WT1801E, WT1802E, WT1803E, WT1804E, WT1805E, WT1806E

Precision Power Analyzer

USER'S MANUAL

YOKOGAWA
Yokogawa Meters & Instruments Corporation

IM WT1801E-02EN
1st Edition

Thank you for purchasing the WT1801E, WT1802E, WT1803E, WT1804E, WT1805E, or WT1806E Precision Power Analyzer. This User's Manual explains how to use this instrument. To ensure correct use, please read this manual thoroughly before beginning operation.
Keep this manual in a safe place for quick reference in the event a question arises.

List of Manuals

The following manuals, including this one, are provided as manuals for this instrument. Please read all the manuals.

Manual Title	Manual No.	Description
WT1801E, WT1802E, WT1803E, WT1804E, WT1805E, WT1806E Precision Power Analyzer Features Guide	IM WT1801E-01EN	The supplied CD contains the PDF file of this manual. This manual explains all the features of this instrument other than the communication interface features.
WT1801E, WT1802E, WT1803E, WT1804E, WT1805E, WT1806E Precision Power Analyzer User's Manual	IM WT1801E-02EN	This manual. The supplied CD contains the PDF file of this manual. The manual explains how to operate this instrument.
WT1801E, WT1802E, WT1803E, WT1804E, WT1805E, WT1806E Precision Power Analyzer Getting Started Guide	IM WT1801E-03EN	This guide explains the handling precautions and basic operations of this instrument.
WT1801E, WT1802E, WT1803E, WT1804E, WT1805E, WT1806E Precision Power Analyzer Communication Interface User's Manual	IM WT1801E-17EN	The supplied CD contains the PDF file of this manual. This manual explains the communication interface features of this instrument and how to use them.
WT1801E, WT1802E, WT1803E, WT1804E, WT1805E, WT1806E Precision Power Analyzer	IM WT1801E-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 functionality. The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
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1st Edition: September 2016 (YMI)

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Revisions

- 1st Edition: September 2016

Symbols and Notation Used in This Manual

Notes and Cautions

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 cause 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 proper operation of the instrument.

Units

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

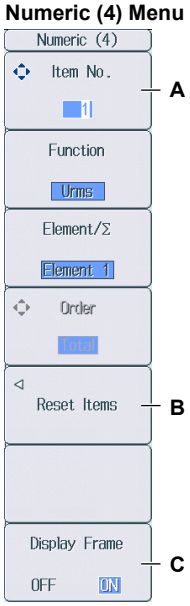
Key Operation and Functions

Key Operation

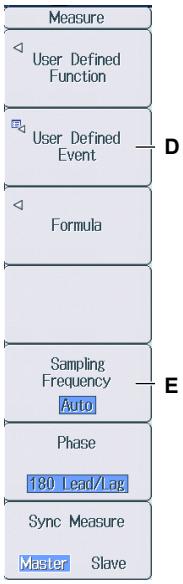
How to Use Setup Menus That Appear When Keys Are Pressed

The operation after you press a key varies depending on the key that you press.

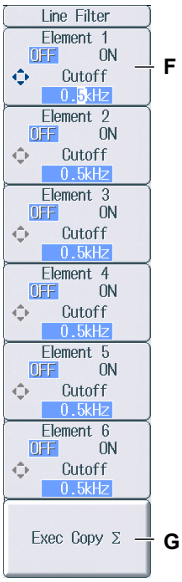
Numeric (4) Menu



Measure Menu



Line Filter Menu



Numeric Form Menu

A: Press the soft key to use the cursor keys to configure this setting. Use the cursor keys to set the value or select an item.
B: A related setup menu appears when you press the soft key.
C: The selected setting switches each time you press the soft key.
D: A dialog box or the keyboard appears when you press the soft key.
Use the cursor keys and the SET key to configure the settings.
E: Press the soft key to display a selection menu.
Press the soft key that corresponds to the appropriate setting.
F: Press the soft key to use the cursor keys to configure this setting. After you configure the setting, the status of the selected setting switches each time you press the soft key.
G: Press the soft key to execute the specified feature.
H: Press the soft key to apply the value assigned to the key.

How to Display the Setup Menus That Are Written in Purple below the Keys

In the explanations in this manual, “SHIFT+key name (written in purple)” is used to indicate the following operation.

1. Press **SHIFT**. The SHIFT key lights to indicate that the keys are shifted.
   Now you can select the setup menus written in purple below the keys.
2. Press the key that you want to display the setup menu of.

ESC Key Operation

If you press **ESC** when a setup menu or available options are displayed, the screen returns to the menu level above the current one. If you press **ESC** when the highest level menu is displayed, the setup menu disappears.

RESET Key Operation

If you press **RESET** when you are using the cursor keys to set a value or select an item, the setting is reset to its default value (depending on the operating state of this instrument, the setting may not be reset).

SET Key Operations

The operation varies as indicated below depending on what you are setting.

- For a setup menu that has two values that you use the cursor keys to adjust
  Press **SET** to switch the value that the cursor keys adjust.
- For a menu that has the cursor keys + SET mark (+SET) displayed on it
  Press **SET** to confirm the selected item.

Cursor Keys Operations

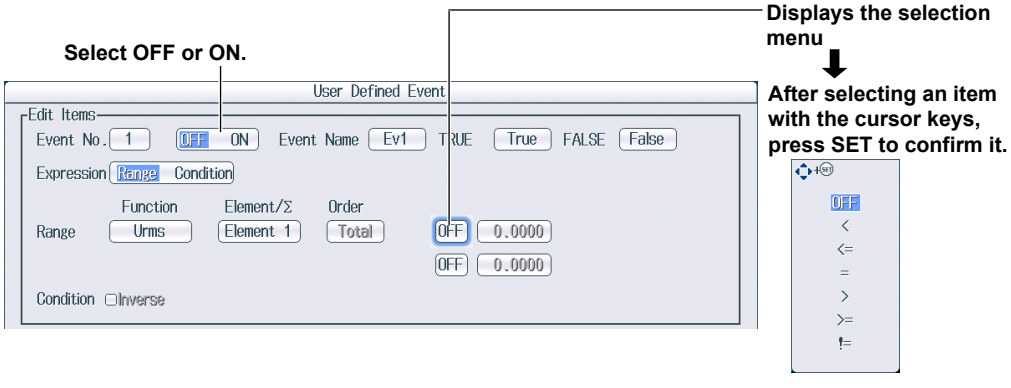
The operation varies as indicated below depending on what you are setting.

- When setting a value
  Up and down **cursor** keys: Increases and decreases the value
  Left and right **cursor** keys: Changes which digit to set
- When selecting the item to set
  Up and down **cursor** keys: Moves the cursor between settings

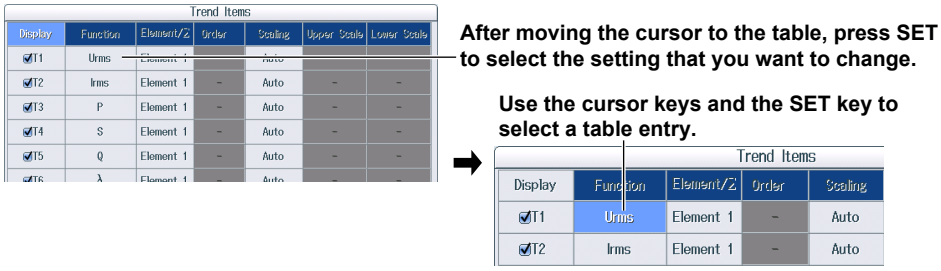
How to Enter Values in Setup Dialog Boxes

1. Use the keys to display the appropriate setup dialog box.
2. Use the **cursor** keys to move the cursor to the item that you want to set.
3. Press **SET**. The operation varies as indicated below depending on what you are setting.
   - A selection menu appears.
   - A check box is selected or cleared.
   - An item is selected.
   - A table of settings is selected.

Displaying a Selection Menu and Selecting an Item



Setting Items in a Table



How to Clear Setup Dialog Boxes

Press **ESC** to clear the setup dialog box from the screen.

Entering Values and Strings

Entering Values

Using the Cursor Keys to Enter Values

Select the appropriate item using the soft keys, and change the value using the cursor keys and the SET key. This manual sometimes describes this operation simply as “using the cursor keys.”

Note

Some items that you can set using the cursor keys are reset to their default values when you press the RESET key.

Entering Character Strings

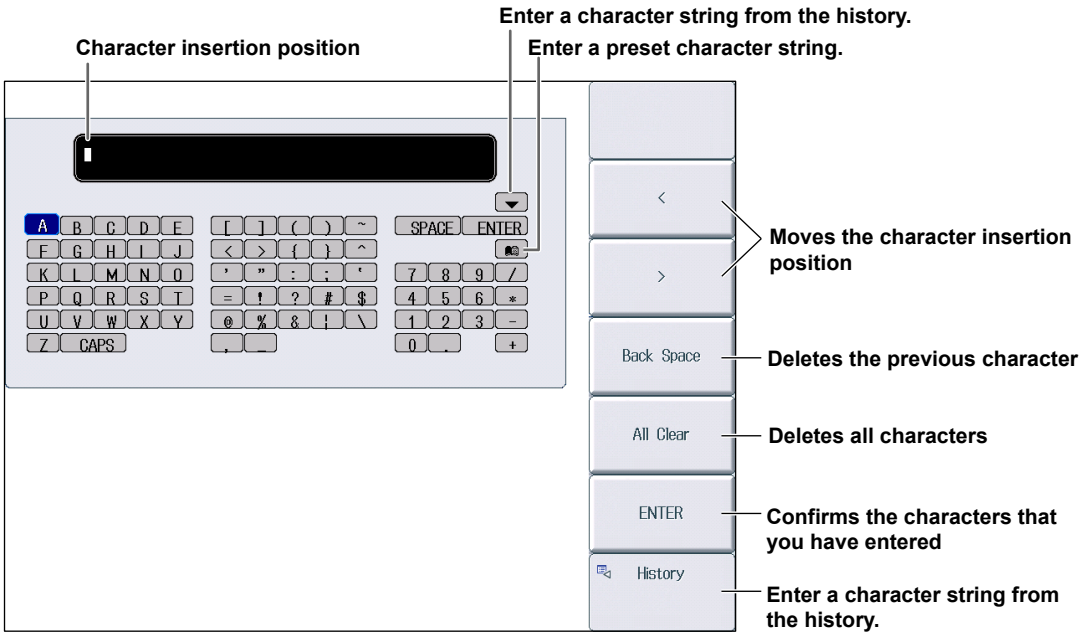
Use the keyboard that appears on the screen to enter character strings such as file names and comments. Use the cursor keys and the SET key to operate the keyboard and enter a character string.

How to Operate the Keyboard

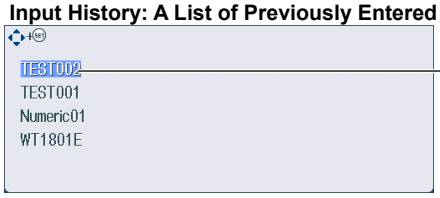
1. After bringing up the keyboard, use the **cursor** keys to move the cursor to the character that you want to enter.
2. Press **SET** to enter the character.
   - If a character string has already been entered, use the arrow soft keys (**<** and **>**) to move the cursor to the position you want to insert characters into.
   - To switch between uppercase and lowercase letters, move the cursor to **CAPS** on the keyboard, and then press **SET**.
   - To delete the previous character, press the **Back Space** soft key.
   - To delete all the characters, press the **All Clear** soft key.
3. Repeat steps 1 and 2 to enter all the characters in the string.
   - Select [▼] on the keyboard or press the **History** soft key to display a list of character strings that you have entered previously. Use the cursor keys to select a character string, and press **SET** to enter the selected character string.
   - Select [abc] on the keyboard to display a list of preset character strings. The following operands and equations, which are used with user-defined functions, are included as preset character strings.

ABS(	PPK(	HVF(	RMS(
SQR(	MPK(	HCF(	MN(
SQRT(	CF	KFACT(	RMN(
LOG(	TI(	EAU(	DC(
LOG10(	THD(	EAI(	AC(
EXP(	THF(	PLLFRQ(	PC(
NEG(	TIF(		

     Use the **cursor** keys to select a character string, and press **SET** to enter the selected character string.
4. Press the **ENTER** soft key, or move the cursor to ENTER on the keyboard, and press **SET** to confirm the character string and clear the keyboard.



Input History: A List of Previously Entered Character Strings



Note

- @ cannot be entered consecutively.
- File names are not case-sensitive. Comments are case-sensitive. The following file names cannot be used due to MS-DOS limitations:
  AUX, CON, PRN, NUL, CLOCK, COM1 to COM9, and LPT1 to LPT9
- For details on file name limitations, see the features guide, IM WT1801E-01EN.

Contents

1.1 Configuring the Wiring System Settings

This section explains the following settings for wiring systems:

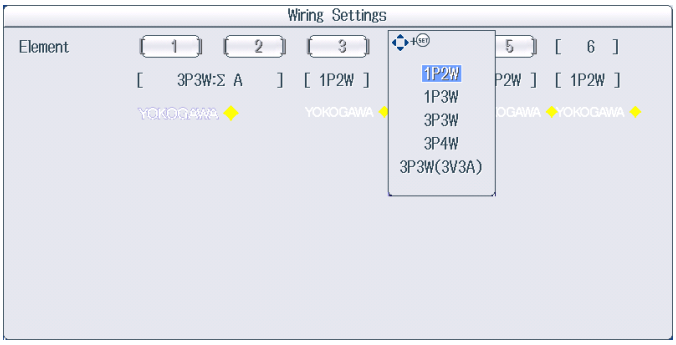
- Wiring system
- Wiring unit
- Wiring pattern

► "Wiring System (Wiring)" in the features guide

Wiring Settings (Wiring Settings)

Press **WIRING** and then the **Wiring** soft key to display the following screen.

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



Wiring System Pattern

- If you select 1P3W, 3P3W, 3P4W, or 3P3W(3V3A) 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 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

- Because the wiring system with the largest element number is automatically determined according to the settings of the wiring systems with smaller element numbers, the element with the largest element number cannot be selected.
- You cannot set the wiring units for larger element numbers before the wiring units for smaller element numbers.
- To measure voltage, current, and active power Σ functions using high speed data capturing, set the wiring system to 3P4W or 3P3W (3V3A). When the wiring system is set to 1P3W or 3P3W, voltage, current, and active power Σ functions are not measured.

1.2 Setting the Voltage and Current Ranges

This section explains the following settings for the voltage and current ranges:

- Input element
- Auto range
- Fixed range

► **"Voltage Range (RANGE UP/DOWN (V))" and "Current Range (RANGE UP/DOWN (A))" in the features guide**

Voltage Range (VOLTAGE RANGE)

1. Press the **ELEMENT** key for setting ranges to select the input element or wiring unit that you want to set the voltage range of.
   - While the setup menu is displayed, press **ESC**. Information corresponding to the input elements or wiring units will be displayed highlighted on the menu. You can also use the soft keys corresponding to the highlighting to select the input element or wiring unit.
   - Press **SHIFT+**the **ELEMENT** (ALL) key for setting ranges to collectively configure all the input elements for which the following conditions are met.
     The input element type (for 5 A or for 50 A) is the same.
     The valid measurement range setting (see section 1.7) is the same.
2. Follow the instructions below to set the voltage range.

Auto Range Setting

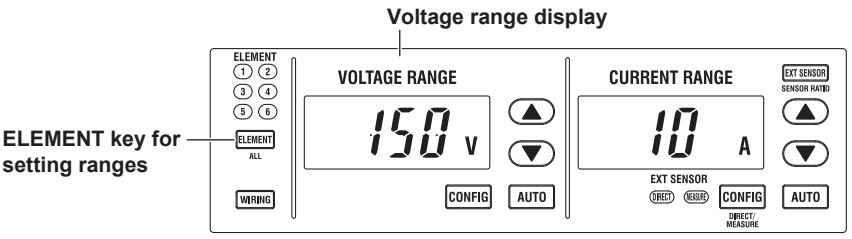
Press the voltage range's **AUTO** key.

Setting the Fixed Range

Press the voltage range's **fixed range** keys (▲ and ▼) to set the voltage range.

Available Voltage Range Options

When the crest factor is set to 3	When the crest factor is set to 6 or 6A
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 Element Independent (see section 1.9) is set to OFF, the voltage ranges of input elements that are assigned to the same wiring unit are set to the same range. When Element Independent is set to ON, you can set the voltage range of input elements that are assigned to the same wiring unit separately.

Current Range (CURRENT RANGE)

1. Press the **ELEMENT** key for setting ranges to select the input element or wiring unit that you want to set the current range of.
   - While the setup menu is displayed, press **ESC**. Information corresponding to the input elements or wiring units will be displayed highlighted on the menu. You can also use the soft keys corresponding to the highlighting to select the input element or wiring unit.
   - Press **SHIFT+**the **ELEMENT** (ALL) key for setting ranges to collectively configure all the input elements for which the following conditions are met.
     The input element type (for 5 A or for 50 A) is the same.
     The valid measurement range setting (see section 1.7) is the same.
2. Follow the instructions below to set the current range.

Auto Range Setting

Press the current range's **AUTO** key.

Setting the Fixed Range

Press the current range's **fixed range** keys (▲ and ▼) to set the current range.

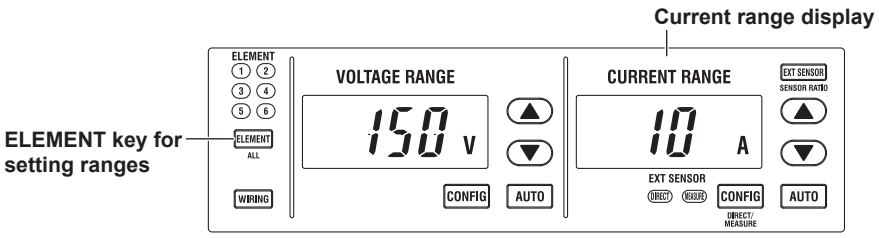
Available Current Range Options

- **5 A Input Element**

When the crest factor is set to 3	When the crest factor is set to 6 or 6A
10 mA, 20 mA, 50 mA, 100 mA, 200 mA, 500 mA, 1 A, 2 A, 5 A	5 mA, 10 mA, 25 mA, 50 mA, 100 mA, 250 mA, 500 mA, 1 A, 2.5 A

- **50 A Input Element**

When the crest factor is set to 3	When the crest factor is set to 6 or 6A
1 A, 2 A, 5 A, 10 A, 20 A, 50 A	500 mA, 1 A, 2.5 A, 5 A, 10 A, 25 A



Note

When Element Independent (see section 1.9) is set to OFF, the current ranges of input elements that are assigned to the same wiring unit are set to the same range. When Element Independent is set to ON, you can set the current range of input elements that are assigned to the same wiring unit separately.

1.3 Setting the External Current Sensor Range (Option)

This section explains the following settings for external current sensor ranges (current ranges that are used when external current sensors are being used). This feature is available on models with the /EX1 to /EX6 option.

- Input element
- External current sensor
- Auto range
- Fixed range

► "External Current Sensor Range (EXT SENSOR; option)" in the features guide

1. Press the **ELEMENT** key for setting ranges to select the input element or wiring unit that you want to set the external current sensor range of.
   - While the setup menu is displayed, press **ESC**. Information corresponding to the input elements or wiring units will be displayed highlighted on the menu. You can also use the soft keys corresponding to the highlighting to select the input element or wiring unit.
   - Press **SHIFT+**the **ELEMENT** (ALL) key for setting ranges to collectively configure all the input elements for which the following conditions are met.
     The input element type (for 5 A or for 50 A) is the same.
     The valid measurement range setting (see section 1.7) is the same.
2. Press **EXT SENSOR** to illuminate the EXT SENSOR key.
   Press **EXT SENSOR** again to turn the EXT SENSOR key off. In this state, you can set the current range that is used when current is applied directly to this instrument (see section 1.2).
3. Follow the instructions below to set the external current sensor range.

   Auto Range Setting

   Press the current range's **AUTO** key.

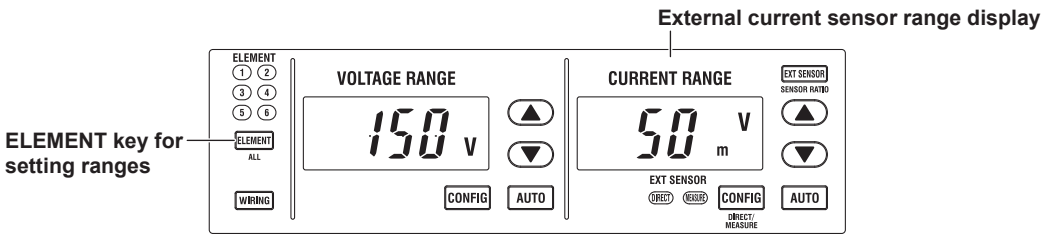
   Setting the Fixed Range

   Press the current range's **fixed range** keys (▲ and ▼) to set the external current sensor range.

Available External Current Sensor Range Options

When the display format of the external current sensor range is set to DIRECT, 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 MEAS, the setup range is set to the value from the following table divided by the external current sensor conversion ratio (the unit is A). For instructions on how to set the display format of the external current sensor range, see section 1.5.

When the crest factor is set to 3	When the crest factor is set to 6 or 6A
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 Element Independent (see section 1.9) is set to OFF, the external current sensor ranges of input elements that are assigned to the same wiring unit are set to the same range. When Element Independent is set to ON, you can set the external current sensor range of input elements that are assigned to the same wiring unit separately.

1.4 Setting the External Current Sensor Conversion Ratio (Option)

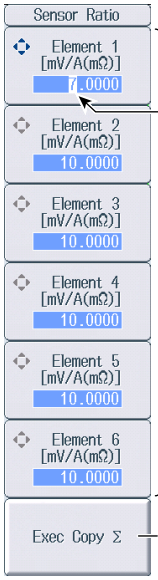
This section explains the following settings for the external current sensor conversion ratio. This feature is available on models with the /EX1 to /EX6 option.

- Conversion ratio
- Copying the conversion ratio

► "External Current Sensor Conversion Ratio (SENSOR RATIO; option)" in the features guide

Sensor Ratio Menu

Press **SHIFT+EXT SENSOR** (SENSOR RATIO) to display the following menu.



Cursor (use the ◄► cursor keys to move it)

Set the conversion ratio (0.0001 to 99999.9999).

Copies the conversion ratio
The conversion ratio of the input element that is indicated by the cursor is copied to all the input elements in that element's wiring unit.

Note

When using the dedicated shunt box, you can select an external current sensor conversion ratio preset in the menu for configuring all elements (see section 1.17).

External Current Sensor Range and Conversion Ratio Configuration Example

When measuring 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

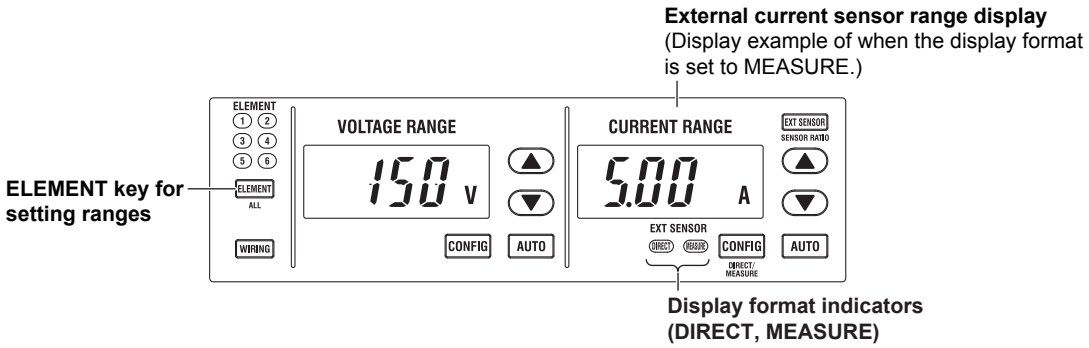
1.5 Setting the Display Format of the External Current Sensor Range (Option)

This section explains the following setting for the external current sensor range. This feature is available on models with the /EX1 to /EX6 option.

- Display format

► "External Current Sensor Range Display Format (DIRECT/MEASURE; option)" in the features guide

1. Press the **ELEMENT** key for setting ranges to select the input element or wiring unit that you want to set the external current sensor range of.
   - If you press **ESC** to clear the setup menu from the screen, soft keys corresponding to the input elements or wiring units will be displayed on the menu. You can use these soft keys to select the input element or wiring unit.
   - Press **SHIFT+**the **ELEMENT** (ALL) key for setting ranges to collectively configure all the input elements for which the following conditions are met.
     The input element type (for 5 A or for 50 A) is the same.
     The valid measurement range setting (see section 1.7) is the same.
2. Press **EXT SENSOR** to illuminate the EXT SENSOR key.
   Press **EXT SENSOR** again to turn the EXT SENSOR key off.
3. Press **SHIFT+**the current range's **CONFIG** (DIRECT/MEASURE) key. The DIRECT indicator or MEAS indicator, which indicates the display format, illuminates. The external current sensor range is displayed in the indicated display format.
   Press **SHIFT+**the current range's **CONFIG** (DIRECT/MEASURE) key again to switch the display format. The indicators illuminate and turn off appropriately.



1.6 Setting the Scaling Feature When Using a VT or CT

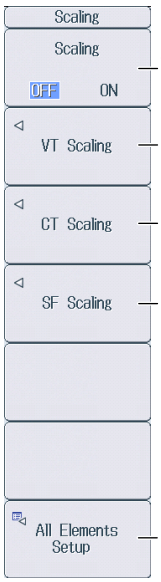
This section explains the following settings for measuring voltage through an external VT (voltage transformer) and current that through an external CT (current transformer):

- Turning the scaling feature on and off
- VT ratio
- CT ratio
- Power coefficient

► "Scaling (SCALING)" in the features guide

Scaling Menu

Press **SCALING** to display the following menu.



Turns the scaling feature on and 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.

Set the CT ratio.

Set the power coefficient.

Display the menu for configuring all elements (see section 1.17).

Setting the VT Ratio (VT Scaling)

Press the **VT** Scaling soft key to display the following menu.

Cursor (use the ◄► cursor keys to move it)

Set the VT ratio (0.0001 to 99999.9999).

Copies the VT ratio

The VT ratio of the input element that is indicated by the cursor is copied to all the input elements in that element's wiring unit.

Setting the CT Ratio (CT Scaling)

Press the **CT Scaling** soft key to display the following menu.

Cursor (use the ◄► cursor keys to move it)

Set the CT ratio.

Copies the CT ratio
The CT ratio of the input element that is indicated by the cursor is copied to all the input elements in that element's wiring unit.

Note

When using the dedicated CT, you can select a CT ratio preset in the menu for configuring all elements (see section 1.17).

Setting the Power Coefficient (SF Scaling)

Press the **SF Scaling** soft key to display the following menu.

Cursor (use the ◄► cursor keys to move it)

Set the power coefficient.

Copies the power coefficient
The power coefficient of the input element that is indicated by the cursor is copied to all the input elements in that element's wiring unit.

1.7 Setting the Valid Measurement Range

This section explains the following settings for the valid measurement range:

- Valid measurement range
- Measurement ranges that this instrument can switch to when a peak over-range occurs

► “Valid Measurement Range (CONFIG (V)/CONFIG (A))” in the features guide

Setting the Valid Voltage Measurement Range (Voltage Range Configuration)

Press the voltage range’s **CONFIG** key to display the following screen.

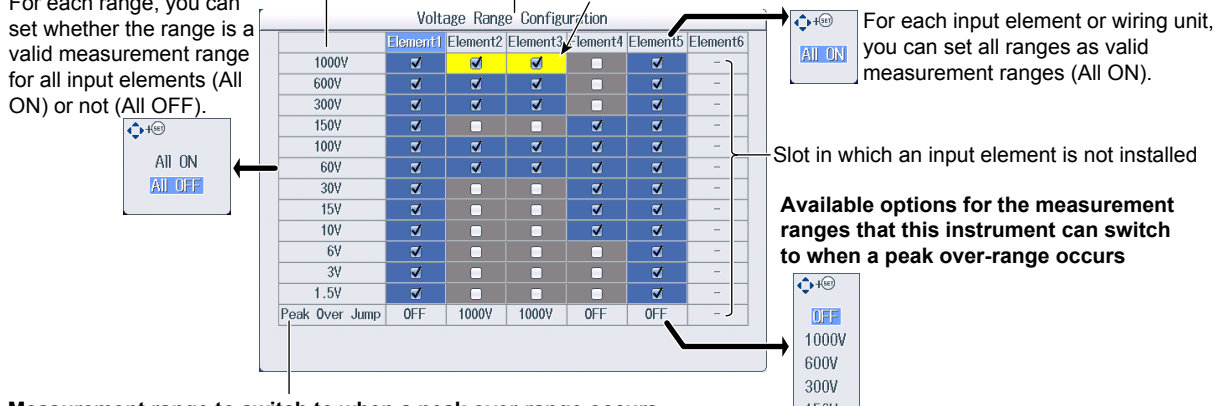
Valid measurement range

- The measurement range switches (in order) between the ranges whose check boxes are selected.
- Ranges whose check boxes are not selected are skipped.
- When Element Independent (see section 1.9) is set to OFF, the input elements that are assigned to the same wiring unit are set to the same status.

Available voltage range options

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

For each range, you can set whether the range is a valid measurement range for all input elements (All ON) or not (All OFF).



For each input element or wiring unit, you can set all ranges as valid measurement ranges (All ON).

Slot in which an input element is not installed

Available options for the measurement ranges that this instrument can switch to when a peak over-range occurs

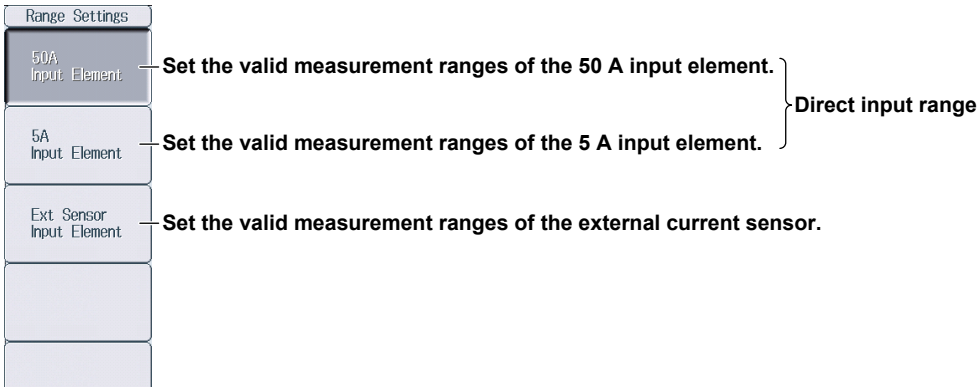
OFF
1000V
600V
300V
150V
100V
60V
30V
15V
10V
6V
3V
1.5V

Measurement range to switch to when a peak over-range occurs

- When Element Independent is set to OFF, 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**), this 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 is set to OFF, the measurement range increases in the order specified by the measurement ranges whose check boxes have been selected.

Setting the Valid Current Measurement Range (Current Range Configuration)

Press the current range's **CONFIG** key to display the following menu.



Setting the Valid Measurement Range of 50 A Input Elements (50A Input Element)—Direct Input Range

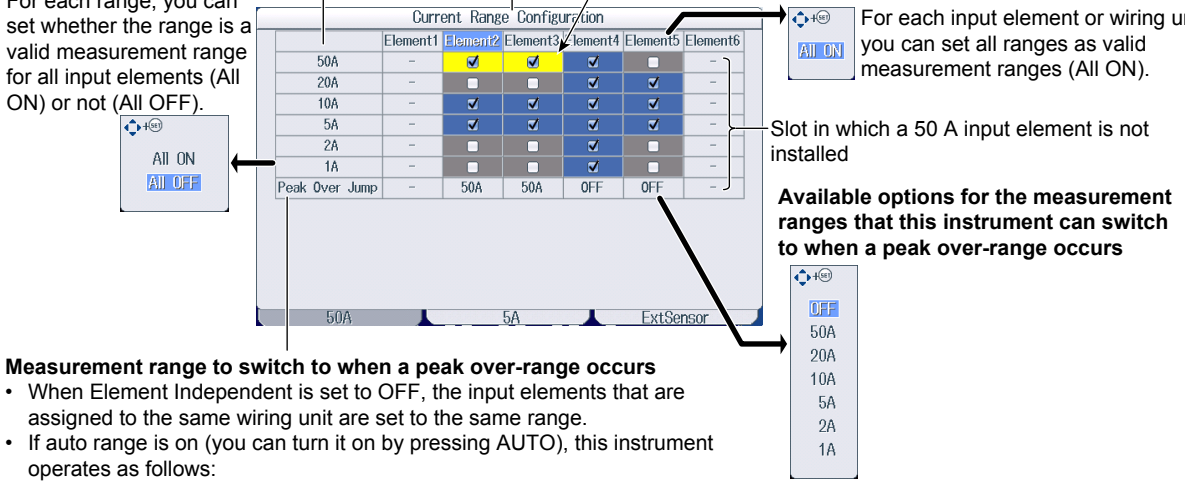
Valid measurement range

- The measurement range switches (in order) between the ranges whose check boxes are selected.
- Ranges whose check boxes are not selected are skipped.
- When Element Independent (see section 1.9) is set to OFF, the input elements that are assigned to the same wiring unit are set to the same status.

Available current range options

For each range, you can set whether the range is a valid measurement range for all input elements (All ON) or not (All OFF).

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



Measurement range to switch to when a peak over-range occurs

- When Element Independent is set to OFF, 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), this 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 is set to OFF, the measurement range increases in the order specified by the measurement ranges whose check boxes have been selected.

Setting the Valid Measurement Range of 5 A Input Elements (5A Input Element)—Direct Input Range

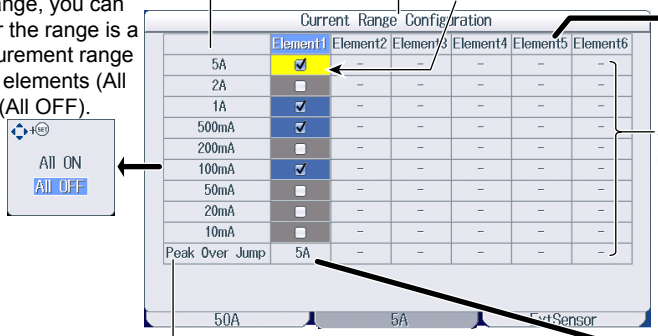
Valid measurement range

- The measurement range switches (in order) between the ranges whose check boxes are selected.
- Ranges whose check boxes are not selected are skipped.
- When Element Independent (see section 1.9) is set to OFF, the input elements that are assigned to the same wiring unit are set to the same status.

Available current range options

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

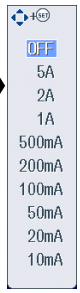
For each range, you can set whether the range is a valid measurement range for all input elements (All ON) or not (All OFF).



For each input element or wiring unit, you can set all ranges as valid measurement ranges (All ON).

Slot in which a 5 A input element is not installed

Available options for the measurement ranges that this instrument can switch to when a peak over-range occurs



Measurement range to switch to when a peak over-range occurs

- When Element Independent is set to OFF, 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**), this 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 is set to OFF, the measurement range increases in the order specified by the measurement ranges whose check boxes have been selected.

Setting the Valid Measurement Range of External Current Sensors (Ext Sensor Input Element)

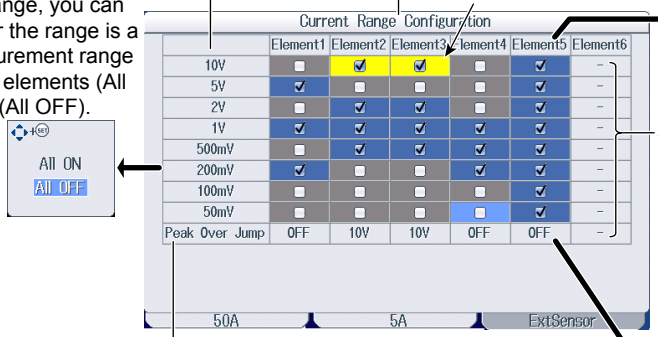
Valid measurement range

- The measurement range switches (in order) between the ranges whose check boxes are selected.
- Ranges whose check boxes are not selected are skipped.
- When Element Independent (see section 1.9) is set to OFF, the input elements that are assigned to the same wiring unit are set to the same status.

Available external current sensor range options

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

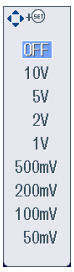
For each range, you can set whether the range is a valid measurement range for all input elements (All ON) or not (All OFF).



For each input element or wiring unit, you can set all ranges as valid measurement ranges (All ON).

Slot in which an input element is not installed

Available options for the measurement ranges that this instrument can switch to when a peak over-range occurs



Measurement range to switch to when a peak over-range occurs

- When Element Independent is set to OFF, 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**), this 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 is set to OFF, the measurement range increases in the order specified by the measurement ranges whose check boxes have been selected.

1.8 Setting the Efficiency Equation

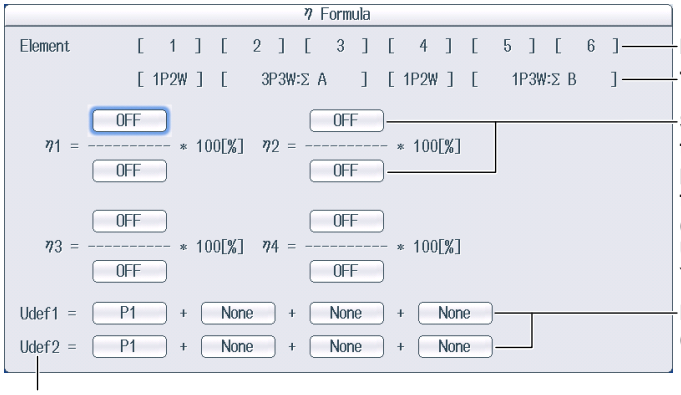
This section explains the following settings for the efficiency equation:

- Efficiency equation
- Summation of the active power and motor output[3]

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

Setting the Efficiency Equation (ηFormula)

Press **WIRING** and then the **η Formula** soft key to display the following screen.



Installed input elements

The set wiring systems

Set the denominator and numerator of the efficiency equation to the active power and motor power measurement functions.
(P1 to P6,[1] PΣA to PΣC,[2] Pm,[3] Udef1, Udef2).
You can set up to four equations: η1 to η4.

Define Udef1 and Udef2
(P1 to P6,[1] PΣA to PΣC,[2] Pm[3]).

To add active powers and motor output and use them in η1 to η4, use Udef1 and Udef2.

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 Can be set on models with the /MTR option.

1.9 Turning the Independent Input Element Configuration On and Off

This section explains how to turn the independent input element configuration on and off.

► “Independent Input Element Configuration (Element Independent)” in the features guide

Wiring Menu

Press **WIRING** to display the following menu.

Turns independent input element configuration on and off

1.10 Setting Delta Computation

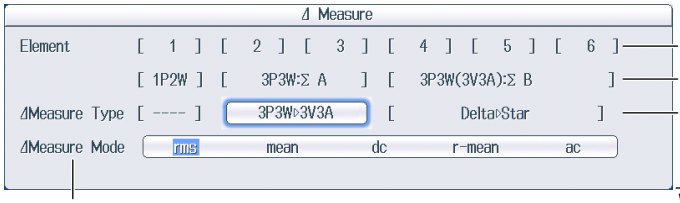
This section explains the following settings for the delta computation.

- Delta computation type
- Delta computation mode

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

Delta Computation Settings (Δ Measure)

Press **WIRING** and then the Δ **Measure** soft key to display the following screen.



Installed input elements

The set wiring systems

Set the delta computation type.
The available options vary depending on the set wiring systems.

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

Set the delta computation mode (rms, mean, dc, r-mean, ac).

1.11 Setting the Crest Factor

This section explains how to set the crest factor.

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

System Config Menu

Press **UTILITY** and then the **System Config** soft key to display the following menu.

Set the crest factor (CF3, CF6, CF6A).

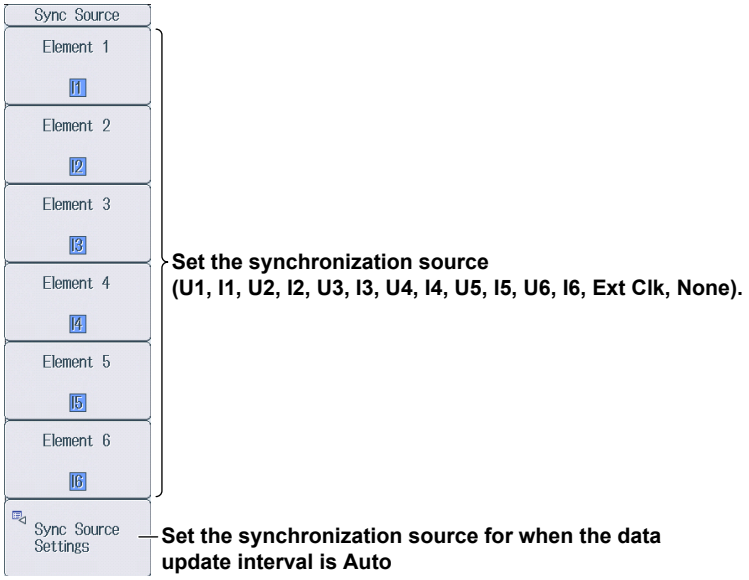
1.12 Setting Measurement Periods

This section explains how to set the synchronization sources that determine the measurement period.

► **"Measurement Period (SYNC SOURCE)" in the features guide**

Sync Src Menu

Press **SYNC SOURCE** to display the following menu.

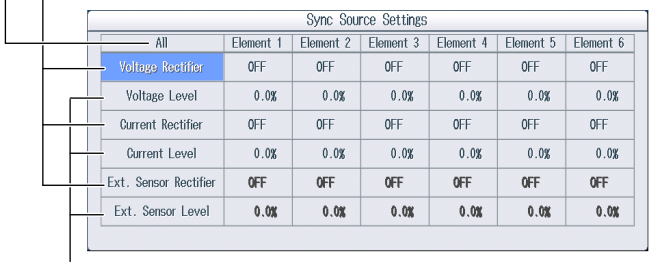


Setting the Synchronization Source for When the Data Update Interval is Auto (Sync Source Setting)

Press **SYNC SOURCE** and then the **Sync Src Setting** soft key to display the following screen.

To set all elements to the same setting at once, change the settings in the All column.

Turn on or off the synchronization source rectifier for voltage, current, and external current sensor signals.



Set the synchronization source level for voltage, current, and external current sensor signals.

- **When the rectifier function is off: -100.0% to 100.0%**
- **When the rectifier function is on: 0.0% to 100.0% (absolute value)**

1.13 Setting Line Filters

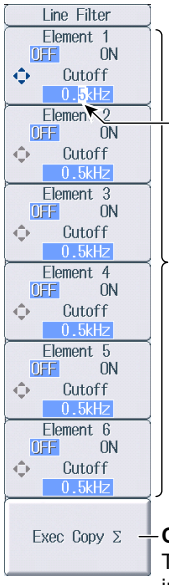
This section explains the following settings for line filters:

- Turning line filters on and off
- Cutoff frequency

► “Line Filter (LINE FILTER)” in the features guide

Line Filter Menu

Press **LINE FILTER** to display the following menu.



Cursor (use the ◄► cursor keys to move it)

Configure the line filter settings:

- **Turn the line filter on or off.**
- **Set the cutoff frequency (0.1kHz to 100.0kHz in steps of 0.1 kHz, 300kHz, 1MHz).**

Copies the line filter setting

The line filter setting of the input element that is indicated by the cursor is copied to all the input elements in that element’s wiring unit.

1.14 Setting Frequency Filters

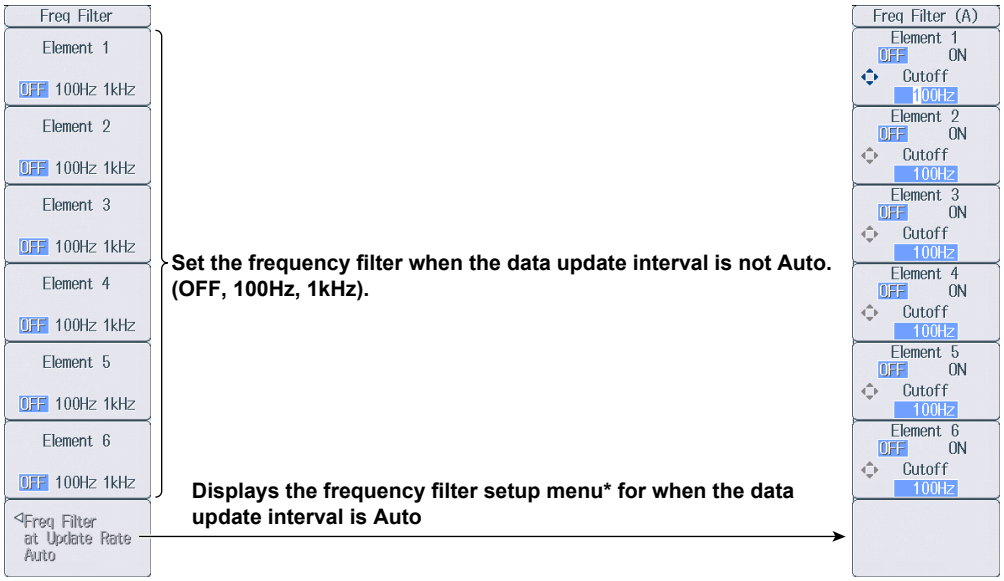
This section explains how to set the frequency filter.

► "Frequency Filter (FREQ FILTER)" in the features guide

Freq Filter Menu

When the data update interval is not Auto

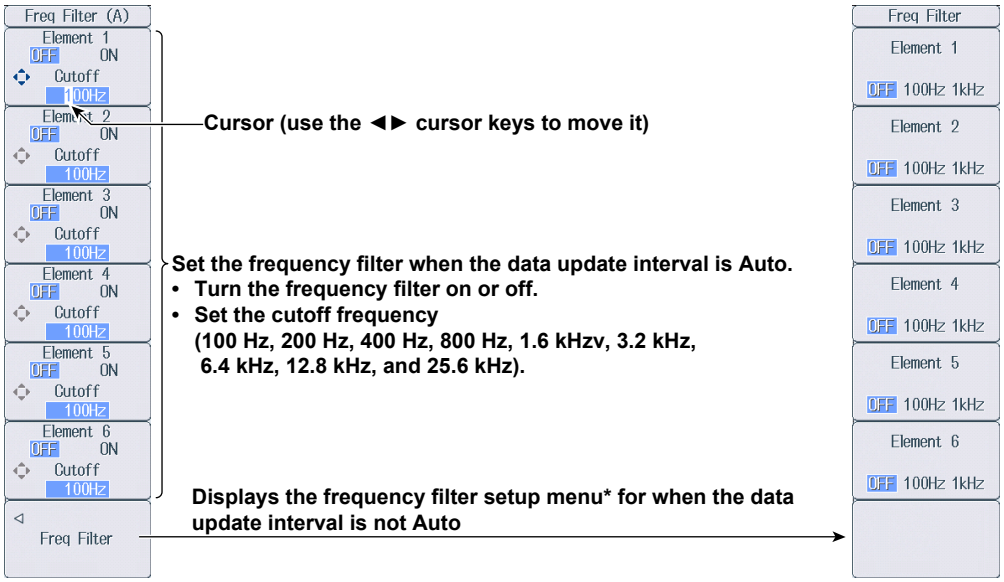
Press **SHIFT+LINE FILTER** (FREQ FILTER) to display the following menu.



Freq Filter (A) Menu

When the data update interval is Auto

Press **SHIFT+LINE FILTER** (FREQ FILTER) and then the **Freq Filter at Update Rate Auto** soft key to display the following menu.



* The menu item is displayed, but the function is invalid.

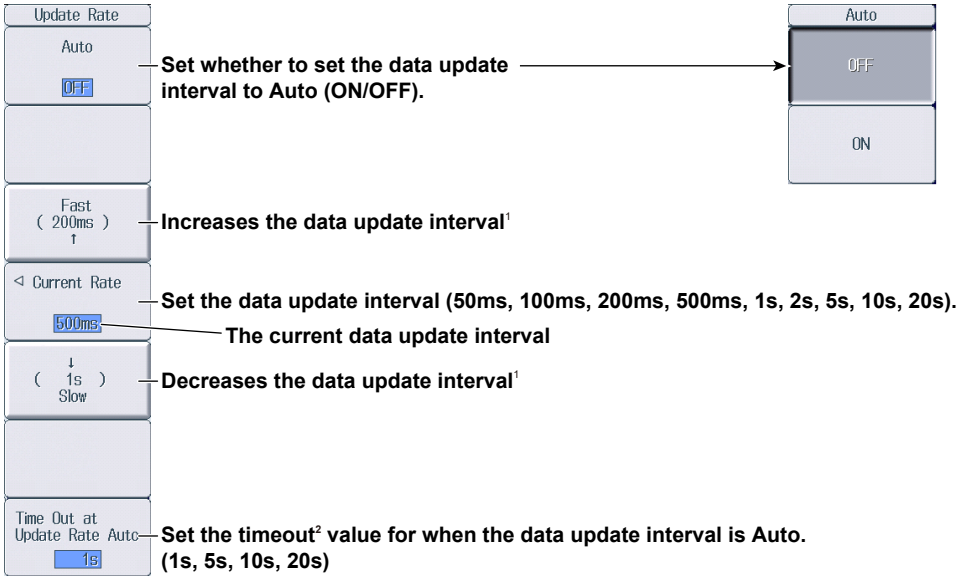
1.15 Setting the Data Update Interval

This section explains how to set the data update interval.

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

Update Rate Menu

Press **UPDATE RATE** to display the following menu.



1 You can set this when the data update interval is not Auto.

2 You can set this when the data update interval is Auto.

1.16 Setting Averaging

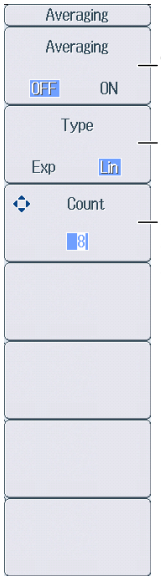
This section explains the following settings for averaging:

- Turning averaging on and off
- Averaging type
- Attenuation constant
- Average count

► "Averaging (AVG)" in the features guide

Averaging Menu

Press **AVG** to display the following menu.



Turns averaging on and off

Set the averaging type (Exp, Lin).

Set the attenuation constant or average count.
• When Type is set to Exp: Set the attenuation constant (2 to 64).
• When Type is set to Lin: Set the average count (8 to 64).

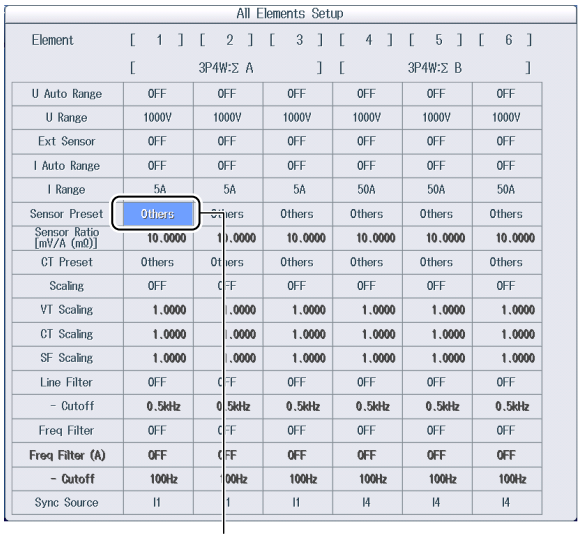
1.17 Displaying the Menu for Configuring All Elements

This section explains how to set the settings for all elements.

► “Settings of All Elements (All Elements Setup)” in the features guide

All Elements Setup Menu

1. Press **WIRING** and then the **All Elements Setup** soft key to display the following menu.
Use the **cursor** keys to select the setting that you want to change, and then press **SET** to display the available options or an input box.



Use the cursor keys to select the item that you want to set.

1.18 Displaying the Setup Parameter List

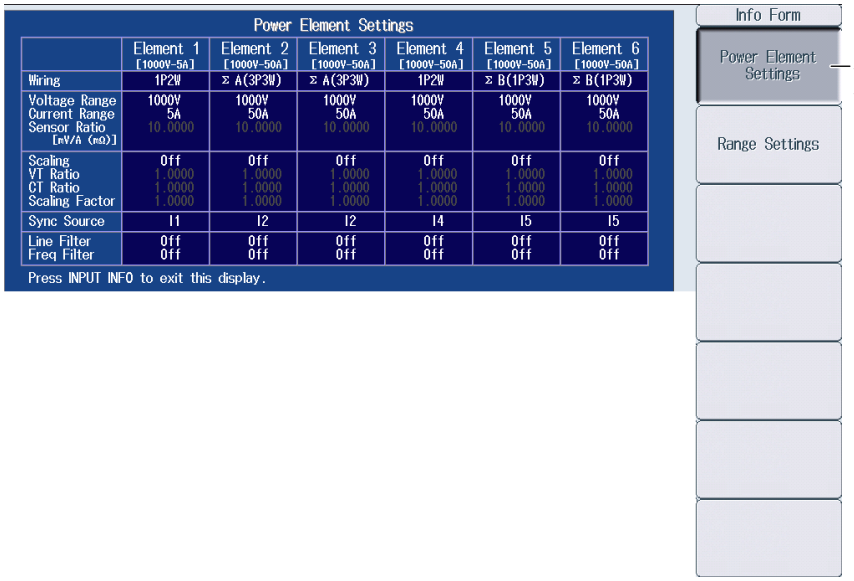
This section explains how to display a list of setup parameters.

► “Displaying the Setup Parameter List (INPUT INFO)” in the features guide

Info Form Menu

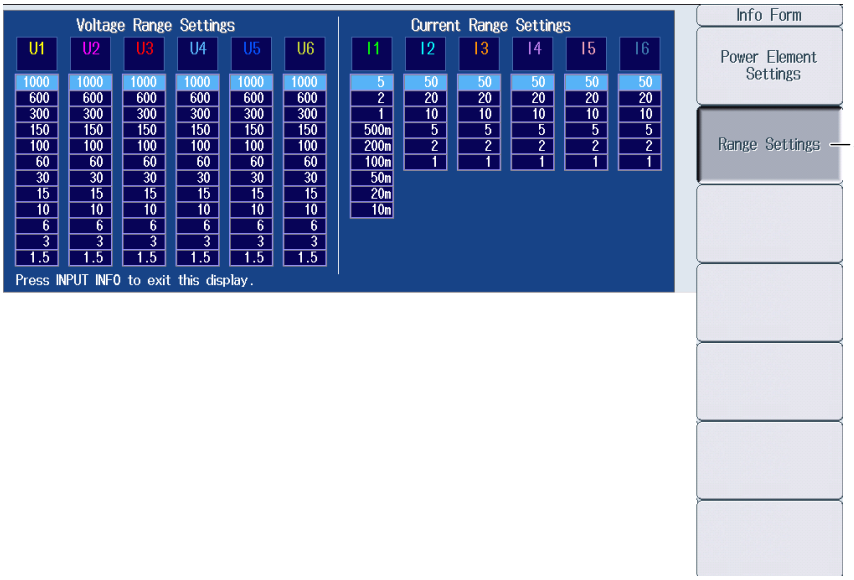
1. Press **INPUT INFO**. The INPUT INFO key illuminates and the split display appears.
   The top half of the screen displays the setup parameter list. Press INPUT INFO again to clear the setup parameter list and display the previous screen.
2. Hold down **FORM** until the Info Form menu appears.
   Input element or measurement range settings are displayed.

Input Element Settings List



Select Power Element Settings.

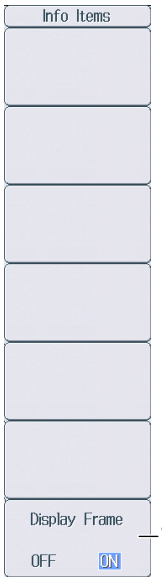
Measurement Range Settings List



Select Range Settings.

Info Items Menu

3. Press **ITEM** to display the Info Items menu.



Turns the display frame on and off

2.1 Setting Harmonic Measurement Conditions

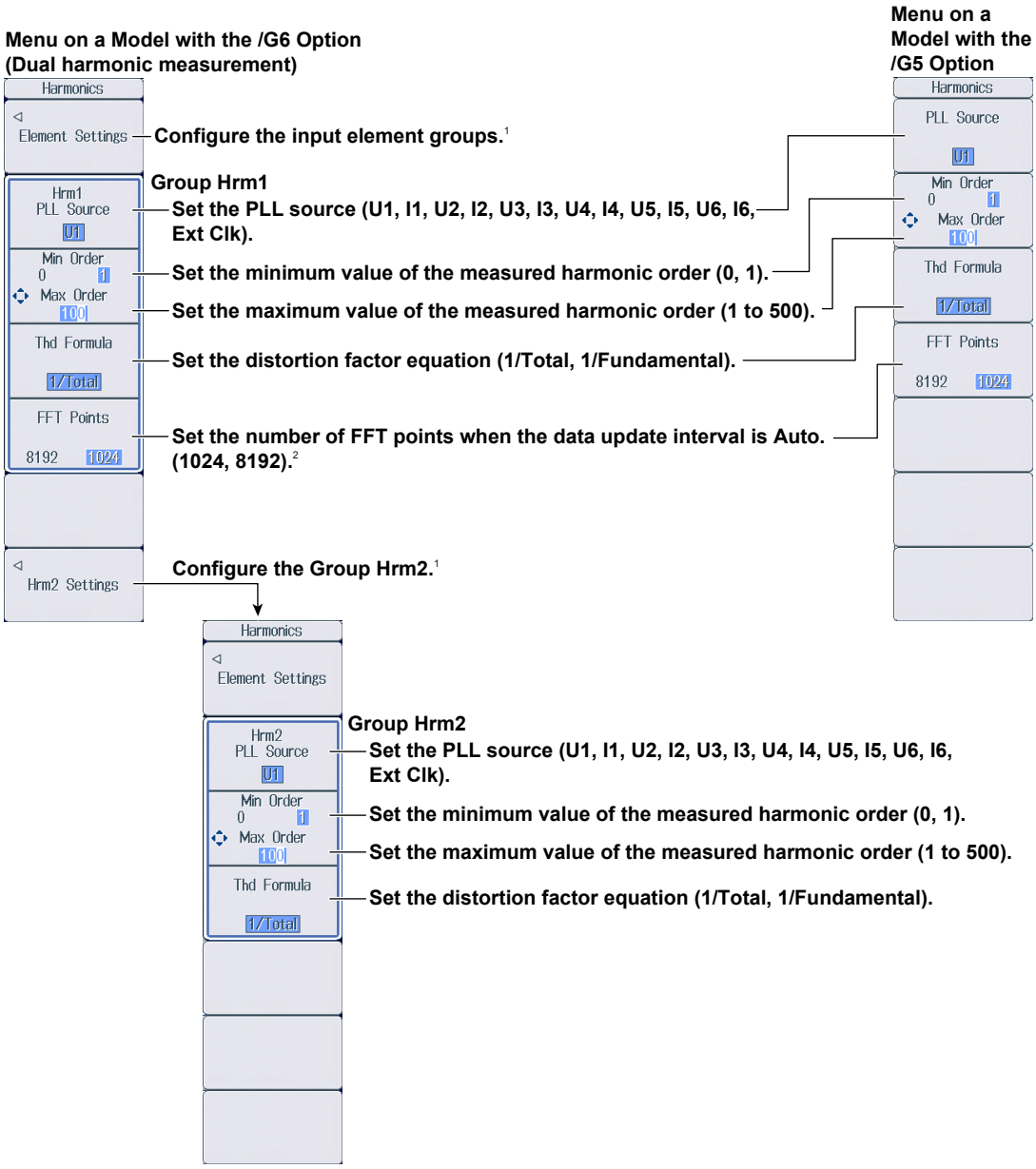
This section explains the following settings for harmonic measurement conditions. This feature is available on models with the /G5 or /G6 option.

- Input element group
- PLL source
- Measured harmonic order
- Distortion factor equation

► "Harmonic Measurement Conditions (Option)" in the features guide

Harmonics Menu

Press **HRM SET** to display the following menu.

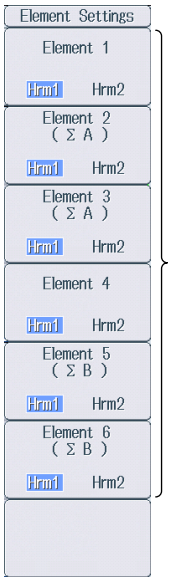


1 You can set this when the data update interval is not Auto.

2 You can set this when the data update interval is Auto.

Setting the Input Element Group (Element Settings)

Press the **Element Settings** soft key to display the following menu.



Set the group of the input element (Hrm1, Hrm2).
Input elements that are assigned to the same wiring unit are set to the same group.

3.1 Setting Motor Evaluation Conditions

This section explains the following settings for motor evaluation conditions. This feature is available on models with the /MTR option.

- Scaling factor
- Unit
- Input signal type
- Analog input range
- Analog input linear scale
- Line filter
- Synchronization source
- Pulse input range
- Torque signal pulse rating
- Number of pulses per revolution of the revolution signal
- Motor's number of poles for computing the synchronous speed
- Voltage or current whose frequency is measured to compute the synchronous speed
- Electrical angle measurement
- Motor efficiency and total efficiency computations

► "Motor Evaluation Conditions (Option)" in the features guide

Setting Motor Evaluation Conditions (MOTOR Settings)

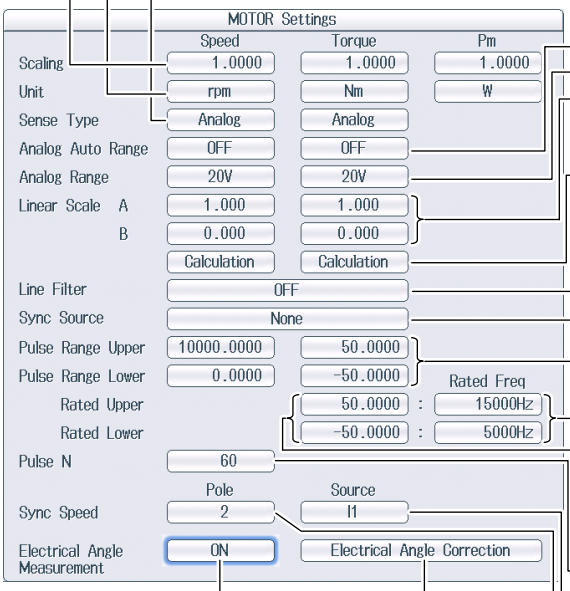
Press **SHIFT+SCALING** (MOTOR/AUX SET) to display the following screen.

On models with the /AUX option, the auxiliary input conditions setup screen is displayed. See section 4.1.

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 unit (up to 8 characters).
Set the speed, torque, and Pm units.

Set the input signal type (Analog, Pulse).
Set the type of revolution sensor for Speed and the type of the torque meter for Torque.



When Sense Type is set to Analog:

- **Turns the 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, 100Hz, 1kHz).**
- **Set the synchronization source (U1, I1, U2, I2, U3, I3, U4, I4, U5, I5, U6, I6, Ext Clk, None).**
  Even if Sense Type is set to Pulse, correctly setting the synchronization source improves measurement accuracy.

When Sense Type is set to Pulse:

- **Set the upper and lower limits.**
  Revolution signal: 0.0000 to 99999.9999 [rpm]
  Torque signal: −10000.0000 to 10000.0000 [N•m]
- **Set the positive and negative rated torque signal pulse frequencies (1 to 100000000 [Hz]).**
- **Set the positive and negative rated torque signal values (−10000.0000 to 10000.0000 [N•m]).**

Set the number of pulses per revolution of the revolution signal (1 to 9999).

Set the voltage or current whose frequency will be measured to compute the synchronous speed (U1, I1, U2, I2, U3, I3, U4, I4, U5, I5, U6, I6).

Set the number of motor poles that will be used to compute the synchronous speed (1 to 99).

Turns electrical angle measurement on and off

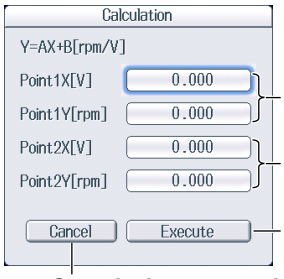
Configure the electrical angle correction.
You can configure the electrical angle correction when Electrical Angle Measurement is set to ON.

Computing A and B (Calculation)

Compute A (the slope) and B (the offset) from two points on the characteristics graph of a revolution sensor or torque meter.

Rotating Speed's A and B

On the motor evaluation conditions setup screen, select **Calculation** under Speed to display the following screen.



Set the first X-axis value [V] and Y-axis value [rpm] (−1.000 T to 1.000 T).

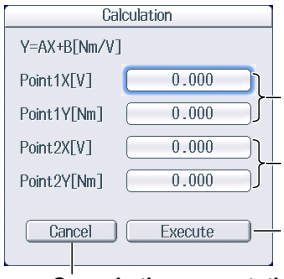
Set the second X-axis value [V] and Y-axis value [rpm] (−1.000 T to 1.000 T).

Computes A and B

Cancels the computation

Torque's A and B

On the motor evaluation conditions setup screen, select **Calculation** under Torque to display the following screen.



Set the first X-axis value [V] and Y-axis value [Nm] (−1.000 T to 1.000 T).

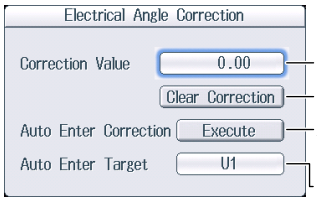
Set the second X-axis value [V] and Y-axis value [Nm] (−1.000 T to 1.000 T).

Computes A and B

Cancels the computation

Setting the Electrical Angle Correction Value (Electrical Angle Correction)

On the motor evaluation conditions setup screen, select **Electrical Angle Correction** to display the following screen.



Set the correction value (−180.00 to 180.00).

Clears the correction value

Automatically computes the correction value
Correction Value is set to the computed value.

Set the voltage or current to automatically compute the correction value of (U1, I1, U2, I2, U3, I3, U4, I4, U5, I5, U6, I6).

Computing the Motor Efficiency and Total Efficiency

This instrument can compute the motor efficiency (the ratio of motor output to the power consumed by the motor) and total efficiency from the measured active power and motor output. For information on how to set expressions, see section 1.8.

4.1 Setting Auxiliary Input Conditions

This section explains the following settings for auxiliary input conditions. This feature is available on models with the /AUX option.

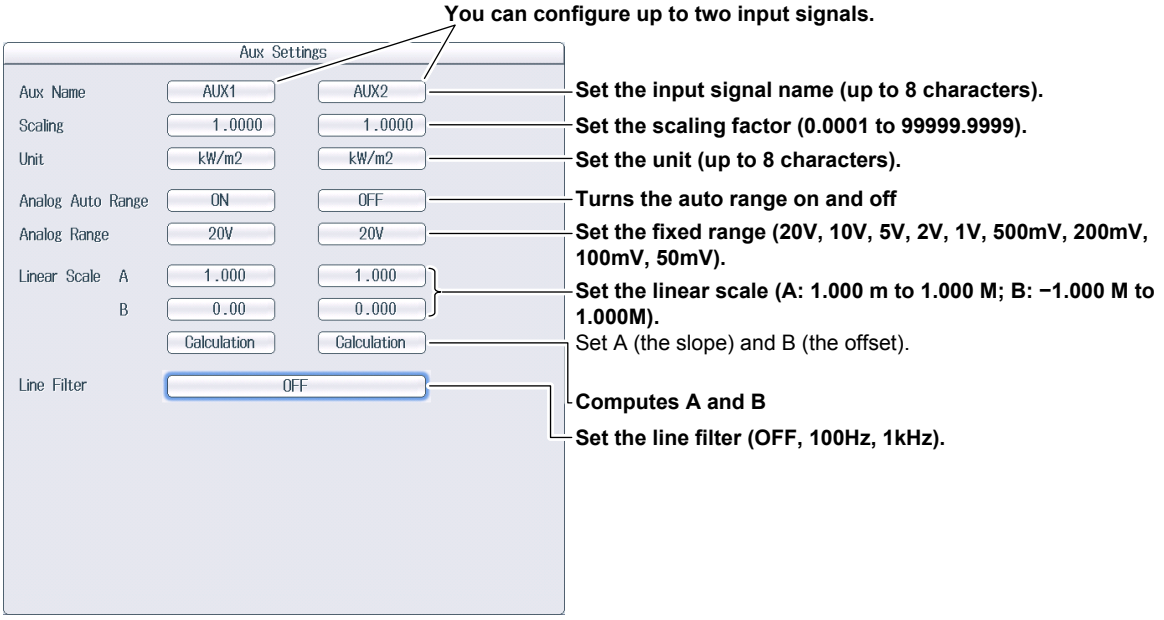
- Input signal name
- Scaling factor
- Unit
- Input signal range
- Input signal linear scale
- Line filter

► "Auxiliary Input Conditions (Option)" in the features guide

Setting Auxiliary Input Conditions (Aux Settings)

Press **SHIFT+SCALING** (MOTOR/AUX SET) to display the following screen.

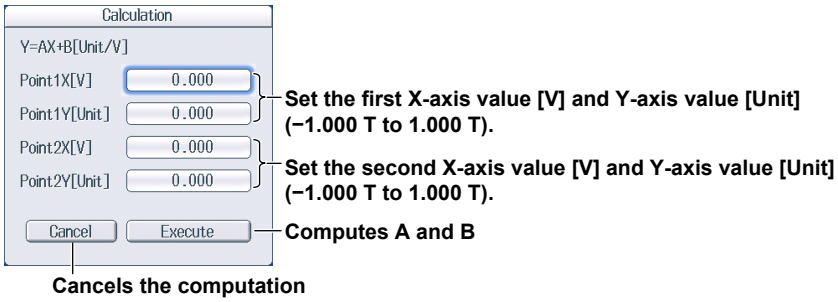
On models with the /MTR option, the motor evaluation conditions setup screen is displayed. See section 3.1.



Computing A and B (Calculation)

Compute A (the slope) and B (the offset) from two points on the characteristics graph of the input signal.

On the auxiliary input conditions setup screen, select **Calculation** to display the following screen.



5.1 Holding Measured Values

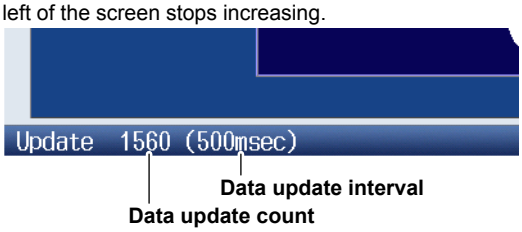
This section explains how to hold measured values.

► “Holding Measured Values (HOLD)” in the features guide

Press **HOLD**. The HOLD key illuminates, and the displayed measured value is held.

- Values such as D/A output, the list of numeric data that is being printed on the built-in printer, and communication output are also held.
- Press **HOLD** again to turn the HOLD key off. This releases the hold feature. The measured data is then updated at the specified data update rate (see section 1.15).

If you hold the measured value, the data update count in the lower left of the screen stops increasing.



5.2 Performing Single Measurements

This section explains how to perform single measurements.

► “Single Measurement (SINGLE)” in the features guide

1. Press **HOLD**. The HOLD key illuminates, and the displayed measured value is held.
2. Press **SINGLE**. A single measurement is performed at the specified data update rate, and this instrument then holds the measured value.

Note

- If, while the HOLD key is illuminated, you press **HOLD** again, the HOLD key will turn off, and the hold feature will be released.If you press SINGLE 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 press the key.
- When the data update interval is set to Auto, single measurement is not possible.

6.1 Setting the Display Format

This section explains how to set the numeric data display format. To set the display format, you can:

- Select it from the Numeric Form menu.
- Set it directly by pressing NUMERIC.

► "Numeric Data Display Format" in the features guide

Numeric Form Menu

Press **NUMERIC** and then **FORM** to display the following menu.

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **FORM** again.

Select the 4 Items display.

Select the 8 Items display.

Select the 16 Items display.

Select the matrix display.
You can select four or six columns (see section 6.4).

Select the All Items display.

Select the harmonics list display (/G5 or /G6 option).
This instrument switches between the single and dual list displays each time you press this soft key.

Select the custom display.
You can load the background and customize the numeric data display (see section 6.7).

NUMERIC Key

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

6.2 Switching the Displayed Page

This section explains how to switch the displayed numeric data page.

► "Switching the Displayed Page (PAGE UP/PAGE DOWN)" in the features guide

1. Follow the procedure in section 6.1 to select the numeric data display format.

4 Items, 8 Items, 16 Items, Matrix, All Items, and Custom Displays

2. Press **PAGE▲** to display the previous page.

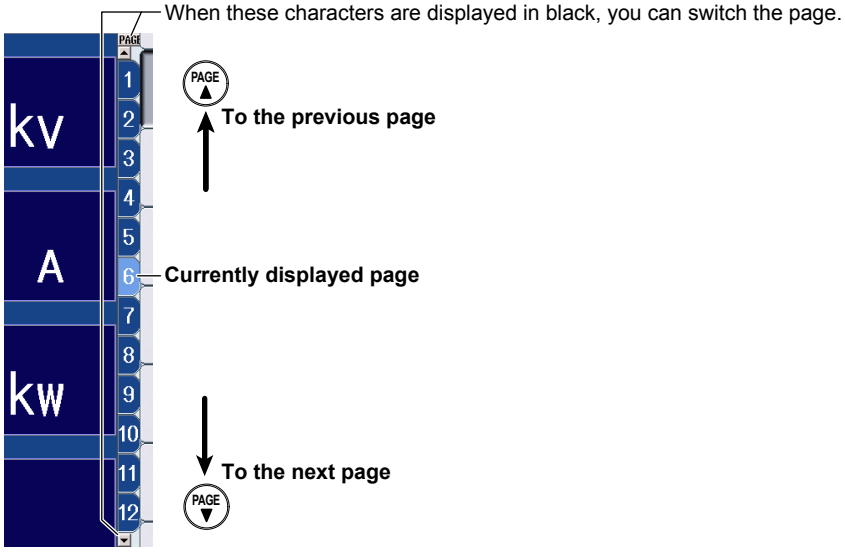
   Press **PAGE▼** to display the next page.

   Press **SHIFT+PAGE▲** (⏫) to jump to the first page.

   Press **SHIFT+PAGE▼** (⏬) to jump to the last page.

   - You can switch the displayed page separately for the 4 Items, 8 Items, 16 Items, Matrix, All Items, and Custom displays.
   - For the All Items display, the first page is always displayed in the top half of the screen, and the currently selected page from pages 2 to 12 is displayed in the bottom half of the screen. On the split display, you can switch between pages 1 to 12.
   - For the Custom display, you can switch between pages when the display is set so that the total number of displayed items is more than the number of items that can be displayed on one page (see section 6.7).

Example of the 4 Items Display



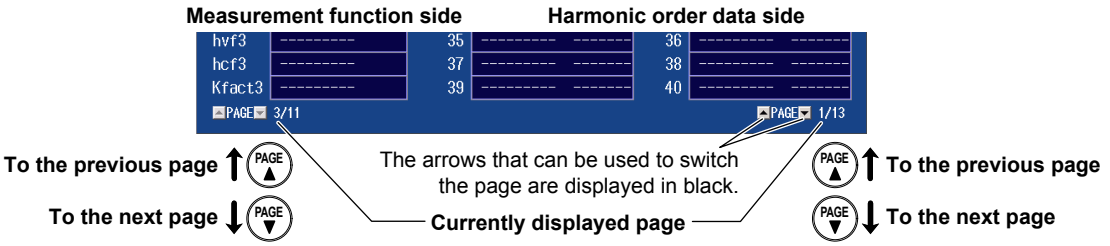
Hrm List Single and Hrm List Dual Displays (/G5 or /G6 options)

2. Press **ESC** to clear the menu.
3. Press the **cursor** keys (◄►) to select either the measurement function side (the left side of the screen) or the harmonic order data side (the right side of the screen).
4. Press **PAGE▲** to display the previous page.

   Press **PAGE▼** to display the next page.

   Press **SHIFT+PAGE▲** (⏫) to jump to the first page.

   Press **SHIFT+PAGE▼** (⏬) to jump to the last page.



Note

If you do not perform step 2 to clear the menu, you cannot switch between the measurement function and the harmonic order data sides.

6.3 Changing the Displayed Items on the 4 Items, 8 Items, and 16 Items Displays

This section explains the following settings for the displayed items on the 4 Items, 8 Items, and 16 Items displays:

- Item number
- Measurement function
- Element and wiring unit
- Harmonic order
- Resetting the displayed items
- Turning the display frame on and off

To change the displayed items, you can:

- Set the items on the Numeric (4), Numeric (8), or Numeric (16) menu.
- Set items directly by pressing the function select keys and ELEMENT.

► **“4-, 8-, and 16-Value Displays (4 Items/8 Items/16 Items)” in the features guide**

1. Follow the procedure in section 6.1 to set the numeric data display format to the 4 Items, 8 Items, or 16 Items display.

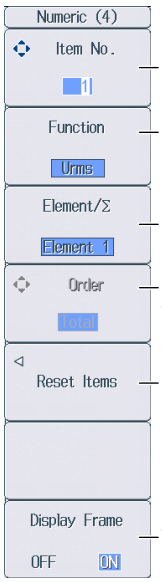
Numeric (4), Numeric (8), and Numeric (16) Menus

2. Press **ITEM** to display the following menu.

   If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Items menu may be displayed. If this happens, press **ITEM** again.

   In step 1, you can also display the Numeric (4), Numeric (8), or Numeric (16) menu by pressing **NUMERIC**, **ITEM**, and then repeatedly pressing **NUMERIC**.

Example of the Numeric (4) Menu



Select the item number that you want to set. (**4 Items display: 1 to 48**; **8 Items display: 1 to 96**; **16 Items display: 1 to 192**)

Set the measurement function (None, other functions—for details on the various measurement functions, see “Items That This Instrument Can Measure” in the features guide).

Set the element and wiring unit (Element 1 to Element 6, ΣA to ΣC).

Set the harmonic order (Total, 0 to 500; /G5 or /G6 option).
You can set this setting only when you have selected a measurement function that includes a harmonic order.

Set the resetting of displayed items.

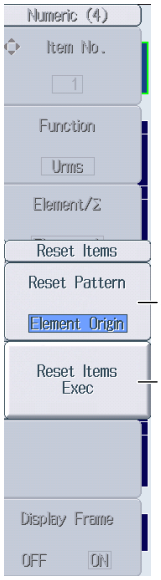
Turns the display frame on and off

Switching the Page

To set items on pages that aren’t currently displayed, switch to these pages. For details on how to switch pages, see section 6.2.

Reset Items Menu

Press the **Reset Items** soft key to display the following menu.



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

Resets the items using the specified reset pattern

Function Select Keys and the ELEMENT Key

Follow steps 1 and 2 on the previous page to display the Numeric (4), Numeric (8), or Numeric (16) menu.

3. Press **ESC** to clear the menu.

Example of the 8 Items Display

Displayed in the upper left of the numeric data display screen

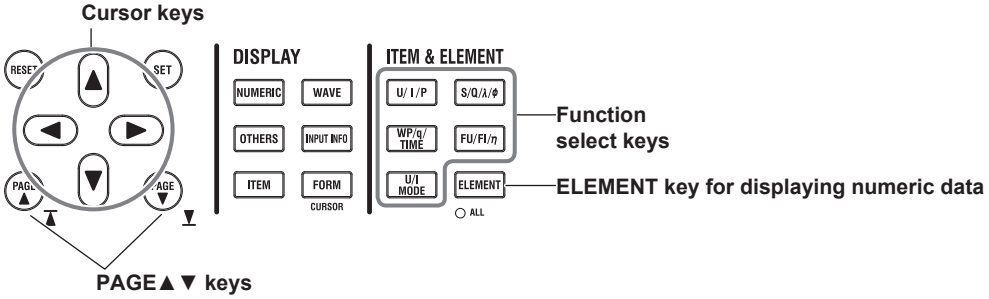
4. Press the **cursor** keys, the **PAGE▲▼** keys, or the **SHIFT+PAGE▲▼** (▲ and ▼) keys to select the item that you want to change.

5. Press the function select key that corresponds to the measurement function that you want to display.

Function select keys: **U/I/P** key, **S/Q/λ/Φ** key, **WP/q/TIME** key, **FU/FI/η** key, and **U/I MODE** key

6. Press the **ELEMENT** key for displaying numeric data to select the element and wiring unit that you want to display.

- Press **SHIFT+**the **ELEMENT** (ALL) key for displaying numeric data to illuminate the indicator below the ELEMENT key and change all elements of the measurement functions on the displayed page to the same element and wiring unit at once.
- Press **SHIFT+**the **ELEMENT** (ALL) key for displaying numeric data again to turn the indicator off and stop setting all elements at once.



6.4 Changing the Displayed Items on the Matrix Display

This section explains the following settings for the displayed items on the Matrix display:

- Item number
- Measurement function
- Element and wiring unit
- Harmonic order
- Resetting the displayed items
- Display column
- Turning the display frame on and off

To change the displayed items, you can:

- Set the items on the Matrix Items menu.
- Set items directly by pressing the function select keys and ELEMENT.

► **"Matrix Display (Matrix)" in the features guide**

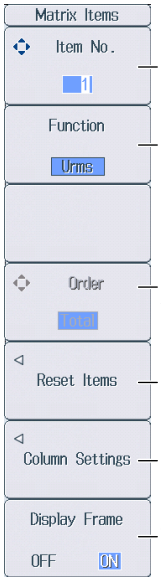
1. Follow the procedure in section 6.1 to set the numeric data display format to the Matrix display.

Matrix Items Menu

2. Press **ITEM** to display the following menu.

   If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Items menu may be displayed. If this happens, press **ITEM** again.

   In step 1, you can also display the Matrix Items menu by pressing **NUMERIC**, **ITEM**, and then repeatedly pressing **NUMERIC**.



Select the item number that you want to set (1 to 81).

Set the measurement function (None, other functions—for details on the various measurement functions, see "Items That This Instrument Can Measure" in the features guide).

Set the harmonic order (Total, 0 to 500; /G5 or /G6 option).
You can set this setting only when you have selected a measurement function that includes a harmonic order.

Set the resetting of displayed items.

Configure the columns to display.

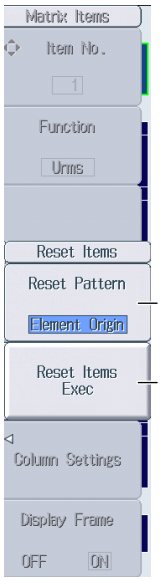
Turns the display frame on and off

Switching the Page

To set items on pages that aren't currently displayed, switch to these pages. For details on how to switch pages, see section 6.2.

Reset Items Menu

Press the **Reset Items** soft key to display the following menu.

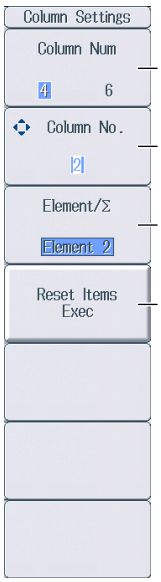


Set the reset pattern (Element Origin, Function Origin, Clear Current Page, Clear All Pages).

Resets the items using the specified reset pattern

Column Settings Menu

Press the **Column Settings** soft key to display the following menu.



Set the number of columns (4, 6).

Set the column number (1 to 6).

Set the element and wiring unit (None, Element 1 to Element 6, ΣA to ΣC).

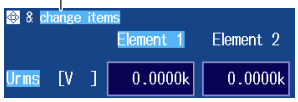
Resets items to the default values

Function Select Keys and the ELEMENT Key

Follow steps 1 and 2 on page 6-6 to display the Matrix Items menu.

3. Press **ESC** to clear the menu.

Displayed in the upper left of the numeric data display screen

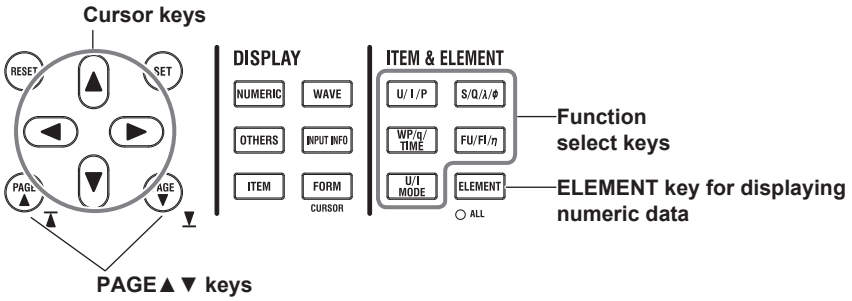


Changing the Measurement Function (Vertical direction)

4. Press the **cursor** keys (▲▼), the **PAGE▲▼** keys, or the **SHIFT+PAGE▲▼** (▲ and ▼) keys to select the row that you want to change.
5. Press the function select key that corresponds to the measurement function that you want to display.
   Function select keys: **U/I/P** key, **S/Q/λ/Φ** key, **WP/q/TIME** key, **FU/FI/η** key, and **U/I MODE** key

Changing the Element and Wiring Unit (Horizontal direction)

4. Use the **cursor** keys (◄►) to select the column that you want to change.
5. Press the **ELEMENT** key for displaying numeric data to select the element and wiring unit that you want to display.



6.5 Changing the All Items Display

This section explains the following All Items display settings:

- Harmonic order
- Turning the display of all element and all wiring unit data on and off
- Turning the display frame on and off

► “All Display (All Items)” in the features guide

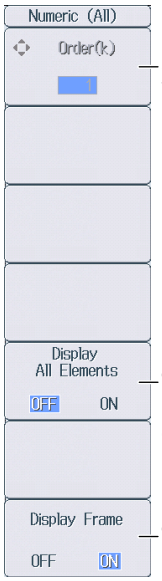
1. Follow the procedure in section 6.1 to set the numeric data display format to the All Items display.

Numeric (All) Menu

2. Press **ITEM** to display the following menu.

   If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Items menu may be displayed. If this happens, press **ITEM** again.

   In step 1, you can also display the Numeric (All) menu by pressing **NUMERIC**, **ITEM**, and then repeatedly pressing **NUMERIC**.



Set the harmonic order (Total, 0 to 500; /G5 or /G6 option).
You can set this setting only when you have selected the page of a measurement function includes a harmonic order. For details on how to switch pages, see section 6.2.

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 7 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

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 section 6.4).

6.6 Changing the Harmonics List Display (Option)

This section explains the following settings for the harmonics list display (Hrm List). This feature is available on models with the /G5 or /G6 option.

- List number
- Measurement function
- Element and wiring unit
- Turning the display frame on and off

To change the displayed items, you can:

- Set the items on the List Items menu.
- Set items directly by pressing the function select keys and ELEMENT.

► **"Single Harmonics and Dual Harmonics Lists (Hrm List Single/Dual; option)" in the features guide**

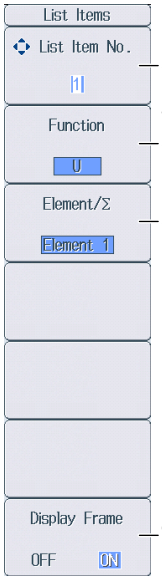
1. Follow the procedure in section 6.1 to set the numeric data display format to the harmonics list display (Hrm List).

List Items Menu

2. Press **ITEM** to display the following menu.

   If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Items menu may be displayed. If this happens, press **ITEM** again.

   In step 1, you can also display the List Items menu by pressing **NUMERIC**, **ITEM**, and then repeatedly pressing **NUMERIC**. There is a List Items menu for the single harmonics list and the dual harmonics list. When you repeatedly press **NUMERIC**, the menu for the single harmonics list is displayed after the All Items display, and the menu for the dual harmonics list is displayed after the menu for the single harmonics list.



Select the list number that you want to set (1, 2).
Function, element, and wiring unit settings that you make for list number 2 are also reflected in the right column of the harmonic order data of the dual harmonics list.

Set the measurement function (U, I, P, S, Q, λ, Φ, ΦU, ΦI, Z, Rs, Xs, Rp, Xp).

Set the element and wiring unit (Element 1 to Element 6, ΣA to ΣC).

Turns the display frame on and off

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.

Function Select Keys and the ELEMENT Key

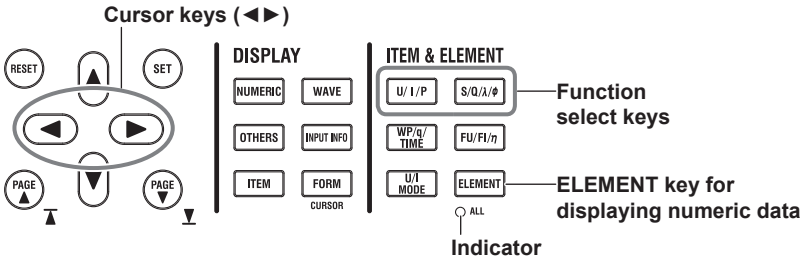
Follow steps 1 and 2 on page 6-10 to display the List Items menu.

3. Press **ESC** to clear the menu.
4. Use the **cursor** keys (◄►) to select the harmonic order data side (the right side of the screen).
   If you are displaying the dual harmonics list, you can set the left or right column of the harmonic order data, whichever you have selected.

Example of the Single Harmonics List

Displayed in the upper left of the numeric data display screen

5. Press the function select key that corresponds to the measurement function that you want to display.
   Function select keys: **U/I/P** key and **S/Q/λ/Φ** key
   (The **WP/q/TIME** key, **FU/FI/η** key, and **U/I** MODE key are disabled.)
6. Press the **ELEMENT** key for displaying numeric data to select the element and wiring unit that you want to display.
   - If you are displaying the dual harmonics list, press **SHIFT+**the **ELEMENT** (ALL) key for displaying numeric data to illuminate the indicator below the ELEMENT key and change all elements of the left and right columns of the harmonic order data to the same element and wiring unit at once.
   - Press **SHIFT+**the **ELEMENT** (ALL) key for displaying numeric data again to turn the indicator off and stop setting all elements at once.



6.7 Setting the Custom Display

This section explains the following Custom display settings:

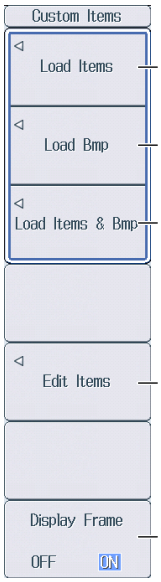
- Loading of display configuration files
- Loading of background files
- Display configuration
  Total items, items per page, custom items (item number, measurement function, element and wiring unit, harmonic order, display position, font size, font color), saving custom display configuration files
- Turning the display frame on and off

► **"Custom Display (Custom)" in the features guide**

1. Follow the procedure in section 6.1 to set the numeric data display format to Custom.

Custom Items Menu

2. Press **ITEM** to display the following menu.
If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Items menu may be displayed. If this happens, press **ITEM** again.



Loads a display configuration file

Loads a background file

Loads display configuration and background files at the same time
► page 6-14

You can load files for the custom display.
Display configuration files: .txt files
Background files: .bmp files

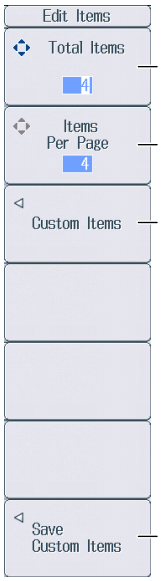
- You can use the "Edit Items" menu described below to change the display configuration that you have loaded.
- To load both a display configuration file and background file at the same time, load the display configuration file.

Configure the display configuration.

Turns the display frame on and off

Setting the Display Configuration (Edit Items)

Press the **Edit Items** soft key to display the following menu.



Set the total number of items (1 to 192).

Set the number of items per page (1 to 192).

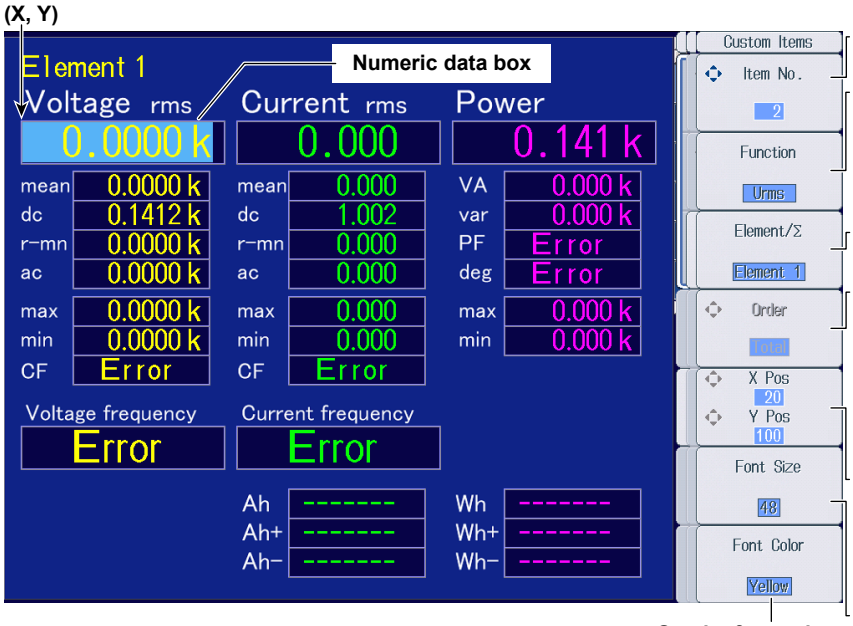
- Any changes made to Total Items will change the Items Per Page setting, and vice-versa.
- For details on how to switch pages, see section 6.2.

Customize display items.

Saves the display configuration file

Customizing Display Items (Custom Items)

Press the **Custom Items** soft key to display the following screen.



Select the item number that you want to set (1 to the Total Items setting).

Set the measurement function (None, other functions—for details on the various measurement functions, see "Items That This Instrument Can Measure" in the features guide).

Set the element and wiring unit (Element 1 to Element 6, ΣA to ΣC).

When Function is set to None:
Set the character string (up to 15 characters).
When the measurement function includes a harmonic order:
Set the harmonic order (Total, 0 to 500; /G5 or /G6 option).

Set the display position.

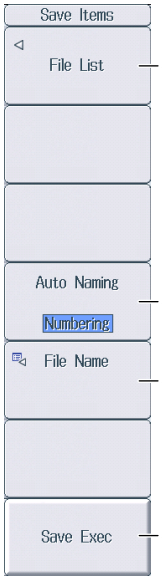
- **X Pos: 0 (left edge of the screen) to 800 (right edge of the screen)**
- **Y Pos: 0 (top of the screen) to 671 (bottom of the screen)**

Set the font size (14, 16, 20, 24, 32, 48, 64, 96, 128).

Set the font color (Yellow, Green, Magenta, Cyan, Red, Orange, Light Blue, Purple, Blue, Pink, Light Green, Dark Blue, Blue Green, Salmon Pink, Mid Green, Gray, White, Dark Gray, Blue Gray, Black).

Saving Display Configuration Files (Save Custom Items)

Press the **Save Custom Items** soft key to display the following menu.



Set the save destination. ► section 17.2

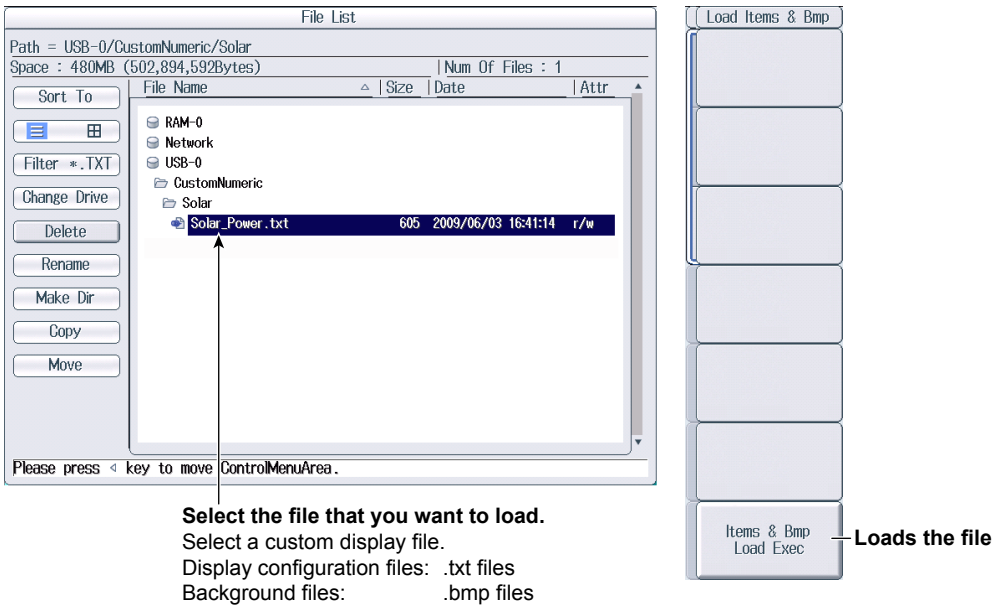
Set auto naming. ► section 17.2

Set the file name. ► section 17.2

Saves the display configuration
Note that if a file with the same name exists in the destination folder, it will be overwritten without warning.
File names are not case-sensitive.

Loading Display Configuration and Background Files at the Same Time (Load Items & Bmp)

Follow the procedure on page 6-12 to display the Custom Items menu, and then press the **Load Items & Bmp** soft key to display the following screen.



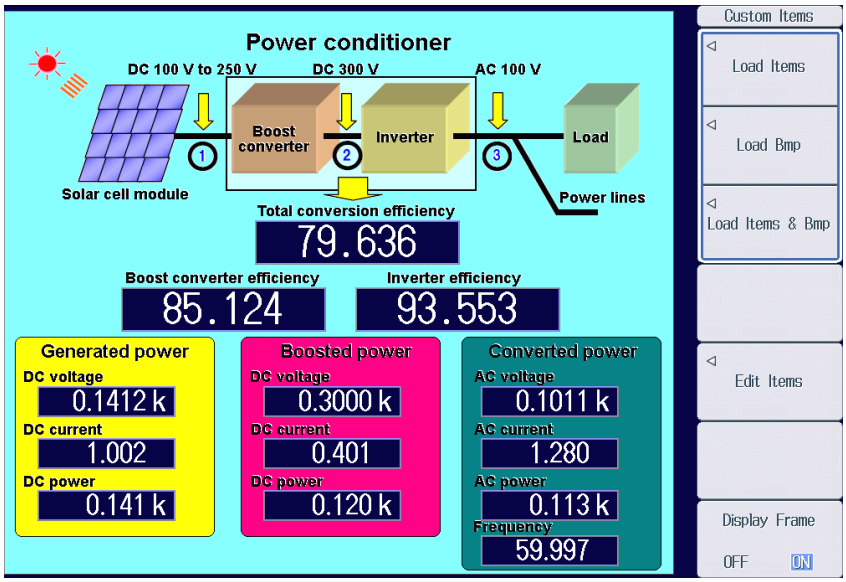
Select the file that you want to load.
Select a custom display file.
Display configuration files: .txt files
Background files: .bmp files

To load both a display configuration file and background file at the same time, load the display configuration file.
However, 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.

For the operating procedure, see section 17.6.

Loads the file

Example of Loading a File for the Custom Display



Note

After you properly load a display configuration file and a background file, if you restart this instrument and the same background file is not in the same location, the background will return to its default.

7.1 Setting User-Defined Functions

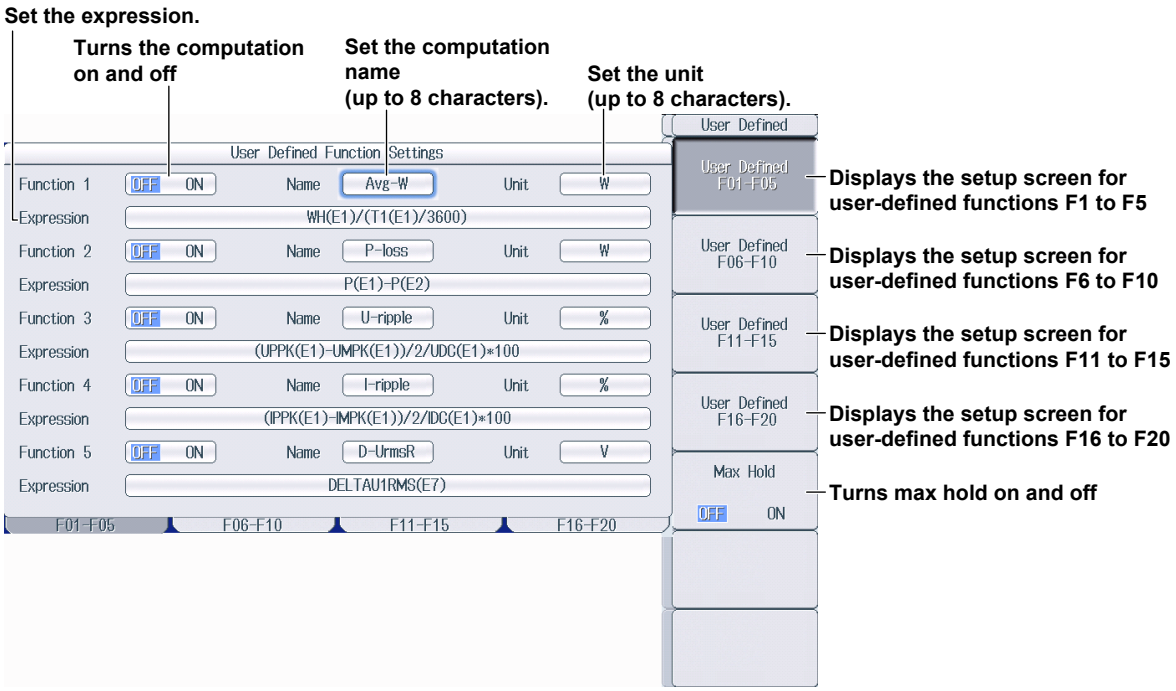
This section explains the following settings for user-defined functions:

- Turning computations on and off
- Computation name
- Unit
- Expressions
- Turning max hold on and off

► "User-Defined Functions (User Defined Function)" in the features guide

Setting User-Defined Functions (User Defined Function)

Press **MEASURE** and then the **User Defined Function** soft key to display the following screen.



7.2 Setting User-Defined Events

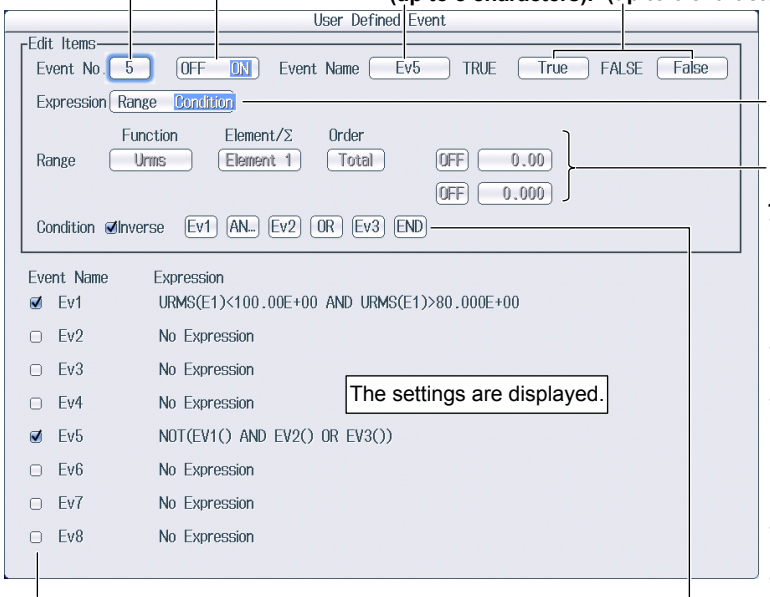
This section explains the following settings for user-defined events:

- Event number
- Turning events on and off
- Event name
- Character string displayed when events occur or do not occur
- Judgment condition setup method
  - Using numeric data to perform judgment
    Measurement function, element and wiring unit, harmonic order, comparison condition, comparison reference
  - Using logical AND and OR of events to perform judgment
    Inversion of judgment conditions

► “User-Defined Events (User Defined Event)” in the features guide

Setting User-Defined Events (User Defined Event)

Press **MEASURE** and then the **User Defined Event** soft key to display the following screen.



Set the event number (1 to 8).

Turns the event on and off

Set the event name (up to 8 characters).

Set the character string that is displayed when events occur or do not occur (up to 6 characters).

Select the judgment condition setup method (Range, Condition).

Using numeric data to perform judgment (Range)

- **Set the measurement function (for details on the various measurement functions, see “Items That This Instrument Can Measure” in the features guide).**
- **Set the element and wiring unit (Element 1 to Element 6, ΣA to ΣC).**
- **Set the harmonic order (Total, 0 to 500; /G5 or /G6 option).**
  You can set this setting when the measurement function includes a harmonic order.
- **Set the comparison condition (OFF, <, <=, =, >, >=, !=).**
- **Set the comparison reference (−9.999T to 9.999T).**

Using logical AND and OR of events to perform judgment (Condition)

- **Set the judgment condition inversion.**
- **Set AND, OR, or END.**
- **Set the events.**
  You can select events whose event numbers are smaller than the number specified by Event No. for the current event.

When you turn an event on, the corresponding check box is selected.

7.3 Setting Apparent Power, Reactive Power, and Corrected Power Equations

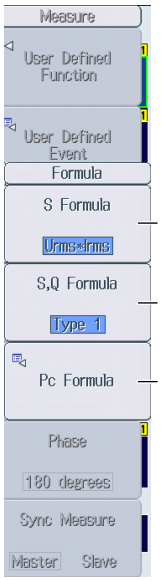
This section explains the following settings for the apparent power, reactive power, and corrected power equations:

- Apparent power equation
- Apparent power and reactive power equation types
- Corrected power equation
  Applicable standard and coefficients

► "Apparent Power, Reactive Power, and Corrected Power Equations (Formula)" in the features guide

Formula Menu

Press **MEASURE** and then the **Formula** soft key to display the following menu.



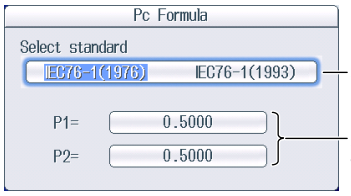
Set the apparent power equation (Urms*Irms, Umean*Imean, Udc*Idc, Umean*Irms, Urmean*Irmean).

Set the apparent power and reactive power equation types (Type 1, Type 2, Type 3).

Set the corrected power equation.

Setting the Corrected Power Equation (Pc Formula)

Press the **Pc Formula** soft key to display the following screen.



Set the applicable standard (IEC76-1(1976), IEC76-1(1993)).

Set the coefficients (0.0001 to 9.9999).
When Select standard is IEC76-1(1976), set coefficients P1 and P2.

7.4 Setting the Sampling Frequency

This section explains how to set the sampling frequency.

► “Sampling Frequency (Sampling Frequency)” in the features guide

Measure Menu

Press **MEASURE** to display the following menu.

Set the sampling frequency (Auto, Clock A, Clock B, Clock C).

7.5 Setting the Phase Difference Display Format

This section explains how to set the phase difference display format.

► “Phase Difference Display Format (Phase)” in the features guide

Measure Menu

Press **MEASURE** to display the following menu.

Set the phase difference display format (180 degrees, 360 degrees).

7.6 Setting Master and Slave Synchronized Measurement

This section explains the following setting for master and slave synchronized measurement.

- Master and slave

► "Master/Slave Synchronized Measurement (Sync Measure)" in the features guide

Measure Menu

Press **MEASURE** to display the following menu.

Select whether this is the master unit or a slave unit (Master, Slave).

7.7 Setting the Voltages or Currents Whose Frequencies Will Be Measured

This instrument can measure the frequencies of the voltages or currents of all elements, so the setup menu is not displayed even if you press **SHIFT+MEASURE** (FREQ MEASURE).

8.1 Setting Independent Integration

This section explains the following settings for independent integration. If you turn independent integration on, you can start, stop, and reset integration for each input element separately.

- Turning independent integration on and off
- Element that independent integration will be performed on

► **"Enabling or Disabling Independent Integration (Independent Control)" in the features guide**

Integ Menu

Press **INTEG** to display the following menu.

Turns independent integration on and off

Select the elements that independent integration will be performed on.* This soft key is displayed when Independent Control is set to ON.

The input elements that independent integration will be performed on are displayed.

* 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).

Selecting the Element That Independent Integration Will Be Performed On (Element Object)

Press the **Element Object** soft key to display the following screen.

Select the check boxes for the input elements that you want independent integration to be performed on.

Clears all selected input elements

Selects all input elements

8.2 Setting Integration Conditions

This section explains the following settings for integration conditions:

- Integration mode
- Integration timer
- Scheduled times for real-time integration
- Turning integration auto calibration on and off
- Watt-hour integration method for each polarity
- Current mode for current integration
- Rated time of integrated D/A output (/DA option)

► **"Integration Conditions (Integ Set)" in the features guide**

Integ Menu

Press **INTEG** and then the **Integ Set** soft key to display the following menu.

Set the integration mode (Normal, Continuous, R-Normal, R-Continuous).[1]

Set the integration timer.

Set the scheduled times for real-time integration.
This soft key is displayed when Mode is set to R-Normal or R-Continuous.

Turns integration auto calibration on and off[1]

Set the watt-hour integration methods for each polarity.[1]

Set the current modes for current integration.

Set the rated time of integrated D/A output (/DA option).

1 You can set this when the data update interval is not Auto.

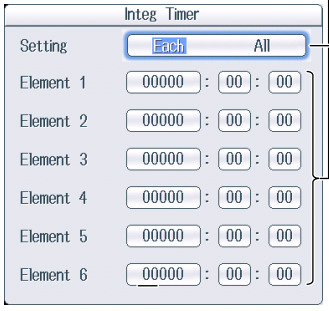
Setting the Integration Timer (Integ Timer)

Press the **Integ Timer** soft key to display the following screen.

When Independent Integration Is Off

Set the integration timer (00000 hours : 00 minutes : 00 seconds to 10000 hours : 00 minutes : 00 seconds).*

When Independent Integration 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.

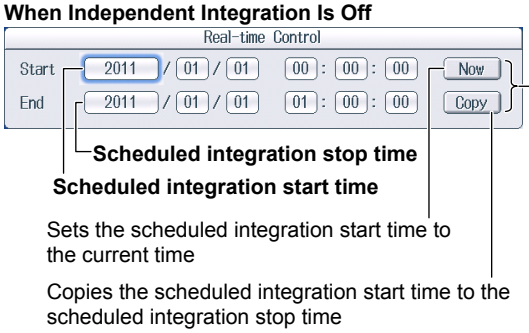
* When Mode is set to Normal and the integration timer is 00000 : 00 : 00, this instrument is in manual integration mode.

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

Press the **Real-time Control** soft key to display the following screen.

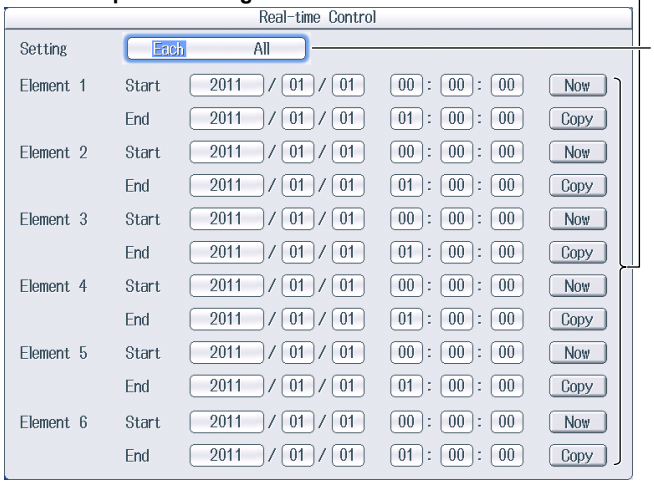
The Real-time Control soft key is displayed when Mode is set to R-Normal or R-Continuous.

When Independent Integration Is Off



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 On



Select the schedule setup method (Each, All).
When you select Each, you can set the schedule for each input element.

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

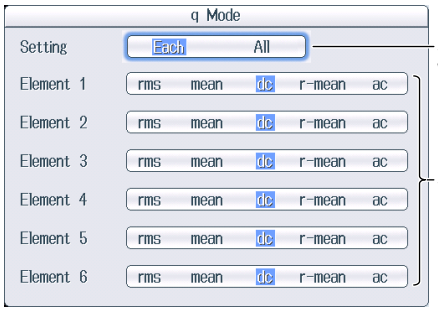
Press the **WP± Type** soft key to display the following screen.

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

Set the integration method (Charge/Discharge, Sold/Bought).

Setting the Current Mode for Current Integration (q Mode)

Press the **q Mode** soft key to display the following screen.



Select the current mode setup method (Each, All).
When you select Each, you can set the current mode for each input element.

Set the current mode (rms, mean, dc, r-mean, ac).

Setting the Rated Time of Integrated D/A Output (D/A Output Rated Time, /DA option)

Press the **D/A Output Rated Time** soft key to display the following screen.

Set the rated time of integrated D/A output (00000 hours : 00 minutes : 00 seconds to 10000 hours : 00 minutes : 00 seconds).

8.3 Starting, Stopping, and Resetting Integration

This section explains how to start, stop, and reset integration.

► **“Starting, Stopping, and Resetting Integration (Start/Stop/Reset)” in the features guide**

Integ Menu

Press **INTEG** to display the following menu.

Starts integration

This instrument starts integration using the integration mode that you have specified (see section 8.2).

- The START indicator to the right of the INTEG key illuminates.
  Integration has started; “Integ: Start” is displayed.*
- The START indicator to the right of the INTEG key blinks.
  The integration operation is ready; “Integ: Ready” is displayed.*

Stops integration

This instrument automatically stops integration according to the integration mode that you have specified. To force integration to stop, press this soft key. The integration time and integrated value are held.

- The STOP indicator to the right of the INTEG key blinks.
  Integration has stopped; “Integ: Stop” is displayed.*
  If you press the Start soft key when “Stop” is displayed in yellow, you can resume integration from the point where you stopped integration.
- The STOP indicator to the right of the INTEG key illuminates.
  Integration has stopped automatically because the integration timer has expired; “Integ: TimeUp” is displayed.*
  Integration has stopped automatically because of real-time control; “Integ: Stop” is displayed.* “Stop” is displayed in orange.

Resets the integration time and integrated value.

All integration data is deleted, and the no-data display, “-------,” appears.
The STOP indicator to the right of the INTEG key turns off.

* Character strings are displayed in the upper-right section of the screen.

Note

If you do not reset integration, you will not be able to start it again.

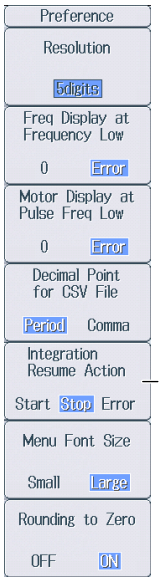
8.4 Integration Resume Action at Power Failure Recovery

This section explains how to set the Integration Resume Action at Power Failure Recovery.

► **"Integration Resume Action at Power Failure Recovery (Integration Resume Action)" in the features guide**

Integration Resume Action Menu

Press **UTILITY**, the **System Config** soft key, and then the **Preference** soft key to display the following menu.



Set the Integration Resume Action at Power Failure Recovery (Start, Stop, Error).

9.1 Setting the Display Format

This section explains the following settings for the waveform display format:

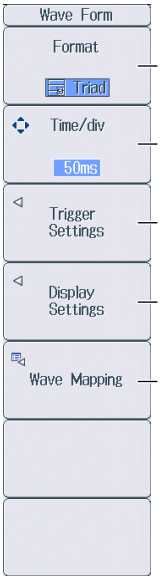
- Number of divisions of the waveform screen
- Time axis
- Trigger
- Advanced waveform display settings
- Waveform mapping

► "Display Format (FORM)—Waveform" in the features guide

Wave Form Menu

Press **WAVE** and then **FORM** to display the following menu.

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **FORM** again.



Set the number of divisions of the waveform screen (Single, Dual, Triad, Quad, Hexa).[1]

Set the time axis (0.05 ms to $\frac{\text{the specified data update interval}}{10}$).[2]

Configure trigger settings.[3]

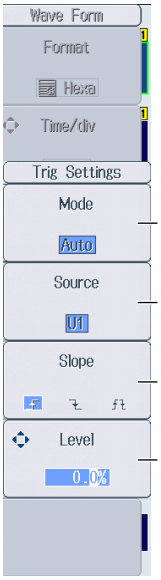
Configure the advanced waveform display settings.

Set waveform mapping.

1 **In addition to using this Format soft key, you can repeatedly press WAVE to change the order and the number of divisions.**
2 **For information on how to set the data update interval, see section 1.15.**
3 **You can set this when the data update interval is not Auto.**

Configuring Trigger Settings (Trigger Settings)

Press the **Trigger Settings** soft key to display the following menu.



Set the trigger mode (Auto, Normal, OFF).

Set the trigger source (U1, I1, U2, I2, U3, I3, U4, I4, U5, I5, U6, I6, Ext Clk).

Set the trigger slope (, ,).

Set the trigger level (0.0% to ±100.0%).

Configuring Advanced Waveform Display Settings (Display Settings)

Press the **Display Settings** soft key to display the following menu.

Set the display interpolation (,).

Set the grid (, ,).

Turns the display of scale values on and off

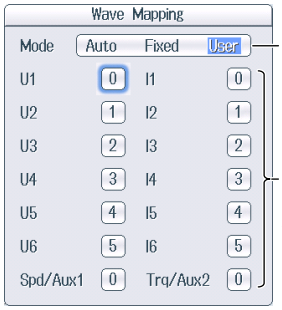
Turns the display of waveform labels on and off

Note

Changes that you make to the waveform display settings on the Display Settings menu are also reflected in the advanced trend display settings (see section 10.1).

Setting Waveform Mapping (Wave Mapping)

Press the **Wave Mapping** soft key to display the following screen.



Select the waveform mapping mode (Auto, Fixed, User).

Set the mapping destination (the divided screen number: 0 to 5).
Map each waveform (U1, I1, etc.) to the part of the divided screen that you want it to appear on.

- These settings are displayed when Mode is set to User.
- Spd/Aux1 and Trq/Aux2 can be set on models with the /MTR or /AUX options.

9.2 Turning the Display of Waveforms On and Off and Setting the Vertical Zoom Factors and Vertical Positions

This section explains the following waveform display settings:

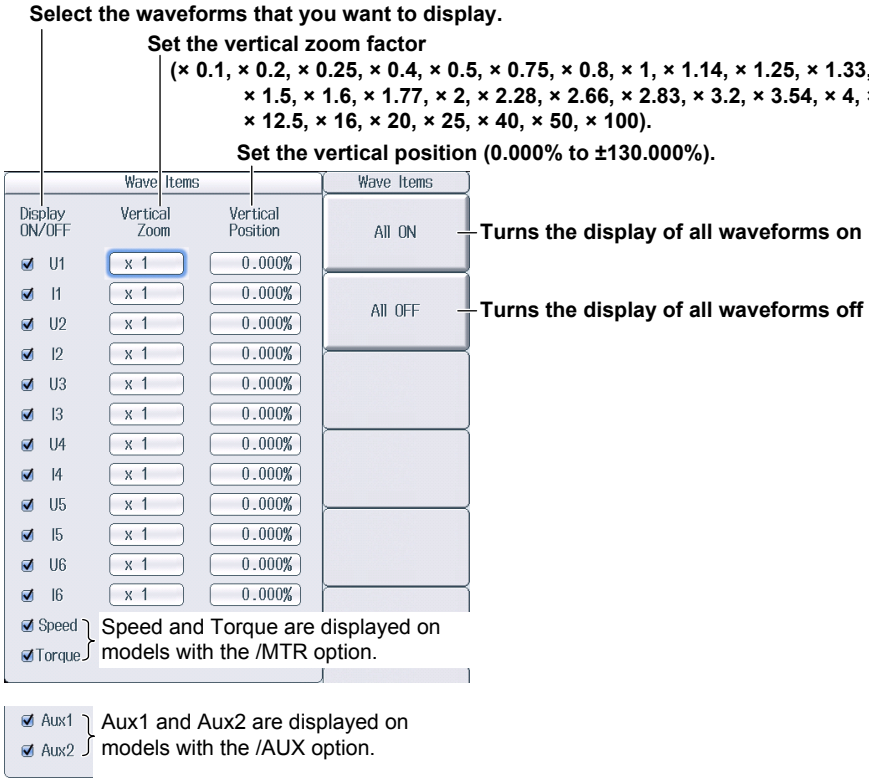
- Turning the display of waveforms on and off
- Vertical zoom factor
- Vertical position

► **"Display Items (ITEM)—Waveform" in the features guide**

Configuring the Waveform Display

Press **WAVE** and then **ITEM** to display the following menu.

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **ITEM** again.



10.1 Setting the Display Format

This section explains the following settings for the trend display format:

- Number of divisions of the trend screen
- Time axis
- Restarting trends
- Advanced trend display settings

► "Display Format (FORM)—Trend" in the features guide

Others Menu

Press **OTHERS** to display the following menu.

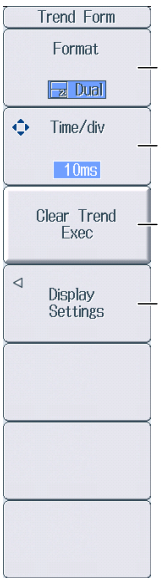
Select Trend.

Even if you select one of these settings, you can still show the trend display. You can split the screen into top and bottom halves, and show the trend display in one half and another display in the other half. ► chapter 13

Trend Form Menu

Press **FORM** to display the following menu.

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **FORM** again.



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

Set the time axis (3s, 6s, 10s, 30s, 1min, 3min, 6min, 10min, 30min, 1hour, 3hour, 6hour, 12hour, 1day).

Restarts the trend

Configure the advanced trend display settings.

Configuring Advanced Trend Display Settings (Display Settings)

Press the **Display Settings** soft key to display the following menu.

Set the display interpolation (⋰, ⋱, ∿).

Set the grid (▦, ⬚, ⊞).

Turns the display of scale values on and off

Turns the display of trend labels on and off

Note

Changes that you make to the trend display settings on the Display Settings menu are also reflected in the advanced waveform display settings (see section 9.1).

10.2 Turning the Trend Display On and Off and Setting the Measurement Functions to Display and the Vertical Scales

This section explains the following trend display settings:

- Turning the trend display on and off
- Measurement function
- Element and wiring unit
- Harmonic order
- Vertical scale

  Vertical scale mode and upper and lower limits of vertical scales

► “Display Items (ITEM)—Trend” in the features guide

1. Follow the procedure in section 10.1 to select Trend on the Others menu.

Configuring the Trend Display

2. Press **ITEM** to display the following screen.

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **ITEM** again.

Select the trends that you want to display.
If you move the cursor to Display, and then press SET, you can select all the trends (All ON) and clear all the selections (All OFF).

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

Set the element and wiring unit (Element 1 to Element 6, ΣA to ΣC).

Set the harmonic order (Total, 0 to 500; /G5 or /G6 option).
You can set this setting when the measurement function includes a harmonic order.

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

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

Trend Items

Display	Function	Element/Σ	Order	Scaling	Upper Scale	Lower Scale
☑T1	Urms	Element 1	–	Manual	100.0	-100.0
☑T2	Irms	Element 1	–	Auto	–	–
☑T3	P	Element 1	–	Auto	–	–
☑T4	S	Element 1	–	Auto	–	–
☑T5	Q	Element 1	–	Auto	–	–
☑T6	λ	Element 1	–	Auto	–	–
☑T7	ϕ	Element 1	–	Auto	–	–
☑T8	FreqU	Element 1	–	Auto	–	–
☐T9	Urms	Element 1	–	Auto	–	–
☐T10	Urms	Element 1	–	Auto	–	–
☐T11	Urms	Element 1	–	Auto	–	–
☐T12	Urms	Element 1	–	Auto	–	–
☐T13	Urms	Element 1	–	Auto	–	–
☐T14	Urms	Element 1	–	Auto	–	–
☐T15	Urms	Element 1	–	Auto	–	–
☐T16	Urms	Element 1	–	Auto	–	–

11.1 Setting the Display Format

This section explains the following settings for the bar graph display format. This feature is available on models with the /G5 or /G6 option.

- Number of divisions of the bar graph screen
- Bar graph display range (displayed harmonic orders)

► **"Display Format (FORM)—Bar Graph" in the features guide**

Others Menu

Press **OTHERS** to display the following menu.

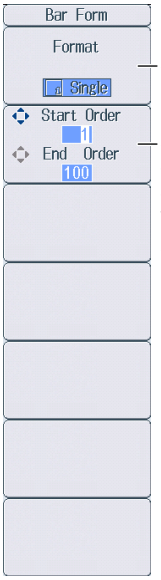
Select Bar.

Even if you select one of these settings, you can still show the bar graph display. You can split the screen into top and bottom halves, and show the bar graph display in one half and another display in the other half. ► chapter 13

Bar Form Menu

Press **FORM** to display the following menu.

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **FORM** again.



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

Set the bar graph display range.

- **The display' s start harmonic order (0 to 490)**
- **The display' s end 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.

11.2 Setting the Measurement Function to Display and the Vertical Scale

This section explains the following bar graph display settings. This feature is available on models with the /G5 or /G6 option.

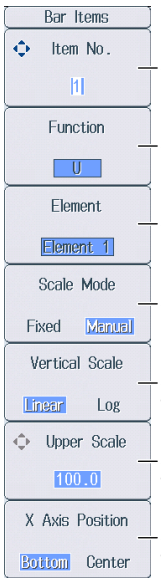
- Bar graph number
- Measurement function
- Element
- Vertical scale
  Vertical scale mode, vertical scale type, vertical scale upper limit, and X-axis position

► **"Display Items (ITEM)—Bar Graph" in the features guide**

1. Follow the procedure in section 11.1 to select Bar on the Others menu.

Bar Items Menu

2. Press **ITEM** to display the following menu.
If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **ITEM** again.



Select the bar graph number that you want to set (1, 2, 3).

Set the measurement function (U, I, P, S, Q, λ, Φ, ΦU, ΦI, Z, Rs, Xs, Rp, Xp).

Set the element (Element 1 to Element6).

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

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

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

12.1 Setting the Display Format

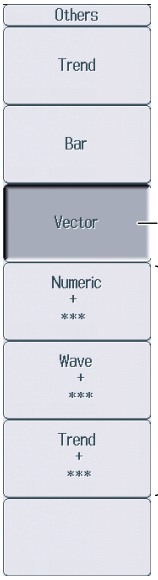
This section explains the following settings for the vector display format. This feature is available on models with the /G5 or /G6 option.

- Number of divisions of the vector screen
- Turning the numeric data display on and off

► "Display Format (FORM)—Vector" in the features guide

Others Menu

Press **OTHERS** to display the following menu.



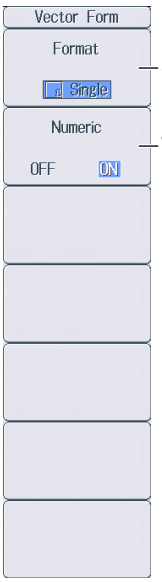
Select Vector.

Even if you select one of these settings, you can still show the vector display. You can split the screen into top and bottom halves, and show the vector display in one half and another display in the other half. ► chapter 13

Vector Form Menu

Press **FORM** to display the following menu.

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **FORM** again.



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

Turns the numeric data display on and off

12.2 Setting the Element and Wiring Unit to Display and the Zoom Factor

This section explains the following vector display settings. This feature is available on models with the /G5 or /G6 option.

- Vector number
- Element and wiring unit
- Zoom factor

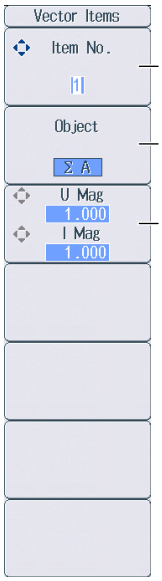
► "Display Items (ITEM)—Vector" in the features guide

1. Follow the procedure in section 12.1 to select Vector on the Others menu.

Vector Items Menu

2. Press **ITEM** to display the following menu.

- If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the Info Form menu may be displayed. If this happens, press **ITEM** again.
- If setup parameter list is being displayed, the vector that you have set to vector number 1 is displayed in the bottom half of the screen.



Select the vector number that you want to set (1, 2).

Set the element and wiring unit (Element 1 to Element 6, ΣA to 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.
- If you press this soft key to select both U Mag and I Mag, you can link the zoom factors of both settings and change them at the same time.

13.1 Configuring the Split Display

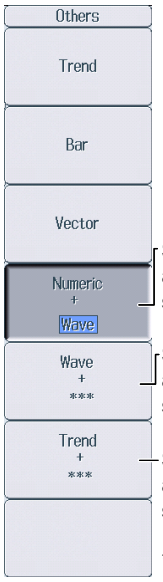
This section explains the following split display settings:

- The two screens to display
- Switching between Form menus
- Switching between Items menus

► “Split Display” in the features guide

Others Menu

Press **OTHERS** to display the following menu.



The split screen that you configure last is displayed.

Set the top half of the screen to the Numeric display, and set the display that you want to show in the bottom half of the screen (Wave, Trend, Bar,* Vector*).

Set the top half of the screen to the Wave display, and set the display that you want to show in the bottom half of the screen (Numeric, Trend, Bar,* Vector*).

Set the top half of the screen to the Trend display, and set the display that you want to show in the bottom half of the screen (Numeric, Wave, Bar,* Vector*).

* This feature is available on models with the /G5 or /G6 option.

Form Menu

Press **FORM** to switch between the Form menus of the two screens that you set on the Others menu. Configure the settings on each menu.

Display	For Instructions on How to Use the Form Menu, See:
Numeric	Sections 6.1 and 6.2
Wave	Section 9.1
Trend	Section 10.1
Bar	Section 11.1
Vector	Section 12.1

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the setup parameter list is displayed in the top half of the screen and the screen that you set to display in the top half of the split screen on the Others menu is displayed in the bottom half of the screen. Additionally, if you repeatedly press **FORM**, you can switch between the Info Form menu and the menu of the screen that is displayed in the bottom half of the screen.

Items Menu

Press **ITEM** to switch between the Items menus of the two screens that you set on the Others menu. Configure the settings on each menu.

Display	For Instructions on How to Use the Items Menu, See:
Numeric	Sections 6.3 to 6.7
Wave	Section 9.2
Trend	Section 10.2
Bar	Section 11.2
Vector	Section 12.2

If the setup parameter list is being displayed (the INPUT INFO key is illuminated), the setup parameter list is displayed in the top half of the screen and the screen that you set to display in the top half of the split screen on the Others menu is displayed in the bottom half of the screen. Additionally, if you repeatedly press **ITEM**, you can switch between the Info Form menu and the menu of the screen that is displayed in the bottom half of the screen.

14.1 Performing Cursor Measurements on Waveforms

This section explains the following settings for performing cursor measurements on waveforms:

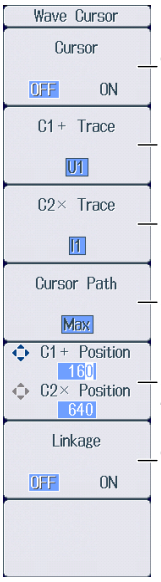
- Turning the cursor display on and off
- The waveforms to perform cursor measurements on
- Cursor movement path
- Cursor position
- Turning linked cursor movement on and off

► “Cursor Measurement” in the features guide

1. Follow the procedures in chapter 9 to display waveforms.

Wave Cursor Menu

2. Press **SHIFT+FORM** (CURSOR) to display the following menu.



Turns the cursor display on and off

Set the waveform to measure with cursor 1 (+) (U1, I1, U2, I2, U3, I3, U4, I4, U5, I5, U6, I6, Speed,[1] Torque,[1] Aux1,[2] Aux2[2]).

Set the waveform to measure with cursor 2 (×) (U1, I1, U2, I2, U3, I3, U4, I4, U5, I5, U6, I6, Speed,[1] Torque,[1] Aux1,[2] Aux2[2]).

Set the cursor movement path (Max, Min, Mid).

Set the positions of cursor 1 (+) and cursor 2 (×) (0, which is the left edge of the screen to 800, which is the right edge of the screen)

Turns linked cursor movement on and off

1 This feature is available on models with the /MTR option.
2 This feature is available on models with the /AUX option.

14.2 Performing Cursor Measurements on Trends

This section explains the following settings for performing cursor measurements on trends:

- Turning the cursor display on and off
- The trends to perform cursor measurements on
- Cursor position
- Turning linked cursor movement on and off

► **"Cursor Measurement" in the features guide**

1. Follow the procedures in chapter 10 to display trends.

Trend Cursor Menu

2. Press **SHIFT+FORM** (CURSOR) to display the following menu.

Turns the cursor display on and off

Set the trend to measure with cursor 1 (+) (T1 to T16).

Set the trend to measure with cursor 2 (×) (T1 to T16).

Set the positions of cursor 1 (+) and cursor 2 (×) (0, which is the left edge of the screen to 1601, which is the right edge of the screen)

Turns linked cursor movement on and off

14.3 Performing Cursor Measurements on Bar Graphs

This section explains the following settings for performing cursor measurements on bar graphs:

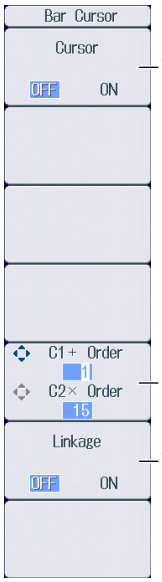
- Turning the cursor display on and off
- Cursor position
- Turning linked cursor movement on and off

► “Cursor Measurement” in the features guide

1. Follow the procedures in chapter 11 to display bar graphs.

Bar Cursor Menu

2. Press **SHIFT+FORM** (CURSOR) to display the following menu.



Turns the cursor display on and off

Set the harmonic order of the bar graph to measure with cursor 1 (+) and cursor 2 (×) (0 to 500).

Turns linked cursor movement on and off

15.1 Setting the Number of Data Captures and Configuring the Capture Control Settings

This section explains the following settings concerning the number of data captures for high speed data capturing and the capture control settings.

- Number of data captures
- Confirming and optimizing the maximum capturing count
- Capture control settings
  Voltage and current measurement modes, turning the HS filter on and off, setting the HS filter cutoff frequency, triggering, performing synchronized measurement using an external signal
- Selecting whether to save to a file

► **"Capture Count (Capture Count)" and "Capture Control Settings (Control Settings)" in the features guide**

Others Menu

Press **OTHERS** to display the following menu.

Select High Speed Data Capturing.

HS Settings Menu

Press **FORM** to display the following menu.

Set the number of data captures (Infinite, 1 to 9999).

Confirm and optimize the maximum capturing count.*

Configure capture control settings.

Select whether to save to a file*

- OFF: When high speed data capturing is performed, you can use communication commands to output the captured data.
- ON: "File State: Ready" appears in the upper left of the screen. When high speed data capturing is performed, the captured data is recorded (saved) under the save conditions set in section 15.2.

Set the save conditions. ►section 15.2

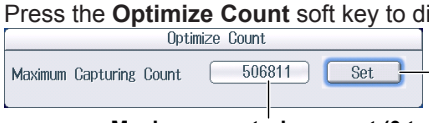
Starts high speed data capturing ►section 15.4

Stops high speed data capturing ►section 15.4

* You cannot configure the settings in "Confirming and Optimizing the Maximum Capturing Count" when Record to File is set to OFF.

Confirming and Optimizing the Maximum Capturing Count (Optimize Count)

Press the **Optimize Count** soft key to display the following screen.



Set the number of data captures.
The capturing count is set to the maximum capturing count displayed to the left.

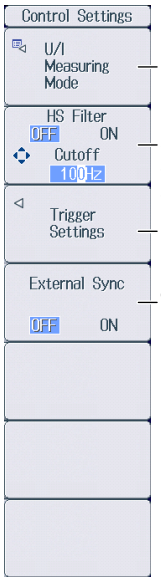
Maximum capturing count (0 to the maximum number of captures)

* The maximum number of times that data can be captured depends on the number of numeric data items that you have set to be saved and the free space at the save destination.
For instructions on how to set the save destination and the numeric data items to be saved, see section 15.2.

Even if you have specified a USB memory device as the save destination, if you remove the USB memory device, the save destination switches automatically to the internal RAM disk. If you close this screen and then open it again by pressing the Optimize Count soft key, the maximum capturing count changes to the value determined by the internal RAM disk's free space.

Configuring Capture Control Settings (Control Settings)

Press the **Control Settings** soft key to display the following menu.



Configure the voltage and current measurement modes.

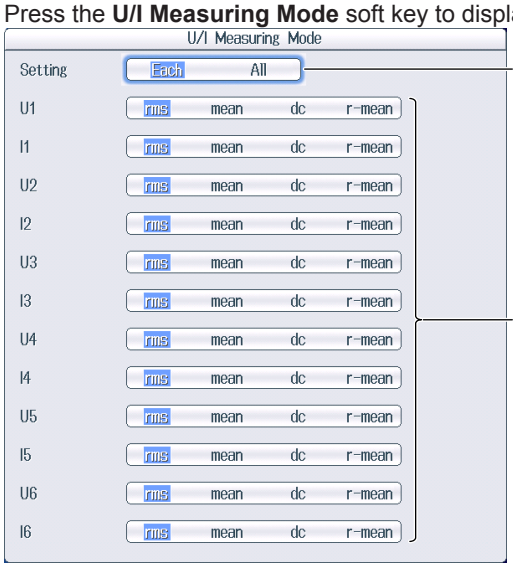
Set the HS Filter.
- **Turn the HS filter on or off.**
- **Set the cutoff frequency (1 Hz to 1000 Hz in steps of 1 Hz)**

Configure trigger settings.

Turn external signal synchronization on or off.
- OFF: This instrument captures data every 5 ms.
- ON: This instrument captures data in sync with an external signal.

Configuring the Voltage and Current Measurement Modes

Press the **U/I Measuring Mode** soft key to display the following menu.



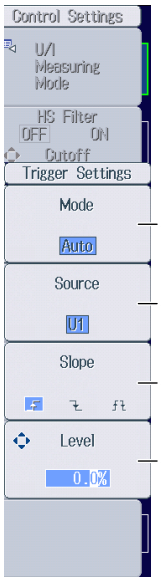
Select the measurement mode setup method (Each, All).
When you select Each, you can set the measurement mode separately for the current and voltage of each input element.

Set the measurement mode (rms, mean, dc, r-mean).

Note

If the voltage and current measurement mode settings differ for elements assigned to the same wiring unit, the measurement data (Σ function) for the wiring unit is displayed as "-------" (no data).

Configuring Trigger Settings



Set the trigger mode (Auto, Normal, OFF).

Set the trigger source (U1, I1, U2, I2, U3, I3, U4, I4, U5, I5, U6, I6, Ext Clk).

Set the trigger slope (, ,).

Set the trigger level (0.0% to ±100.0%).

15.2 Configuring the Save Conditions of Captured Numeric Data

This section explains the following settings for the save conditions of captured numeric data.

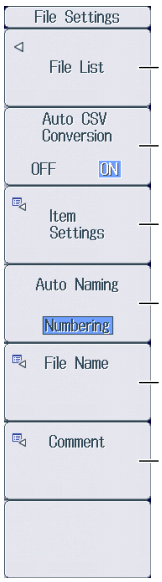
- Save destination
- Selecting whether to perform automatic CSV conversion when capturing stops
- Numeric data items to save
- Auto naming
- File name
- Comment

► “Save Conditions (File Settings)” in the features guide

1. Follow the procedure in section 15.1 to select High Speed Data Capturing on the Others menu.

File Settings Menu

2. Press **FORM** and then the **File Settings** soft key to display the following menu.



Set the save destination and perform manual CSV conversion.

Select whether to perform automatic CSV conversion when high speed data capturing stops.

Set the numeric data items to save.

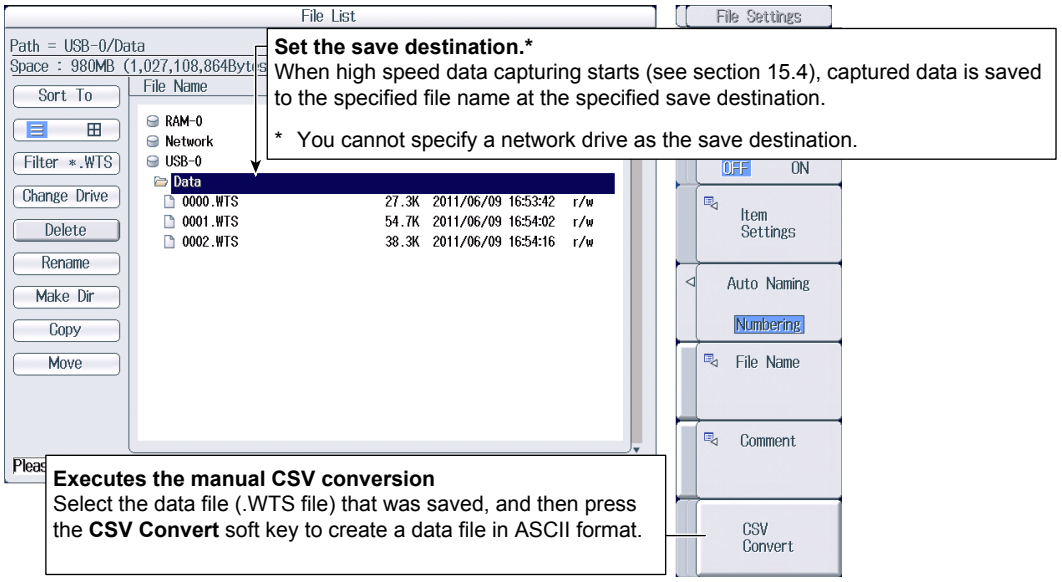
Set auto naming. ► section 17.2

Set the file name. ►section 17.2.

Set a comment. ► section 17.2

Setting the Save Destination and Performing Manual CSV Conversion

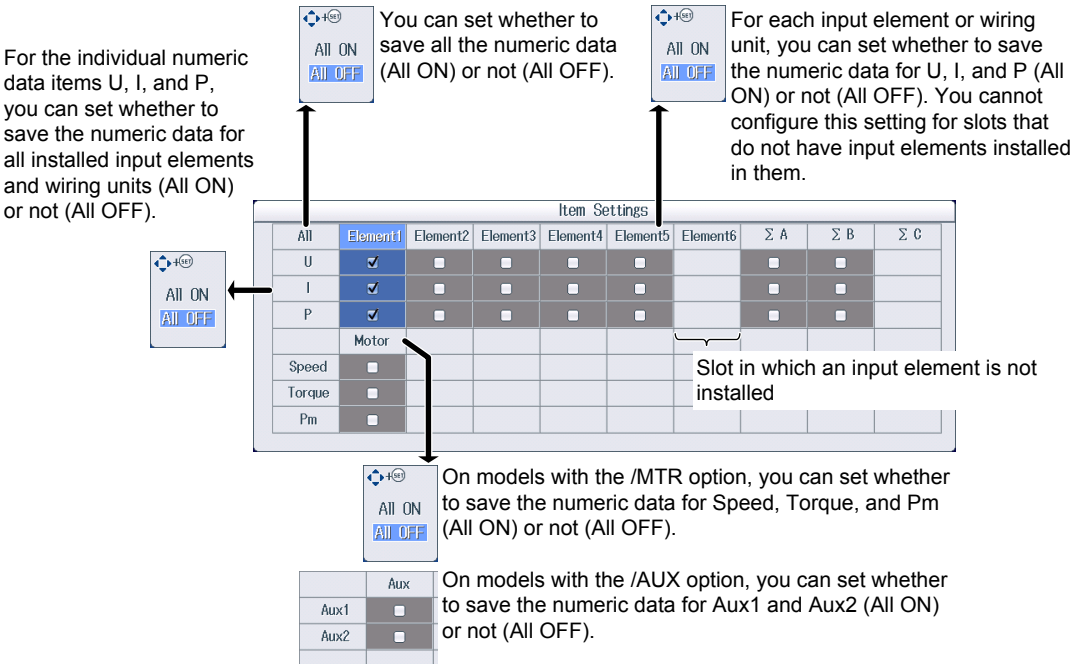
Press the **File List** soft key to display the following screen.



Setting the Numeric Data Items to Save

Press the **Item Settings** soft key to display the following screen.

The numeric data items in this screen whose check boxes are selected are saved.



Note

Even if you select the check box for wiring unit ΣA, ΣB, or ΣC, the wiring unit's numeric data will not be saved under the following circumstances.

- When the wiring system has not been set
- When the wiring system is set to 1P3W or 3P3W
- When input elements assigned to the same wiring unit have different voltage or current measurement mode settings

For information on how to set the wiring system, see section 1.1.

15.3 Changing the Displayed Items for High Speed Data Capturing

This section explains the following settings concerning the displayed items for high speed data capturing.

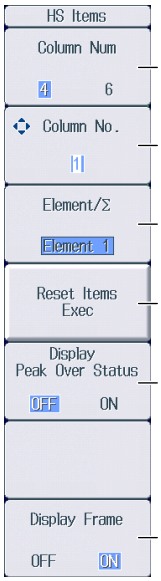
- Number of columns
- Column number
- Element and wiring unit
- Resetting the displayed items
- Peak over-range information
- Turning the display frame on and off

► “Display Items (ITEM)—High Speed Data Capturing” in the features guide

1. Follow the procedure in section 15.1 to select High Speed Data Capturing on the Others menu.

HS Items Menu

2. Press **ITEM** to display the following menu.



Set the number of columns (4, 6).

Set the column number (1 to 6).

Set the element or wiring unit (None, Element 1 to Element 6, ΣA to ΣC).

Resets items to the default values

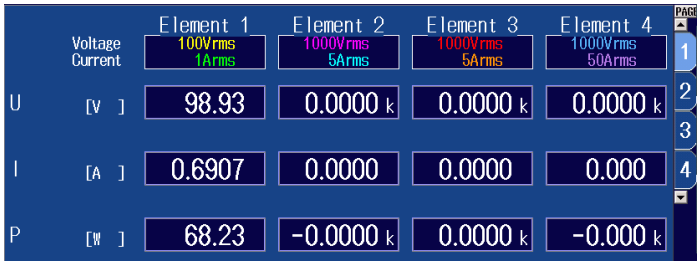
Peak over-range information

Turns the display frame on and off

Switching the Page

You can switch between page 1 and 2 (pages 1 to 4 on models with the /MTR or /AUX option). The items are arranged for high speed data capturing, and the displayed measurement functions are fixed for every page. For details on how to switch pages, see section 6.2.

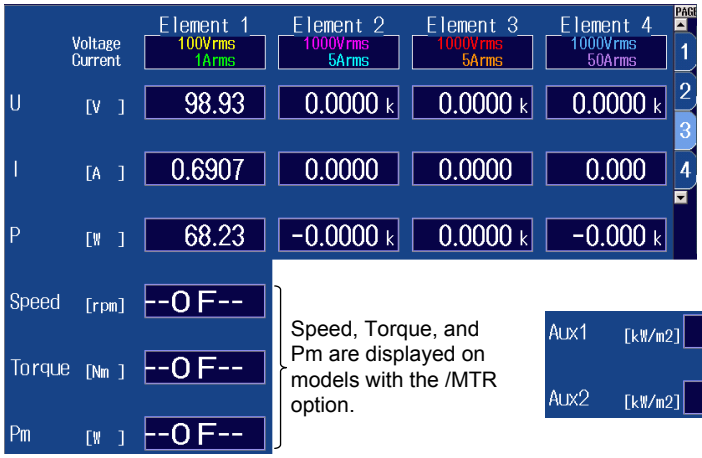
Page 1 Example



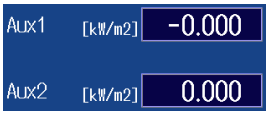
Page 2 Example

Page 3 Example

(Page 3 can only be selected on models with the /MTR or /AUX option.)



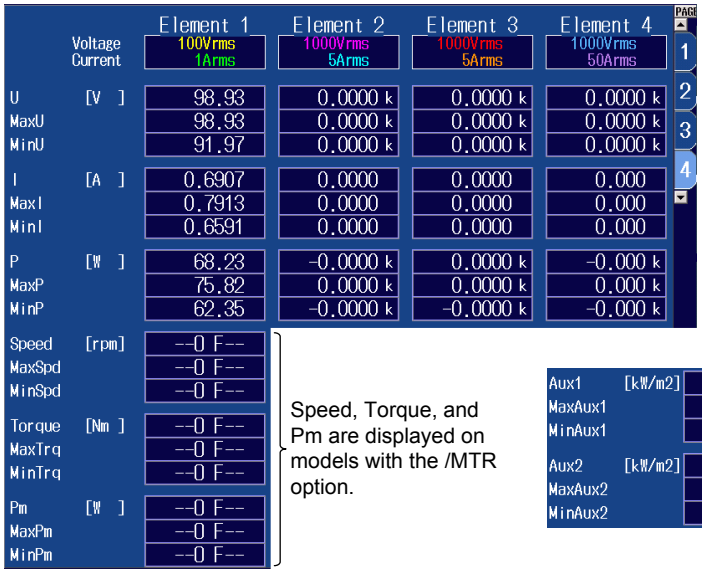
Speed, Torque, and Pm are displayed on models with the /MTR option.



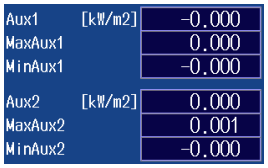
Aux1 and Aux2 are displayed on models with the /AUX option.

Page 4 Example

(Page 4 can only be selected on models with the /MTR or /AUX option.)



Speed, Torque, and Pm are displayed on models with the /MTR option.

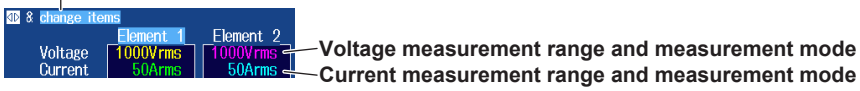


Aux1 and Aux2 are displayed on models with the /AUX option.

ELEMENT Key

3. Press **ESC** to clear the menu.

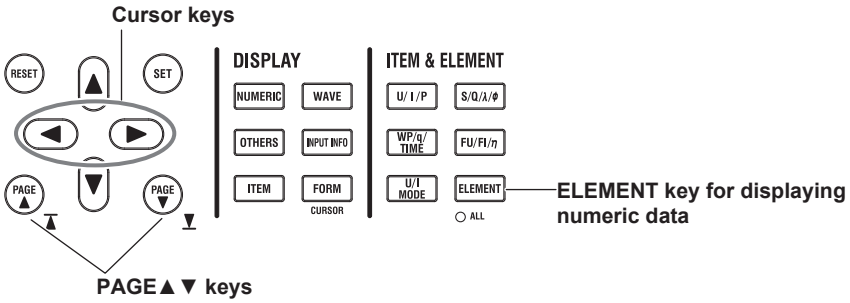
Displayed in the upper left of the numeric data display screen



Changing the Element and Wiring Unit (Horizontal direction)

4. Use the **cursor keys (◄►)** to select the column that you want to change.
5. Press the **ELEMENT** key for displaying numeric data to select the element and wiring unit that you want to display.

   In high speed data capturing, the elements and wiring unit configurations are the same on all four pages. If you change the element and wiring unit configuration on one page, the configuration changes on the other pages as well.



15.4 Starting and Stopping High Speed Data Capturing

This section explains how to start and stop high speed data capturing.

► **“Starting and Stopping High Speed Data Capturing (Start/Stop)” in the features guide**

CAUTION

During high speed data capturing and when captured data is being saved, the storage medium 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 medium and corrupt its data.

During high speed data capturing, “HS State: Start” appears in the upper right of the screen.
While the captured data is being saved, “File State: Rec” appears in the upper left of the screen.

French

ATTENTION

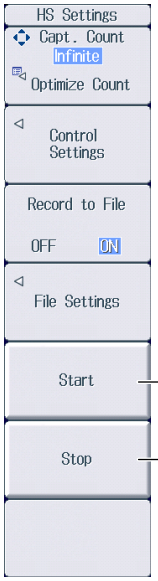
Pendant la collecte de données haute vitesse et lorsque les données collectées sont enregistrées, le système a constamment accès au support de stockage, même si l’icône qui l’indique ( ) n’est pas affichée. Ne retirez pas le support de stockage USB et ne coupez pas l’alimentation. Vous risqueriez d’endommager le support de stockage et les données qu’il contient.

Lors de la collecte des données haute vitesse, « HS State: Start » s’affiche dans l’angle supérieur droit de l’écran.
Lorsque les données collectées sont enregistrées, « File State: Rec » s’affiche dans l’angle supérieur gauche de l’écran.

1. Follow the procedure in section 15.1 to select High Speed Data Capturing on the Others menu.

HS Settings Menu

2. Press **FORM** to display the following menu.



Starts high speed data capturing
High speed data capturing starts according to the specified number of data captures (see section 15.1), the capture control settings (see section 15.1), and the save conditions (see section 15.2).

- When high speed data capturing is started, “HS State: Start” appears in the upper right of the screen.
- When the captured data is being saved, “File State: Rec” appears in the upper left of the screen.

Stops high speed data capturing
After the specified number of data captures have been made, high speed data capturing automatically stops. To force high speed data capturing to stop, press this soft key.
When high speed data is stopped, “HS State: Ready” appears in the upper right of the screen.

Note

- You cannot restart high speed data capturing without first stopping high speed data capturing.
- After you stop high speed data capturing and then change the settings or restart high speed data capturing, the data captured up to that point is deleted.

16.1 Configuring Storage Control

This section explains the following settings for storage control:

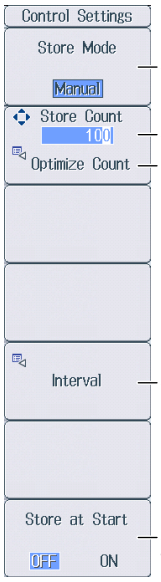
- Storage mode
- Storage count
- Confirming and optimizing the maximum storage count
- Storage interval
- Scheduled times for real-time storage
- Trigger event (synchronization to a user-defined event)
- Storage of numeric data when storage starts

► “Storage Control (Control Settings)” in the features guide

Control Settings Menu

Press **SHIFT+STORE START** (STORE SET) and then the **Control Settings** soft key to display one of the menus shown below. The menu that appears varies depending on the storage mode setting that you have specified.

Manual Storage Mode



Set Store Mode to Manual.

Set the storage count (Infinite, 1 to 9999999).

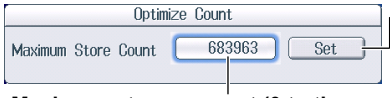
Confirms and optimizes the maximum storage count

Set the storage interval.

Select whether to store numeric data when storage starts.
This soft key is displayed when Interval is set to a value other than 00 : 00 : 00.

Confirming and Optimizing the Maximum Storage Count

Press the **Optimize Count** soft key to display the following screen.



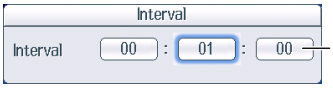
Sets the storage count
The storage count is set to the maximum storage count displayed to the left.

Maximum storage count (0 to the maximum number of times that data can be stored to the save destination)*

* 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 16.2. For details on how to set the save destination, see section 16.3.
Even if you have specified a USB memory device as the save destination, if you remove the USB memory device, the save destination switches automatically to the internal RAM disk. If you close this screen and then open it again by pressing the Optimize Count soft key, the maximum storage count changes to the value determined by the internal RAM disk’s free space.

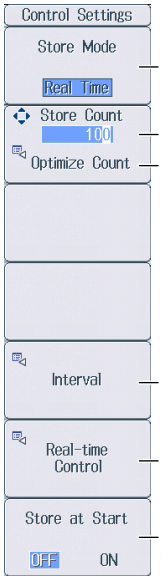
Setting the Storage Interval

Press the **Interval** soft key to display the following screen.



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

Scheduled Times for Real-Time Storage Mode



Set Store Mode to Real Time.

Set the storage count (Infinite, 1 to 9999999).

Confirms and optimizes the maximum storage count ► previous page

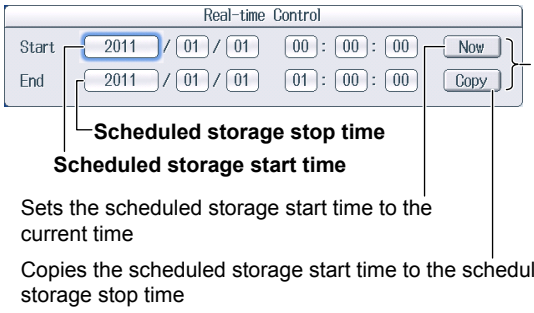
Set the storage interval. ► previous page

Set the scheduled times for real-time storage.

Select whether to store numeric data when storage starts.
This soft key is displayed when Interval is set to a value other than 00 : 00 : 00.

Setting Scheduled Times for Real-Time Storage

Press the **Real-time Control** soft key to display the following screen.



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

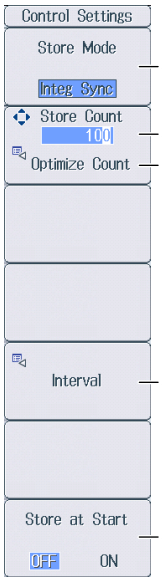
Scheduled storage stop time

Scheduled storage start time

Sets the scheduled storage start time to the current time

Copies the scheduled storage start time to the scheduled storage stop time

Integration-Synchronized Storage Mode



Set Store Mode to Integ Sync.

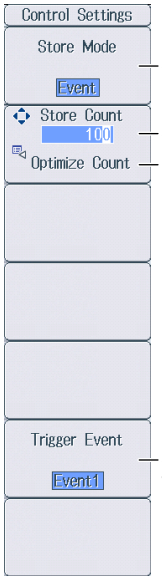
Set the storage count (Infinite, 1 to 9999999).

Confirms and optimizes the maximum storage count ► previous page

Set the storage interval. ► previous page

Select whether to store numeric data when storage starts.

Event-Synchronized Storage Mode



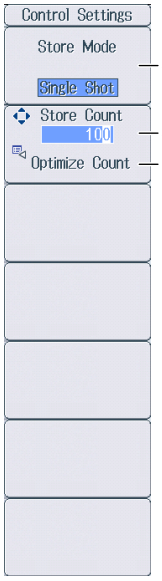
Set Store Mode to Event.

Set the storage count (Infinite, 1 to 9999999).

Confirms and optimizes the maximum storage count ► page 16-1

Select the trigger event (Event 1 to Event 8).
When measured data is updated, storage is started if the conditions of the specified user-defined event are met.

Single-Shot Storage Mode



Set Store Mode to Single Shot.

Set the storage count (Infinite, 1 to 9999999).

Confirms and optimizes the maximum storage count ► page16-1

16.2 Setting the Numeric Data Items to Store

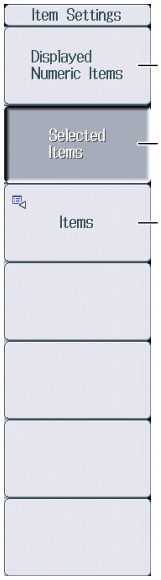
This section explains how to set the numeric data items to store.

- Numeric data items to store
  - Numeric data items that are displayed on the screen
  - Numeric data items specified on the stored item setup screen

► “Stored Items (Item Settings)” in the features guide

Item Settings Menu

Press **SHIFT+STORE START** (STORE SET) and then the **Item Settings** soft key to display the following menu.



Stores the numeric data that is displayed on the screen
Press this soft key to store the numeric data items that are displayed on the screen.

Stores the numeric data that you have specified on the Store Items setup screen
Press this soft key to store the numeric data items that you have specified on the Store Items setup screen that is displayed when you press the Items soft key.

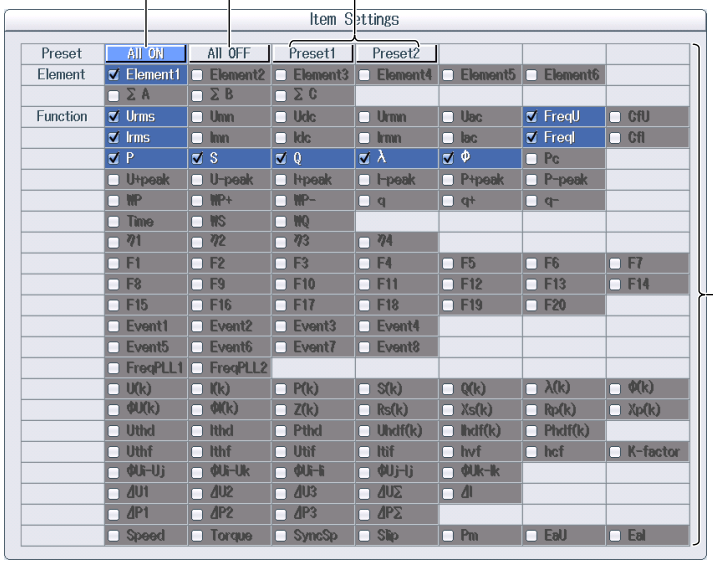
Set the stored items.
This soft key is displayed when you select Selected Items.

Setting Stored Items (Items)

Press the **Items** soft key to display the following screen.

When you press the Selected Items soft key on the Item Settings menu, the numeric data items that you have specified on the following screen are stored.

Selects all the numeric data items
Clears the selection of all the numeric data items
Selects the preset numeric data items



Select the check boxes for the numeric items that you want to store.

16.3 Configuring the Save Conditions of Stored Numeric Data

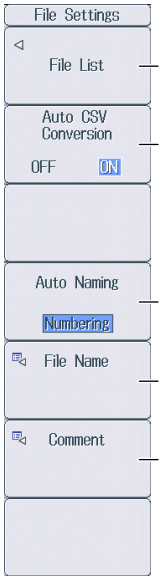
This section explains the following settings for the save conditions of stored numeric data:

- Save destination
- Selecting whether to perform automatic CSV conversion when storage stops
- Auto naming
- File name
- Comment

► "Save Conditions (File Settings)" in the features guide

File Settings Menu

Press **SHIFT+STORE START** (STORE SET) and then the **File Settings** soft key to display the following menu.



Set the save destination and perform manual CSV conversion.

Select whether to perform automatic CSV conversion when storage stops.

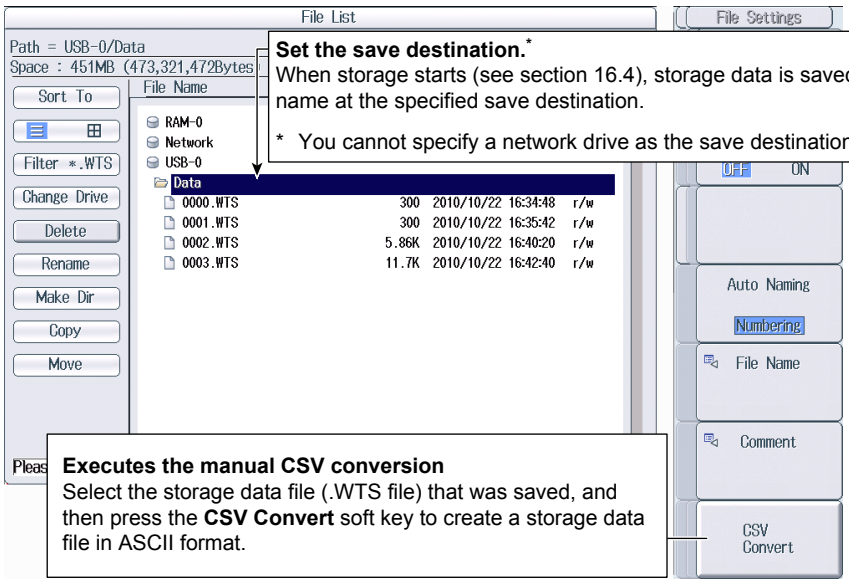
Set auto naming. ► section 17.2

Set the file name. ► section 17.2

Set a comment. ► section 17.2

Setting the Save Destination and Performing Manual CSV Conversion

Press the **File List** soft key to display the following screen.



Set the save destination.*
When storage starts (see section 16.4), storage data is saved to the specified file name at the specified save destination.

* You cannot specify a network drive as the save destination.

Executes the manual CSV conversion
Select the storage data file (.WTS file) that was saved, and then press the **CSV Convert** soft key to create a storage data file in ASCII format.

16.4 Starting, Stopping, and Resetting Storage

This section explains how to start, stop, and reset storage.

► **"Starting, Stopping, and Resetting Storage (STORE START, STORE STOP, and STORE RESET)" in the features guide**

CAUTION

During storage, the storage medium 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 medium or corrupt its data.

Storage is in progress when the STORE START key is illuminated or blinking or when the STORE STOP key is blinking.

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.

Starting the Storage Operation

Press **STORE START**. This instrument starts storage using the storage mode that you have specified (see section 16.1).

- The STORE START key is illuminated.
  Storage has started; "Store: Start" is displayed.*
- The STORE START key is blinking.
  The storage operation is ready; "Store: Ready" is displayed.*

* Character strings are displayed in the upper left of the screen.

Stopping the Storage Operation

This instrument automatically stops storage according to the storage mode that you have specified. To pause storage, press **STORE STOP**.

- The STORE STOP key is blinking.
  Storage has been paused; "Store: Stop" is displayed.*
  If you press STORE START when "Stop" is displayed in yellow, you can resume the storage operation from the point where you stopped the storage operation.
- The STORE STOP key is illuminated.
  Storage has been automatically stopped; "Store: Close" is displayed, and then "Store:Cmpl" is displayed.*

* Character strings are displayed in the upper left of the screen.

Resetting the Storage Operation

Press **SHIFT+STORE STOP** (STORE RESET). The STORE STOP key turns off.

- If the storage operation has been paused
  This instrument finishes writing stored data to a file and closes the file.
- If the storage operation has automatically stopped
  When the storage operation stops automatically, this instrument finishes writing stored data to a file and closes the file. Therefore, the reset operation performs no file operations.

Note

If you do not reset storage, you will not be able to start it again.

17.1 Connecting USB Memory Devices

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 this instrument to the network. For details, see section 20.4.

► "Storage Media" in the features guide

CAUTION

- Do not remove the USB memory device or turn off the power when the USB memory device is being accessed. Doing so may damage the storage medium or corrupt its data.
- When the USB memory device is being accessed,  is displayed in the center of the top part of the screen and the USB memory device indicator blinks.

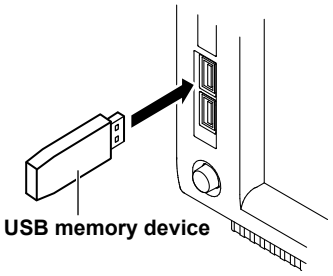
French

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 front panel.
Hot-plugging is supported: you can connect or disconnect the USB device at any time, regardless of whether this instrument is on or off. When the power is on, this 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 an incompatible USB memory device.
- 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 Handling Precautions

Follow the general handling precautions that are included with your USB memory.

17.2 Saving Setup Parameters

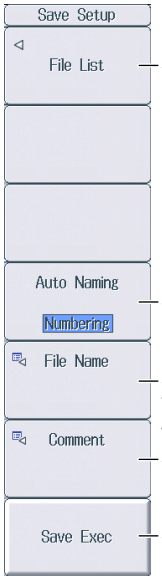
This section explains the following settings for saving setup parameters:

- Save destination
- Auto naming
- File name
- Comment

► “Saving Setup Parameters (Save Setup)” in the features guide

Save Setup Menu

Press **FILE** and then the **Save Setup** soft key to display the following menu.



Set the save destination.

Set the auto naming method (OFF, Numbering, Date).

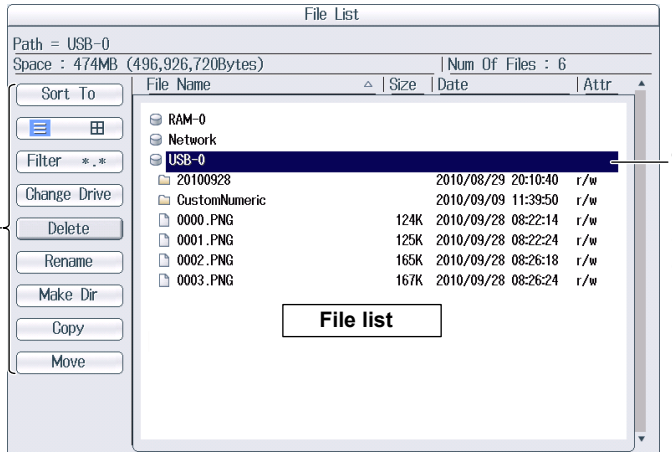
Set the file name.
You can set the file name that is used when Auto Naming is set to OFF. This is also used as the common file name when Auto Naming is set to Numbering.

Set a comment.

Saves the data

Setting the Save Destination (File List)

Press the **File List** soft key to display the following screen.



The destination storage medium (drive) or folder
Use the **cursor** keys (▲▼) to move the cursor, and press **SET** to select the destination.

Note

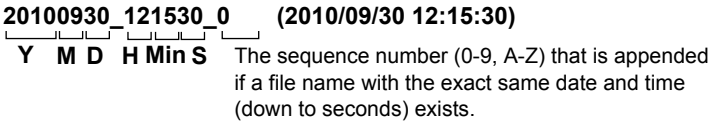
For details on how to move between the operation menu and the file list and how to operate the operation menu, see section 17.6.

Setting Auto Naming (Auto Naming)

OFF: The auto naming feature is not used. 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: This 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.



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.

Setting the File Name (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.

Setting the Comment (Comment)

You can add a comment that consists of up to 30 characters when saving files. You do not have to enter a comment. All characters, including spaces, can be used in comments.

17.3 Saving Waveform Display Data

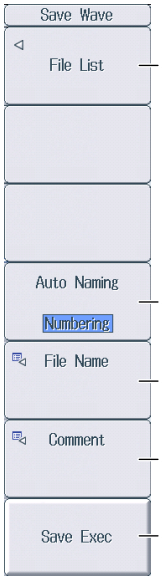
This section explains the following settings for saving waveform display data:

- Save destination
- Auto naming
- File name
- Comment

► “Saving Waveform Display Data (Save Wave)” in the features guide

Save Wave Menu

Press **FILE** and then the **Save Wave** soft key to display the following menu.



Set the save destination. ► section 17.2

Set auto naming. ► section 17.2

Set the file name. ► section 17.2

Set a comment. ► section 17.2

Saves the data

17.4 Saving Numeric Data

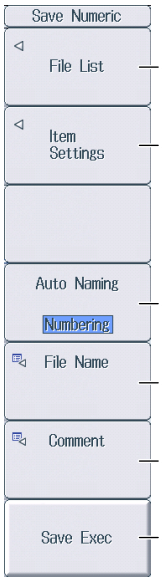
This section explains the following settings for saving numeric data:

- Save destination
- Numeric data items to save
- Auto naming
- File name
- Comment

► “Saving Numeric Data (Save Numeric)” in the features guide

Save Numeric Menu

Press **FILE** and then the **Save Numeric** soft key to display the following menu.



Set the save destination. ► section 17.2

Set the numeric data items to save.

Set auto naming. ► section 17.2

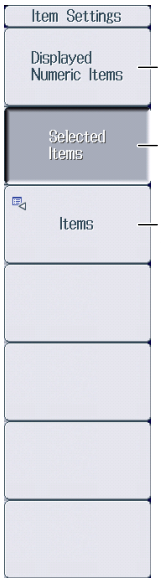
Set the file name. ► section 17.2

Set a comment. ► section 17.2

Saves the data

Setting the Numeric Data Items to Save (Item Settings)

Press the **Item Settings** soft key to display the following menu.



Saves the numeric data that is displayed on the screen
Press this soft key to save the numeric data items that are displayed on the screen.

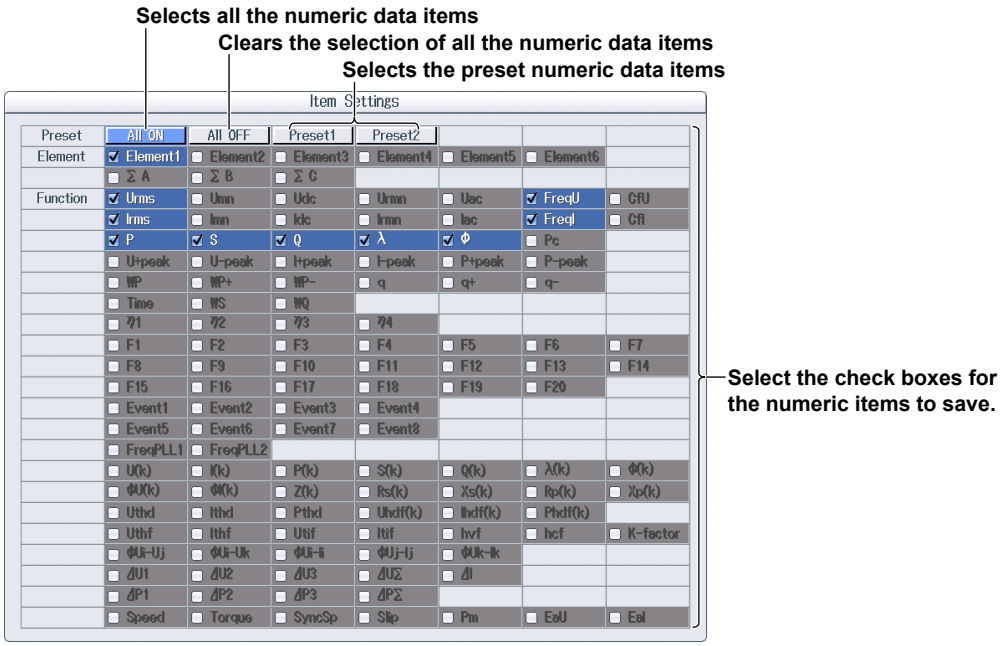
Saves the numeric data that you have specified on the File Items setup screen
Press this soft key to save the numeric data items that you have specified on the File Items setup screen that is displayed when you press the Items soft key.

Set the items to save.
This soft key is displayed when you select Selected Items.

Setting Items to Save (Items)

Press the **Items** soft key to display the following screen.

When you press the Selected Items soft key on the menu on the previous page, the numeric data items that you have specified on the following screen are saved.



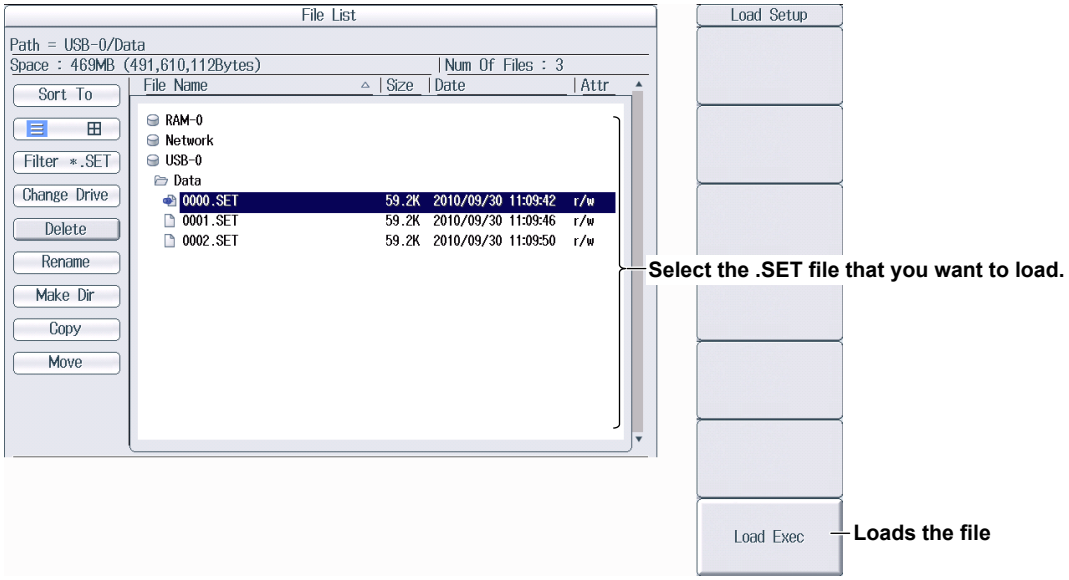
17.5 Loading Setup Parameters

This section explains how to load setup parameters.

► “Loading Setup Parameters (Load Setup)” in the features guide

Load Setup Menu

Press **FILE** and then the **Load Setup** soft key to display the following screen.



Note

- This instrument cannot load setup parameters that have been saved by a product with an incompatible firmware version.
- This instrument cannot load setup parameters that were saved by an instrument with a different element configuration or with different options.

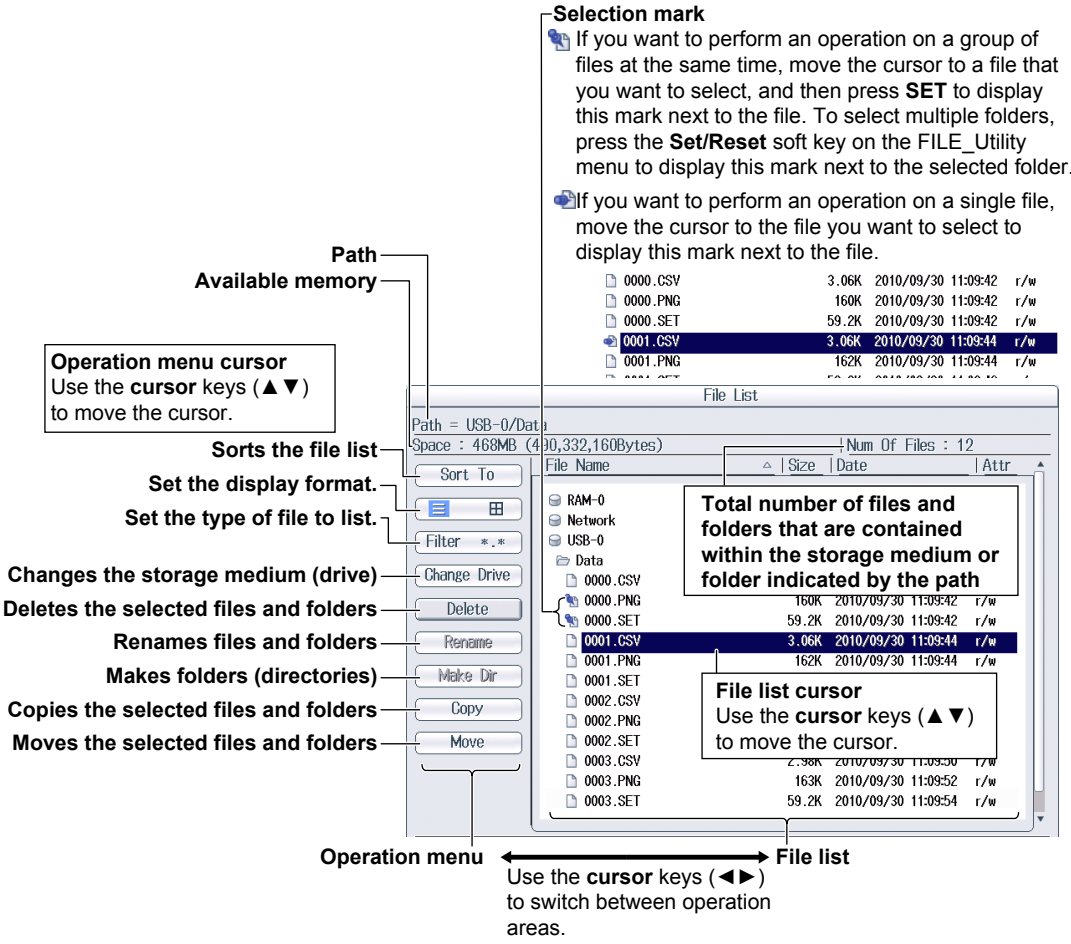
17.6 File Operations

This section explains the file list's operation menu and the FILE_Utility menu.

- Sorting the file list
- Display format
- Type of file to list
- Changing storage media (drives)
- Deleting files and folders
- Renaming files and folders
- Making folders (directories)
- Copying files and folders
- Moving files and folders
- Selecting files and folders (All Set, All Reset, and Set/Reset)

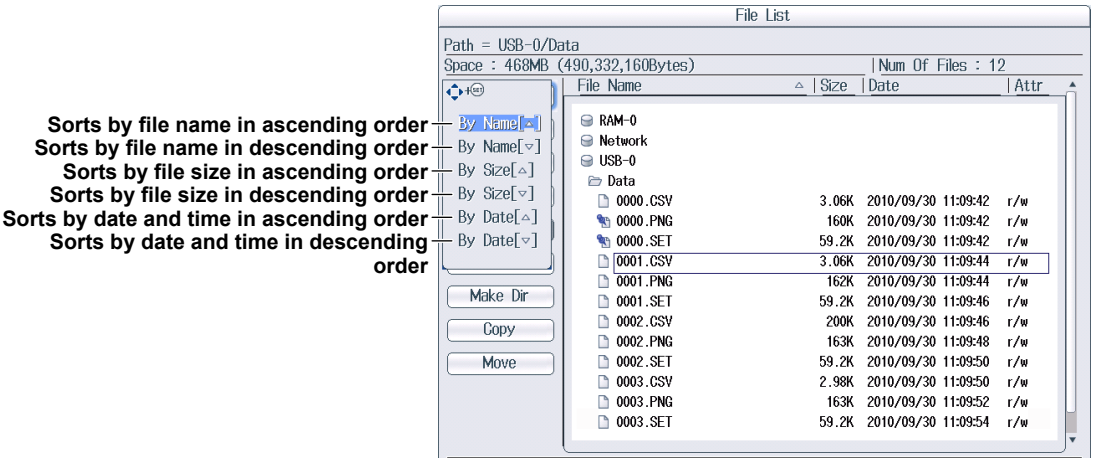
► "File Operations (Utility)" in the features guide

The File List (File List)



Sorting the File List (Sort To)

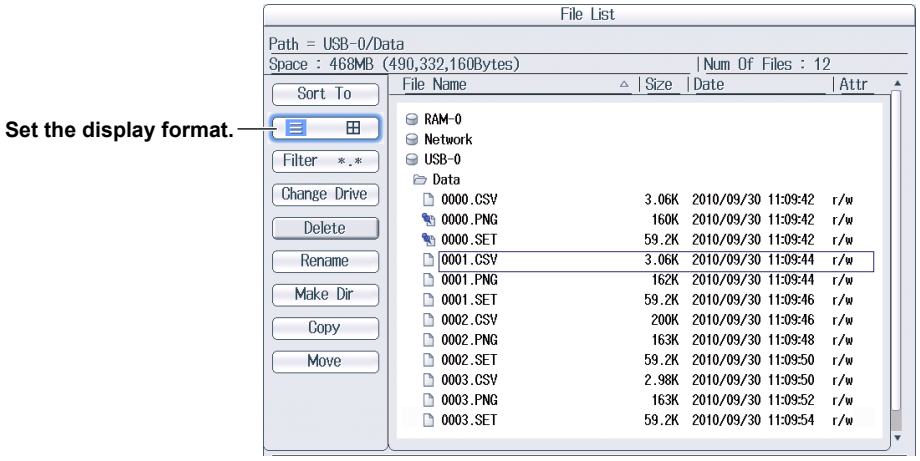
Select **Sort To** on the operation menu to display the following screen.



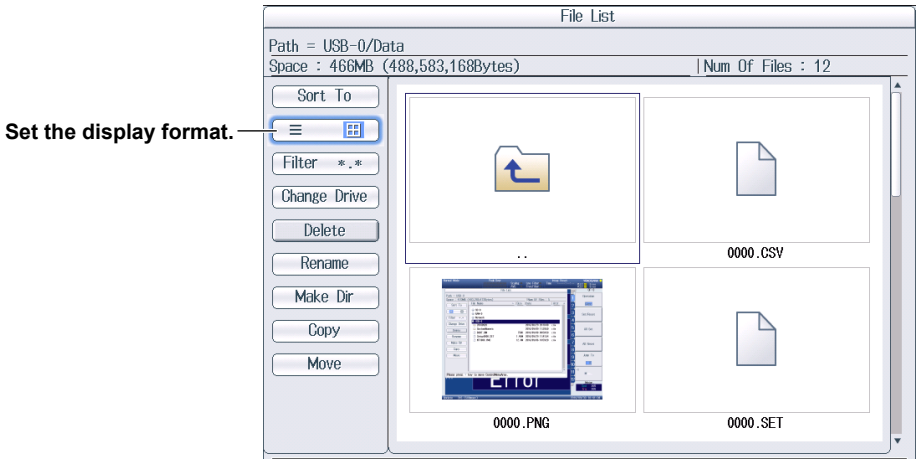
Setting the Display Format (≡, ⊞)

Select ≡ or ⊞ on the operation menu to display the following screen.

List Display (≡)

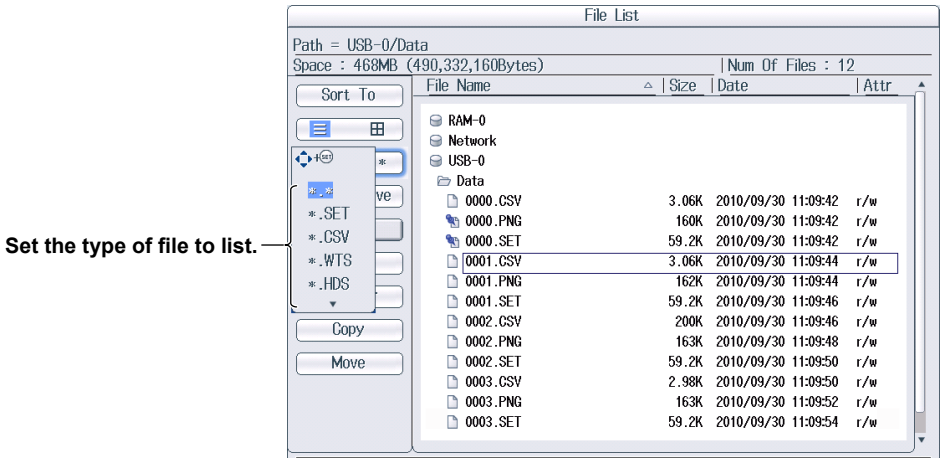


Thumbnail Display (⊞)



Setting the Type of Files to List (Filter)

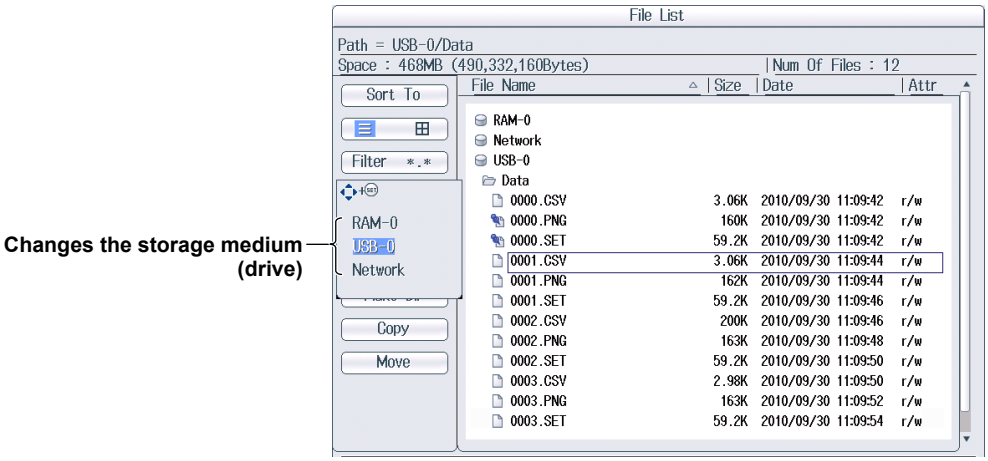
Select **Filter** on the operation menu to display the following screen.



File Type	
.	All files
*.SET	Setup parameter files
*.CSV	Numeric data files (ASCII format), storage data files (ASCII format), and waveform display data files (ASCII format)
*.WTS	Storage data files (binary format)
*.HDS	Storage header files (binary format)
*.BMP	Screen image data files (BMP format) and custom display background files
*.PNG	Screen image data files (PNG format)
*.JPG	Screen image data files (JPEG format)
*.TXT	Custom display configuration files

Changing the Storage Medium or Drive (Change Drive)

Select **Change Drive** on the operation menu to display the following screen.



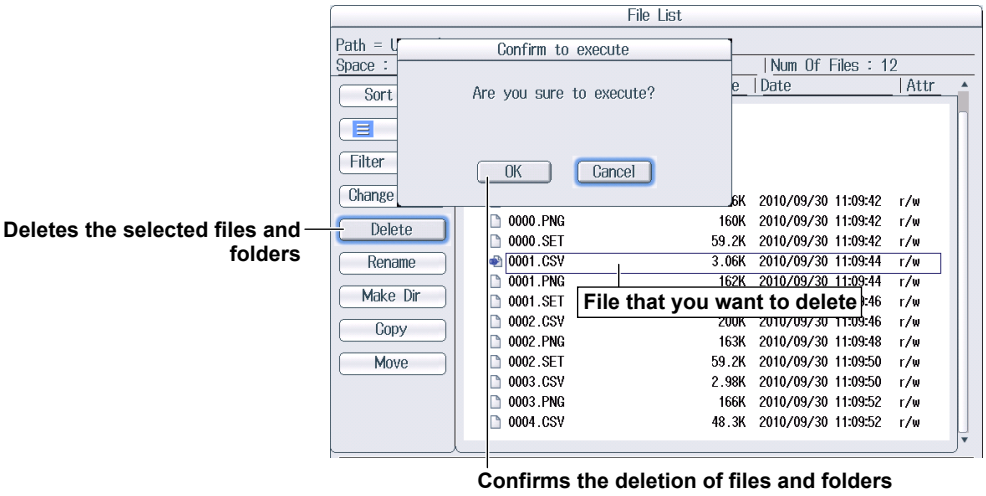
Storage Medium (Drive) Type	
RAM-0	Internal RAM disk of this instrument
USB-0	USB memory device that was detected first
USB-1	USB memory device that was detected second
Network	Network drive

Note

You can also change the storage medium by highlighting the storage medium (drive) you want to change to in the file list and pressing SET.

Deleting Files and Folders (Delete)

1. Select the file or folder in the file list that you want to delete.
2. Select **Delete** on the operation menu to display the following screen.

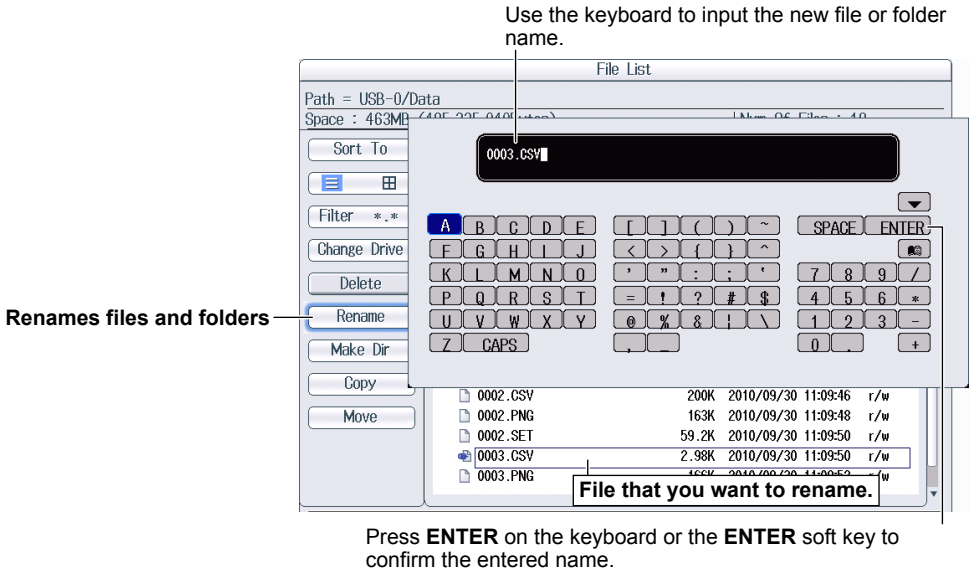


Note

- To delete multiple files or folders that are in the file list at the same time, move the cursor to the file or folder that you want to delete, and then carry out the following operations.
  Files: Press SET or the Set/Reset soft key on the Utility menu.
  Folders: Press the Set/Reset soft key on the Utility menu. If you press SET, all the files and folders that you have selected up to that point will be cleared.
- You cannot delete folders on network drives.

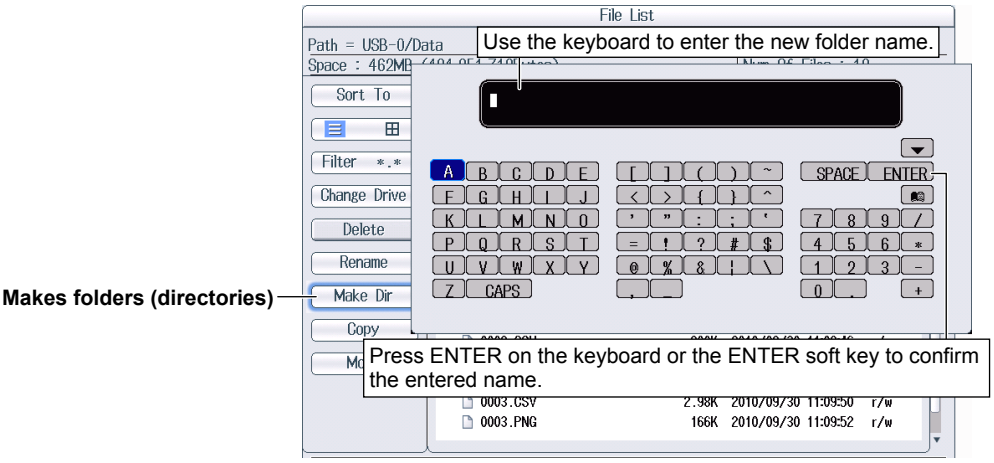
Renaming Files and Folders (Rename)

1. Select the file or folder in the file list that you want to rename.
2. Select **Rename** on the operation menu to display the following screen.



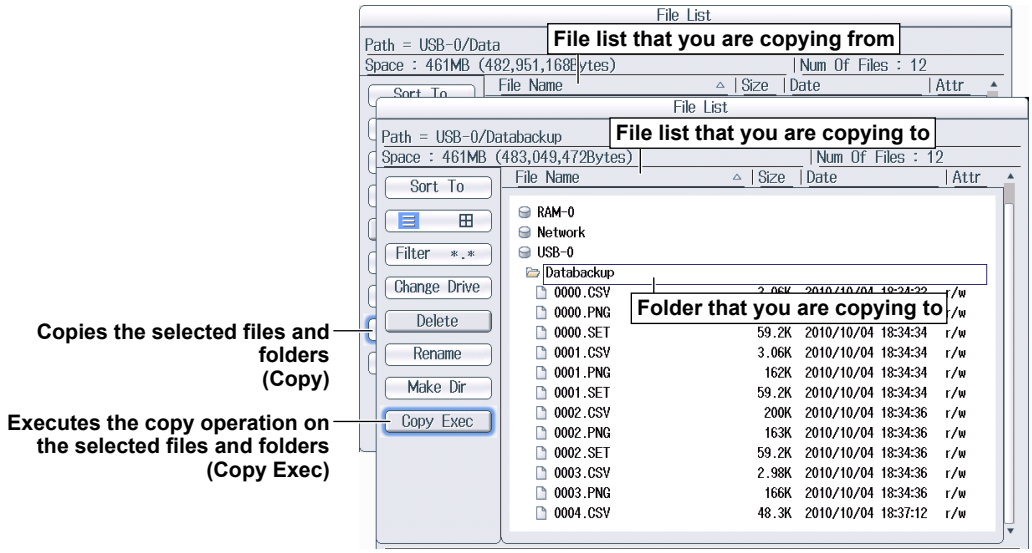
Making Folders (Directories; Make Dir)

1. Select the drive or folder in the file list that you want to make the new folder in.
2. Select **Make Dir** on the operation menu to display the following screen.

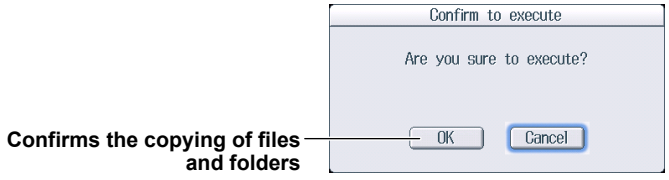


Copying Files and Folders (Copy)

1. Select the file or folder in the file list that you want to copy.
2. Select **Copy** on the operation menu to display the following screen.



3. Select the drive or folder in the file list that you are copying to.
4. Select **Copy Exec** on the operation menu to display the following screen.

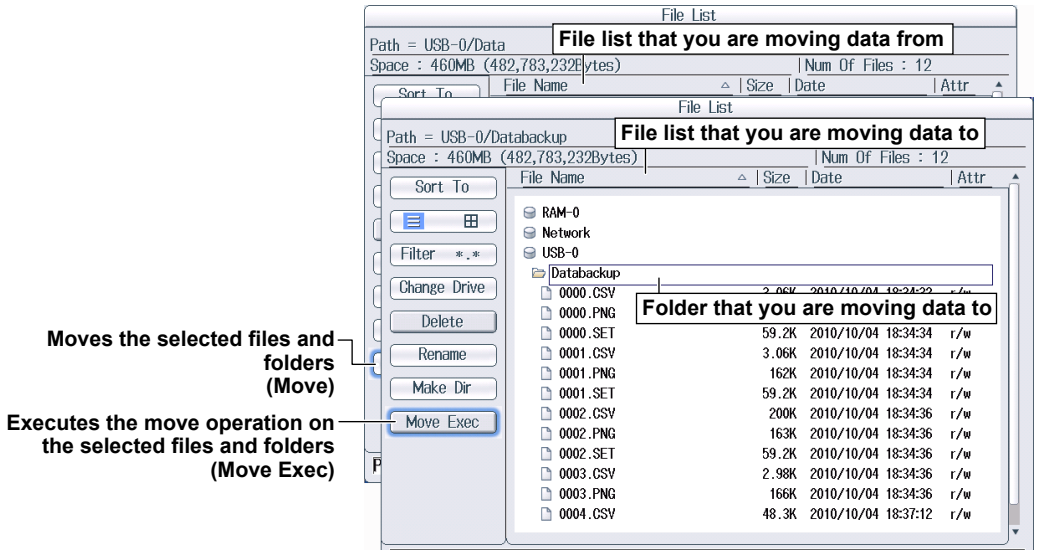


Note

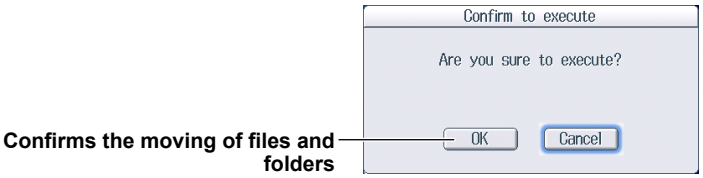
- The procedure for selecting multiple files or folders at the same time to copy them is the same as the procedure for selecting multiple files or folders at the same time to delete them. For more details, see the note on page 17-11.
- You cannot copy folders on a network drive.
- You can perform file operations on the file list that you are copying to as well.

Moving Files and Folders (Move)

1. Select the file or folder in the file list that you want to move.
2. Select **Move** on the operation menu to display the following screen.



3. Select the drive or folder in the file list that you are moving to.
4. Select **Move Exec** on the operation menu to display the following screen.

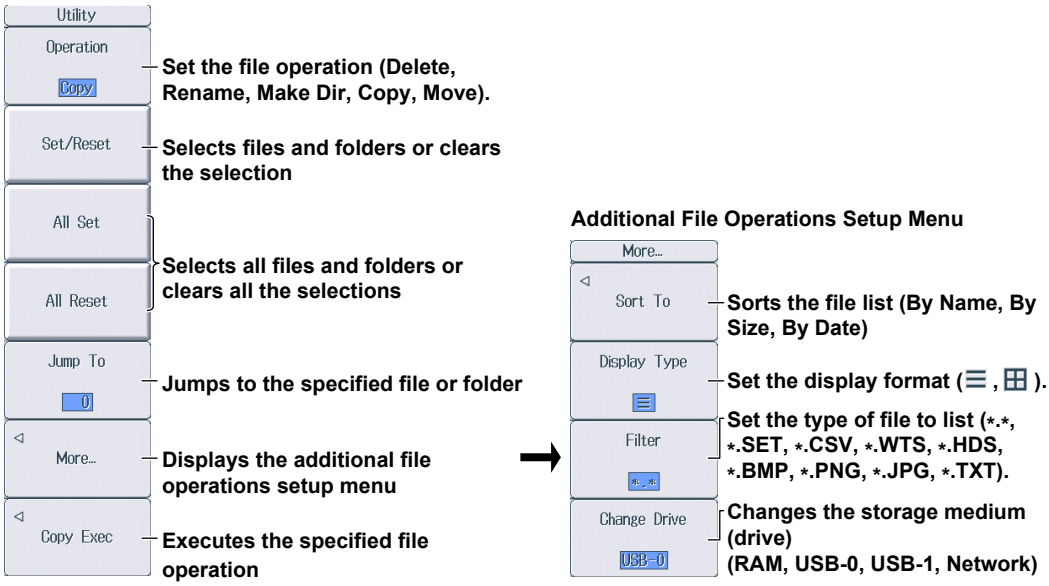


Note

- The procedure for selecting multiple files or folders at the same time to move them is the same as the procedure for selecting multiple files or folders at the same time to delete them. For more details, see the note on page 17-11.
- You cannot move folders on a network drive.
- You can perform file operations on the file list that you are moving data to as well.

FILE Utility Menu

Press **FILE** and then the **Utility** soft key to display the following menu.



Setting the File Operation (Operation, More)

You can perform the same file operations as those that you can perform from the operation menu described on pages 17-8 to 17-13.

Select/Clear (Set/Reset)

This soft key selects the file or folder in the file list that is highlighted or clears the selection. The selection marks (see page 17-8) are displayed to the left of the selected files.

Select All and Clear All (All Set and All Reset)

All Set: In the file list, when a drive is highlighted or a file or folder in a drive or folder is highlighted, pressing this soft key selects all the files and folders in the corresponding drive or folder. The selection marks (see page 17-8) are displayed to the left of the selected files and folders.

All Reset: Pressing this soft key clears all the selected files and folders.

Jump to the Specified File or Folder (Jump To)

Press this soft key to move the cursor to the file or folder in the file list that you specify by its position number. The top-most position in the file list is number 0.

Range: 0-999. However, if you specify a position whose number is larger than the total number of files and folders in the file list, the cursor will move to the bottom-most file or folder in the file list.

18.1 Saving Screen Images

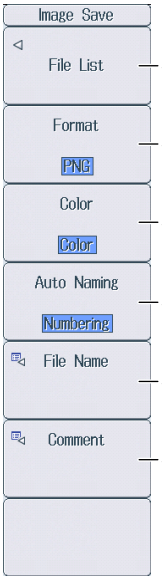
This section explains the following settings for saving screen images:

- Save destination
- File format
- Color
- Auto naming
- File name
- Comment

► “Saving Screen Images” in the features guide

Image Save Menu

Press **SHIFT+IMAGE SAVE** (MENU) to display the following menu.



Set the save destination. ► section 17.2

Set the data format (BMP, PNG, JPEG).

Set the color (OFF, Color, Reverse, Gray).

Set auto naming. ► section 17.2

Set the file name. ► section 17.2

Set a comment. ► section 17.2

Saving Screen Captures

Press **IMAGE SAVE** to save the screen image with the save conditions that you specified on the Image Save menu.

19.1 Loading Roll Paper into the Built-In Printer (Option)

This section explains how to load roll paper into the optional built-in printer.

Printer Roll Paper

Only use roll paper specifically made for use with this instrument. When you first use the printer, use the included roll paper. When you need a new supply of roll paper, contact your nearest YOKOGAWA dealer.

Part Number: B9316FX
Specifications: Heat sensitive paper, 10 m
Minimum Quantity: 10 rolls

Handling Roll Paper

The roll paper is made of heat sensitive paper that changes color thermochemically. Please read the following information carefully.

Storage Precautions

When in use, the heat-sensitive paper changes color gradually at temperatures of approximately 70° C or higher. The paper can be affected by heat, humidity, light, and chemicals, whether something has been recorded on it or not. As such, please follow the guidelines listed below.

- Store the paper in a cool, dry, and dark place.
- Use the paper as quickly as possible after you break its protective seal.
- If you attach a plastic film that contains plasticizing material, such as vinyl chloride film or cellophane tape, to the paper for a long time, the recorded sections will fade due to the effect of the plasticizing material. Use a holder made of polypropylene to store the roll paper.
- When pasting the record paper to another material, do not use paste that contains organic solvents such as alcohol or ether. Doing so will change the paper's color.
- We recommend that you make copies of the recordings if you intend to store them for a long period of time. Because of the nature of heat-sensitive paper, the recorded sections may fade.

Handling Precautions

- Use genuine, YOKOGAWA-supplied roll paper.
- If you touch the roll paper with sweaty hands, there is a chance that you will leave fingerprints on the paper, thereby blurring the recorded sections.
- If you rub something against the surface of the roll paper, the paper may change color due to frictional heat.
- If the roll paper comes into contact with products such as chemicals or oil, there is a chance that the paper will change color or that the recorded sections will disappear.

Loading the Roll Paper

WARNING

A roll paper cutter is present inside the printer unit cover. Be careful of the cutter so as to avoid injuring your fingers or hands.

- Do not insert your fingers into the opening on the printer unit (the roll paper ejection hole).
- When you have opened the printer unit cover to place roll paper in the holder, avoid touching the cutter with your fingers and hands.

Do not touch the print head and print motor. If you do, you may burn yourself.

French

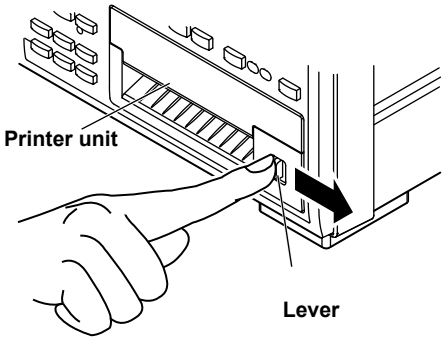
AVERTISSEMENT

Un dispositif de coupe de papier en rouleau est fixé sur le couvercle de l'imprimante. Prendre garde de se blesser les mains ou les doigts avec le dispositif de coupe.

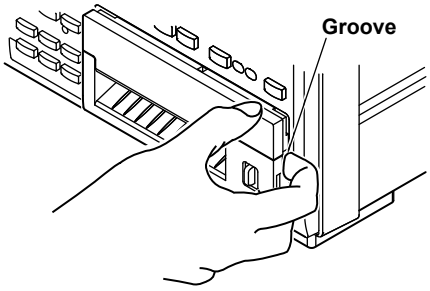
- Ne pas insérer de doigt dans l'ouverture de sortie du papier en rouleau de l'imprimante.
- Ne pas laisser une main ou des doigts entrer en contact avec le dispositif de coupe lors de l'ouverture du couvercle de l'imprimante et de la charge du papier en rouleau dans son logement.

Ne touchez pas la tête d'impression ni le moteur d'impression. Vous pourriez vous brûler.

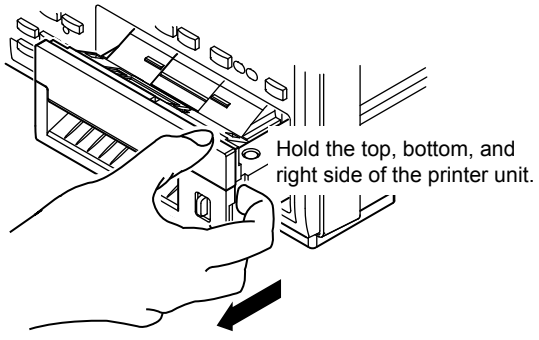
1. Slide the lever to the right to make the printer unit protrude from this instrument.



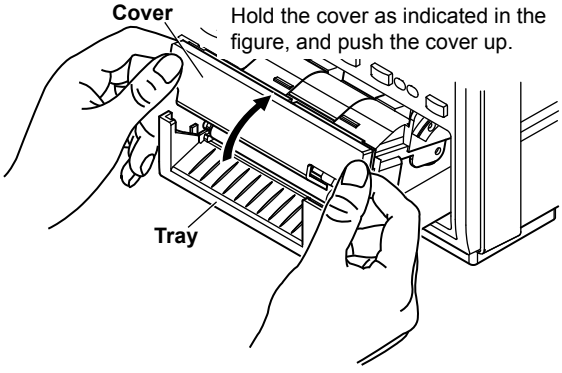
2. Insert your finger into the groove on the right side of the printer unit.



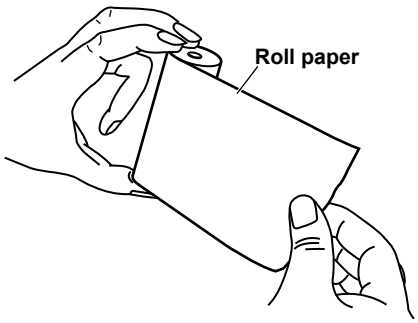
3. Hold the top, bottom, and right side of the printer unit, and then pull it toward you until it stops (pull the unit approximately 5 cm).

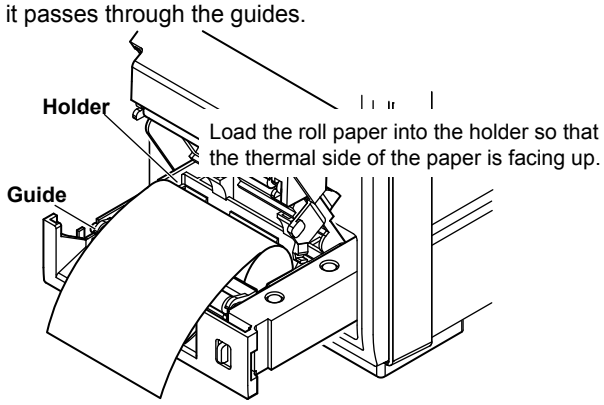


4. Hold the left and right sides of the printer unit's tray with your hands, and push the right and left sides of the front of the cover with your thumbs to raise it.

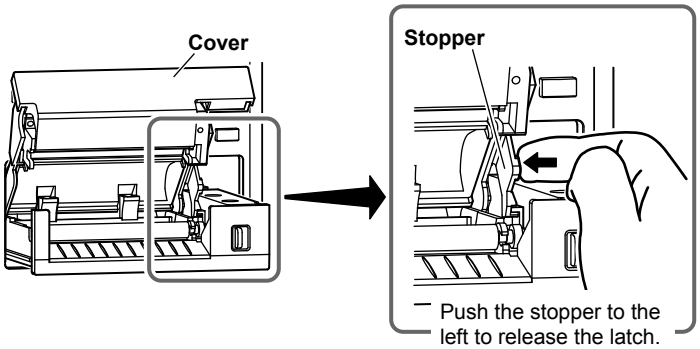


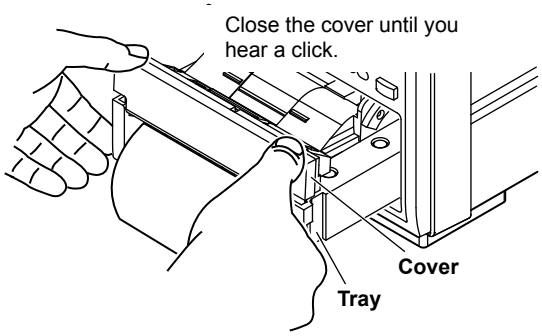
5. Pull approximately 10 cm of the roll paper out, and load the roll paper in the holder so that the thermal side of the paper is facing up. Load the paper so that it passes through the guides.



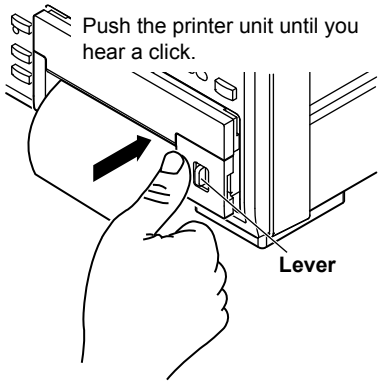


6. Lower the cover while you push the stopper to the left to release the latch. Hold the tray from underneath with both hands, and close the cover until you hear a click.

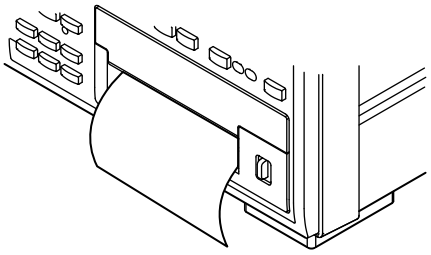




7. Push the printer unit (push the area to the left of the lever on the front panel) back into this instrument until you hear a click.



This completes the procedure for loading the roll paper.



Feeding Paper

Press **SHIFT+PRINT** (MENU) to display the following menu.

Feeds paper
Each time that you press this soft key, this instrumentfeeds approximately 3 cm of the roll paper.

Cutting Roll Paper

After you load roll paper and close the cover or after you print measured data, to cut the roll paper, pull the paper up against the top of the cover.

Note

- If you open the printer cover immediately after you cut the roll paper, repeat steps 5 to 7 on pages 19-2 and 19-3.
- After you load roll paper and close the cover, check whether the paper feeds correctly. If the roll paper does not feed straight, repeat steps 1 to 7 on pages 19-2 and 19-3.
- If you load the roll paper backwards, the paper may not feed properly or data may not be printed. This is because the print head doesn't come into contact with the thermal side of the paper. Load the roll paper into the holder in the proper orientation.

19.2 Printing Using the Built-in Printer (Option)

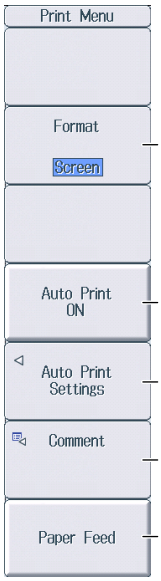
This section explains the following settings for printing on the optional built-in printer:

- Output format
- Executing auto printing
- Auto printing
  Print mode, print count, print interval, scheduled times for real-time printing, trigger event (synchronized to a user-defined event), and printing data when printing starts
- Comment
- Feeding paper

► “Printing Screen Images and Numeric Data (Option)” in the features guide

Print Menu Menu

Press **SHIFT+PRINT** (MENU) to display the following menu.



Set the output format (Screen, List).

Turns auto printing on (executes auto printing)

Configure auto printing.

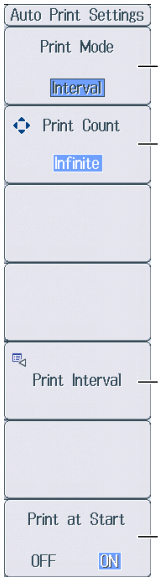
Set a comment. ► section 17.2

Feeds paper ► section 19.1

Configuring Auto Printing

Press the **Auto Print Settings** soft key to display one of the menus shown below. The menu that appears varies depending on the Print Mode setting that you have specified.

Interval Print Mode



Set Print Mode to Interval.

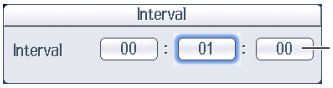
Set the print count (Infinite, 1 to 9999).

Set the print interval.

Select whether to print the data at print start

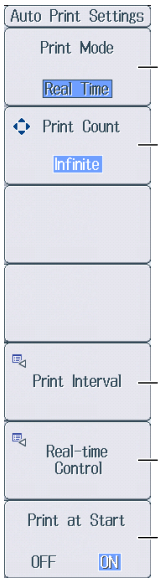
Setting the Print Interval

Press the **Print Interval** soft key to display the following screen.



Set the print interval
(00 hours : 00 minutes : 10 seconds to 99 hours : 59 minutes : 59 seconds).

Scheduled Times for Real-Time Print Mode



Set Print Mode to Real Time.

Set the print count (Infinite, 1 to 9999).

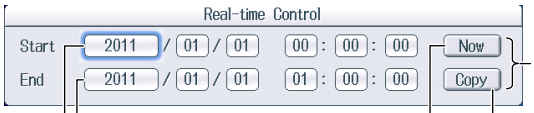
Set the print interval ► “Interval Print Mode” above

Set the scheduled times for real-time printing.

Select whether to print the data at print start

Setting Scheduled Times for Real-Time Printing

Press the **Real-time Control** soft key to display the following screen.



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

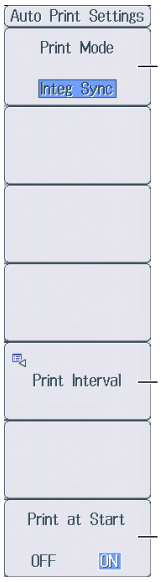
Scheduled print stop time

Scheduled print start time

Sets the scheduled print start time to the current time

Copies the scheduled print start time to the scheduled print stop time

Integration-Synchronized Print Mode

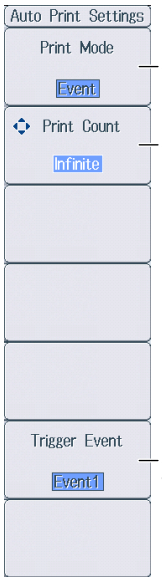


Set Print Mode to Integ Sync.

Set the print interval ► “Interval Print Mode” on the previous page

Select whether to print the data at print start

Event-Synchronized Print Mode



Set Print Mode to Event.

Set the print count (Infinite, 1 to 9999).

Set the trigger event (Event 1 to Event 8).
When measured data is updated, data is printed each time the conditions of the specified user-defined event are met.

Printing

Press **Print** to print data according to the conditions specified in the Print Menu menu.

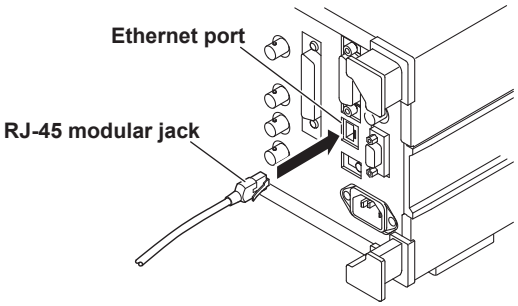
20.1 Connecting this instrument to a Network

This section explains how to connect this instrument to a network.

Ethernet Interface Specifications

There is a 1000BASE-T port located on the rear panel of the instrument.

Item	Specifications
Ports	1
Electrical and mechanical specifications	IEEE802.3
Transmission system	Ethernet (1000BASE-T, 100BASE-TX, 10BASE-T)
Communication protocol	TCP/IP
Supported services	FTP server, DHCP, DNS, remote control (VXI-11), SNTP, FTP client, Modbus/TCP server, and Web server
Connector type	RJ-45 connector



Items Required to Connect this instrument to a Network

Cable

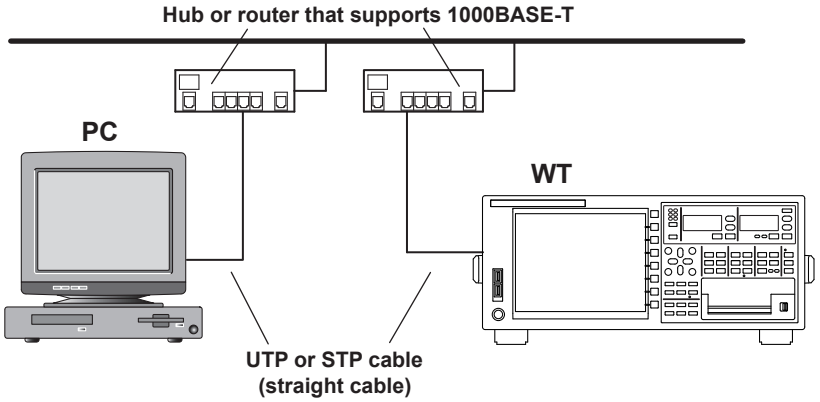
Use one of the following types of network cables that supports the data rate of your network.

- A UTP (Unshielded Twisted-Pair) cable
- An STP (Shielded Twisted-Pair) cable

Connection Procedure

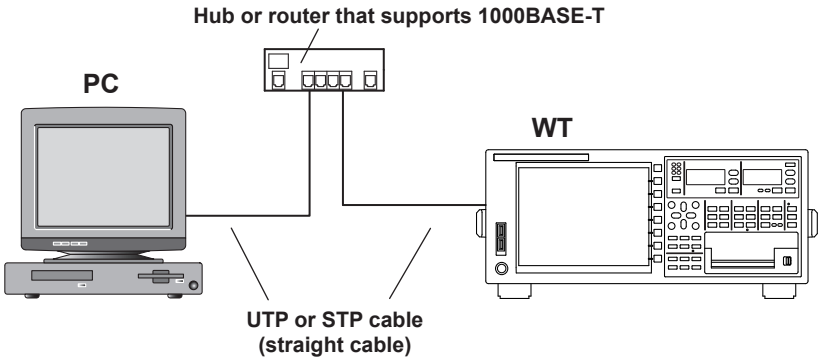
To Connect to a PC over a Network

1. Turn off this 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 this instrument.



To Connect to a PC through a Hub or Router

1. Turn off this 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 this instrument.



Note

- Use a hub or router that supports the data rate of your network.
- When you connect a PC to this 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 this instrument to a PC directly. Direct communication without a hub or router is not guaranteed to work.

20.2 Configuring TCP/IP Settings

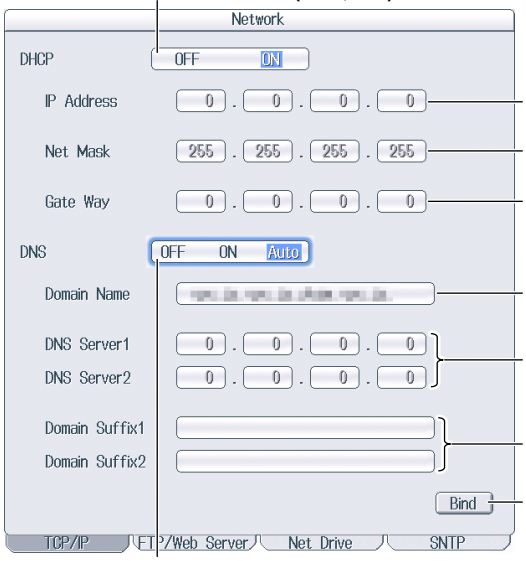
This section explains the following TCP/IP settings for connecting this instrument to a network:

- DHCP
  IP address, subnet mask, and default gateway
- DNS
  Domain name, DNS server IP address, and domain suffix

► “TCP/IP (TCP/IP)” in the features guide

Configuring TCP/IP Settings (TCP/IP)

Press **UTILITY**, the **Network** soft key, and then the **TCP/IP** soft key to display the following screen.



Set the DHCP (OFF, ON).

Set these when DHCP is set to OFF.

- **IP address**
- **Subnet mask**
- **Default gateway**

These are displayed when DNS is set to ON or Auto.

- **Domain name**
- **DNS server IP address (1: primary, 2: secondary)**
- **Domain suffix (1: primary, 2: secondary)**

Applies the settings

Set the DNS (OFF, ON, Auto).

- OFF: The DNS is disabled.
- ON: The DNS is enabled. Set the domain name, and the DNS server’s primary and secondary IP addresses and domain suffixes.
- Auto: The DNS is enabled. Set the domain suffixes. The domain name and the DNS server IP addresses are set automatically. The Auto option is only displayed when DHCP is set to ON.

20.3 Accessing this instrument from a PC (FTP Server)

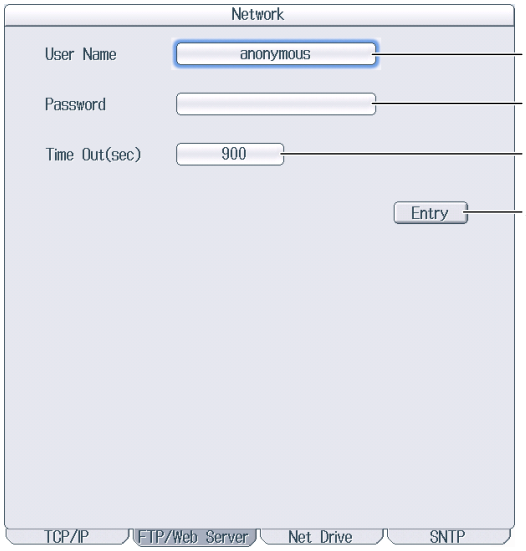
This section explains the following settings for accessing this instrument from a PC on a network:

- User name
- Password
- Timeout
- FTP client software

► “FTP Server (FTP Server)” in the features guide

Configuring FTP Server Settings (FTP/Web Server)

Press **UTILITY**, the **Network** soft key, and then the **FT/WebP Server** soft key to display the following menu.



Set the user name (up to 32 characters).

Set the password (up to 32 characters).

Set the timeout value (30 to 3600 s).

Applies the settings

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 this instrument.

Note

If you set the user name to “anonymous,” you can access this instrument without entering a password.

20.4 Monitoring the display of this instrument from a PC (Web Server)

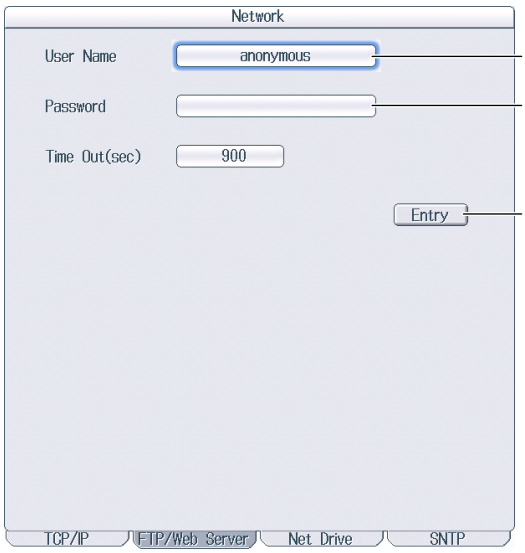
This section explains the following settings for accessing this instrument from a PC over a network to show the instrument's display on the PC and remotely controlling the instrument from the PC.

- User name
- Password
- Connecting to the DLM4000 from a PC

► "Web Server (Web Server)" in the features guide

Configuring Web Server Settings (FTP/Web Server)

Press **UTILITY**, the **Network** soft key, and then the **FTP/Web Server** soft key to display the following menu.



Set the user name (up to 32 characters).

Set the password (up to 32 characters).

Applies the settings

Note

Time Out is a setting used by the FTP server feature. It is not necessary for the Web server feature.

Connecting to this instrument from a PC

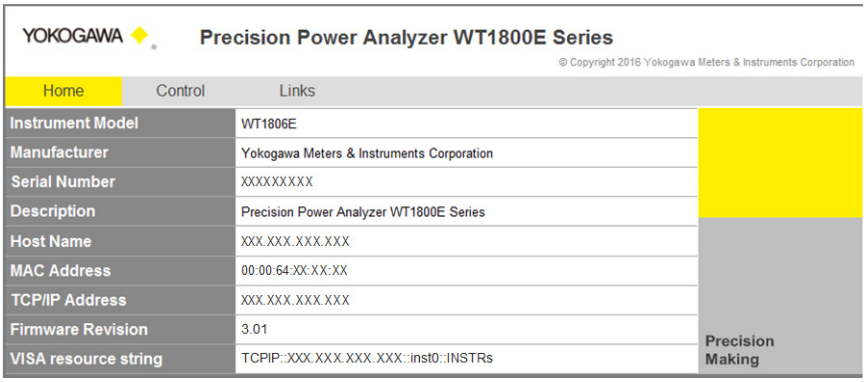
1. Open a Web browser* on a PC that is connected to the network.
   * Recommended browser: Internet Explorer 9.0 or later
2. Enter the following address.
   http://xxx.xxx.xxx.xxx/
   (Type the IP address of this instrument for xxx.xxx.xxx.xxx.)
3. Enter the user name and password that you set on the network setup screen of this instrument, which is shown on the previous page, and connect to this instrument.
   The following screen appears.

Note

If you set the user name to “anonymous,” you can access this instrument without entering a password.

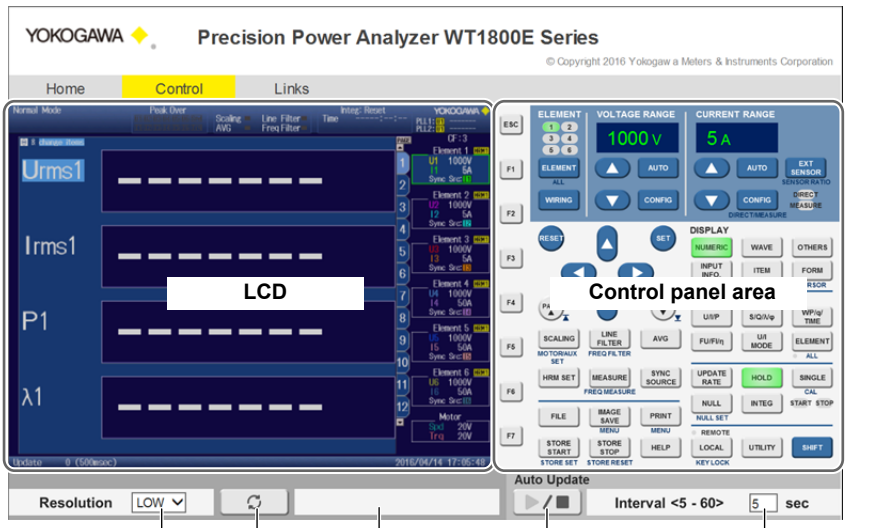
Home Screen

Information about the instrument is displayed.



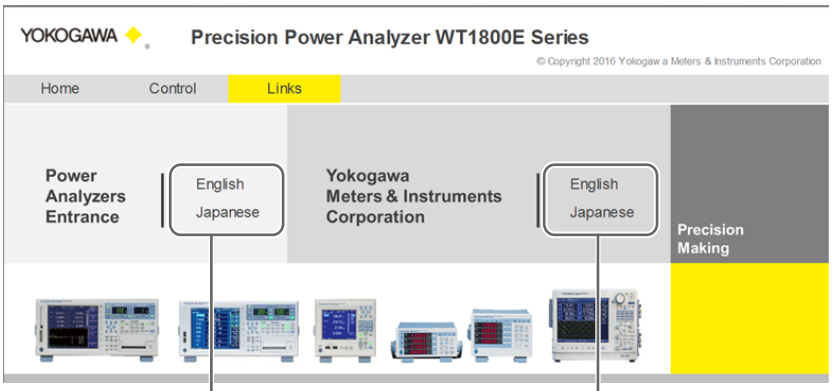
Control Screen

4. Click the Control tab.
   The following screen appears.



Links Screen

5. Click the Link tab.
The following screen appears.



Link to Yokogawa Meters & Instruments homepage

Link to Yokogawa Meters & Instruments power analyzer homepage

20.5 Connecting to a Network Drive

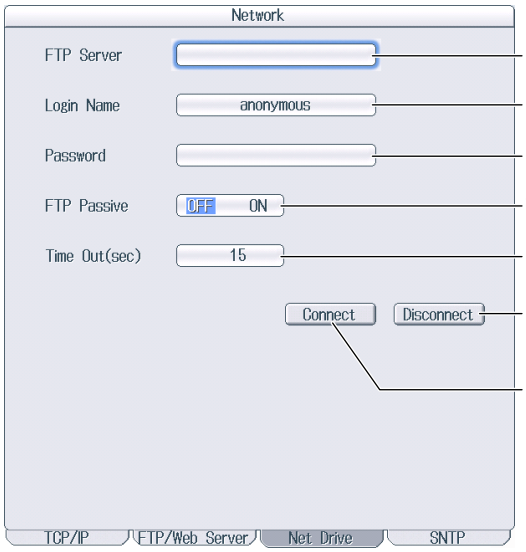
This section explains the following settings for saving and loading various data of this instrument from a network drive (FTP server):

- FTP server (file server)
- Login name
- Password
- Turning FTP passive mode on and off
- Timeout
- Connecting to and disconnecting from a network drive

► “Network Drive (Net Drive)” in the features guide

Configuring Network Drive (Net Drive) Settings and Connecting to It

Press **UTILITY**, the **Network** soft key, and then the **Net Drive** soft key to display the following menu.



Set the FTP server’s host name.

Set the login name (up to 32 characters).

Set the password (up to 32 characters).

Turns FTP passive mode on and off

Set the timeout value (1 to 3600 s).

Disconnects this instrument from the network drive (FTP server)

Connects this instrument to the network drive (FTP server)

20.6 Using SNTP to Set the Date and Time

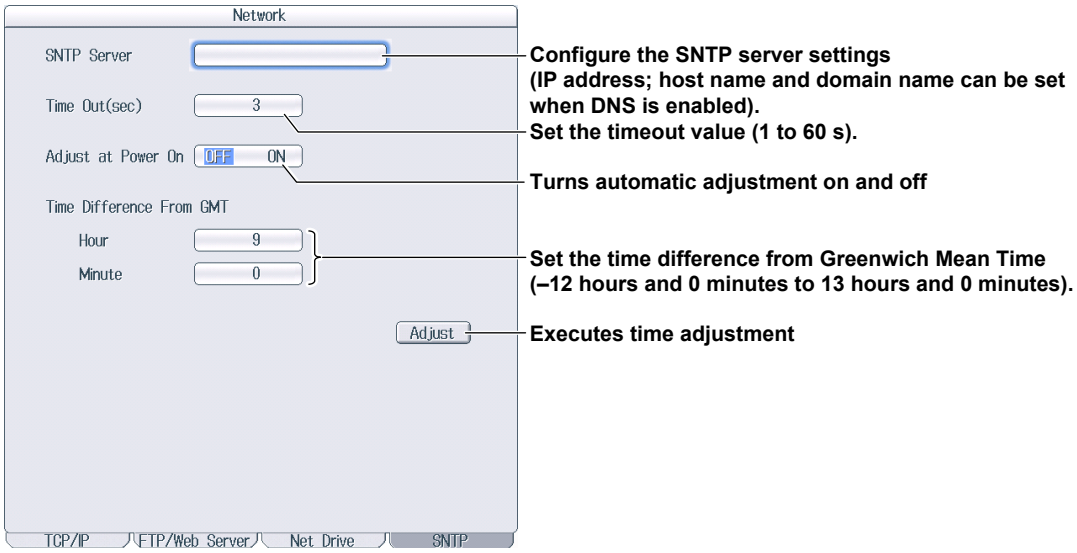
This section explains how to use SNTP to set the date and time of this instrument.

- SNTP server
- Timeout
- Turning automatic adjustment on and off
- Time difference from Greenwich Mean Time (setting shared with the date and time on the System Config menu)
- Time adjustment

► **"SNTP (SNTP)" in the features guide**

Configuring SNTP Settings (SNTP)

Press **UTILITY**, the **Network** soft key, and then the **SNTP** soft key to display the following menu.



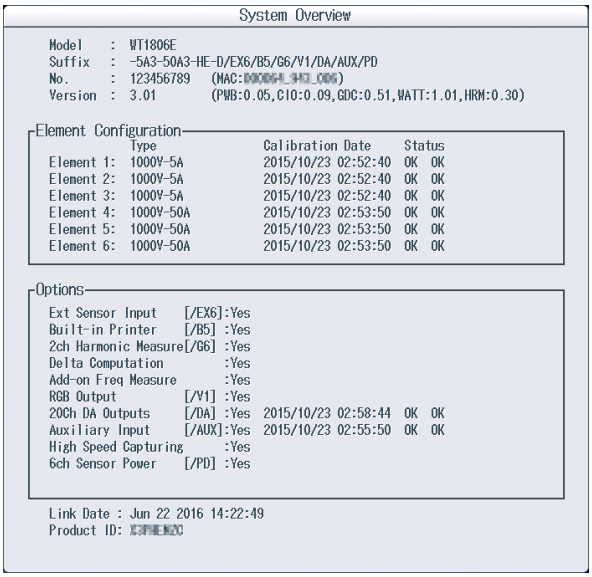
21.1 Viewing System Information (Overview)

This section explains how to view system information of this instrument.

► “Overview (System Overview)” in the features guide

System Information List (System Overview)

Press **UTILITY** and then the **System Overview** soft key to display the following screen.



Displayed Contents

Model	Model
Suffix	Suffix code
No.	Instrument number
Version	Firmware version
Element Configuration	Input element types
Options	Options
Link Date	Date and time that the firmware was created
Product ID	Unique number assigned to each instrument (necessary for the purchase of additional options)

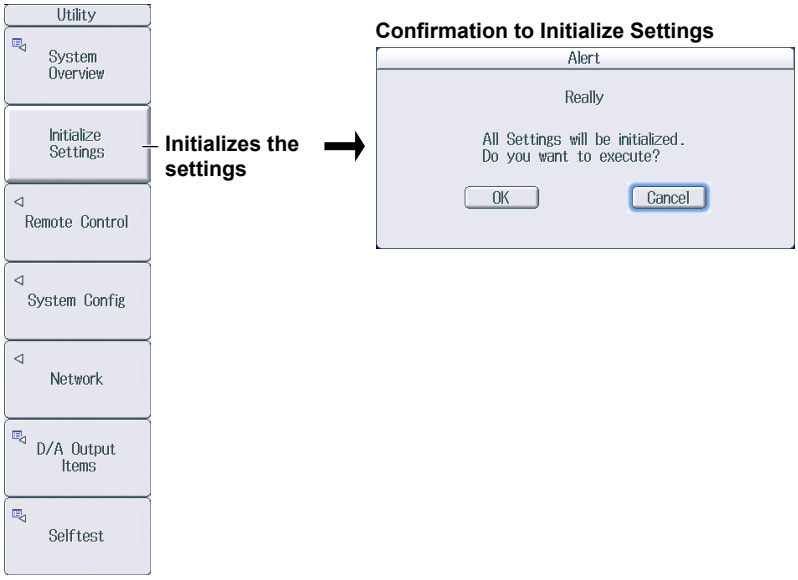
21.2 Initializing Settings

This section explains how to initialize this instrument settings to their factory default values.

► “Initializing Settings (Initialize Settings)” in the features guide

Utility Menu

Press **UTILITY** to display the following menu.



Note

Only initialize this instrument if you are sure that it is okay for all of the settings to be returned to their initial values. You cannot undo an initialization. We recommend that you save the setup parameters before you initialize this instrument.

21.3 Setting the Message, Menu, and USB Keyboard Languages

This section explains the settings that you can use to change the message, menu, and USB keyboard languages.

► “Language (Language)” and “USB Keyboard Language (USB Keyboard)” in the features guide

System Config Menu

Press **UTILITY** and then the **System Config** soft key to display the following menu.

Set the date and time ► section 3.4 in the getting started guide, IM WT1801E-03EN

Configure the language settings.

Set the USB keyboard language (Japanese, English).

Configuring the Language Settings

Press the **Language** soft key to display the following menu.

Set the menu language (Japanese, English, Chinese, German).

Set the message language (Japanese, English, Chinese, German).

Note

Even if you set the menu or message language to a language other than English, some terms will be displayed in English.

21.4 Setting the Screen Brightness and Configuring the Display Color Settings

This section explains how to set the screen brightness and configure the display color settings.

► “Adjusting the LCD (LCD)” in the features guide

LCD Menu

Press **UTILITY**, the **System Config** soft key, and then the **LCD** soft key to display the following menu.

Turns off the LCD backlight (you can turn on the backlight by pressing any key)

Select whether to automatically turn off the LCD backlight.

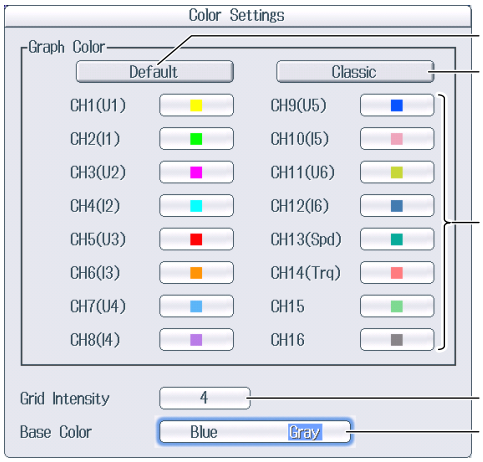
Set the amount of time before the backlight is automatically turned off (1min to 60min).

Set the LCD backlight brightness (1 to 10).

Configure the display color settings.

Configuring the Display Color Settings

Press the **Color Settings** soft key to display the following menu.



Sets the graph colors to the default values

Sets the graph colors to the classic values

Set the graph colors for CH1 to CH16.

Set the grid intensity (1 to 8).

Set the menu and setup screen background color (Blue, Gray).

21.5 Configuring the Environment Settings

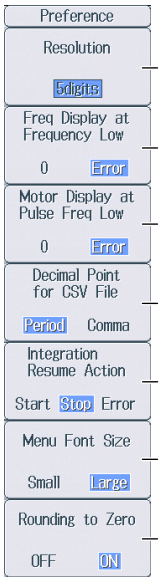
This section explains the following environment settings:

- Number of digits of numeric data to display
- Frequency display value when the measured frequency is less than the lower limit
- Motor display value (/MTR option) when the measured pulse frequency is less than the lower limit
- Decimal point and separator to use when data is saved in ASCII format (.CSV)
- Integration resume action at power failure recovery
- Menu font size
- Rounding to zero

► **"Environment Settings (Preference)" in the features guide**

Preference Menu

Press **UTILITY**, the **System Config** soft key, and then the **Preference** soft key to display the following menu.



Set the number of digits of numeric data to display (4digits, 5digits).

Set the frequency display value when the measured frequency is less than the lower limit (0, Error).

On models with the /MTR option, set the motor display value when the measured pulse frequency is less than the lower limit (0, Error).

Set the decimal point and separator to use when data is saved in ASCII format as a .CSV file (Period, Comma).

Set the integration resume action at power failure recovery (Start, Stop, Error).

Set the menu font size (Small, Large).

Turns rounding to zero on and off

21.6 Configuring D/A Output Items (Option)

This section explains the following settings for D/A output. This feature is available on models with the /DA option.

- Measurement function
- Element and wiring unit
- Harmonic order
- D/A output range
  Range mode, range maximum, and range minimum

► "D/A Output (D/A Output Items; option)" in the features guide

Configuring D/A Output Items

Press **UTILITY** and then the **D/A Output Items** soft key to display the following screen.

D/A output signal name
For details on the connector pinout and the D/A output signal assignment, see section 4.6 in the getting started guide, IM WT1801E-03EN.

Output item
This display changes according to the Function, Element/Σ, and Order settings.

Set the measurement function
(None, other functions—for details on the various measurement functions, see "Items That This Instrument Can Measure" in the features guide).

Set the element and wiring unit (Element 1 to Element 6, ΣA to ΣC).

Set the harmonic order (Total, 0 to 500; /G5 or /G6 option).
You can set this setting when the measurement function includes a harmonic order.

D/A Output Items

Ch	Item	Function	Element/Σ	Order	Range Mode	Max	Min
1	Urms1	Urms	Element 1	-	Manual	100.0	-100.0
2	Irms1	Irms	Element 1	-	Fixed	-	-
3	P1	P	Element 1	-	Fixed	-	-
4	S1	S	Element 1	-	Fixed	-	-
5	Q1	Q	Element 1	-	Fixed	-	-
6	λ1	λ	Element 1	-	Fixed	-	-
7	φ1	Φ	Element 1	-	Fixed	-	-
8	fU1	FreqU	Element 1	-	Fixed	-	-
9	fI1	FreqI	Element 1	-	Fixed	-	-
10	Urms1	Urms	Element 1	-	Fixed	-	-
11	Urms1	Urms	Element 1	-	Fixed	-	-
12	Urms1	Urms	Element 1	-	Fixed	-	-
13	Urms1	Urms	Element 1	-	Fixed	-	-
14	Urms1	Urms	Element 1	-	Fixed	-	-
15	Urms1	Urms	Element 1	-	Fixed	-	-
16	Urms1	Urms	Element 1	-	Fixed	-	-
17	Urms1	Urms	Element 1	-	Fixed	-	-
18	Urms1	Urms	Element 1	-	Fixed	-	-
19	Urms1	Urms	Element 1	-	Fixed	-	-
20	Urms1	Urms	Element 1	-	Fixed	-	-

Select the mode of the D/A output range (Fix, Manual).

Set the maximum and minimum values of the range (–9.999 T to 9.999 T).
These settings can be set when Range Mode is set to Manual.

21.7 Carrying Out Self-Tests (Selftest)

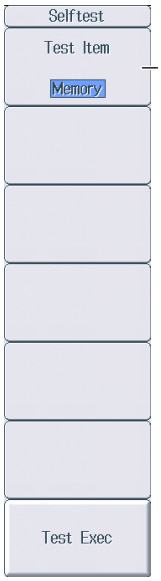
This section explains the following settings for testing whether the memory and keys of this instrument are functioning properly:

- Test item
  - Memory test
  - Key test
    Operation keys, indicators, and keyboard

► “Self-Test (Selftest)” in the features guide

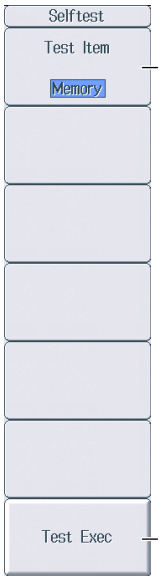
Selftest Menu

Press **UTILITY** and then the **Selftest** soft key to display the following menu.



Set the item to test (Memory, Key Board).

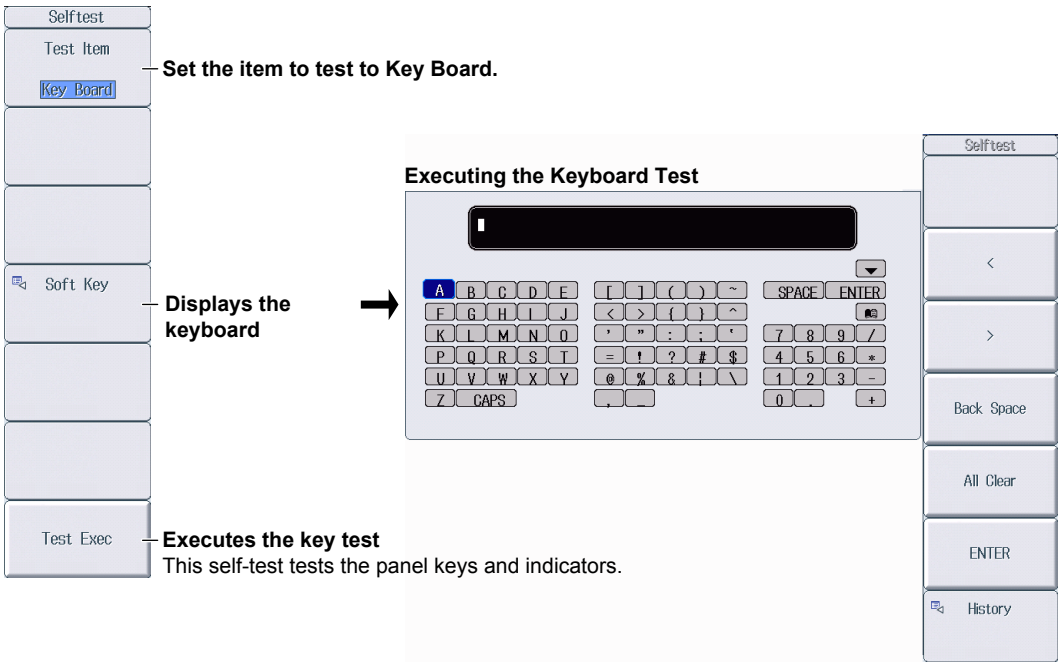
Executing the Memory Test



Set the item to test to Memory.

Executes the test

Executing the Key Test



21.8 Performing Zero-Level Compensation

This section explains how to perform zero-level compensation.

► “Zero-Level Compensation (CAL)” in the features guide

Press **SHIFT+SINGLE** (CAL) to execute zero-level compensation.

Note

- This 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 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.

21.9 Using the NULL Feature

This section explains the following settings for the NULL feature:

- NULL feature setup method
  All the signals of a given signal type or the selected signals
- Enabling and disabling the NULL feature

► “NULL Feature (NULL SET)” in the features guide

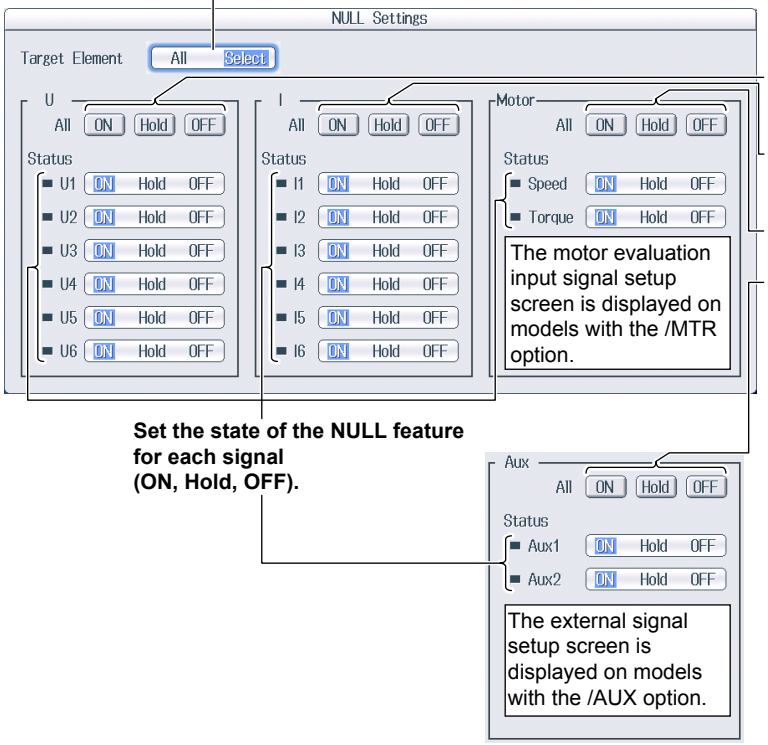
Configuring NULL Feature Settings

Press **SHIFT+NULL** (NULL SET) to display the following screen.

Select the setup method of the NULL feature (All, Select).
If you select All, the NULL feature is turned on for all the input signals that you can use this screen to set.

Set the state of the NULL feature for all the signals of a given signal type (ON, Hold, OFF).

- **For the voltage signals of the installed input elements**
- **For the current signals of the installed input elements**
- **For motor evaluation input signals**
- **For external signals**



Set the state of the NULL feature for each signal (ON, Hold, OFF).

Enabling and Disabling the NULL Feature

Press **NULL** to illuminate the NULL key and enable the NULL feature.

- The NULL value for each signal is used for those signals that have been configured to use the NULL feature.
- Press **NULL** again to turn the NULL key off and disable the NULL feature.

21.10 Locking the Keys

This section explains how to lock the panel keys, which prevents you from unintentionally changing the current state of this instrument.

► “Key Lock (KEY LOCK)” in the features guide

Key Lock (KEY LOCK)

Press **SHIFT+LOCAL** (KEY LOCK). “LOCK” is displayed in the upper right of the screen, and the operation keys are locked.

- The key lock disables all keys of this instrument except for the power switch, SHIFT key, and LOCAL key.
- Press **SHIFT+LOCAL** (KEY LOCK) again to release the key lock.

Note

When the keys are locked, you cannot use a USB mouse or keyboard to operate this instrument either.

Appendix 1 Messages and Corrective Actions

Messages

Error 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 21.3. 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 communication error messages. These messages are explained in the communication interface user's manual, IM WT1801E-17EN.

Warning Messages (1 to 99)

Code	Message	Chapter or Section
3	Turned on pressing the RESET key. The system has been initialized.	3.6[1]
11	Cannot measure PLL frequency. Check input level.	2.1
12	File access slow. Too many files in directory or medium read/write speed slow.	17.6
64	File access is aborted.	—
80	System Configuration was changed. The system has been initialized.	—
84	Key lock is enabled. To release the lock, press the KEY LOCK (SHIFT+LOCAL) key.	21.10
85	In remote control mode, all keys are locked except LOCAL key. Please hit LOCAL 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 of the MOTOR/AUX are switched to fixed ranges. Even if the Data Update Interval setting is Auto, Voltage/Current measurement range are also switched to fixed ranges.	1.2 and 1.15
89	Processing system settings change. Please wait for a moment.	—
90	This model has no external current sensor. Check the specifications to see whether or not the optional external current sensor is provided.	21.1
91	This model has no built-in printer. Check the specifications to see whether or not the optional built-in printer is provided.	21.1
92	This model has no harmonics measurement. Check the specifications to see whether or not the optional harmonics measurement is provided.	21.1
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.	21.1
97	There are measure conditions which make sigma functions unmeasurable. All or part of sigma funtions will not be measured.	1.1 and 15.1
98	External Sync interval has gone out of range. Check External Sync (MEAS START) input.	4.4[*1]

1 Getting started guide, IM WT1801E-03EN
2 Communication interface user's manual, IM WT1801E-17EN

Setup Error Messages (500 to 899)

Code	Message	Chapter or Section
600	File access failure.	—
601	Invalid file name. Check the file name.	17.2
602, 603	No USB device or no storage media inserted. Check the USB device connection, and the existance of a storage medium in the drive.	17.1
604	Media failure. Check the storage medium.	17.1
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.	17.1
608, 609	File already exists.	—
610	Contains invalid characters.	17.2
611, 612	Media full. Delete unnecessary file(s) or use another disk.	17.6
613	Cannot delete a directory if there are files in the directory.	17.6
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	Media failure. Check the medium.	—
657	File operation is interrupted.	—
658	File unknown format. Check the file format.	17.5 and 17.6
662	Cannot load this bitmap file. Use file of 16bit Color or 24bit Color Mode with less or equal size 800x672.	6.7
663	Cannot load this text file. Confirm the contents of file.	6.7
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.	—
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 20
679	Printer error. Maintenance service is required.	—
680	Close the printer cover.	19.1
681	Paper empty. Load a roll chart.	19.1
682	The printer head temperature is abnormality. Printing will be aborted. Printing will not be possible until the printe head temperature comes normal.	—
683	Printer over heat. Power off immediately.	—
685	Printer time out. Maintenance service is required.	—
686	Printer error.	—
690	Cannot execute for the directory depth is 10 or more.	—
691	Cannot execute because of source and destination are overrapped.	—

Code	Message	Chapter or Section
692	Cannot execute for the media itself.	—
693	Cannot store at Network Drive.	16.3
694	Trigger Event is Off.	7.2
695	File version is new. Update firmware.	—
696	The file may be damaged or an unsuccessful file close could have occured.	—
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.	—
711	File operation not allowed during hard copy. Wait until the hard copy completes.	—
713	Cannot execute for All or Custom display mode.	—
720	Over Run had occured.	—
721	Can not set or execute because store is processing. Try Again.	—
722	No target Element for integration execution.	8.1
723	Can not set or execute when Integ Independent Control is on.	8.1
724	Can not set or execute because recording is processing. Try again.	—
725	File creation stopped. File size exceeded 2G bytes.	—
750, 751	Unable to connect to the server. Check the network settings and configuration.	Chapter 20
752	This ftp function in not supported.	—
753	FTP Error: Client Handle Confirm the network settings and connection.	Chapter 20
758	Failed to acquire time from SNTP server. Confirm the network settings and connection.	20.5
759	Failed to initialize network. Confirm the network settings.	Chapter 20
800	Illegal date-time. Set the correct date and time.	3.5*
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.	17.2
802	Cannot be set or executed in the Normal measurement mode. Usable measurement mode are as follows.	—
811	Cannot be set to this display mode. Harmonics option is necessary.	—
812	Cannot be set or executed while storing data.	—
813	Cannot be set while integration is running. Reset Integration.	8.3
814	Cannot be set or executed when NULL is on. Please turn NULL off.	21.9
815	Cannot be set or executed when the Data Update Interval is Auto.	1.15
823	Cannot change during CAL. Wait until CAL is completed.	21.8
827	Illegal math expression. Input a correct computing equation.	8.1
831	Processing now. Retry setting or execution again.	—
841	Attempted to start integration after integration time has reached its preset value.	8.3
842	Attempted to start integration while integration is in progress.	8.3
843	Measurement stopped due to overflow during integration or due to a power failure.	8.3
844	Attempted to stop integration even though integration was not in progress.	8.3
845	Attempted to reset integration even though integration was in progress or integration mode was not selected.	8.3
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”.	8.2
848	Attempted made to start integration in real time counting integration mode when the end time had already passed.	8.2
849	Attempted made to start storing in real time counting storing mode when the end time had already passed.	16.1

* Getting started guide, IM WT1801E-03EN

Appendix 1 Messages and Corrective Actions

Code	Message	Chapter or Section
850	Cannot be set or executed at current store state. To set or execute, reset store.	16.4
852	Stored file is illegal. Initialize memory before storing.	16.4
854	Waveform display data not found.	—
855	Data destination memory is full. Saving has been stopped.	—
856	An error has occured while storing. Storing has been stopped.	—
857	Cannot be set while Master/Slave Synchronized Measurement is set to Slave.	7.6
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.	16.3
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.	1.1
865	Cannot be set while integration is running. Stop or reset Integration.	8.3
866	Cannot be set or executed while Auto Print is operating. Turn off Auto Print from the [PRINT MENU] (SHIFT+PRINT) menu.	19.2
867	Auto Print is not in operation. Start Auto Print from the [PRINT MENU] (SHIFT+PRINT).	19.2
868	Print out destination must be set to Built-in Printer in order to start Auto Print. Set [Print to] to Built-in from the [PRINT MENU] (SHIFT+PRINT) menu.	19.2
869	Auto Print funciton is not supported in the current measurement mode or settings.	19.2
870	Auto Print [Interval] setting is invalid. Set [Interval] time to an appropriate amount from the [PRINT MENU](SHIFT+PRINT) ->[Auto Print Settings] menu.	19.2
871	Attempted made to start Auto Print when the end time had already passed. Set [End Time] to a future date & time from the [PRINT MENU](SHIFT+PRINT) ->[Auto Print Settings] menu.	19.2
872	Auto print's print-out has been canceled. The printer or file system is in action.	19.2
874	Sync source, PLL source or trigger source cannot be set to Ext Clk, while Master/Slave Synchronization Measurement is set to Slave.	7.6
875	Master/Slave Synchronization Measurement cannot be set to Slave, while sync source, PLL source or trigger source is set to Ext Clk.	7.6
876	Can not calculate from present point value.	3.1 or 4.1
877	Can not set 0 to count.	15.1 or 16.1
879	Can not set or execute while recording high speed data. Stop measurement and wait for file status "Ready".	15.4
880	Cannot be set or executed while initialization. Wait until status changes to "Ready".	15.4
881	Cannot be set or executed while measurement is in progress. To set or execute, "Stop" measurement.	15.4
882	Stopped measurement. Detection error of measuring interval signal. Check External Sync (MEAS START) input.	4.4*
883	Cannot be set or executed in High Speed Data Capturing Mode.	—
884	Can not set wiring to 1P3W/3P3W in High Speed Data Capturing Mode. Select a different wiring.	1.1
885	Cannot be set or executed in High Speed Data Capturing Mode. Set or execute in Normal Measurement Mode.	Appendix 10*
886	Cannot be set or executed to same current ranges, due to different types of elements are installed or external current sensor settings are not same.	1.3
887	Cannot start integration. Turn off Independent Element setting by the [WIRING] menu, or switch the measurement ranges to fixed ranges.	1.1
888	Cannot start the integration. Turn off Independent control by the [INTEG] menu or turn off Auto of the Data Update Inerval by the [UPDATE RATE] menu.	8.1 or 1.15
889	Setting and execution is not available when auto-ranging is set to ON.	1.2

* Getting started guide, IM WT1801E-03EN

Code	Message	Chapter or Section
890	Cannot start the store. Change store mode from synchronize with integration or set store interval to zero by the [STORE SET] menu. Otherwise, turn off Auto of the Data Update Interval by the [UPDATE RATE] menu.	16.1 or 1.15
891	Cannot start the auto print. Change print mode from sychronize with integration by the [STORE SET] menu. Otherwise, turn off Auto of the Data Update Interval by the [UPDATE RATE] menu.	19.2 or 1.15
892	Cannot start the integration. Set S and Q Formula to another expecting for Type 3 by the [MEASURE] menu, or fix measurement ranges.	7.3, 1.2, or 1.3

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.	—
905	System failure. Install the input modules and the options correctly.	—
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.	—
910	This operation is prohibited for EEPROM protection.	—
915	EEPROM SUM error. EEPROM may be damaged. Maintenance service is required.	—
919	Module installation condition and setup parameters do not match. The system has been initialized. Maintenance service is required.	—
920	SUM error of NULL value. The Null value is reset to 0.	—
921	System Failed to Draw Display. Maintenance service is required.	—
922	Failed in communication with devices. Maintenance service is required.	—
923	Transmit data abnormality from devices. Maintenance service is required.	—
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.	—

Index

Symbols

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V

W

Z

Page