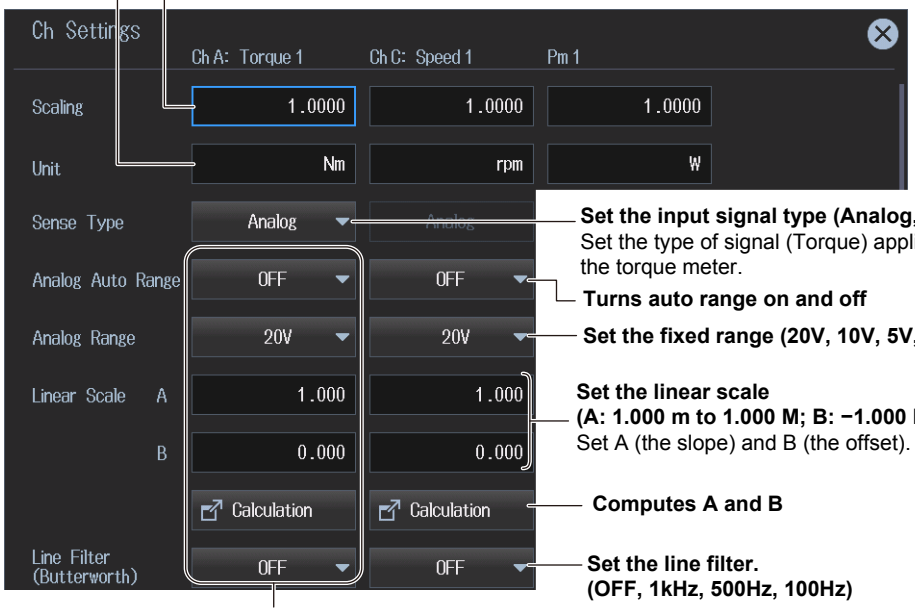
4. Tap **Ch Settings**. A single motor (revolution signal: analog) setup screen appears.



Single motor (revolution signal: analog) setup screen

Set the unit (up to 8 characters).
Set the speed, torque, and Pm units.

Set the scaling factor (0.0001 to 99999.9999).
Set the scaling factor that is used to convert the signal from the revolution sensor or torque meter to speed (rotating speed), torque, and Pm (motor output).



Set the input signal type (Analog, Pulse).
Set the type of signal (Torque) applied from the torque meter.

Turns auto range on and off

Set the fixed range (20V, 10V, 5V, 2V, 1V).

Set the linear scale (A: 1.000 m to 1.000 M; B: −1.000 M to 1.000M).
Set A (the slope) and B (the offset).

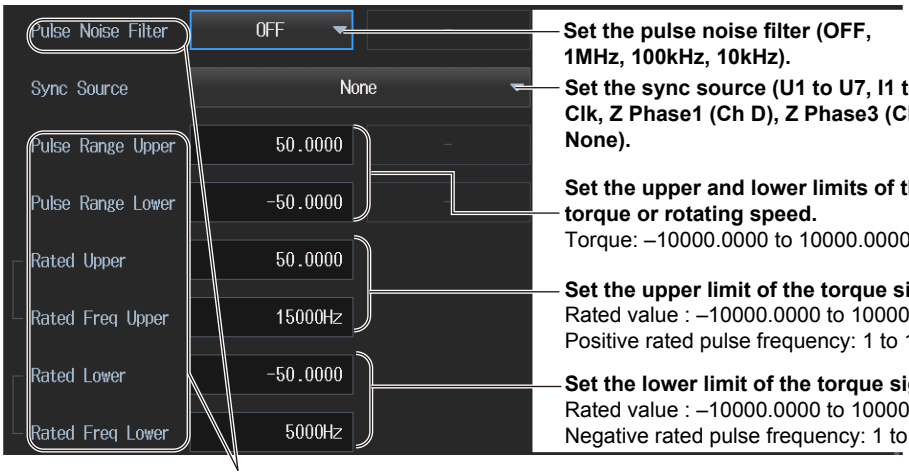
Computes A and B

Set the line filter. (OFF, 1kHz, 500Hz, 100Hz)

You can set the range, scale, filter, and the like of the torque signal when Sense Type is set to Analog.

Drag the screen to display the bottom area of the setup screen.

(Torque column) (Speed column) (Pm column)



Set the pulse noise filter (OFF, 1MHz, 100kHz, 10kHz).

Set the sync source (U1 to U7, I1 to I7, Ext Clk, Z Phase1 (Ch D), Z Phase3 (Ch H), None).

Set the upper and lower limits of the torque or rotating speed.
Torque: –10000.0000 to 10000.0000 [N•m]

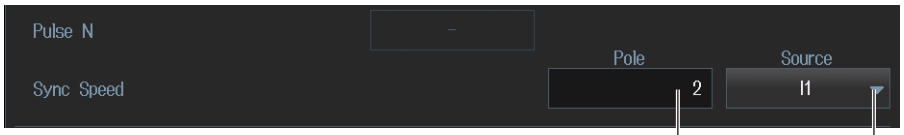
Set the upper limit of the torque signal.
Rated value : –10000.0000 to 10000.0000 [N•m]
Positive rated pulse frequency: 1 to 100000000 [Hz]

Set the lower limit of the torque signal.
Rated value : –10000.0000 to 10000.0000 [N•m]
Negative rated pulse frequency: 1 to 100000000 [Hz]

You can set these when SenseType is set to Pulse.

Drag the screen to display the bottom area of the setup screen.

(Torque column) (Speed column) (Pm column)

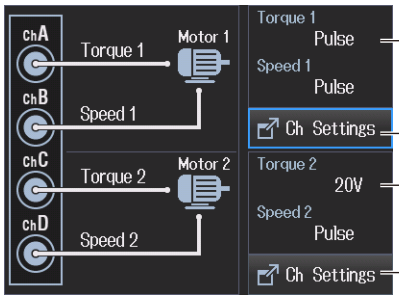


Set the number of motor poles that will be used to compute the synchronous speed (1 to 99).

Set the voltage or current whose frequency will be measured to compute the synchronous speed (U1 to U7, I1 to I7).

Double Motor

4. Tap **Ch Settings**. A double motor setup screen appears.



Shows the Motor1' s torque signal input range.
The torque signal appears when Sense Type is set to Analog.

Motor1 Ch Settings button

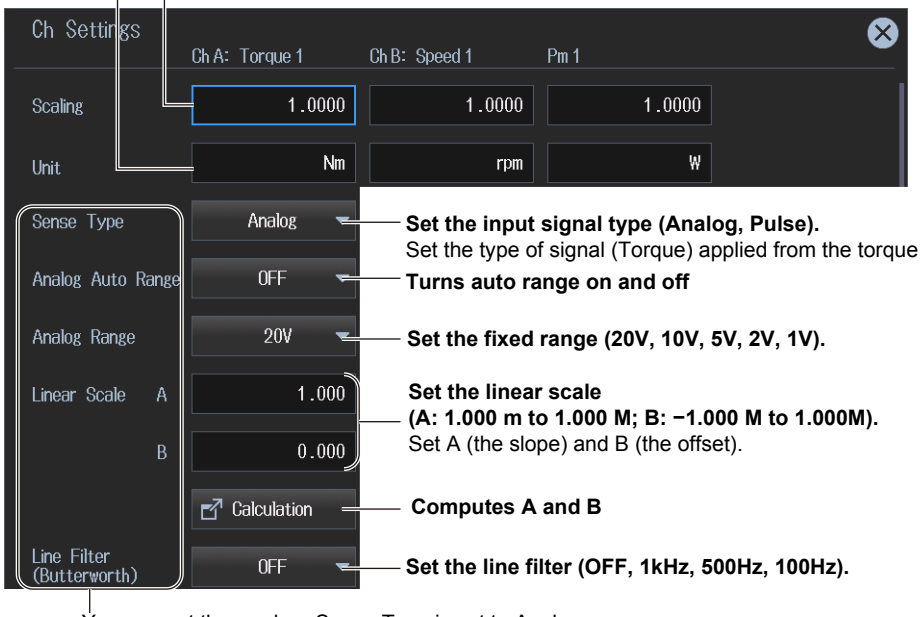
Shows the Motor2' s torque signal input range.
The torque signal appears when Sense Type is set to Analog.

Motor2 Ch Settings button

Double motor setup screen

Set the unit (up to 8 characters).
Set the speed, torque, and Pm units.

Set the scaling factor (0.0001 to 99999.9999).
Set the scaling factor that is used to convert the signal from the revolution sensor or torque meter to speed (rotating speed), torque, and Pm (motor output).



Set the input signal type (Analog, Pulse).
Set the type of signal (Torque) applied from the torque meter.

Turns auto range on and off

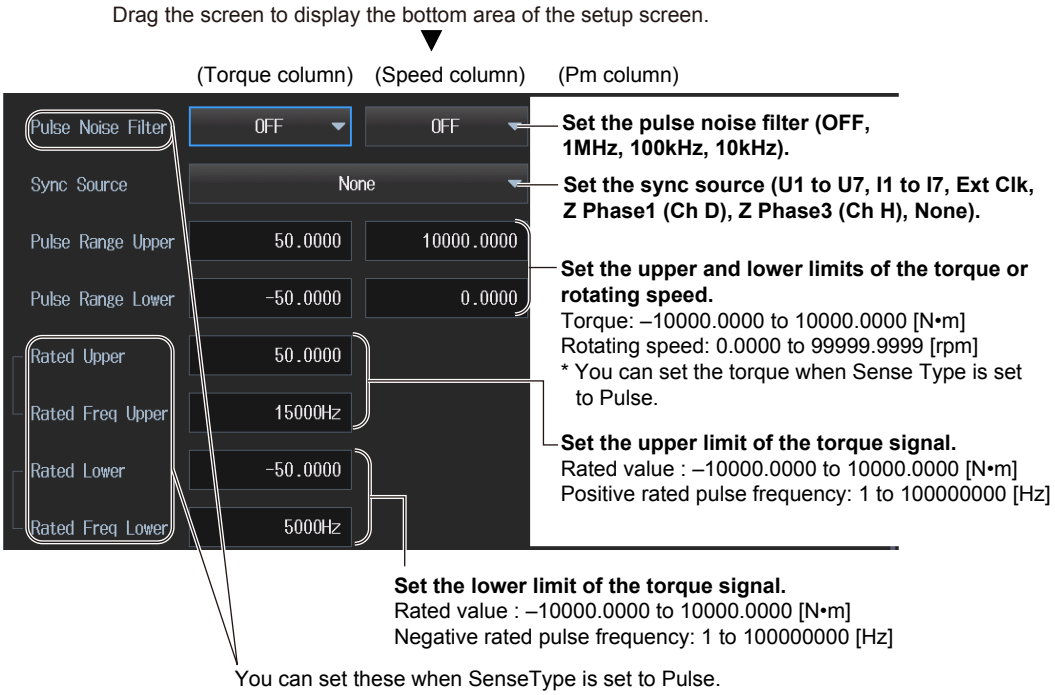
Set the fixed range (20V, 10V, 5V, 2V, 1V).

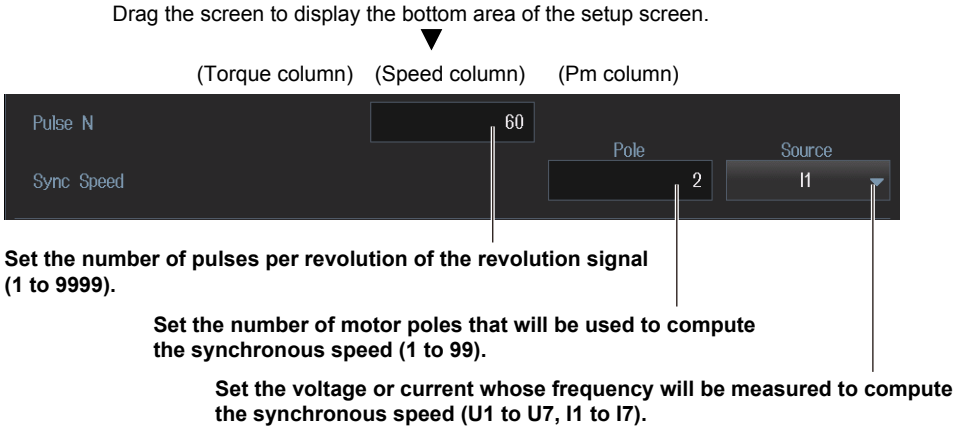
Set the linear scale
(A: 1.000 m to 1.000 M; B: −1.000 M to 1.000M).
Set A (the slope) and B (the offset).

Computes A and B

Set the line filter (OFF, 1kHz, 500Hz, 100Hz).

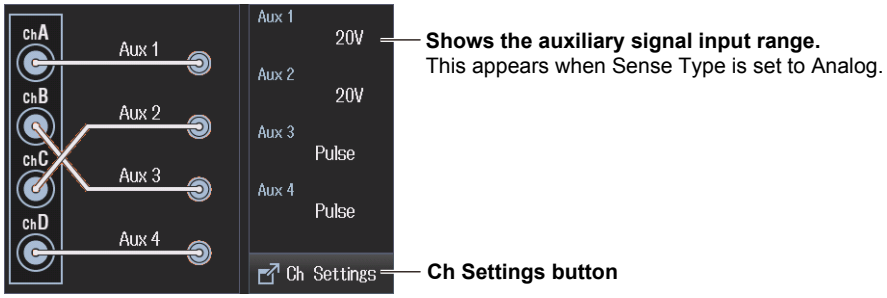
You can set these when Sense Type is set to Analog.





Auxiliary

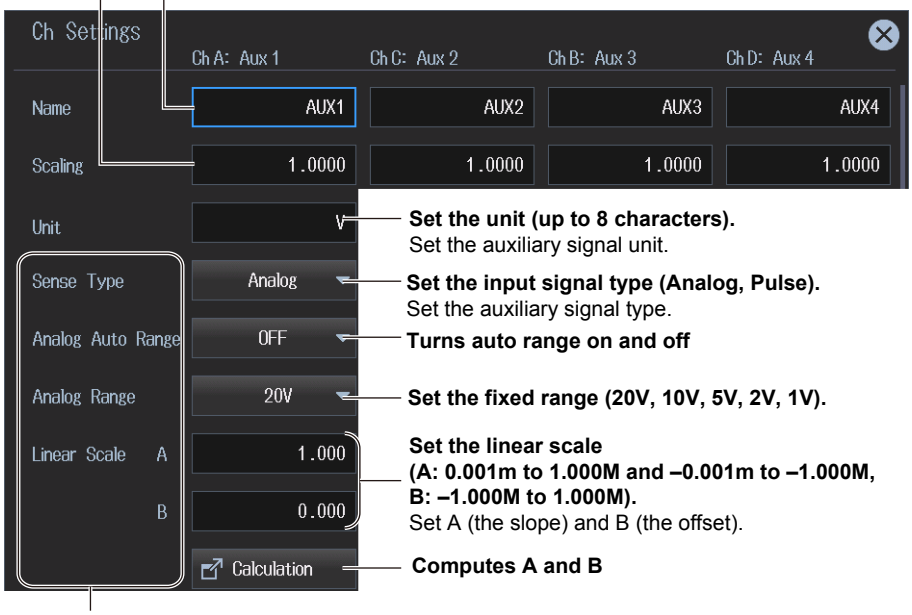
4. Tap **Ch Settings**. An auxiliary input setup screen appears.



Auxiliary input setup screen

Set the scaling factor (0.0001 to 99999.9999).
Set the scaling factor for scaling or computing auxiliary signals.

Set the signal name (up to 8 characters).
Set the signal names for Aux1 to Aux4.



Set the unit (up to 8 characters).
Set the auxiliary signal unit.

Set the input signal type (Analog, Pulse).
Set the auxiliary signal type.

Turns auto range on and off

Set the fixed range (20V, 10V, 5V, 2V, 1V).

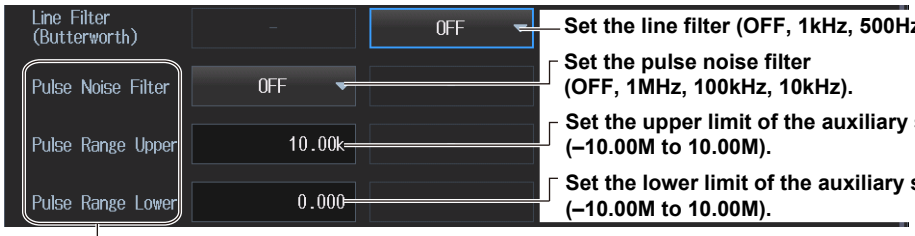
Set the linear scale
(A: 0.001m to 1.000M and –0.001m to –1.000M,
B: –1.000M to 1.000M).
Set A (the slope) and B (the offset).

Computes A and B

You can set these when Sense Type is set to Analog.

Drag the screen to display the bottom area of the setup screen.

(Ch A: Aux 1 column) (Ch B: Aux 3 column)
(Ch C: Aux 2 column) (ChD: Aux 4 column)



Set the line filter (OFF, 1kHz, 500Hz, 100Hz).[1]

Set the pulse noise filter
(OFF, 1MHz, 100kHz, 10kHz).

Set the upper limit of the auxiliary signal
(–10.00M to 10.00M).

Set the lower limit of the auxiliary signal
(–10.00M to 10.00M).

You can set these when SenseType is set to Pulse.

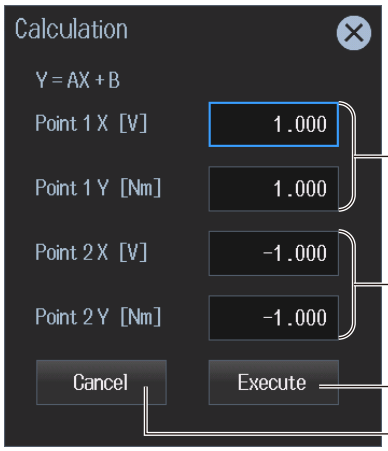
1 You can set this when SenseType is set to Analog.

Computing A and B (Calculation)

Compute A (slope) and B (offset) from two points on the characteristics graph of the input signal.

Torque A and B

On the Motor/Aux setup screen, tap **Calculation** under Torque. The following screen appears.



Set the first X-axis value [V] and Y-axis value [Nm] (−1.000 T to 1.000 T).

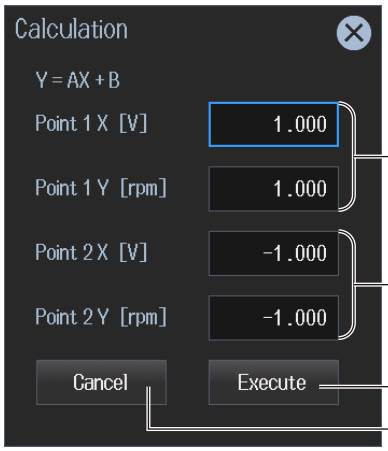
Set the second X-axis value [V] and Y-axis value [Nm] (−1.000 T to 1.000 T).

Computes A and B

Cancels the computation

Rotating Speed A and B

On the Motor/Aux setup screen, tap **Calculation** under Speed. The following screen appears.



Single Motor (Speed: Analog)

Set the first X-axis value [V] and Y-axis value [rpm] (−1.000 T to 1.000 T).

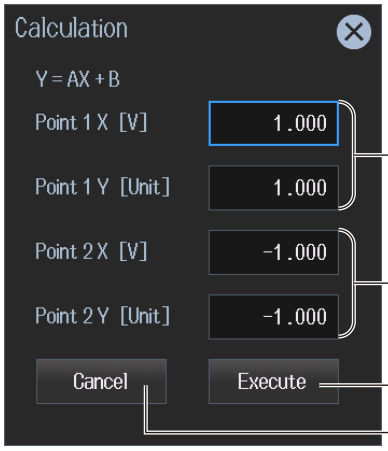
Set the second X-axis value [V] and Y-axis value [rpm] (−1.000 T to 1.000 T).

Computes A and B

Cancels the computation

External Signal Input A and B

On the Motor/Aux setup screen, tap **Calculation** under Aux1 to Aux4. The following screen appears.



Set the first X-axis value [V] and Y-axis value [Unit] (−1.000 T to 1.000 T).

Set the second X-axis value [V] and Y-axis value [Unit] (−1.000 T to 1.000 T).

Computes A and B

Cancels the computation

Setting the Electrical Angle Measurement (Electrical Angle Measurement)

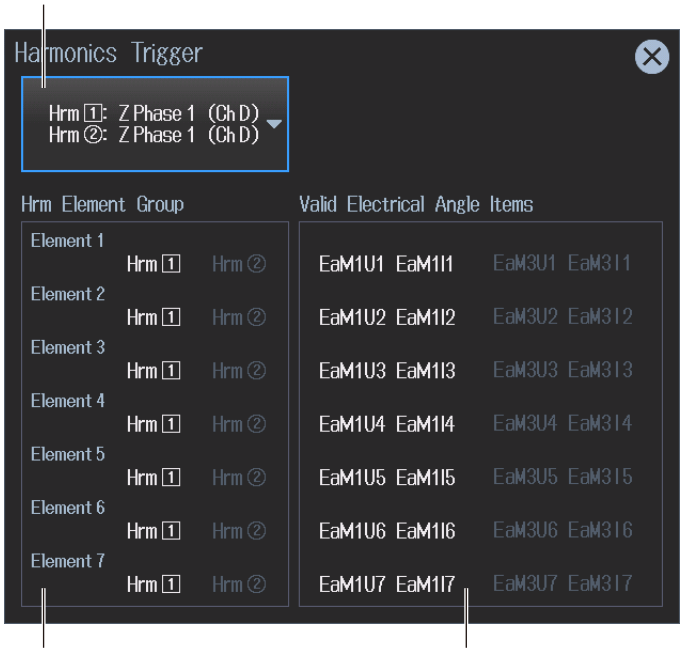
Selecting the Harmonic Group (Harmonics Trigger)

5. Tap **ON/OFF** under Electrical Angle Measurement. The button changes to ON. The Harmonics and Correction buttons next to the ON/OFF button become available (step 7).

6. Tap **Harmonics Trigger**. A Harmonics Trigger screen appears.

Set the harmonic analysis trigger.

(**Hrm①: Z Phase 1 (Ch D)**
Hrm②: Z Phase 1 (Ch D), **Hrm①: Z Phase 1 (Ch D)**
Hrm②: None, **Hrm①: None**
Hrm②: Z Phase 1 (Ch D))



Shows harmonic element grouping

Electrical angle measurement items
These are determined and shown automatically depending on the configuration.

Hrm①: Z Phase 1 (Ch D)
Hrm②: Z Phase 1 (Ch D) : Set the Hrm1 and Hrm2 triggers to the Z phase of motor 1.

Hrm①: Z Phase 1 (Ch D)
Hrm②: None : Set the Hrm1 trigger to the Z phase of motor 1.

Hrm①: None
Hrm②: Z Phase 1 (Ch D) : Set the Hrm2 trigger to the Z phase of motor 1.

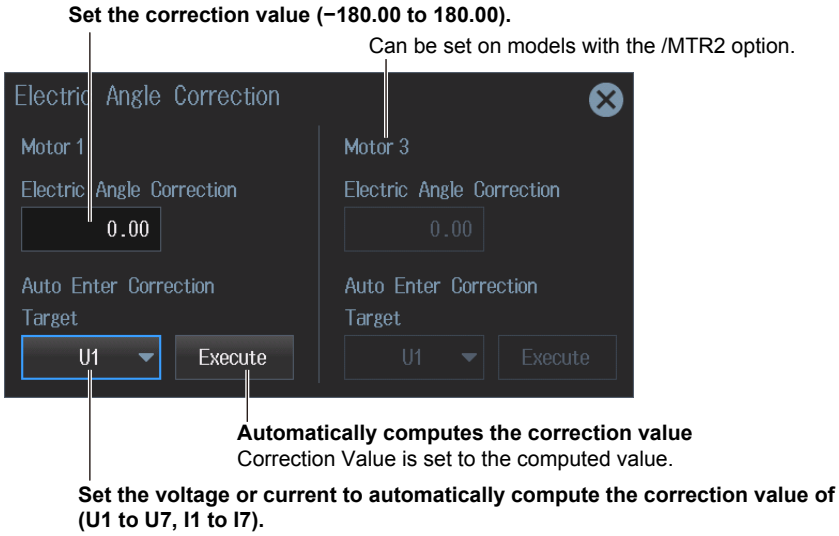
Note

The harmonic analysis trigger parameters vary depending on the /MTR1 option and /MTR2 option.

- **Electrical angle measurement of motor 1 set to on and Electrical angle measurement of motor 2 set to off**
  Hrm1: Z Phase1 and Hrm2: Z Phase1
  Hrm1: Z Phase1 and Hrm2: None
  Hrm1: None and Hrm2: Z Phase1
- **Electrical angle measurement of both motor 1 and motor 2 set to on**
  Hrm1: Z Phase1 and Hrm2: Z Phase3
  Hrm1: Z Phase3 and Hrm2: Z Phase1
- **Electrical angle measurement of motor 1 set to off and electrical angle measurement of motor 2 set to on**
  Hrm1: Z Phase3 and Hrm2: Z Phase3
  Hrm1: Z Phase3 and Hrm2: None
  Hrm1: None and Hrm2: Z Phase3

Setting the Electrical Angle Correction Value (Electric Angle Correction)

7. Tap **Correction**. An Electric Angle Correction screen appears.



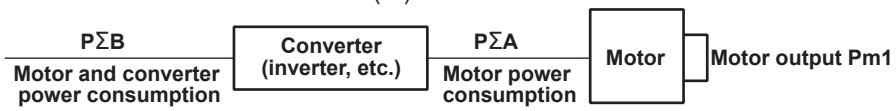
Setting the Motor Efficiency Computation

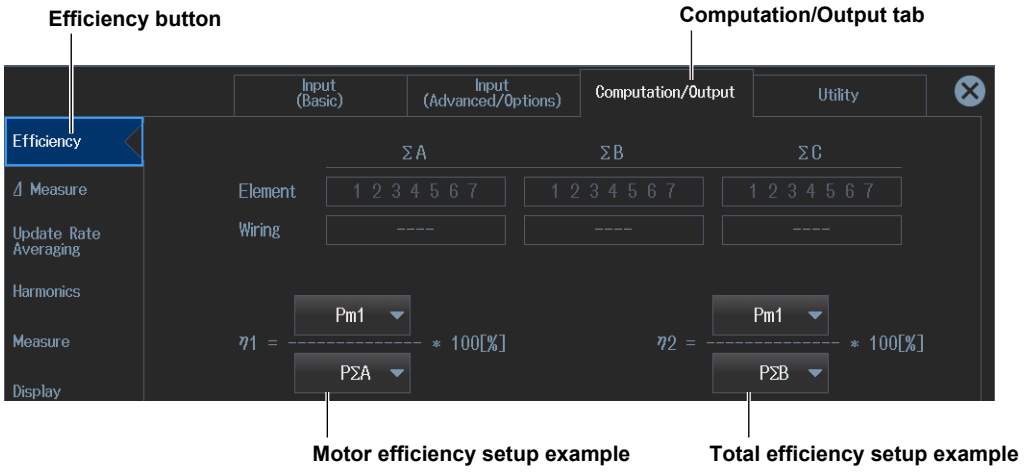
This instrument can compute the motor efficiency (the ratio of power consumption to motor output) and total efficiency from the active power and motor output that it measures.* For information on how to set expressions, see section 2.11.

- **Example in which motor efficiency is set to η1 and total efficiency to η2**

$$\text{Motor efficiency } \eta1(\%) = \frac{\text{Motor output Pm (W)}}{P\Sigma A(W)} \times 100$$

$$\text{Total efficiency } \eta2(\%) = \frac{\text{Motor output Pm (W)}}{P\Sigma B(W)} \times 100$$

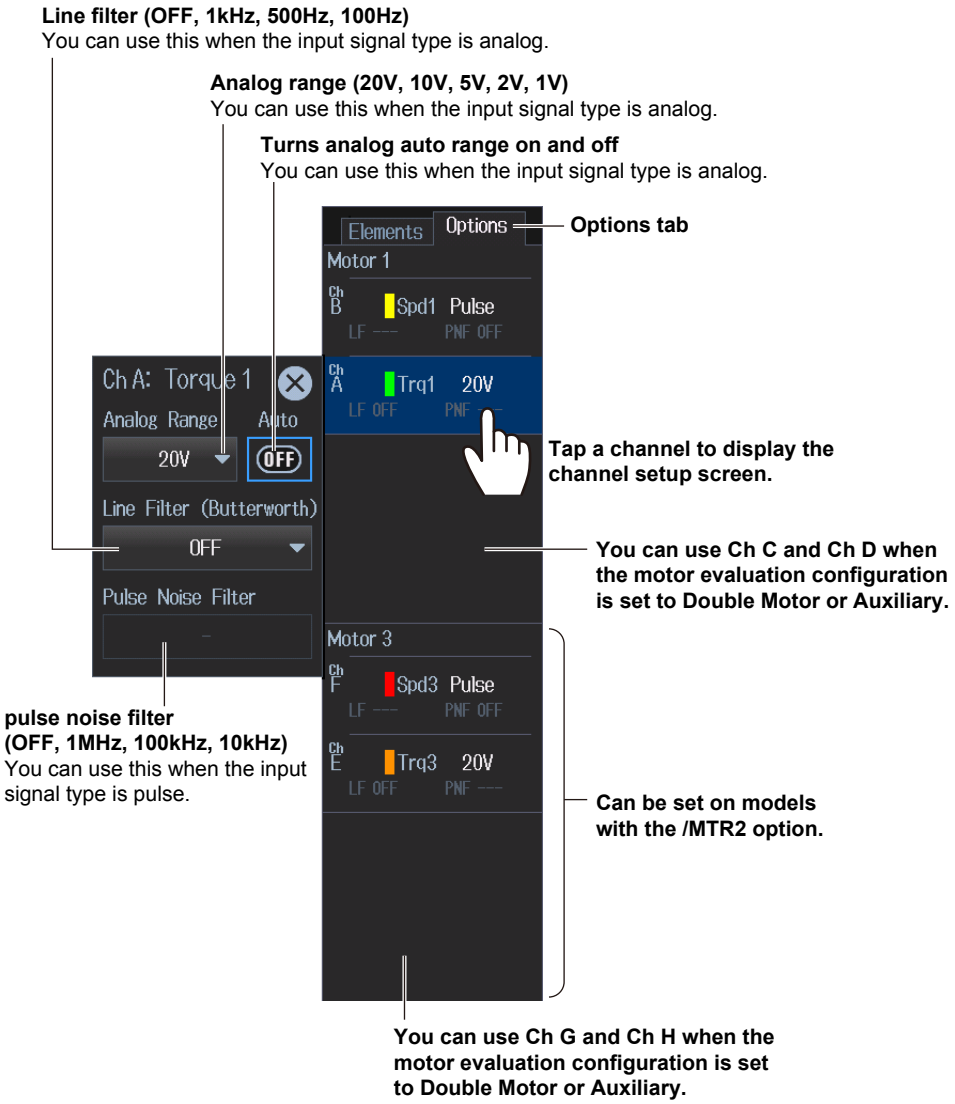




Procedure Using the Input Information Area (Options tab)

If you use the input information area shown on the right side of the screen, you can set the analog range, line filter, and pulse noise filter while viewing the measurements. These settings are the same as those in “Configuring the Channels (Ch Settings)” described earlier.

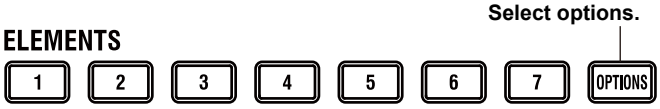
1. Tap the **Options** tab. An Options menu appears in the input information area.
2. Tap the channel (Ch A to Ch H) you want to control. A channel setup screen appears.
   The channel display and channel setup screen vary depending on the motor evaluation configuration setting.



Procedure Using Keys

You can use the front panel keys to display the input information area and the motor evaluation condition setup screen.

1. Press **OPTIONS**. The input information area display changes to Options tab.
2. Press **OPTIONS** again. A motor evaluation condition setup screen appears.
   Press OPTIONS yet again to return to the input information area (Options tab) display.



9.2 Displaying the Motor Evaluation (numeric display)

This instrument shows on the screen the measurements (measurement functions) of motor evaluation based on the revolution sensor or torque meter signals applied to Ch A to Ch H on the rear panel. In addition, this instrument shows on the screen the measurements (measurement functions) of the motor power consumption based on the voltage or current applied to the wiring units. Using an example, this section explains how to display motor evaluation measurements numerically. Note that to determine the motor efficiency or total efficiency values (η), you need to set equations (see sections 2.11 and 9.1).

In addition, this section explains operating procedures using the following setup methods.

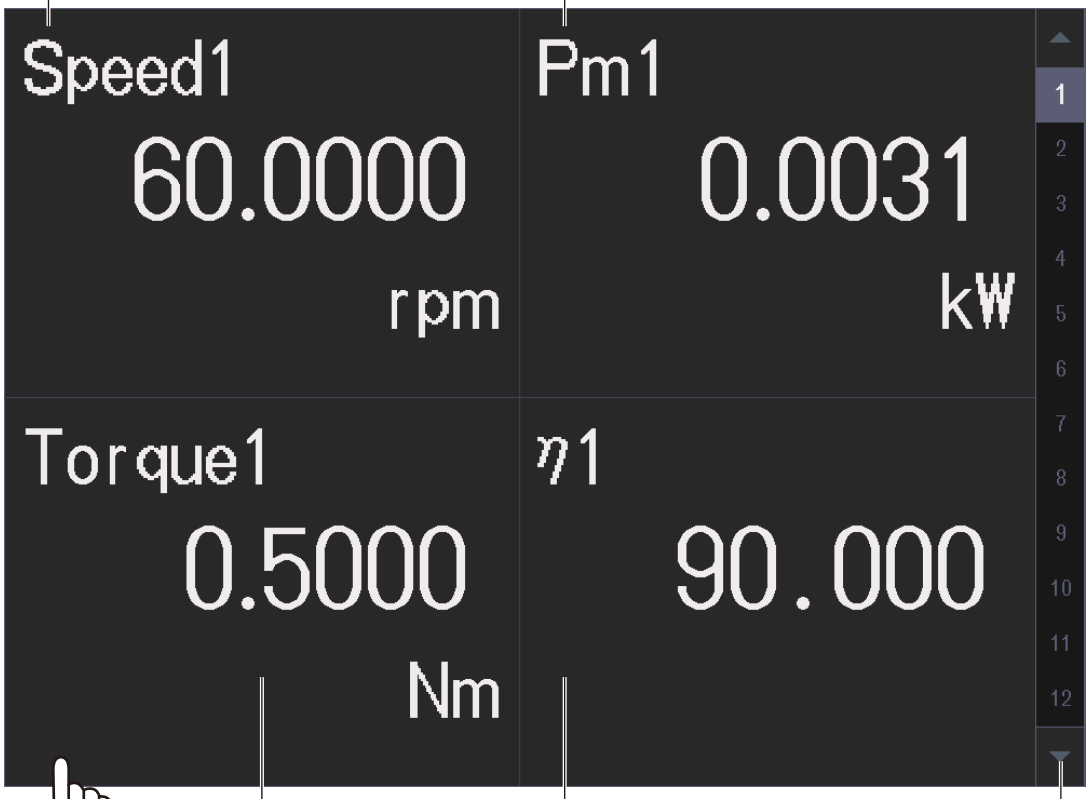
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Measurement Display Screen (Example of a 4 items display)

Motor evaluation measurement display

Measured motor rotating speed

Measured motor mechanical output



Measured motor torque

Measured motor efficiency

If you hold your finger down on the 4-, 8-, 16-value, matrix or harmonics display for at least 1 second, you can perform the operations described in "Switching the Displayed Items (Items)," provided later.

Switches the displayed page (Page Up/Page Down)
Switches to the measurement display of another input element Tap ▲ or ▼ to change the displayed page in order from the current number. Tap the number directly to change to the number display page.

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

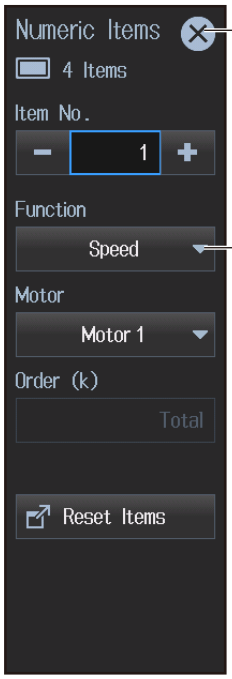
Switching the Displayed Items (Items)

You can switch the measured value (measurement function) shown in the screen.

3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 3.1.

4. Tap **Items**. The following screen appears.



Closes the menu

Set the displayed item.
You can set the following items for displaying motor evaluation.
• Motor evaluation (Motor group):
Speed (motor rotating speed), **Torque** (motor torque),
SyncSP (sync speed), **Slip** (slip (%)),
Pm (Motor mechanical output (mechanical power)),
EaM1U1 to EaM1U7
(electrical angle: phase angles of U1 to U7 relative to the falling edge of the Speed1 signal' s Z phase input),
EaM3U1 to EaM3U7
(electrical angle: phase angles of U1 to U7 relative to the falling edge of the Speed3 signal' s Z phase input),
EaM1I1 to EaM1I7
(electrical angle: phase angles of I1 to I7 relative to the falling edge of the Speed1 signal' s Z phase input),
EaM3I1 to EaM3I7
(electrical angle: phase angles of I1 to I7 relative to the falling edge of the Speed3 signal' s Z phase input)

• Efficiency (Efficiency group):
η1 to η4 (efficiency)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon . A Display menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the screen explained earlier.

Note

For details on the Display menu, see page iv.

10.1 Holding Measured Values

► “Holding Measured Values (Hold, HOLD)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

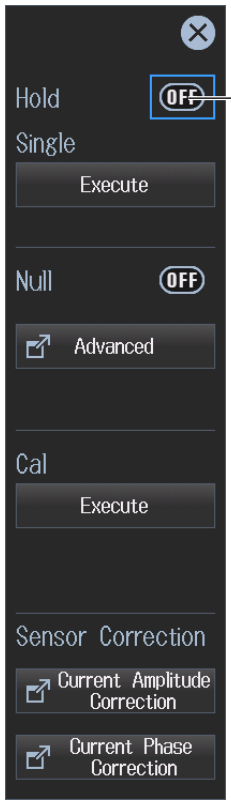
Procedure Using the Menu Icons

1. Tap the **Misc** menu icon

. A Misc menu appears in the sub menu area on the right side of the screen.
2. Tap the Hold **ON/OFF** button to select ON. The HOLD key illuminates, and the displayed measured value is held.

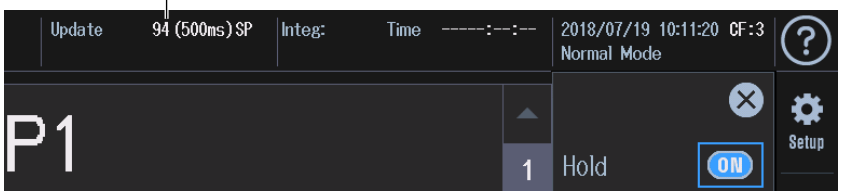
   Tap the Hold **ON/OFF** button to select OFF. This releases the held measured values. The measured data is then updated at the specified data update interval (see section 2.10).

Misc Menu



Executes the holding of measured values (OFF, ON)
When holding is in progress, the HOLD key illuminates.

If you hold the measured value, the data update counter at the top of the screen stops.



Note

Values in the numeric data list of D/A output, communication output, and the like as well as the graph display are put on hold.

Procedure Using Keys

You can also use the front panel keys to hold the measured values.

Holding Measured Values

The HOLD key LED illuminates, and the measure values are put on hold.

10.2 Single Measurement

► “Single Measurement (Single Execute, SINGLE)” in the features guide

This section explains operating procedures using the following setup methods.

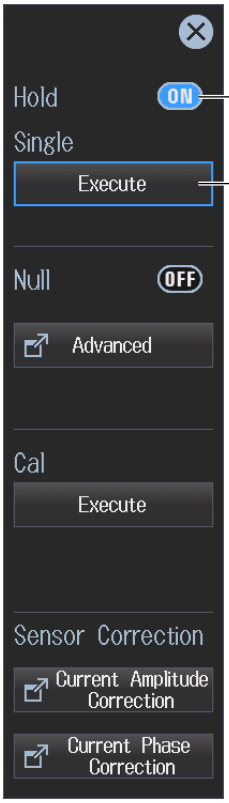
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Menu Icons

1. Tap the **Misc** menu icon

. A Misc menu appears in the sub menu area on the right side of the screen.
2. Tap the Hold **ON/OFF** button to select ON. The HOLD key illuminates, and the displayed measured value is held.
3. Tap **Execute** under Single. A single measurement is performed at the specified data update rate, and the instrument then holds the measured value.

Misc Menu



1. **Execute the holding of measured values (OFF, ON)**
   When holding is in progress, the HOLD key illuminates.
2. **Execute a single measurement.**
   You can execute this once while holding is in progress.

Note

If, while the HOLD key is illuminated, you tap Hold again, the HOLD key will turn off, and the held measured values will be released. If you tap Single Execute while the hold feature is released, the measured value is updated (re-measured) when the time specified by the data update rate elapses after you tap the key.

Procedure Using Keys

You can also use the front panel keys to perform single measurements.

Single measurement
While the HOLD key LED is illuminated, a measurement is executed once, and the display is updated.

11.1 Configuring, Enabling, and Disabling the Null Feature

► “Null Feature (Null)” in the features guide
► “Enabling and Disabling the Null Feature (Null, NULL)” in the features guide

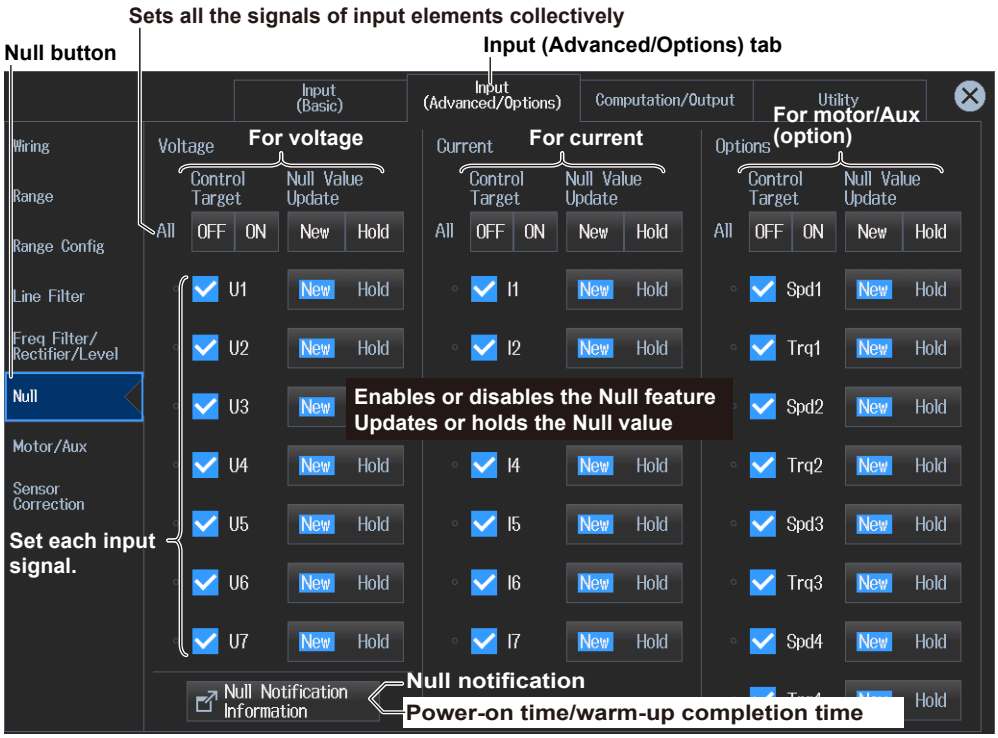
This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap the **Input (Advanced/Options)** tab. An input settings (advanced/options) overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Null**. The null feature setup screen appears.

Using the menu icon or the front panel keys on the next page, enable and disable the null feature.



Note

You can also display the input settings (advanced/options) overview screen by moving the cursor on the Input (Advanced/Options) tab using the arrow keys and then pressing SET.

Procedure Using the Menu Icons

You can use the menu icons shown on the right side of the screen to configure, enable, and disable the null feature.

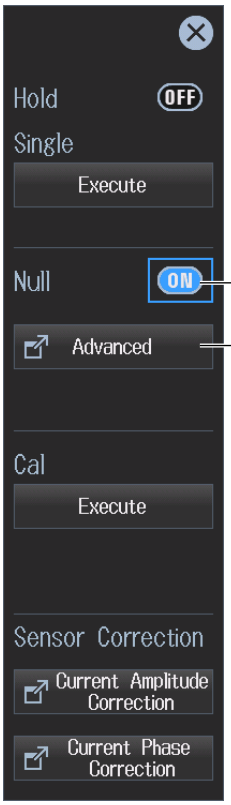
1. Tap the **Misc** menu icon

. A Misc menu appears in the sub menu area on the right side of the screen.
   By tapping the displayed items, you can specify the same settings as when using the tap operation explained earlier.

Configuring, Enabling, and Disabling the Null Feature

2. Tap **Advanced** under Null. The same null feature setup screen appears as shown on the previous page.
3. After configuring the feature, close the screen.
4. Tap the Null **ON/OFF** button to select ON. The NULL key illuminates, and the null feature is enabled.
   - The null value of each input signal is used for those signals whose null feature mode is set to ON.
   - If you tap the Null **ON/OFF** button and select OFF, the NULL key turns off, and the null feature is disabled.

Misc Menu



Enables or disables the null feature (OFF, ON)
While the null feature is enabled, the NULL key illuminates.

Configure the null feature.
See the previous page.

Procedure Using Keys

You can use the front panel keys to enable and disable the null feature.

Enables or disables the null feature
While the null feature is enabled, the NULL key LED illuminates.

11.2 Zero-Level Compensation (Cal)

► “Zero-Level Compensation (Cal Execute, CAL)” in the features guide

This section explains operating procedures using the following setup methods.

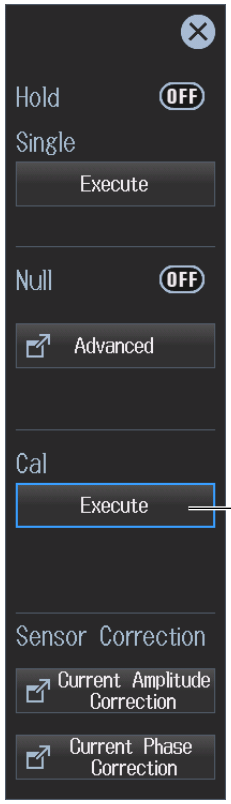
- Procedure Using the Menu Icons (see page iii)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Menu Icons

1. Tap the **Misc** menu icon

. A Misc menu appears in the sub menu area on the right side of the screen.
2. Tap the **Execute** under Cal. Zero-level compensation is executed.

Misc menu



Executes zero-level compensation (Cal)

Note

- The instrument automatically performs zero-level compensation after you change the measurement range or input filter.
- To make accurate measurements, we recommend that you execute zero-level compensation after warming up the instrument for at least 30 minutes.
- If the measurement range and input filter remain the same for a long period of time, the zero level may change due to the changes in the instrument’s environment. If this happens, we recommend that you execute zero-level compensation.
- The integration feature includes an auto calibration feature that automatically performs zero-level compensation.

Procedure Using Keys

You can also use the front panel keys to execute zero-level compensation (Cal).

12.1 Cursor Measurement on Waveforms

This instrument shows on the screen the waveforms of the voltage and current applied to the input elements or wiring units. When you place cursors on the waveforms, the instrument shows the measured values at the cursor positions.

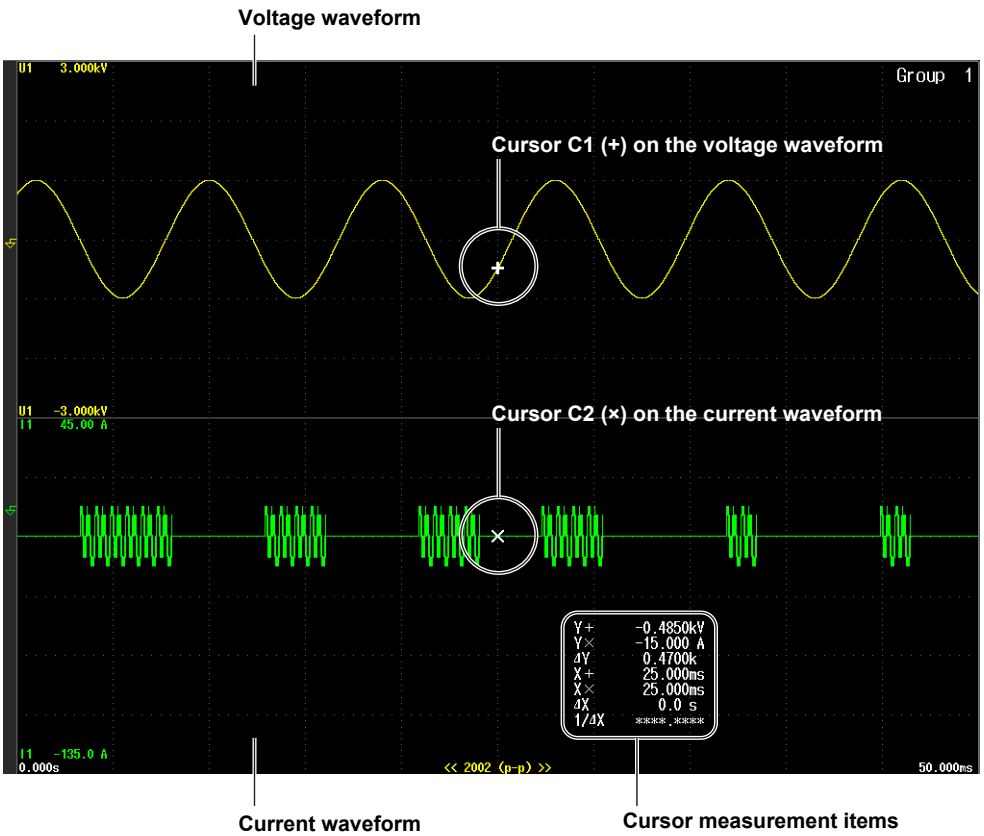
► “Cursor Measurement (Cursors)” in the features guide

Using an example, this section explains how to display waveform cursor measurement results.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Cursor Measurement on Waveforms (Example of voltage and current)

Waveform display of input element 1



Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 6.1.

Setting the Graph Display Type (Graph)

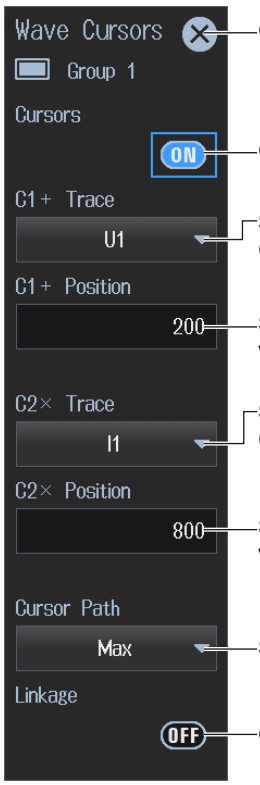
4. Tap **Graph** to select Wave.

Note

For instructions on how to display the waveforms, see sections 6.1 and 6.2.

Displaying the Cursors (Cursors)

5. Tap **Cursors**. A Wave Cursors screen appears.



Closes the menu

Cursor display (OFF, ON)

Set the waveform to measure using cursor 1(+).
(U1 to U7, I1 to I7, Spd1 to Spd2,[1] Spd3 to Spd4,[2] Trq1 to Trq2,[1] Trq3 to Trq4,[2] Aux1 to Aux4,[3] Aux5 to Aux8[4])

Set the cursor 1 (+) position (0, which is the left edge of the screen to 1000, which is the right edge of the screen)

Set the waveform to measure using cursor 2(×).
(U1 to U7, I1 to I7, Spd1 to Spd2,[1] Spd3 to Spd4,[2] Trq1 to Trq2,[1] Trq3 to Trq4,[2] Aux1 to Aux4,[3] Aux5 to Aux8[4])

Set the cursor 2 (×) position (0, which is the left edge of the screen to 1000, which is the right edge of the screen)

Set the cursor movement path (Max, Min, Mid).

Cursor movement linking (OFF, ON)

1 You can set this on models with the /MTR1 option when MTR Configuration is set to Single Motor or Double Motor (see section 9.1).

2 You can set this on models with the /MTR2 option when MTR Configuration is set to Single Motor or Double Motor (see section 9.1).

3 You can set this on models with the /MTR1 option when MTR Configuration is set to Auxiliary (see section 9.1).

4 You can set this on models with the /MTR2 option when MTR Configuration is set to Auxiliary (see section 9.1).

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

12.2 Cursor Measurement on Trends

This instrument shows on the screen the trends of the voltage and current applied to the input elements or wiring units. When you place cursors on the trends, the instrument shows the measured values at the cursor positions.

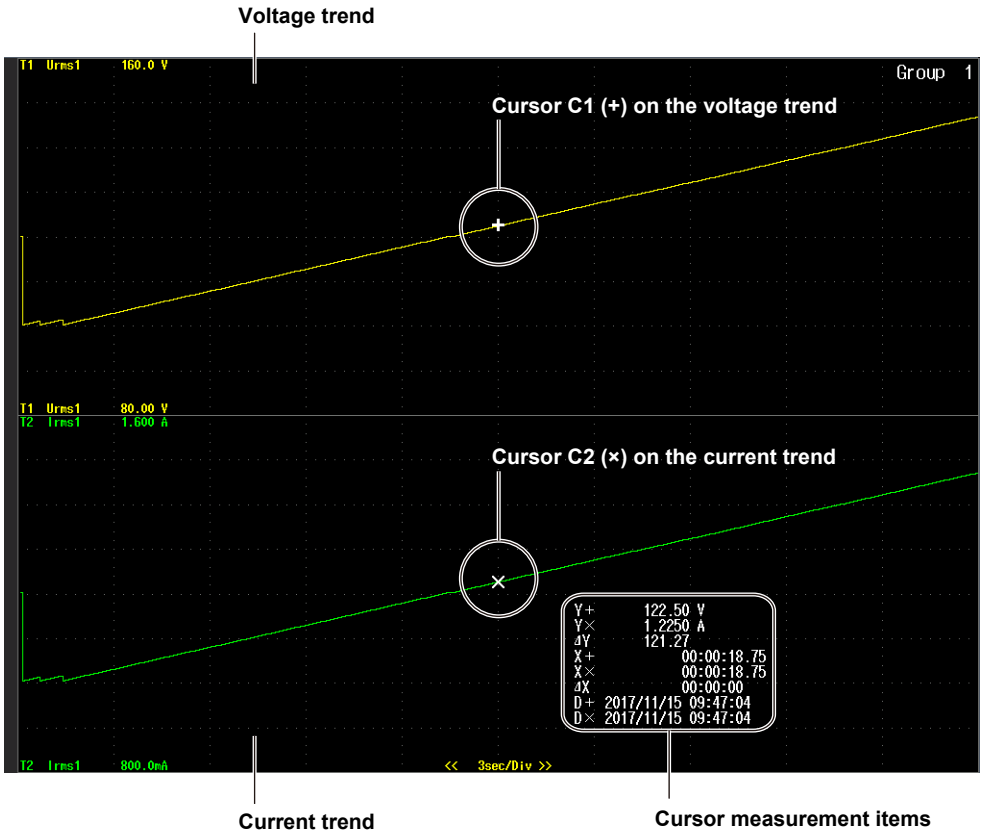
► “Cursor Measurement (Cursors)” in the features guide

Using an example, this section explains how to display trend cursor measurement results.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Cursor Measurement on Trends (Example of voltage and current)

Trend display of input element 1



Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 6.1.

Setting the Graph Display Type (Graph)

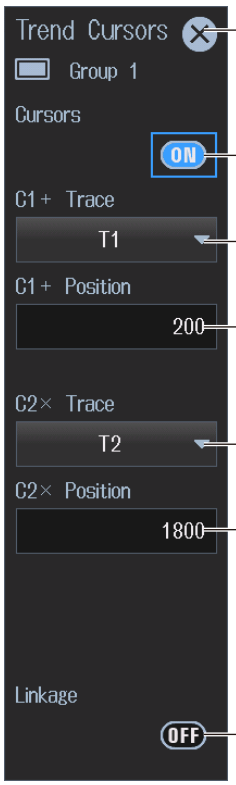
4. Tap **Graph** to select Trend.

Note

For instructions on how to display the waveforms, see sections 6.1 and 6.3.

Displaying the Cursors (Cursors)

5. Tap **Cursors**. A Trend Cursors screen appears.



Closes the menu

Cursor display (OFF, ON)

Set the trend to measure with cursor 1 (+) (T1 to T16).

Set the cursor 1 (+) position (0, which is the left edge of the screen to 2001, which is the right edge of the screen)

Set the trend to measure with cursor 2 (×) (T1 to T16).

Set the cursor 2 (×) position (0, which is the left edge of the screen to 2001, which is the right edge of the screen)

Cursor movement linking (OFF, ON)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

12.3 Cursor Measurement on Bar Graphs

This instrument shows on the screen the harmonic orders and magnitudes of the voltage, current, and the like applied to the input elements with bar graphs. When you place cursors on the bar graphs, the instrument shows the measured values at the cursor positions.

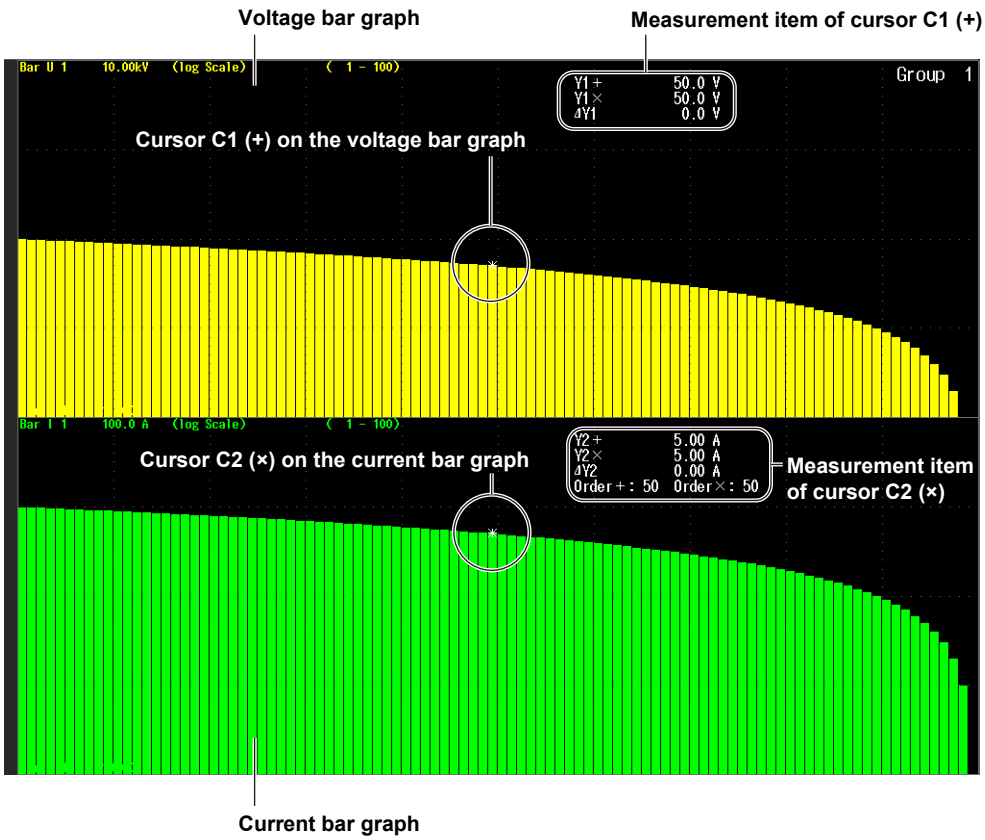
► "Cursor Measurement (Cursors)" in the features guide

Using an example, this section explains how to display bar graph cursor measurement results.
In addition, this section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Menu Icons (see page iii)

Cursor Measurement on Bar Graphs (Example of voltage and current)

Bar graph display of input element 1



Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Display**.

   A display format setup screen (Numeric/Graph) appears. For details, see section 6.1.

Setting the Graph Display Type (Graph)

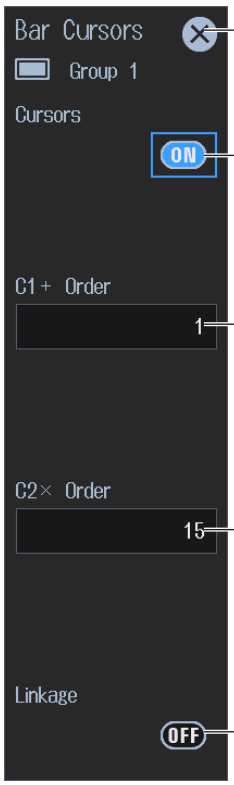
4. Tap **Graph** to select Bar.

Note

For instructions on how to display the waveforms, see sections 6.1 and 6.4.

Displaying the Cursors (Cursors)

5. Tap **Cursors**. The following screen appears.



Closes the menu

Cursor display (OFF, ON)

Set the harmonic order of the bar graph to measure with cursor 1 (+) (0, dc to 500).

Set the harmonic order of the bar graph to measure with cursor 2 (×) (0, dc to 500).

Cursor movement linking (OFF, ON)

Procedure Using the Menu Icons

You can also use the menu icons shown on the right side of the screen to switch the displayed items.

1. Tap the **Display** menu icon

. A Display menu appears in the sub menu area on the right side of the screen.

By tapping the displayed items, you can specify the same operation as explained in “Switching the Displayed Items” described earlier.

Note

For details on the Display menu, see page iv.

13.1 Setting IEC Harmonic Measurement Conditions

► "IEC Harmonic Measurement (Option)" in the features guide
► "Harmonic Measurement Conditions (Harmonics)" in the features guide

This section explains how to perform harmonic measurements in accordance with IEC 61000-4-7. Harmonic measurement and judgment can be performed in accordance with IEC 61000-3-2 by controlling this instrument using the Harmonic/Flicker Measurement Software (sold separately). This section explains operating procedures using the following setup methods.

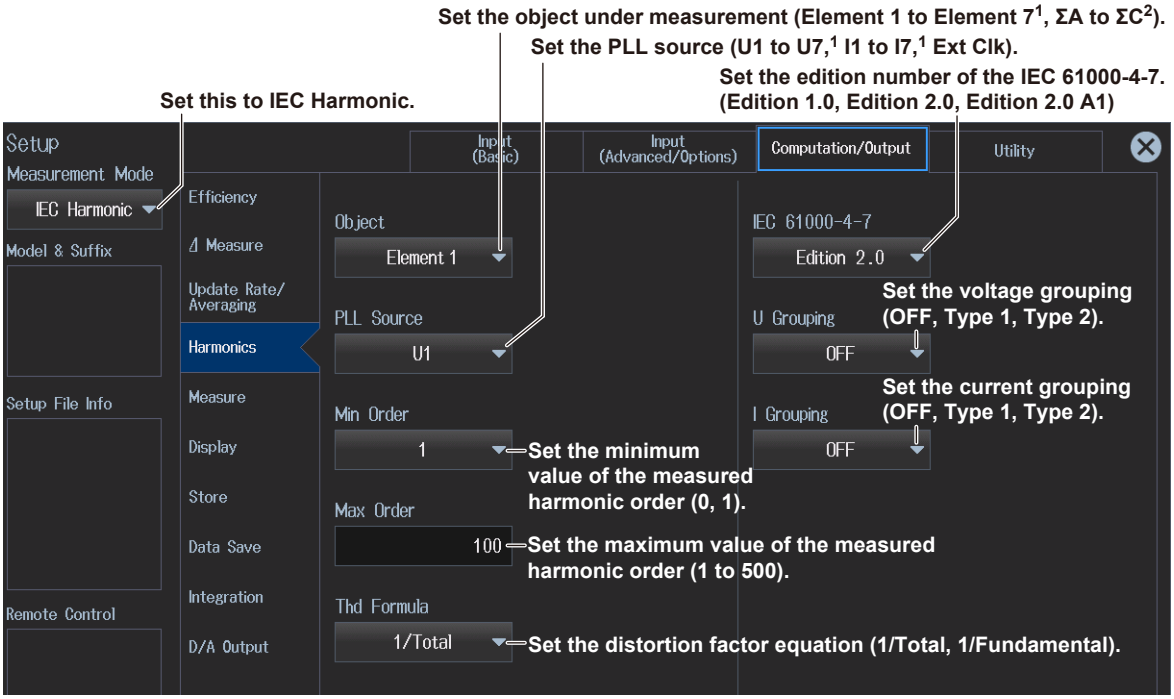
- Procedure Using the Setup Menu (see chapter 1)

Note

- In IEC Harmonic measurement, there is a limitation on the instrument functions and measurement functions that can be measured. See the appendix in the *Getting Started Guide*, IM WT5000-03EN.
- While controlling this instrument with the Harmonic/Flicker Measurement Software, do not release the instrument's remote mode and change the instrument's settings. If you do, the instrument may not be able to perform harmonic measurement in accordance with the IEC standard. If you release the instrument's remote mode, close the Harmonic/Flicker Measurement Software.

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. From the **Measurement Mode** pull-down menu, select IEC Harmonic. An IEC harmonic measurement setup screen appears.
   Pressing **ESC** closes the setup screen.



1 Can be set within the range of the installed input elements.
2 Can be set within the range of the wiring unit that is automatically determined by the installed input elements.

14.1 Configuring IEC Voltage Fluctuation/Flicker Measurements

► “IEC Voltage Fluctuation and Flicker Measurement (Option)” in the features guide
► “Measurement Conditions (Measured Settings)” in the features guide
► “Judgment Conditions (Limit Settings)” in the features guide

This section explains how to perform IEC voltage fluctuation/flicker measurements.
Operating procedures are explained using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)

Note

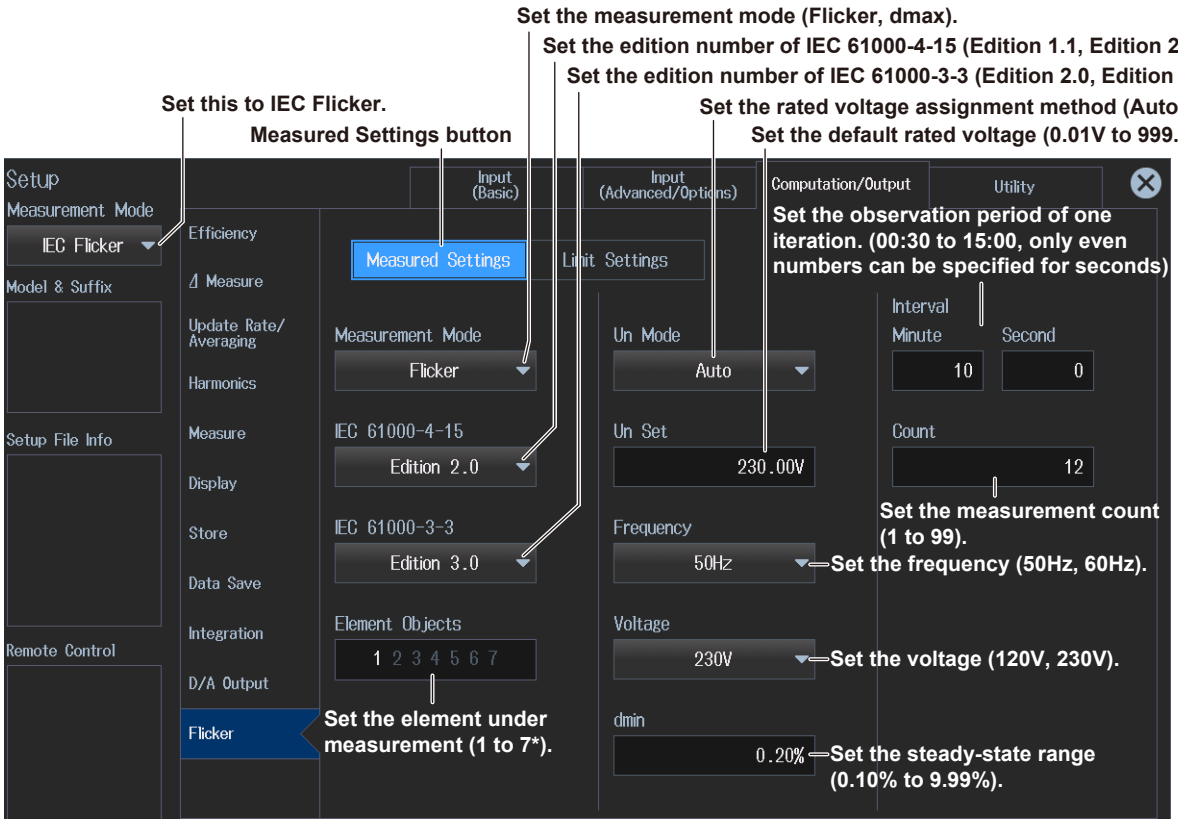
- In IEC voltage fluctuation/flicker measurement, there is a limitation on the instrument functions and measurement functions that can be measured. See the appendix in the *Getting Started Guide*, IM WT5000-03EN.
- While controlling this instrument with the Harmonic/Flicker Measurement Software, do not release the instrument’s remote mode and change the instrument’s settings. If you do, the instrument may not be able to perform voltage fluctuation/flicker measurement in accordance with the IEC standard. If you release the instrument’s remote mode, close the Harmonic/Flicker Measurement Software.

Procedure Using the Setup Menu

1. Tap the **Setup** icon ( ), or press **MENU** under SETUP.
2. From the **Measurement Mode** pull-down menu, select IEC Flicker. A voltage fluctuation/flicker measurement setup screen appears.
   Pressing **ESC** closes the setup screen.

Setting Measurement Conditions (Measured Settings)

3. Tap the **Measured Settings** tab. An measurement condition setup screen appears.



* Can be set within the range of the installed input elements.

Setting Judgment Conditions (Limit Settings)

3. Tap the **Limit Settings** tab. A judgment condition setup screen appears.

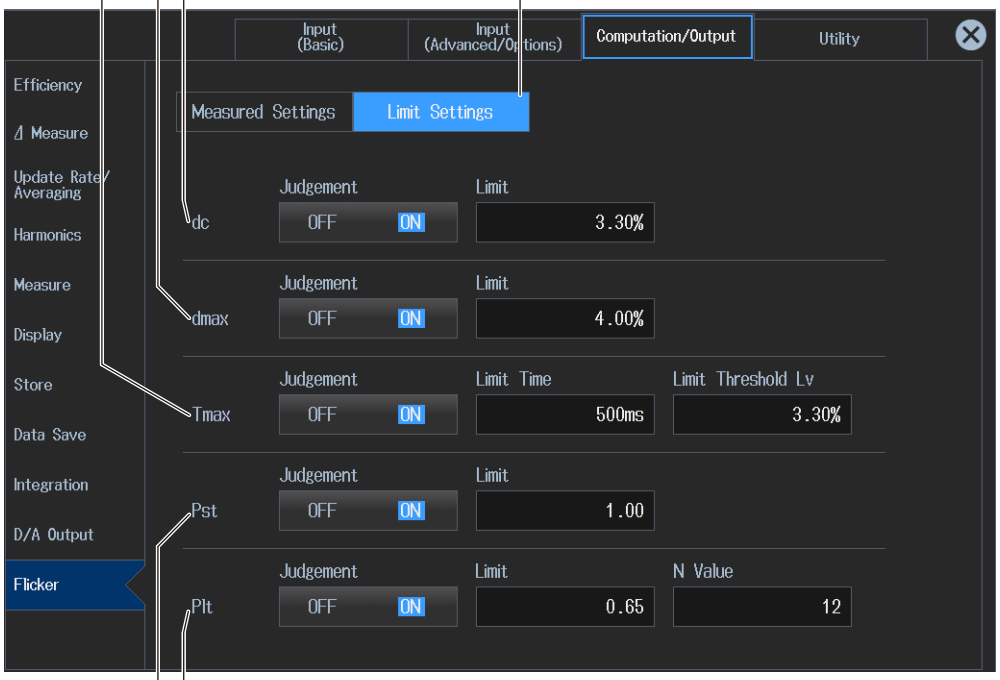
Turn on or off the judgment of the period during which relative voltage change exceeds the threshold level Tmax, set the Tmax limit value (1 ms to 99999 ms), and set the threshold level (1.00% to 99.99%).

"d(t)" is displayed here when the IEC 61000-4-15 edition number is set to Edition 1.1 or the IEC 61000-3-3 edition number is set to Edition 2.0.

Turn on or off the judgment of the maximum relative voltage change dmax, and set the dmax limit value (1.00% to 99.99%).

Turn on or off the judgment of the relative steady-state voltage change dc, and set the dc limit value (1.00% to 99.99%).

Limit Settings button



Turn on or off the judgment of the long-term flicker value Plt, set the Plt limit value (0.10 to 99.99), and set constant N of the calculation equation for long-term flicker value Plt (1 to 99).

Turn on or off the judgment of the short-term flicker value Pst, and set the Pst limit value (0.10 to 99.99).

14.2 Executing IEC Voltage Fluctuation/Flicker Measurements

► “Executing the Normal Voltage Fluctuation and Flicker Measurements” in the features guide
► “Executing the Measurement of dmax Caused by Manual Switching” in the features guide

This section explains how to perform IEC voltage fluctuation/flicker measurements.
Operating procedures are explained using the following setup methods.

- Procedure Using the Menu Icons (see page iii)

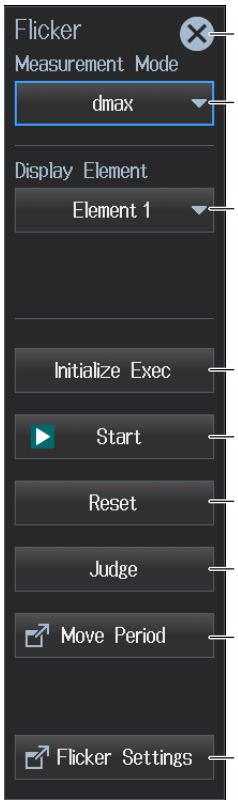
For the relationships between measurement operation (transition of the flicker measurement status) and initializing, starting, and resetting, see the execution workflow of each measurement in the Features Guide.

1. Set the measurement mode to IEC Flicker according to steps 1 and 2 in section 14.1.
   The Integration icon at the right edge of the screen changes to the Flicker icon.
2. Tap the **Flicker** menu icon . A Flicker menu appears in the sub menu area on the right side of the screen.
3. Set the voltage fluctuation/flicker measurement mode to Flicker or dmax.
   A menu is displayed according to the selected measurement mode.
4. Tap **Initialize Exec** to perform initialization.
   Initialization takes about 30 seconds. When the flicker measurement status in the upper center of the screen changes to “Ready,” the **Start** button is enabled.
5. Tap **Start** to start measuring.
   In dmax measurement mode, when the measurement of a single observation period is completed, the measurement operation stops, and the flicker measurement status changes to “Ready.” To perform dmax measurement 24 times, tap **Start** every time the status becomes “Ready.”

Normal voltage fluctuation/flicker measurement

Closes the menu
Set the measurement mode to Flicker.
Switch the element you want to display the measurement data of.
Scrolls the screen page
Executes initialization
Starts a measurement
Reset
Set the measurement conditions and judgment conditions (see section 14.1).

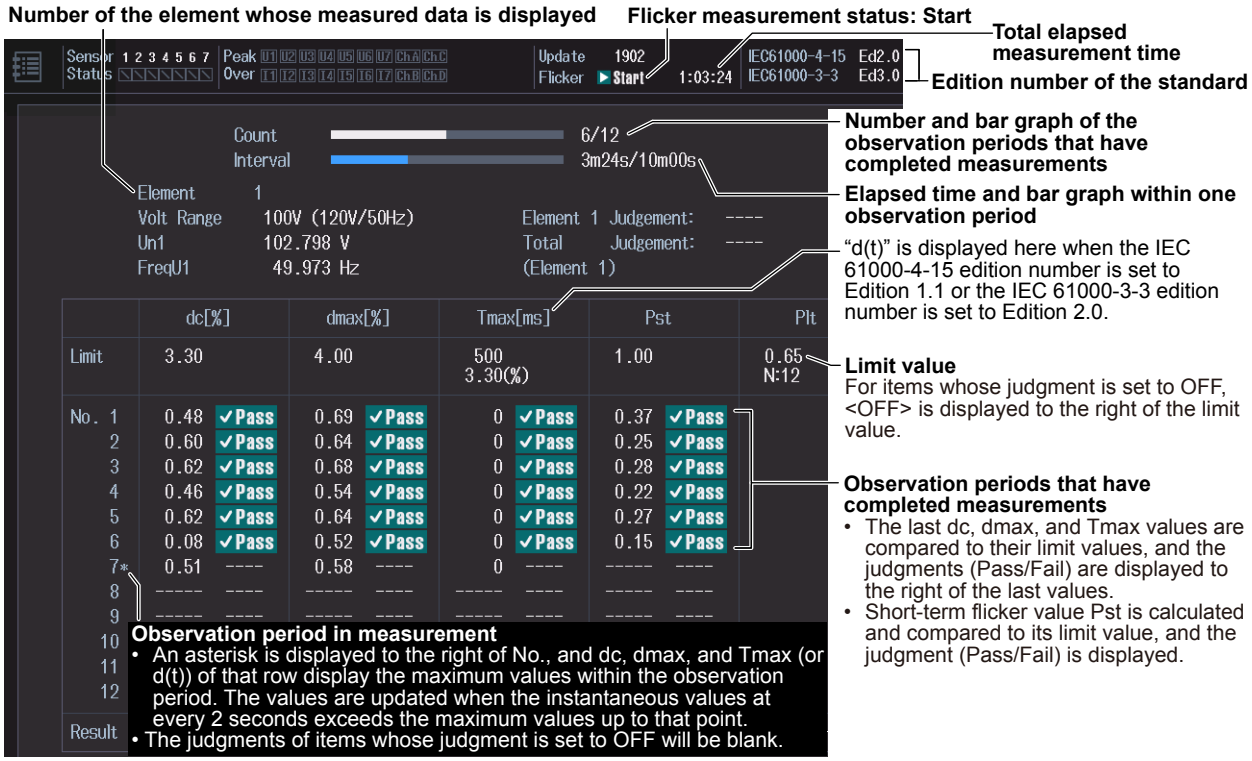
Measurement of dmax caused by manual switching



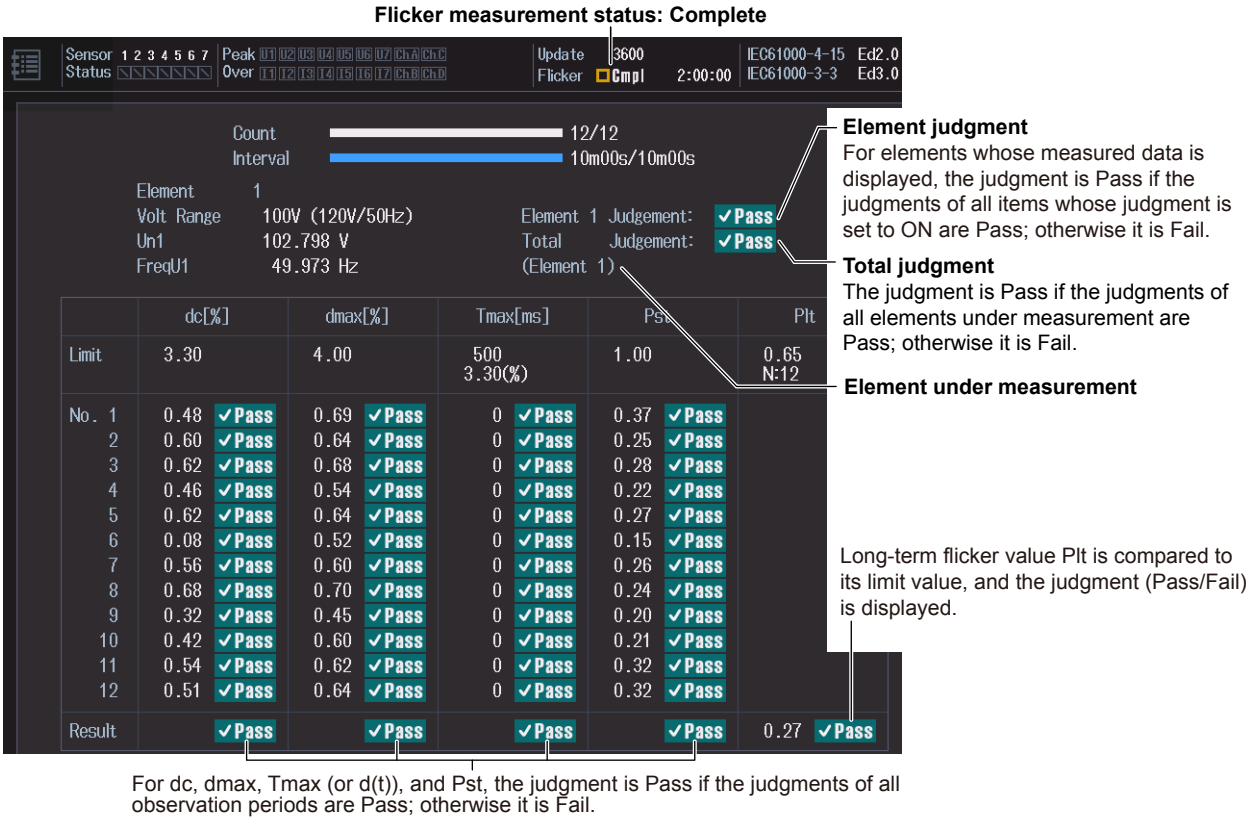
Closes the menu
Set the measurement mode to dmax.
Switch the element you want to display the measurement data of.
Executes initialization
Starts a measurement
Reset
Completes the measurement and displays the judgment
Changes the observation period and measures again
Set the measurement conditions and judgment conditions (see section 14.1).

Display Example; Normal Voltage Fluctuation/Flicker Measurement (Measurement mode: Flicker)

Display during Measurement

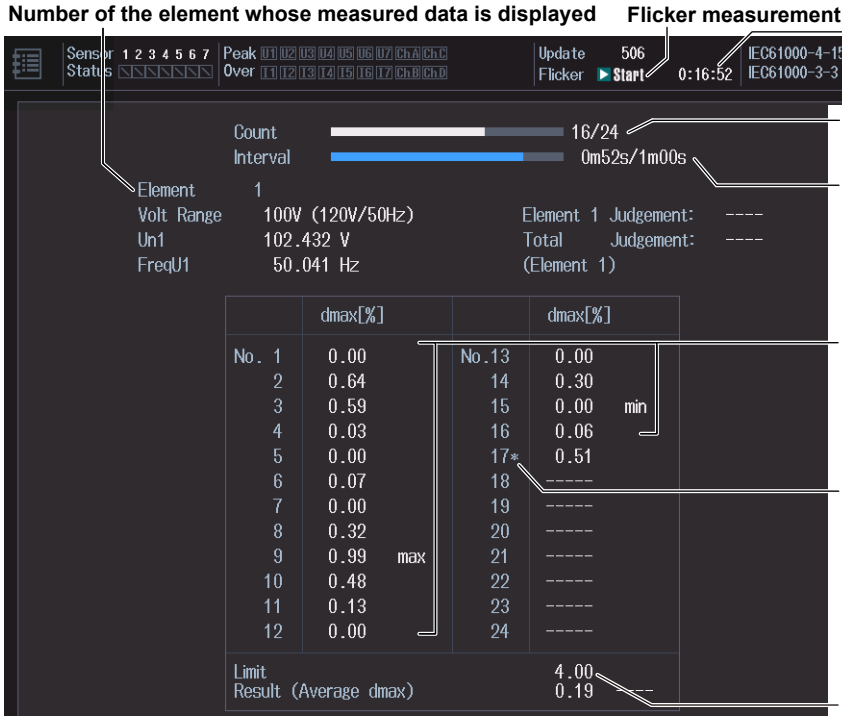


Judge Display When the Measurement Is Complete



Display Example; Measurement of dmax Caused by Manual Switching (Measurement mode: dmax)

Display during Measurement

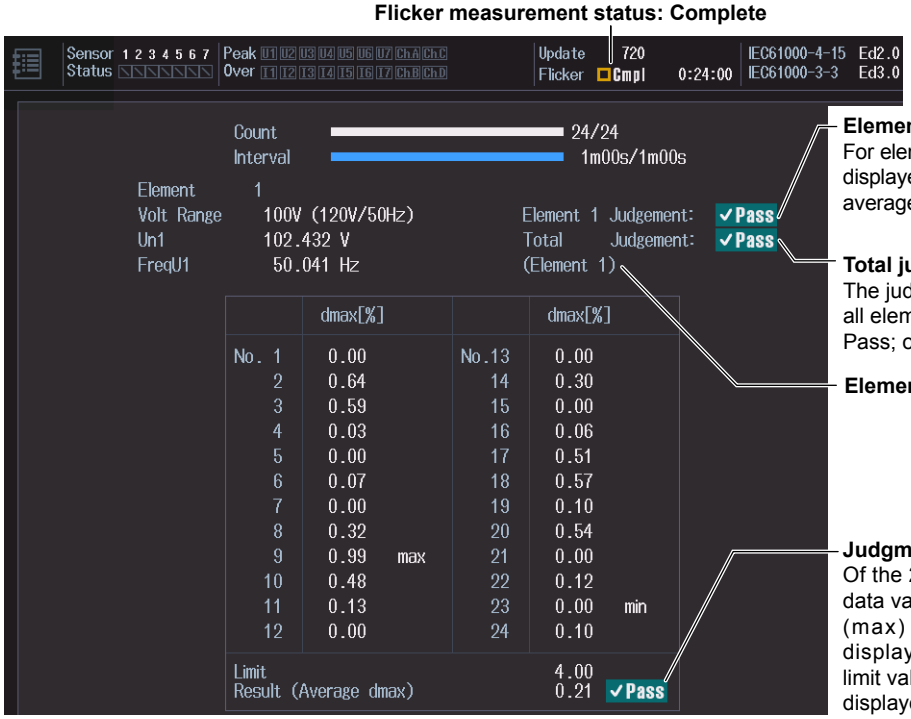


Observation periods that have completed measurements
For the dmax values in the observation periods up to this point, "max" and "min" are displayed to the right of the maximum and minimum dmax values.

Observation period in measurement
An asterisk is displayed to the right of No., and dmax of that row displays the maximum value within the observation period. The values are updated when the instantaneous values at every 2 seconds exceeds the maximum values up to that point.

Limit value

Judge Display When the Measurement Is Complete



Element judgment
For elements whose measured data is displayed, the judgment result of the average dmax value is displayed.

Total judgment
The judgment is Pass if the judgments of all elements under measurement are Pass; otherwise it is Fail.

Element under measurement

Judgment of the average dmax value
Of the 24 dmax values, the average of 22 data values, which excludes the maximum (max) and minimum (min) values, is displayed. The value is compared to its limit value, and the judgment (Pass/Fail) is displayed.

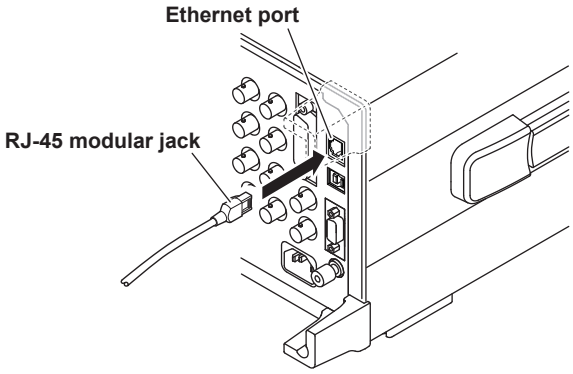
15.1 Connecting the Instrument to a Network

This section explains how to connect the instrument to a network.

Ethernet Interface Specifications

There is a 1000BASE-T port located on the rear panel of this instrument.

Item	Specifications
Ports	1
Electrical and mechanical specifications	IEEE802.3 compliant, Auto-MDIX
Transmission system	Ethernet(1000BASE-T/100BASE-TX/10BASE-T)
Communication protocol	TCP/IP
Supported services	Server: FTP, remote control (VXI-11, Socket), Modbus/TCP, and Web Client: DHCP, DNS, SNTP, FTP (Net Drive)
Connector type	RJ-45 connector



Items Required to Connect the Instrument to a Network

Cable

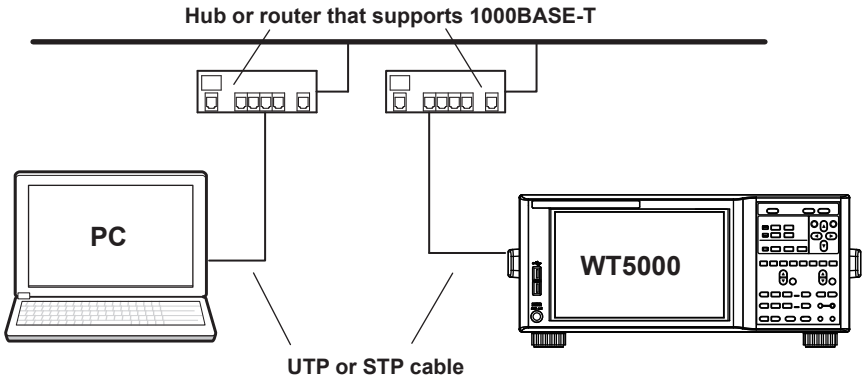
Use one of the following types of network cable that conforms to the transfer speed of your network.

- A UTP (Unshielded Twisted-Pair) cable
- An STP (Shielded Twisted-Pair) cable

Connection Procedure

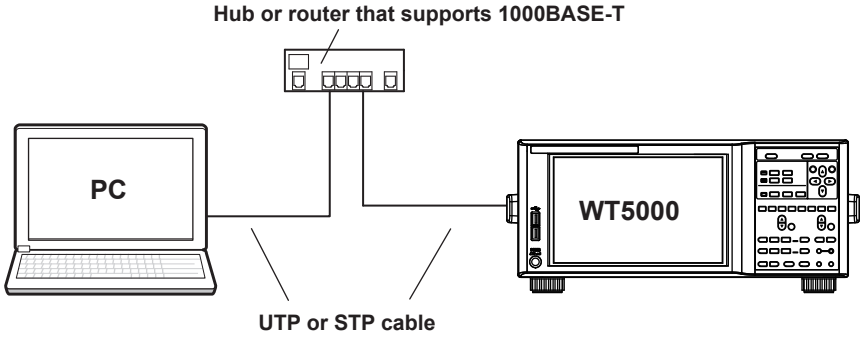
To Connect to a PC over a Network

1. Turn off the instrument.
2. Connect one end of a UTP (or STP) cable to the ETHERNET 1000BASE-T port on the rear panel.
3. Connect the other end of the UTP (or STP) cable to a hub or router.
4. Turn on the instrument.



To Connect to a PC through a Hub or Router

1. Turn off the instrument and the PC.
2. Connect one end of a UTP (or STP) cable to the ETHERNET 1000BASE-T port on the rear panel.
3. Connect the other end of the UTP (or STP) cable to a hub or router.
4. Connect the PC to the hub or router in the same way.
5. Turn on the instrument.



Note

- Use a hub or router that conforms to the transfer speed of your network.
- When you connect a PC to the instrument through a hub or router, the PC must be equipped with an auto switching 1000BASE-T/100BASE-TX/10BASE-T network card.
- Do not connect the instrument to a PC directly. Direct communication without a hub or router is not guaranteed to work.

15.2 Configuring the TCP/IP Settings

► “TCP/IP (TCP/IP)” in the features guide

This section explains operating procedures using the following setup methods.

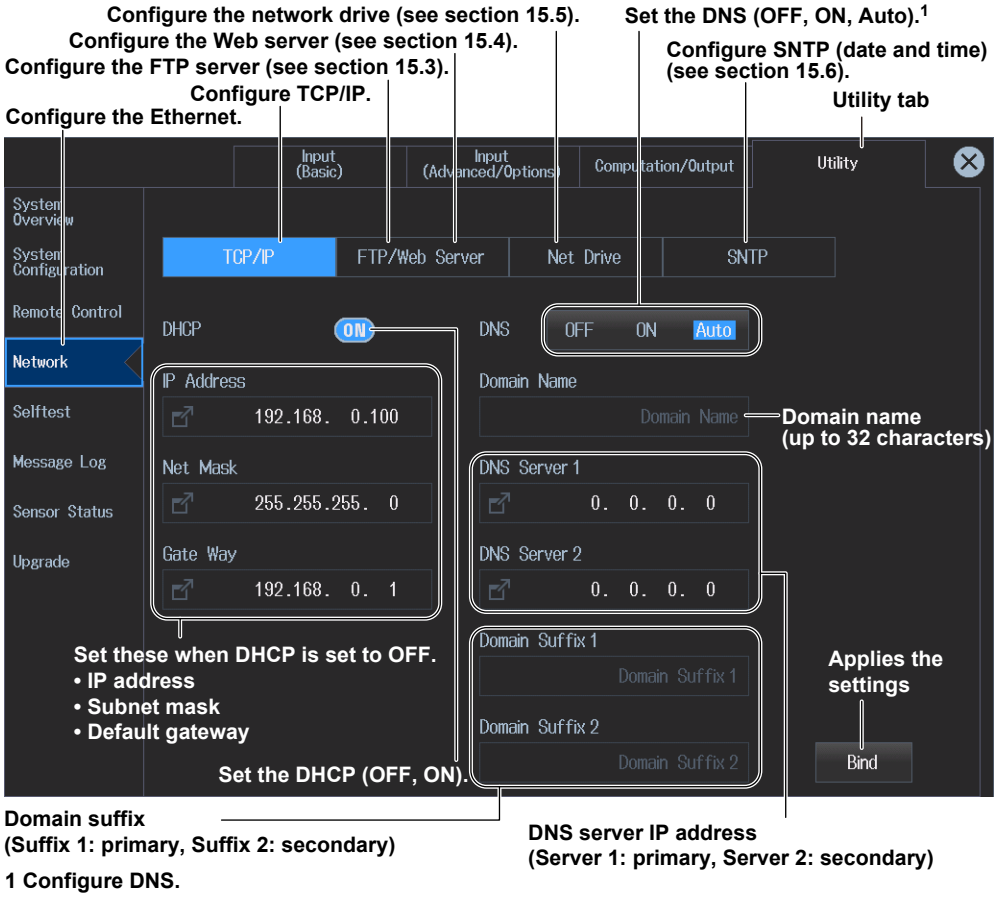
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Network**. An Ethernet setup screen (TCP/IP, FTP/Web Server, Net Drive, SNTP) appears.

Configuring the TCP/IP Settings (TCP/IP)

4. Tap **TCP/IP**. A TCP/IP screen appears.



1 Configure DNS.

- OFF: DNS is disabled.
- ON: DNS is enabled.
  Set the domain name, and the DNS server's primary and secondary IP addresses and domain suffixes.
- Auto: DNS is enabled.
  Set the domain suffix. The domain name and the DNS server IP addresses are set automatically.
  The Auto option is only displayed when DHCP is set to ON.

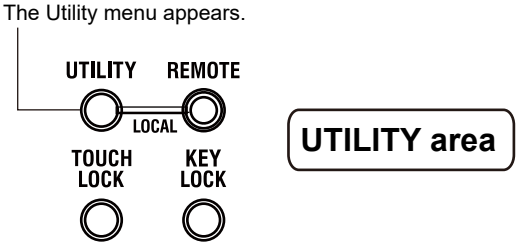
Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

You can also use the front panel keys to configure Ethernet communication.

Configure Ethernet communication.
The Utility menu appears.



15.3 Accessing the Instrument from a PC (FTP Server)

► “FTP Server (FTP/Web Server)” in the features guide

This section explains operating procedures using the following setup methods.

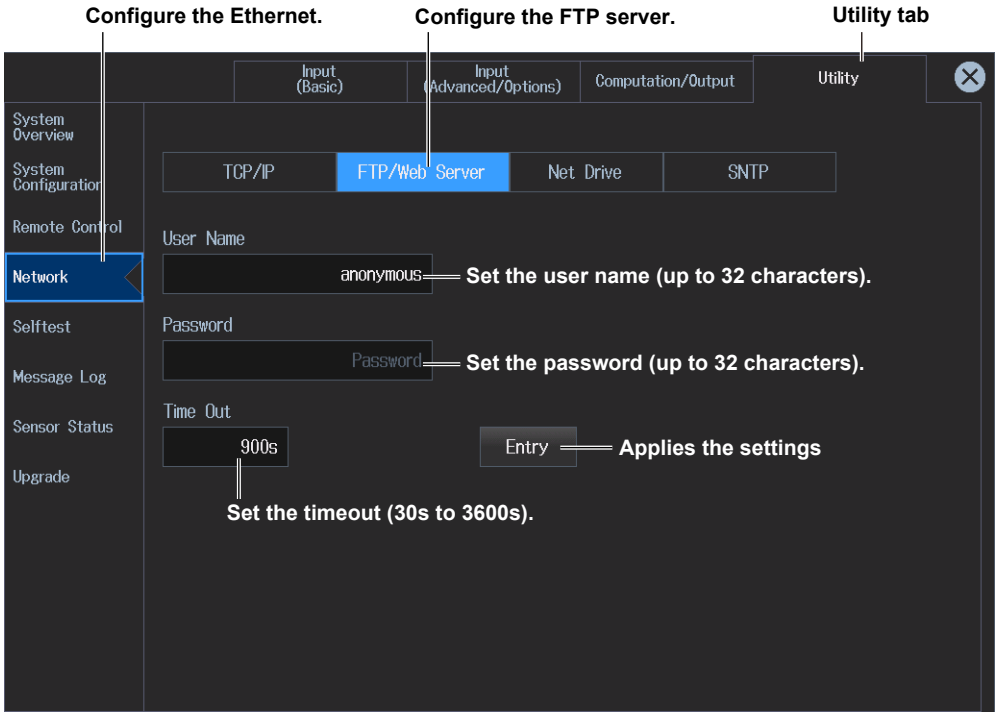
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Network**. An Ethernet setup screen (TCP/IP, FTP/Web Server, Net Drive, SNTP) appears.

Configuring the FTP Server (FTP Server)

4. Tap **FTP/Web Server**. An FTP/Web Server screen appears.



Note

- If you set the user name to “anonymous,” you can connect to the instrument without entering a password.
- You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

FTP Client Software

Start an FTP client on a PC.

Enter the user name and password that you entered on the screen shown above to connect to the instrument.

Procedure Using Keys

See section 15.2.

15.4 Web Server Feature

► “Web Server (FTP/Web Server)” in the features guide

This section explains operating procedures using the following setup methods.

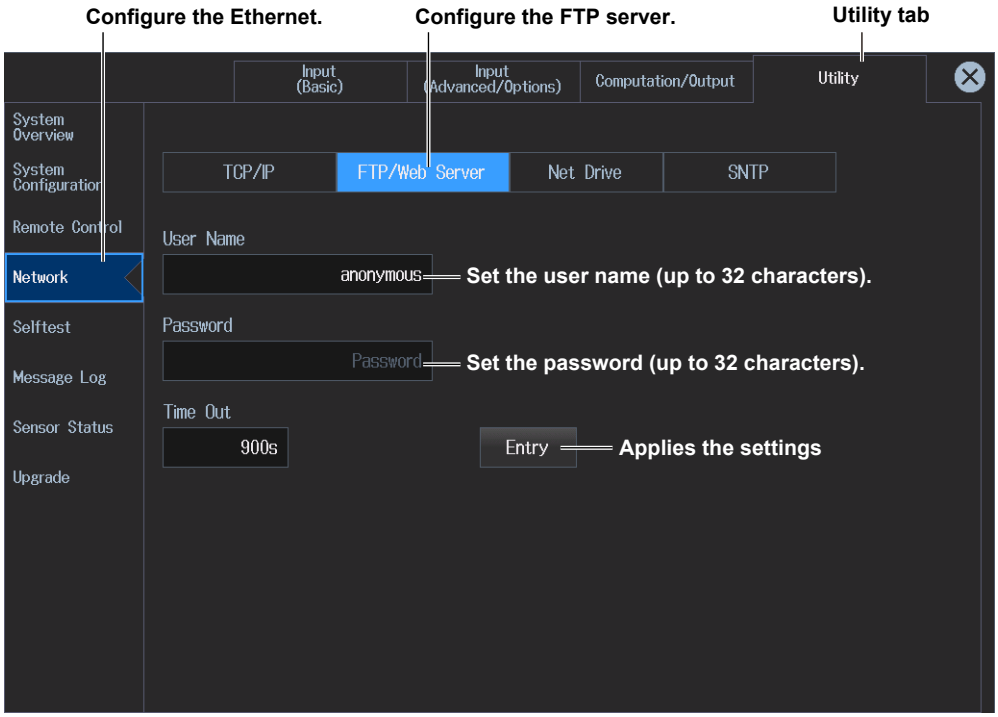
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Network**. An Ethernet setup screen (TCP/IP, FTP/Web Server, Net Drive, SNTP) appears.

Configuring the Web Server (Web Server)

4. Tap **FTP/Web Server**. An FTP/Web Server screen appears.
   Time Out is a setting used by the FTP server feature. You do not have to set it for the Web server feature.



Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 15.2.

Operations on the PC

1. Open a Web browser on a PC that is connected to the network.
2. Specify the following address.
   http://xxx.xxx.xxx.xxx/
   (Type this instrument's IP address for xxx.xxx.xxx.xxx.)
3. Enter the user name and password that you entered on the screen shown on the previous page to connect to the instrument. The instrument's home screen appears.
   If you set the user name to "anonymous," you can connect to the instrument without entering a password.
4. Click a side navigation item. The corresponding screen appears.

Note

- Disable the pop-up blocker feature on your Web browser when you want to capture the screen image.
- While using the Web server feature, there may be a delay in response or no response depending on the network environment.

15.5 Connecting to a Network Drive

► “Network Drive (Net Drive)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

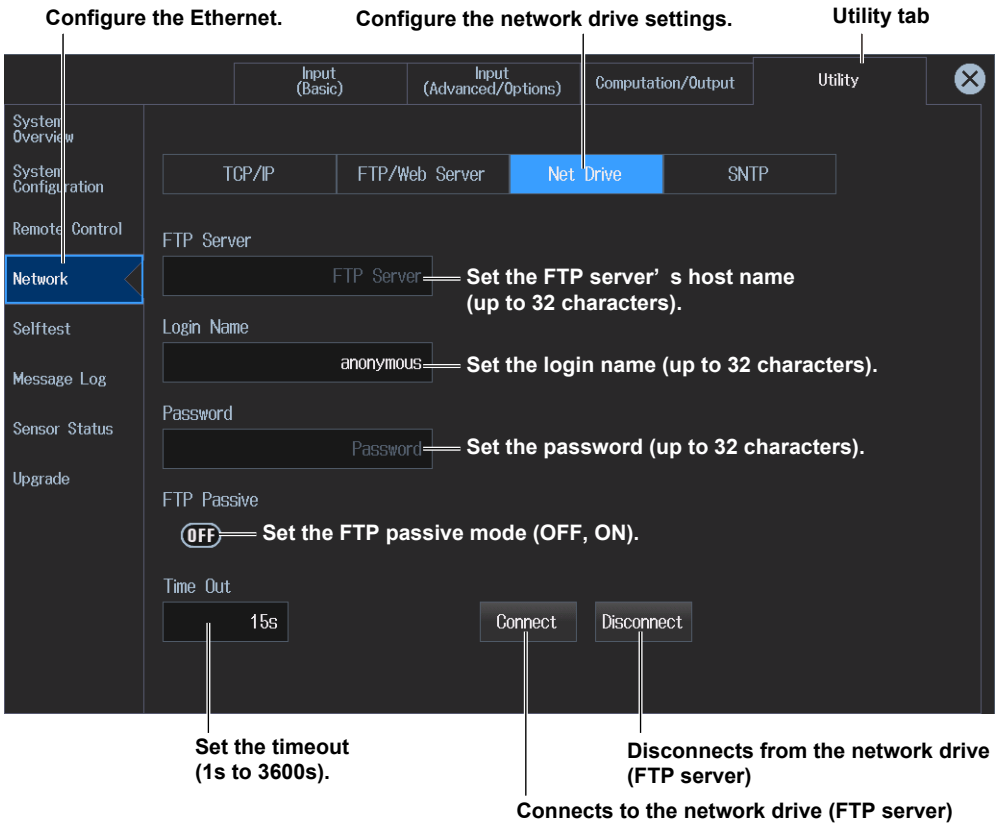
Procedure Using the Setup Menu

1. Tap the **Setup** icon

, or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Network**. An Ethernet setup screen (TCP/IP, FTP/Web Server, Net Drive, SNTP) appears.

Configuring the Network Drive (Net Drive)

4. Tap **Net Drive**. A Net Drive screen appears.



Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 15.2.

15.6 Setting the Date and Time via SNTP

► “SNTP (SNTP)” in the features guide

This section explains operating procedures using the following setup methods.

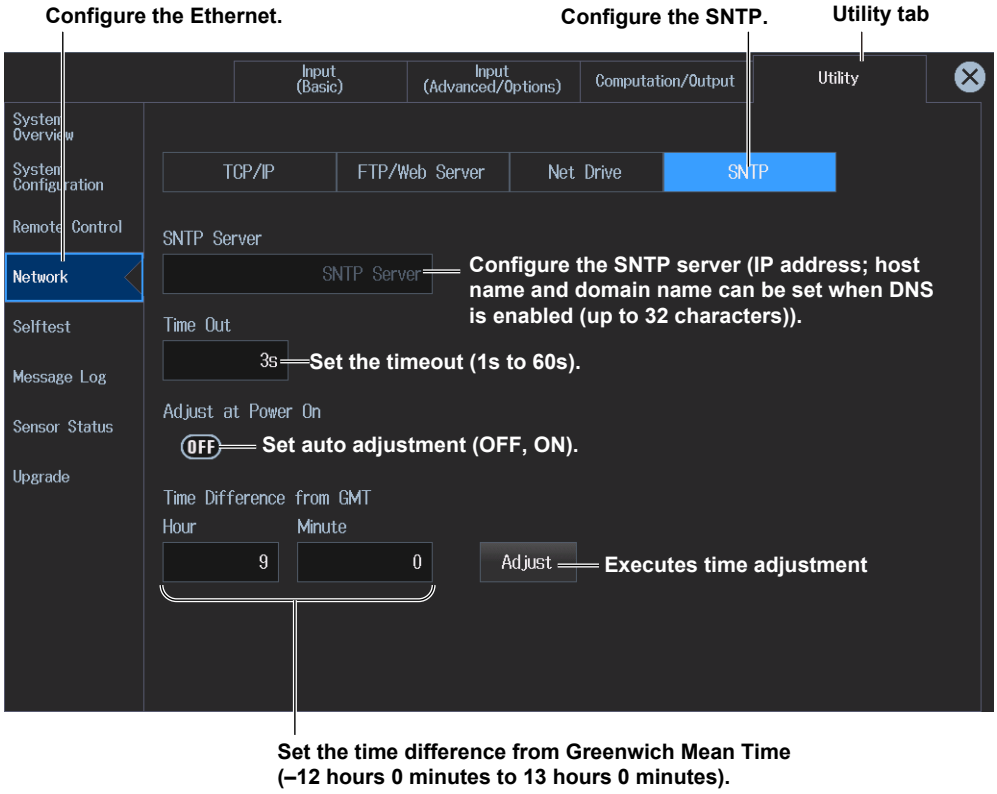
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.
3. Tap **Network**. An Ethernet setup screen (TCP/IP, FTP/Web Server, Net Drive, SNTP) appears.

Configuring the SNTP Settings (SNTP)

4. Tap **SNTP**. An SNTP screen appears.



Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 15.2.

16.1 Remote Control

► “Remote Control (Remote Control)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

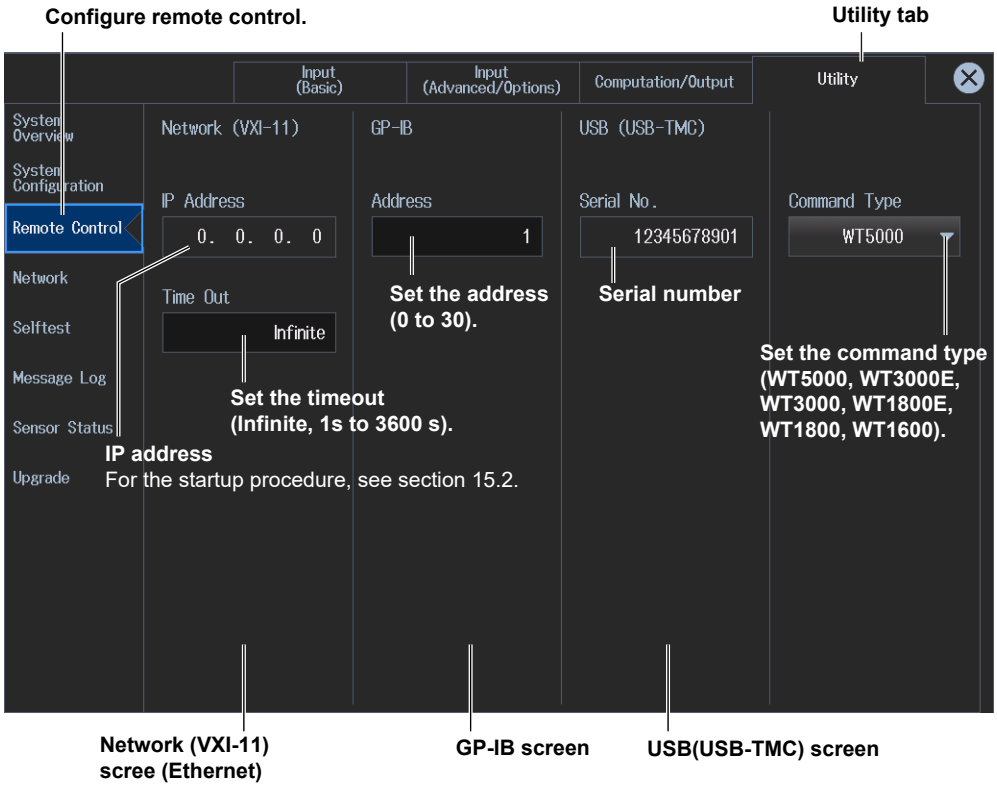
Procedure Using the Setup Menu

1. Tap the **Setup** icon

, or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Remote Control Settings (Remote Control)

3. Tap **Remote Control**. A remote control setup screen (Network(VXI-11/GP-IB/USB(USB-TMC)) appears.



Note

- Only use one communication interface: GP-IB, USB, or Network. If you send commands simultaneously from more than one communication interface, the instrument will not execute the commands properly.
- You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Network (VXI-11)

To use the Ethernet interface, you must specify the following TCP/IP settings.

- IP address
- Subnet mask
- Default gateway

For details on setting these parameters, see section 15.2.

USB Settings

- Install the YOKOGAWA USB driver on your PC. For information about how to obtain the YOKOGAWA USB driver, contact your nearest YOKOGAWA dealer. You can also access the YOKOGAWA USB driver download web page and download the driver.
  http://www.yokogawa.com/jp-ymi/tm/F-SOFT/
- Do not use USB drivers (or software) supplied by other companies.

GP-IB Settings

- When the controller is communicating with the instrument or with other devices through GP-IB, do not change the address.
- Each device that is connected in a GP-IB system has its own unique address. This address is used to distinguish between different devices. Therefore, you must assign a unique address to the instrument when connecting it to a PC or other device.

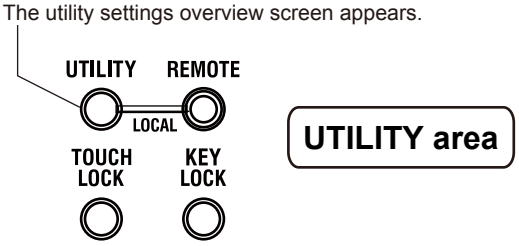
Command Type

Specify the command type compatible with this instrument or legacy models (WT3000E, WT3000, WT1800E, WT1800, WT1600).
The response to the *IDN? and *OPT? commands will be according to the model of the specified command type.

Procedure Using Keys

You can also press UTILITY on the front panel to display the utility settings overview screen.

The utility settings overview screen appears.



16.2 Configuring the D/A Output (option)

► “D/A Output (D/A Output, option)” in the features guide

This section explains operating procedures using the following setup methods.

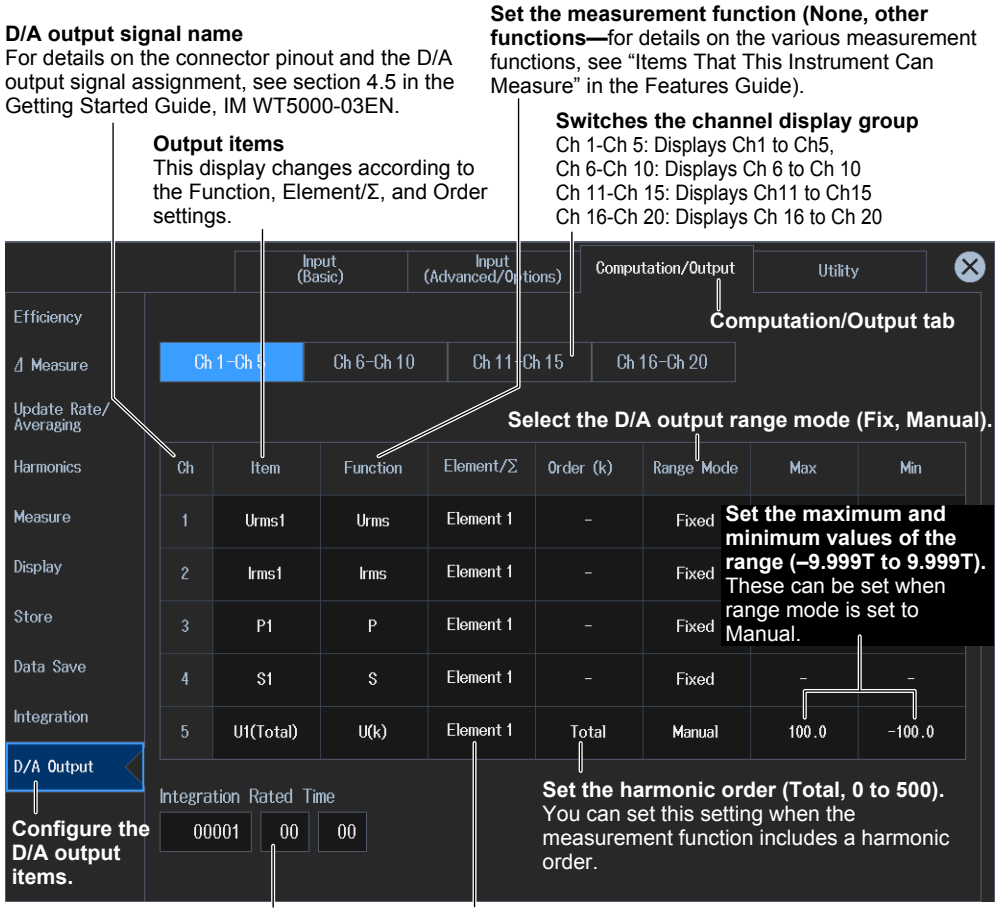
- Procedure Using the Setup Menu (see chapter 1)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap **Computation/Output** tab. A computation and output settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Configuring the D/A Output (D/A Output)

3. Tap **D/A Output**. A DA output setup screen appears.



Note

You can also display the computation/output settings overview screen by moving the cursor on the Computation/Output tab using the arrow keys and then pressing SET.

16.3 Configuring the IEEE 1588 Time Synchronization

► “IEEE 1588 Time Synchronization Feature (IEEE 1588)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

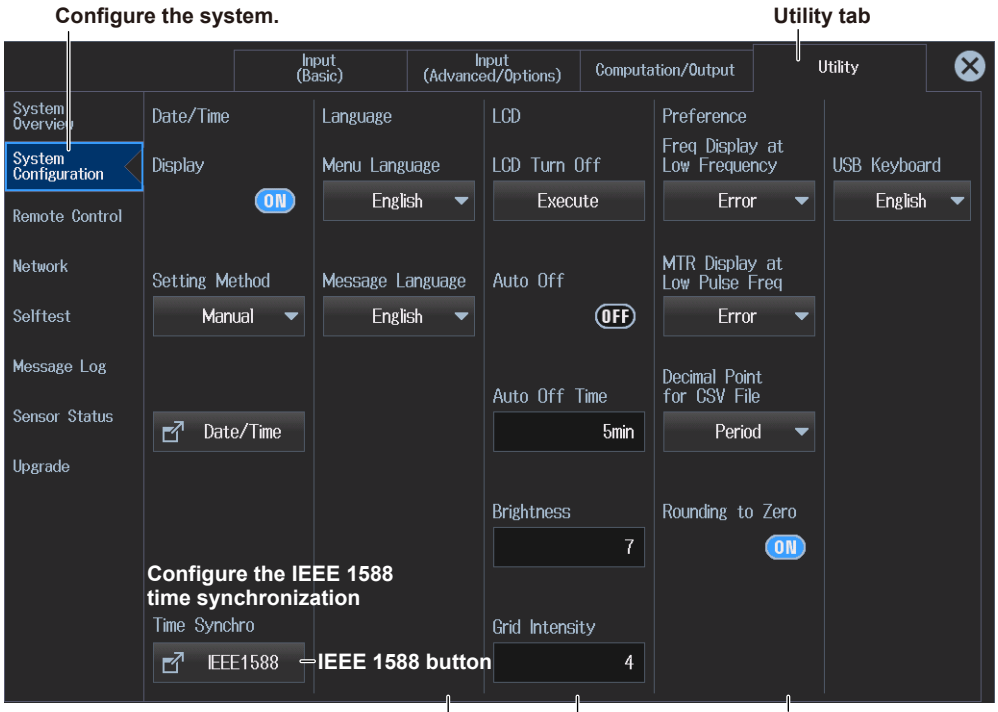
Procedure Using the Setup Menu

1. Tap the **Setup** icon

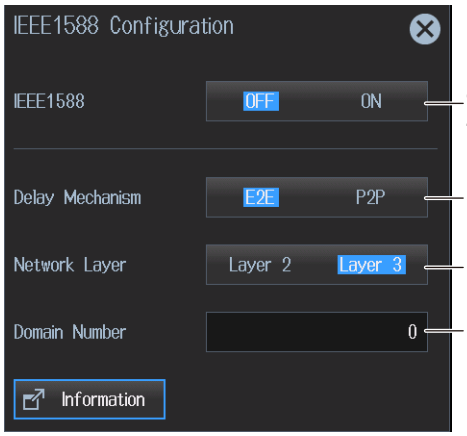
, or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Configuring the IEEE 1588 Time Synchronization

3. Tap System Configuration. A system setup (Date/Time, Language, LCD, Preference) appears.



IEEE 1588 Configuration Screen



Turns the IEEE1588 time synchronization feature on and off

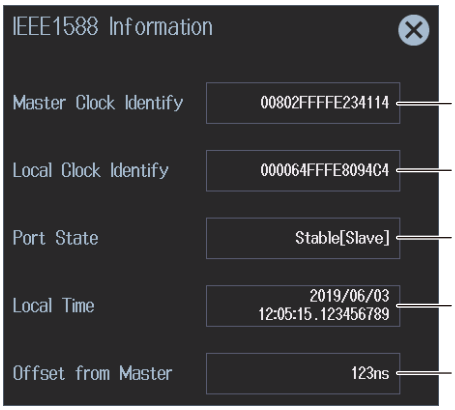
Set the delay mechanism (E2E, P2P).

Configure the network layer (Layer 2, Layer 3).

Set the domain number (0 to 255).

Tap Information.

IEEE 1588 information



Master clock ID (64-bit identifier)

Local clock ID (64-bit identifier)

Port state, IEEE1588 state indication in brackets

Local time

Offset from master

Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 16.1.

16.4 Setting the Message, Menu, and USB Keyboard Languages

► “System Configuration (System Configuration)” in the features guide

This section explains operating procedures using the following setup methods.

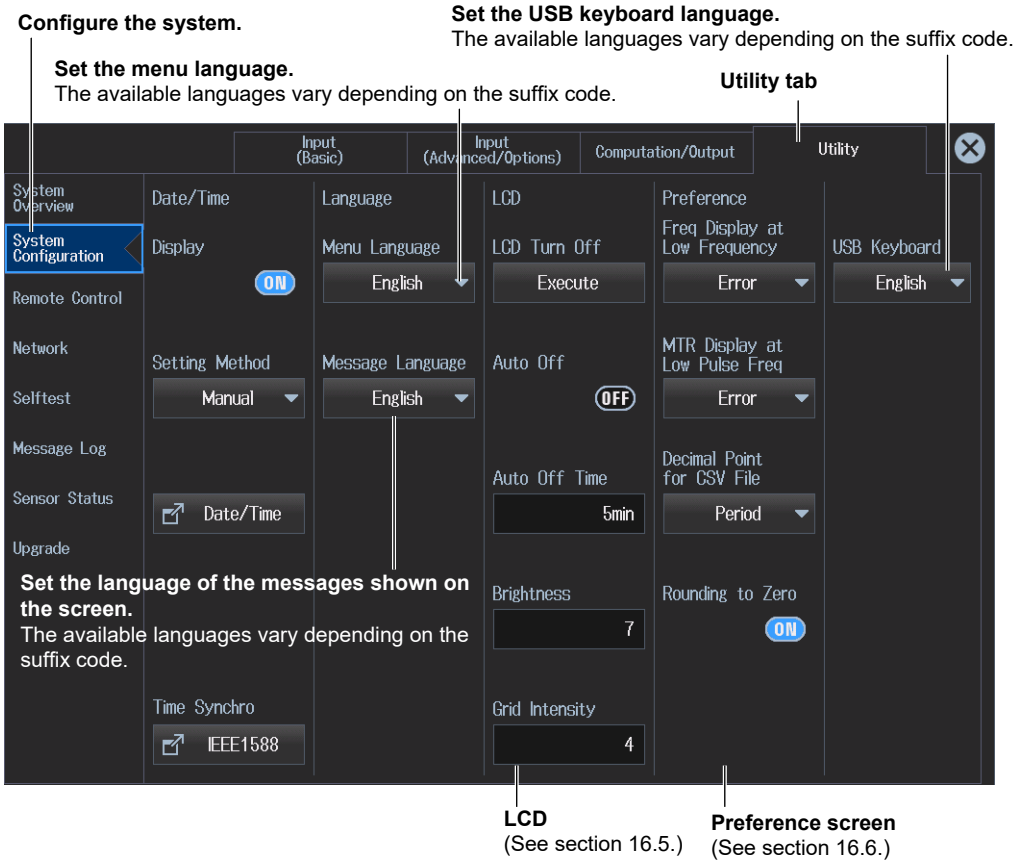
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Language and USB Keyboard (Language, USB Keyboard)

3. Tap **System Configuration**. A system setup (Date/Time, Language, LCD, Preference) appears.



Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 16.1.

16.5 Setting the Screen Brightness and Turning the Screen Off

► “LCD (LCD)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

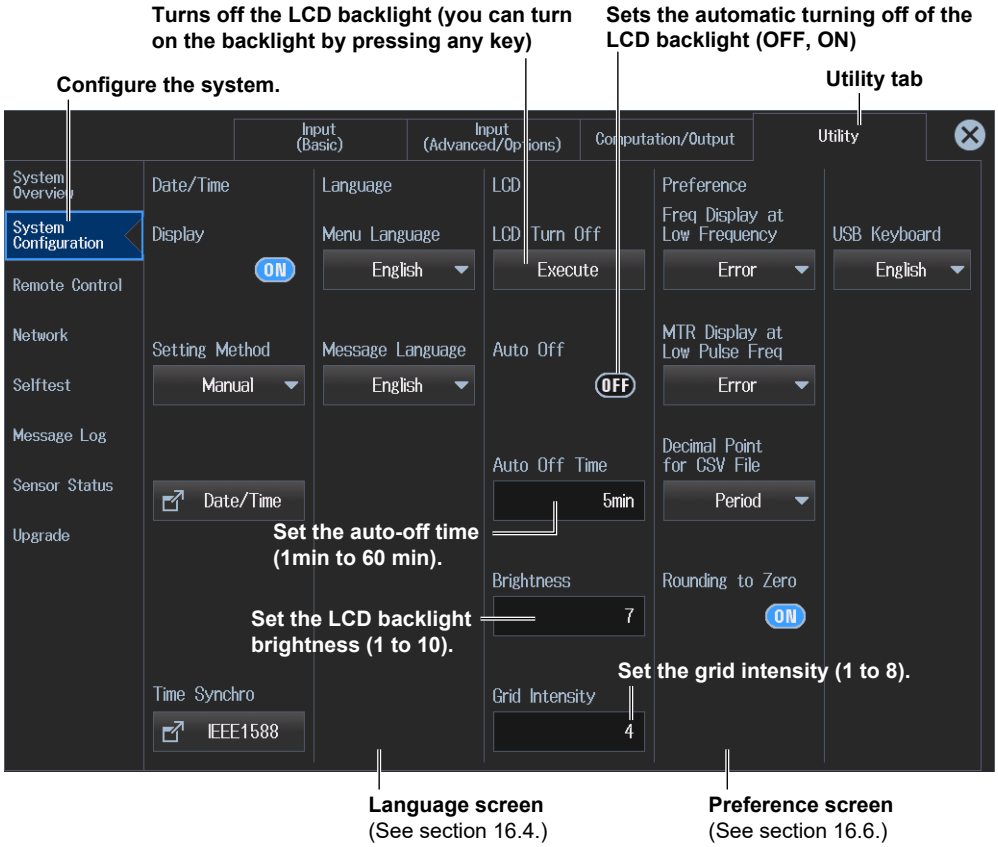
Procedure Using the Setup Menu

1. Tap the **Setup** icon

, or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Setting the Screen Brightness and Turning the Screen Off (LCD)

3. Tap **System Configuration**. A system setup (Date/Time, Language, LCD, Preference) appears.



Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 16.1.

16.6 Environment Settings (Preference)

► “Environment Settings (Preference)” in the features guide

This section explains operating procedures using the following setup methods.

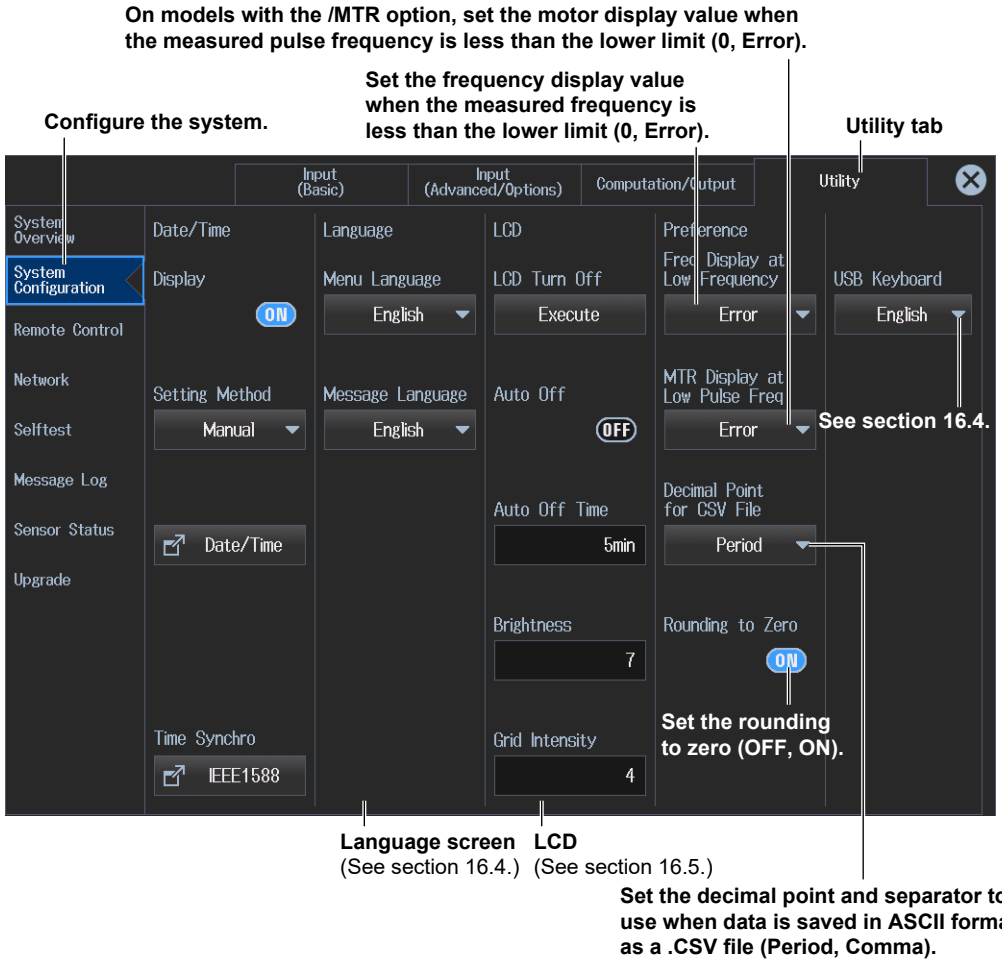
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon , or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Environment Settings (Preference)

3. Tap **System Configuration**. A system setup (Date/Time, Language, LCD, Preference) appears.



Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 16.1.

16.7 Self-Test

► “Self-test (Selftest)” in the Features Guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon

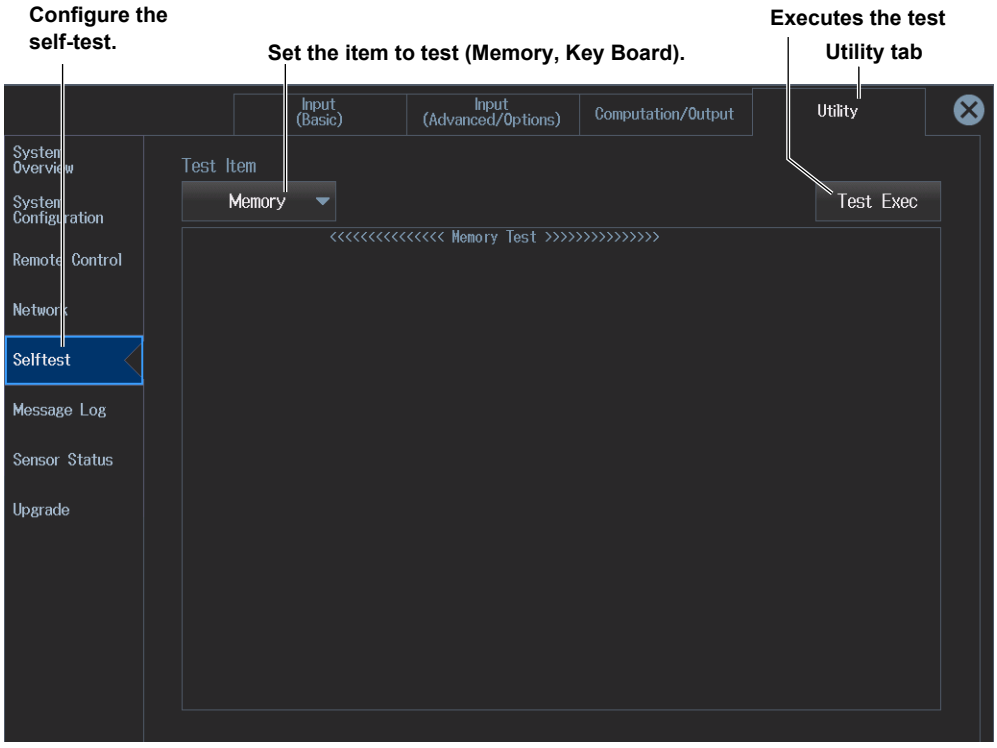
, or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Self-test (Selftest)

3. Tap **Selftest**. A self-test screen appears.

Memory Test

4. Tap **Test Item** to select Memory.

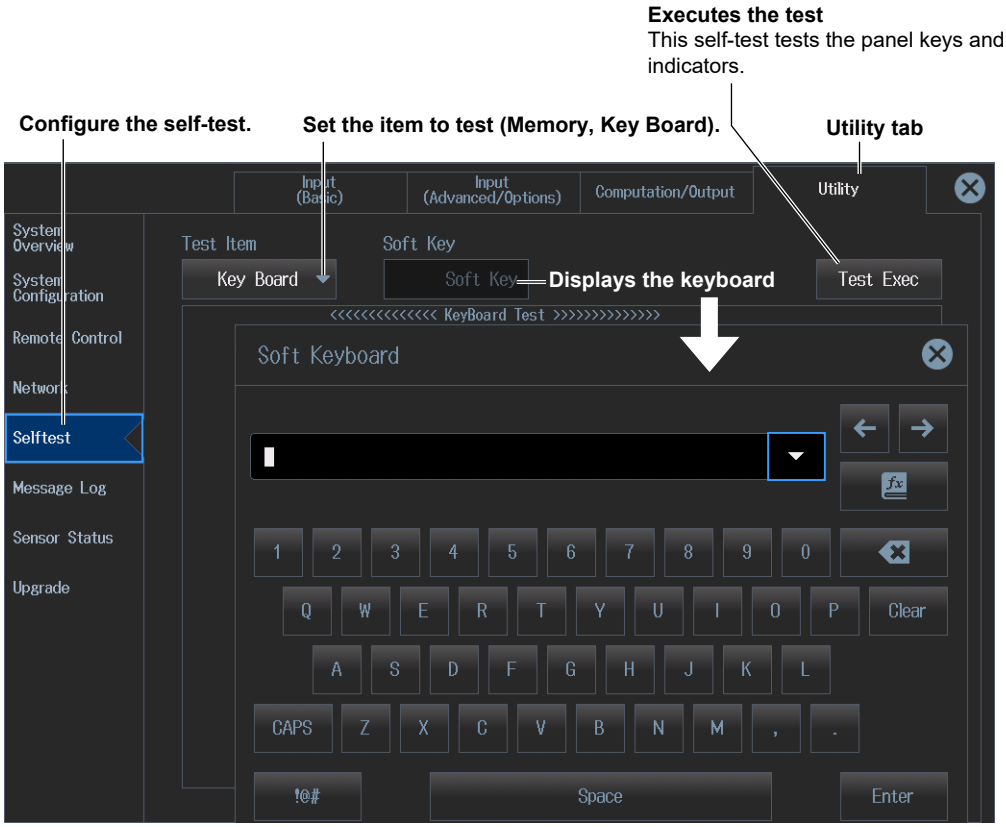


Executing the Soft Keyboard Test

4. Tap **Test Item** to select Key Board.

- **Front Panel Key Test**

5. Tap **Test Exec**. A front panel key test and indicator test will be executed.



- **Onscreen Soft Keyboard Test**

5. Tap **Soft Key**. A soft keyboard appears.

6. Tap **Test Exec**. A soft keyboard test will be executed.

Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 16.1.

16.8 Displaying the Message Log

► “Message Log Display (Message Log)” in the features guide

This section explains operating procedures using the following setup methods.

- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

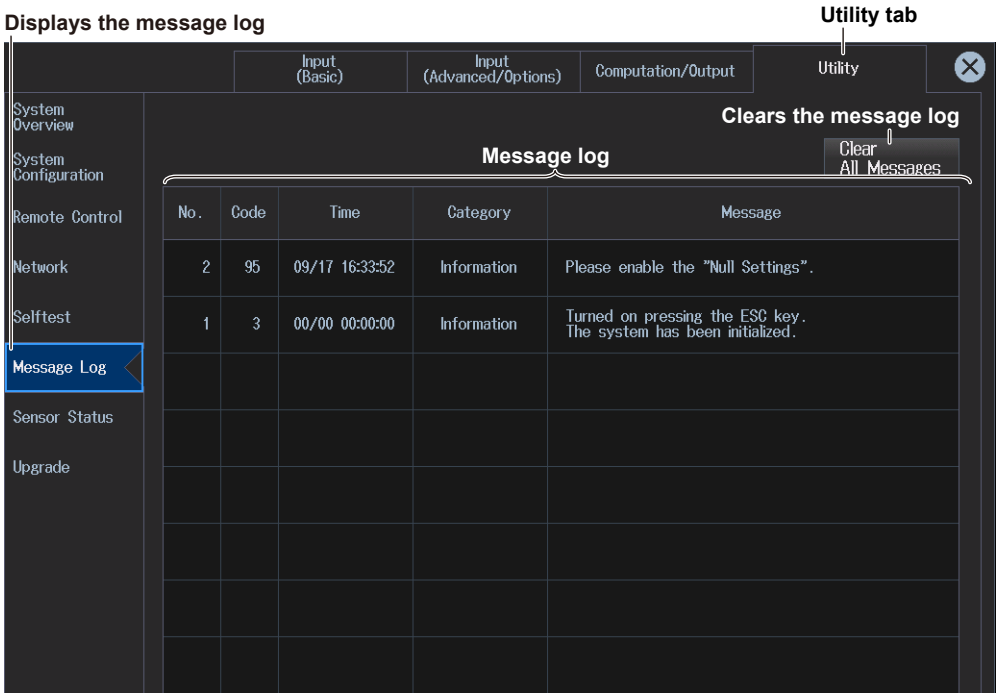
Procedure Using the Setup Menu

1. Tap the **Setup** icon

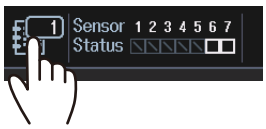
, or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Message Log Display (Message Log)

3. Tap **Message Log**. A list is displayed containing all the messages that were indicated on the screen since the instrument was started.



You can also tap the message log indicator in the upper left of the screen to display the list of messages.



Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 16.1.

16.9 Viewing the Instrument Information and Current Sensor Status

► “Instrument Information (System Overview)” in the features guide
► “Current Sensor Status Display (Sensor Status)” in the features guide

This section explains operating procedures using the following setup methods.

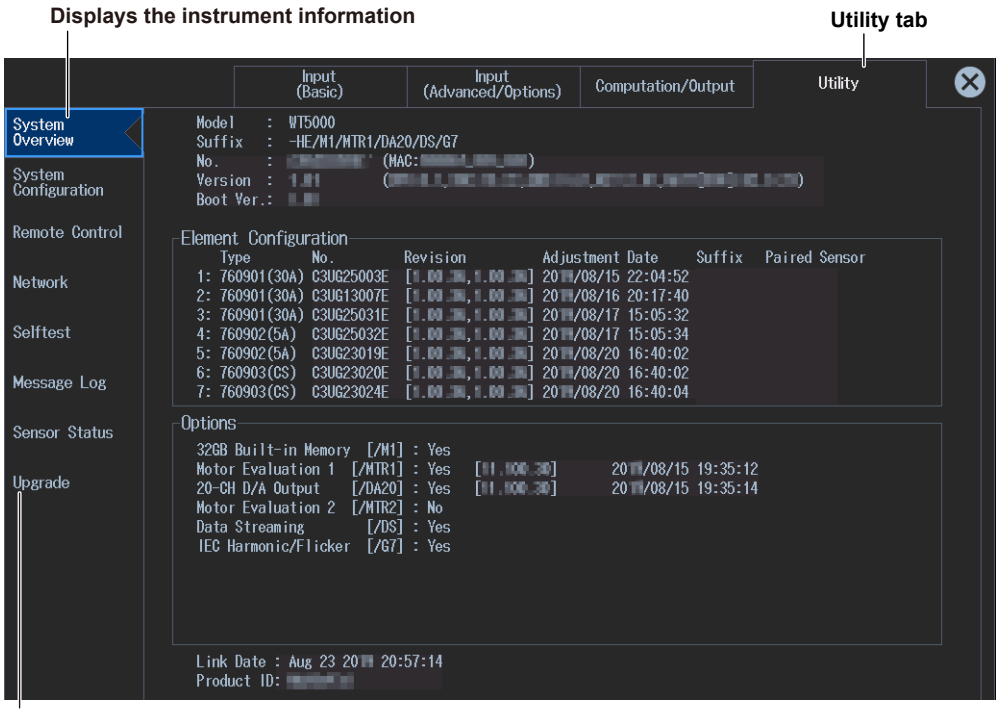
- Procedure Using the Setup Menu (see chapter 1)
- Procedure Using the Keys (other than SETUP) (see section 1.2 in IM WT5000-03EN)

Procedure Using the Setup Menu

1. Tap the **Setup** icon (Setup), or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.
   Pressing **ESC** closes the overview screen.

Viewing the Instrument Information (System Overview)

3. Tap **System Overview**. A instrument information overview appears.



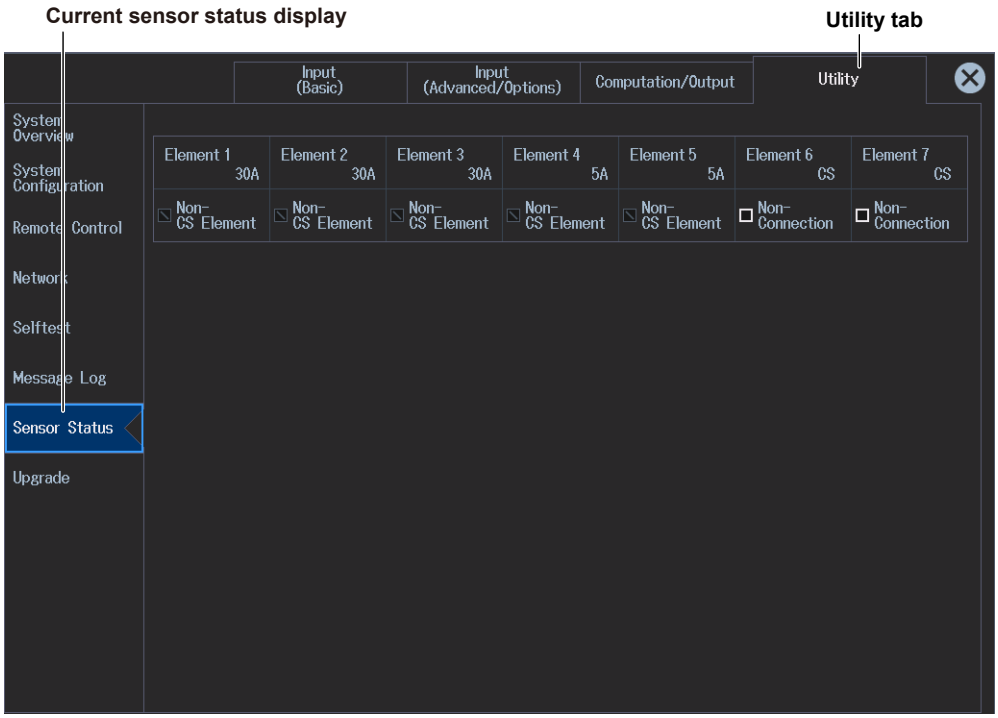
Upgrade
A screen appears for upgrading the instrument firmware and adding options. For the procedure, see the manual provided when upgrading the firmware or adding options.

Displayed Information

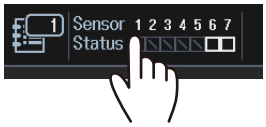
Model	The model number
Suffix	The suffix code
No.	The instrument number and MAC address
Version	The firmware version
Boot Ver.	The boot program version
Element Configuration	The input element types
Options	The options
Link Date	The date and time that the firmware was created
Product ID	A unique number assigned to each instrument

Current Sensor Status Display (Sensor Status)

3. Tap **Sensor Status**. The current sensor statuses are listed.



You can also tap the sensor status indicator in the upper left of the screen to display the list of current sensor statuses.



Note

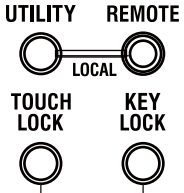
You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using Keys

See section 16.1.

16.10 Locking the Touch Panel and Front Panel Operations

You can lock the operation of the instrument to prevent affecting the measurement operation as a result of accidentally tapping the touch panel or pressing the front panel keys.



UTILITY area

Locks the front panel key operation
Press this key to lock the keys on the front panel. The key illuminates.
Press the key again to clear that state.

Locks the touch panel operation
Press this key to lock touch panel. The key illuminates.
Press the key again to clear that state.

Note

In remote mode (REMOTE LED lit), the front panel nor the touch panel can be used. To release remote mode, press UTILITY. For details on remote mode, see the communication interface user's manual, IM WT5000-17EN.

Appendix 1 Messages and Corrective Actions

Messages

Messages may appear on the screen while you are using this instrument. This section describes the error messages and how to respond to them. You can display the messages in the language that you specify through the operations explained in section 16.4. If servicing is necessary to solve the problem indicated by a message, contact your nearest YOKOGAWA dealer.

In addition to the following error messages, there are also communications error messages. These messages are explained in the communication interface user's manual, IM WT5000-17EN.

Warning Messages (1 to 99)

Code	Message	Chapter or Section
3	Turned on pressing the ESC key. The system has been initialized.	3.7[1]
11	Cannot measure PLL frequency. Check input level.	5.1
12	File access slow. Too many files in directory or medium read/write speed slow.	8.6
64	File access is aborted.	—
80	System Configuration was changed. The system has been initialized.	—
81	Input element configuration was changed. The system has been initialized.	—
84	Key lock is enabled. To release the lock, press the KEY LOCK key.	1.2[1]
85	In remote control mode, all keys are locked except LOCAL (UTILITY) key. Please hit LOCAL (UTILITY) key to exit the remote control mode.	Chapters 1 to 3[2]
86	In Local Lockout mode, all keys are locked. Please cancel the local lockout.	Chapters 1 to 3[2]
87	Firmware was changed. The system has been initialized.	—
88	Integration has started and measurement ranges are switched to fixed ranges.	2.2, 2.3
89	Processing system settings change. Please wait for a moment.	—
93	This model has neither motor evaluation function or auxiliary input. Check the specifications to see whether or not the optional motor evaluation function and the optional auxiliary input are provided.	16.9
95	Null setting is OFF. When using the current sensor, please enable the null settings.	11.1

1 Getting Started Guide, IM WT5000-03EN
2 Communication Interface User's Manual, IM WT5000-17EN

Setup Error Messages (500 to 899)

Code	Message	Chapter or Section
600	File access failure.	—
601	Invalid file name. Check the file name.	8.2
602, 603	No USB device or no storage media inserted. Check the USB device connection, and the existence of a storage medium in the drive.	8.1
604	Media failure. Check the storage medium.	8.1
605	File not found. Check the filename and the storage medium.	—
606	Media is protected. Set the disk's(medium's) write protect switch to OFF.	—
607	Media was removed while accessing. Check the storage medium.	8.1
608, 609	File already exists.	—
610	Contains invalid characters.	8.2
611, 612	Media full. Delete unnecessary file(s) or use another disk.	8.6
613	Cannot delete a directory if there are files in the directory.	8.6
614	File is protected.	—
615	Physical format error. Reformat the medium. If the same error occurs, the instrument is probably unable to execute a format on this medium.	—
616 to 620, 622 to 641	File system failure. Check using another disk. If the same message still appears, maintenance service is required.	—
621	File is damaged. Check the file.	—
643 to 653, 659, 660	Media failure. Check the medium.	—
656	Cannot save more than 256 item to the root directory. Change save destination or delete files/directories from the root directory.	8.2
662	File operation is interrupted.	—
663	File unknown format. Check the file format.	1.5
665	Cannot load this file format. File was stored on other models or other versions.	—
666	File is now being accessed. Execute after access is made.	—
668	Cannot load this bitmap file. Use file of 16bit Color or 24bit Color Mode with less or equal size 1000x720.	3.7
669	Cannot load this text file. Confirm the contents of file.	1.5
675	Cannot load this file. Model/options do not conform.	—
676	Writing prohibited in this file.	—
677	An error occurred while network access. Confirm network conditions.	Chapter 15
690	Cannot execute for the directory depth is 10 or more.	—
691	Cannot execute because of source and destination are over lapped.	—
692	Cannot execute for the media itself.	—
693	Cannot store at Network Drive.	7.3
694	Trigger Event is Off.	3.5
695	File version is new. Update firmware.	—
696	The file may be damaged or an unsuccessful file close could have occurred.	—
697	Abnormal data file. Unsuccessful finish of file save is detected.	—
705	Can not operate while accessing medium. Wait until access has completed.	—
706	Can not operate during hard copy. Wait until output has completed.	—
713	Cannot execute for All or User display mode.	—
714	Cannot execute for All display mode.	—

Code	Message	Chapter or Section
720	Over Run had occurred.	—
721	Can not set or execute because store is processing. Try Again.	—
722	No target Element for integration execution.	4.1
723	Can not set or execute when Integ Independent Control is on.	4.1
724	Can not set or execute because recording is processing. Try again.	—
725	File creation stopped. File size exceeded 2G bytes.	—
726	Cannot start integration. In order to start, set Time/div for wave bigger than 0.01 ms.	6.2
750, 751	Unable to connect to the server. Check the network settings and configuration.	Chapter 15
752	This ftp function in not supported.	—
753	FTP Error: Client Handle Confirm the network settings and connection.	Chapter 15
758	Failed to acquire time from SNTP server. Confirm the network settings and connection.	15.6
759	Failed to initialize network. Confirm the network settings.	Chapter 15
760	Cannot execute or set when IEEE 1588 is on. To execute or change this setting, turn off IEEE 1588.	16.3
761	Cannot execute or set when SNTPs "Adjust at Power On" is on. To execute or change the setting, turn off "Adjust at Power On".	15.6
762	Cannot execute when IEEE 1588 is not in the "Stable" state. To execute, wait until the state becomes "Stable" or turn off IEEE 1588.	16.3
800	Illegal date-time. Set the correct date and time.	3.6*
801	Illegal file name. The file name contains characters which are not allowed or the file name is not a valid MS-DOS file name. Enter another file name.	8.2
802	Cannot be set or executed in the Normal measurement mode.	—
803	Cannot be set or executed in the IEC Harmonic measurement mode	13.1
812	Cannot be set or executed while storing data.	—
813	Cannot be set while integration is running. Reset Integration.	4.2
814	Cannot be set or executed when NULL is on. Please turn NULL off.	11.1
820	Cannot be set or executed in the Flicker measurement mode.	14.1
821	Attempt made to start flicker measurement while flicker initialization is not finished.	—
822	Attempt made to start flicker measurement while flicker measurement is in progress or result of flicker judgement is displayed.	—
823	Cannot change during CAL. Wait until CAL is completed.	11.2
824	Attempt made to initialize flicker measurement while flicker measurement is in progress or result of flicker judgement is displayed.	—
825	Cannot change limit settings while flicker measurement is in progress.	—
826	Cannot be set or executed when flicker measurement is not reset.	14.2
827	Illegal math expression. Input a correct computing equation.	4.1
828	Cannot start flicker measurement when all periods of dmax measurement are finished.	—
829	Cannot judge flicker measurement untill all periods of dmax measurement are finished.	—
830	Cannot move period while dmax measurement is not ready.	—
831	Processing now. Retry setting or execution again.	—
841	Attempted to start integration after integration time has reached its preset value.	4.2
842	Attempted to start integration while integration is in progress.	4.2
843	Measurement stopped due to overflow during integration or due to a power failure.	4.2
844	Attempted to stop integration even though integration was not in progress.	4.2
845	Attempted to reset integration even though integration was in progress or integration mode was not selected.	4.2
846	Attempted to start integration while measurement of peak overflow was in progress.	—
847	Attempted to start integration in continuous integration mode when integration preset time was set to “0”.	4.1
848	Attempted made to start integration in real time counting integration mode when the end time had already passed.	4.1

* Getting Started Guide, IM WT5000-03EN

Code	Message	Chapter or Section
849	Attempted made to start storing in real time counting storing mode when the end time had already passed.	7.1
850	Cannot be set or executed at current store state. To set or execute, reset store.	7.4
852	Stored file is illegal. Initialize memory before storing.	7.4
854	Waveform display data not found.	—
855	Data destination memory is full. Saving has been stopped.	—
856	An error has occurred while storing. Storing has been stopped.	—
857	Cannot be set while Master/Slave Synchronized Measurement is set to Slave.	2.14
858	Store process is in progress now. Execute or set setting again.	—
859	Cannot convert selected file. Select a file with an extension of WTS or HDS.	7.3
862	Numeric data not found.	—
863	Cannot be set or executed when different types of elements are installed.	—
864	This wiring cannot be set as the first selected element.	2.1
865	Cannot be set while integration is running. Stop or reset Integration.	4.2
874	Sync source, PLL source or trigger source cannot be set to Ext Clk, while Master/Slave Synchronization Measurement is set to Slave.	2.14
875	Master/Slave Synchronization Measurement cannot be set to Slave, while sync source, PLL source or trigger source is set to Ext Clk.	2.14
876	Can not calculate from present point value.	9.1
877	Can not set 0 to count.	7.1
878	Can not set 0. Set to a value other than 0.	—
880	Cannot be set or executed while initialization. Wait until status changes to "Ready".	—
881	Cannot be set or executed while measurement is in progress. To set or execute, "Stop" measurement.	—
882	Stopped measurement. Detection error of measuring interval signal. Check External Sync (MEAS START) input.	4.3*
885	Cannot be set or executed in Current Measurement Mode. Set or execute in Normal Measurement Mode.	1.1
889	Setting and execution is not. available when auto-ranging is set to ON.	—
893	Invalid cutoff frequency setup. Set the cutoff frequencies so that the low pass filter's (LPF) cutoff frequency is higher than the high pass filter (HPF).	2.7
894	Cannot be executed/set in current condition. For all current inputs with in the same wiring, “CT Type” or “Input Resistance” must have the same setup.	2.1

* Getting Started Guide, IM WT5000-03EN

System Error Messages (900 to 999)

Code	Message	Chapter or Section
901	Failed to backup setup data. The system has been initialized. Maintenance service is required.	—
902	System RAM failure. Maintenance service is required.	—
903	System ROM failure. Maintenance service is required.	—
904	Internal temperature is too high. Maintenance service is required. It will shutdown automatically.	—
905	Detected Sensed disconnection of input element. Turn Off the instrument and reinsert the input element. If this error continues or frequently occurs, maintenance service is required.	—
906	Fan stopped. Power off immediately. Maintenance service is required.	—
907	Backup battery is flat. Maintenance service is required to replace the back-up battery.	—
909	Illegal SUM value. Maintenance service is required.	—
911	Software exception has occurred. A firmware update may be required. Notify maintenance service the Service No. below.	—
915	EEPROM SUM error. EEPROM may be damaged. Maintenance service is required.	—
918	Input element1 is not installed. Turn Off the instrument and insert an input element to element1.	—
919	Option board cannot be detected. Maintenance service is required.	—
921	Failed in communication with devices. Maintenance service is required.	—
922	Failed in communication with devices. Maintenance service is required.	—
923	Transmit data abnormality from devices. Maintenance service is required.	—
925	Error while synchronizing to IEEE 1588. Please turn IEEE 1588 off once to reset state.	16.3
926	The USB device's power consumption exceeded the capacity of the USB hub.	—
927	Disconnected USB device port 1, because overcurrent was detected.	—
928	Disconnected USB device port 2, because overcurrent was detected.	—
929	A USB mass storage device that is greater than 137 GB in capacity has been connected. Be careful in using this device. If an area exceeding 137 GB is accessed, the storage device may break.	—
931	Hardware configuration error occurred. Restart this machine. If it occurred again, maintenance service is required.	—
932	Error occurred while ImageFile process.	—
940	An element with an old version has been installed. The firmware may require an element version upgrade for correct measurement. Contact maintenance service for element update instructions.	—
941	A new element version or type has been installed. In order to make correct measurements or to measure with the new element types, upgrade the instrument's firmware.	—
942	Hardware mismatch error occurred. Maintenance service is required.	—
943	An overcurrent of internal shunts has been detected. The measured data is incorrect.	—
944	An overcurrent of the CT sensors or the current probes has been detected. The power of devices has been shutdown. Power off immediately.	—
945	An overcurrent has been detected. The power of sensors has been shutdown. Power off immediately.	—
946	The connection with CT series has been detected. The CT Type settings are different from the detected sensors. Please confirm them.	—
947	Detected changes in insertion and removal with the CT sensors. Please confirm them.	—
948	An Error of the sensor power supply was detected. The power to the device has been shutdown. Power off immediately. Maintenance service is required.	—

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