
**User's
Manual**

**DM7560
Digital Multimeter**

Thank you for purchasing the DM7560 Digital Multimeter.

This user's manual explains the features and operating procedures of the DM7650. To ensure correct use, please read this manual thoroughly before operation. Keep this manual in a safe place for quick reference in the event that a question arises.

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 improvements to the product's performance and functionality. Refer to our website to view our latest manuals.
- 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.
- Copying or reproducing all or any part of the contents of this manual without the permission of YOKOGAWA is strictly prohibited.

Trademarks

- Microsoft, Windows, Windows 10, and Windows 11 are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- Adobe and Acrobat are either registered trademarks or trademarks of Adobe Inc.
- Other company and product names are registered trademarks or trademarks of their respective holders.
- In this manual, the ® and TM symbols do not accompany their respective registered trademark or trademark names.

Revisions

- September 2016 1st Edition
- October 2017 2nd Edition
- December 2023 3rd Edition
- December 2025 4th Edition

Manuals

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

Manuals Included with the Product

Manual Title	Manual No.	Description
DM7560 Digital Multimeter Getting Started Guide	IM DM7560-02EN	The guide explains the handling precautions, basic operations, and specifications of the instrument.
DM7560 Digital Multimeter Request to Download Manuals	IM DM7560-73Z2	The document describes the manuals provided on the website.
Safety Instruction Manual	IM 00C01C01-01Z1	Safety manual (European languages)

Manuals Provided on the Website

Download the following manuals from the YOKOGAWA website.

Manual Title	Manual No.	Description
DM7560 Digital Multimeter User's Manual	IM DM7560-01EN	This manual. The manual explains all the instrument's features and instructions on how to use them, except for the communication features.
DM7560 Digital Multimeter Communication Interface User's Manual	IM DM7560-17EN	The manual explains the instrument's communication interface features and instructions on how to use them.

For details on downloading manuals, see Request to Download Manuals (IM DM7560-73Z2). To view the PDF data, you need Adobe Acrobat Reader or a software application that can open PDF data.

The "EN", "Z1", and "Z2" in the manual numbers are the language codes.

Symbols and Notation Used in This Manual

Unit

k: Denotes 1000.

Example: 100 kS/s (sample rate)

K: Denotes 1024.

Example: 720 KB (file size)

Displayed Characters

Bold characters in procedural explanations are used to indicate panel keys and soft keys that are used in the procedure and menu items that appear on the screen.

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

French

AVERTISSEMENT

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

ATTENTION

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

Note

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

Notations Used in This Manual

- The operation keys in procedures and the like in each section are shown in the following manner.

Example: The [DCV] key is shown as .

- The shifted function of each operation key on the front panel is indicated with blue characters (except LOCAL).

The shifted function is explained in the following manner. This shows that you need to press the SHIFT key first and then the relevant key next.

Example:  →  is [SHIFT] → [DCV(TEMP)] key

In the above example, the function is shifted to temperature measurement.

- In the sections explaining measurement functions, explanation is normally provided in the following order: function (purpose and characteristics), connection procedure, operating procedure, CAUTION statements, and memo statements.
- For convenience, the menu keys under the LCD are given the following names: M1 to M6. These names are used to explain operating procedures and the like in this manual.



M1



M2



M3



M4



M5



M6

Contents

Manuals	ii
Symbols and Notation Used in This Manual	iii
Chapter 1 Overview	
1.1 Applications	1-1
1.2 Features	1-2
1.2.1 Easy to view and understand	1-2
1.2.2 Easy to use	1-2
1.2.3 High speed and high resolution	1-3
1.2.4 Abundant convenient functions	1-3
Chapter 2 Name and Function of Each Part	
2.1 Name and Outline of Front Panel Parts	2-1
2.1.1 Display area	2-2
2.1.2 Input terminal area	2-3
2.1.3 FUNCTION area	2-4
2.1.4 TRIG & UTILITY setting area	2-5
2.1.5 Rotary knob & RANGE switching area	2-7
2.2 Name and Function of Rear Panel Parts	2-9
2.3 Screen Display	2-11
2.3.1 Screen configuration	2-11
2.3.2 Annunciator	2-14
2.3.3 Primary display	2-16
2.3.4 Secondary display	2-23
2.3.5 Message display	2-25
Chapter 3 Basic Operation	
3.1 Settings That You Should Know	3-1
3.1.1 Screen settings	3-1
3.1.2 Settings at power-on	3-3
3.1.3 System settings	3-4
3.1.4 Saving and recalling of setting conditions	3-5
3.2 Basic Operation Using the Menus, Keys, and Rotary Knob	3-6
3.2.1 Basic operation of menus	3-6
3.2.2 Operation using keys and rotary knob (switch)	3-15

Chapter 4 Measurement and Function Setting

4.1	Important Notices Before Measurement.....	4-1
⚠ 4.1.1	Cautions when connecting test leads	4-1
4.1.2	About input signals.....	4-2
4.2	Before Starting Measurement	4-3
4.3	Measurement Function.....	4-5
4.3.1	DC voltage measurement (DCV)	4-5
4.3.2	AC voltage measurement (ACV).....	4-9
4.3.3	DC current measurement (DCI)	4-12
4.3.4	AC current measurement (ACI)	4-14
4.3.5	2-terminal resistance measurement (2WΩ)	4-18
4.3.6	4-terminal resistance measurement (4WΩ)	4-21
4.3.7	Continuity test (CONT ■).....	4-24
4.3.8	Diode measurement (▶▶)	4-26
4.3.9	Temperature measurement (TEMP)	4-27
4.3.10	Frequency measurement (FREQ).....	4-31
4.4	Trigger Setting (TRIG).....	4-34
4.4.1	Trigger mode (AUTO/SINGLE)	4-34
4.4.2	TRIG menu setting.....	4-35
4.5	System Settings (SYSTEM)	4-37
4.5.1	Setting the SYSTEM/REMOTE menu.....	4-39
4.5.2	Setting the SYSTEM/SETUP menu	4-42
4.5.3	Setting the SYSTEM/COPY menu.....	4-43
4.5.4	Setting the SYSTEM/TOOLS menu	4-50
4.6	Calculation Function (NULL/MATH)	4-54
4.6.1	Smoothing (Moving average).....	4-55
4.6.2	NULL calculation	4-56
4.6.3	CALCULATE (Scaling/dB) calculation	4-57
4.6.4	LIMIT calculation	4-63
4.6.5	STATISTIC calculation	4-65
4.7	Saving and Recalling Setting Conditions (SETUP SAVE/RECALL).....	4-66
4.7.1	Setting the SAVE menu	4-69
4.7.2	Setting the RECALL menu	4-71
4.7.3	External control function of SETUP RECALL.....	4-74
4.8	Display Settings (DISP).....	4-79
4.8.1	Setting the NUMERIC SETUP menu (Primary display)	4-82
4.8.2	Setting the ARC SCALE METER SETUP menu (Primary display).....	4-83
4.8.3	Setting the ANALOG METER SETUP menu (Secondary display).....	4-87
4.8.4	Setting the STATISTIC SETUP menu (Secondary display)	4-90
4.9	Trend Chart Display Function	4-91
4.9.1	Online trend chart display	4-92
4.9.2	Offline trend chart display	4-97
4.10	Histogram Chart Display Function.....	4-107
4.10.1	Common functions of online and offline histogram chart displays.....	4-108
4.10.2	Offline histogram chart display	4-115
4.11	Log Function (LOG).....	4-118
4.11.1	Log measurement in NORMAL mode	4-120
4.11.2	Log measurement in BULK mode	4-123
4.11.3	Log data (CSV format)	4-127
4.12	Default Settings of Functions and Features	4-130

Chapter 5 Daily Inspection and Calibration

5.1	Daily Cleaning	5-1
5.2	Calibration	5-2
5.3	Calibration (Adjustment) Using the CALIBRATION Menu	5-3
5.3.1	Outline	5-3
5.3.2	Cautions before execution	5-3
5.3.3	Equipment used for calibration (adjustment)	5-4
5.3.4	Preparation before calibration (adjustment)	5-5
5.3.5	Execution of calibration (adjustment)	5-8
 5.4	Fuse Replacement	5-21

Chapter 6 Measurement Guide

6.1	Common Items of Functions	6-1
6.2	Function-Specific Items	6-2
6.2.1	Voltage measurement (DCV, ACV)	6-2
6.2.2	Alternating current voltage measurement (ACV) and alternating current measurement (ACI)	6-3
6.2.3	2 terminal resistance measurement (2MΩ) and 4 terminal resistance measurement (4WΩ)	6-3
6.2.4	Temperature measurement (TEMP)	6-3
6.3	AUTO ZERO Function	6-4
6.4	Table of Conditions for Clearing Data	6-5

1.1 Applications

The DM7560 digital multimeter (hereinafter called “this instrument”) is mainly used for:

- Design and evaluation of analog circuits and digital circuits for a wide range of technicians and students (research and development);
- General-purpose instrument for production lines, inspection departments, and service-related departments in manufacturing floors;
- Design and evaluation of power electronics devices for a portion of the inverter market

1.2 Features

1.2.1 Easy to view and understand

This instrument is compact yet has a relatively large screen that allows clear color display.

In particular, it can display multilateral measurement results in real time on the LCD using abundant functions, as described below.

1 Color LCD

This instrument has a 4.3-inch color LCD screen (with LED backlight) with a resolution of 480 dots by 272 dots and rich colors that make it easy to view.

2 Menu display in the LCD screen

The lower part of the LCD screen displays a menu corresponding to each function (when a key on the front panel is pressed). Items in the menu can be selected by pressing the menu key on the lower part of the LCD screen, and submenus on the lower layer are displayed together. (You can press the [CLOSE] key or the rotary knob to return to the previous screen.)

3 Display of measurement results

Measurement results are displayed in different formats in two display areas: primary display and secondary display.

4 Trend chart display and histogram chart display

The relatively large LCD allows measurement results to be displayed intuitively in real time on graphs, such as trend charts and histogram charts. (Refer to sections 4.9 and 4.10.)

5 Dual display (simultaneous display of two measurement functions)

This instrument normally displays the result of one measurement function, but it is also possible to display two measurement results simultaneously (e.g. alternating current voltage measurement (ACV : section 4.3.2) and frequency measurement (FREQ : section 4.3.10).

6 Analog display

The following functions are available so that you can get a sense of the measurement results in a visual manner.

- 1 ANALOG METER: A marker (▲) is used to indicate the measured value on the bar scale in the display area on the secondary display. (Refer to section 4.8.3.)
- 2 ARC SCALE METER : A needle is used to indicate the measured value on a circular arc scale in the display area on the primary display. (Refer to section 4.8.2.)

7 NUMERIC display (numeric display of measurement results)

You can select the font size (NORMAL and LARGE) and font (7SEG and NORMAL) used on the NUMERIC display of the primary display. (Refer to sections 2.3.3.1 and 4.8.)

8 LIMIT display (judgment results of LIMIT calculation)

Judgment results (GO/HIGH /LOW) of the LIMIT calculation can be shown in the display area on the primary display and secondary display. The primary display, in particular, uses large characters to improve the visibility. (Refer to sections 2.3.3.4 and 4.6.4.)

1.2.2 Easy to use

This instrument has the following easy-to-use features.

1 Menu to allow configuration during measurement

Using the menus and submenus displayed on the LCD, you can check the settings, select the settings, and set values while making measurements.

2 Configuration using the rotary switch

To select items and set values in the submenu, you can use the rotary switch and arrow keys in the upper right of the front panel. (Refer to section 3.2.)

1.2.3 High speed and high resolution

This instrument uses an ADC based on the $\Delta\Sigma$ method and features high performance as described below:

1 High sampling rate

Direct current measurement (DCV and DCI) and resistance measurement (2W Ω and 4W Ω) functions feature a high sampling rate of 30 kS/s maximum. (Refer to section 4.3.)

2 High resolution

The DM7560 features 6-1/2 digit resolution and full-scale (FS) of 1199999 counts.

1.2.4 Abundant convenient functions

The following convenient functions are available.

1 Trend chart/histogram function

This instrument can process and analyze acquired and stored measurement data and show the results in intuitive trend charts and histogram charts.

When combined with the limit judgment function, you can visually see the results of GO/NOGO judgments.

2 Logging function

The logging memory allows long-term interval measurement results to be stored as data.

Measurement data can be saved in a USB memory device or read from a connected PC. (Refer to section 4.11.)

When the logging function is switched to bulk (BULK) mode, this instrument concentrates on data acquisition and does not perform any other functions. This makes it possible to measure with a guaranteed sampling rate. (Refer to section 4.11.2.)

3 Off-line browse function

An off-line browse function is available to display the content of the LOG memory. When switched to off-line browsing, the measurement operation stops, and the content of the current LOG memory is displayed.

- In the trend chart display, data can be observed in detail by expanding the acquired data through the adjustment of the horizontal axis. (Refer to section 4.9.2.)
- In the histogram chart display, the number of bins and central value can be adjusted. (Refer to section 4.10.1 and 4.10.2.)

2.1 Name and Outline of Front Panel Parts

Figure 2.1 shows the front panel. Table 2.1 on the next page lists the names of the items numbered **1** to **5**, and describes the screens, keys, input terminals, and switches.

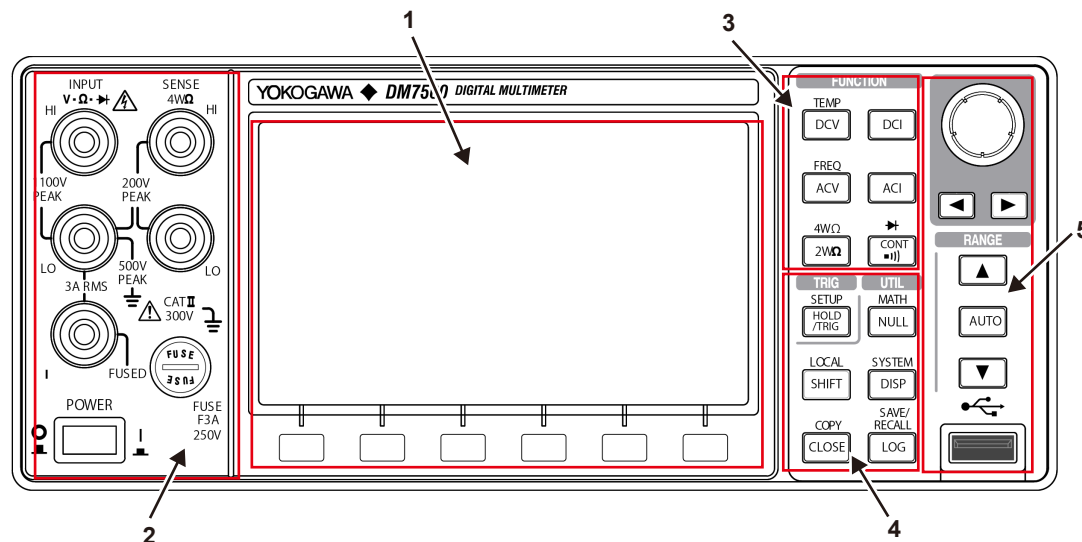


Figure 2.1 Front panel

Table 2.1 Name and arrangement of front panel parts

No	Name	Arrangement	Refer to
1	Display area	This area consists of the LCD screen and menu keys below it.	Section 2.1.1
2	Input terminal area	This area contains input terminals used to measure voltage, current, resistance, and the like. A fuse holder and POWER switch are located in the lower area.	Section 2.1.2
3	FUNCTION are	This area contains the function keys used to set various measurement functions such as voltage, current, resistance, continuity test, and diode and to execute measurements.	Section 2.1.3
4	TRIG & UTILITY setting area	This area contains various setting keys such as the trigger, display, calculation, log, and system keys. It also contains execution keys such as [SHIFT] and [COPY].	Section 2.1.4
5	Rotary knob & RANGE switching area	The Rotary knob (switch) and arrow keys are located in the upper area, the [AUTO] key (AUTO RANGE switching) in the center, and a USB port in the lower area.	Section 2.1.5

2.1 Name and Outline of Front Panel Parts

2.1.1 Display area

Figure 2.2 shows the display area of the front panel. Table 2.2 describes the name and function of each part.

* Figure 2.2 also shows the exploded view of the area marked in blue.

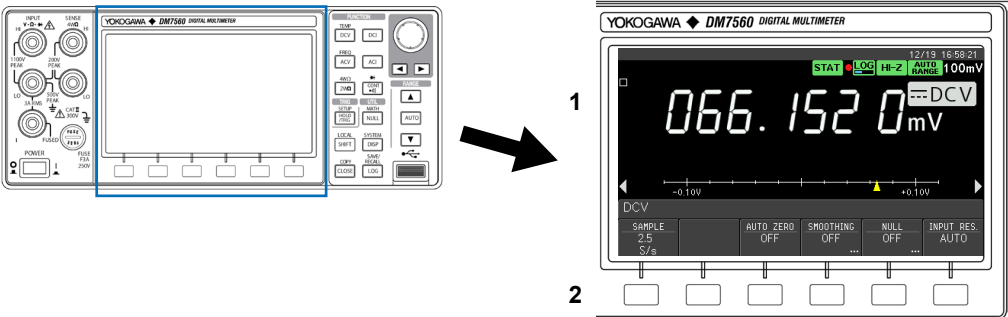


Figure 2.2 Display area

Table 2.2 Contents of the display area

No	Name	Contents and functions (outline)	Refer to
1	LCD screen	The screen is a 4.3-inch color LCD (LED backlight). The screen displays the following items in order from the top. • Message and header information • Annunciator (multiple indicators) and range • Primary display : Measurement result of each main function Sampling indicator • Secondary display : Measurement result of each sub function, various calculation results, histogram information, cursor measurement results • Menu : Used to set each function and the functions of the TRIG & UTILITY area.	Section 2.3
2	Menu keys	Menu keys (for convenience, this document uses M1 to M6 keys) corresponding to the horizontal sections of the setting menu are arranged below the LCD screen. You can press the keys to select or execute menu items or to open sub menus at the lower layer.	—

2.1.2 Input terminal area

Figure 2.3 shows the input terminal area of the front panel. Table 2.3 describes the name and function of each part.

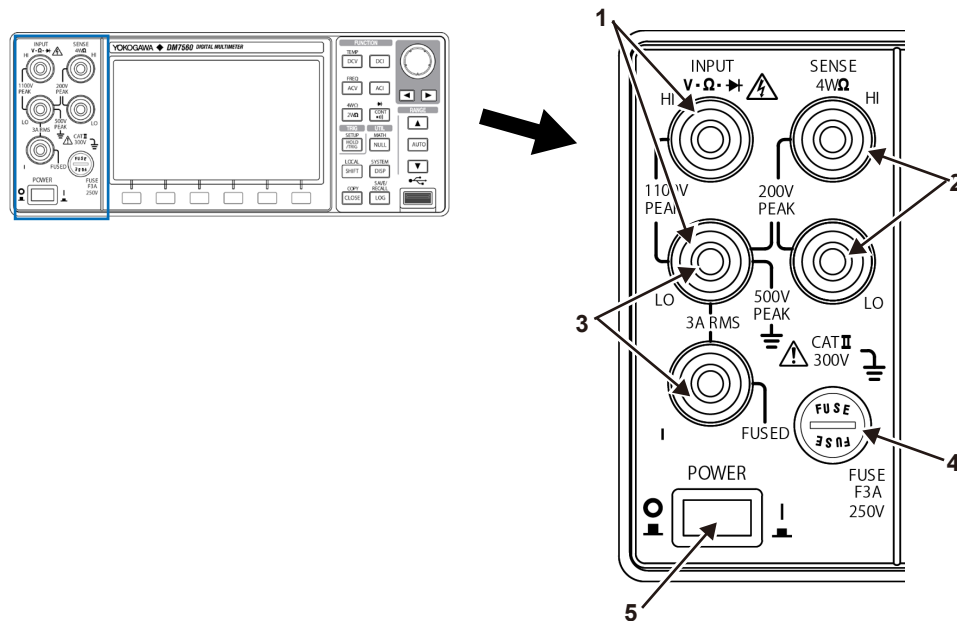


Figure 2.3 Input terminal area

Table 2.3 Input terminal area

Nº	Name	Contents and functions (outline)	Refer to
1	INPUT V · Ω · $\rightarrow$ HI-LO input terminal	Input terminal for measuring voltage (DCV, ACV), resistance (2WΩ), temperature (TEMP), and diode ($\rightarrow$) and performing continuity tests (CONT). Connect the included test lead (pair of red and black leads) or banana terminal to this terminal. Be careful of the range and maximum permissible input.	Sections 4.1 & 4.3 Cautions (page V)
2	SENSE 4WΩ HI-LO input terminal	Input terminal for resistance measurement (4WΩ) and temperature measurement (TEMP, RTD-4Wire). • Max. permissible input: 200 Vpeak for all ranges	Sections 4.1, 4.3.6, 4.3.9 Cautions (page V)
3	I-LO input terminal	Input terminal for current measurement (DCI, ACI). • Max. permissible input : 3 A DC or rms (continuous) / 250 V (Open circuit voltage)	Sections 4.1, 4.3.3, 4.3.4 Cautions (page V)
4	FUSE	The fuse is installed for overcurrent protection when measuring current (DCI, ACI). • Fuse specification: F3A, 250 V In addition to the fuse installed in this instrument, two fuses are included.	Section 5.4
5	POWER switch	Power switch of this instrument. • ON: I (switch is pressed) • OFF: O (switch is not pressed)	

2.1 Name and Outline of Front Panel Parts

2.1.3 FUNCTION area

Figure 2.4 shows the FUNCTION area of the front panel. Table 2.4 describes the name and function of each part.

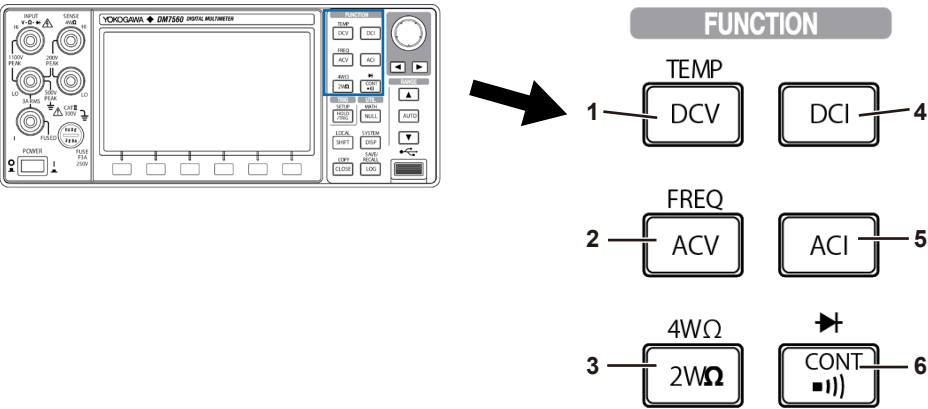


Figure 2.4 FUNCTION area

Table 2.4 Name and function of each part in the FUNCTION area

Nº	Name	Contents and functions (outline)	Refer to
1	DCV (TEMP) key TEMP	- This key selects DC voltage measurement (DCV). If pressed, the DCV menu opens in the lower area of the screen. - This key also selects temperature measurement (TEMP). To do so, press the [SHIFT] key and then this key. If pressed, the TEMP menu opens in the lower area of the screen.	Section 4.3.1 Section 4.3.9
2	ACV(FREQ) key FREQ	- This key selects AC voltage measurement. If pressed, the ACV menu opens in the lower area of the screen. - This key also selects frequency measurement. To do so, press the [SHIFT] key and then this key. If pressed, the FREQ menu opens in the lower area of the screen.	Section 4.3.2 Section 4.3.10
3	2WΩ (4WΩ) key 4WΩ	- This key selects 2-terminal resistance measurement. If pressed, the 2WΩ menu opens in the lower area of the screen. - This key also selects 4-terminal resistance measurement. To do so, press the [SHIFT] key and then this key. If pressed, the 4WΩ menu opens in the lower area of the screen.	Section 4.3.5 Section 4.3.6
4	DCI key	This key selects DC current measurement. If pressed, the DCI menu opens in the lower area of the screen.	Section 4.3.3
5	ACI key	This key selects AC current measurement. If pressed, the ACI menu opens in the lower area of the screen.	Section 4.3.4
6	CONT(▶) key ▶	- This key selects Continuity test. If pressed, the CONT menu opens in the lower area of the screen. - This key also selects diode measurement. To do so, press the [SHIFT] key and then this key. If pressed, the DIOD menu opens in the lower area of the screen.	Section 4.3.7 Section 4.3.8

2.1.4 TRIG & UTILITY setting area

Figure 2.5 shows the TRIG & UTILITY area of the front panel. Table 2.5 describes the name and function of each part.

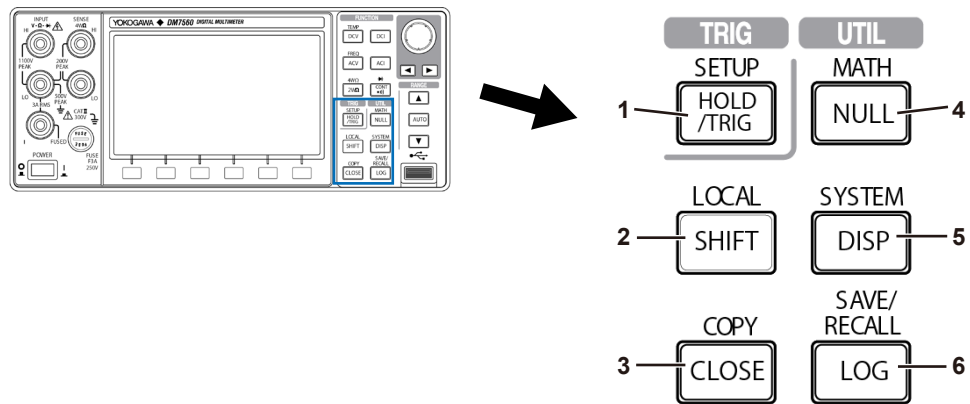


Figure 2.5 TRIG & UTILITY setting area

2.1 Name and Outline of Front Panel Parts

Table 2.5 Name and function of each part of TRIG & UTILITY setting part

No	Name	Contents and functions (outline)	Refer to
1	HOLD/TRIG (SETUP) key SETUP	- This key selects start/stop of measurement when the trigger mode is set to AUTO and is the key for manual trigger when set to SINGLE. When the □ mark flashes to indicate the trigger action state on the upper left of the screen when the key is pressed, the state is TRIG action state. On the other hand, when the mark on the left of the screen becomes II when pressed, the state is HOLD. - This key also displays the trigger setting (SETUP) menu. To do so, press the [SHIFT] key and then this key. If pressed, the TRIG menu opens in the lower area of the screen.	Section 4.4
2	SHIFT (LOCAL) key LOCAL	- If pressed once, the mark indicating the shift state is displayed. If pressed again, the shift state is released. - If [SHIFT] key is pressed and the corresponding key is pressed, the measurement function or setting (blue characters) above the key in the FUNCTION part and TRIG & UTILITY setting area of the front panel is activated. - This key is also used to select either the primary display or secondary display in order to switch the measurement screen. - If this instrument is remotely controlled, this key operates as a [LOCAL] key. The instrument changes from the remote state to the local state, and the keys on the front panel become available.	Section 3.2
3	CLOSE (COPY) key COPY	- This key is normally used to close the menu. Every time it is pressed after moving to a lower layer (i.e. menu to submenu), the menu returns by one layer. - If the setting menu of TRIG & UTILITY setting area is open, the setting menu of TRIG & UTILITY setting area closes when the menu returns to the highest layer, and the screen returns to the FUNCTION menu currently set. - If the [SHIFT] key is pressed and then the [CLOSE(COPY)] key is pressed, the screenshot (HARD COPY) or the latest measurement result in text format can be output to the USB memory.	Section 3.2 Section 4.5
4	NULL (MATH) key MATH	- This key switches the NULL function (difference calculation function) ON/OFF in each measurement function of the FUNCTION area. This applies only to the function currently opened. - This key is also used to select the MATH calculation menu. If the [SHIFT] key is pressed and then the [NULL(MATH)] key is pressed, the MATH menu opens in the lower part of the screen, and settings can be changed.	Sections 4.3.1 to 4.3.6 Section 4.6
5	DISP (SYSTEM) key SYSTEM	- This key selects the DISP setting menu. If pressed, the DISPLAY menu opens in the lower part of the screen, and settings can be changed. - This key is also used to select the SYSTEM setting menu. If the [SHIFT] key is pressed and then the [DISP(SYSTEM)] key is pressed, the SYSTEM menu opens in the lower part of the screen, and settings can be changed.	Section 4.8 Section 4.5
6	LOG (SAVE/RECALL) key SAVE/RECALL	- This key sets the log function menu. If pressed, the LOG menu opens in the lower part of the screen, and settings can be changed. - This key is also used to display the menu for saving and recalling settings. Press the [SHIFT] key and then press the [LOG(SAVE/RECALL)] key to select. If the key is pressed, the SETUP SAVE/RECALL menu opens in the lower part of the screen, and settings can be changed or settings can be saved or recalled.	Section 4.11 Section 4.7

2.1.5 Rotary knob & RANGE switching area

Figure 2.6 shows the Rotary knob & RANGE switching area of the front panel. Table 2.6 on next page describes the name and function of each part.

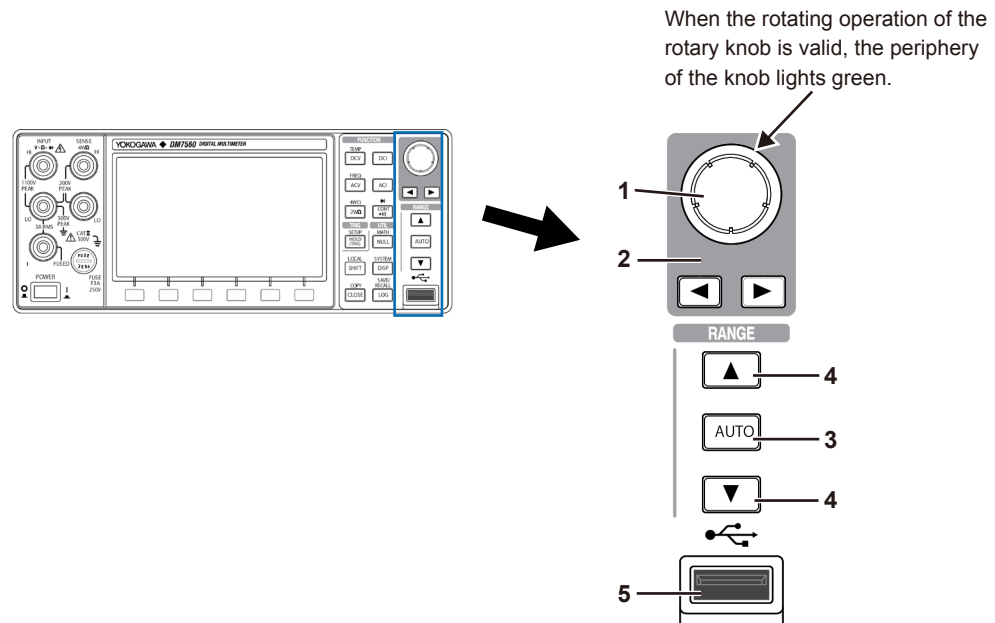


Figure 2.6 Rotary knob & RANGE switching part

2.1 Name and Outline of Front Panel Parts

Table 2.6 Name and function of each part of Rotary knob & RANGE switching area

No	Name	Contents and functions (outline)	Refer to
1	Rotary knob (switch)	<When the periphery of the rotary knob is lit > - This is used to select one of the multiple setting items in the screen menu. When the periphery of the knob lights up, the function is available. Turn the knob clockwise or counterclockwise to select. Ex. Selecting the SAMPLE (sampling rate) function - Rotate the knob to input characters, numeric values, or symbols, and select lists, cursor movement. Ex. SETUP NAME is set in SETUP SAVE/RECALL menu. <When the periphery of the rotary knob is not lit > - Pressing the knob at the highest layer of the menu clears the trend chart, histogram chart, and statistic data. <Regardless of whether the periphery of the rotary knob is lit > - This also returns the screen menu to the next higher layer. (The equivalent function to CLOSE key in Section 2.1.4) Every time this is pressed, the screen menu returns to the next higher layer.	Section 3.2.2
2	Arrow key	<When the periphery of the rotary knob is lit > - This key is used to move the cursor position when selecting a character, numeric value, or symbol. <When the periphery of the rotary knob is not lit > - Usually, the DISPLAY key is pressed to switch the content of the primary or secondary display in the DISPLAY menu. The same action can be carried out by using the arrow keys and SHIFT key together.	Section 3.2
3	AUTO key	- This key switches the voltage or current range between AUTO and MANUAL in each function. Each time the key is pushed, the state of AUTO RANGE/MANUAL RANGE is displayed on the annunciator of the screen. - When the off-line trend chart is displayed, T cursors are displayed, a statistic calculation between T1 cursor and T2 cursor are executed, and the results are displayed. Use this key to calculate and display again after the T cursor is moved.	— Section 4.3
4	Range switching key (up arrow/down arrow)	This key manually switches the range of the voltage and current in each function. The up arrow key is used to switch to the next larger range and the down arrow key to the next lower range. If this key is pressed in AUTO RANGE state, the state is changed to MANUAL RANGE, allowing you to change the range.	—
5	USB port	This is for connecting a USB memory device. It can be used to output screen hard copies, save and recall setting conditions, export log data, and so on.	Section 4.7 Section 4.11

2.2 Name and Function of Rear Panel Parts

Figure 2.7 (a) shows the rear panel of the DM7560 (/C2). Figure 2.7 (b) shows that of the DM7560 (/C1). Table 2.7 describes the names and functions of items numbered from 1 to 5.

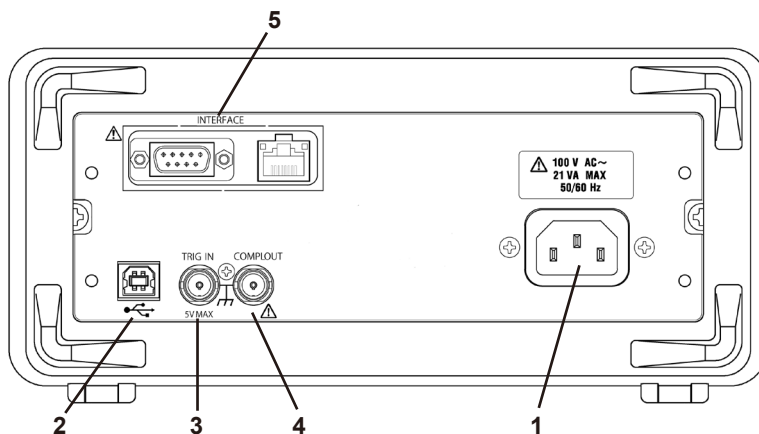


Figure 2.7(a) Rear panel of the DM7560 (main unit+/C2)

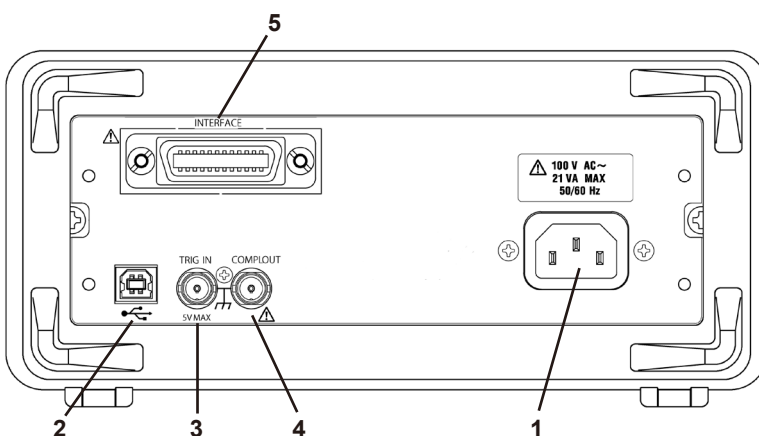


Figure 2.7(b) Rear panel of the DM7560 (main unit+/C1)

2.2 Name and Function of Rear Panel Parts

Table 2.7 Name and function of rear panel parts

No	Name	Contents and functions (outline)	Refer to
1	AC LINE INPUT	- This is the inlet for the power cord connection. Use the attached power cord. - The power supply specification is as follows and is indicated above the inlet. AC 100 V/115 V/220 V/240 V $\pm 10\%$, 50 Hz/60 Hz Power consumption (POWER) is 21 VA MAX.	-
2	USB (device) terminal	- This is a USB interface (Type B) terminal. A PC or the like can be connected in order to control this instrument externally. For the rules, commands, and usage, see the Communication Interface User's Manual. - This terminal becomes available when USB is selected in the SYSTEM/REMOTE/INTERFACE menu. For the specifications, see Chapter 4 Specifications in the Getting Started Guide.	IM DM7560-17EN Section 1.3 IM DM7560-02EN Chapter 4
3	TRIG IN terminal (BNC)	This is an external trigger input terminal. Use the TRIG/EXT TRIG menu to enable or disable the terminal and select the slope polarity. Maximum permissible input: 5 V MAX (H:2.4 Vmin, L:0.9 Vmax) Input impedance: about 10 kΩ	Section 4.4
4	COMPL OUT terminal (complete output terminal, BNC)	This is the pulse output terminal that shows measurement completion. It can be used to synchronize this instrument with other equipment. a) TTL level output (H:2.4 Vmin, L:0.4 Vmax) b) Polarity: positive logic	-
5	INTERFACE installation unit (/C2 or /C1)	Either of the following two interfaces is installed, and the corresponding connector can be seen. For details, see the Communication Interface User's Manual. a) LAN&RS-232 interface /C2 (See Figure 2.7(a).) b) GP-IB interface /C1 (See Figure 2.7(b).)	IM DM7650-17EN

2.3 Screen Display

Setting menus are displayed in the lower part of the screen, and the menu keys are displayed below the LCD screen.

2.3.1 Screen configuration

Figure 2.8 (a) and Figure 2.8 (b) show typical examples of the screen configuration of this instrument. Table 2.8 shows the names and display contents.

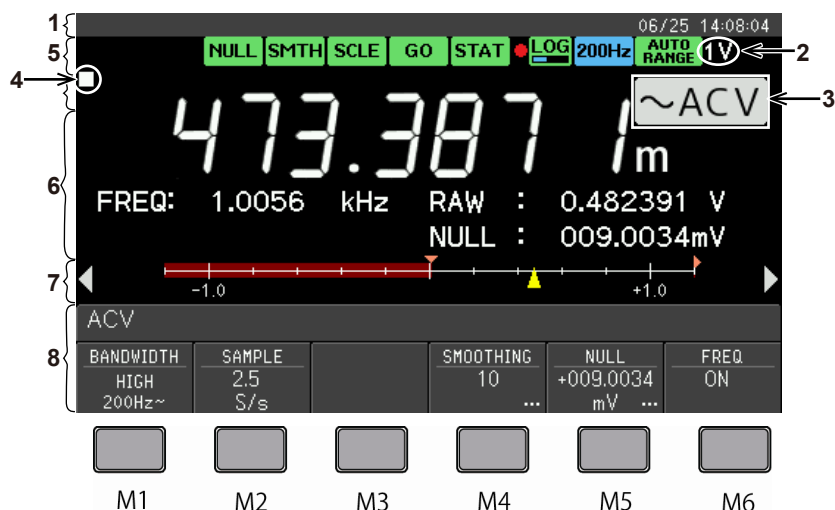


Figure 2.8(a) Example1 (PRIMARY: NUMERIC, SECONDARY: ANALOG METER)

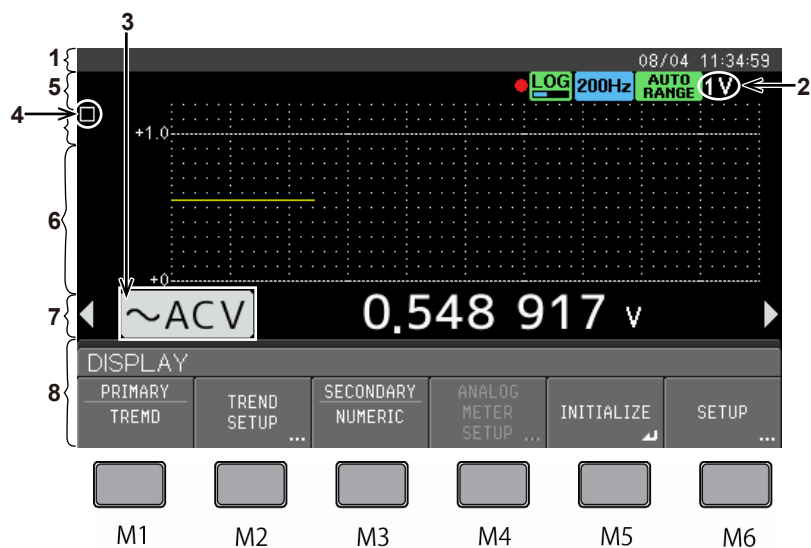


Figure 2.8(b) Example2 (PRIMARY: TREND, SECONDARY: NUMERIC)

2.3 Screen Display

Table 2.8(a) Names and display contents in each part of screen

No	Name	Display contents	Refer to
1	Message display area	- The upper left part of the screen shows messages that notifies the user of event occurrences. Messages displayed here are automatically cleared when a specified time (about 4 seconds) elapses. Ex. USB memory device insertion/removal detection message "USB memory is connected." "USB memory is disconnected." - The contents displayed in the upper right part of the screen can be set to one of the three types below. It is set in the SYSTEM/SETUP/HEADER menu. - OFF : No display - DATETIME: Month, day, and time - SETUPNAME: Setting condition name The preset name is displayed in the SETUP SAVE/RECALL/SETUP NAME menu.	Section 2.3.5 Section 4.5.2 Section 4.7
2	Range display (RANGE, in white oval)	This displays the range used in the measurement of each function. The range is set using AUTO RANGE and MANUAL RANGE (up/down arrow keys).	Section 2.1.5
3	Function display (in white rectangle)	- This displays the function name selected by the function key in the FUNCTION area. - DCV: DC voltage measurement - DCI: DC current measurement - ACV: AC voltage measurement - ACI: AC current measurement 2WΩ: 2-terminal resistance measurement 4WΩ: 4-terminal resistance measurement - TEMP: Temperature measurement Note - FREQ: Frequency measurement - CONT: Continuity test ➡ DIOD: Diode measurement	Section 4.3
4	Sampling indicator display (in white circle)	- If TRIG is set to AUTO This flashes in an alternating pattern (□ ↔ ■) depending on the SAMPLE (sampling rate) setting of each function. If the [HOLD] key is pressed, the indicator changes to II, and the state changes to the HOLD state (II: sampling stop). - If TRIG is set to SINGLE This flashes, and afterwards, enters the HOLD state while data is acquired the number of times specified by the sample count after a trigger is activated.	Section 4.4
5	Annunciator (multiple indicators display area)	- This area consists of multiple indicators indicating the operating status of the instrument. The maximum number of indicators simultaneously displayed is 10. - The displayed indicators vary depending on the function. Ex. If ON is set in the MATH/STATISTIC menu, the STAT indicator is displayed.	Section 2.3.2
6	Primary display	- This is the area that displays the measurement results selected by the function. You can select from the following five types in the DISPLAY/SECONDARY menu. - NUMERIC : Measurement value, suffix, and unit - TREND : Trend chart indicating the time-changing measurement value - HISTOGRAM : Histogram chart indicating the frequency distribution of measurement values. - LIMIT : Judgment result of the LIMIT calculation using large characters and color. - ARC SCALE METER : Measurement displayed using a needle on a circular arc scale (like an analog display) * Usually, the display is selected using the method above, but you can also select the display by using the SHIFT and arrow keys together.	Section 2.3.3 Section 4.8

Table 2.8(b) Names and display contents in each part of screen

No	Name	Display contents	Refer to
7	Secondary display	- This is a supplement area that displays the measurement result selected by the function. You can select from the following seven types in the DISPLAY/SECONDARY menu. However, the display type on the secondary display is limited by the type displayed on the primary display. (The type not selected in the menu is displayed in gray.) • NUMERIC : This displays the function, measurement value, suffix, and unit. This is selectable when the primary display in 6 is set to TREND or HISTOGRAM. • ANALOG METER : This displays the position of the measurement value with a Δ mark. The range is shown on the horizontal axis. • LIMIT : This displays the HIGH, GO, or LOW result of the LIMIT calculation. This is selectable only when LIMIT judgment is set ON. • STATISTIC : This displays the statistics information. This is selectable only when STATISTIC is set ON. • HISTOGRAM : If the primary display in 6 is set to HISTOGRAM, numeric values of 6 items related to BIN are displayed. • CURSOR : If the primary display in 6 is set to HISTOGRAM, numeric values of 4 items related to the cursor are displayed. • TREND : If the primary display in 6 is set to TREND, 3 items related to the time are displayed. * Usually, the display is selected using the method above, but you can also select the display by using the SHIFT and arrow keys together.	Section 2.3.4 Section 4.8 Section 4.6.4
8	Menu display area	- This displays the menu of each function and TRIG&UTILITY setting menu. Pressing the menu key or [CLOSE] key below the screen or pressing the rotary switch moves the menu to the upper or lower layer. • TRIG&UTILITY setting menu is a light gray menu that is overlaid on the menu of each function. In the example of Figure 2.8(b), the DISPLAY menu is overlaid on the ACV menu.	Section 2.1.4

2.3.2 Annunciator

The annunciator consists of multiple indicators that show the operation status of the instrument. The maximum number of indicators that may be displayed simultaneously is 10. Figure 2.9 shows a display example.



Figure 2.9 Example of annunciator and indicators

Indicators that are displayed vary depending on the function. Table 2.9 on the next page shows the indicator types, display contents, and conditions.

Table 2.9 Indicators and display contents

Type	Action and display	Indicator display and condition
AUTO RANGE	This indicates whether the measurement range is set to auto or manual.	 : Auto range  : Manual range
IMPEDANCE (DCV) BANDWIDTH (ACV, ACI, FREQ)	This indicates the input impedance state of DCV. It displays the BANDWIDTH (AC filter) setting state of ACV and ACI. The display is fixed to 20 Hz for FREQ.	 : High impedance  : 10MΩ  : BANDWIDTH is set to MID.  : BANDWIDTH is set to HIGH.
STATISTIC	This displays the ON/OFF state of statistics calculation.	 : Statistics calculation ON - Not displayed: Statistics calculation OFF
AUTO ZERO	This displays the ON/OFF state of Auto Zero.	 : Auto Zero ON - Not displayed: Auto Zero OFF
NULL	This displays the ON/OFF state of Null calculation.	 : Null calculation ON - Not displayed: Null calculation OFF
SMOOTHING	This displays the ON/OFF state of SMOOTHING calculation.	 : SMOOTHING calculation ON - Not displayed: SMOOTHING calculation OFF
MATH	This indicates the MATH calculation type.	 : dBm/dBV calculation ON  : Scaling calculation ON - Not displayed: Math calculation OFF
LIMIT	This indicates the LIMIT calculation result.	 : LOW ≤ measurement result ≤ HIGH  : HIGH < measurement result  : Measurement result < LOW  : There is no acquisition data. - Not displayed: LIMIT calculation OFF
LOG	This indicates the log function state.	< At NORMAL mode > (The log function is always running.)  : No data in the LOG memory  : Some free space in the LOG memory  : No free space in the LOG memory < At BULK mode > - Non-display: Log stop state and no data in the LOG memory  : Log stop state and some free space in the LOG memory  : Log stop state and no free space in the LOG memory  : Log running state and some free space in the LOG memory  : Log running state and no free space in the LOG memory
REMOTE Continuous writing in USB memory	This indicates the remote control state (remote/local). In the local state, the state of the continuous USB memory write function of the VALUE TO USBMEM function (CONTINUOUS mode) is displayed.	- Not displayed: Local state and continuous writing to USB memory is OFF.  : Local state and continuous writing to USB memory is ON.  : Remote state

*1. Indicators in the table above are for the black background (BACKGROUND: BLACK). In the case of the white background (BACKGROUND: WHITE), outline characters are used in the indicators.

2.3.3 Primary display

This is the main area displaying the measurement result selected by the function.

There are five display types: NUMERIC, TREND CHART, LIMIT, ARC SCALE METER and HISTOGRAM CHART. You can switch between them as you like. (Refer to section 4.8 for the switching method.)

Figure 2.10 shows an example of NUMERIC display. In addition, NUMERIC, TREND CHART, LIMIT, ARC SCALE METER and HISTOGRAM CHART are described in sections 2.3.3.1 to section 2.3.3.5.



Figure 2.10 Example of primary display

2.3.3.1 NUMERIC display

Figure 2.11 (a) to (d) show examples of NUMERIC display.

When FONT SIZE is NORMAL



Figure 2.11(a) Example of NUMERIC display (FONT: 7SEG)

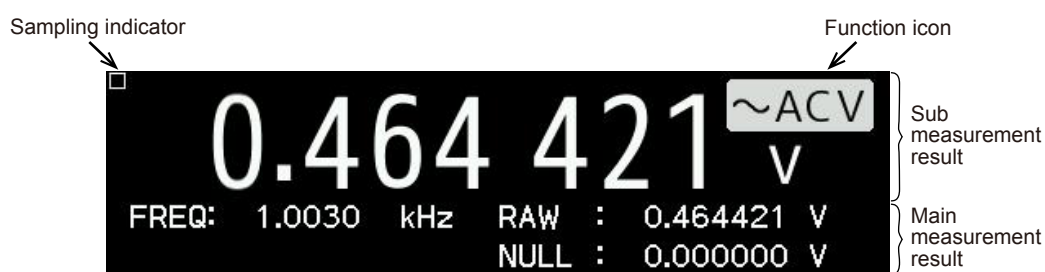


Figure 2.11(b) Example of NUMERIC display (FONT: NORMAL)

The sub measurement result displays numeric value information that accompanies the main measurement result. Table 2.10 shows the functions that can be used with each displayed item and its displayed contents.

Table 2.10 Display contents of sub measurement result

Display item	Available functions	Contents
RAW	Function other than CONT and DIODE	If NULL or MATH calculation (dB/SCALING) is set ON, raw data before calculation is displayed. *RAW data is the data obtained after performing SMOOTHING calculation.
NULL	Function other than CONT and DIODE-+-+	If NULL calculation is set ON, NULL value is displayed.
ACV	Only FREQ function	ACV voltage is displayed.
FREQ	Only ACV function	Frequency is displayed.
CONT	Only CONT function	SHORT state of the continuity test is displayed.

2.3 Screen Display

When FONT SIZE is LARGE



Figure 2.11(c) Example of NUMERIC display (FONT :7SEG)



Figure 2.11(d) Example of NUMERIC display (FONT :NORMAL)

Main measurement result displays measurement (numerical value and measurement result), suffix of the function and measurement, and the unit.

2.3.3.2 Trend chart display

Figure 2.12 shows an example of trend chart display.

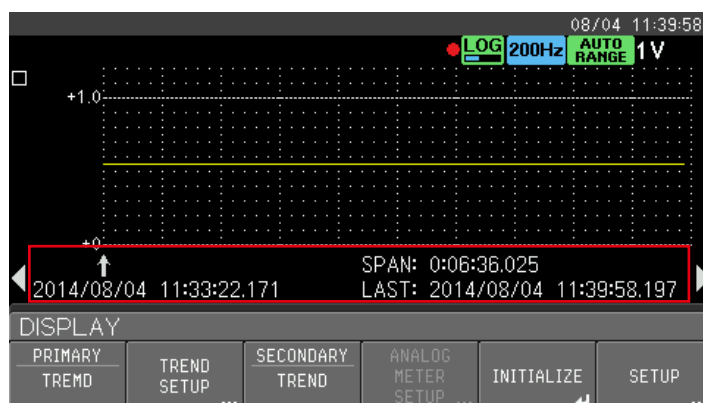


Figure 2.12 Example of online trend chart display

- ↑: Displays the date and time when the first data displayed on the chart was acquired.
- SPAN: Displays the elapsed time after the measurement start time.
- LAST: Displays the date and time when the latest measurement result was acquired.

* For details on the off-line trend chart display, refer to section 4.9.2.

2.3 Screen Display

2.3.3.3 Histogram chart display

Figure 2.13 shows an example of histogram chart display.

* For a description of the bin appearing in this section, refer to section 4.10.1.

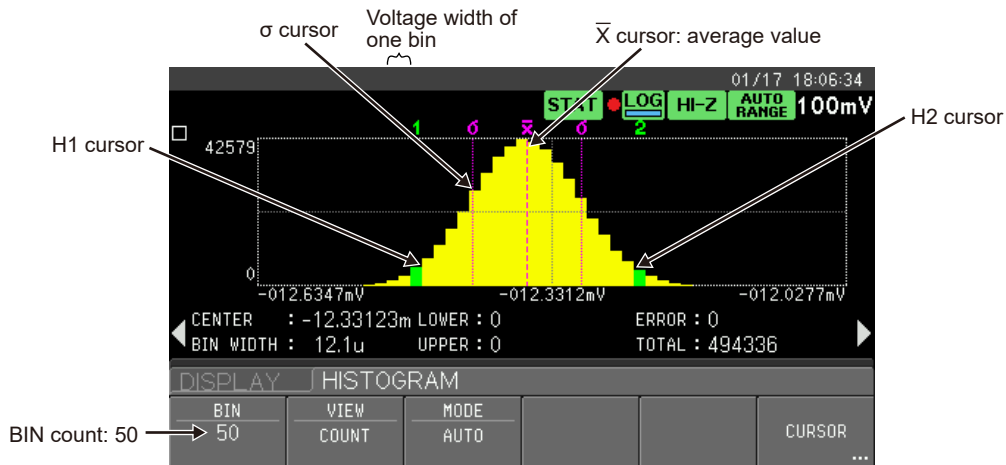


Figure 2.13 Example of online histogram chart display

When the primary display shows the histogram chart, the following histogram information can be displayed.

X cursor and σ cursor are displayed only when statistic calculation is ON.

- CENTER: Measurement value at the center of histogram display (voltage, current, and resistance)
- BIN WIDTH: Width of one BIN (see the diagram above)
- LOWER: Number of data points of which the measurement values are less than the lower limit of the histogram range
- UPPER: Number of data points of which the measurement values are greater than the upper limit of the histogram range
- ERROR: Number of data points in error whose calculation result is invalid.
- TOTAL : Total number of data points
- X cursor: Average value of distributed measurement value and cursor (dotted line)
- σ cursor: Average value of the distributed measurement values converted to standard deviation (solid line). For σ , 1 (about 68%), 2 (about 95%), or 3 (about 99.7%) can be selected.
- H1, H2 cursors: Two green cursors in the above diagram can be displayed.

Pressing the arrow keys changes the displayed content of the statistical information on the secondary display.



- H1, H2 values: Display the voltage range and degree of the BIN of each green cursor in the above diagram.
- H1 - H2 values: Display the voltage range and degree of the BIN between green cursors in the diagram. In addition, the ratio (%) of measurement data between H1 and H2 cursors to all measurement values is displayed.

* For the off-line trend chart display, refer to section 4.10.2.

2.3.3.4 LIMIT display

Figure 2.14(a) to (d) show examples of LIMIT judgment results displayed on the primary display.



Figure 2.14(a) Display example of LIMIT judgment result (for GO)



Figure 2.14(b) Display example of LIMIT judgment result (for HIGH)

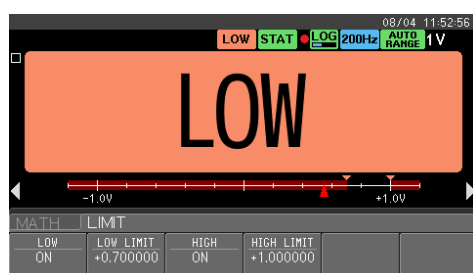


Figure 2.14(c) Display example of LIMIT judgment result (for LOW)

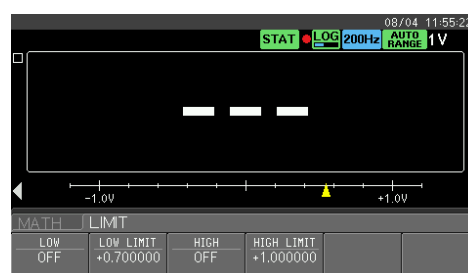


Figure 2.14(d) Display example of LIMIT judgment result (for " - - ")

If HIGH and LOW of LIMIT calculation in MATH menu are enabled and LIMIT is selected in PRIMARY of DISPLAY menu, the judgment results in Figure 2.14(a), (b), (c) are displayed. To make the judgment result on the primary display easy to view, the primary display is shown larger than the secondary display.

- Display items on the primary display
 - 1 Judgment result: HIGH/ LOW/ GO/ " - - " display
 - For detailed display conditions of each judgment result, refer to section 4.6.4.
 - 2 Sampling indicator
 - Note 1) Even if NULL calculation is set ON and FREQ is set ON, NULL value, RAW value, and frequency are not displayed.
 - Note 2) The function icon is not displayed. However, if NUMERIC is selected on the secondary display, a small icon is displayed on the left side of the secondary display.
- Display color of judgment result
 - 1 HIGH, LOW: red
 - 2 GO: green
- For LIMIT calculation, refer to section 4.6.4. For settings of LIMIT display on the primary display, refer to section 4.8.

2.3 Screen Display

2.3.3.5 ARC SCALE METER display

Figure 2.15 shows an example of a ARC SCALE METER displayed on the primary display.



Figure 2.15 Display example of ARC SCALE METER (NUMERIC)

If ARC SCALE METER is selected in PRIMARY of DISPLAY menu, ARC SCALE METER is displayed as shown in figure 2.15.

ARC SCALE METER indicates the measurement value on the scales of the arc with the indicator.

- Display items on primary display

- 1 Scales on arc
- 2 Indicator
- 3 TITLE

One item is selected from the following and is displayed in the center of the LCD screen.

- 1) UNIT: Function unit
- 2) BLANK: Non-display
- 3) TEXT: Up to eight characters (including numbers and symbols) can be set.

- 4 Setting area of HIGH/ LOW of LIMIT calculation is displayed with a red arc band.

The scale can be set by selecting AUTO, FULL SCALE, MANUAL (specifying range and offset), or LOG (maximum and minimum values) in the DISPLAY/ARC SCALE METER SETUP menu. A LIMIT area (the red part on Figure 2.15) can be displayed as shown in the example.

- For details on setting the ARC SCALE METER display on the primary display, refer to section 4.8.2.

2.3.4 Secondary display

This is the supplement area displaying the measurement result selected by the function.
The displayed information can be selected from the DISPLAY/SECONDARY menu (or [SHIFT] key or arrow keys).
(Refer to section 4.8 or section 3.4.2.2 for the switching method.)
Figure 2.16 shows a display example.

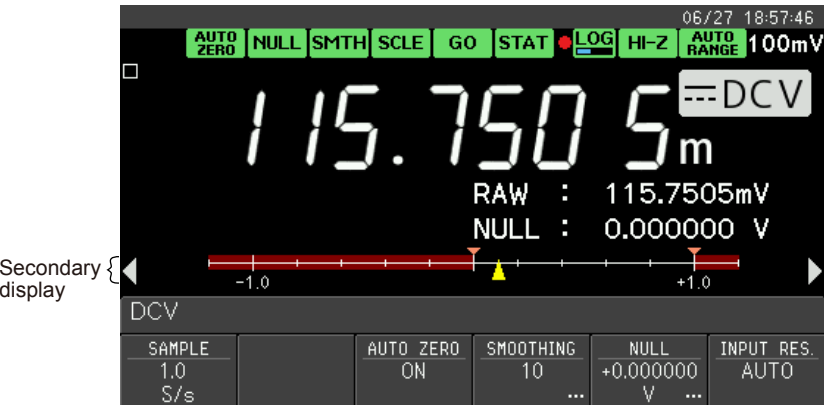


Figure 2.16 Example of secondary display

The display type is described in Section 2.3.4.1 to Section 2.3.4.4.

2.3.4.1 ANALOG METER display

Figure 2.17 shows a display example.

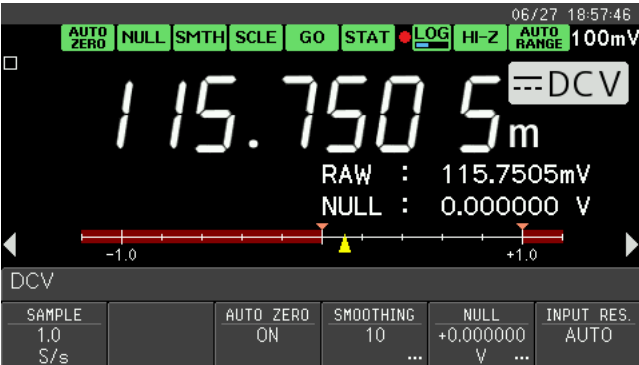


Figure 2.17 Example of ANALOG METER display

The analog meter shows the latest measurement value with a Δ mark on the horizontal axis.
You can set the scale to FULL SCALE or MANUAL (range and offset are specified) using the DISPLAY/ANALOG METER SETUP menu. As shown in the example, LIMIT area (the red part in Figure 2.17) can be displayed.

2.3 Screen Display

2.3.4.2 LIMIT calculation result display

Figure 2.18 shows a display example.



Figure 2.18 Example of LIMIT calculation result display

HIGH/GO/LOW of the calculation result is displayed. The three displayed contents are as follows. HIGH LIMIT value and LOW LIMIT value are set in the MATH/LIMIT menu. (Refer to section 4.6.4.)

- HIGH: When measurement value > HIGH LIMIT value
- GO : When HIGH LIMIT value $\geq$ measurement value $\geq$ LOW LIMIT value
- LOW : When LOW LIMIT value > measurement value
- - - - : When there is no acquisition data in the LIMIT calculation settings

2.3.4.3 STATISTIC (statistic information) display

Figure 2.19 shows a display example.



Figure 2.19 Example of STATISTIC calculation result display

The following statistics are displayed

- MAX : Maximum value
- MIN : Minimum value
- AVG : Average value
- σ : Standard deviation (selectable within the range of 1σ to 6σ)
- ERR. : Number of error data points.
*Error data is invalid data that is not applicable to statistical calculation, such as overload data and overflow data, and is not included in the number of samples.
- NUM : Number of samples

2.3.4.4 NUMERIC (numeric value) display

Figure 2.20 shows a display example.



Figure 2.20 Example of NUMERIC display

This can be displayed when the primary display is not set to NUMERIC. As shown in the example, the function icon, measurement value, and unit are displayed.

2.3.5 Message display

Messages in Table 2.11(a) and (b) are displayed at the top of the LCD screen of this instrument.

If an error occurs when outputting to the USB memory or the internal memory (saving or writing), the error messages in Table 2.11(a) are displayed.

Table 2.11(a) Error message and display contents

Error message	Display contents (condition, factor)	Measures
Error: No result	No measurement result	• Execute measurement.
Error: No USB memory	USB memory not installed	• Insert a USB memory device.
Error: Disk full	USB memory capacity is full and output cannot be done.	• Reduce the information in the USB memory device or change the USB memory device.
Error: File access	Access error to USB memory	• Release the USB memory write/read lock. • Check that appropriate directories (folder names) and files are available.
Error: Read-only file	When writing is tried in the read-only memory.	• Change the file attribute to "writable" or specify another file name.

2.3 Screen Display

Status messages in Table 2.11 (b) are displayed through key operation.

Table 2.11(b) Status messages and display contents

Status message	Display contents (condition, factor)
Acquisition buffer was initialized.	When the internal data buffer for the trend and histogram is cleared
Remote setup was saved. Reboot now.	When restarting is required as a result of changing remote setting parameters
- Line frequency update completed. - Line frequency update failed.	- When power supply frequency is manually detected - If the detection of power supply frequency fails
Screen image was dumped to "file name."	When a screenshot is executed
"Add Text to "file name."	When one-line logging data is output to USB memory
Setup initialization completed.	When initialization of setting condition is completed
Read from USB → Erasing ...→ Write to flash → Verifying ...→ Check flash	When the firmware is being updated, message changes in each phase.
CAL data saved to flash ROM.	When the calibration data is saved in the internal flash memory
Log data deleted.	When the LOG memory data is cleared from the LOG menu/CLEAR LOG menu
Log data exported to "file name."	When the contents of the LOG memory are written in USB memory
Setup saved to "file name."	When setting conditions are saved
Setup recalled from "file name."	When setting conditions are recalled
Default setting recalled.	When factory setting conditions are recalled
Log data empty, ENTER OFFLINE BROWSE disabled.	If log data is empty when executing ENTER OFFLINE BROWSE menu, this message is displayed, and switching to offline is not possible.
This operation isn't enable while in offline browse.	If the operation which cannot be executed in the offline browse status is executed in the offline browse status, this message is displayed, and the operation is invalid.
This operation isn't enable while in bulk-logging.	If an operation other than the [STOP LOG] key is performed when bulk-log measurement is being executed, this message is displayed, and the operation is invalid.
Can't start while EXT TRIG is disabled.	When the external trigger setting is invalid, and the stop event is "EXT TRIG"
Can't start while both HIGH and LOW LIMIT are OFF.	When stop events are "LIMIT-HIGH" or "LIMIT-NOGO" and both HIGH and LOW of the limit operation are OFF
Can't start while HIGH LIMIT is OFF.	When stop events are "LIMIT-HIGH" or "LIMIT-NOGO" and HIGH of the limit operation is OFF
Can't start while LOW LIMIT is OFF.	When stop events are "LIMIT-LOW" and LOW of the limit operation is OFF
MANUAL settings are updated.	When MANUAL mode settings are successfully applied using APPLY TO MANUAL
Can't apply to MANUAL settings while no data.	When MANUAL mode settings fail to be applied using APPLY TO MANUAL Example) When APPLY TO MANUAL is executed when no measurement has taken place using the present measurement function or measurements have been cleared
Calculating...	When STATISTIC calculation is being performed again in the off-line browse status

3.1 Settings That You Should Know

Entering the settings in this chapter before using this instrument will make it easier to use.

3.1.1 Screen settings

When you first turn on this instrument after unpacking it, settings are set to default values (factory settings). You can change these settings as you like according to your environment or preferences.

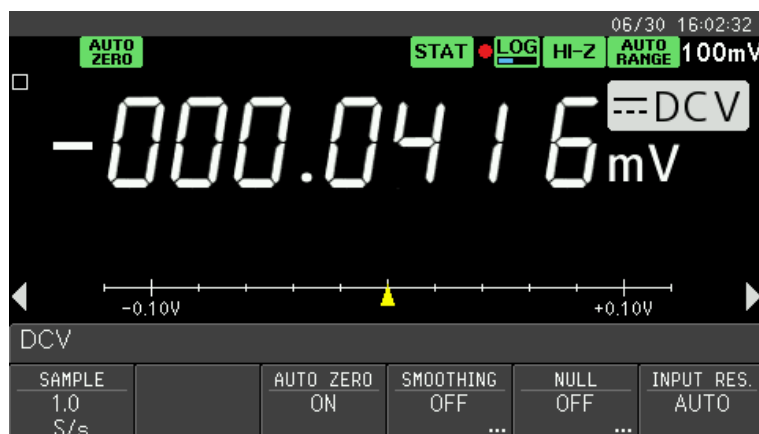
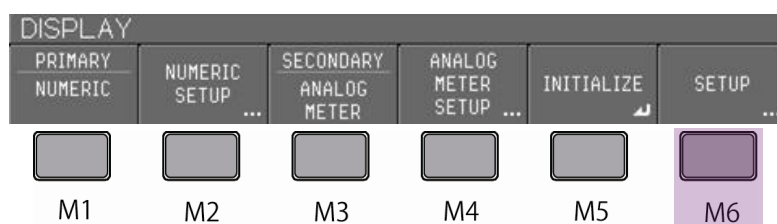


Figure 3.1 Screen display at startup

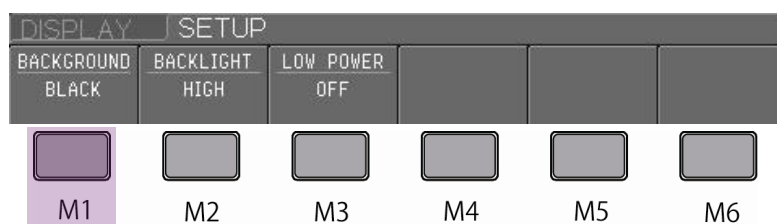
As an example, the procedure to change the settings from the default to BACKGROUND: WHITE, BACKLIGHT: LOW, and LOW POWER: 5 minutes is provided below. (If you do not need to change these settings, you do not have to.)

- BACKGROUND: You can select WHITE or BLACK (default) for the screen background color.
- BACKLIGHT: You can select LOW or HIGH (default) for the background brightness of the LCD screen.
- LOW POWER: When the keys are not operated for the specified time, the DM7560 switches to LOW POWER mode and turns the screen off. The available timeout settings are OFF (default), 1, 5, 10, 30, and 60 minutes.

1 Press [DISP]. The DISPLAY menu below opens.

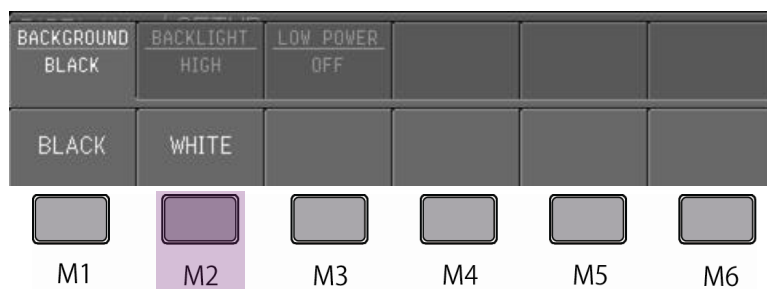


2 Press M6 shown in step **1** to select SETUP submenu. The SETUP submenu below opens. Press M1 to set BACKGROUND (background color) to white.

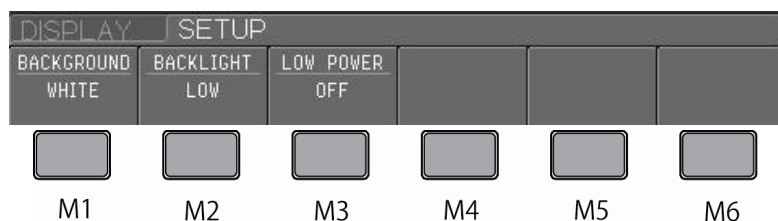


3.1 Settings That You Should Know

- 3 The BACKGROUND submenu below opens. Press M2 to select WHITE.

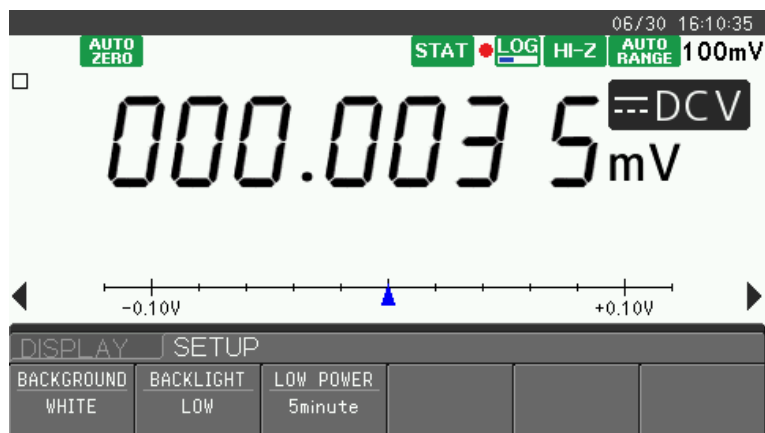


- 4 BACKGROUND: WHITE is set as shown below.



- 5 Then, repeat steps 1 to 4 above to set BACKLIGHT and LOW POWER.

Settings are changed to BACKGROUND: WHITE, BACKLIGHT: LOW, LOW POWER: 5 minutes as shown below, and the background color of the screen is changed to WHITE.

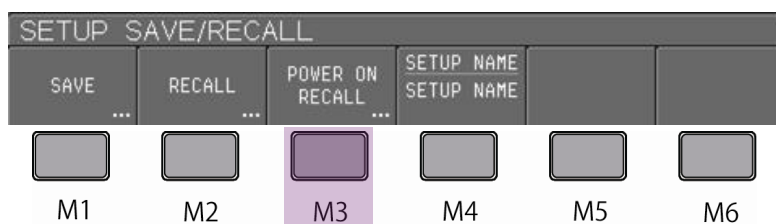


3.1.2 Settings at power-on

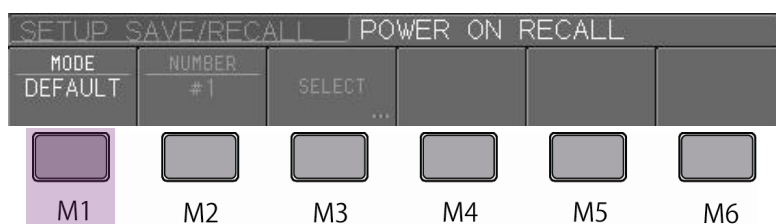
By factory default, the DM7560 starts with default settings every time the power is turned on. You can make the DM7560 start with the settings that were being used when the power was previously turned off by entering the following settings. For details, see section 4.7.

As an example, the procedure to change to MODE: LAST in SETUP SAVE/RECALL/POWER ON RECALL menu is provided below.

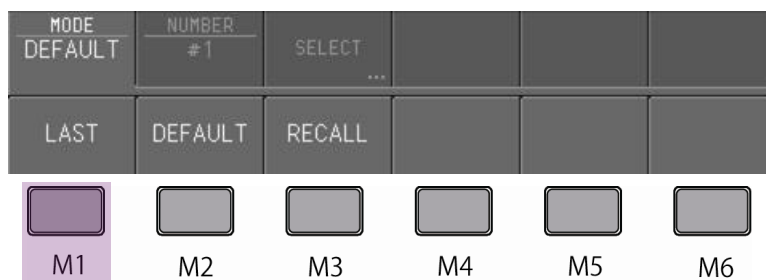
- 1 Press [SHIFT]→[LOG(SAVE/RECALL)]. The SETUP SAVE/RECALL menu opens.



- 2 Press M3 in the SETUP SAVE/RECALL menu shown in step 1 to select the POWER ON RECALL menu. The POWER ON RECALL menu opens.



- 3 Press M1 in the POWER ON RECALL menu shown in step 2 to select the MODE menu. The MODE menu opens.



- 4 Press M1 in the POWER ON RECALL menu shown in step 3 to select MODE:LAST. MODE:LAST is set as shown below. With this setting, the last setting conditions are used at power-on.



3.1.3 System settings

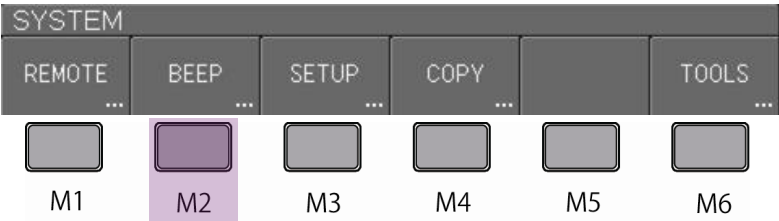
To make things convenient, the parameters of the SYSTEM menu ([SHIFT]→[DISP(SYSTEM)]) should be set at an early stage.

For details on System settings (SYSTEM), see section 4.5.

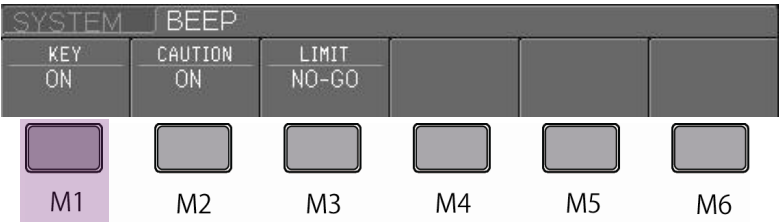
- SYSTEM/BEEP menu
 - KEY: ON (default)/OFF state of the sound generated when keys are pressed

Setting the sound generated when keys are pressed (ON→OFF)

- 1 Press [SHIFT]→[DISP(SYSTEM)]. The SYSTEM menu opens.



- 2 Press M2 in the SYSTEM menu shown in step 1 to select the BEEP menu. The BEEP menu opens.



- 3 Press M1 in the BEEP menu shown in step 2 to set the KET menu to OFF. KEY: OFF is indicated as shown below, and the key sound is no longer generated when the keys on the front panel are pressed.



3.1.4 Saving and recalling of setting conditions

Setting conditions that have been set to your needs can be stored in the internal memory or a USB memory device. By doing so, you can quickly recall the setting conditions according to the measurements you want to perform.

Note For details on the settings that are saved and recalled, see Table 4.1(a) to (c) in section 4.12.
The settings in Table 4.2 of section 4.12 cannot be saved.

You can view a summary of the stored measurement setting conditions in the SETUP SAVE/RECALL/SAVE or RECALL/SELECT menu. The following figure shows a SETUP SUMMARY (setting condition summary) screen.



Figure 3.2 SETUP SUMMARY (setting condition summary)

3.2 Basic Operation Using the Menus, Keys, and Rotary Knob

This section describes the basic operation of this instrument.

The description is roughly divided into operations that mainly use the menu displayed at the lower part of the screen and operations that use keys and rotary knob (switch).

- 3.2.1 Basic operation of menus
- 3.2.2 Operations using keys and rotary knob (switch)

3.2.1 Basic operation of menus

Menus are used mainly to set measurement conditions of functions and various features. This section describes the basic operation of menus for different purposes.

3.2.1.1 Opening and closing a menu

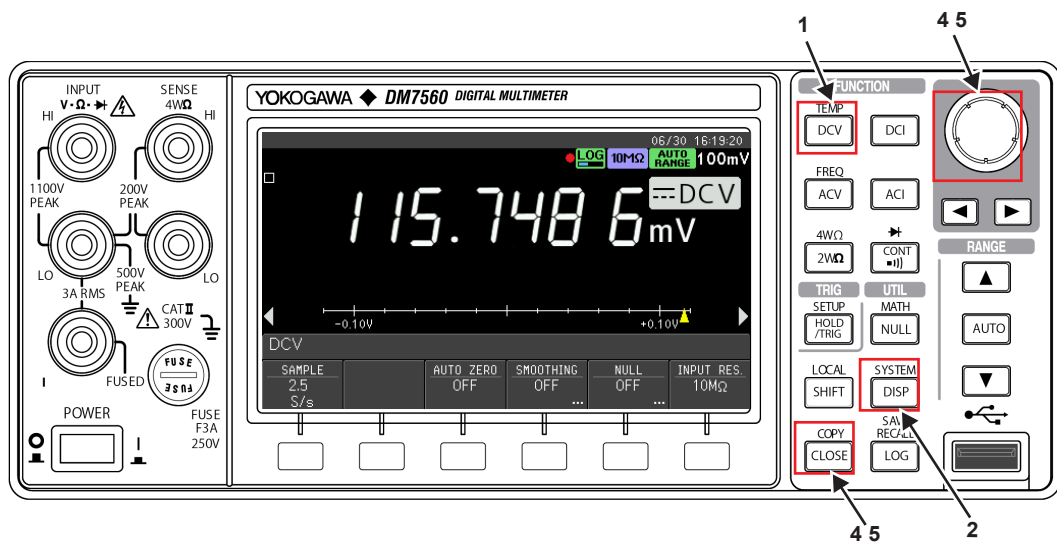


Figure 3.3 Example of a screen display

Opening a function or TRIG & UTILITY menu

The procedure for using menus is described using the DCV measurement screen in Figure 3.6 as an example.

- 1 Press [DCV] in the red frame numbered 1. The DCV menu below opens.

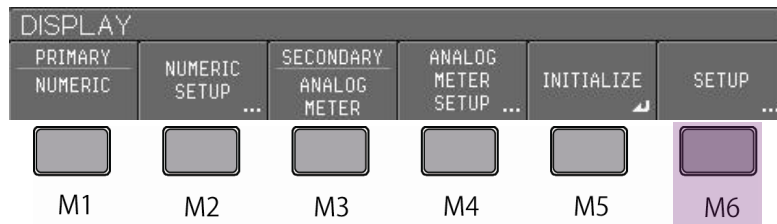
DCV					
SAMPLE		AUTO ZERO	SMOOTHING	NULL	INPUT RES.
2.5		OFF	OFF	OFF	AUTO
S/s			...	...	

- 2 Press [DISP] in the red frame of Figure 3.5 when 1 is displayed. The DISPLAY menu opens as shown below. (The TRIG&UTILITY menu is shown in light gray.)

DISPLAY					
PRIMARY	NUMERIC	SECONDARY	ANALOG	INITIALIZE	SETUP
NUMERIC	SETUP	ANALOG	METER	SETUP	
	...	METER	SETUP	...	...

Opening a submenu.

- 3 Next, press M6 in the DISPLAY menu below.



The SETUP submenu opens as shown below.

**Closing the submenu**

- 4 Press [CLOSE] in the red frame on Figure 3.6 in the DISPLAY/SETUP menu below. Or, press the rotary knob in Figure 3.6.



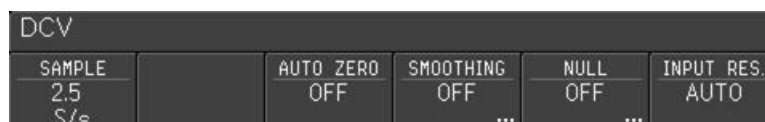
The screen returns to DISPLAY menu below.

**Closing the function and TRIG&UTILITY menu**

- 5 Next, press [CLOSE] in the red frame on Figure 3.6 in the DISPLAY menu below. Or, press the rotary knob in Figure 3.6.



Return to DCV menu below.



3.2 Basic Operation Using the Menus, Keys, and Rotary Knob

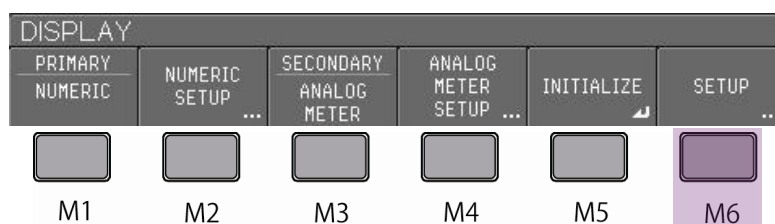
3.2.1.2 Selecting an item in the menu

The procedure is described using an example of setting DISPLAY/SETUP/LOW POWER: 10 minute.

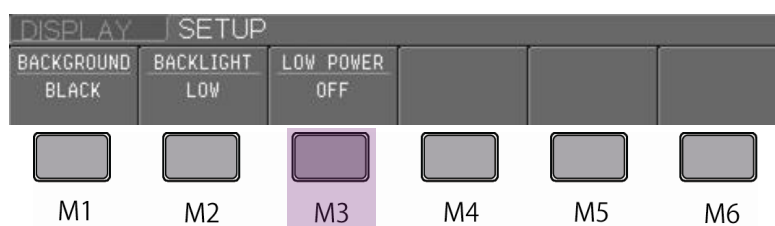
With this setting, if nothing is done within 10 minutes after the last operation, the instrument enters LOW POWER mode and the backlight of the LCD screen turns OFF. Any operation in LOW POWER mode causes the screen to return to the normal screen. When the backlight turns OFF in LOW POWER mode, the periphery LED of the rotary knob flashes slowly.

Selecting an item in a menu

- 1 Press M6 in the DISPLAY menu below. The SETUP menu shown in step 2 opens.



- 2 Press M3 in the SETUP submenu to select the LOW POWER menu. The LOW POWER submenu shown in step 3 opens.



- 3 Press M4 in the LOW POWER submenu to select 10 minute.



Setting is made to DISPLAY/SETUP/LOW POWER: 10 minute as shown below.



3.2.1.3 Setting the numeric value for an item in a menu

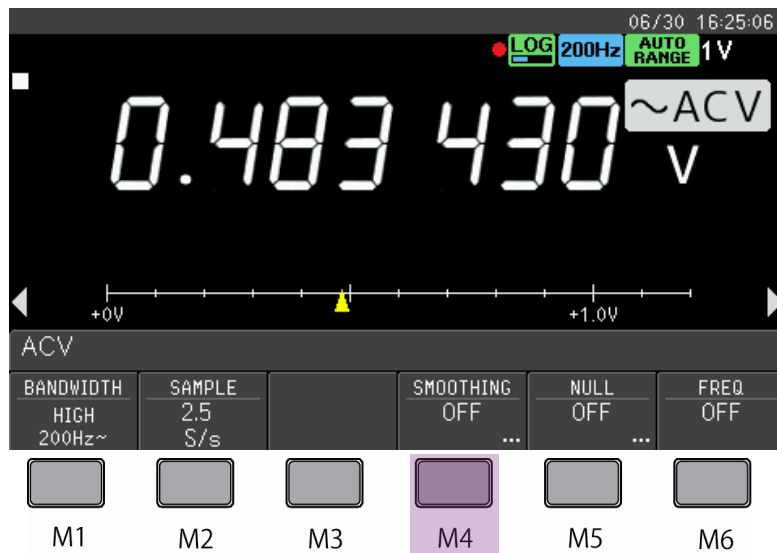
The procedure is described using an example of setting ACV/SMOOTHING/Length: 20.

With the default setting, SMOOTHING is set to OFF for all functions.

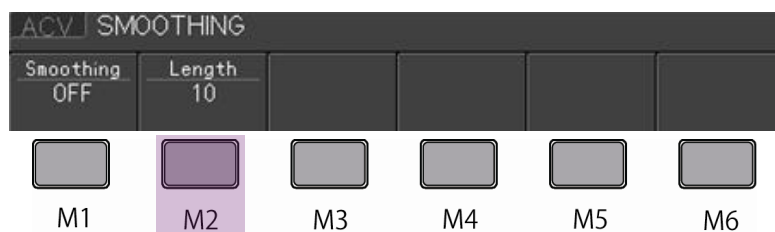
If set to ON, the average count is set to 10 by default.

Set the numeric value for an item in a menu. (The average number of times is changed from 10 to 20.)

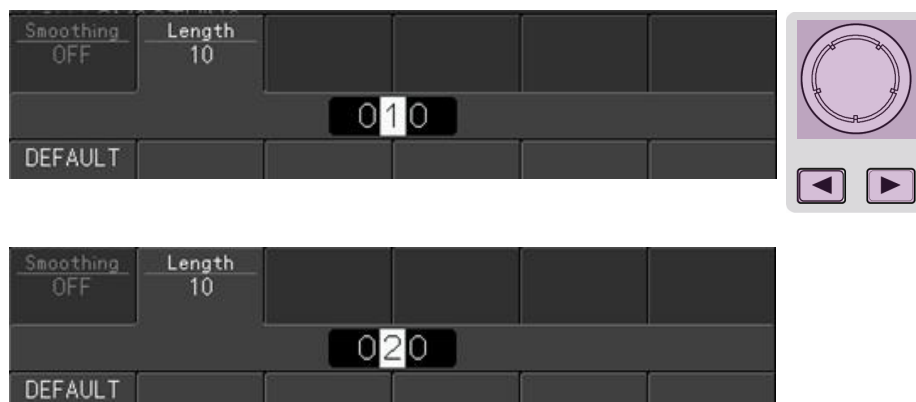
- 1 Press M4 in the ACV menu below. The SMOOTHING submenu shown in step 2 opens.



- 2 Press M2 in the SMOOTHING submenu to select the Length (average number of times) submenu.



- 3 The Length submenu opens. Using the rotary knob and the left/right arrow keys, set the value to 20.

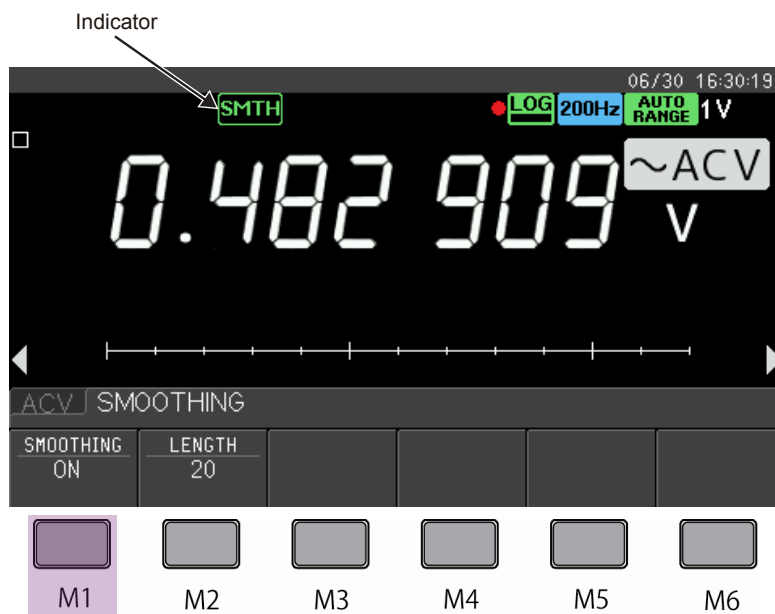


3.2 Basic Operation Using the Menus, Keys, and Rotary Knob

- 4 Press [CLOSE] or the rotary knob (switch) to return to the SMOOTHING menu below.



- 5 Press M1 to turn SMOOTHING (moving average) ON.
The SMOOTHING indicator appears at the top of the screen.



When the preset number of samples are acquired, the indicator changes to the mark shown below.



3.2.1.4 Setting the name of an item in a menu

When saving the setting conditions or LOG data in the external memory (e.g. USB memory), a directory name and file name are required.

The directory (folder) has a default name. The file name consists of a preset name followed by a serial number that is assigned each time a file is saved.

Ex. SETUP SAVE RECALL/SAVE menu

- DIRECTORY :SETUP
- FILENAME :STUP0000~

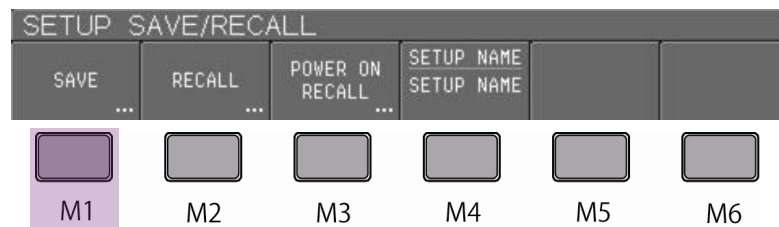
This instrument has limitations on the character types and the number of characters that can be used for the directory (folder name) and file name. You can change the preset name of the folder and file as you like. This section describes an example of setting a name.

Saving setting conditions in a USB memory device

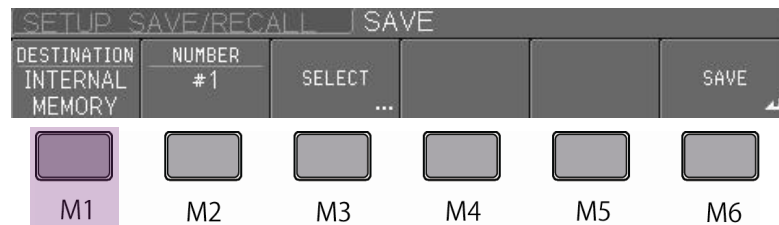
Ex. SETUP SAVE RECALL/SAVE menu

- DIRECTORY:SET_A
- FILENAME:SETA0000~

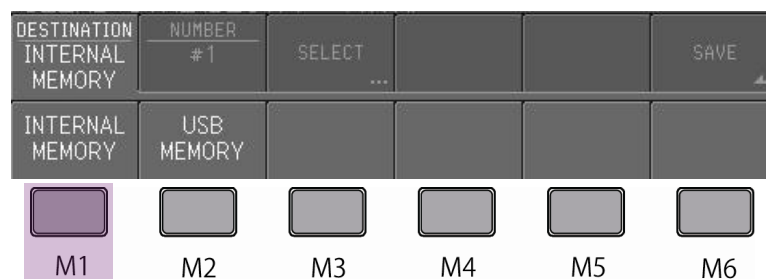
- 1 Press [SHIFT]→[LOG(SAVE/RECALL)]. The SETUP SAVE/RECALL menu below opens.



- 2 Press M1 shown in step 1, and select the SAVE menu. The SAVE menu below opens.



- 3 Press M1 shown in step 2, and select the DESTINATION menu. The DESTINATION menu below opens.



3.2 Basic Operation Using the Menus, Keys, and Rotary Knob

- 4 Press M1 shown in step 3 to select USB MEMORY for the storage destination. The screen returns to the SAVE menu below.

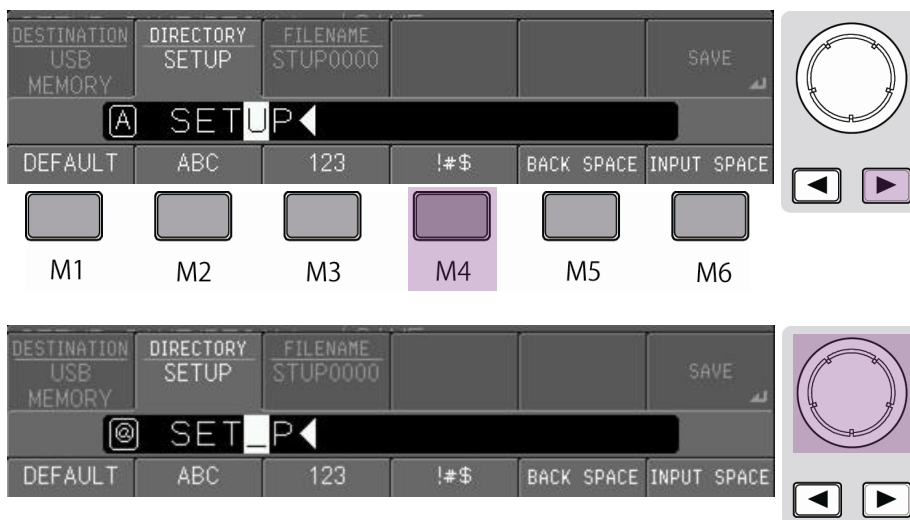


- 5 Press M2 shown in step 4 to select DIRECTORY(directory). The DIRECTORY menu below opens.

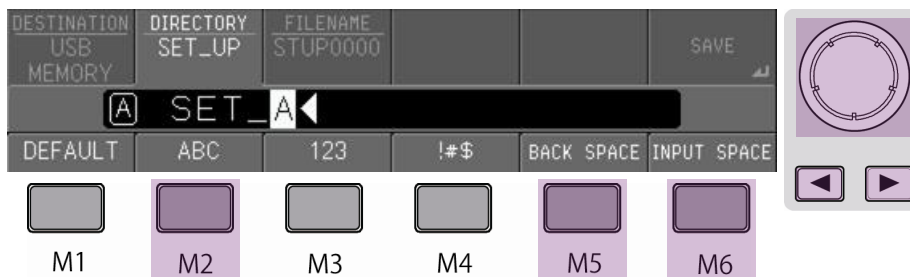


- 6 Press the right arrow key below the rotary knob to move the cursor to the character you want to set.

Press M4 to select the symbol [!#\$] below the menu.



Then, use the rotary knob, arrow keys, and menu keys to edit the name as shown below.



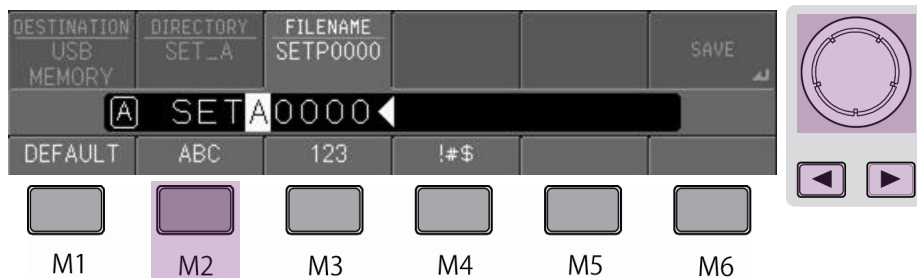
- 7 When you finish editing in step 6, press [CLOSE]. The edited directory name appears in the DIRECTORY menu below.



- 8 Press M3 in the diagram below to open the FILENAME menu below.



- 9 As described in step 6, use the rotary knob, arrow keys, and menu keys to edit the name as shown below.



- 10 When you finish editing in step 9, press [CLOSE]. The screen returns to the SAVE menu below.



- 11 Press M6 in step 10 to save the setting conditions to the specified directory and file name in the USB memory device.

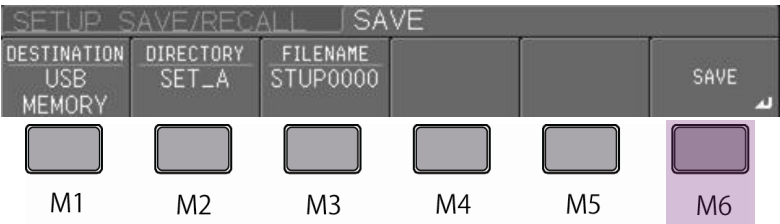
3.2.1.5 Executing setting items in a menu

The menu of each setting function in TRIG&UTILITY has several menu items that is executed when the corresponding key is pressed.
In the case of the SAVE menu and RECALL menu also (explained in section 3.2.1.4), pressing a menu key (M1 to M6) after completing the procedure executes the corresponding operation.
A return mark is displayed as shown in the following example of the SAVE execution menu to indicate that an item is executable.

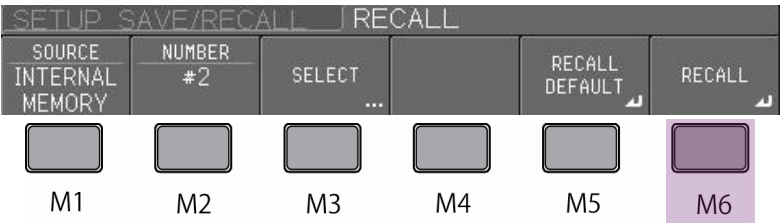


Examples of menu items that can be executed are shown below.

Ex.1 SAVE execution menu



Ex.2 RECALL execution menu



3.2.2 Operation using keys and rotary knob (switch)

This section describes how to use the combination of keys and rotary knob (switch) for each purpose.

3.2.2.1 Switching 1st and 2nd functions

As already explained in the menu key operation of section 2.1.3, "FUNCTION area," and section 2.1.4 "TRIG & UTILITY setting area," the 1st and 2nd functions are written on the key and above the key as shown below.

Ex. [ACV(FREQ)], [DISP(SYSTEM)]

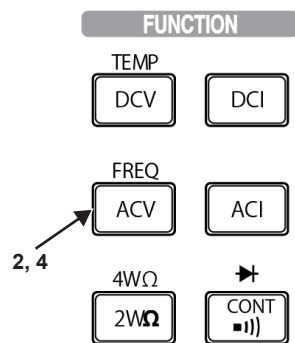
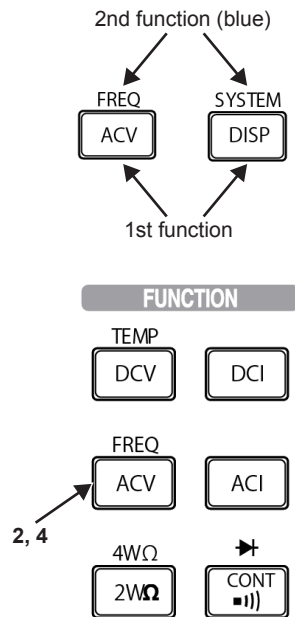


Figure 3.4 FUNCTION part

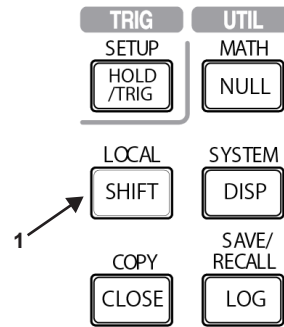


Figure 3.5 TRIG & UTILITY setting part

Switching between the 1st function and 2nd function

The following procedure describes how to switch from AC voltage measurement (ACV) to the frequency measurement (FREQ) in the example shown above.

- 1 Press [SHIFT] in Figure 3.5. The blue indicator **SHIFT** lights in the upper right of the screen.
- 2 Press [ACV(FREQ)] in Figure 3.4.
- 3 The screen of AC voltage measurement (ACV) in Figure 3.6(a) changes to the screen of frequency measurement (FREQ) in Figure 3.6(b).
- 4 Press [ACV(FREQ)] to return to AC voltage measurement (ACV) screen.

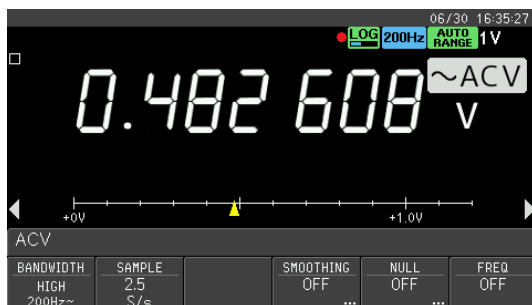


Figure 3.6(a) AC voltage measurement



Figure 3.6(b) Frequency measurement (FREQ) screen

3.2 Basic Operation Using the Menus, Keys, and Rotary Knob

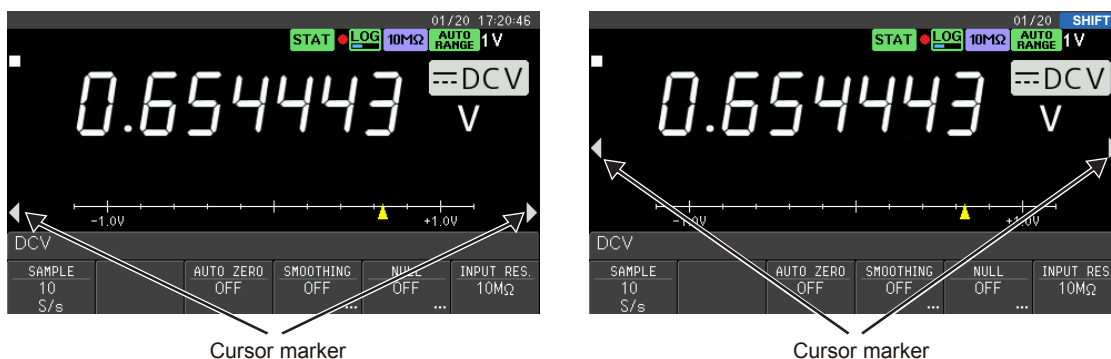
3.2.2.2 Switching primary display and secondary display

Section 2.3 describes the screen configuration of this instrument. This section describes how to switch the primary display and secondary display.

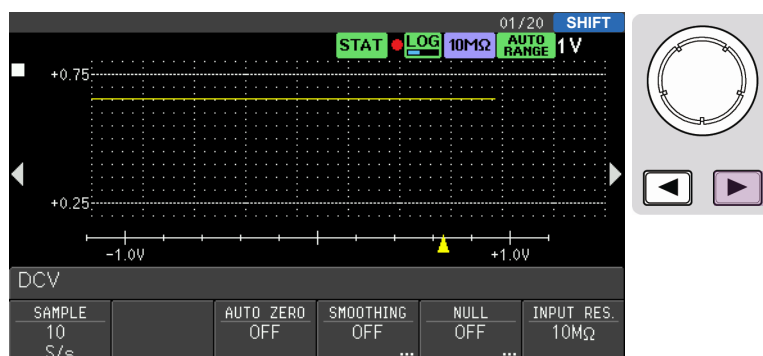
Switching the primary display

The following example describes how to switch from NUMERIC display to trend chart display to histogram display in the DCV function.

- 1 Press [SHIFT] when the instrument is the state shown in the left figure. As shown in the right figure, the SHIFT indicator (blue) is displayed at the top of the screen, and the cursor marker moves to the primary display.



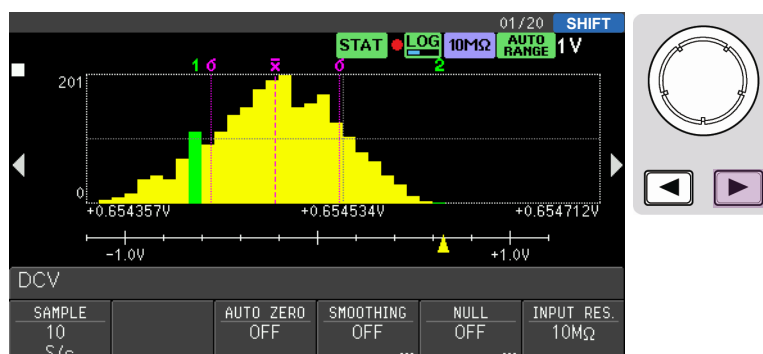
- 2 Press the right arrow key below the rotary knob once. As shown below, the primary display changes to the trend chart display.



Note

Pressing the left arrow key changes the display in a different order (e.g., 1 → 3 → 2 → 1)

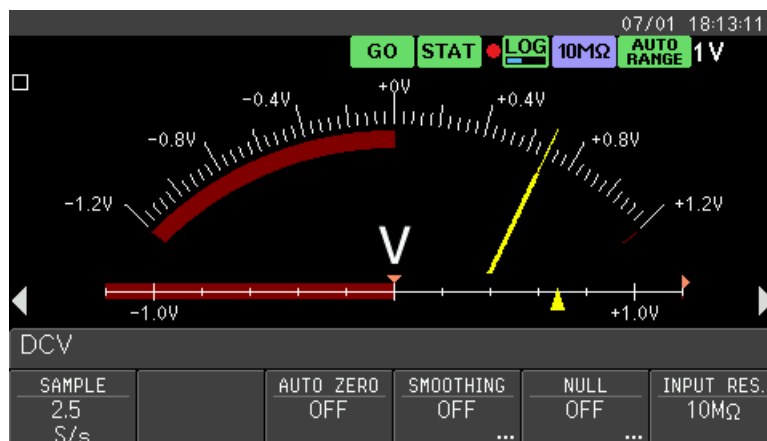
- 3 Press the right arrow key below the rotary knob as described in step 2. The primary display changes to the histogram chart display.



- 4 Likewise, each time you press the right arrow key below rotary knob key, the primary display changes between LIMIT display and ARC SCALE METER display. Pressing the right arrow key once at the ARC SCALE METER display returns the screen to the NUMERIC display.



LIMIT display

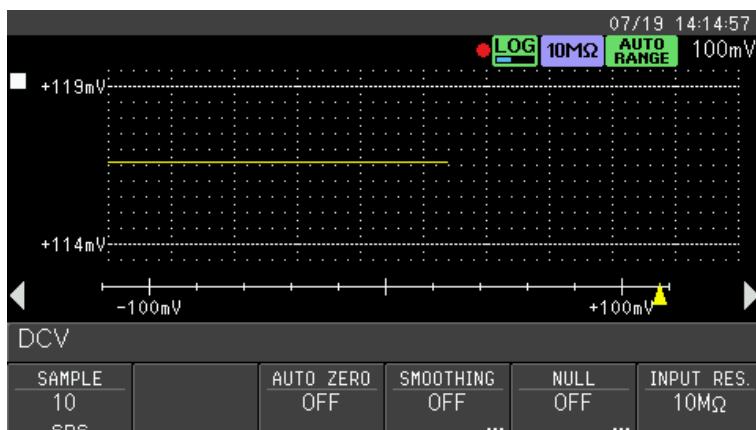


ARC SCALE METER display

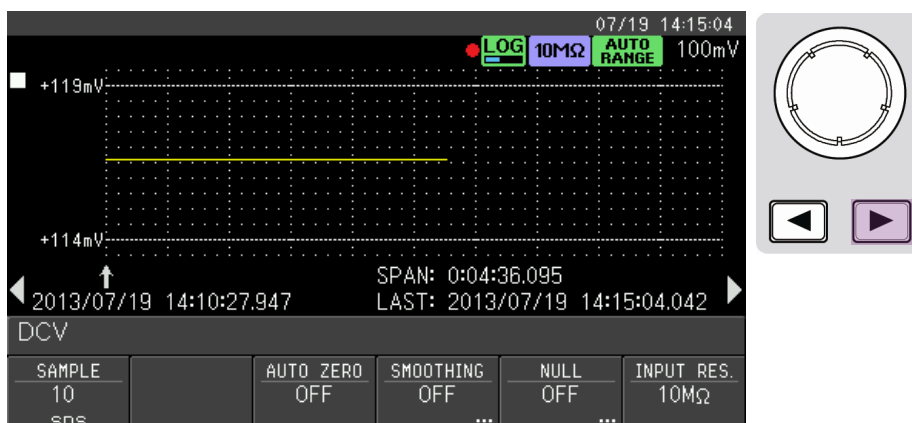
3.2 Basic Operation Using the Menus, Keys, and Rotary Knob

Switching the secondary display

This example uses the case where the primary display shows the trend chart.



- 1 Press the right arrow key below the rotary knob once. As shown below, the secondary display changes from the analog meter to the time information of the trend chart.

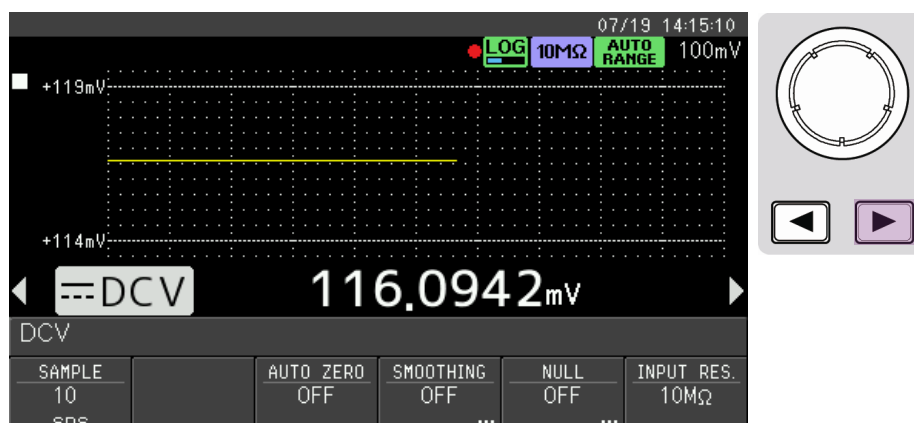


Note

If the left arrow key is pressed, the display is changed to NUMERIC display of step 2 shown below.

- 2 Press the right arrow key below the rotary knob once.

The display changes from the time information of the trend chart to NUMERIC display.



After that, every time the right arrow key below the rotary knob is pressed, the display changes in the order of NUMERIC → ANALOG METER → time information of trend chart.

4.1 Important Notices Before Measurement

4.1.1 Cautions when connecting test leads

- Failure to observe the following items may result in electric shock or damage to this instrument or measured items.



WARNING

- Be sure to confirm that the input terminal connecting the function and the test lead is proper for measurement before measurement.
- Be sure to remove the test lead from the measured circuit before switching functions.
- Never apply a signal exceeding the maximum input voltage or current. Various warnings (see the table below) are displayed at the input terminals on the front panel as shown below:



AVERTISSEMENT

- S'assurer que la borne d'entrée connectant la fonction et le câble d'essai est adaptée avant d'effectuer la mesure.
- Veiller à enlever le câble d'essai du circuit mesuré avant de commuter la fonction.
- jamais entrer le signal dépassant la tension d'entrée ou le courant maximaux. Plusieurs avertissements (voir le tableau ci-dessous) s'affichent aux bornes d'entrée sur le panneau avant comme illustré ci-dessous :

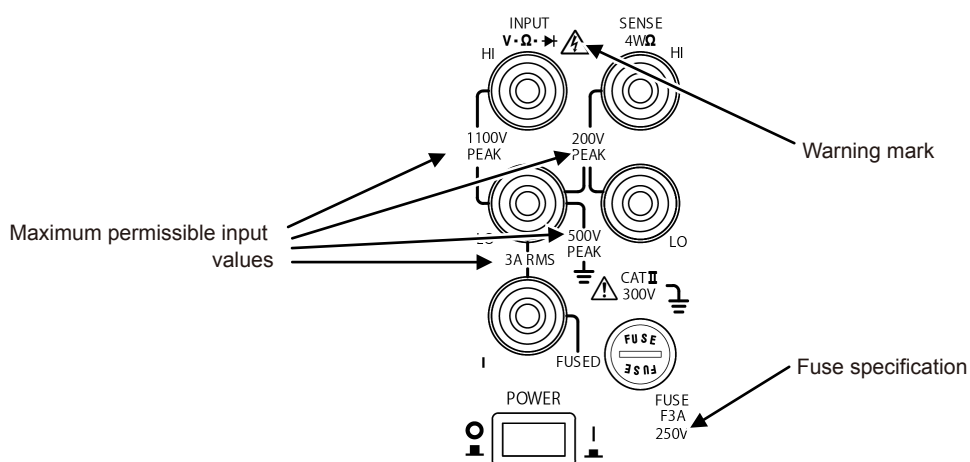


Figure 4.1 Warnings on panel

4.1 Important Notices Before Measurement

4.1.2 About input signals

- Do not apply a voltage or current exceeding the specification to the input terminal. If you do, fire or failures may occur. The following table shows the maximum permissible inputs.

Input terminal	Function*1	Max. permissible input
INPUT V · Ω · $\rightarrow$ HI-LO	DCV (100 mV~100 V range) 2 W Ω , 4 W Ω , CONT, DIOD, TEMP	800 Vpeak (continuous), 1100 Vpeak (1 min.)
	DCV (1000 V range)	1100 Vpeak (continuous)
	ACV, FREQ	750 Vrms and $\pm$ DC 500V or less*2
SENSE 4W Ω HI-LO	4 W Ω , TEMP (RTD)	200 Vpeak
I-LO	DCI, ACI	3 A (DC or rms, continuous) (250V*3)

*1) Refer to the functions in section 4.3, "Measurement function" for the names of each corresponding function.

*2) As for the voltage that the alternating-current component is superimposed to the DC component, the maximum permissible input is 1100 V when converted to Vpeak.

*3) When the open circuit voltage of the instrument circuit exceeds 250 V, electric current cannot be measured.

CAUTION

- All ranges are common to the I-LO input, and the maximum permissible input is continuous 3 ADC or 3 Arms (protect it with 3 A fuse). Do not input an excessive electric current. (For detailed specifications, see section 4.2.3 in the IM DM7560-02EN.)
- Circuits that generate voltages exceeding 250 V between the measurement terminals can not be measured if the protection fuse (3 A) at the current measurement terminal of this instrument is blown. It may cause malfunction.

ATTENTION

- Toutes les plages sont communes à l'entrée I-LO et l'entrée maximale admise est 3 ADC continu ou 3 Arms continu (la protéger avec un fusible de 3 A). Ne pas alimenter avec un courant excessif. (Voir la section 4.2.3 dans le manuel d'instructions DM7560-02EN pour plus de détails.)
- Si le fusible de protection (3 A) pour la borne de mesure du courant de cet instrument a fondu, le courant sur le circuit mesuré qui fait que la tension dépasse 250 V entre les bornes mesurées ne peut pas être mesuré. Ceci peut être à l'origine d'un dysfonctionnement.

4.2 Before Starting Measurement

Processes from measurement preparation up to completion differ depending on user conditions. This section provides examples of measurement processes for each user condition.

- For users who have used this instrument for measurement and want to use the previous settings
 - Installation of this instrument and confirmation of power supply cord connection (see sections 2.1 and 2.2 of the Getting Started Guide, IM DM7560-02EN)
If installation and connection have already been completed, proceed to the next process.
 - Powering on (see section 2.2 of the Getting Started Guide, IM DM7560-02EN)
It is convenient to make the following setting with the SETUP SAVE/RECALL menu.
 - POWER ON RECALL: LAST
This instrument starts with the settings that were being used when the power was turned off previously. For the setting procedure, see section 3.1.2.
- For users who want to make numerous measurements by changing the setting conditions
 - Installation of this instrument and confirmation of power supply cord connection (see section 2.1 and 2.2 of the Getting Started Guide, IM DM7560-02EN)
If installation and connection have already been completed, proceed to the next process.
 - Powering on (see section 2.2 of the Getting Started Guide, IM DM7560-02EN)
It is convenient to make the following setting with the SETUP SAVE/RECALL menu.
 - POWER ON RECALL: RECALL
This instrument starts with the settings saved in the internal memory. For saving and recalling setting conditions, see section 4.7.
 - Changing setting conditions
The SETUP SAVE/RECALL/RECALL menu is used to recall and change the setting conditions. For recalling setting conditions, see section 4.7.

CAUTION

Since connection to the input terminal of this instrument may differ depending on functions, be careful. If the connection method is different, use the procedure below:

- Disconnect the measurement signal. Remove the test lead, probe, cable, and the like from this instrument.
- Use the SETUP SAVE/RECALL menu to recall the setting conditions of the next function.
- Connect the measurement signal of the next function to the proper location. For the connection method of each function, see sections 4.3.1 to 4.3.10.

ATTENTION

La connexion à la borne d'entrée de cet instrument pouvant diverger selon les fonctions, prendre toutes les mesures nécessaires. Si le mode de connexion est différent, suivre la procédure ci-dessous :

- Débrancher la connexion du signal de mesure. Enlever le câble d'essai, la sonde, le câble et autres dispositifs de cet instrument.
- Utiliser le menu SETUP SAVE/RECALL (enregistrer/rappeler la configuration) pour appeler l'état de réglage de la fonction suivante.
- Connecter le signal de mesure de la fonction suivante au bon endroit. Pour le mode de connexion de chaque fonction, voir les sections 4.3.1 à 4.3.10.

4.2 Before Starting Measurement

For beginners who are making measurements using this instrument for the first time

We recommend that you prepare each function in section 4.3 and make measurements by referring to the following measurement flow chart. The flow chart does not assume a particular function.

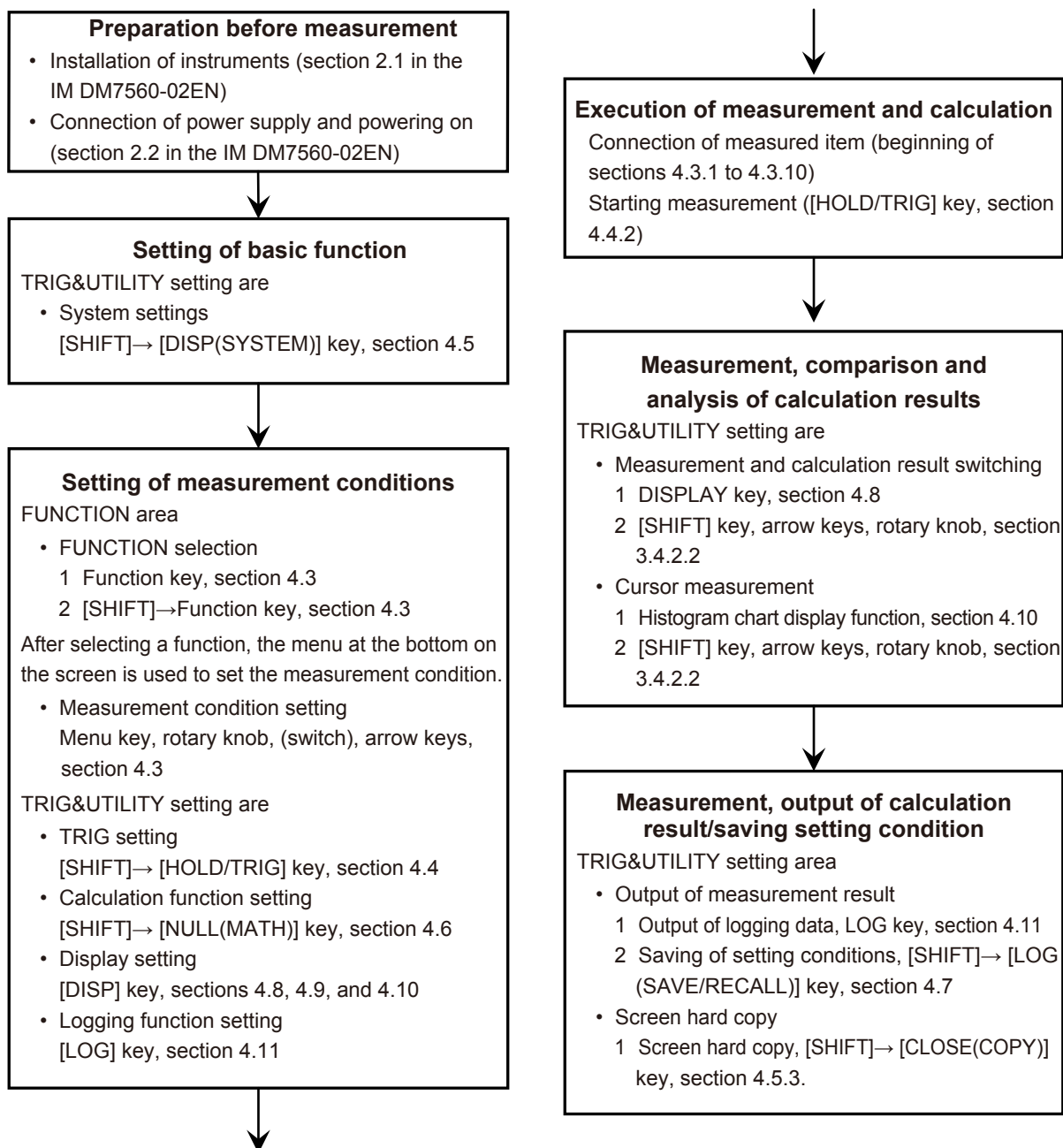


Figure 4.2 Measurement flow chart

4.3 Measurement Function

This section describes the 10 functions available in the FUNCTION area.

4.3.1 DC voltage measurement (DCV)

DC voltage measurement has five ranges from 100 mV to 1000 V.

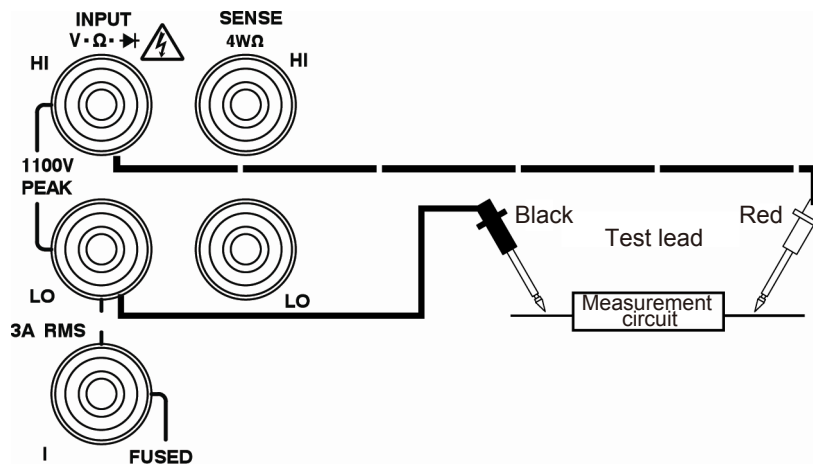
(For detailed specifications, see section 4.2.1 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

AVERTISSEMENT

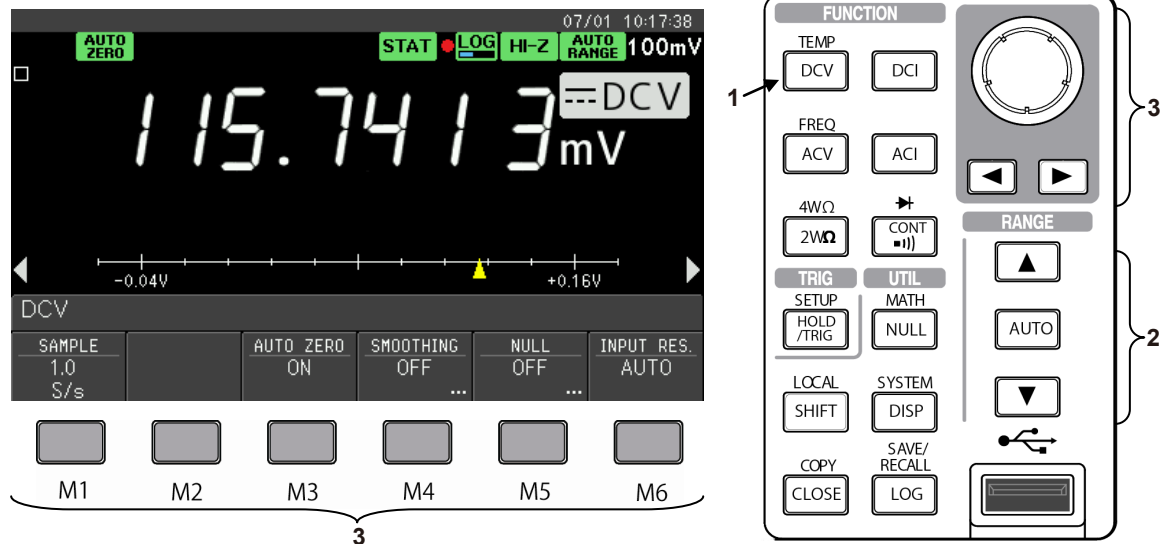
Pour éviter tout choc électrique, voir « 4.1.1 Précautions à prendre lors de la connexion du câble d'essai. »



- Connect the black test lead to INPUT $V \cdot \Omega \cdot \rightarrow$ LO terminal and the measured circuit.
- Connect the red test lead to INPUT $V \cdot \Omega \cdot \rightarrow$ HI terminal and the measured circuit.

4.3 Measurement Function

- 1 Press [DCV], and specify DCV measurement.
- 2 Select the suitable range by pressing [AUTO] or the up/down key to set it manually.
- 3 DCV measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, “Basic operation of menus.” For the settings on the DCV menu, see “DCV menu items and settings” on the next page.



DCV menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
SAMPLE Note: Selections of the sampling rate differ depending on the power supply frequency and ON/OFF setting of AUTOZERO. For details, see SAMPLE (sampling rate) on the next page.		Set the sampling rate using one of the following five types.	—
	• DEFAULT	• 20 PLC (at 50 Hz) or 24PLC (at 60 Hz) is set.	—
	• 20PLC (24PLC)	• 20 PLC (at 50 Hz) or 24PLC (at 60 Hz) is set.	
	• 5PLC (6PLC)	• 5 PLC (at 50 Hz) or 6PLC (at 60 Hz) is set.	
	• 1PLC	• 1 PLC (at 50 or 60 Hz) is set.	
	* Numeric selection	* The sampling rate in the SAMPLE table can be selected by turning the rotary knob.	
AUTOZERO		Select from the following three options.	6.3
	• OFF	• AutoZero is executed once when the function is switched, and that value is applied to the subsequent measurement.	—
	• ONCE	• AutoZero is executed once when the ONCE key is pressed, and that value is applied to the subsequent measurement. As a setting value of AUTO ZERO, OFF is displayed.	
	• ON	• For every measurement, AUTO ZERO is performed.	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	—
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT The average count is set to 10. * Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed.	—
		• ON Difference calculation is executed with the NULL value being set by NULL VAL below.	
	• NULL VAL	• DEFAULT The default NULL value (i.e. +0.000000 V) is used.	
		• GET VAL The current measured value (RAW) is set as NULL value.	
		• +/- The sign (+ or -) can be set by pressing the M3 key.	
		• Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob. * Numeric selection Set the NULL value using arrow keys and the rotary knob.	
INPUT RES.		Select the input impedance of the input terminal.	—
	• 10 MΩ	• The input impedance is fixed to 10 MΩ.	—
	• AUTO	• The input impedance is set to HI-Z for measurement ranges that HI-Z (10 V or less) is possible. Otherwise, 10 MΩ is set.	

4.3 Measurement Function

SAMPLE (sampling rate)

At sampling rates lower than 100 S/s, the available SAMPLE options vary depending on the power supply frequency and the ON/OFF state of AUTO ZERO as shown in the table below.

At sampling rates of 100 S/s or higher, the available SAMPLE options do not vary depending on the ON/OFF state of AUTO ZERO as shown in the table below, but the PLC conversion value changes between 50 Hz and 60 Hz power supply frequency. If Auto Zero is set to ON at sampling rates of 100 S/s or higher, the same action is executed as when AUTO ZERO is set to ONCE; i.e. Auto Zero is executed once and that value is applied to the subsequent measurement. (For details of AUTO ZERO function, see section 6.3.)

50 Hz		60 Hz		Number of displayed digits	Remarks
SAMPLE (S/s, sampling rate* ¹)	PLC conversion value* ²	SAMPLE (S/s, sampling rate* ¹)	PLC conversion value* ²		
Screen display		Screen display			
2.5(1)	20	2.5(1)	24	6 and 1/2 digits	() shows values for AUTOZERO ON or 4 WΩ.
10(4)	5	10(4)	6		
50(20)	1	60(20)	1		
100	0.5	100	0.6	5 and 1/2 digits	SAMPLE on the left is displayed as the selection regardless of ON/OFF setting of AUTOZERO (except for 4 WΩ).
500	0.1	500	0.12		
1 k	0.05	1 k	0.06		
2 k	25 m	2 k	0.03		
7.5 k	6.67 m	7.5 k	8 m		
15 k	3.33 m	15 k	4 m		
30 k	1.67 m	30 k	2 m		

*1 In normal measurement, data acquisition without dropouts at a set cycle of the sampling rate is not guaranteed. To acquire continuous data without dropouts, set the log function mode to BULK. (Refer to section 4.11.2.)

*2 PLC conversion value: Value corresponding to sampling cycle/power supply cycle

Note

- If INPUT RES. (input impedance) is AUTO and "Free Run" is set when the input terminal is opened, the measurement value may gradually increase or "OVERLOAD" may be displayed. This is not a failure.
- For measurements of low level voltages, see "Measurement of low level voltage (100 mV range or less)" in section 6.2.1.
- Caution is required after measuring high voltage (300 Vrms or more) or high current (1 A or more). See "Precaution on settling" in section 6.1.

4.3.2 AC voltage measurement (ACV)

AC voltage measurement has five ranges from 100 mV to 750 V.

This function allows TRUE RMS (true root mean squared value) to be used for measurement; i.e. true root mean squared value such as sine wave, triangle wave, SCR waveform, and square wave can be measured (For detailed specifications, see section 4.2.2 in the IM DM7560-02EN.).

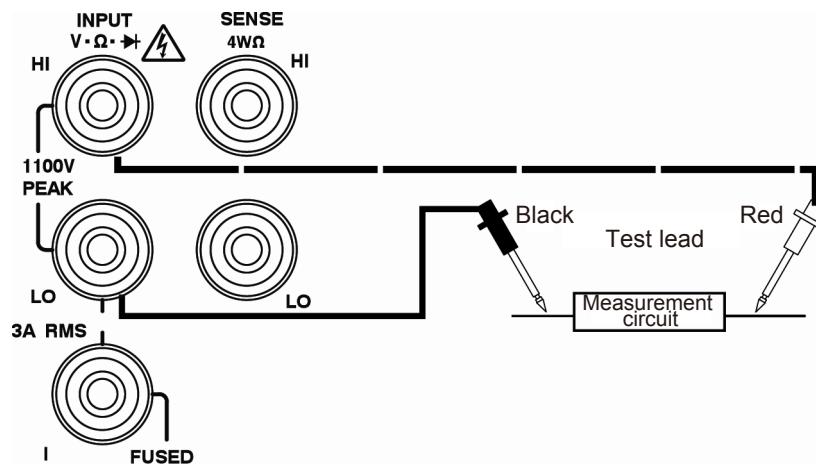
WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Précautions à prendre lors de la connexion du câble d'essai. »

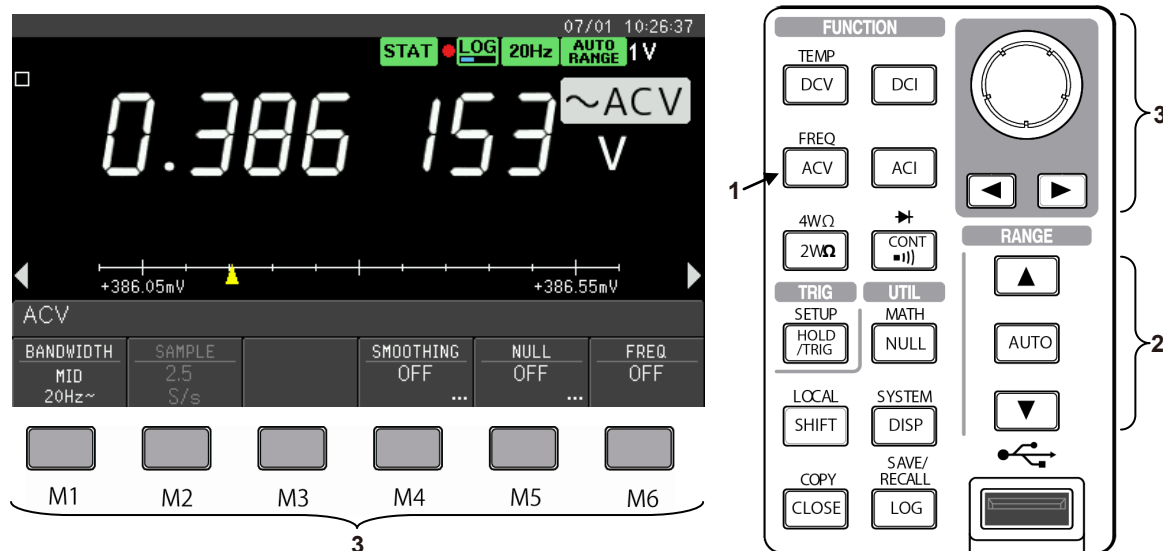
4



- Connect the black test lead to INPUT V · Ω · ⚡ LO terminal and the measured circuit.
- Connect the red test lead to INPUT V · Ω · ⚡ HI terminal and the measured circuit.

4.3 Measurement Function

- 1 Press [ACV], and specify ACV measurement.
- 2 Select the suitable range by pressing [AUTO] or the up/down key to set it manually.
- 3 ACV measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, “Basic operation of menus.” For the settings on the ACV menu, see “ACV menu items and settings” on the next page.



ACV menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
BANDWIDTH		Two frequency ranges below are selected.	—
	• MID	• 20 Hz-300 kHz (750V range: 20 Hz-100 kHz)	6.2.2
	• HIGH	• 200 Hz-300 kHz (750V range: 200 Hz-100 kHz)	
SAMPLE Note: Selections of the sampling rate differ depending on the power supply frequency and ON/OFF setting of BANDWIDTH. For details, see SAMPLE (sampling rate) in next page.		Set the sampling rate using one of the following five types. (The following set value is for BANDWIDTH:HIGH.)	—
	• DEFAULT	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	—
	• 20PLC (24PLC)	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	
	• 5PLC (6PLC)	• 5 PLC (at 50 Hz) or 6 PLC (at 60 Hz) is set.	
	• 1PLC	• 1 PLC (at 50 or 60Hz) is set.	
	*Numeric selection	* The sampling rate in the SAMPLE table on the next page can be selected by turning the rotary knob.	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	—
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT The average count is set to 10.	
		* Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed. • ON Difference calculation is executed with the NULL value being set by NULL VAL below.	—
	• NULL VAL	• DEFAULT : Adjust the NULL value to +0.000000 the V. • GET VAL When the numerical value is set with the rotary knob and the arrow key, and the M2 is pressed, measurements (RAW) are set as NULL value. • +/- The sign (+ or -) can be set by pressing the M3 key. • Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob. * Numeric setting Set the NULL value with the rotary knob and arrow keys.	
FREQ		Select on/off to set whether to display the frequency in the sub-measurement result in the measurement result of ACV measurement.	2.3.3.1
	• OFF	• Do not display the frequency.	—
	• ON	• Display the frequency in the sub-measurement result.	

Note

- For low frequency measurement, see “Voltage measurement and current measurement at low frequencies” in section 6.2.2.
- Caution is required after measuring high voltage (300 Vrms or more) or high current (1 A or more). See “Precaution on settlings” in section 6.1.

SAMPLE (sampling rate)

Power supply frequency	50Hz		60Hz	
BANDWIDTH setting	HIGH	MID	HIGH	MID
SAMPLE (sampling rate)	2.5 S/s (20PLC)	2.5 S/s (20PLC) fixed	2.5 S/s (24PLC)	2.5 S/s (24PLC) fixed
	10 S/s (5PLC)		10 S/s (6PLC)	
	50 S/s (1PLC)		60 S/s (1PLC)	

The sampling rate in the table above is satisfied with the following display digits.

- Display digit: 6 and 1/2 digits

4.3.3 DC current measurement (DCI)

DC current measurement has five ranges from 1 mA to 3 A.

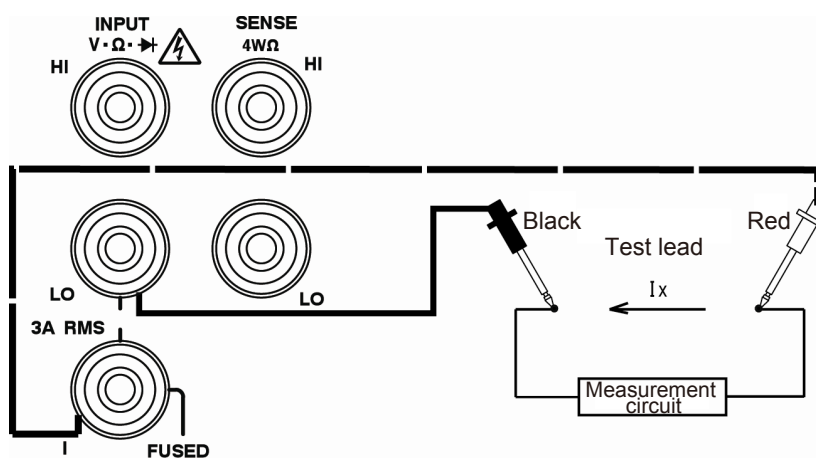
(For detailed specifications, see section 4.2.3 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

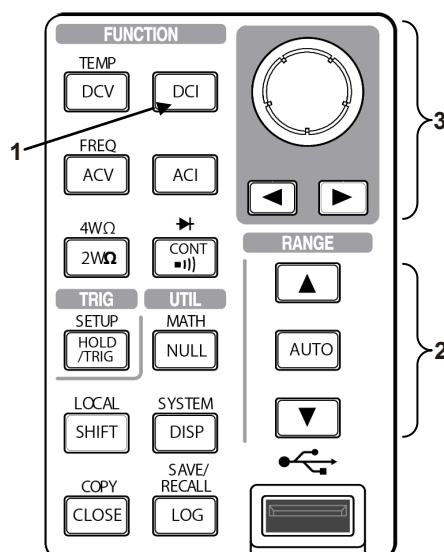
AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »



- Connect the black test lead to LO terminal and the red to the I terminal.
- Disconnect the measured circuit, and connect the tip of the test leads to the circuit in series.

- 1 Press [DCI], and specify DCI measurement.
- 2 Select the suitable range by pressing [AUTO] or the up/down key to set it manually.
- 3 DCI measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, "Basic operation of menus." For the settings on the DCI menu, see "DCI menu items and settings" on the next page.



DCI menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
SAMPLE Note: Selections of the sampling rate differ depending on the power supply frequency and ON/OFF setting of AUTOZERO. For details, see SAMPLE (sampling rate) of section 4.3.1.		Set the sampling rate using one of the following five types.	IM DM7560-02EN
	• DEFAULT	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	4.3.1
	• 20PLC (24PLC)	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	
	• 5PLC (6PLC)	• 5 PLC (at 50 Hz) or 6 PLC (at 60 Hz) is set.	
	• 1PLC	• 1 PLC (at 50 or 60 Hz) is set.	
	* Numeric selection	* The sampling rate in the SAMPLE table can be selected by turning the rotary knob.	
AUTOZERO		Select from the following three options.	6.3
	• OFF	• AutoZero is executed once when the function is switched, and that value is applied to the subsequent measurement.	–
	• ONCE	• AutoZero is executed once when the ONCE key is pressed, and that value is applied to the subsequent measurement. As a setting value of AUTO ZERO, OFF is displayed.	
	• ON	• For every measurement, AUTO ZERO is performed.	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	–
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT The average count is set to 10. * Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed.	–
		• ON Difference calculation is executed with the NULL value being set by NULL VAL below.	
	• NULL VAL	• DEFAULT The default of the NULL value (i.e. +0.000000 A) is used.	
		• GET VAL The current measurement value (RAW) is set to the NULL value.	
		• +/- The sign (+ or -) can be set by pressing the M3 key.	
		• Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob. * Numeric selection NULL value is set by arrow keys and the rotary knob.	

CAUTION

- All ranges are common to the I-LO input, and the maximum permissible input is continuous 3 ADC or 3 Arms (protect it with 3 A fuse). Do not input an excessive electric current. (For detailed specifications, refer to section 4.2.3 in the IM DM7560-02EN.)
- Circuits that generate voltages exceeding 250 V between the measurement terminals can not be measured if the protection fuse (3 A) at the current measurement terminal of this instrument is blown. It may cause malfunction.

ATTENTION

- Toutes les plages sont communes à l'entrée I-LO et l'entrée maximale admise est 3 ADC continu ou 3 Arms continu (la protéger avec un fusible de 3 A). Ne pas alimenter avec un courant excessif. (Voir la section 4.2.3 dans le manuel d'instructions DM7560-02EN pour plus de détails.)
- Si le fusible de protection (3 A) pour la borne de mesure du courant de cet instrument a fondu, le courant sur le circuit mesuré qui fait que la tension dépasse 250 V entre les bornes mesurées ne peut pas être mesuré. Ceci peut être à l'origine d'un dysfonctionnement.

Note

Caution is required after measuring high voltage (300 Vrms or more) or high current (1 A or more). See "Precaution on settlings" in section 6.1.

4.3.4 AC current measurement (ACI)

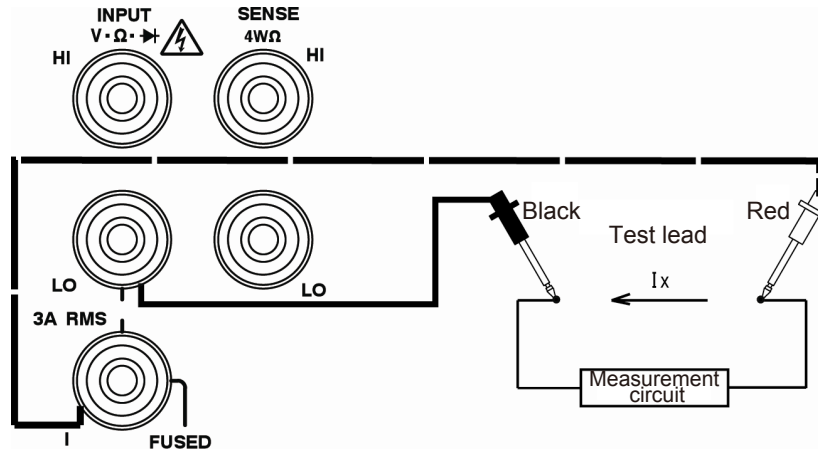
The AC current measurement has two ranges: 1 A and 3 A. This function allows the analog calculation type TRUE RMS (true root mean squared value) to measure the AC current; i.e. true root mean squared value such as sine wave, triangle wave, SCR waveform, and square wave can be measured. (For detailed specifications, see section 4.2.4 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

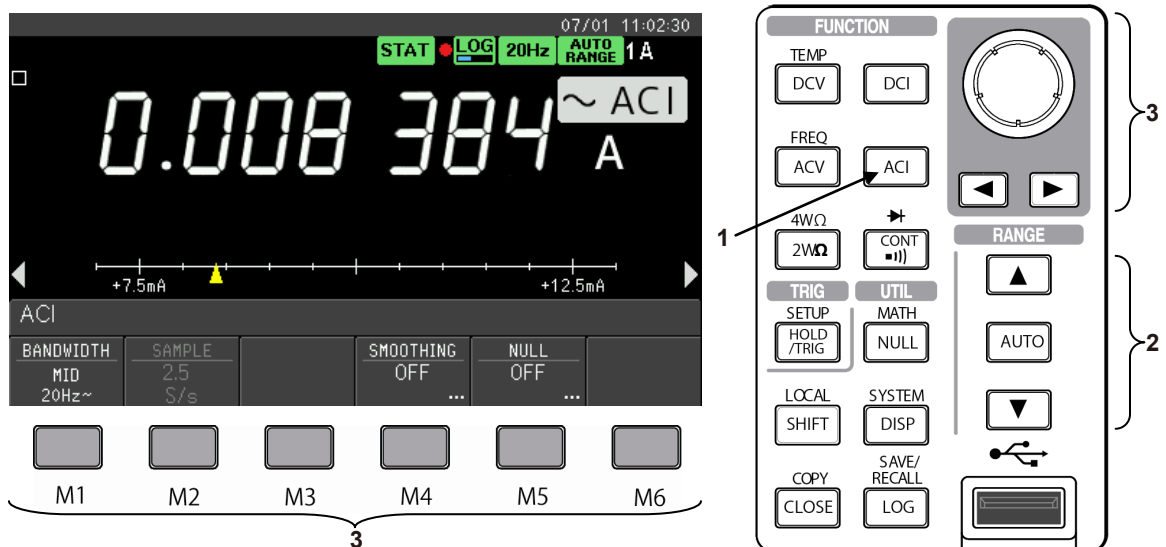
AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »



- Connect the black test lead to LO terminal and the red to the I terminal.
- Disconnect the measured circuit, and connect the tip of the test leads to the circuit in series.

- 1** Press [ACI], and specify ACI measurement.
- 2** Select the suitable range by pressing [AUTO] or the up/down key to set it manually.
- 3** ACI measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, “Basic operation of menus.” For the settings on the ACI menu, see “ACI menu items and settings” on the next page.



4.3 Measurement Function

ACI menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
BANDWIDTH		Select either of two frequency ranges below.	—
	• MID	• 20 Hz to 5 kHz	6.2.2
	• HIGH	• 200 Hz to 5 kHz	
SAMPLE Note: Selections of the sampling rate differ depending on the power supply frequency and setting of BANDWIDTH. For details, see SAMPLE (sampling rate) of section 4.3.2.		Set the sampling rate using one of the following five types. (The following set value is for BANDWIDTH:HIGH.)	—
	• DEFAULT	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	4.3.2
	• 20PLC (24PLC)	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	
	• 5PLC (6PLC)	• 5 PLC (at 50 Hz) or 6 PLC (at 60 Hz) is set.	
	• 1PLC	• 1 PLC (at 50 or 60 Hz) is set.	
	* Numeric selection	* The sampling rate in the SAMPLE table can be selected by turning the rotary knob.	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	—
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT The average count is set to 10.	
		* Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed.	—
		• ON Difference calculation is executed with the NULL value being set by NULL VAL below.	
	• NULL VAL	• DEFAULT The default of the NULL value (i.e. +0.000000 A) is set.	
		• GETVAL The current measurement value (RAW) is set to the NULL value.	
		• +/- The sign (+ or -) can be set by pressing the M3 key.	
		• Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.	
		* Numeric selection NULL value is set by arrow keys and the rotary knob.	

CAUTION

- All ranges are common to the I-LO input, and the maximum permissible input is continuous 3 ADC or 3 Arms (protect it with 3 A fuse). Do not input an excessive electric current. (For detailed specifications, refer to section 4.2.3 in the IM DM7560-02EN.)
 - Circuits that generate voltages exceeding 250 V between the measurement terminals can not be measured if the protection fuse (3 A) at the current measurement terminal of this instrument is blown. It may cause malfunction.
-
-

ATTENTION

- Toutes les plages sont communes à l'entrée I-LO et l'entrée maximale admise est 3 ADC continu ou 3 Arms continu (la protéger avec un fusible de 3 A). Ne pas alimenter avec un courant excessif. (Voir la section 4.2.3 dans le manuel d'instructions DM7560-02EN pour plus de détails.)
 - Si le fusible de protection (3 A) pour la borne de mesure du courant de cet instrument a fondu, le courant sur le circuit mesuré qui fait que la tension dépasse 250 V entre les bornes mesurées ne peut pas être mesuré. Ceci peut être à l'origine d'un dysfonctionnement.
-
-

Note

- For low frequency measurement, see "Voltage measurement and current measurement at low frequencies" in section 6.2.2.
 - Caution is required after measuring high voltage (300 Vrms or more) or high current (1 A or more). See "Precaution on settlings" in section 6.1.
-

4.3.5 2-terminal resistance measurement ($2W\Omega$)

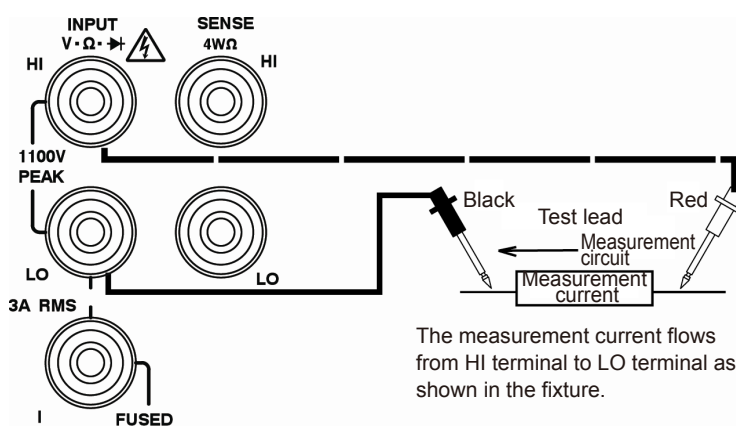
This function measures the resistance using two test leads. The 2-terminal resistance measurement has seven ranges from $100\ \Omega$ to $100\ M\Omega$. The measurement value includes an error between the resistance of the test lead itself and the contact resistance. The error can be canceled when making measurement by shorting the tip of the test leads in advance and turning on the NULL calculation. (See section 4.6.2. The NULL value is obtained using GET VAL when the test leads are shorted.) (For detailed specifications, see section 4.2.5 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

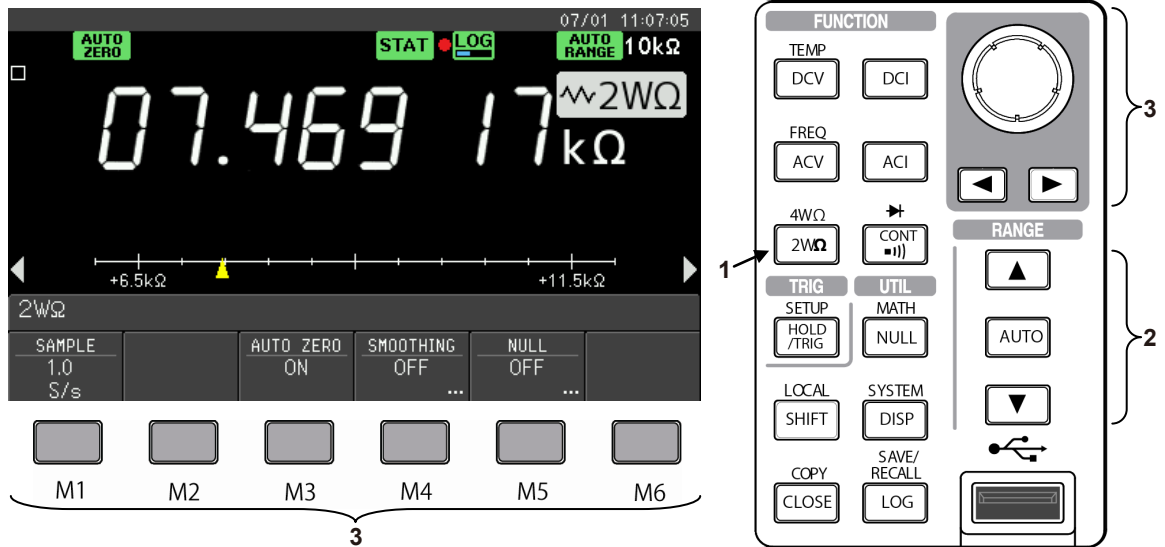
AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »



- Connect the black test lead to INPUT $V \cdot \Omega \cdot \text{LO}$ terminal and the measured resistance.
- Connect the red test lead to INPUT $V \cdot \Omega \cdot \text{LO}$ terminal and the measured resistance.

- 1 Press [2WΩ], and specify 2WΩ measurement.
- 2 Select the suitable range by pressing [AUTO] or the up/down key to set it manually.
- 3 2WΩ measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen (outside). For the operation, see section 3.2.1, “Basic operation of menus.” For the settings on the 2WΩ menu, see “2WΩ menu items and settings” on the next page.



4.3 Measurement Function

2WΩ menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
SAMPLE Note: Selections of the sampling rate differ depending on the power supply frequency and ON/OFF setting of AUTOZERO. For details, see SAMPLE (sampling rate) of 4.3.1.		Set the sampling rate using one of the following five types.	—
	• DEFAULT	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	4.3.1
	• 20PLC (24PLC)	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	
	• 5PLC (6PLC)	• 5 PLC (at 50 Hz) or 6 PLC (at 60 Hz) is set.	
	• 1PLC	• 1 PLC (at 50 or 60 Hz) is set.	
	* Numeric selection	* The sampling rate in the SAMPLE table can be selected by turning the rotary knob.	
AUTOZERO		Select from the following three options.	—
	• OFF	• AutoZero is executed once when the function is switched, and that value is applied to the subsequent measurement.	—
	• ONCE	• AutoZero is executed once when pressing ONCE key and that value is applied to the subsequent measurement. As a setting value of AUTO ZERO, OFF is displayed.	
	• ON	• For every measurement, AUTO ZERO is performed.	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	—
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT The average count is set to 10.	
		* Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed.	—
		• ON Difference calculation is executed with the NULL value being set by NULL VAL below.	
	• NULL VAL	• DEFAULT The default of the NULL value (i.e. +0.000000 Ω) is set.	
		• GET VAL The current measurement value (RAW) is set to the NULL value.	
		• +/- The sign (+ or -) can be set by pressing the M3 key.	
		• Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.	
		* Numeric selection NULL value is set by arrow keys and the rotary knob.	

Note

- For measurement of high and low resistance, see "High resistance measurement" and "Low resistance measurement" in section 6.2.3.

4.3.6 4-terminal resistance measurement (4W Ω)

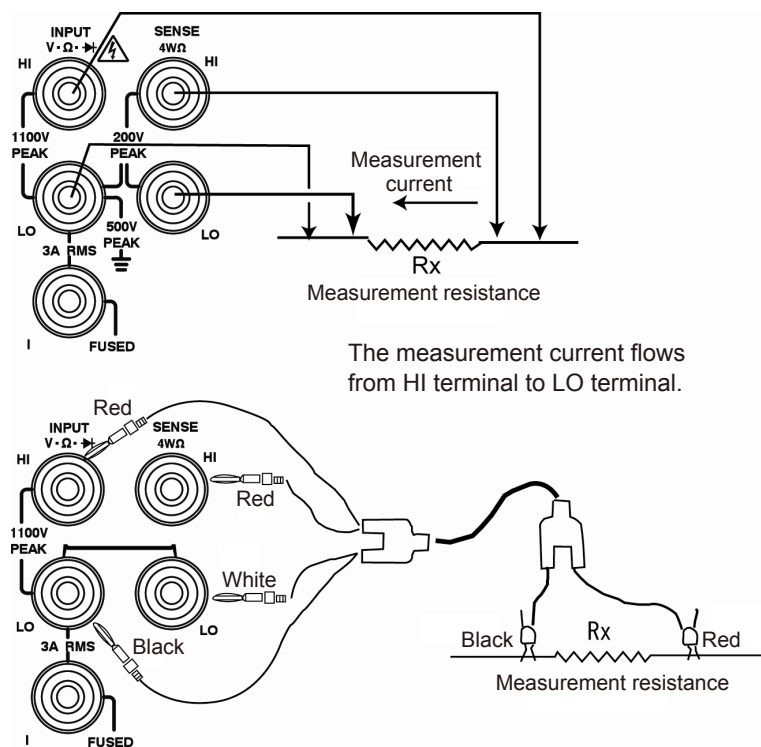
This function measures the resistance using four test leads. The 4-terminal resistance measurement has seven ranges from 100 Ω to 100 M Ω . This function can make stable low resistance measurements by deleting the resistance of the test lead itself and the contact resistance between the measured resistance and the test lead. (For details, see section 4.2.5 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »

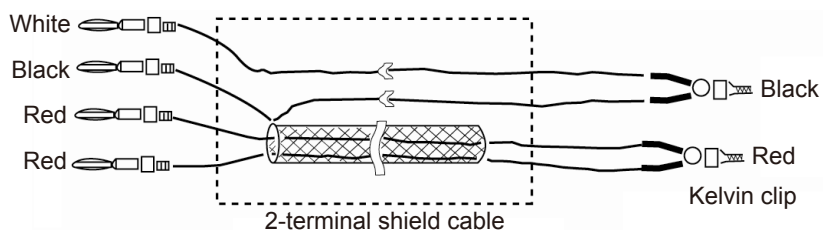


Connection method when using 4-terminal resistance measurement cable

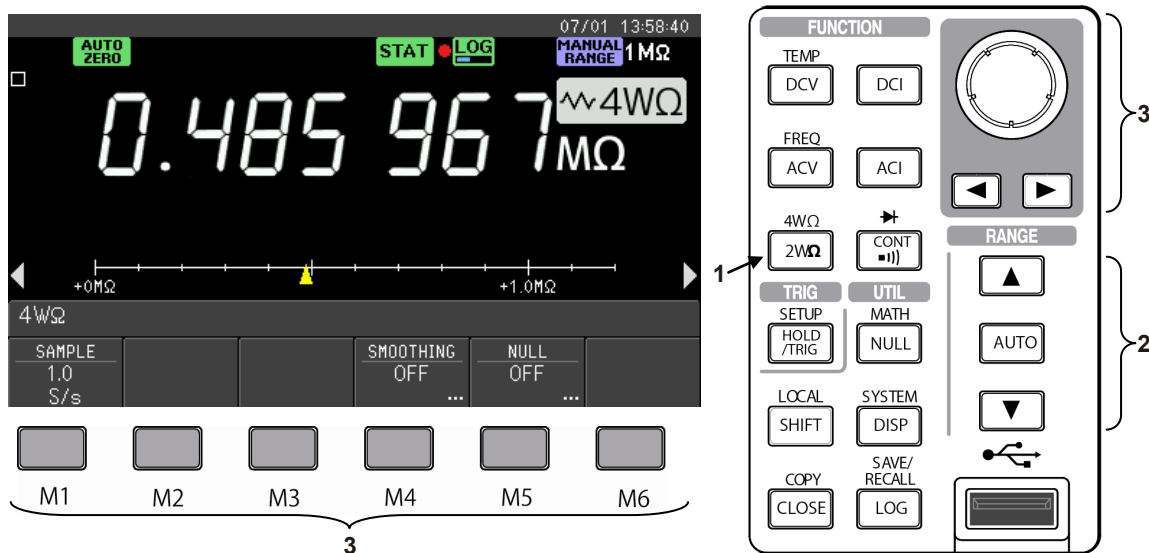
- Connect the red banana terminals to INPUT V · Ω · Hz HI terminal and SENSE 4W Ω HI terminal.
- Connect the white banana terminal to SENSE 4W Ω LO terminal and the black banana terminal to INPUT V · Ω · Hz LO terminal.
- Connect the red Kelvin clip to one side of the measured resistance.
- Connect the black Kelvin clip to the other side of the measured resistance.

4.3 Measurement Function

Internal wiring of 4-terminal resistance measurement cable (example)



- 1 Press [SHIFT]→[2WΩ(4WΩ)], and specify 4 WΩ measurement.
- 2 Select the suitable range by pressing [AUTO] or the Up/down key in the manual operation.
- 3 4 WΩ measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen (outside). For the operation, see section 3.2.1, “Basic operation of menus.” For the settings on the 4 WΩ menu, see “4 WΩ menu items and settings” on the next page.



4WΩ menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
SAMPLE Note: Selections of the sampling rate differ depending on the power supply frequency. For details, see section 4.3.1 SAMPLE (sampling rate).		Set the sampling rate using one of the following five types.	—
	• DEFAULT	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	4.3.1
	• 20PLC (24PLC)	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	
	• 5PLC (6PLC)	• 5 PLC (at 50 Hz) or 6 PLC (at 60 Hz) is set.	
	• 1PLC	• 1 PLC (at 50 or 60 Hz) is set.	
	* Numeric selection	* The sampling rate in the SAMPLE table can be selected by turning the rotary knob.	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	—
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT The average count is set to 10. * Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed.	—
		• ON Difference calculation is executed with the NULL value being set by NULL VAL below.	
	• NULL VAL	• DEFAULT The default of the NULL value (i.e. +0.000000 Ω) is set.	
		• GET VAL The current measurement value (RAW) is set to the NULL value.	
		• +/- The sign (+ or -) can be set by pressing the M3 key.	
		• Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob. * Numeric selection NULL value is set by arrow keys and the rotary knob.	

- For the 4WΩ function, the AUTO ZERO function is in the ON state. For details on the AUTO ZERO function, see section 6.3.

Note

- For measurement of high and low resistance, see “High resistance measurement” and “Low resistance measurement” in section 6.2.3.

4.3.7 Continuity test (CONT $\cdot \Omega$)

This function can execute a continuity test while measuring the resistance value. Since the built-in electronic buzzer sounds when the circuit is shorted and does not when the circuit is disconnected, the conduction of the circuit can be checked. Conduction judgment uses the user-setting threshold value (THRESHOLD); i.e. using "measurement value < threshold value."

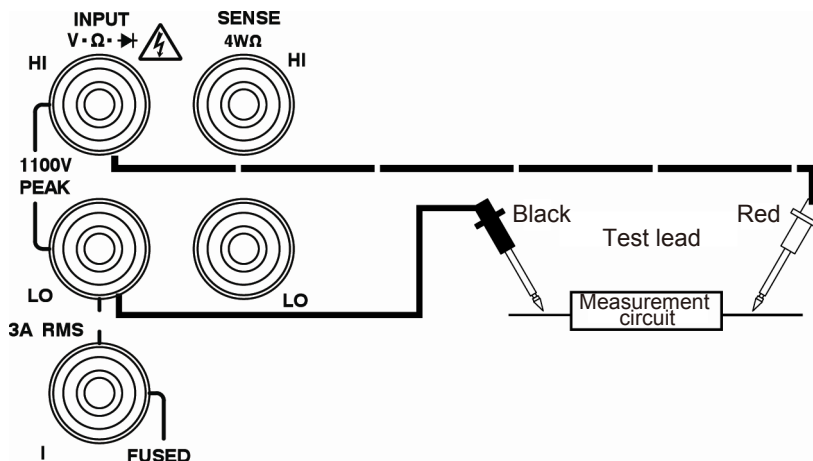
The continuity test uses the 1k Ω range of the resistance measurement. The threshold value range is from 1 Ω to 1000 Ω (default: 10 Ω). (For details, see section 4.2.6 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »

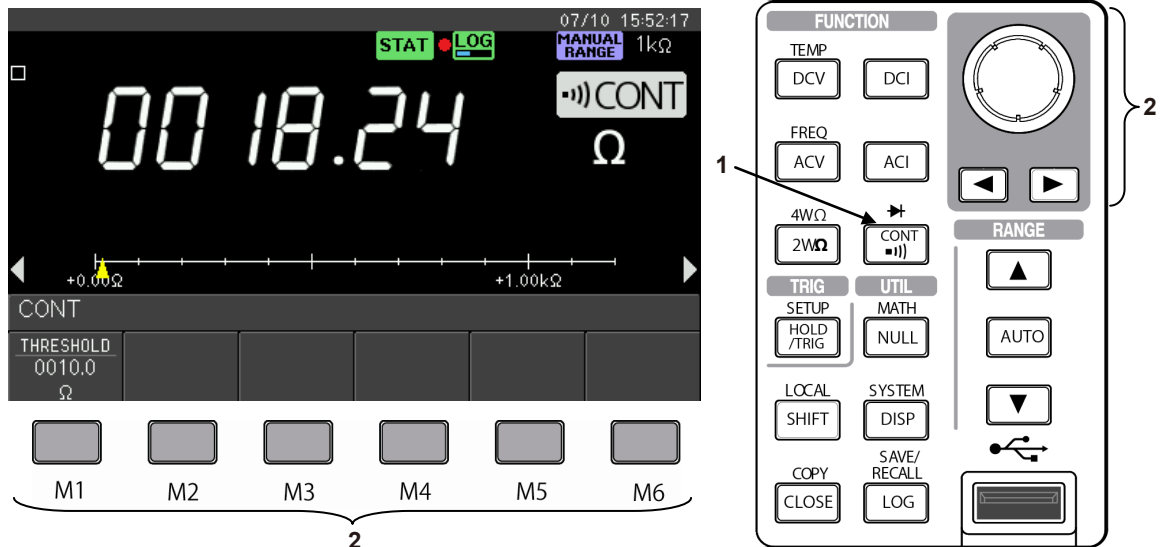


- Connect the black test lead to INPUT V · Ω · $\rightarrow$ LO terminal and the measured resistance.
- Connect the red test lead to INPUT V · Ω · $\rightarrow$ HI terminal and the measured resistance.

- 1 Press [CONT ■||) (→)], and specify continuity test.

*The range is fixed to 1 kΩ, and the range key is invalidated.

- 2 Continuity test measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen (outside). For the operation, see section 3.2.1, "Basic operation of menus." For the settings on the Continuity test menu, see "CONT ■||) menu items and settings" on the next page.



CONT ■||) menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
THRESHOLD		Set the threshold value of the continuity test.	—
	• DEFAULT	• The threshold value is set to 10 Ω.	—
	• GET VAL	• Set the current measurement value as a threshold. Note: Do not set it for the OPEN display. If set below 1 Ω, it is set to 1 Ω.	
	* Numeric setting	• Set the 1.0Ω-1000.0Ω threshold with the rotary knob and the arrow keys.	

The measurement example below shows that the continuity test is executed with the threshold value (THRESHOLD) set to 10 Ω. The resistance value is 7.73 Ω, the buzzer sounds, and the display area of the sub-measurement result indicates "SHORT."



"OPEN" is displayed when resistance is 1000 Ω or more.

4.3.8 Diode measurement (➤)

The function checks the polarity of the diode and diagnoses its failure. It measures and displays the forward voltage of the diode in the forward bias. In the backward bias, it displays over-range for normal diodes.

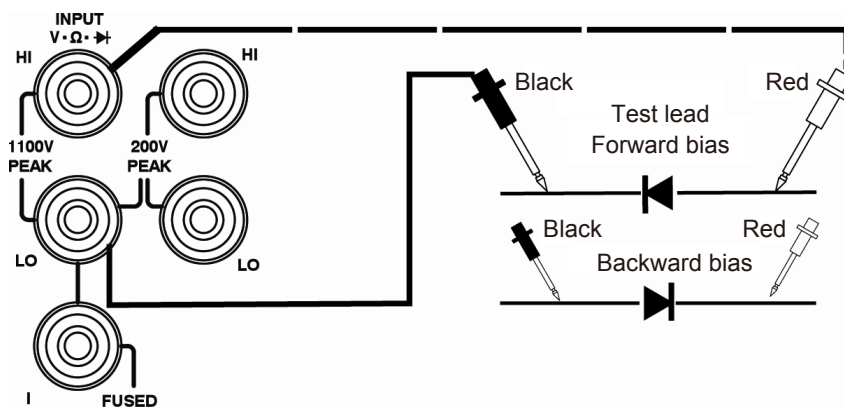
The diode measurement uses 1 V range of the DC voltage measurement. The measurement current is about 1 mA, and the measurement range is from 0.1 mV to 1.1999 V. (For details, see section 4.2.7 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »



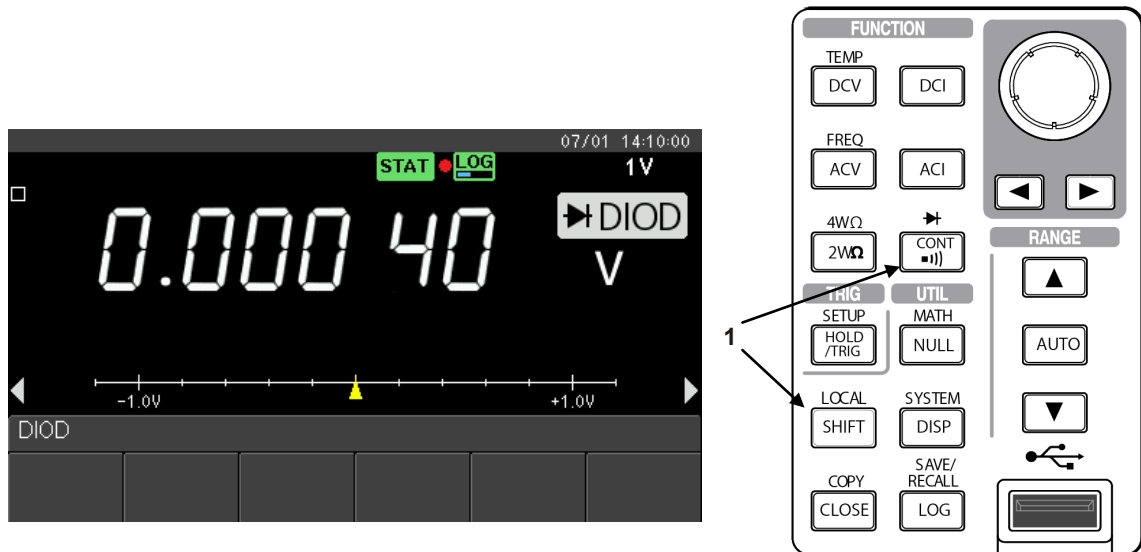
- Connect the black test lead to INPUT V · Ω · ➤ LO terminal and the one side of diode.
- Connect the red test lead to INPUT V · Ω · ➤ HI terminal and the other side of diode.

- 1 Press [SHIFT] → [CONT ■||] (▶), and specify diode measurement.

*The range is fixed to 1V and does not change even if you press the range key.

In addition, the DIOD menu does not have setting items. (See the screen example below.)

The screen example below shows measurement of the forward voltage of the diode.



4.3.9 Temperature measurement (TEMP)

This function can measure the temperature directly by connecting a sensor.

The sensors that you can use are the thermocouple and the resistance temperature detector (RTD (2W): 2-lead type) and the resistance temperature detector (RTD (4W): 4-lead type). (For detailed specifications, see section 4.2.8 and section 4.2.9 in the IM DM7560-02EN.)

- **About thermocouples**

Select R, K, T, J, or E for the thermocouple type.

In measurements using a thermocouple, in principle, the voltage caused by the difference between the temperature at the measurement terminal of this instrument and that of the item measured by the thermocouple is measured. The temperature at the measurement terminal of this instrument is called "cold junction temperature." To improve the measurement accuracy, this instrument requires you to enter the temperature of the measurement terminal.

<How to set the cold junction temperature>

Measure an item whose temperature is known using the thermocouple to be used, and set the cold junction temperature so that this instrument indicates that temperature. When setting the cold junction temperature, this instrument should be installed in the environment where the temperature is actually measured.

- **About resistance temperature detectors**

Select RTD (2W): 2-lead type or RTD (4W): 4-lead type for the sensor, and select the new standard Pt100 or the old standard JPt100 from the menu.

WARNING

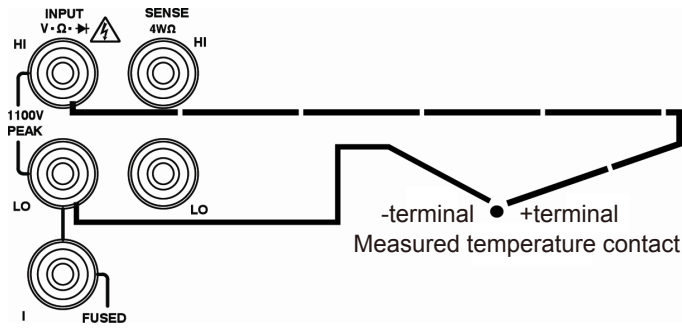
To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

AVERTISSEMENT

Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »

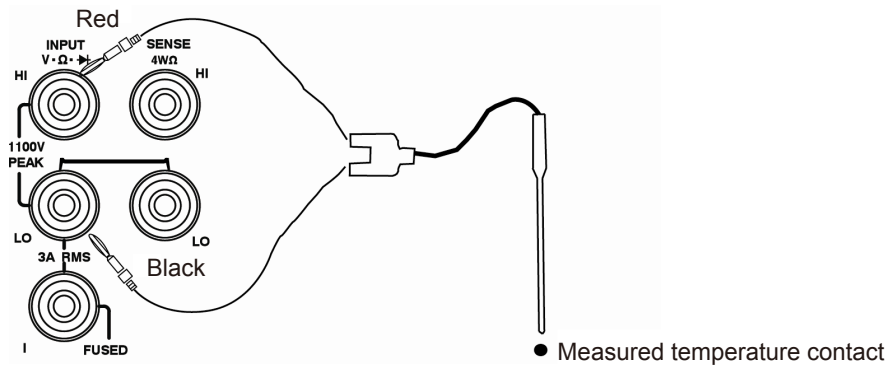
4.3 Measurement Function

Connection method using the thermocouple



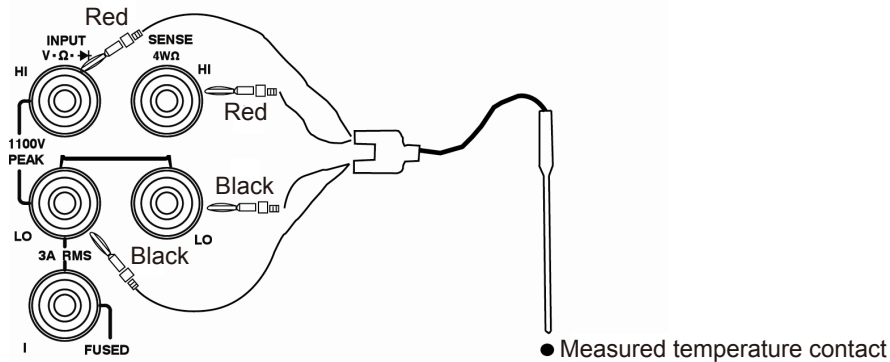
- Connect + terminal of the thermocouple to INPUT V · Ω · Hz HI terminal.
- Connect - terminal of the thermocouple to INPUT V · Ω · Hz LO terminal.
- Connect the tip of the thermocouple (temperature contact) to the measured temperature contact.

Connection method using the resistance temperature detector (RTD(2W): 2-lead type)(example)



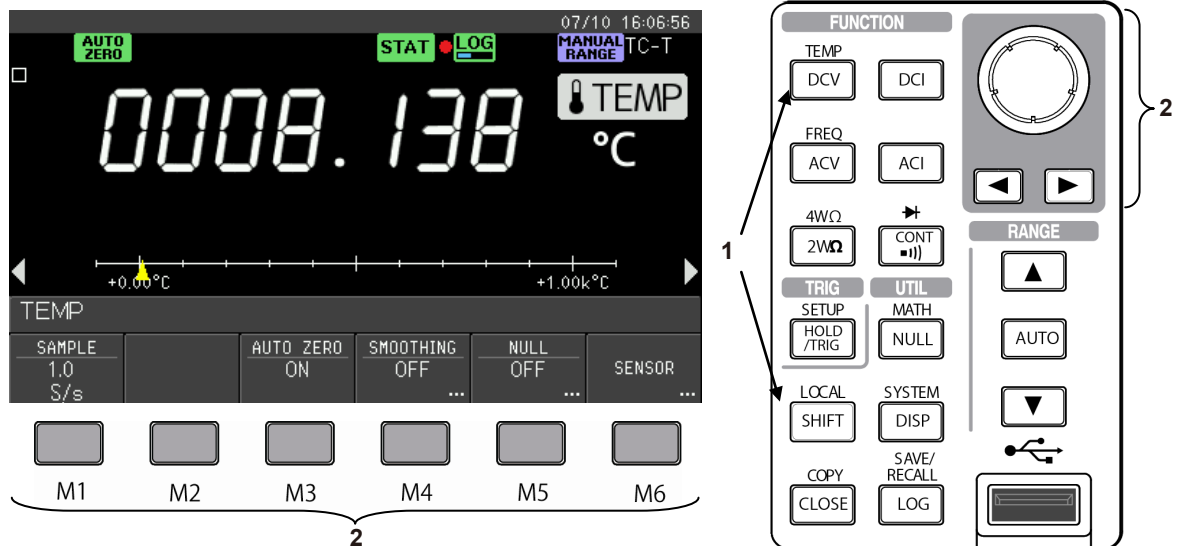
- Connect the red banana terminal of the resistance temperature detector to INPUT V · Ω · Hz HI terminal.
- Connect the black banana terminal of the resistance temperature detector to INPUT V · Ω · Hz LO terminal.
- Connect the tip of the resistance temperature detector to the measured temperature contact.

Connection method using the resistance temperature detector (RTD(4W): 4-lead type) (example)



- Connect the red banana terminal of the resistance temperature detector to INPUT V · Ω · Hz HI terminal.
- Connect the black banana terminal of the resistance temperature detector to INPUT V · Ω · Hz LO terminal.
- Connect the red banana terminal of the resistance temperature detector to the HI terminal of SENSE 4WΩ.
- Connect the black banana terminal of the resistance temperature detector to the LO terminal of SENSE 4WΩ.
- Connect the tip of the resistance temperature detector to the measured temperature contact.

- 1 Press [SHIFT] → [DCV(TEMP)], and specify temperature measurement. There is no range selection, unlike voltage and current measurement. Select the sensor type after step 2.
- 2 Temperature measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen (outside). For the operation, see section 3.2.1, "Basic operation of menus." For the settings on the temperature measurement menu, see "TEMP menu items and settings" on the next page.



4.3 Measurement Function

TEMP menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
SAMPLE Note: Selections of the sampling rate differ depending on the power supply frequency and ON/OFF setting of AUTOZERO. For details, see SAMPLE (sampling rate) of section 4.3.1.		Set the sampling rate using one of the following five types.	—
	• DEFAULT	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	4.3.1
	• 20PLC (24PLC)	• 20 PLC (at 50 Hz) or 24 PLC (at 60 Hz) is set.	
	• 5PLC (6PLC)	• 5 PLC (at 50 Hz) or 6 PLC (at 60 Hz) is set.	
	• 1PLC	• 1 PLC (at 50 or 60 Hz) is set.	
	• Numeric value selection	* The sampling rate in the SAMPLE table can be selected by turning the rotary knob.	
AUTOZERO		Select from the following three options.	6.3
	• OFF	• AutoZero is executed once when the function is switched, and that value is applied to the subsequent measurement.	—
	• ONCE	• AutoZero is executed once when pressing ONCE key and that value is applied to the subsequent measurement.	
	• ON	• For every measurement, AUTO ZERO is performed.	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	—
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT: The average count is set to 10. * Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed.	—
		• ON Difference calculation is executed with the NULL value being set by NULL VAL below.	
	• NULL VAL	• DEFAULT The default of the NULL value (i.e. +0.000000°C) is set.	
		• GET VAL The current measurement value (RAW) is set to the NULL value.	
		• +/- The sign (+ or -) can be set by pressing the M3 key.	
		• Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob. * Numeric selection NULL value is set by arrow keys and the rotary knob.	
SENSOR		Refer to "Items and setting contents of SENSOR menu" on the next page.	-

Items and setting contents of SENSOR menu

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
SENSOR (TC)		This is the menu when the thermocouple (TC) is selected for the sensor (SENSOR). Select TC TYPE and COLD JUNCTION (cold junction temperature) below.	—
	• TC TYPE	• Select R, K, T, J, or E.	—
	• COLD JUNCTION	• DEFAULT Cold junction temperature is set to +0000.000°C. * Numeric value setting Set a numeric value within the range of -50.0°C to +100.0°C using the rotary knob and arrow keys.	
RTD(4W)		This is the menu when the resistance temperature detector RTD (4W) is selected for the sensor. Select RTD TYPE below.	—
	• RTD TYPE	• Pt100 (new standard) • JPt100 (old standard)	—
RTD(2W)		This is the menu when the resistance temperature detector RTD (2W) is selected for the sensor. Select RTD TYPE below.	—
	• RTD TYPE	• Pt100 (new standard) • JPt100 (old standard)	—

Note

- For accurate measurement, see "For accurate temperature measurement" in section 6.2.4.

4.3.10 Frequency measurement (FREQ)

This measures the frequency of the signal applied to the signal input terminal using the reciprocal method. The measurement range of the AC coupling is from 3 Hz to 300 kHz. The number of displayed digits varies depending on the gate time (GATE TIME).

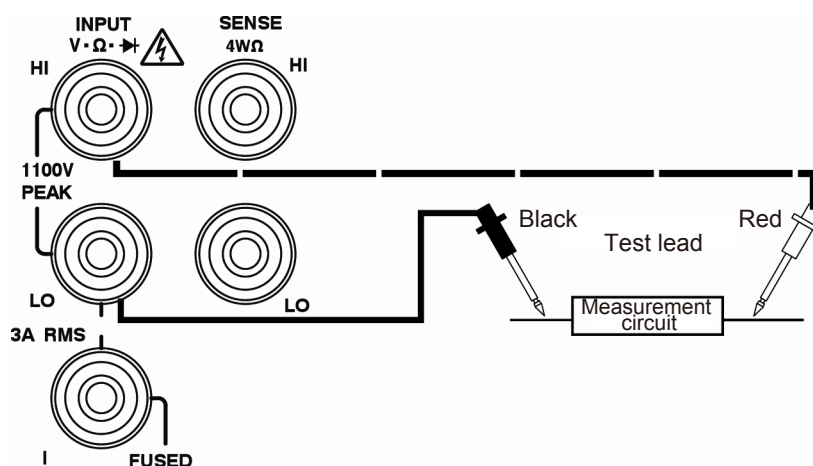
(For details, see section 4.2.10 in the IM DM7560-02EN.)

WARNING

To avoid electric shock, see section 4.1.1, "Cautions when connecting test leads."

AVERTISSEMENT

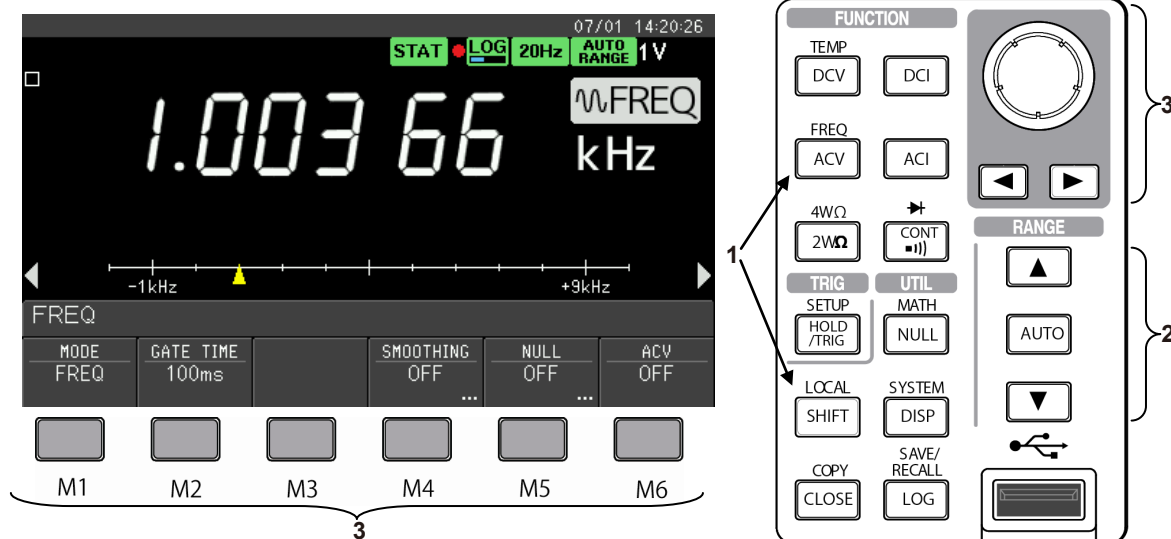
Pour éviter tout choc électrique, voir « 4.1.1 Cautions when connecting test lead. »



- Connect the black test lead to INPUT V · Ω · LO terminal and one side of the measured circuit.
- Connect the red test lead to INPUT V · Ω · HI terminal and the other side of the measured circuit.

4.3 Measurement Function

- 1 Press [SHIFT]→[ACV(FREQ)], and specify frequency measurement.
- 2 Select the suitable range by pressing [AUTO] or the up/down key to set it manually.
- 3 FREQ measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, “Basic operation of menus.” For the settings on the FREQ menu, see “FREQ menu items and settings” on the next page.



FREQ menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Sections
MODE		Select from the following two modes.	—
	• FREQ	• This displays the result of measurement in terms of frequency.	—
	• PERIOD	• This displays the result of measurement in terms of period.	
GATE TIME		Select from the following four gate times	—
	• 1 ms	• Set to 1 ms (measurement: about 20 times, display: 4 digits).	—
	• 10 ms	• Set to 10 ms (measurement: about 10 times, display: 5 digits).	
	• 100 ms	• Set to 100 ms (measurement: about 4 times/second, display: 6 digits).	
	• 1 s	• Set to 1 s (measurement: about 0.5 times/second, display: 7 digits).	
SMOOTHING		Set moving averaging. Set the on/off state of the following two items and the average count.	4.6.1
	• SMOOTHING	• OFF Averaging is not executed.	—
		• ON Averaging is executed with the following LENGTH setting.	
	• LENGTH	• DEFAULT The average count is set to 10. * Numeric value setting Average count is set to an integral number from 2 to 100 using the rotary knob and arrow keys.	
NULL		A difference calculation is executed between NULL calculation setting value (NULL VAL) and the measurement value (RAW). The measurement result is the result of difference calculation. Setting can be done for each function.	4.6.2
	• NULL	• OFF Difference calculation is not executed.	—
		• ON Difference calculation is executed with the NULL value being set by NULL VAL below.	
	• NULL VAL	• DEFAULT The default of the NULL value (i.e.+0.000000 Hz) is set.	
		• GET VAL The current measurement value (RAW) is set to the NULL value.	
		• +/- The sign (+ or -) can be set by pressing the M3 key.	
		• Selecting -9 to +9 or 0 to 9 When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob. * Numeric selection NULL value is set by arrow keys and the rotary knob.	
ACV		Set whether to show the ACV measurement result display with the FREQ sub-measurement result.	2.3.3.1
	• OFF	• The ACV measurement result is not shown.	—
	• ON	• The ACV measurement result is shown.	

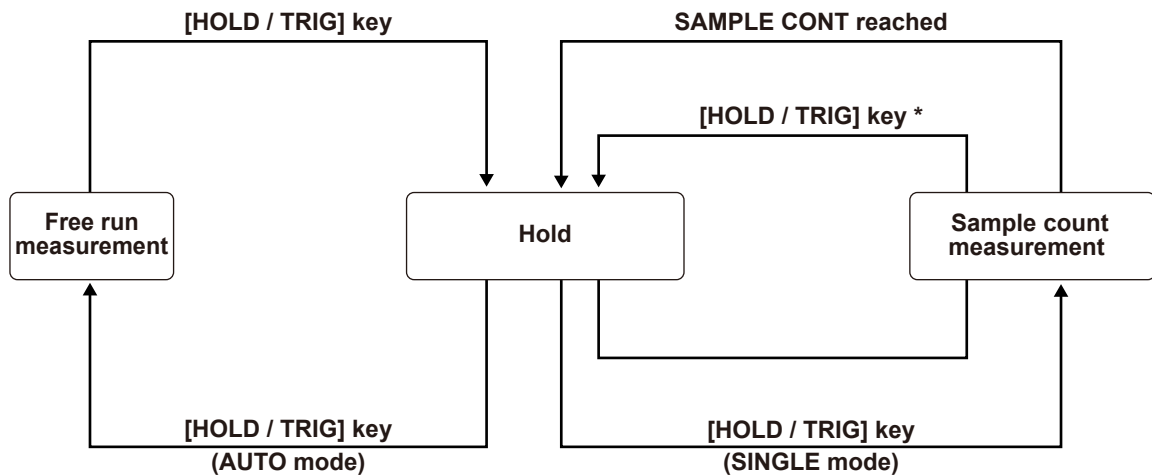
4.4 Trigger Setting (TRIG)

The trigger mode, delay after trigger input, interval time, and external trigger are set with the TRIG menu.

This section describes how to set trigger actions and the settings on the TRIG menu. For trigger specifications, see section 4.3 in the IM DM7560-02EN.

4.4.1 Trigger mode (AUTO/SINGLE)

In each function, measurement is performed according to the conditions set on the TRIG menu and the sampling rate. Figure 4.3 outlines the state transition among these actions.



- Hold: A state in which measurement is not running and a measurement beginning event (pressing the HOLD/TRIG key /External trigger) is being waited for.
 - Free run measurement: A state in which measurement is continuously repeated according to the sampling rate and interval
 - Sample count measurement: A state in which measurement is continuously repeated for the specified sample count according to the sampling rate and interval
- * When the HOLD/TRIG key is pressed when measurement is being performed in single mode, the measurement is interrupted and changed to the hold state even if it hasn't reached the sample count.

Figure 4.3 State transition between free run measurement and hold

These actions and states can be manually changed using keys as described below.

There are two trigger modes: AUTO and SINGLE.

AUTO mode

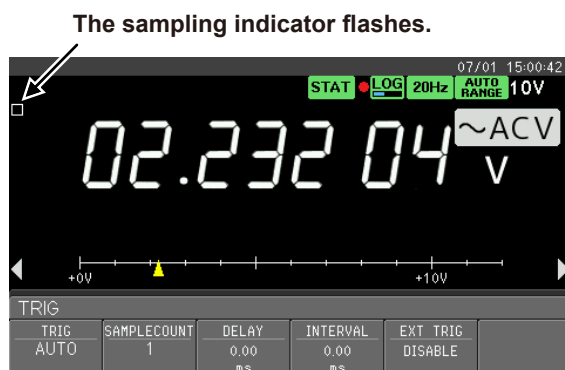
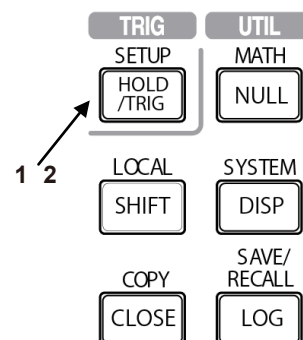
In this mode, the instrument automatically generates triggers and makes repeated measurements in accordance with the preset sampling rate and interval time. You can use [HOLD/TRIG] to start measurement and return the instrument to the hold state.

SINGLE mode

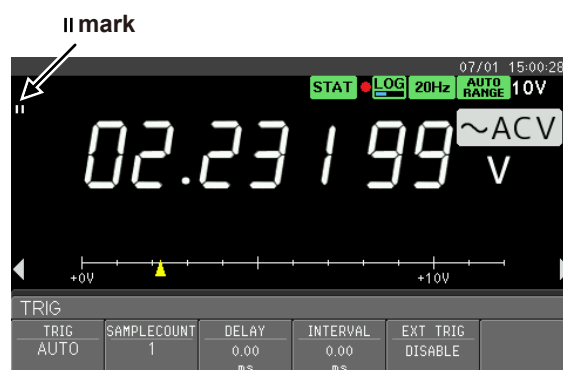
In this mode, the instrument makes a single measurement for the preset samples each time an external trigger* is received or the HOLD/TRIG key is pressed and then returns to the hold state.

* External triggers can be received in the hold state. If this happens, a single mode measurement is performed.

- 1 In the free run state, press [HOLD/TRIG] shown on the right. The instrument changes to the hold state, the sampling indicator on the left screen disappears, and the last measured result is displayed.
- 2 In the hold state in step 1, press [HOLD/TRIG]. The instrument changes to the free run state (AUTO or SINGLE).



Free Run state



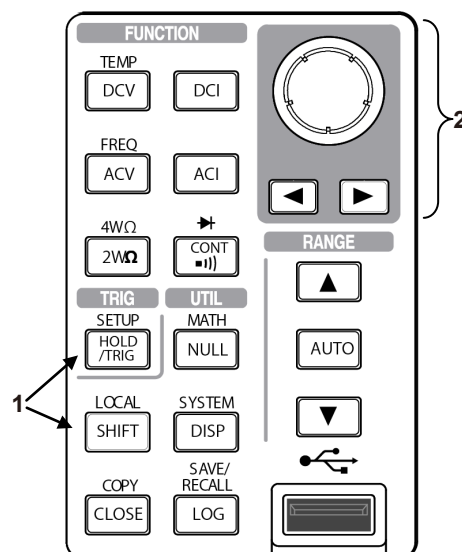
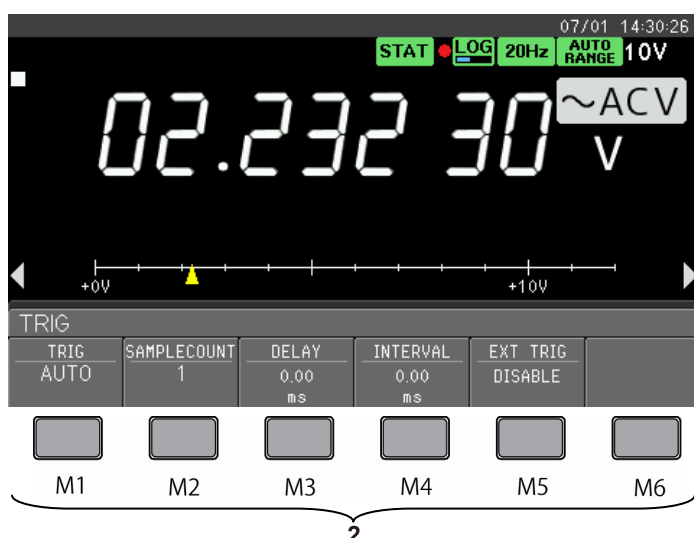
Hold state

In addition to triggers using [HOLD/TRIG], the instrument can receive external triggers through the TRIG IN terminal on the rear panel and remote triggers from a remote control. (For the setting procedure, see 4.4.2.)

4.4.2 TRIG menu setting

This section describes how to set the trigger action and the settings on the TRIG menu.

- 1 Press [SHIFT]→[HOLD/TRIG]. The TRIG menu appears below the screen.
- 2 Set the trigger mode, trigger source, delay after trigger input, and interval time in each of the items on the TRIG menu.
Trigger measurement conditions are set using the menu below the screen; i.e. use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, "Basic operation of menus." For the settings on the TRIG menu, see "TRIG menu items and settings" on the next page.



4.4 Trigger Setting (TRIG)

TRIG menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
TRIG		Select either of two trigger actions below.	—
	• AUTO	• Repeated measurement is performed automatically according to the preset sampling rate in each function and the specified interval time.	—
	• SINGLE	• Measurement is performed for the specified sample count each time a trigger is received.	
SAMPLE COUNT		Set the number of times measurement is performed continuously for each trigger.	—
	• DEFAULT	• Number of times: 1	—
	* Numeric value setting	• Set the numeric value with the rotary knob and arrow keys. Setting range: 1 to 100,000 (times, positive integral number)	
DELAY		Set the delay time after trigger input until the initial data measurement.	—
	• DEFAULT	• Setting time: 0.00 ms	—
	* Numeric value setting	• Setting range: 0.00 ms to 3,600 s • Setting resolution: 10 μ s	
INTERVAL		Set the sampling measurement interval. *1. This is discarded when set shorter than the sampling rate. The measuring period is determined with this value when set longer than the sampling rate. In that case, the sampling rate only affects the measurement accuracy. *2. If the filter setting is MID for AC voltage measurement (ACV) or AC current measurement (ACI), set the interval to 0.00 ms or a time longer than 1.1 s. (If set to any other value, the interval time is assumed to be 1.1 s.)	—
	• DEFAULT	• Setting time : 0.00 ms	—
	* Numeric value setting	• Setting range : 0.00 ms to 3,600 s • Setting resolution : 10 μ s	
EXT TRIG		Set whether to execute trigger actions when external triggers are received through the TRIG terminal on the rear panel. If external triggering is enabled, select which slope to use, rising or falling.	—
	• DISABLE	• Trigger action is not executed based on external trigger.	—
	• POS SLOPE	• Trigger action is executed on the rising edge of external triggers.	
	• NEG SLOPE	• Trigger action is executed on the falling edge of external triggers.	

4.5 System Settings (SYSTEM)

The SYSTEM menu consists of the following items that you can configure.

REMOTE

- Remote interface selection, settings of various interfaces

BEEP

- Key sound, warning tone for measurement errors, tone for GO/NO-GO limit judgment, sound on/off setting

SETUP

- Basic settings such as header display contents and power supply frequency

COPY

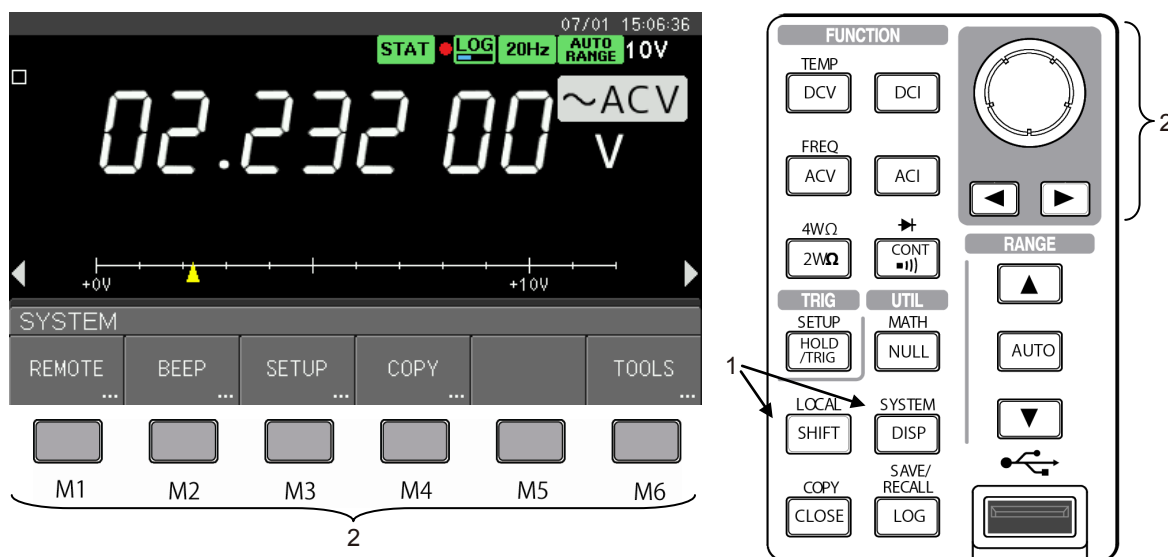
- Settings related to data output to the USB memory (USB port on the front panel)

TOOLS

- Firmware version information display, initialization of setting conditions, panel lock on/off setting, firmware update, and execution of calibration

The following describes how to configure the system and the settings on the SYSTEM menu.

- 1 Press [SHIFT]→[DISP(SYSTEM)]. The SYSTEM menu appears below the screen.
- 2 Set the function of each item on the SYSTEM menu. Use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, “Basic operation of menus.” For the settings on the SYSTEM menu, see “SYSTEM menu items and settings” on the next page.



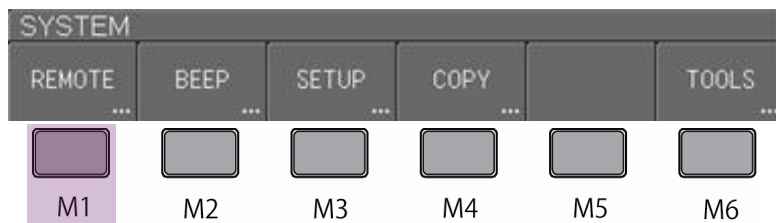
4.5 System Settings (SYSTEM)

SYSTEM menu items and settings

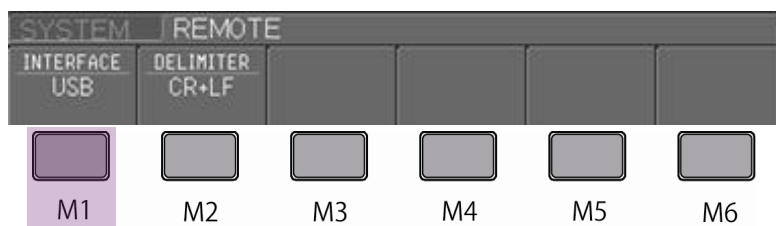
Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
REMOTE		The menu items vary depending on whether LAN & RS-232 (/C2) or GP-IB (/C1) is installed.	4.5.1
	• USB	- When the LAN & RS-232(/C2) is installed USB, TCP/IP, RS232 - When the GP-IB(/C1) is installed USB, GPIB	—
	• GPIB		
	• TCP/IP		
	• RS232		
BEEP		Turn on/off the sound that is generated when keys are pressed, the warning tone for erroneous measurement results, and the tone for GO/NO-GO limit judgment.	—
	• KEY	• OFF No sound is generated when a key on the front panel is pressed.	—
		• ON A sound is generated when a key on the front panel is pressed.	
	• CAUTION	• OFF No sound is generated eve if the measurement result is erroneous (e.g. calculation overflow and LIMIT calculation setting error).	—
		• ON A sound is generated if the measurement result is erroneous (e.g. calculation overflow and LIMIT calculation setting error).	
	• LIMIT	• OFF No sound is generated for limit judgment (GO/NO-GO).	—
		• GO A sound is generated for LIMIT judgment (GO).	
		• NO-GO The sound is generated for LIMIT judgment (NO-GO).	
SETUP		See section 4.5.2, "Setting the SYSTEM/SETUP menu."	4.5.2
COPY		See section 4.5.3, "Setting the SYSTEM/COPY menu."	4.5.3
TOOLS		See section 4.5.4, "Setting the SYSTEM/TOOLS menu."	4.5.4

4.5.1 Setting the SYSTEM/REMOTE menu

To select the interface, follow the procedure below. Then, configure the interface according to the explanation for the relevant interface on the following pages.

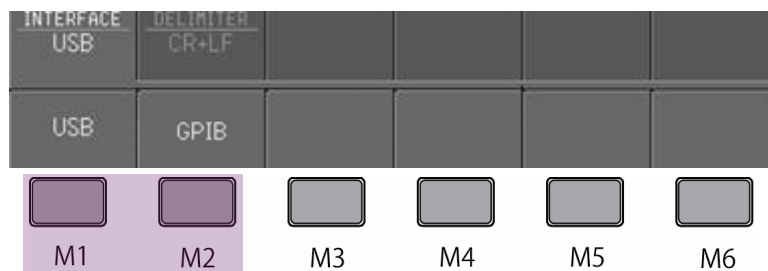


- 1 Press M1 on the menu screen above, and select REMOTE. The REMOTE menu below opens.

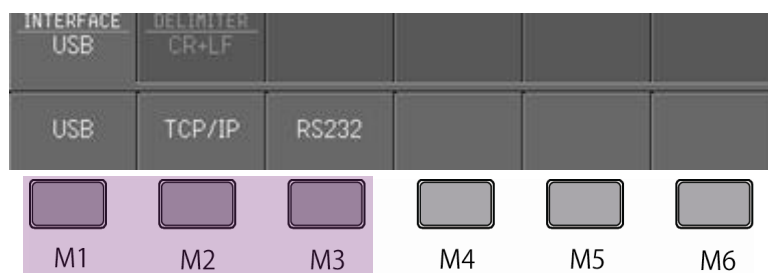


- 2 Press M1 on the menu screen above, and select INTERFACE. Depending on whether GP-IB (/C1) or LAN & RS-232 (/C2) installed, the menu item a) or b) will be displayed.

- a) When the GP-IB interface (/C1) is installed
Press M1 or M2 to select the interface.



- b) When the LAN & RS-232 interface (/C2) is installed
Press M1 to M3 to select the interface.



4.5 System Settings (SYSTEM)

INTERFACE: USB

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
REMOTE(USB)		If INTERFACE is set to USB, set the items below.	—
	• INTERFACE	• When USB is selected	—
	• DELIMITER	• CR+LF: The delimiter is set to CR+LF. • LF: The delimiter is set to LF.	

INTERFACE: GPIB

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
REMOTE(GPIB)		If INTERFACE is set to GPIB INTERFACE, set the items below.	—
	• INTERFACE	• When GPIB is selected	—
	• DELIMITER	• CR+LF: The delimiter is set to CR+LF. • LF: The delimiter is set to LF.	
	• GPIB CONFIG	• DEFAULT: The address is set to the default setting (9). * Numeric value setting: Turn the rotary knob to set the address to 0 to 31.	

INTERFACE: TCP/IP

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
REMOTE (TCP/IP)		If INTERFACE is set to TCP/IP, set the items below.	—
	• INTERFACE	• When TCP/IP is selected	—
	• DELIMITER	• CR+LF: The delimiter is set to CR+LF. • LF: The delimiter is set to LF.	
	• TCP/IP CONFIG	DHCP • ON If ENTER is selected, ADDRESS, GATEWAY, and SUBNET MASK are acquired from a DHCP server. If you press ENTER and set DHCP to ON, the DM7560 must be restarted. After restarting, the address is automatically acquired. • OFF The DM7560 operates with the assigned ADDRESS, GATEWAY, SUBNET MASK.	
		ADDRESS • DEFAULT The address is set to the default setting. * Numeric value setting Turn the rotary knob to set the address.	
		GATEWAY • DEFAULT The address is set to the default setting. * Numeric value setting Turn the rotary knob to set the address.	
		SUBNET MASK • DEFAULT The address is set to the default setting. * Numeric value setting Turn the rotary knob to set the address.	
		MAC ADDRESS • The MAC address (physical address) is displayed in gray. This a device-specific value and cannot be changed.	
		ENTER • This updates the TCP/IP settings. When you execute ENTER, you will be asked to restart the DM7560. After restarting, the new settings take effect. Note: Even when DHCP, ADDRESS, GATEWAY, and SUBNET MASK settings are changed, the changes are not reflected unless you execute ENTER.	

INTERFACE: RS232

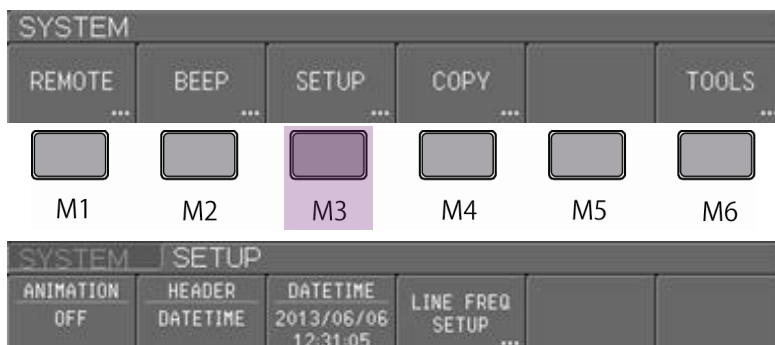
Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
REMOTE (RS232)		If INTERFACE is set to RS232, set the items below.	–
	• INTERFACE	• When RS232 is selected	–
	• DELIMITER	• CR+LF The delimiter is set to CR+LF.	
		• LF The delimiter is set to LF.	
	• RS232 CONFIG	BIT RATE • DEFAULT The bit rate is set to the default setting (38400 bps). * Numeric value setting Turn the rotary knob to set the bit rate to 38400, 19200, 9600, 4800, 2400, 1200, 600, or 300.	
		PARITY • Use the M1 to M3 menu keys to select NONE, ODD, or EVEN.	
		STOP BIT • Use the M1 and M2 menu keys to select 1 bit or 2 bit.	

4.5 System Settings (SYSTEM)

4.5.2 Setting the SYSTEM/SETUP menu

The following describes settings on the SYSTEM/SETUP menu. (For specifications, see section 4.12 in the IM DM7560-02EN.)

Press M3 on the SYSTEM menu below to open the SETUP menu.



SYSTEM/SETUP menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
ANIMATION		Select the menu operation when an item is selected.	—
	• OFF	• The menu changes directly when an item is selected.	—
	• ON	• The menu changes by scrolling when an item is selected.	—
HEADER		Select the content displayed at the top right of the screen.	—
	• DATE TIME	• Date and time is displayed in the header area at the top right of the screen.	—
	• SETUP NAME	• The SETUP name preset with the SETUP SAVE/RECALL menu is displayed in the header area at the top right of the screen.	
	• OFF	• Nothing is displayed in the header area at the top right of the screen.	
DATETIME		Edit the content of the date and time.	—
	• ENTER	• This updates the year/month/day, time to the setting below. Note: Even if the numeric value is set, updating does not take place unless you execute ENTER.	—
	* Numeric value setting	• This sets the numeric value of year (Gregorian), month/day, time (hour, minute, second).	
	• CANCEL	• This closes the DATE TIME menu.	
LINE FREQ SETUP		Set the power frequency that this instrument will use.	—
	• MODE	• AUTO (default setting) The instrument automatically detects and sets the power supply frequency when it starts.	—
		• MANUAL Set the power supply frequency manually.	
	• LINE FREQ UPDATE (MODE : at AUTO)	• If you press M2 when MODE above is set to AUTO, automatic detection of power supply frequency is updated.	
	• MANUAL (MODE : MANUAL: at manual)	• 50 Hz If this is selected when MODE above is set to MANUAL, the power supply frequency is set to 50 Hz.	
		• 60 Hz If this is selected when MODE above is set to MANUAL, the power supply frequency is set to 60 Hz.	
	• CURRENT (50 Hz/60 Hz)	• The current power frequency is displayed. Note: This only displays the frequency. This is not a menu item for setting or executing.	—

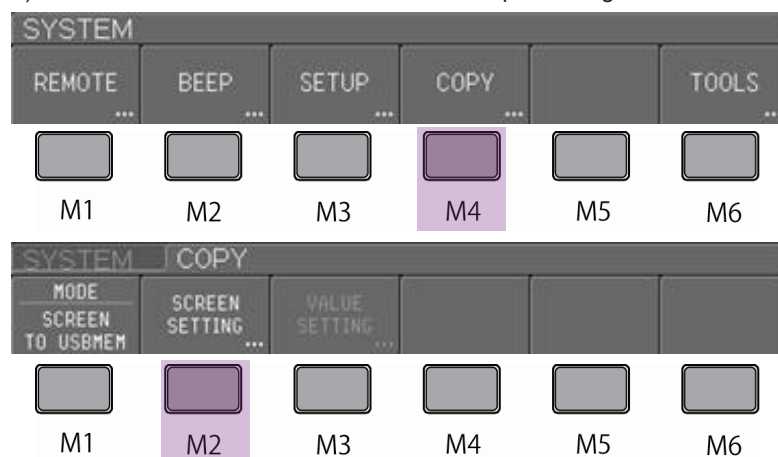
4.5.3 Setting the SYSTEM/COPY menu

The following describes the settings on the SYSTEM/COPY menu. (For specifications, see section 4.12 in the IM DM7560-02EN.)

4.5.3.1 SCREEN TO USBMEM menu

This instrument can output screenshot data to a USB memory device. The following describes the setting procedure, menu items, and settings.

- 1 - a) Press M4 on the SYSTEM menu below to open the figure below.



- 2 Press M2 on the screen of step 1 to open the SCREEN SETTING menu.



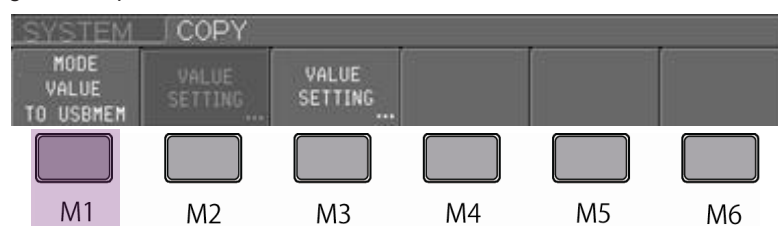
For the subsequent operation, see “SYSTEM/COPY/SCREEN SETTING menu items and settings” on the next page.

- 3 After setting each menu item, press [SHIFT]→[CLOSE (COPY)] to output to the USB memory. When hard copy is successful, to prevent overwriting the file, the four-digit number at the end of the file name is incremented.

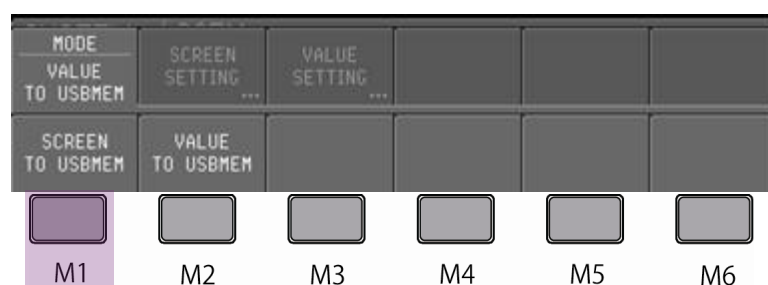
<If MODE is not set to SCREEN TO USBMEM>

If MODE is set to VALUE TO USBMEM in step 1 above, it is necessary to change MODE to SCREEN TO USBMEM as shown in the procedure below.

- 1 - b) If MODE is set to VALUE TO USBMEM, press M4 in step 1 -a) above to open the following figure, and press M1.



- 1 - c) When the following figure opens, press M1. The menu in step 2 above opens.



4.5 System Settings (SYSTEM)

SYSTEM/COPY/SCREEN SETTING menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
FORMAT		• This selects the file format of the screen data to be output to the USB memory.	—
	• PNG (COLOR)	• A color file format with .png extension is selected.	—
	• BMP (COLOR)	• A color file format with .bmp extension is selected.	
	• TIFF (COLOR)	• A color file format with .tiff extension is selected.	
	• PNG (B&W)	• A monochrome file format with .png extension is selected.	
	• BMP (B&W)	• A monochrome file format with .bmp extension is selected.	
	• TIFF (B&W)	• A monochrome file format with tiff extension is selected.	
DIRECTORY		• Edit the directory (folder name) in the USB memory that image data is output to.	—
	• DEFAULT (COPY)	• If DEFAULT is selected, the folder name is set to "COPY."	—
	• ABC	• If the ABC is pressed, alphabet characters can be selected with the rotary knob.	
	• 123	• If 123 is pressed, numbers (0 to 9) can be selected with the rotary knob.	
	• !#\$	• If !#\$ is selected, symbols can be selected with the rotary knob.	
	• BACK SPACE	• If BACK SPACE is pressed, the character, number, or symbol before the cursor position is deleted.	
	• INPUT SPACE	• If INPUT SPACE is pressed, "_" is displayed, and a space is inserted.	
FILE NAME		• Edit the file name to be saved in the directory (folder) in the USB memory when outputting screen data to the USB memory.	—
	• DEFAULT	• If DEFAULT is selected, the folder name is set to "COPY0000."	—
	• ABC	• If ABC is pressed, alphabet characters can be selected with the rotary knob.	
	• 123	• If 123 is pressed, numbers (0 to 9) can be selected with the rotary knob.	
	• !#\$	• If !#\$ is selected, symbols can be selected with the rotary knob.	

4.5.3.2 VALUE TO USBMEM menu

VALUE TO USBMEM is a function to output measurement results, time stamps (date and time), and attribute information (function, calculation setting, and LIMIT calculation result) to the USB memory in the text format.

- ONE TIME

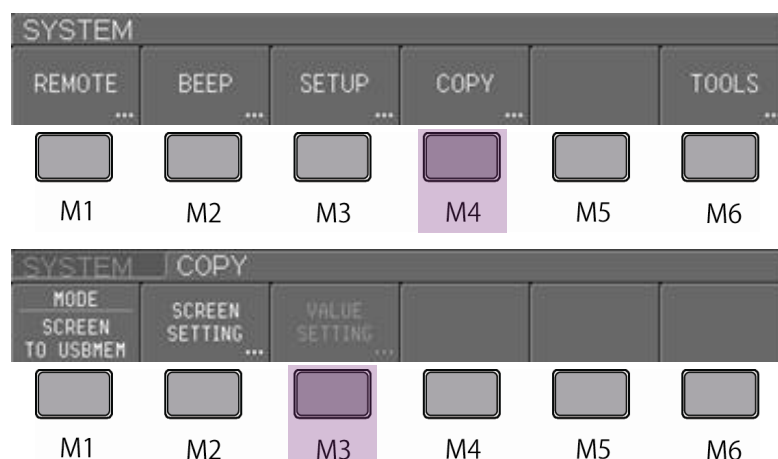
With this setting, this instrument converts the latest measurement result into one line of text every time [SHIFT] → [CLOSE(COPY)] is pressed and appends it to the specified file.

- CONTINUOUS

With this setting, this instrument switches the starting/stopping of continuous writing to the USB memory every time [SHIFT] → [CLOSE(COPY)] is pressed. When continuous writing is started, this instrument converts into one line of text every time a new measurement result is acquired, and appends it to the specified file.

In either operation, the conversion method into text is the same as EXPORT of the log function. (Refer to 4.11.3, "Log data.")

- 1 -a) Press M4 on the SYSTEM menu below to open the figure below.

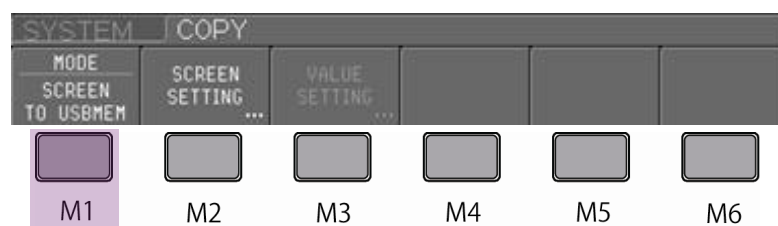


- 2 Press M3 on the screen above to open the VALUE SETTING menu.
For the subsequent operation, see "SYSTEM/COPY/MODE: VALUE SETTING menu items and settings" on the next page.
- 3 After each menu item is set, press [SHIFT] → [CLOSE (COPY)].
When ACTION is set to ONE TIME, the latest measurement result in operated point is converted to one line of text and appended to the file.
When ACTION is set to CONTINUOUS, continuous writing starts to the USB memory. When you press [SHIFT] → [CLOSE (COPY)] again, it stops.

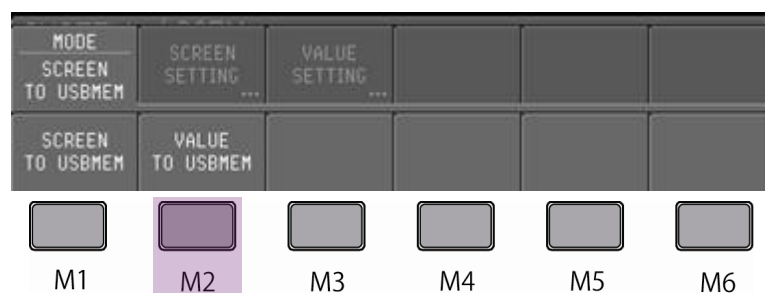
<If MODE is not set to VALUE TO USBMEM>

If MODE is set to SCREEN TO USBMEM in step 1 above, it is necessary to change MODE to VALUE TO USBMEM as shown in the procedure below.

- 1 -b) If MODE is set to SCREEN TO USBMEM, press M4 in step 1 -a) above to open the following figure, and press M1.



- 2 -c) When the following figure opens, press M2. The menu in step 2 above opens.



4.5 System Settings (SYSTEM)

SYSTEM/COPY/MODE:VALUE SETTING menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
ACTION		• It sets the operating of VALUE TO USBMEM.	—
	• ONE TIME	• Every time [SHIFT] → [CLOSE (COPY)] is pressed, the latest measurement result is converted to one line of text, and appended to the specified file.	4.5.3.3
	• CONTINUOUS	• Every time [SHIFT] → [CLOSE (COPY)] is pressed, the continuous writing in the USB memory starts and stops. When continuous writing starts, the measurement result is converted to one line of text every time the measurement is executed and is appended to the specified file.	
DIRECTORY		• Edit the output destination directory (folder name) in the USB memory.	—
	• DEFAULT (COPY)	• If DEFAULT is selected, the folder name is set to "TEXT."	—
	• ABC	• If ABC is pressed, an alphabet character can be selected with the rotary knob.	
	• 123	• If 123 is pressed, a number (0 to 9) can be selected with the rotary knob.	
	• !#\$	• If !#\$ is selected, a symbol can be selected with the rotary knob.	
	• BACK SPACE	• If BACK SPACE is pressed, the character, number, or symbol before the cursor position is deleted.	
	• INPUT SPACE	• If INPUT SPACE is pressed, "_ " is displayed, and a space is selected.	
FILE NAME		• Edit the file name to be output to the USB memory.	—
	• DEFAULT	• If DEFAULT is selected, the folder name is set to "COPY0000."	—
	• ABC	• If ABC is pressed, an alphabet character can be selected with the rotary knob.	
	• 123	• If 123 is pressed, a number (0 to 9) can be selected with the rotary knob.	
	• !#\$	• If !#\$ is selected, a symbol can be selected with the rotary knob.	
TIME STAMP		• This sets whether or not time stamp information is added when outputting to the USB memory.	—
	• ON	• Time stamp information is added in the output text (default setting).	—
	• OFF	• Time stamp information is not added in the output text.	
ATTRIBUTE		• This sets whether or not the ATTRIBUTE information below is added when outputting to the USB memory. a) Function name b) NULL (NULL ON: NULL displayed; NULL OFF: blank) c) Calculation name (The valid one in SCALING, dBm, and dBv is displayed.) d) Judgment result of LIMIT calculation or error type	4.11.1
	• ON	• ATTRIBUTE information above is included in the output text data (default setting)	—
	• OFF	• ATTRIBUTE information above is not included in the output text data.	

4.5.3.3 Continuous writing to USB memory using the VALUE TO USBMEM menu

Continuous writing is a function executed continuously that converts measurement results to one line of text and appends it to the file. Using a USB memory device with large capacity enables data greater than the size of the LOG memory (100,000 pieces or less) to be saved. This function is effective when saving long term data at a comparatively low-speed measuring period.

Example: When measurement at 1S/s period is performed over one year, 31 million 536 thousand measurement results are acquired.

Output text settings		Maximum size of one-line text (per one measurement result)	Free space necessary in USB memory
Time stamp	Attribute information		
No	No	15 byte	About 473 MB
No	Yes	52 byte	About 1,640 MB
Yes	No	44 byte	About 1,388 MB
Yes	Yes	81 byte	About 2,554 MB

< Setting method >

Set MODE (SYSTEM/COPY) to COPY to VALUE TO USBMEM.

Set ACTION (SYSTEM/COPY/VALUE SETTING) of VALUE TO USBMEM to CONTINUOUS.

Additionally, execute the file setting at the output destination and the setting of the text conversion as well as the case of ONE TIME for the ACTION setting.

Additionally, set the output destination file and text conversion in the same manner as when ACTION is set to ONE TIME.

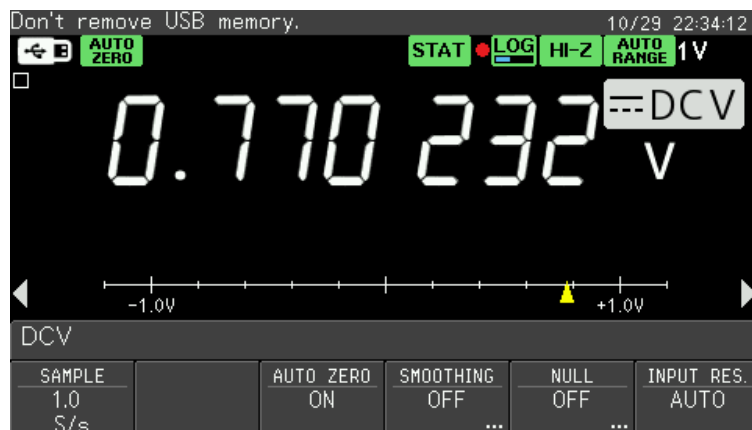
These settings cannot be changed while continuously writing to the USB memory.

4.5 System Settings (SYSTEM)

< Starting and Stopping >

When [SHIFT] → [CLOSE (COPY)] is pressed, continuous writing to the USB memory starts. A USB memory icon is displayed in the annunciator while continuously writing to the USB memory.

Moreover, the messages "Don't remove USB Memory" and "Press COPY to stop VALUE TO USBMEM" blink alternately in the status message line.



Example of screen display while continuously writing to the USB memory

When [SHIFT] → [CLOSE (COPY)] is pressed again while continuous writing is in progress, continuous writing is stopped.

CAUTION

- Do not turn off the power supply or pull out the USB memory while continuously writing to the USB memory. Doing so may seriously damage the USB memory and destroy data.
- Continuous writing over a long time causes the size of the output file to become large. Start writing after confirming that there is an enough free space. Continuous writing stops automatically when there is no more free space.

ATTENTION

- Ne pas couper l'alimentation électrique et ne pas extraire la clé USB pendant l'écriture continue dans la clé USB. La clé USB peut être sérieusement endommagée car les données sont perdues.
- Si l'écriture continue est exécutée pendant longtemps, la taille du fichier de sortie augmente également. Commencer l'écriture après avoir vérifié au préalable qu'il y a suffisamment d'espace. En outre, l'écriture continue s'arrête automatiquement lorsqu'il n'y a plus d'espace libre.

< Operation limitation >

In the following conditions, continuous writing to the USB memory cannot be started.

- Remote state
- While acquiring log data in BULK mode
- Off-line browse state

The following functions cannot be used while continuous writing is in progress.

- All setting changes under the SYSTEM/COPY menu
- Starting acquiring log data in BULK mode
- Off-line browse
- Export of log function
- Execution of calibration
- Saving of setup data in USB memory
- All setup recalls
 - Recall from USB memory
 - Recall from the internal memory
 - Recall of default setup
 - External control function of SETUP RECALL

In addition, this instrument terminates continuous writing when the instrument switches to remote mode while continuous writing is in progress.

< About file output >

The size of the output text file is limited to 8 MB. When this is exceeded, a new file is created with the 4-digit number at the end of the file name incremented by 1, and data is output to this new file. Note that continuous writing stops automatically when the value of the last 4 digits exceeds 9999.

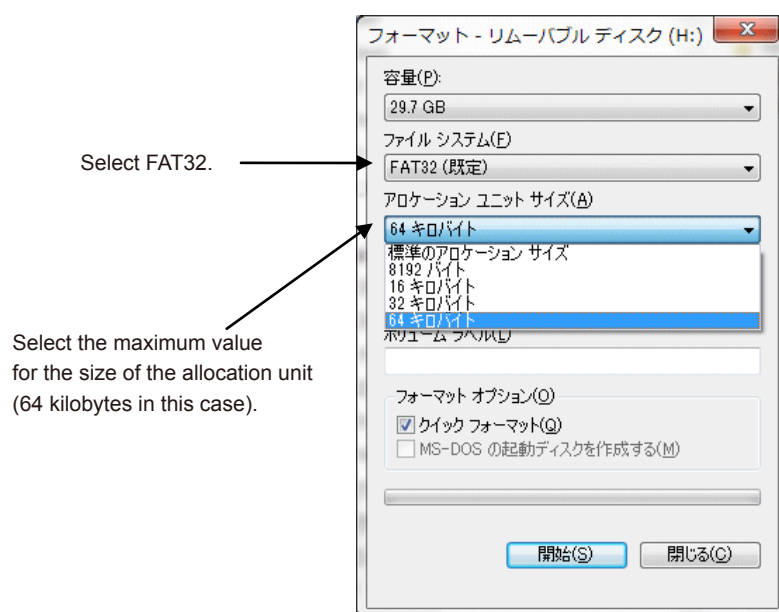
< About the writing speed >

The speed of writing to the USB memory is far slower than the speed of writing to the LOG memory in the main unit. The speed also varies greatly depending on the type and condition of the memory in use. As such, there is no guarantee that the instrument will acquire all the data without any dropouts even at a slow sampling rate.

Data dropout can be reduced in the following ways.

- Using an empty formatted USB memory
- Setting the size of the allocation* unit as large as possible when formatting
 - * Note that increasing the allocation unit size improves the writing speed but reduces the memory usage efficiency.

Format the USB memory with a general personal computer. This instrument supports the FAT or FAT32 file system.

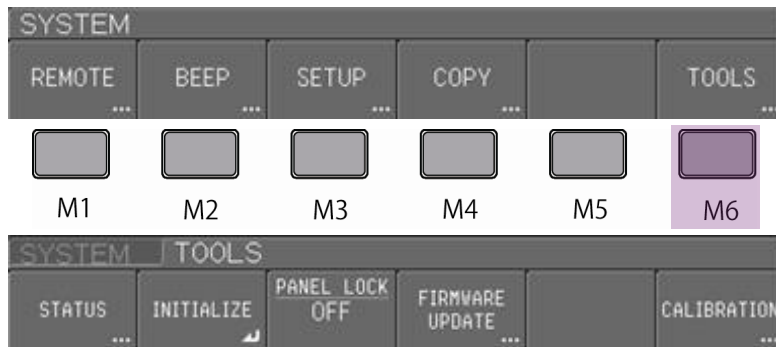


Example of the formatter screen (Windows7)

4.5 System Settings (SYSTEM)

4.5.4 Setting the SYSTEM/TOOLS menu

The following describes the settings of SYSTEM/TOOLS menu. (For specifications, see section 4.12 on the IM DM7560-02EN.) Press M6 on the SYSTEM menu below to open the TOOLS menu.



For the subsequent operation, see “SYSTEM/TOOLS menu items and settings” on the next page.

SYSTEM/TOOLS menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
STATUS		Pressing M1 changes the screen to TOOLS STATUS screen. The information of this instrument is displayed as shown in the examples below.	—
		- Model name DM7560 - Firmware Description Firmware for DM7560 - Version 1.00 - Build Date & Time June 17 2016 09:41:28 - Serial Number PKRCAA001	—
INITIALIZE		If M2 is pressed, the message "Do you initialize system?" is displayed in the menu. This initializes the setting conditions of this instrument to the factory settings.	4.7
	• OK	If M2 is pressed, the setting conditions of this instrument are initialized to the factory settings and this instrument is restarted. Only the current setting conditions are initialized. The information saved in the internal memory and USB memory are not deleted.	—
	• CANCEL	If M6 is pressed, the inquiry menu for initialization closes.	
PANEL LOCK		This sets the on/off state of the function that locks the keys on the front panel.	—
	• OFF	If M3 is pressed when ON is displayed in the menu, the panel lock function is set to off. Keys are enabled.	—
	• ON	If M3 is pressed when OFF is displayed in the menu, the panel lock function is set to on. When a key is pressed, nothing happens, but a tone indicating that the keys are locked is generated.	
FIRMWARE UPDATE		This is the menu for updating the firmware in the instrument.	This section
	• SELECT	This displays the file to be updated on the screen. The file is selected by turning the rotary knob. The operation procedure is described in this section.	—
	• UPDATE	If M2 is pressed after selecting the file in SELECT above, the firmware in this instrument is updated. It takes several minutes to complete the update. The operation procedure is described in this section.	
CALIBRATION		- This causes the instrument to enter the calibrating (adjustment) menu. - If M6 is pressed, the message "Do you enter CALIBRATION menu?" is displayed in the menu. - For details on calibration and how to perform it, see section 5.2.	5.2
	• OK	Pressing M1 causes the instrument to enter the calibration menu.	—
	• CANCEL	Pressing M6 closes the inquiry menu.	

4.5.4.1 FIRMWARE UPDATE menu

This section describes the updating of the firmware in this instrument.

When updating the firmware, refer to the preparation and cautions below.

Preparation

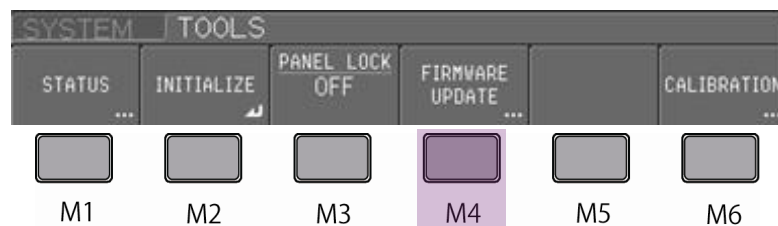
- Stop applying signals to the terminals on the front and rear panels, and remove the test leads, cables, and adapters.
- Download the firmware for updating from the YOKOGAWA website, or contact your nearest YOKOGAWA dealer.

<https://tmi.yokogawa.com/solutions/products/generators-sources/digital-multimeters/dm7560-digital-multimeter-65-digit/>

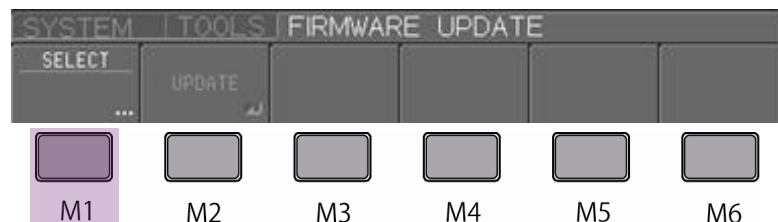
CAUTION

- Do not turn off the power and remove the USB memory when the software of this instrument is being updated.
- When the instrument is restarted after completing a software update, the internal hardware may be updated. If this happens, never turn off the power during updating.
- If the software of this instrument is updated, a large part of internal settings is initialized. Important SETUP (setting conditions) should be saved on the internal memory and USB memory using the SAVE function (see section 4.7) in the SAVE/RECALL menu. For details on initialization, see the default settings in section 4.12.
- Be sure to save the software of this instrument in the "FIRMWARE" folder in the USB memory. Otherwise, the file will not be recognized.

- 1 Connect the USB memory containing the update file to the USB port on the front panel.
- 2 When the TOOLS menu below opens, press M4 and open the FIRMWARE UPDATE menu of step 3.

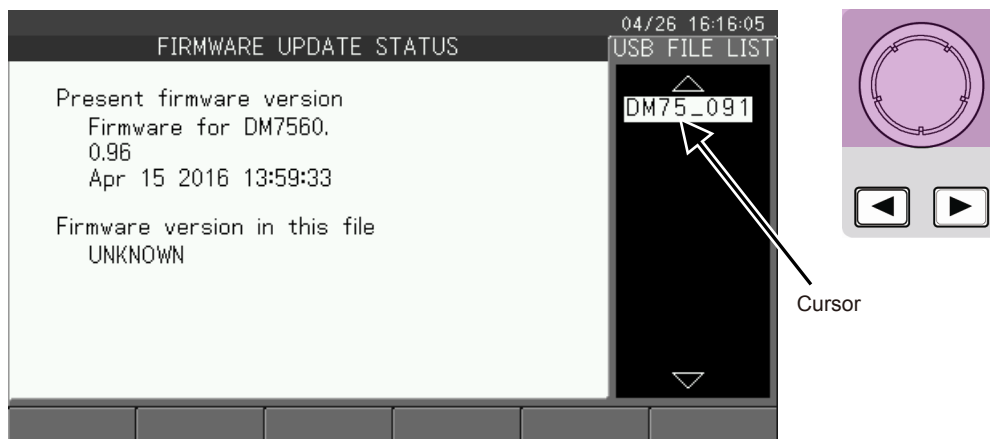


- 3 When the FIRMWARE UPDATE menu below opens, press M1 (SELECT menu), and open the SOFTWARE UPDATE STATUS screen shown in step 4.

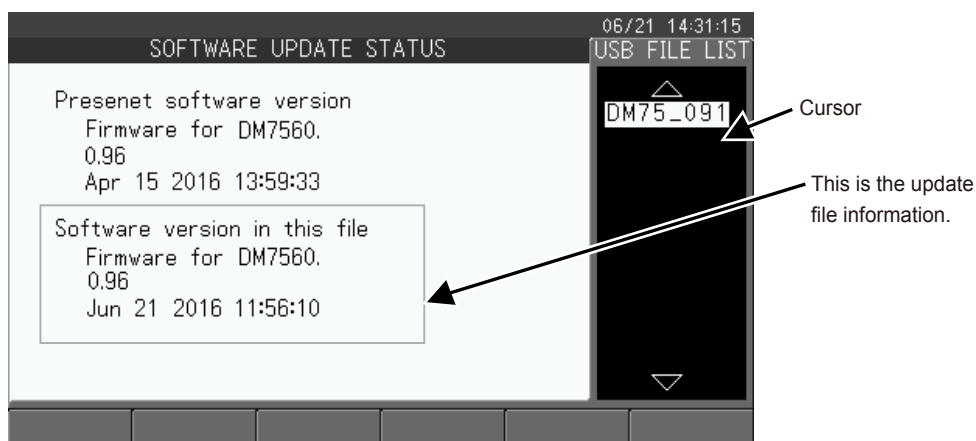


4.5 System Settings (SYSTEM)

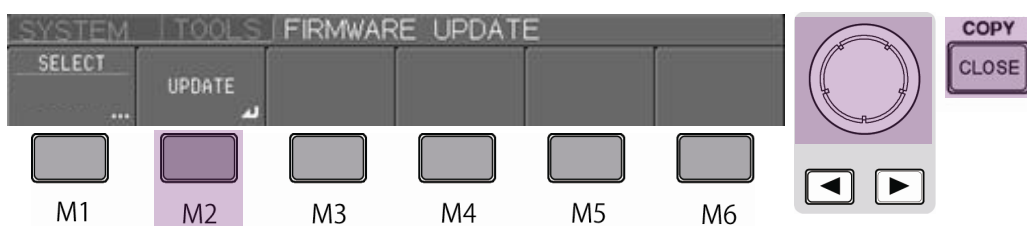
- Turn the rotary knob on the SOFTWARE UPDATE STATUS screen below, and move the cursor to the update file. (See the cursor in step 5.)



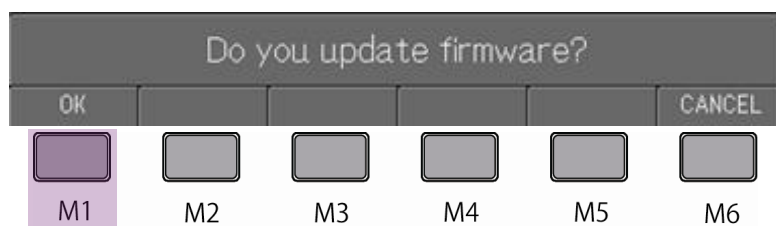
- On the SOFTWARE UPDATE STATUS screen below, the upper file information indicates the current software of this instrument and the lower information indicates the update file. Check that the file is normal.



- After checking the contents in step 5, press [CLOSE] or the rotary knob to close SOFTWARE UPDATE STATUS screen. Press M2 on the FIRMWARE UPDATE menu below.

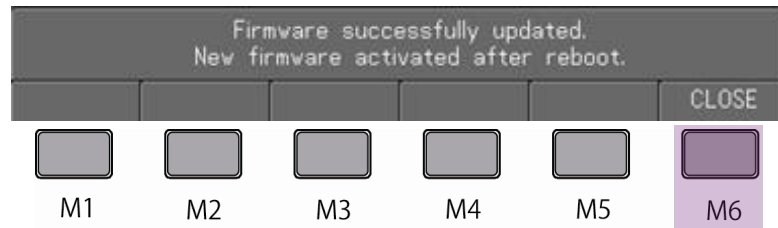


- The inquiry screen below appears. Press M1 to execute UPDATE.



While updating, several kinds of the blue bars indicating the progress are displayed at the top of the screen. It may take several minutes to complete the update.

- 8** If updating is completed, the following message appears. Press M6 to close the message screen.



- 9** Turn the power switch off and then back on.

- 10** If the following screen does not appear, proceed to step **11**.

If it does, perform the following procedure and then proceed to step **11**.

Depending on the nature of the update, the internal hardware of this instrument may be updated when the instrument is restarted after the software updating. If this happens, the update status is displayed in text on the LCD, instead of the normal startup screen.

Example

```
Firmware for DM7560, version:3.00(July 20 2016)
SeriesID: DM7560-SystemID: 0
COPY RIGHT (C) 2016 Yokogawa Meters & Instruments Corporation
CPLD revision: 8
Check CPLD status... OK
Key Controller: Updating .....
Update Key Controller: Successful
FPGA revision: 70
Check FPGA status... OK
Please Restart
```

Do not turn off the power supply until "Please Restart" is displayed at the bottom line.

When "Please Restart" appears, turn off the power switch, and restart the instrument.

- 11** Open the SYSTEM/TOOLS/STATUS menu. The TOOLS STATUS screen below appears. Check that the version has been updated.

TOOLS STATUS		04/26 16:16:17
Model	DM7560	
Firmware Description	Firmware for DM7560.	
Version	0.96	
Build Date & Time	Apr 15 2016 13:59:33	
Serial Number	PKS2AA003	

4.6 Calculation Function (NULL/MATH)

This instrument has roughly six calculation functions as described below.

Each calculation can be set simultaneously as an independent function. However, the scaling calculation and dB calculation cannot be selected simultaneously.

Calculations set using the menu of each function

- 1 Smoothing calculation: This executes moving average. The average count can be selected from 2 to 100 (positive integral number; default: 10). Measurement data after smoothing is retained as raw data. (When smoothing is off, measurements are retained as raw data.)
... For details, see section 4.6.1.
- 2 NULL calculation: This executes the following difference calculation:
Measurement result = Raw value – NULL value. The NULL value can be set to the measurement or numerical value using the NULL menu of each function.
.... For details, see section 4.6.2.

Calculation set individually using the MATH menu

- 3 CALCULATE calculation: The following two calculations are available.
 - 1) Scaling calculation: You can select from two calculation expressions and set the constants in each calculation expression. The result of the calculation is displayed as the measurement result.
... For details, see section 4.6.3.1.
 - 2) dB calculation: You can select dBm or dBV. The result of the dB calculation is displayed as the measurement result.
.... For details, see section 4.6.3.2.
- 4 Limit calculation: You can set two arbitrary threshold values (HIGH and LOW). Judgment is performed based on three zones.
.... For details, see section 4.6.4.
- 5 Statistic calculation: This calculates the maximum value, minimum value, average, and standard deviation of the measurement result and displays them in the secondary display.
.... For details, see section 4.6.5.

Calculations are performed according to A → B → C shown below, and the measurement result, the judgment result, and statistical information are obtained.

- A: Measurements → Smoothing → The measurement data is retained as raw data. → NULL calculation → Scaling calculation/dB calculation → The measurement result
- B: The measurement result of A → Limit calculation → Judgment result
- C: The measurement result of A → Statistic calculation → Statistical information

The following describes the setting procedure and the settings for each calculation.

4.6.1 Smoothing (Moving average)

Smoothing takes the moving average of acquired measurements.

Smoothing can be applied to the following functions: DCV, ACV, DCI, ACI, 2WΩ, 4WΩ, FREQ, and TEMP. (It cannot be applied to CONT and DIOD.) There is a smoothing menu in each function. On the smoothing menu, you can turn on or off the calculation and set the length (average count) to an integer value between 2 and 100.

<Indicator in the upper part of the screen >

The indicator changes as follows during measurement acquisition.

When BACKGROUND (background color of screen) is set to BLACK

- Until the specified length (average count) is reached:



- After the specified length (average count) is reached:



When BACKGROUND (background color of screen) is set to WHITE

- Until the specified length (average count) is reached:



- After the specified length (average count) is reached:



4.6.2 NULL calculation

This sets the target numeric value of the difference calculation as the NULL value and performs difference calculation using the expression below. The result of the difference calculation is displayed in the measurement result. The raw value is the measurement data after smoothing as explained in section 4.6.1.

Measurement result = Raw value – NULL value

NULL calculation can be applied to the following functions: DCV, ACV, DCI, ACI, 2WΩ, 4WΩ, TEMP, and FREQ. (It cannot be applied to CONT and DIOD.) The following is a measurement example of AC current measurement ACV.



- Raw value : 80.9727 mV
- NULL value : 8.8231 mV
- Measurement result : 72.1496 mV

Setting the NULL value

Set the NULL value by combining the following five methods.

- Setting the default value
Select DEFAULT (0.000000) on the NULL/NULL VAL menu of each function.
- Setting using the measurement value
Select GET VAL on the NULLVAL/NULL VAL menu of each function. The NULL value is set to the acquired measurement value.
- Setting the sign (+,-)
Pressing +/- (M3) reverses the sign.
- Setting the range to 0 to 9 or -9 to +9
When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob.
When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.
- Arbitrary manual setting
Set the numeric value on the NULL VAL in NULL/NULL VAL menu of each function using the rotary knob or arrow keys.
 - * For the setting procedure, see "Menu items and settings" of each function in sections 4.3.1 to 4.3.10 and section 3.2.1 "Basic operation of menu."

Turning the NULL calculation on and off using the [NULL] key

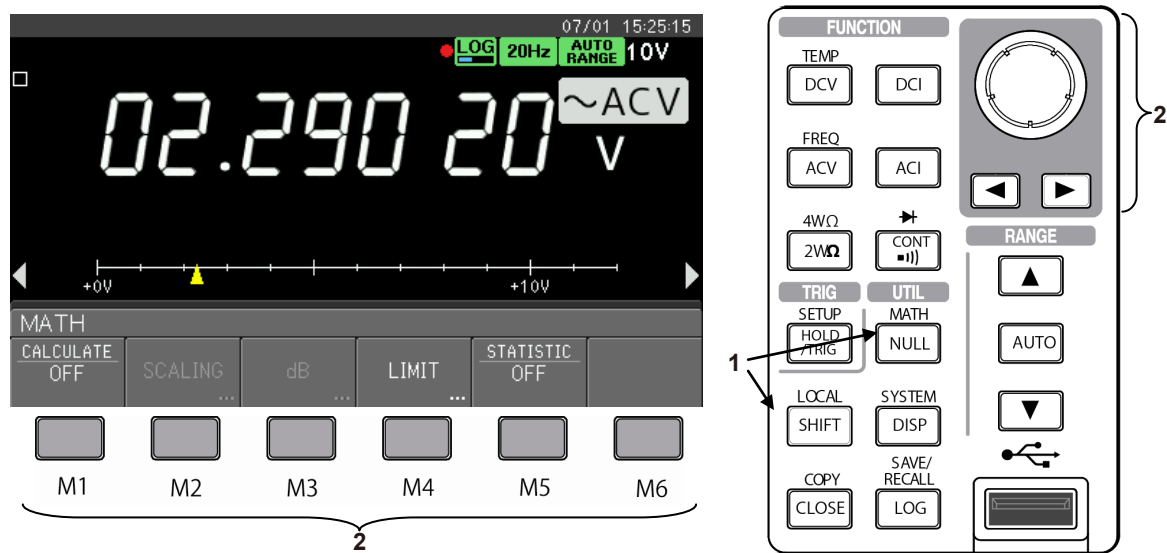
You can turn on or off the NULL calculation with the [NULL] key. You can also turn on or off the NULL calculation with [NULL] key when measuring the DCV, ACV, DCI, ACI, 2WΩ, 4WΩ, TEMP and FREQ functions.

- NULL setting OFF → ON
NULL calculation is changed from OFF to ON, and the NULL value is set to the first acquired measurement after the [NULL] null key is pressed.
- NULL setting ON → OFF
This is the same as changing the NULL setting from ON to OFF in each function's menu.

4.6.3 CALCULATE (Scaling/dB) calculation

The following describes the calculation details, settings, and procedure for the CALCULATE calculations (scaling and dB) described in the beginning of section 4.6. The procedure is explained from opening the MATH menu to displaying each calculation menu.

- 1 Press [SHIFT]→[NULL(MATH)] on the screen below to open the MATH menu.
- 2 Use the items on the MATH menu to set various functions. Use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, “Basic operation of menus.” For MATH menu settings, see “MATH menu items and settings” on the next page.



<MATH menu when SCALING calculation is selected>



<MATH menu when dB calculation is selected>



4.6 Calculation Function (NULL/MATH)

MATH menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
CALCULATE		• Turns on or off the CALCULATE calculation function. Select the SCALING calculation or dB calculation.	—
	• OFF	• This turns off the MATH calculation function. LIMIT calculation and STATISTIC calculation can be turned on or off independently of MATH calculation.	•
	• SCALING	• This turns on the SCALING calculation function. The SCALING menu becomes available.	
	• dB	• This turns on the dB calculation function. The dB menu becomes available. This is selectable only for DCV and ACV.	
SCALING		See section 4.6.3.1, “SCALING function.”	4.6.3.1
dB		See section 4.6.3.2, “dB calculation.”	4.6.3.2
LIMIT		• This opens a menu for setting the HIGH/LOW of LIMIT calculation, HIGH value, and LOW value.	4.6.4
	• LOW	• Turn on or off the LOW value judgment of LIMIT calculation.	—
	• LOW LIMIT	Set the LOW value of LIMIT calculation. DEFAULT This sets the LOW value to the default value -999.9999. GET VAL Press M2 to set the LOW value to the current measurement. * Numeric value setting Set the LOW value using the rotary knob or arrow keys.	
	• HIGH	• Turn on or off the HIGH value judgment of LIMIT calculation.	
	• HIGH LIMIT	Set the HIGH value of LIMIT calculation. DEFAULT This sets the HIGH value to the default value +999.9999T. GET VAL Press M2 to set the HIGH value to the current measurement. Numeric value setting Set the HIGH value using the rotary knob or arrow keys.	
STATISTIC		• Turn on or off the STATISTIC calculation.	4.6.5
	• OFF	• This turns off the statistics calculation function.	—
	• ON	• This turns of the statistics calculation function.	

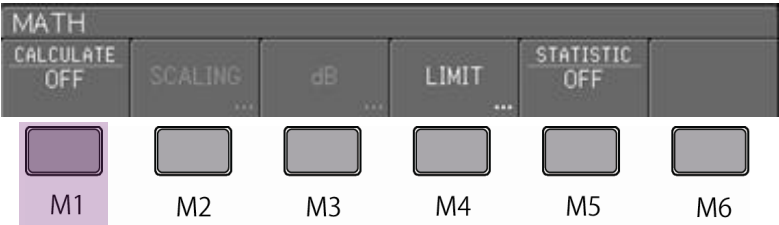
4.6.3.1 SCALING function

The scaling function is used for converting measurements into user-defined units.

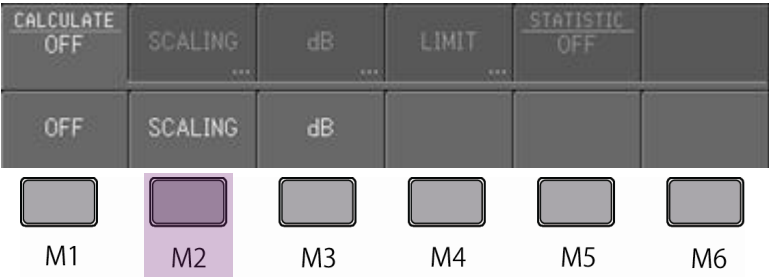
The SCALING/MODE menu is used to select the following two calculation expressions:

- 1) Displayed value = (measurement value – A)*B/C
 - 2) Displayed value = D/measurement value
- Set constants A, B, C, and D to 7-digit numbers using the SCALING menu.
 - A, B, C, and D do not have units. They are constants with multipliers, and only a single value is assigned to each of them regardless of the measurement function. The multiplier corresponds to T, G, M, k, m, μ , n, and p.
 - When the cursor is on a multiplier when setting a constant, turn the rotary knob clockwise to multiply the numeric value part by 10 and counterclockwise to multiply by 1/10.
 - The scaling calculation and dB calculation cannot be set simultaneously.

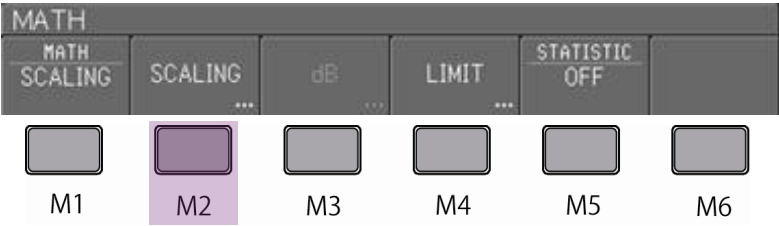
- 1 Press [SHIFT]→[NULL(MATH)] to open the MATH menu.



- 2 Press M1 in step 1, and open the CALCULATE menu.



- 3 Press M2 in step 2, and select SCALING. SCALING is set to CALCULATE.



- 4 Press M2 in step 3, and open the SCALING menu shown below.



For the settings on the SCALING menu, see “SCALING menu items and settings” on the next page. Use the menu keys (M1 to M6) and the rotary knob below the screen. For the operation, see section 3.2.1, “Basic operation of menus.”

4.6 Calculation Function (NULL/MATH)

SCALING menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
MODE		• Select the MODE of SCALING calculation from the following two calculation expressions.	—
	• (X-A)• B/C	• By pressing M1, the calculation expression on the left is selected. Constants A, B, and C are set using the menu item below.	—
	• D/X	• By pressing M2, the calculation expression on the left is selected. Constant D is set using the menu item below.	
A * When (X-A) *B/C MODE is selected		• For the above calculation expression (X-A)*B/C, set constant A.	—
	• DEFAULT	• By pressing M1, A is set to the default value of +000.0000.	—
	* Numeric value setting	• By using the rotary knob and arrow keys, set A to the numeric value.	
	• GET VAL	• By pressing M2, A is set to the measurement value excluding the unit.	
B * When (X-A) *B/C MODE is selected		• For the above calculation expression (X-A)*B/C, set constant B.	—
	• DEFAULT	• By pressing M1, B is set to the default value of +000.1000.	—
	* Numeric value setting	• By using the rotary knob and arrow keys, set B to the numeric value.	
	• GET VAL	• By pressing M2, B is set to the measurement value excluding the unit.	
C * When (X-A) *B/C MODE is selected		• For the above calculation expression (X-A)*B/C, set constant C. Note: C cannot be set to 0.	—
	• DEFAULT	• By pressing M1, C is set to the default value of +000.1000.	—
	* Numeric value setting	• By using the rotary knob and arrow keys, set C to the numeric value.	
	• GET VAL	• By pressing M2, C is set to the measurement value excluding the unit.	
D * When D/X MODE is selected		• For the above calculation expression D/X, set constant D.	—
	• DEFAULT	• By pressing M1, D is set to the default value of +000.1000.	—
	* Numeric value setting	• By using the rotary knob and arrow keys, set D to the numeric value.	
	• GET VAL	• By pressing M2, S is set to the measurement value excluding the unit.	

4.6.3.2 dB calculation

The dB calculation displays measurement values converted into dB.

Select the two dB conversion expressions using the dB/MODE menu.

1) dBm

This calculation sets the voltage at which the standard resistance to consume 1 mW to 0 dBm.

$$dBm = 10 \times \log_{10} \left[\frac{\text{Measurement value}^2 / \text{Standard resistance}}{1.0 \times 10^{-3} [W]} \right]$$

The standard resistance value can be selected from the numeric values below by using the REF-R menu (default value: 600 Ω) 4, 8, 16, 32, 50, 75, 93, 110, 124, 125, 135, 150, 200, 250, 300, 500, 600, 800, 900, 1000, 1200, 8000 Ω

2) dBV This is the logarithm of the voltage measurement value for the standard voltage.

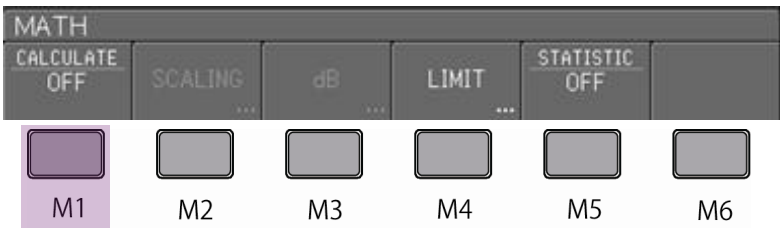
$$dBV = 20 \times \log_{10} \frac{|\text{Measurement value}|}{\text{Standard voltage} [V]}$$

The standard voltage can be set to 1.0 μV (default value), 1.0 mV, or 1.0 V on the REF-V menu.

The dB calculation has the following functions and restrictions:

- The calculation can be used only for DCV and ACV functions.
- The scaling calculation and dB calculation cannot be set simultaneously.
- When NULL calculation is set ON, NULL processing is performed on the raw data before dB calculation and then the dB calculation is performed.
- The dB REL calculation can be performed for dBm and dBV. The dB REL calculation is a function that displays the difference value obtained by subtracting the dB standard value from the dB calculation result. The dB/REL menu is used to turn it on or off.
- The setting range and the multiplier of the dB standard value are as follows: Setting range: Set a 7-digit valid number with a multiplier.
- When the cursor is on a multiplier when setting a constant, turn the rotary knob clockwise to multiply the numeric value part by 10 and counterclockwise to multiply by 1/10.

1 Press [SHIFT]→[NULL(MATH)] on the screen below to open the MATH menu.

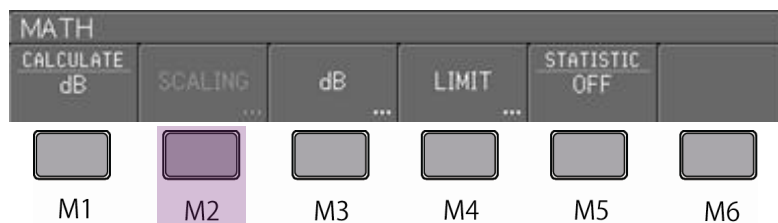


2 Press M1 in step 1, and open the MATH menu. Press M3 and select dB.



4.6 Calculation Function (NULL/MATH)

3 CALCULATE is set to dB as shown below:



4 Press M2 in step 3 to open the dB menu below.



For the subsequent operation, see the following “dB menu Items and settings” on the next page. Use the menu keys M1 to M6 below the screen (outside) and rotary knob for operation. For the operation, see section 3.2.1, “Basic operation of menus.”

dB menu Items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
MODE		• Select the dB calculation MODE from the following two calculation expression	—
	• dBm	• By pressing M1, the calculation expression on the left is selected. The calculation expression is (1) on the previous page.	—
	• dBV	• By pressing M2, the calculation expression on the left is selected. The calculation expression is (2) on the previous page.	—
REF-R • dBm is selected in MODE above		• For the calculation expression dBV above, set the standard resistance.	—
	• DEFAULT	• Press M1 to set REF-R to the default value of 600 Ω.	—
	• Numeric value setting	• By turning the rotary knob, select REF-R value to set the numeric value.	—
REF-V • dBV is selected in MODE above		• For the calculation expression dB REL above, set the standard voltage.	—
	• 1.0 V	• Press M1 to set REF-V to 1.0 V.	—
	• 1.0 mV	• Press M2 to set REF-V to 1.0 mV.	—
	• 1.0 μV	• Press M3 to set REF-V to 1.0 μV.	—
dB REL		• Turn on or off the dB REL calculation.	—
	• OFF	• Press M4 to set dB REL calculation to ON.	—
	• ON	• Press M4 to set dB REL calculation to OFF.	—
dB-REL Val		• When dB REL is set ON, set the dB REL Val value (dB standard value).	—
	• DEFAULT	• Press M1 to set dB REL Val to the default value (+000.0000 dBm: MODE: dBm selected; +000.0000 dB: MODE: dBV selected).	—
	• Numeric value setting	• With the rotary knob and arrow keys, sets dB REL Val value to a numeric value.	—
	• GET VAL	• By pressing M2, set dB REL Val to the measurement value.	—

4.6.4 LIMIT calculation

The function judges which zone includes the measurement result by setting HIGH and LOW threshold values.

For an explanation of the LIMIT menu, refer to “MATH menu items and settings” in section 4.6.3. On the trend chart display, HIGH and LOW threshold value lines are displayed, and dots higher or lower than the threshold values are displayed in red. (For details on the trend chart display, refer to section 4.9.)

The histogram chart display shows the threshold values. However, since the threshold value of the LIMIT calculation is normally not consistent with the edge of BIN, the BIN color is not changed. (For details on the histogram display, refer to section 4.10.)

Displaying LIMIT judgment results

LIMIT judgment result (GO/HIGH/LOW) is displayed in the following three areas.

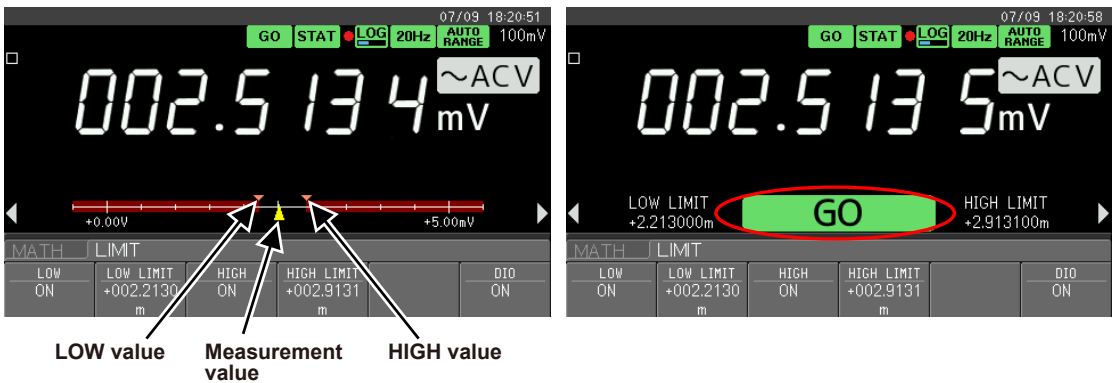
- Limit indicator of annunciator
- Primary display (when “LIMIT” is selected)
- Secondary display (when “LIMIT” is selected)

The displayed contents are as follows:

- **GO** : $LOW \leq \text{Measurement result} \leq HIGH$
 - **HIGH** : $HIGH < \text{Measurement result}$
 - **LOW** : $\text{Measurement result} < LOW$
 - **---** : When the measurement result is invalid (overload, overflow, etc.) for LIMIT calculations.
 - Non-display : If HIGH is set to OFF and LOW is set to OFF* on the LIMIT menu
- * In the primary display, **---** is displayed also when HIGH is set to OFF and LOW is set to OFF on the LIMIT menu.

If either HIGH or LOW is set to ON on the LIMIT menu, judgment is made only for the one set to ON.

The following is an example of the judgment result on the secondary display.

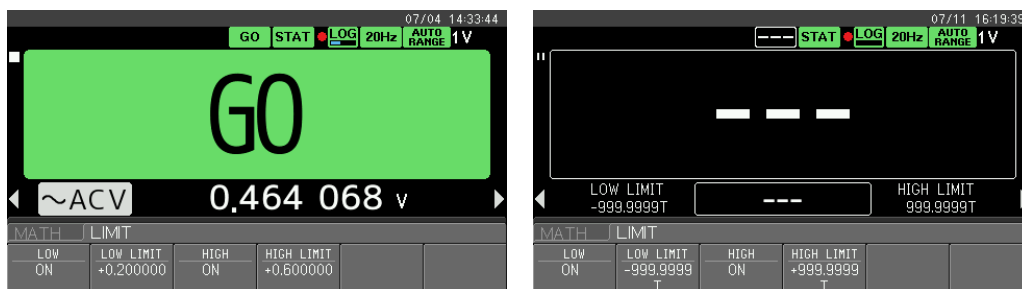


- Function: ACV
- LOW value: 2.2130 mV
- HIGH value: 2.9131mV
- Measurement result: 2.5134 mV, 2.5135 mV
- Judgment result: GO judgment because of LOW value < measurement value < HIGH value

If the secondary display shows the LIMIT judgment as shown in the example above (right), HIGH and LOW threshold values and judgment result are displayed. As shown in the example above (left), the measurement value is displayed with an up triangle mark on the analog meter display and HIGH/LOW threshold values are displayed with down triangle marks.

4.6 Calculation Function (NULL/MATH)

On the other hand, the primary display shows even a larger judgment result (refer to the example of the judgment result). For details on the display, refer to section 2.3.3.4.



- LOW value: 0.200000 V • HIGH value: 0.600000 V • HIGH: ON and LOW: ON but the measurement result is invalid.
- Judgment result: GO judgment because of LOW value < measurement value < HIGH value
- Measurement value: 0.464068 V
Note: Example

Function that indicates LIMIT judgment results by Beep

The relationship among OFF and GO, NO-GO, and LOW/GO/HIGH SYSTEM/BEEP/LIMIT menus is as follows:

- OFF : BEEP does not sound regardless of LIMIT judgment results.
- GO : BEEP sounds if LIMIT judgment result is GO.
- NO-GO : BEEP sounds if LIMIT judgment result is LOW or HIGH.

* For turning on and off the beep sound, refer to section 4.5.

4.6.5 STATISTIC calculation

This calculates the maximum value (MAX), minimum value (MIN), average (AVG), and standard deviation (σ) of the measurement results. If ON is set on the MATH/STATISTIC menu, the annunciator shows the STAT indicator. STATISTIC and the measurement result are displayed on the secondary display. The following is a measurement example.



- ERR: Number of invalid data (overload, overflow, etc.) for the statistical calculation.
- NUM: Number of samples of statistical calculations (number of calculated data)

A statistical calculation is executed indefinitely until the calculation result is cleared. However, the calculation of the average value and σ stops when the number of samples exceeds two billion, and the values are no longer updated. (The maximum and minimum value are updated.) Refer to section 6.4 for the timing at which the result of a statistical calculation is cleared.

The data below are not included in statistic calculation. Such data is counted as an error.

- Overload data
- Data for moving average that is collected before the first value is calculated
- Erroneous data whose correct value cannot be acquired such as overflow in scaling calculation

4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

The following items can be set and executed on the SETUP SAVE/RECALL menu.

SAVE

- Save setting conditions (SETUP).
- You can set the save destination to the internal memory (INTERNAL MEMORY) or USB memory* (USB MEMORY).
 - * Setting conditions cannot be saved in the USB memory while continuous writing to the USB memory is in progress by the VALUE TO USB function.
Refer to "Correspondence USB memory" at the USB memory connection entrance of 4.1 common specifications in the IM DM7560-02EN for the USB memory that can be used.

RECALL

- It recalls the setting conditions.
- The source can be selected from the internal memory (INTERNAL MEMORY) or USB memory* (USB MEMORY).
 - * The recall of the setting condition in the USB memory cannot be executed while executing a continuous writing in the USB memory by the VALUE TO USB function.
For the USB memory that can be used, refer to "Compatible USB memory" under USB port in section 4.1, "Common specifications," in the IM DM7560-02EN.

POWER ON RECALL

- You can set the power-on setting conditions in advance and use them to start the instrument.
- Select factory initial settings, setting conditions that were being used when the power was previously turned off, or setting conditions saved in the internal memory in advance.

SETUP NAME

- You can assign names to setting conditions (with alphanumeric characters, symbols, spaces).

Note

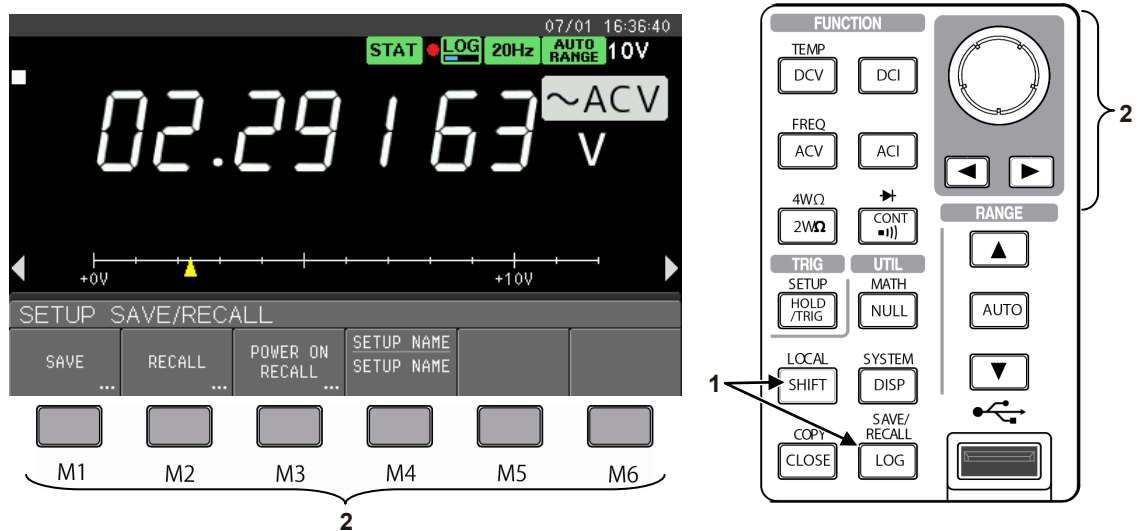
Using SETUP NAME

Assigned names can be displayed on the items of the SETUP NAME menu. Naming is convenient when you want to remember a set of important setting conditions or when distinction becomes difficult among many sets of setting conditions. In addition, the summary of the setting conditions (SETUP SUMMARY) can be displayed in SAVE or RECALL operation, and SETUP NAME is displayed in the first line. In addition, current SETUPNAME can be displayed in the upper right of the measurement screen.

4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

The following describes how to save and recall setting conditions and the settings on the SETUP SAVE/RECALL menu.

- 1 Press [SHIFT]→[LOG(SAVE/RECALL)]. The SETUP SAVE/RECALL menu opens.
- 2 Use each item on the SETUP SAVE/RECALL menu to set various functions.
Use the menu keys M1 to M6 below the screen (outside) and rotary knob for operation. For the operation, see section 3.2.1, "Basic operation of menus." For SETUP SAVE/RECALL menu setting, see "SETUP SAVE/RECALL menu items and settings" on the next page.



4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

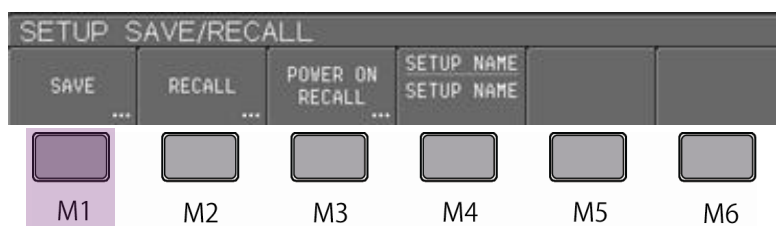
SETUP SAVE/RECALL menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
SAVE		See section 4.7.1, "Setting the SAVE menu."	4.7.1
RECALL		See section 4.7.2, "Setting the RECALL menu."	4.7.2
POWER ON RECALL		The instrument starts with the preset setting conditions when it is powered on. The conditions are set using MODE, NUMBER, and SELECT below.	—
	• MODE	Select any of the following three modes for POWER ON RECALL. • LAST The instrument starts with the setting condition when it was previously powered off (POWER switch off). Press M1 to select it. • DEFAULT The instrument starts with the factory setting conditions. Press M2 to select it. • RECALL It starts with the setting conditions set using NUMBER or SELECT below.	—
	• NUMBER • Only when MODE above is RECALL	• Select from the setting conditions in the internal memories from #1 to #10. Turn the rotary knob to select # number. Note: It is necessary to save the setting conditions of #1 to #10 in advance using the SAVE menu. If the internal memory not containing any setting conditions is specified, the instrument starts with the factory initial settings.	—
	• SELECT • Only when MODE above is RECALL	• The # number of the internal memory (INTERNAL MEMORY) is displayed on the right of the screen, and the cursor is displayed on the selected number. SETUP SUMMARY of the selected # number is displayed on the left of the screen. • Select from the setting conditions in #1 to #10 of the internal memory. Turn the rotary knob to select # number.	—
SETUP NAME		Assign a name to the current setting conditions. The setting conditions are stored with the name by using SAVE. The setting conditions can be confirmed with the name in list display (SETUP SUMMARY). The name is set at the cursor position on the SETUP NAME creation plate using the Input/delete menu. The name can be up to 15 characters long, and up to 8 characters can be displayed in the menu.	—
	• ABCabc	• Uppercase and lowercase letters can be entered at the cursor position on the SETUP NAME creation plate. M1 is used to switch uppercase and lowercase, and the input format is displayed at the beginning on the SETUP NAME creation plate. And then, turn the rotary knob to change the letters, and press the knob to close SETUP NAME menu.	—
	• 123	• Numbers from 0 to 9 can be entered at the cursor position on the SETUP NAME creation plate. M2 is used to select the number, and the character input format is displayed at the beginning on the SETUP NAME creation plate. And then, turn the rotary knob to change the numbers, and press the knob to close SETUP NAME menu.	—
	• !#\$	• Symbols (e.g. space and symbol) can be entered at the cursor position on the SETUP NAME creation plate. M3 is used to select a symbol and the character input format is displayed at the beginning on the SETUP NAME creation plate. And then, turn the rotary knob to change the letters, and press the knob to close SETUP NAME menu.	—
	• DELETE	• Deletes the character, number, or symbol at the cursor position on the SETUP NAME creation plate. Press M4 to delete it.	—
	• BACK SPACE	• Deletes the character, number, or symbol before the cursor position on the SETUP NAME creation plate. Press M5 to delete it.	—
	• INPUT SPACE	• Enters a space at the cursor position on the SETUP NAME creation plate. Press M6 to enter it.	—

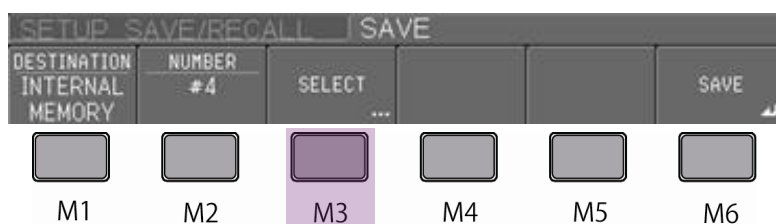
4.7.1 Setting the SAVE menu

The following describes the settings on the SETUP SAVE/RECALL/SAVE menu.

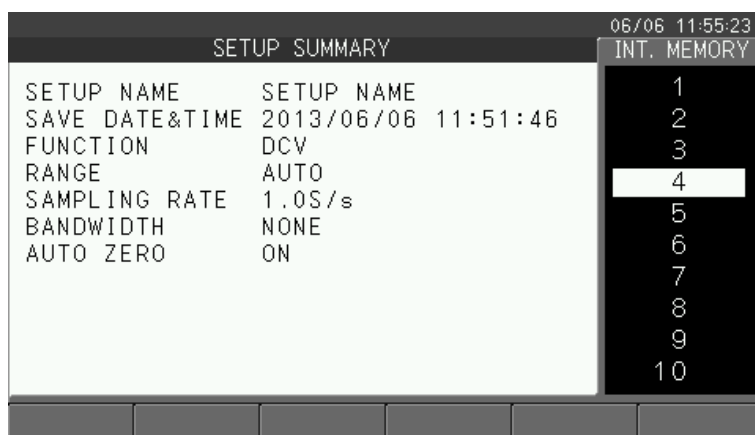
Press M1 on the SETUP SAVE/RECALL menu to open the SAVE menu. (Proceed to step 1 or 2.)



1 If the internal memory is selected for storage



Pressing M3 displays the summary of settings on the SETUP SUMMARY screen (the following is an example of #4) of the internal memory specified by the cursor. See “Items and settings on SAVE (storage: internal memory) setting menu” below.



2 If the USB memory is selected for storage



For details, see “Items and settings on SAVE (storage: USB memory).”

Items and settings on SAVE (storage: internal memory) setting menu

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
DESTINATION	INTERNAL MEMORY	• Select where to save the setting conditions from the following.	—
	USB MEMORY	• Selects the internal memory of this instrument.	—
NUMBER		• Selects the USB memory.	—
SELECT		• Select the internal memory number #1 to #10 by pressing M2 and turning the rotary knob.	—
		• Select the internal memory number #1 to #10 by pressing M3 and turning the rotary knob.	—
SAVE		• This displays SETUP SUMMARY (setting condition summary) of the memory number at the cursor position.	—
		• Saves to the specified storage with the name preset in above. Press M6 to execute it.	—

4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

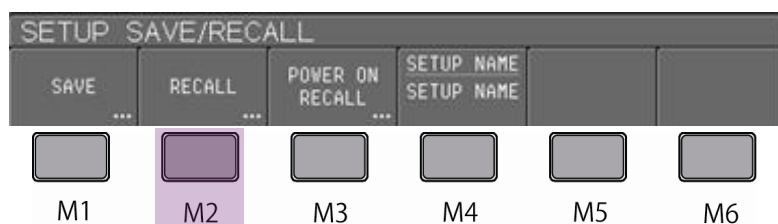
Items and settings on SAVE (storage: USB memory)

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
DESTINATION		Select where to save the setting conditions from the following.	—
	• INTERNAL MEMORY	Selects the internal memory of this instrument.	—
	• USB MEMORY	Selects the USB memory.	
DIRECTORY		Set the directory name in the USB memory. This sets the name at the cursor position on the DIRECTORY creation plate with the Input/Delete menu. The name consists of up to 8 characters, and up to 8 characters are displayed in the menu.	—
	• DEFAULT	This sets the DIRECTORY in "SETUP" format.	—
	• ABC	Uppercase letters can be entered at the cursor position on the DIRECTORY creation plate. M1 is used to select it and the character input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the letters, and press the knob to close DIRECTORY menu.	
	• 123	Enter the number from 0 to 9 at the cursor position on the DIRECTORY creation plate. M3 is used to select it and the character input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the letters, and press the knob to close DIRECTORY menu.	
	• !@\$	Enter the symbol (e.g. space and symbol) at the cursor position on the DIRECTORY NAME creation plate. M4 is used to select it and the character input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the letters, and press the knob to close DIRECTORY menu.	
	• BACK SPACE	Deletes the character, number, or symbol before the cursor position on the DIRECTORY creation plate. Press M5 to delete it.	
	• INPUT SPACE	Enters a space at the cursor position on the DIRECTORY creation plate. Press M6 to enter it.	
FILE NAME		Set the setting condition file name to be saved in the USB memory. The name is set at the cursor position on the FILE NAME creation plate with the input menu below. The name is fixed to 8 characters.	—
	• DEFAULT	FILE NAME is set in the "STUPXXXX" format. "XXXX": numeric value (initial value: 0000)	—
	• ABC	Uppercase letters can be entered at the cursor position on the FILE NAME creation plate. (Note: When the cursor is on the part of above-mentioned FILE NAME "XXXX," only numeric input is possible.) The character input format is displayed at the beginning on the FILE NAME creation plate. Then, turn the rotary knob to change the letters, and press the knob to close FILE NAME menu.	
	• 123	Enter a number from 0 to 9 at the cursor position on the FILE NAME creation plate. M3 is used to select it and the character input format is displayed at the beginning on the FILE NAME creation plate. Then, turn the rotary knob to change the letters, and press the knob to close FILE NAME menu.	
	• !@\$	Enter a symbol at the cursor position on the FILE NAME creation plate. (Note: When the cursor is on the part of above-mentioned FILE NAME "XXXX," only numeric input is possible.) M4 is used to select it and the character input format is displayed at the beginning on the FILE NAME creation plate. Then, turn the rotary knob to change the letters, and press the knob to close FILE NAME menu.	
SAVE		Saves to the specified storage with the preset name above. Press M6 to execute it. To prevent overwriting the file, the four-digit number at the end of the file name is incremented.	—

4.7.2 Setting the RECALL menu

The following describes the setting of the SETUP SAVE/RECALL/RECALL menu.

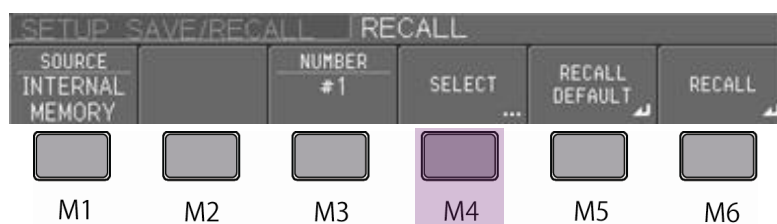
Press M2 on the SETUP SAVE/RECALL menu to open RECALL menu. (Proceed to step 1 or 2.)



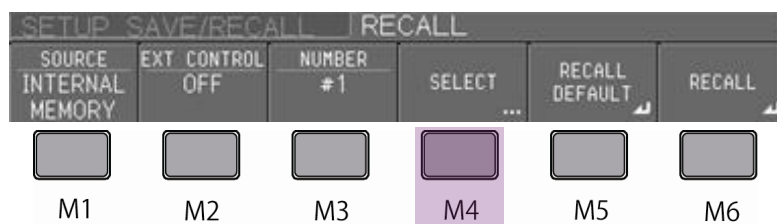
- 1 If the internal memory (INTERNAL MEMORY) is selected for the source

The menu display 1) or 2) is displayed depending on whether the LAN & RS-232 interface (/C2) is installed.

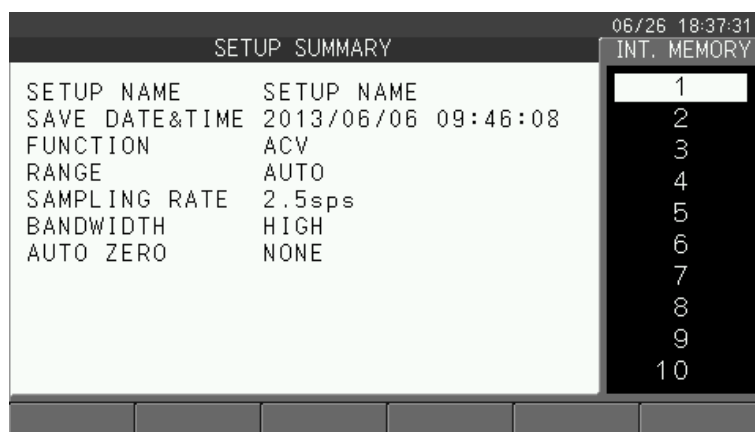
- 1) If the LAN & RS-232 interface (/C2) is not installed



- 2) If the LAN & RS-232 interface (/C2) is installed and EXT CONTROL is set to OFF
(For details on EXT CONTROL, see section 4.7.3)



In 1) and 2) above, pressing M4 displays the summary of settings on the SETUP SUMMARY screen (the following is an example of #1) of the internal memory specified by the cursor.



For details, see “Items and settings on RECALL (source: internal memory) setting menu” on the next page.

4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

Items and settings on RECALL (source: internal memory) setting menu

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
SOURCE		• Selects from where to recall the setting conditions from the following:	—
	• INTERNAL MEMORY	• Selects the internal memory of this instrument.	—
	• USB MEMORY	• Selects the USB memory.	—
EXT CONTROL * Displayed only when LAN & RS-232 interface (/C2) is installed.		• Select whether the external control is used for recalling the setting condition as shown below:	—
	• ON	• External connection is used for control. For an example, see section 4.7.3.	4.7.3
	• OFF	• Keys are used to recall the setting condition of this instrument from the internal memory. Unless you want to use external control, OFF should be selected.	—
NUMBER		• When EXT CONTROL is OFF, press M2 and select the internal memory number #1 to #10 by turning the rotary knob.	4.7.3
SELECT		• Press M3 and select the internal memory number #1 to #10 by turning the rotary knob. • This displays SETUP SUMMARY (setting condition summary) of the memory number at the cursor position.	—
RECALL DEFAULT		• Press M5 to recall the factory setting conditions.	—
RECALL		• Recall from the specified source using the setting condition specified above. Press M6 to execute it.	—

4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

2 If USB memory is selected for the source



For details, see “Items and settings on RECALL (source: USB memory) setting menu” on the table below.

Items and settings on RECALL(source: USB memory) setting menu

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
SOURCE		Selects from where to recall the setting conditions from the following:	—
	• INTERNAL MEMORY	Selects the internal memory of this instrument.	—
	• USB MEMORY	Selects the USB memory.	—
DIRECTORY		Set the directory name in the USB memory. This sets the name at the cursor position on the DIRECTORY creation plate with the Input/Delete menu. The name consists of up to 8 characters, and up to 8 characters are displayed in the menu.	—
	• DEFAULT	This sets the DIRECTORY in "SETUP" format.	—
	• ABC	Uppercase letters can be entered at the cursor position on the DIRECTORY creation plate. M2 is used to select it and the character input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the letters, and press the knob to close DIRECTORY menu.	
	• 123	Enter a number from 0 to 9 at the cursor position on the DIRECTORY creation plate. M3 is used to select it and the character input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the letters, and press the knob to close DIRECTORY menu.	
	• ! @ \$	Enter a symbol (e.g. space and symbol) at the cursor position on the DIRECTORY NAME creation plate. M4 is used to select it and the character input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the letters, and press the knob to close DIRECTORY menu.	
	• BACK SPACE	Deletes the character, number, or symbol before the cursor position on the DIRECTORY creation plate. Press M5 to delete it.	
	• INPUT SPACE	Enters a space at the cursor position on the DIRECTORY creation plate. Press M6 to enter it.	
FILE NAME		Set the setting condition file name to be saved in the USB memory. Press M4 and turn the rotary knob to select the displayed FILE LIST file name.	—
RECALL DEFAULT		Press M5 to recall the factory setting conditions.	—
RECALL		Recall the setting condition from the specified source with the name set in above. Press M6 to execute it.	—

4.7.3 External control function of SETUP RECALL

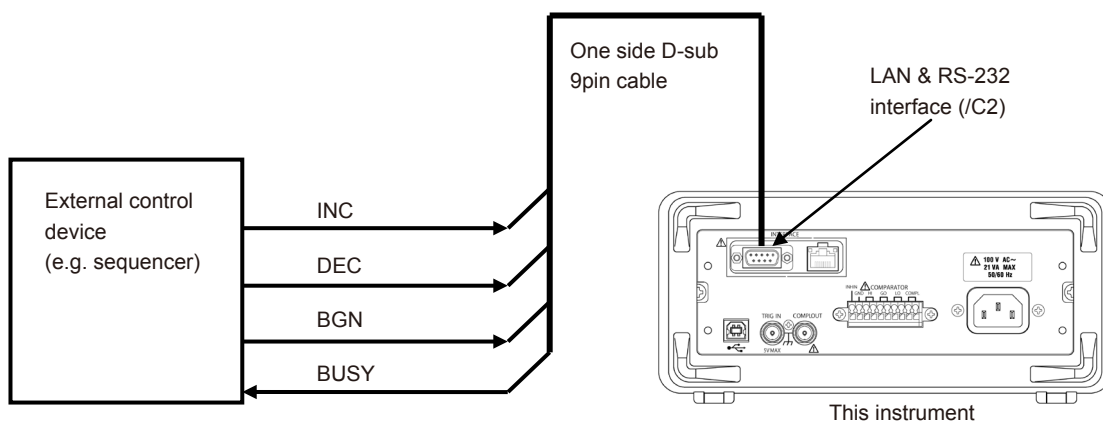
This function requires the LAN & RS-232 interface (/C2).

This instrument can be controlled remotely through a connection with a PC.

Even without a connection with a PC, if the instrument is connected with an external control device (e.g. sequencer) and the setting conditions are saved in the internal memory of this instrument in advance, the setting conditions can be easily recalled from the external control device (e.g. sequencer) to make measurements.

A device configuration example to use this function, usage conditions, and measurement example are provided below.

1 Device configuration example



<External control device>

- Sequencer and the like

<Interface, compatible connector>

This function requires the LAN & RS-232 interface (/C2).

D-sub 9-pin female end (For the signal pin numbers to be used, refer to the table on the next page.)

2 Usage conditions

- 1) This function cannot be used in the following states. In these states, this instrument outputs a high level signal to the RS-232's BUSY terminal (pin #7 of the D-sub 9-pin connector).
 - Remote control
 - Executing the log function in BULK mode
 - Offline browse
 - Continuous writing to the USB memory using the VALUE TO USBMEM function
 - Executing calibration (adjustment).

- 2) The internal memory of this instrument is used. Up to 10 setting conditions can be used.

- 3) Make the connection as shown in the device configuration example, and execute the sequence control in accordance with the table on the next page.

The input/output signal level and pulse width are specified as shown below:

- Input signal
 - H: 2.4 Vmin, L: 0.6 Vmax
 - Maximum rating: ± 15 V
 - Pulse width: 10 ms or more (The logic of the signal can be reversed by the setting.)
- Output signal
 - H: +5.0 Vmin, L: -5.0 Vmax

Signal name	PIN No. of this instrument	Action
INC	#1	When recalled, the memory number (#) of the setting condition is incremented.
GND	#5	Earth ground
DEC	#6	When recalled, the memory number (#) of the setting condition is decremented.
BGN	#9	When recalled, the memory number (#) of the setting condition is returned to the first number.
BUSY	#7	If the control pulse cannot be received, such as when the previous recall action is not completed, this instrument outputs a high level signal to the external control device; otherwise the instrument outputs a low level signal. Be careful when continuously sending control pulses to this instrument.

If increment is performed at the last number (END*), the first number (BEGIN*) is set. Contrarily, if decrement is performed at the first number (BEGIN), the last number (END) is set.

* Refer to the table of "Items and settings on RECALL (source: internal memory) setting menu" on the next page for the END and BEGIN memory numbers.

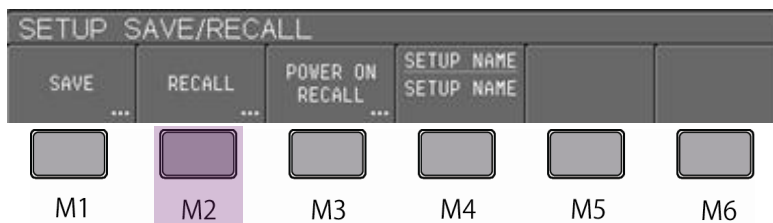
4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

3 Setting method

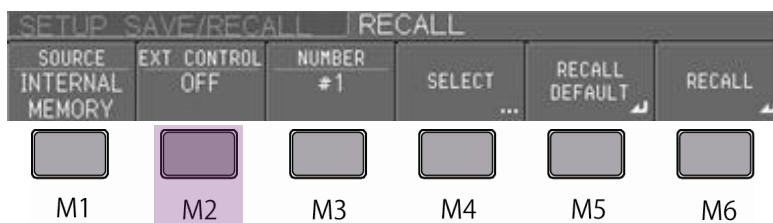
Set the SETUP SAVE/RECALL/RECALL sub menu as shown below:

- SOURCE: INTERNAL MEMORY
- EXT CONTROL: ON
- POLARITY: POSITIVE or NEGATIVE is selected.

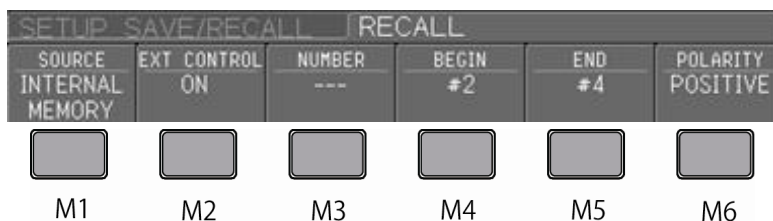
a) Press M2 on the SETUP SAVE/RECALL menu in the figure below.



b) Press M2 on the RECALL menu in the figure below.



c) EXT CONTROL is turned on.



Refer to "Items and settings on RECALL (source: internal memory,) setting menu" on the next page for details other subsequent settings.

4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

Items and settings on RECALL (source: internal memory, EXT CONTROL = ON) setting menu

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
SOURCE		• Select the recall source of the setting conditions from the following:	—
	• INTERNAL MEMORY	• Selects the internal memory of this instrument.	—
	• USB MEMORY	• Selects the USB memory.	—
EXT CONTROL		• Select whether the external control is used for recalling the setting condition as shown below:	—
	• ON	• External connection is made for control. For an example, see this section.	—
	• OFF	• Keys are used to recall the setting condition of this instrument from the internal memory. Unless you want to use external control, OFF should be selected.	—
NUMBER		• When EXT CONTROL is ON, keys are disabled. For external control, the current setting condition is displayed.	—
BEGIN		• Press M4 to open the sub menu, and turn the rotary knob to specify the first memory number to be recalled.	—
END		• Press M5 to open the sub menu, and turn the rotary knob to specify the last memory number to be recalled. • For external control, the last setting condition is displayed.	—
POLARITY		• For external control, increment the setting condition and select the polarity of the control signal to be recalled. Press M6 to open the sub menu, and select the polarity from the following:	—
	• POSITIVE	• Press M1 on the sub menu to select this. If selected, the setting condition is incremented with the positive polarity (pulse) of the control signal and recalled.	—
	• NEGATIVE	• Press M2 on the sub menu to select this. If selected, the setting condition is incremented with the negative polarity (pulse) of the control signal and recalled.	—

4.7 Saving and Recalling Setting Conditions (SETUP SAVE/RECALL)

4 Measurement example

The figure below shows an example of external control of the setting condition for this instrument.



- 1 NUMBER : Setting condition number currently used for measurement (NUMBER)
- 2 BEGIN : First setting condition number (NUMBER)
- 3 END : Last setting condition number (NUMBER)
- 4 POLARITY : Polarity selection of control signal

By inputting high level pulses to the INC signal, measurements are performed by switching the setting conditions like # 3→#4 →#5 → #6 →#3.

4.8 Display Settings (DISP)

The LCD screen of this instrument is described in section 2.3, "Screen display," and display operation is described in section 3.2.2, "Operation using keys and rotary knob (switch)." This section mainly describes the settings on the DISPLAY menu. The following items can be set and executed on the DISPLAY menu.

PRIMARY

- Select the contents displayed on the primary display among NUMERIC (numeric value display), TREND, HISTOGRAM, LIMIT and ARC SCALE METER.
The settings are applied internally to displays that are not currently selected.

PRIMARY SETUP

- Select the settings for the display selected in PRIMARY above.
However, there are no display settings when LIMIT is selected. For limit calculation settings, refer to section 4.6.4, "LIMIT calculation."

SECONDARY

- Selection for the secondary display changes depending on the contents displayed on the primary display.
- Select the content to be displayed on the secondary display among NUMERIC (numeric value display), ANALOG METER (analog meter display), LIMIT (limit calculation) display, STATISTIC (statistics calculation) display, time display of trend display, and numeric value display of HISTOGRAM and CURSOR.

SETUP of SECONDARY

- Select the settings for the display selected in SECONDARY above.
However, only when ANALOG METER and STATISTIC is selected, are there SECONDARY display settings. Otherwise, there are no display settings.

INITIALIZE

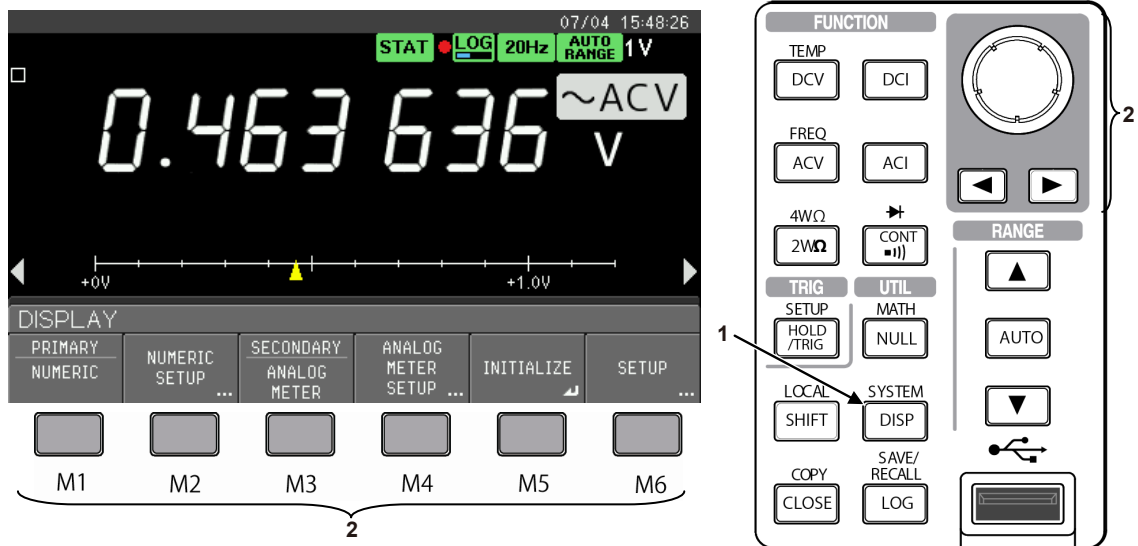
- This clears all the data displayed on the PRIMARY and SECONDARY displays.
This also clears the LOG memory and the data of a statistical calculation at the same time.

SETUP

- Set the background of LCD screen, brightness of the backlight, and the low-power mode of the power supply. (Refer to section 3.3.1 for a setting example.)

4.8 Display Settings (DISP)

- 1 Press [DISP] to open the DISPLAY menu.
- 2 Use each item on the DISPLAY menu to set various functions.
Use the menu keys M1 to M6 below the screen (outside) and rotary knob for operation. For the operation, see section 3.2.1, "Basic operation of menus." For MATH SETUP SAVE/RECALL menu setting, see "DISPLAY menu items and settings" on the next page.



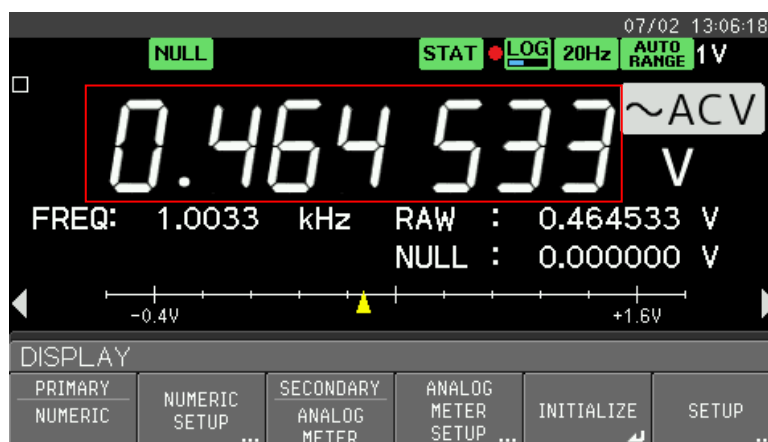
DISPLAY menu items and settings

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
PRIMARY		• Select the contents displayed on the primary display from the following.	2.3
	• NUMERIC	• Displays the numeric value of the measurement result.	2.3.3.1
	• TREND	• Displays the trend chart indicating the time progress of the measurement result.	2.3.3.2
	• HISTOGRAM	• Displays the histogram chart indicating the probability distribution of the measurement result in the vertical axis range.	2.3.3.3
	• LIMIT	• Executes a LIMIT calculation from measurements and displays the judgment result.	2.3.3.4
	• ARCSCALE METER	• It directs a circular arc scale measurements by the indicator.	2.3.3.5
SETUP • SETUP designated by PRIMARY above		• Sets the setting conditions of the display format specified in PRIMARY above.	–
	• NUMERIC	• See section 4.8.1, "Setting the NUMERIC SETUP menu."	4.8.1
	• TREND	• See section 4.9, "Trend chart display function."	4.9.1
	• HISTOGRAM	• See section 4.10, "Histogram chart display function."	4.10.1
	• ARCSCALE METER	• See section 4.8.2, "Setting the ARC SCALE METER SETUP menu."	4.8.2
SECONDARY		• Select the display contents on the secondary display from the following.	2.3
	• NUMERIC	• Displays the numeric value of the measurement result. This menu becomes available when NUMERIC is not displayed on the primary display. The MASKING setting of the NUMERIC SETUP menu of the primary display is applied.	2.3.4.4
	• ANALOG METER	• Displays the measurement result in the analog meter format.	2.3.4.1
	• LIMIT	• Displays the judgment result of LIMIT calculation in MATH calculation. If MATH/LIMIT/LOW or MATH/LIMIT/HIGH menu is on, this menu becomes available.	2.3.4.2
	• STATISTIC	• Displays the numeric values of the maximum value (MAX), minimum value (MIN), average (AVG), and standard deviation (σ) of STATISTIC calculation in MATH calculation. If MATH/STATISTIC menu is on, this menu becomes available.	2.3.4.3
	• HISTOGRAM	• Displays the numeric value acquired from the histogram chart display. • If HISTOGRAM display is set in PRIMARY, this menu is available.	2.3.3.3
	• CURSOR	• Displays the numeric value acquired from the histogram chart display and the cursor. • If HISTOGRAM display is set in PRIMARY, this menu is available.	2.3.3.2 2.3.3.3
	• TREND	• Displays the start time, SPAN, and LAST acquired from the trend chart display. • If TREND display is set in PRIMARY, this menu is available.	2.3.3.2
SETUP • SETUP designated by SECONDARY above	• ANALOG METER	See section 4.8.3, "Setting the ANALOG METER SETUP menu."	4.8.3
	• STATISTIC	See section 4.8.4, "Setting the STATISTIC SETUP menu."	4.8.4
INITIALIZE		• Deletes the measurement result displayed on PRIMARY and SECONDARY display once and starts a new measurement. At the same time, the LOG memory and the statistics calculation data are also cleared.	–
SETUP		• Set the items for LCD screen and the low power mode of the power supply.	–
	• BACKGROUND	Selects the background color of the LCD screen from the following. • WHITE (default setting): White is set for the background color. • BLACK : Black is set for the background color.	–
	• BACKLIGHT	Selects the brightness of the backlight of the LCD screen. • LOW (default setting): LOW is set for brightness. • HIGH : HIGH is set for brightness.	
	• LOW POWER	To save power, the instrument enters low power mode a specified time after the last key operation. In low power mode, the LCD backlight turns off, and the LED of the rotary knob flashes slowly. Set the time from the following options. • OFF (default setting): Low power mode is disabled. • 1minute, 5minute, 10minute, 30minute, 60minute Select 1, 5, 10, 30, or 60 minutes.	

4.8 Display Settings (DISP)

4.8.1 Setting the NUMERIC SETUP menu (Primary display)

The NUMERIC display shows the measurement result of each function numerically. The following shows a display example (in red frame).



NUMERIC display example of primary display

For details on the display, refer to section 2.3.3.1.

On the primary display, you can select the size and font of the characters and mask the lower digits. For the settings on the NUMERIC SETUP menu of the primary display, refer to “Items and settings on NUMERIC SETUP menu” below. For the operation, see section 3.2.1, “Basic operation of menus.”

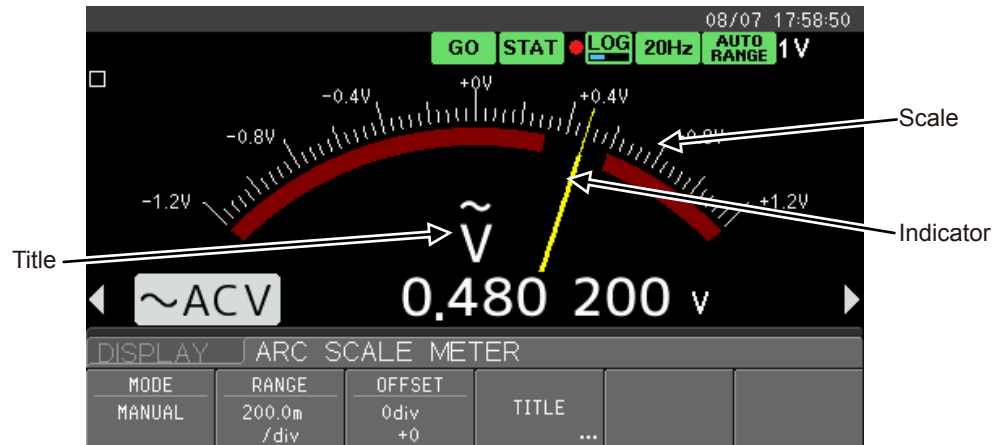
DISPLAY		NUMERIC			
MASKING	OFF	FONT SIZE	NORMAL	FONT	7SEG

Items and settings on NUMERIC SETUP menu

Menu item (1st)	Menu item (2nd)	Settings (detailed menu item)	Refer to
MASKING		Select whether to mask the lower digits for measurement value displayed in NUMERIC. If masked, select the digits to be displayed from the following three types. The MASKING setting is reflected on NUMERIC display on the secondary display.	—
	• OFF (default)	• Not masked; i.e. normally displayed	—
	• nnnnnn-	• Displays six digits. Less significant digits are masked.	
	• nnnnn-	• Displays five digits. Less significant digits are masked.	
FONT SIZE		Select the character size of the measurement value to be displayed in NUMERIC from the following.	2.3.3.1
	• NORMAL	• Normal character size is used.	—
	• LARGE	• The large character size is used. Position of the measurement function and unit moves lower than the normal position. NULL value, RAW value, FREQ numeric value are not displayed.	
FONT		Select the character font of the measurement value to be displayed in NUMERIC from the following.	2.3.3.1
	• 7SEG	• 7-segment is displayed.	—
	• NORMAL	• Gothic type is displayed.	

4.8.2 Setting the ARC SCALE METER SETUP menu (Primary display)

This function indicates on an arc scale meter where the measurement results fall within the specified range. An example is shown below.



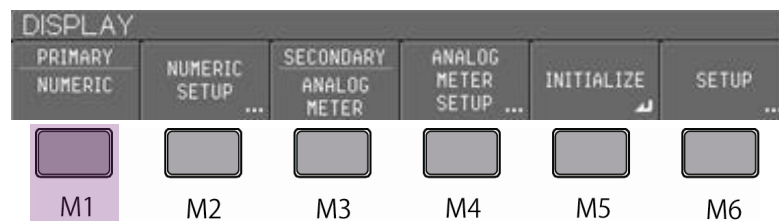
- MOD: MANUAL
- RANG: 200 m /div
- OFFSE: 0 div (+0)
- Measurement result (value): 0.480200 V

Note

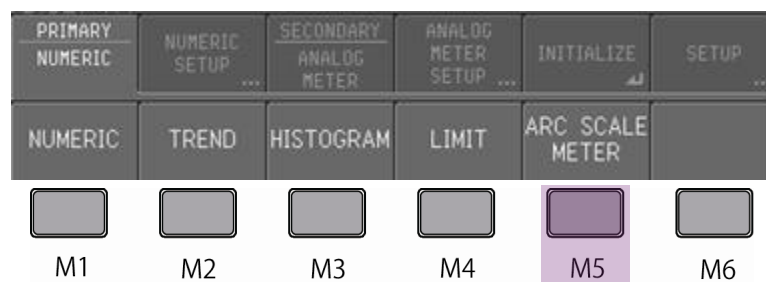
The arc scale meter function has four modes: AUTO, FULLSCALE, MANUAL, and LOG. Except for FULLSCALE mode, the meter display range doesn't consider the measurement range. Therefore, the range of the display of the meter may be set wider than the upper limit or lower limit of the measurement range. Even if an overload occurs in the measurement range, the meter indicator indicates the upper limit value or the lower limit of the measurement range and does not go off the scale.

The following describes how to set the arc scale meter and the settings on the ARC SCALE METER SETUP menu.

- 1 Press M1 on the DISPLAY menu below to open the PRIMARY menu (2).

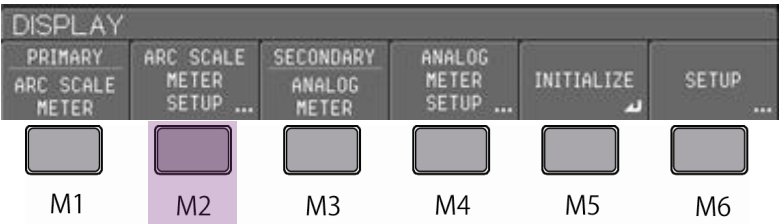


- 2 Press M5 on the following figure, and select ARC SCALE METER to return to the DISPLAY menu (3)

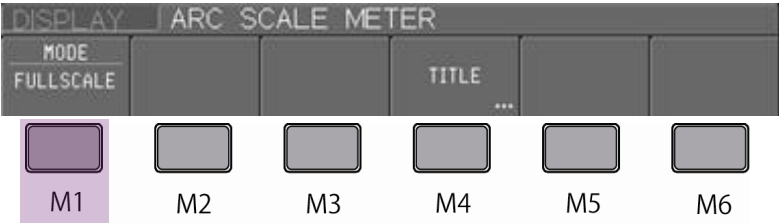


4.8 Display Settings (DISP)

3 Press M2 on the MODE menu below to select the ARC METER SETUP menu (4).



4 Press M1 on the ARC SCALE METER menu below to open the MODE menu (5).



5 Press any of the M1 to M4s on the MODE menu below to select the mode.



For the settings on the ARC SCALE METER SETUP menu, refer to “Items and settings on ARC SCALE METER SETUP menu” and “Items and settings on ARC SCALE METER SETUP/TITLE menu” on the following pages. For the operation, see section 3.2.1, “Basic operation of menus.”

Items and settings on ARC SCALE METER SETUP menu

Menu item (1st)	Menu item (2nd)	Settings (detailed menu item)	Refer to
MODE		Select the ARC SCALE METER mode from the following.	2.3.3.5
	• AUTO	• The acquired data is used to automatically set the range and offset.	—
	• FULLSCALE	• The maximum value in the acquired data is displayed while the measurement range to be displayed is set to FULLSCALE. However, this cannot be selected for FREQ measurement.	
	• MANUAL	• The range and offset are set using the RANGE menu and OFFSET menu below.	
	• LOG	• The acquired data is displayed in a logarithmic scale. The maximum and minimum values of the LOG scale are set on the LOG MAX menu and LOG MIN menu below. • If the acquired data is negative, the absolute value is displayed. • The relationship between LOG MIN and LOG MAX is as follows: 1 LOG MAX must be set larger than 10^1 times of LOG MIN. 2 The difference between LOG MAX and LOG MIN must be set within 10^6 times. 3 If the settings do not satisfy 1 and 2 above, the other setting is automatically adjusted to satisfy 1 and 2.	
APPLY TO MANUAL	• Only if AUTO is selected in MODE above.	The range and offset automatically set in AUTO mode is copied to the setting of MANUAL mode. Memo: • If APPLY TO MANUAL is executed before executing the setting in the MANUAL mode, it might become easy to operate. • Even if APPLY TO MANUAL is executed, the mode is AUTO. Switch the mode manually. • This function is invalid when there is no measurement data (immediately after changing the function or clearing data).	—
RANGE	• Only if MANUAL is selected in MODE above.	This menu is displayed if MANUAL is selected in MODE above. The two methods below are used to set the range manually.	—
	• DEFAULT	• 1.0/div	—
	• Numeric value selection	• Turn the rotary knob to select the range. Setting range: 1.0p/div to 500.0T/div (1-2-5 step)	
OFFSET	• Only if MANUAL is selected in MODE above.	This menu is displayed if MANUAL is selected in MODE above. Two methods below are used to set the offset.	—
	• DEFAULT	• 000000div (+0)	—
	• GET VAL	• The latest measurement is retrieved when the GET VAL(M2) key is pressed.	
	• +/-	• The sign (+ or -) can be set by pressing the M3 key.	
	• Selection of range of numerical value (-9 to +9/0 to 9)	• When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. • When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.	
	• Numeric value selection	• Turn the rotary knob to select the numeric value. Setting range: -100000 div to +100000 div (-100.000kdiv to +100.000kdiv)	—
LOG MIN	• Only if LOG is selected in MODE above.	This menu is displayed if LOG is selected in MODE above. Turn the rotary knob to set the minimum value of the LOG scale. • Setting range: 1.0p/div to 10.0T/div (10-time step)	—
LOG MAX	• Only if LOG is selected in MODE above.	This menu is displayed if LOG is selected in MODE above. Turn the rotary knob to set the maximum value of the LOG scale. • Setting range: 10.0p/div to 100.0T/div (10-time step)	—

For TITLE menu of each MODE, refer to “Items and settings on ARC SCALE METER SETUP/TITLE menu” on the next page.

4.8 Display Settings (DISP)

Items and settings on the ARC SCALE METER SETUP/TITLE menu

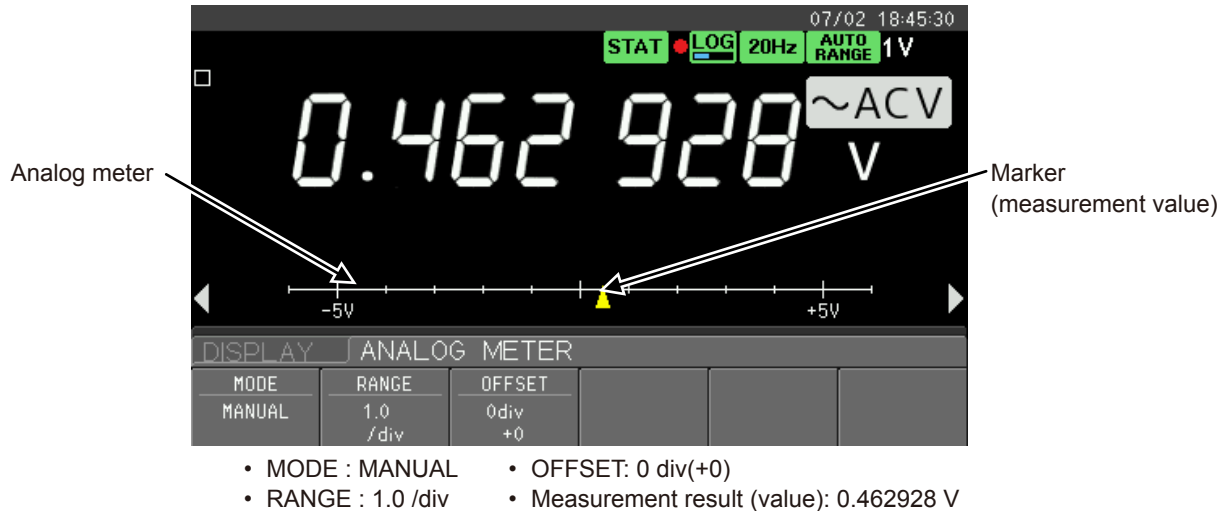
A title can be displayed at the center of ARC SCALE METER. This is convenient when the measurement value can be converted into another unit by combining with SCALING calculation (e.g. RPM conversion).

TITLE is common to each MODE and can be set and displayed.

Menu item (1st)	Menu item (2nd)	Settings (detailed menu item)	Refer to
MODE		Select the content to be displayed as the title at the center of LCD screen from the following three types.	2.3.3.5
	• UNIT	• Displays the unit corresponding to the function being measured. If the function is selected, the unit is automatically set.	—
	• BLANK	• Nothing is displayed.	
	• TEXT	• The name set using the TEXT menu below is displayed as the title. Up to 8 characters (uppercase and lowercase letters, numbers, and symbols) can be set and displayed as the title.	
TEXT		If TEXT is selected in MODE above, the content to be displayed in TITLE can be entered. Up to 8 characters (uppercase and lowercase letters, numbers, and symbols) can be set.	2.3.3.5
	• ABCabc	• Uppercase and lowercase letters can be entered at the cursor position on the TITLE creation plate. M1 key is used to select it and the character input format is displayed at the beginning on the TITLE creation plate. Then, turn the rotary knob to change the letters, and press the knob to close SETUP NAME menu.	—
	• 123	• A number from 0 to 9 can be entered at the cursor position on TITLE creation plate. M2 is used for selection and the number input type is displayed at the beginning of TITLE creation plate. Turn the rotary knob to change the number, and press the knob to close the TEXT menu.	—
	• ! # \$	• A symbol (e.g. space and symbol) can be entered at the cursor position on TITLE creation plate. M3 is used for selection and the symbol input type is displayed at the beginning of TITLE creation plate. Turn the rotary knob to change the character, and press the knob to close the TEXT menu.	—
	• DELETE	• The character at the cursor position on TITLE creation plate is deleted. M4 is used for deletion.	—
	• BACK SPACE	• The character, number, or symbol one character before the cursor position on TITLE creation plate is deleted. M5 is used for deletion.	—
	• INPUT SPACE	• A space is entered at the cursor position on TITLE creation plate. M6 is used to input.	—

4.8.3 Setting the ANALOG METER SETUP menu (Secondary display)

This function indicates on a meter where the measurement results fall within the specified range. An example is shown below. The measurement result is indicated by a marker on the analog meter.



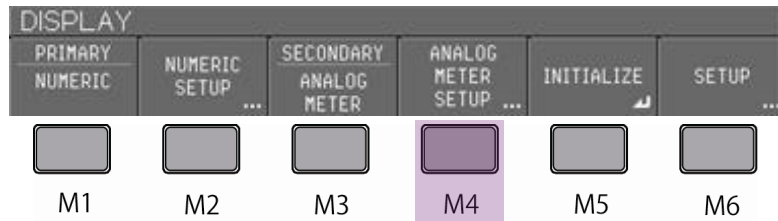
Note

The analog meter function has four modes: AUTO, FULLSCALE, MANUAL, and LOG. Except for FULLSCALE mode, the meter display range doesn't consider the measurement range. Therefore, the range of the display of the meter may be set wider than the upper limit or lower limit of the measurement range. Even if an overload occurs in the measurement range, the meter indicator indicates the upper limit value or the lower limit of the measurement range and does not go off the scale.

4.8 Display Settings (DISP)

The following describes how to set the analog meter and the settings on the ANALOG METER SETUP menu.

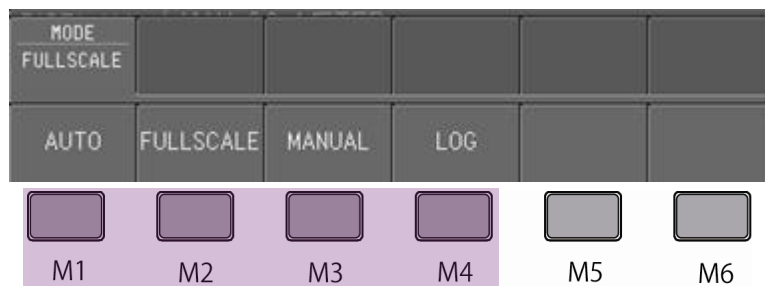
- 1 Press M4 on the DISPLAY menu to open the ANALOG METER SETUP menu (2).



- 2 Press M1 on the following figure, and select the MODE menu (3) to open the MODE menu.



- 3 Press any of the M1 to M4s in the following figure to select the mode.



For the settings on the ANALOG METER SETUP menu, see “ANALOG METER SETUP menu Items and settings” on the next page. For the operation, see section 3.2.1, “Basic operation of menus.”

Items and settings on ANALOG METER SETUP menu

Menu item (1st)	Menu item (2nd)	Settings (detailed menu item)	Refer to
MODE		Select the ANALOG METER mode from the following.	2.3.4.1
	• AUTO	• The acquired data is used to automatically set the range and offset.	—
	• FULLSCALE	• The maximum value in the acquired data is displayed while the measurement range to be displayed is set to FULLSCALE. However, this cannot be selected for FREQ measurement.	
	• MANUAL	• The range and offset are set using the RANGE menu and OFFSET menu below.	
	• LOG	• The acquired data is displayed in a logarithmic scale. The maximum and minimum values of the LOG scale are set on the LOG MAX menu and LOG MIN menu below. • If the acquired data is negative, the absolute value is displayed. • The relationship between LOG MIN and LOG MAX is as follows: 1 LOG MAX must be set larger than 10^1 times of LOG MIN. 2 The difference between LOG MAX and LOG MIN must be set within 10^6 times. 3 If the settings do not satisfy 1 and 2 above, the other setting is automatically adjusted to satisfy 1 and 2.	—
APPLY TO MANUAL	• Only if AUTO is selected in MODE above.	The range and offset automatically set in AUTO mode is copied to the setting of MANUAL mode. Memo: • If APPLY TO MANUAL is executed before executing the setting in the MANUAL mode, it might become easy to operate. • Even if APPLY TO MANUAL is executed, the mode is AUTO. Switch the mode manually. • This function is invalid when there is no measurement data (immediately after changing the function or clearing data).	—
RANGE	• Only if MANUAL is selected in MODE above.	This menu is displayed if MANUAL is selected in MODE above. The two methods below are used to set the range manually.	2.3.4.1
	• DEFAULT	• 1.0/div	—
	• Numeric value selection	• Turn the rotary knob to select the range. Setting range: 1.0p/div to 500.0T/div (1-2-5 step)	
OFFSET		This menu is displayed if MANUAL is selected in MODE above. Two methods below are used to set the offset.	2.3.4.1
	• DEFAULT	• 000000div (+0)	—
	• GET VAL	• The latest measurement is retrieved when the GET VAL(M2) key is pressed.	
	• +/-	• The sign (+ or -) can be set by pressing the M3 key.	
	• Selection of range of numerical value (-9 to +9/0 to 9)	• When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. • When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.	
	• Numeric value selection	• Turn the rotary knob to select the numeric value. Setting range: -100000 div to +100000 div (-100.000kdiv to +100.000kdiv)	—
LOG MIN	• Only if LOG is selected in MODE above.	This menu is displayed if LOG is selected in MODE above. Turn the rotary knob to set the minimum value of the LOG scale.	2.3.4.1
	• Numeric value selection	• Setting range: 1.0p/div to 10.0T/div (10-time step)	
LOG MAX	• Only if LOG is selected in MODE above.	This menu is displayed if LOG is selected in MODE above. Turn the rotary knob to set the maximum value of the LOG scale.	2.3.4.1
	• Numeric value selection	• Setting range: 10.0p/div to 100.0T/div (10-time step)	

4.8.4 Setting the STATISTIC SETUP menu (Secondary display)

The STATISTIC display on the secondary display shows the result of STATISTIC calculation.



Example of the STATISTIC display on the secondary display

The following statistical information is displayed.

- MAX: Maximum value
- MIN: Minimum value
- AVG: Average value
- σ : Standard deviation
- NUM: Number of samples
- ERR: Number of error data*

* Error data is invalid data that is not applicable to statistical calculation, such as overload data and overflow data.

The display of standard deviation (σ) can be selected within the range of 1σ - 6σ .

Item and settings of STATISTIC SETUP menu

Menu item (1st)	Menu item (2nd)	Settings (detailed menu item)	Refer to
σ		Select the display of standard deviation (σ) in the STATISTIC display on a secondary display within the range of 1σ - 6σ . * This setting is common with the setting of the σ cursor in the HISTOGRAM display on the primary display. When this setting is changed, it is reflected in the σ cursor setting.	—
	• DEFAULT	Set it to default value (3σ).	4.6.5 4.10.1.1
	* Numeric value selection	Turn the rotary knob, and set the standard deviation (σ) in the STATISTIC display within the range of 1σ - 6σ .	

4.9 Trend Chart Display Function

The trend chart display can be divided roughly into online and offline modes. The online trend chart display in real time shows measured data. The offline trend chart display shows the content of the LOG memory currently stored. Refer to section 4.11 "Log function" for details in the LOG memory. Features and possible contents are shown by the table below about online trend chart display function/offline trend chart display function.

The following tables show the features and their descriptions about the online trend chart display function and offline trend chart display function. For more details of each trend chart display, refer to sections 4.9.1 and 4.9.2.

Features and descriptions about online trend chart display function

	Feature	Description
1	Real-time display	- Displays the latest measurement result in real time
2	Single-shot measurement	- When measuring in SINGLE mode (TRIG setting), you can press the HOLD (TRIG) key to acquire and display measurement data.
3	Display method	- Displays all data by changing the magnification until the number of data values reaches 100,000. When this number is reached, old data is deleted when new data is added so that the latest 100,000 data values are always displayed. (During this process, the waveform scrolls horizontally.)
4	Clearing of data	- Deletes the displayed data, acquires data from the beginning, and displays it. 1) INITIALIZE is executed from the DISPLAY menu. 2) When rotary knob is pressed or the like (Refer to section 6.4 for a list of data clear conditions.)
5	Display of time stamp	- Displays the time stamps of the data at the head and end of the trend chart when the secondary display is set to TREND.

Features and Descriptions about offline trend chart display function

	Feature	Description
1	Display of data in LOG memory	- Displays the data stored in LOG memory
2	Display method	- It is possible to change the display magnification of the horizontal axis as you like to display the entire data by compressing or a portion of the data by expanding.
3	Cursor display	- Movement of T1 and T2 cursors and information display < Primary display > Displays T1 and T2 cursors < Secondary display > 1) Measurement values at each cursor position and the maximum and minimum values of multiple data points compressed at cursor position on the display 2) Displays the address value and time stamp at the cursor position and the time difference and the number of data points between the cursors 3) Displays statistical data calculated over the range between the two cursors
4	Search function	- T1 and T2 cursors can be moved to the locations that satisfy the specified conditions.

4.9.1 Online trend chart display

The following is an example of the trend chart display.



Primary display
: trend chart display
+2.37080 V to +2.37130 V

Main functions and features of the online trend chart display are as follows:
(For detailed specifications, see section 4.7 in the IM DM7560-02EN.)

Measurement action and display method

- The measurement data is first displayed from the left with the progression of time.
If [HOLD(TRIG)] is pressed to set the instrument to the HOLD state, measurement and display are interrupted. If [HOLD(TRIG)] is pressed again, measurement starts and display is resumed.
If MODE is changed on the TREND/VERTICAL/MODE menu, the data is deleted, and the measurement is executed from the beginning and displayed from the left.
- When measuring with TRIG set to SINGLE mode, measurement data is displayed every time [HOLD/ TRIG] is pressed.
- If the data reaches the right end on the screen, the trend is redrawn by increasing the compression ratio so that all data can be displayed. Compression continues until 100 k data values are displayed on one screen. Beyond this point, the waveform is scrolled to the left maintaining the compression ratio, and new data is displayed at the right end as it is acquired.
- How to clear data

Measurement results are cleared when the following operations occur.

- a) Change in function
- b) Data clear operation
Pressing the rotary knob when only the top menu of function is displayed or pressing INITIALIZE on the DISPLAY menu
- c) Turning on or off the SMOOTHING calculation
- d) Turning on or off the NULL calculation or NULL value setting
- e) Turning on or off the mode of calculation function, SCALING calculation and dB calculation or changing parameters

For a list of clear conditions of the log memory, histogram chart, and statistic calculation, refer to section 6.4.

- Display specifications
 - a) Amount of displayed data: Max. 100 k data
 - b) Horizontal axis: 401 dots (10 div)
 - c) Vertical axis: 121 dots (12 div)

Vertical axis mode (MODE)

Select the vertical mode from the following three types on the TREND/VERTICAL menu.

- **AUTO:** The acquired data is used to automatically set the range and offset.
- **FULLSCALE:** FULLSCALE of the measurement range is assumed to be the maximum value and minimum value of the vertical axis.

When data measured using a different range exists on the same trend chart, the minimum and maximum values are set based on FULLSCALE of the highest range.

- **MANUAL:** The range and offset can be set on the VERTICAL menu.

Note

Except for FULLSCALE mode, the vertical axis of the trend chart display function (common to online and offline) doesn't consider the measurement range.

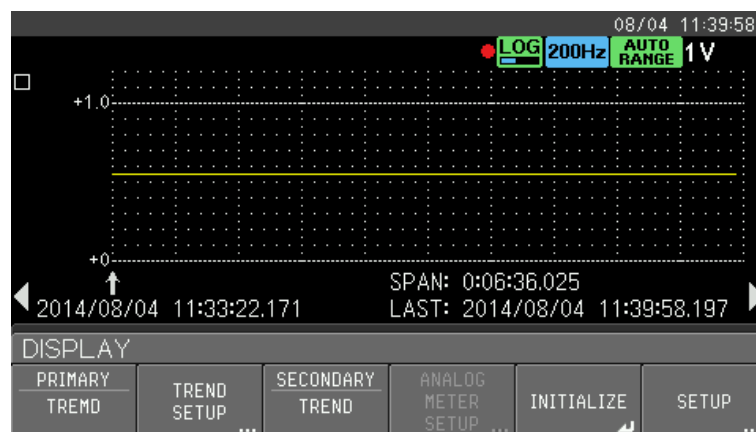
Therefore, the display range may be set wider than the upper limit or lower limit of the measurement range.

If an overload occurs in the measurement range, the data is plotted at the upper limit value or the lower limit of the measurement range.

Combination with the secondary display

If the primary display shows the online trend chart, the contents of secondary display can be selected from the following five types.

- 1 **NUMERIC:** Numeric value display. This displays the latest measurement data and function name.
- 2 **ANALOG METER:** Analog meter display. This displays the measurement data with the marker on the horizontal axis. (See section 4.8.3.)
- 3 **TREND:** Trend chart information display. As shown in the measurement example, three time stamps (date and time) are displayed.

**Secondary display**

- ↑: Time stamp at the left end of the screen
- SPAN: Time difference between the data at the left end of the screen and the latest data
- LAST: Time stamp of the latest data
 - * Time is measured and displayed down to milliseconds.

CAUTION

The sampling rate indicates an approximate measurement rate; it does not ensure the sampling interval. The sampling rate is greatly affected by the calculation function such as statistics calculation and limit judgment. For the time of the trend chart, the time on the secondary display should be used as a standard. Use BULK mode explained in section 4.11.2 if you want to acquire data using an accurate sampling rate.

ATTENTION

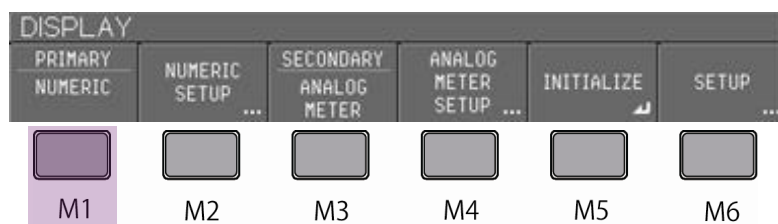
Le taux d'échantillonnage indique le taux de mesure approximatif ; par ex., n'assure pas l'intervalle d'échantillonnage. Il est très sensible à la fonction de calcul, comme le calcul statistique et l'évaluation des limites.

Pour l'heure du graphique des tendances, utiliser par défaut l'heure sur l'écran secondaire. Utiliser le mode BULK décrit à la section 4.11.2 lorsque vous voulez un taux d'échantillonnage précis

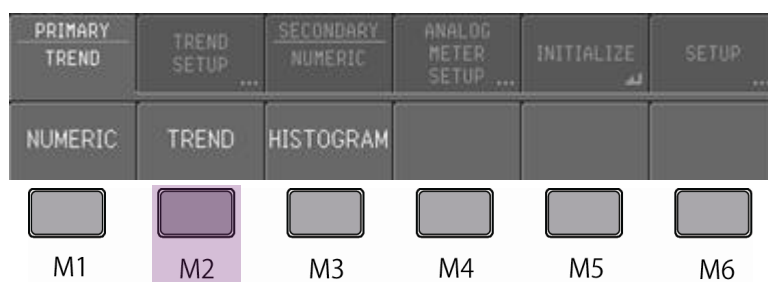
- 4) STATISTIC: Statistical information display (selectable only if STATISTIC is set to ON). The maximum value (MAX), minimum value (MIN), average (AVG), standard deviation (σ), the number of samples (NUM), and the number of error times (ERR) are displayed. (See section 4.6.5 or 2.3.4.3.)
- 5) Display of LIMIT judgment results (selectable only if LIMIT judgment junction is ON). LOW, GO, or HIGH is displayed. LOW LIMIT value and HIGH LIMIT value are also displayed. (See section 4.6.4 or 2.3.4.2.)

The following describes how to set the online trend chart display and the settings on the TREND SETUP menu.

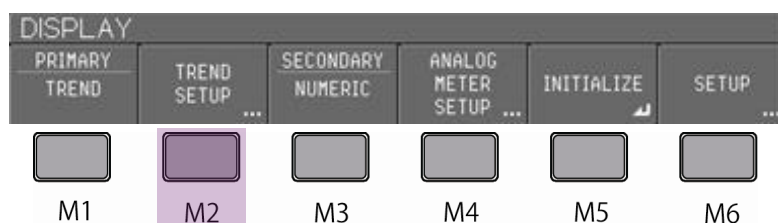
- 1 Press M1 on the DISPLAY menu below to open the PRIMARY menu in step 2.



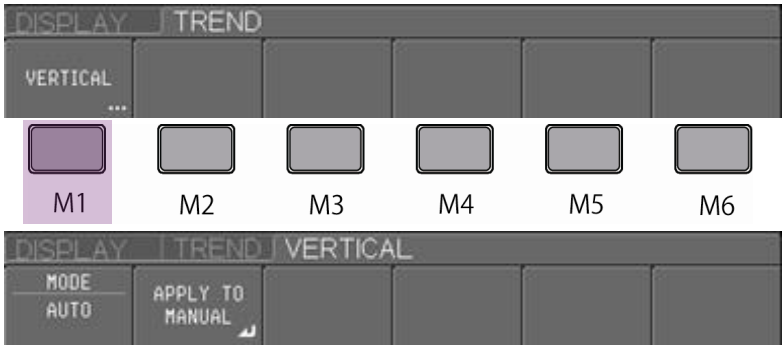
- 2 Press M2 to select TREND. The DISPLAY menu in step 3 opens.



- 3 Press M2 on the following figure to select TREND SETUP. The TREND SETUP menu in 4 opens.



4 Press M1 on the following figure, and select VERTICAL to open the VERTICAL menu.



For the settings on the TREND SETUP(DISPLAY/TREND/VERTICAL) menu, see “TREND SETUP(DISPLAY/TREND/VERTICAL) menu Items and settings” on the next page. For the operation, see section 3.2.1, “Basic operation of menus.”

- TREND SETUP (DISPLAY/TREND/VERTICAL) menu Items and settings

<MODE: AUTO>



<MODE: FULLSCALE>



<MODE:MANUAL>



4.9 Trend Chart Display Function

Menu items (1st)	Menu items (2nd)	Settings (detailed menu items)	Refer to
MODE		Select from the following three vertical axis modes.	—
	• AUTO	• The acquired data is used to automatically set the range and offset.	—
	• FULL SCALE	• The maximum value in the acquired data is displayed while the measurement range to be displayed is set to FULLSCALE.	
	• MANUAL	• The range and offset are set using the RANGE menu and OFFSET menu below.	
APPLY TO MANUAL • When AUTO is selected in MODE above		The range and offset automatically set in AUTO mode is copied to the setting of MANUAL mode. Memo) • If APPLY TO MANUAL is executed before executing the setting in the MANUAL mode, it might become easy to operate. • Even if APPLY TO MANUAL is executed, the mode is AUTO. Switch the mode manually. • This function is invalid when there is no measurement data (immediately after changing the function or clearing data).	—
RANGE • When MANUAL is selected in MODE above		This menu is displayed if MANUAL is selected in MODE above. The two methods below are used to set the range manually.	—
	• DEFAULT	• Press M1 to set the range of 1.0/div.	—
	• Numeric value setting	• Turn the rotary knob to select the range. Setting range: 1.0 p/div to 500.0 T/div	
OFFSET • When MANUAL is selected in MODE above		This menu is displayed if MANUAL is selected in MODE above. Two methods below are used to set the offset.	—
	• DEFAULT	• Press M1 to set the offset of -0 div(+0).	—
	• GET VAL	• The latest measurement is retrieved when the GET VAL(M2) key is pressed.	
	• +/-	• The sign (+ or -) can be set by pressing the M3 key.	
	• Selection of range of numerical value (-9 to + 9/0 to 9)	• When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. • When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.	
	• Numeric value setting	• Use the rotary knob and arrow keys to manually set the offset. Setting range: -100,000 div to +100,000 div	

4.9.2 Offline trend chart display

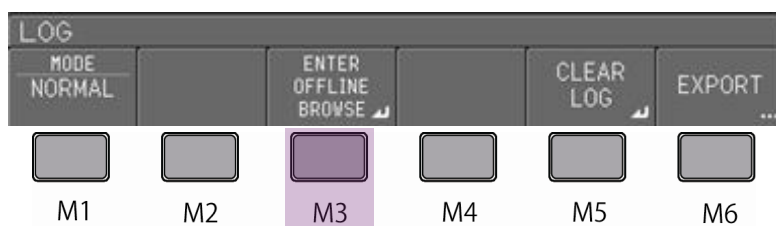
The offline trend chart displays the contents currently saved in the LOG memory. By changing the horizontal setting, the waveform data can be expanded for observation.

When switched to offline mode, only the functions available in offline mode (offline trend chart display and offline histogram chart display) can be used.

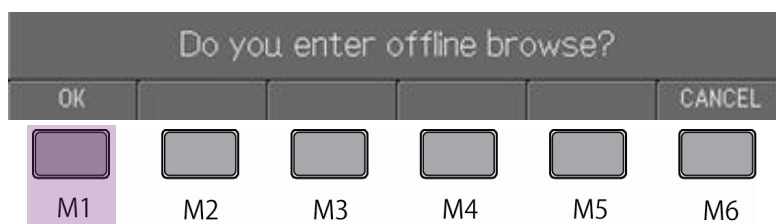
To return to normal mode (online mode), press LOG→EXIT OFFLINE BROWSE or HOLD/TRIG.

This section describes how to switch to the offline trend chart display and the settings on the TREND SETUP menu. Sections 4.9.2.1 to 4.9.2.5 describe functions specific to the offline trend chart display in the trend chart display.

- 1 Press [LOG] to open the LOG menu below. Press M3 on the LOG menu below.



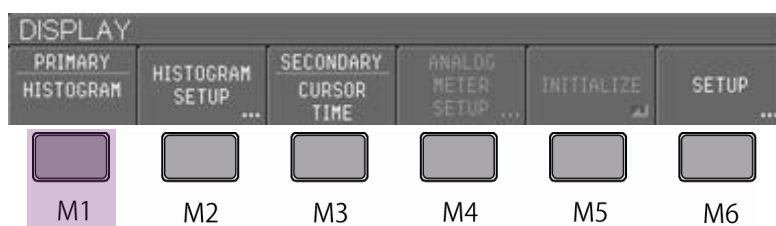
- 2 The screen below opens. Press M1 in the following figure, and select OK.



- 3 The screen switches to the offline browse screen.

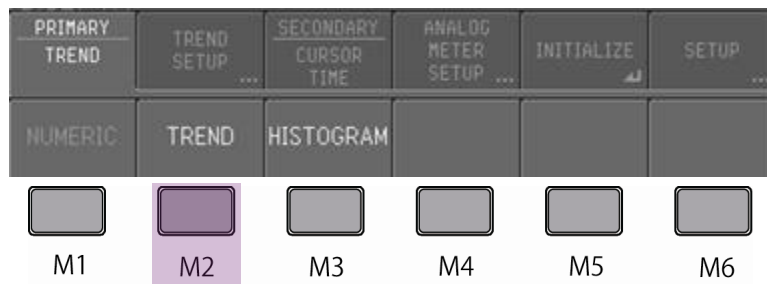


- 4 Press [DISP] to open the DISPLAY menu below.
Press M1 on the DISPLAY menu below to open the PRIMARY menu (5).

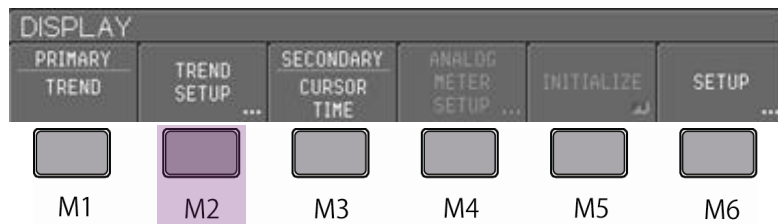


4.9 Trend Chart Display Function

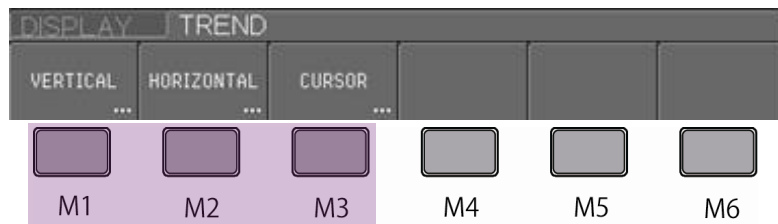
- 5 Press M2 on the following figure to select TREND. The DISPLAY menu (6) opens.



- 6 Press M2 on the following figure to select TREND SETUP. The TREND SETUP menu (7) opens.



- 7 Press any of the M1 to M3s on the following figure to select VERTICAL/HORIZONTAL/CURSOR menu to open the menu.



For the settings on the TREND SETUP (DISPLAY/TREND) menu, see “Items and settings on TREND SETUP (DISPLAY/TREND) menu” on the next pages. For operation, see section 3.2.1, “Basic operation of menus.”

Items and settings on TREND SETUP (DISPLAY/TREND) menu

- TREND SETUP (DISPLAY/TREND/VERTICAL)
The settings are the same as the online trend chart display.
See "Items and settings on TREND SETUP(DISPLAY/TREND/VERTICAL) menu" in section 4.9.1.
- TREND SETUP (DISPLAY/TREND/HORIZONTAL) menu
See "Items and setting of TREND SETUP(DISPLAY/TREND/HORIZONTAL) menu" in this section.
- TREND SETUP (DISPLAY/TREND/CURSOR) menu
See "Items and settings on TREND SETUP(DISPLAY/TREND/CURSOR) menu" in this section.

Items and settings on TREND SETUP(DISPLAY/TREND/HORIZONTAL) menu

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
Readings /div		Set the resolution of the waveform data in the horizontal direction. Set in terms of the number of data values per division.	—
	*Numerical value setting	• Turn the rotary knob to select the numerical value in the setting range below. Setting range: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1k, 2k, 5k, 10k	—
CENTER ADDR		Set the center of the entire waveform in the horizontal direction when waveform data is displayed using address values.	—
	*Numerical value setting	• Use the rotary knob or the arrow keys to select the numerical value. Setting range: 0 to (NUM-1) NUM: Data amount between T1 and T2 cursors	—
SHOW ALL		This sets Readings/div and CENTER ADDRESS automatically so that the entire LOG memory is displayed.	—

Items and settings on TREND SETUP(DISPLAY/TREND/CURSOR) menu

When the CURSOR menu is displayed, the rotary knob becomes available. The cursor selected with the knob moves.

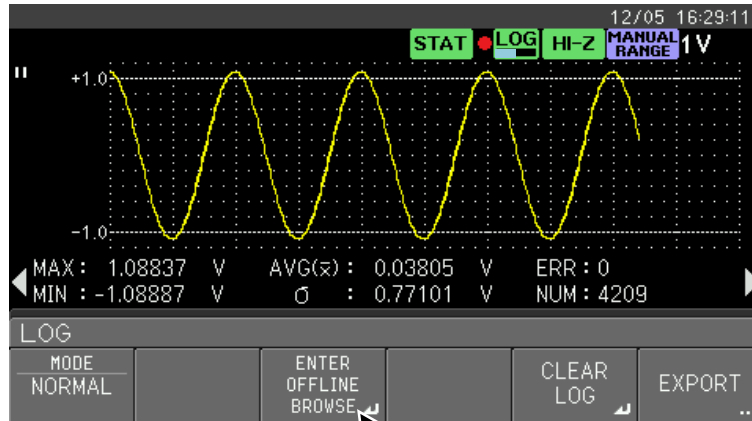
4.9 Trend Chart Display Function

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
KNOB		Select the cursor to be moved when the rotary knob is turned or when the search function is in use. The selected cursor is displayed with a solid line, and the other cursor is displayed with a dotted line.	4.9.2.3
	• TCURSOR1	• T1 cursor moves.	—
	• TCURSOR2	• T2 cursor moves.	
	• TRACK	• Both of T1 and T2 cursors move.	
SEARCH MODE		Select from the following eight modes when operating the search function. Select by turning the rotary knob.	4.9.2.3
	• OFF	• The search function is disabled (default).	—
	• LIMIT GO	• Point where LIMIT judgment changes to GO	
	• LIMIT NOGO	• Point where LIMIT judgment changes to NOGO	
	• LIMIT HIGH	• Point where LIMIT judgment changes to HIGH	
	• LIMIT LOW	• Point where LIMIT judgment changes to LOW	
	• EDGE POSITIVE	• Point where the specified level is crossed upward	
	• EDGE NEGATIVE	• Point where the specified level is crossed downward	
	• EDGE BOTH	• Point where the specified level is crossed regardless of direction	
EDGE VALUE		Set the level using a numerical value when EDGE POSITIVE, EDGE NEGATIVE, or EDGE BOTH is selected for SEARCHMODE when operating the search function.	4.9.2.3
	• DEFAULT	• +000.0000 is set.	—
	• +/-	• The sign (+ or -) can be set by pressing the M3 key.	
	• Selection of range of numerical value (-9 to +9/0 to 9)	• When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. • When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.	
	* Numeric value setting	• Use the rotary knob and arrow keys to select EDGE VALUE. Setting range: -999.9999 T to +999.9999T * Suffix is added to the right of the seven digits. Minimum resolution: 0.0000001p	
TCUESOR1		Moves the T1 cursor to the specified address below and displays the address in the menu.	4.9.2.3
	• TOP	• Address position of the first data obtained in the measurement data	—
	• BOTTOM	• Address position of the last data obtained in the measurement data	
	• DISP CENTER	• Center position of the displayed area	
	• STOP EVENT	• This function operates only for data measured in BULK mode. The T1 cursor moves to the position set with LOG/BULK SETTING/STOP EVENT.	
	* Numeric value setting	• Use the rotary knob and arrow keys to set the numerical value of the TCURSOR1 address. Setting range: 0 to 99999	
TCUESOR2		Moves the T2 cursor to the specified address below and displays the address in the menu.	4.9.2.3
	• TOP	• Address position of the first data obtained in the measurement data	—
	• BOTTOM	• Address position of the last data obtained in the measurement data	
	• DISP CENTER	• Center position of the displayed area	
	• STOP EVENT	• This function operates only for data measured in BULK mode. The T2 cursor moves to the position set with LOG/BULK SETTING/STOP EVENT.	
	* Numeric value setting	• Use the rotary knob and arrow key to set the numerical value of TCURSOR2 address. Setting range: 0 to 99999	
SET DISP POSITION		If the cursor set with KNOB is T1 or T2, the waveform moves to the display position where the cursor is at the center of the screen. If the cursor set with KNOB is TRUCK, expansion ratio is set so that both of T1 and T2 cursors are included on the screen, and the waveforms move so that the center of T1 and T2 cursors is at the center of the screen.	4.9.2.3

4.9.2.1 Switching to offline trend chart display (offline browse function)

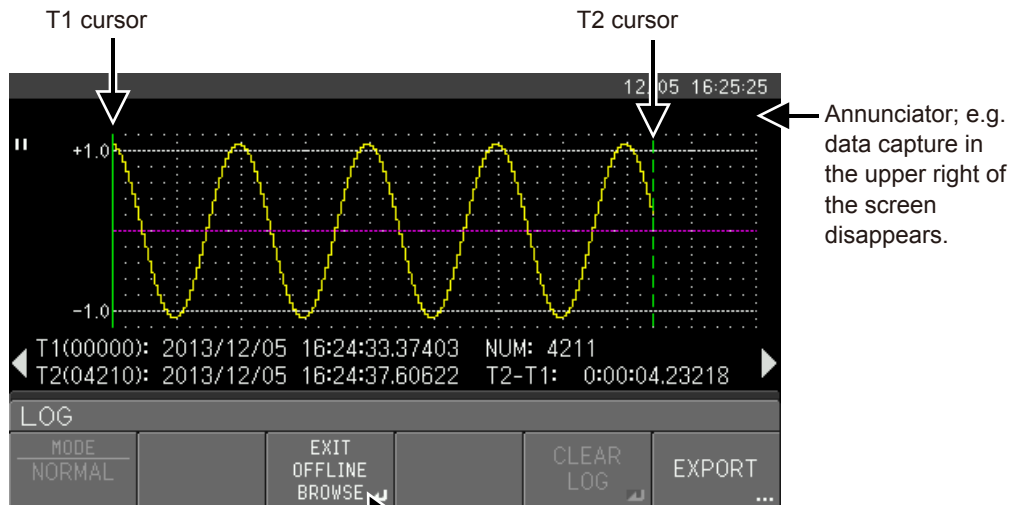
To switch from online to offline on the trend chart display, press [LOG], select LOG/ENTER OFFLINE BROWSE menu, and execute it. The following figure shows an example of switching from online to offline.

Example of online trend chart display



If ENTER OFFLINE BROWSE is selected on the LOG menu, the screen switches to the offline browse screen below (press M3).

Example of offline trend chart display



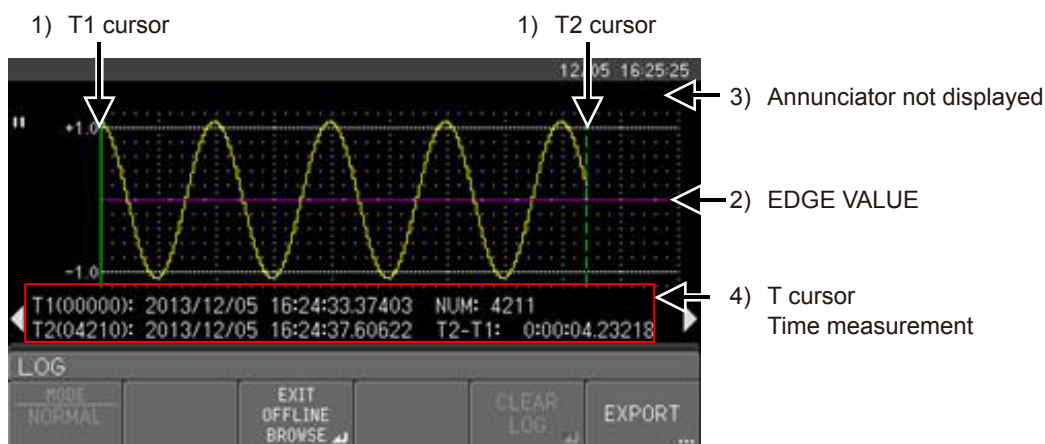
If EXIT OFFLINE BROWSE is selected on the LOG menu, the screen switches to the online browse screen above (press M3).

- T cursor: When switching to the offline browse screen, T1 and T2 cursors are always positioned at each side of the waveform as shown in the figure above.
- Annunciator: The annunciator in the upper right of the screen disappears (nothing is displayed).

4.9 Trend Chart Display Function

4.9.2.2 Screen display

The following shows a screen example of the offline trend chart display to explain the offline-specific display.



1 Primary display

- 1) T1 and T2 cursor: They are positioned at each side of the waveform data just after entering the offline trend chart display. (green solid line and dotted line)
- 2) EDGE VALUE: This is displayed when EDGE POSITIVE, EDGE NEGATIVE, or EDGE BOTH is selected in the SEARCH MODE of the T cursor search function.
- 3) Annunciator: Not displayed

2 Secondary display

Switch contents 4), 5), and 6) on a secondary display with the right and left arrow keys.

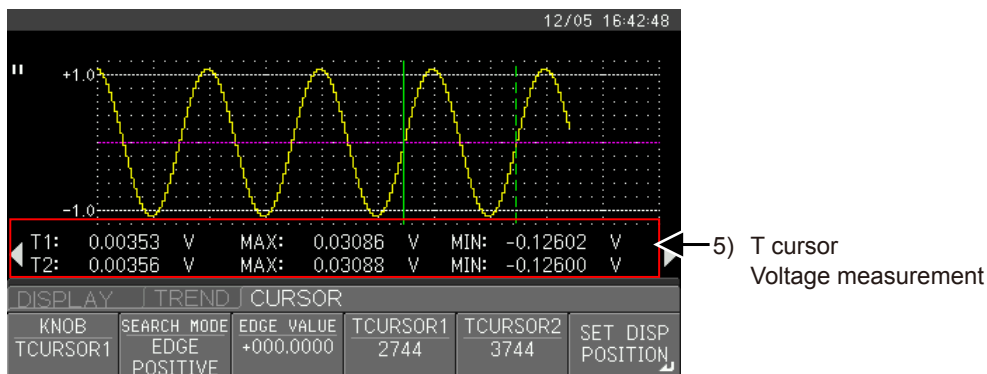
4) CURSOR TIME (T cursor time measurement: in the red frame in the figure above)

- The time stamp of each cursor is displayed with the minimum unit of 10 μ s.
- For the numeric value in (); e.g. T1 (04210), the address in the LOG data is displayed.
- NUM : The number of data values between cursors T1 and T2 is displayed.
- T2-T1 : Time difference between cursors T1 and T2 is displayed.

5) CURSOR VALUE (T cursor voltage measurement: in red frame in the following figure)

Pressing the right arrow key on the screen above causes the screen to switch to the display in the following figure.

- T1 : e.g. 0.00353 V : Voltage at the address specified by each cursor
- MAX : 0.03086; MIN : e.g. -0.12602 V : The maximum and minimum values at the cursor positions are displayed for compressed display.



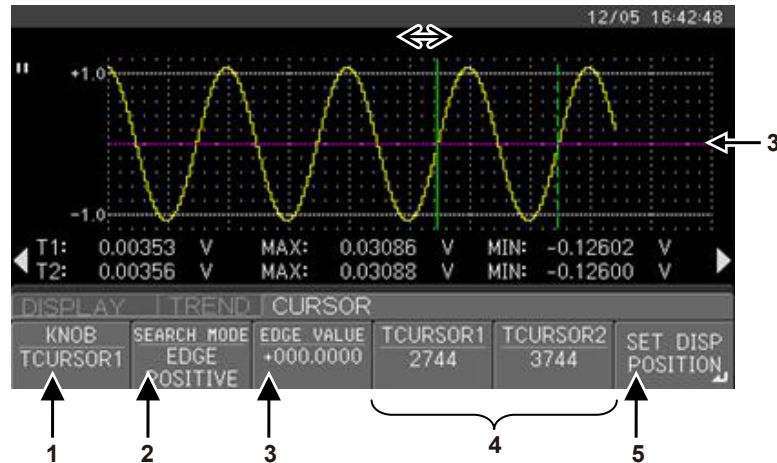
6) Re-calculation and display of statistical data

Pressing the right arrow key on the screen above causes statistical data to be displayed. (See section 4.9.2.4.)

4.9.2.3 Search function using T cursors

The offline trend chart display can show voltage by moving the T cursor to the position that agrees with given conditions on the measured waveform. This function is called the search function.

The following figure shows a measurement example indicating the search function using the T cursors.



The measurement example shows the voltage, maximum (MAX), and minimum (MIN) values at the address specified by the T1 cursor (green solid line).

The search function is set on the DISPLAY/TREND/CURSOR menu (screen above) as described below.

- 1 KNOB: Specifies the cursor that the rotary knob moves and the cursor used for searching. The specified cursor is displayed with a solid line, and the other cursor is displayed with a dotted line.
 - TCURSOR1 : T1 cursor is specified. • TCURSOR2: T2 cursor is specified.
 - TRACK : T1 and T2 cursors are specified while keeping the interval between them constant.

Clockwise rotation causes the T2 to move to the search point; counterclockwise rotation causes the T1 to move to the search point.

- 2 SEARCH MODE: Specify the search mode from the following eight modes. When the search function is set to a setting other than OFF, turning the rotary knob moves the target cursor to the ends of the waveform and the address that matches the following condition.
 - OFF : The search function is disabled. The specified cursor simply moves.
 - LIMIT GO : Point where LIMIT judgment switches to GO
 - LIMIT NOGO : Point where LIMIT judgment switches to NOGO
 - LIMIT HIGH : Point where LIMIT judgment switches to HIGH
 - LIMIT LOW : Point where LIMIT judgment switches to LOW
 - EDGE POSITIVE : Point where the specified level is crossed upward
 - EDGE NEGATIVE : Point where the specified level is crossed downward
 - EDGE BOTH : Point where the specified level is crossed regardless of direction

- 3 EDGE VALUE: Specify the voltage level for edge searching (pink solid line in the measurement example).

You can set this value only when the search mode is set to EDGE POSITIVE, EDGE NEGATIVE, or EDGE BOTH in step 2. The voltage level is displayed on the screen with a pink solid line.

4.9 Trend Chart Display Function

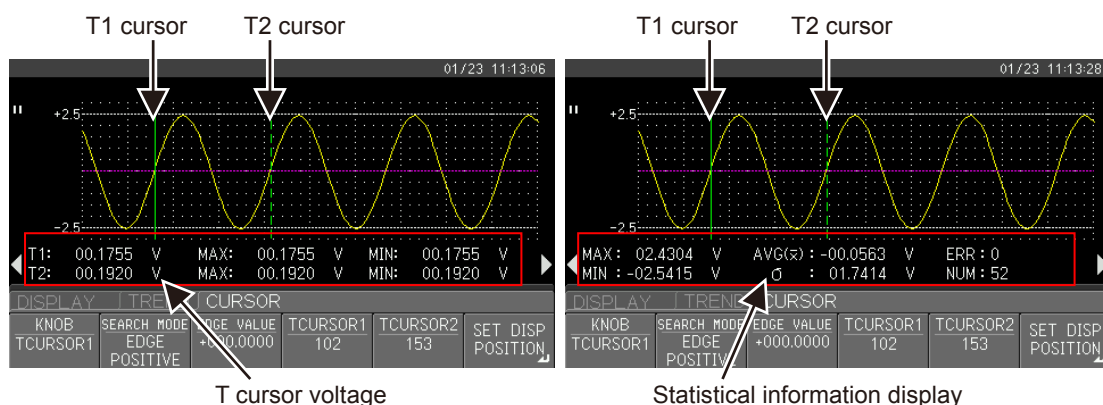
- 4** TCURSOR1/TCURSOR2 : The addresses of the T1 and T2 cursor positions are displayed in the menu.
TOP, BOTTOM, DISP CENTER, and TRIG can be selected on the sub menu, and if the corresponding menu key (M1 to M4) is selected, T1 and T2 cursors move accordingly.
- 5** SET DISP POSITION : If the cursor set using KNOB is T1 or T2, the waveforms move to the display position so that the cursor moves to the center of the screen. If the cursor set using KNOB is TRACK, the expansion ratio is adjusted so that both the T1 and T2 cursors are on the screen, and the waveforms move so that the center of the T1 and T2 cursors is at the center of the screen.

4.9.2.4 Statistical function using T cursors

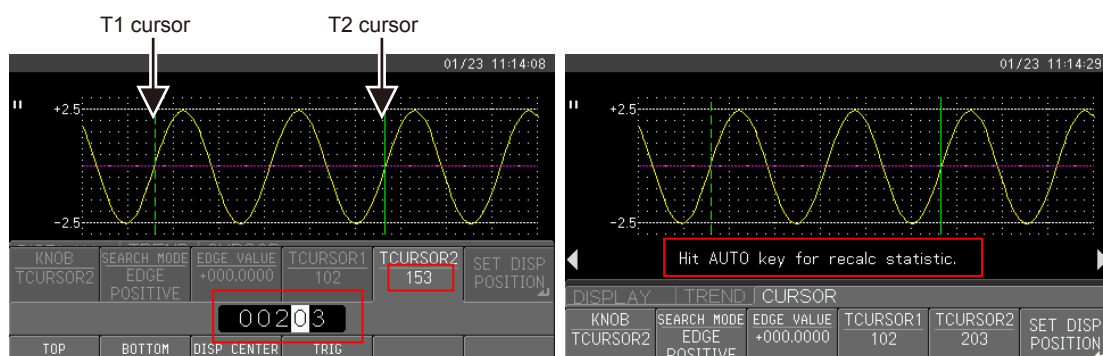
The statistical function during offline browsing calculates the data within the range between the two T cursors of the offline trend chart. Therefore, the statistical information display becomes invalid when either the T1 or T2 cursor or both are moved, in which case the AUTO key must be pressed to perform recalculation.

The process is described below.

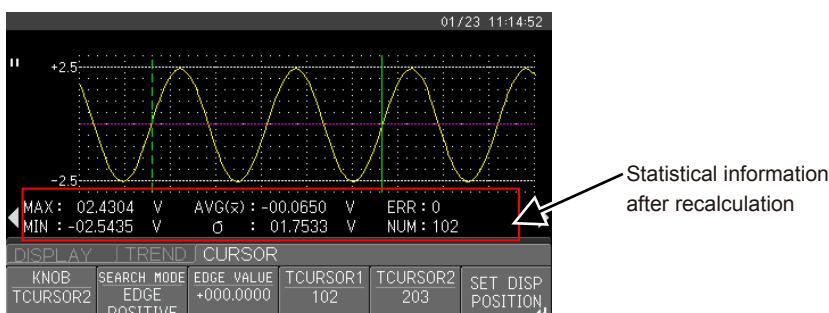
- 1) The data in LOG memory is displayed in the offline trend chart (on the left screen). Press the right arrow and switch the secondary display from T cursor voltage measurement screen to the statistic information screen (on the right screen).



- 2) Select the CURSOR/TCURSOR2 menu, and move the T2 cursor by turning the rotary knob clockwise (153 to 203 in this example). Use [CLOSE] to close the TCURSOR2 menu (on the lower right screen).



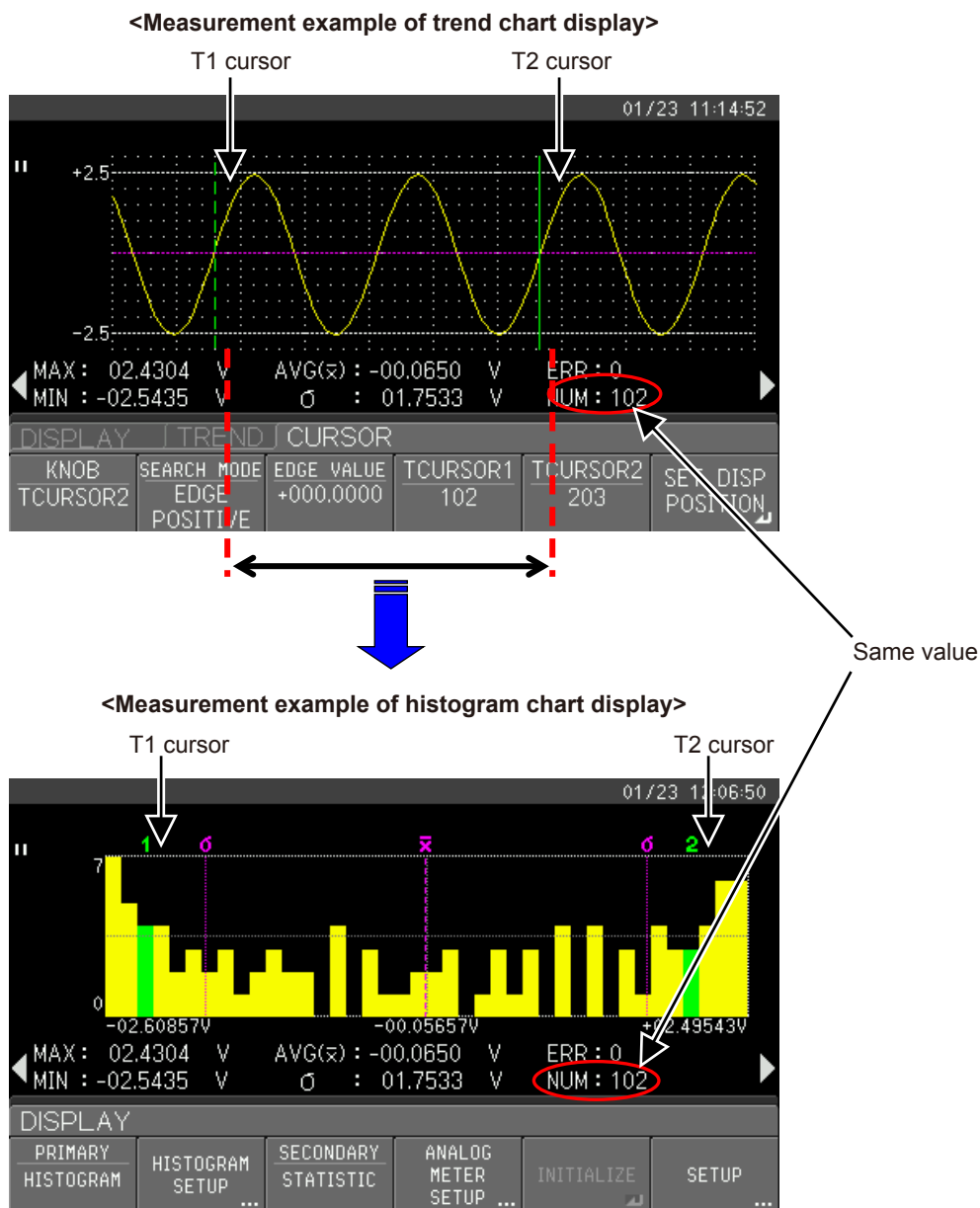
- 3) When "Hit AUTO key for recall statistic" is displayed at the center of the right screen in 2), press [AUTO] to recalculate the statistical information. The recalculated statistical information screen below is displayed.



4.9 Trend Chart Display Function

4.9.2.5 Relationship between offline trend chart display and histogram chart display

The data in the range between the T cursors in the offline trend chart display is the data displayed on the offline histogram chart display (see section 4.10). As described in section, 4.9.2.4, when a T cursor is moved, the distribution status, data amount, and the statistical information change too. The following figure shows a measurement example.



4.10 Histogram Chart Display Function

The histogram chart display function shows a bar graph where the range of the measurement result is shown on the horizontal axis and the frequency of occurrence is shown on the vertical axis.

The histogram chart display is partially described in section 2.3.3.3, "Histogram chart display," and the display operation is described in section 3.2.2, "Operation using keys and rotary knob (switch)." For detailed specifications, see section 4.8, "Histogram chart display function," in the IM DM7560-02EN.

The histogram chart display function is roughly classified into online and offline display modes. The online histogram chart displays the measured data in real time. It generates the histogram from up to 2,000,000,000 data values. The offline histogram chart display shows the results obtained from the data in the range between the T cursors on the trend chart. Refer to section 4.11, "Log function," for details in the LOG memory. The following tables provide the features and descriptions about the online histogram chart display function and offline histogram chart display function.

Features and descriptions about online histogram chart display function

	Feature	Description
1	Real-time display	- Waveform data acquisition and display can be stopped and restarted freely.
2	Single-shot measurement	- When measuring in SINGLE mode (TRIG setting), you can press the HOLD (TRIG) key to acquire and display measurement data.
3	Cursor display	- Display of mean value X cursor, σ cursor, H1 and H2 cursors, movement of cursors and information displays < Secondary display > 1) Sum of the width and frequency within the range placed with two bins specified with cursors 2) Displays the range of the measurement and the frequency of the bin specified with each cursor 3) Statistical data display (when MATH/STATISTIC is set to ON)
4	Clearing of data	- Deletes the displayed data, acquires data from the beginning, and displays it. 1) INITIALIZE is executed from the DISPLAY menu. 2) When rotary knob is pressed or the like (Refer to section 6.4 for a list of data clear conditions.)

* Refer to section 4.10.1 for details on the bin in this table.

Features and descriptions about offline histogram chart display function

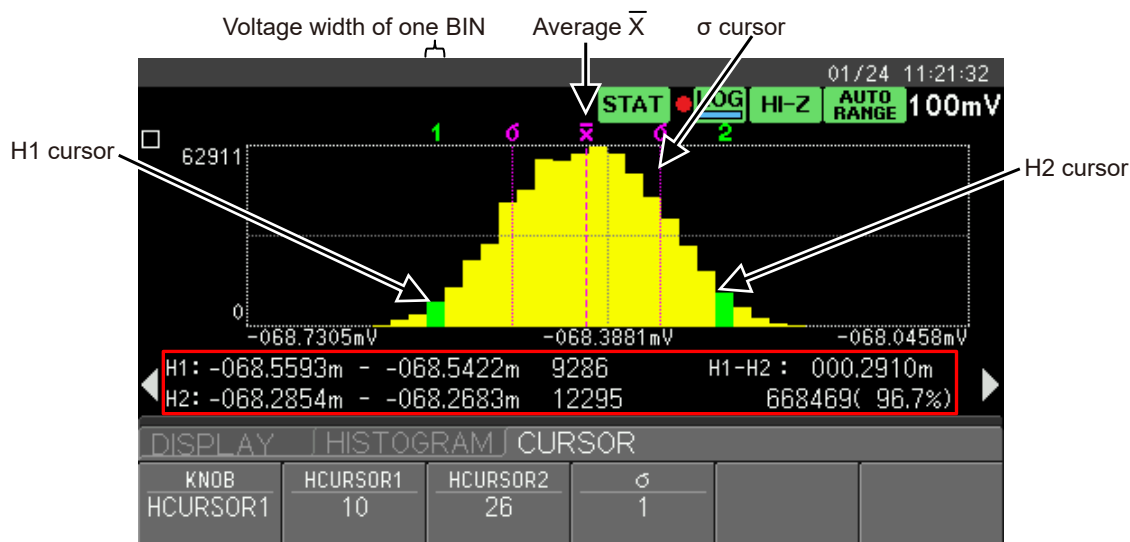
	Feature	Description
1	Display of data in LOG memory	- Displays the data currently stored in LOG memory 1) The histogram can be generated repeatedly by changing the number of bins, the mode setting, data range, and the like.
2	Cursor display	- (This is the same as the description for the online histogram chart display above)

* Refer to section 4.10.1 for details on the bin in this table.

4.10.1 Common functions of online and offline histogram chart displays

This section describes the functions common to online and offline histogram chart displays.

4.10.1.1 Screen display



The histogram chart displays the frequency distribution of the entire measurement and is displayed as a bar graph as shown in the above figure. Each bar is called a bin. Each bin has a width. The width is voltage for voltage measurement and current for current measurement. The above figure is an example of a histogram chart display for DCV measurement.

- 1 The number of bins can be set to 2, 4, 5, 10, 20, 40, 50, 100, 200, or 400 on the BIN menu. The width of one bin is decided from the width of the entire histogram and the number of bins.
- 2 The label of the vertical axis displayed at the left of the graph can be set to frequency (COUNT) or percentage (PERCENT) on the VIEW menu. This setting is applied to the frequency display of the H cursor measurement display on the secondary display.
- 3 The range of the histogram (center value and entire width) is decided by the display mode (AUTO/FULLSCALE/MANUAL). The display mode is set on the MODE menu. Refer to section 4.10.1.2, "Display mode (MODE)" for details.
- 4 The horizontal axis label under the graph shows the range of the histogram decided by the display mode setting. In the above figure, we can see from the label that CENTER is -12.3312 mV, LOWER is -12.6347 mV, and UPPER is -12.0277 mV.

For details on each sub menu of HISTOGRAM, see section 4.10.1.4, "HISTOGRAM SETUP menu."

When the secondary display is set to HISTOGRAM, the information on the histogram like the width of the bin, the total number of data values, and the number of data values outside the range can be displayed on the secondary display.

```

◀ CENTER : -12.33123m LOWER : 0          ERROR : 0
  BIN WIDTH : 12.1u      UPPER : 0        TOTAL : 494336
▶

```

Refer to section 2.3.3.3, "Histogram chart display," for details on the displayed content.

H1 and H2 cursors that specify the bin are displayed in the histogram chart. The bin specified with the cursor is drawn in green. When the secondary display is set to CURSOR, the frequency of occurrence of the specified bin and information about the range between the cursors can be displayed on the secondary display.

```

◀ H1: -068.5593m - -068.5422m 9286      H1-H2 : 000.2910m
  H2: -068.2854m - -068.2683m 12295      668469( 96.7%)
▶

```

Refer to section 2.3.3.3, "Histogram chart display," for details on the displayed content.

Also, $\bar{X}$ (average value) cursor and σ (standard deviation) cursors that show the result of STATISTIC calculation are displayed on the histogram. (Only when MATH/STATISTIC is set to ON if online.)

$\bar{X}$ cursor shows the position of the average value (dotted line) on the histogram. The σ cursor shows the position of "Average value $\pm n\sigma$ " (solid line). Here, " $N\sigma$ " means " $n\sigma = n \times \sigma$ ". The value of n can be changed by selecting σ on the CURSOR menu and turning the rotary knob.

This setting is shared with the setting of σ in the STATISTIC display on the secondary display.

Note that the standard deviation is an amount in which the difference level of the sample is shown. It is known that the probability that a certain sample is within the range of average value $\pm n\sigma$ is as follows depending on the value of n . (When the population takes a normal distribution.)

- n=1: About 68.27 %
- n=2: About 95.45 %
- n=3: About 99.73 %
- n=4: About 99.994 %
- n=5: About 99.99994 %
- n=6: About 99.999997%

4.10 Histogram Chart Display Function

4.10.1.2 Display mode (MODE)

The histogram range (center value and width) can be set using one of three modes: AUTO, FULLSCALE, and MANUAL. In online mode, the histogram data is cleared when the display mode (MODE) is changed.

AUTO mode

The range of the histogram is determined automatically from measured values.

In online mode, the histogram range is changed according to the measured values every time a measurement is made. This is convenient when the range of measurement is not known, such as when data is measured for the first time.

In offline mode, the range is adjusted so that the log data (data within the range between the T cursors on the trend chart) fits the entire screen.

FULLSCALE mode

The range of the histogram is determined according to the measurement range.

In online mode, the histogram range changes according to the current measurement range. Whenever the measurement range is changed, the histogram data is cleared because the histogram range also needs to be changed.

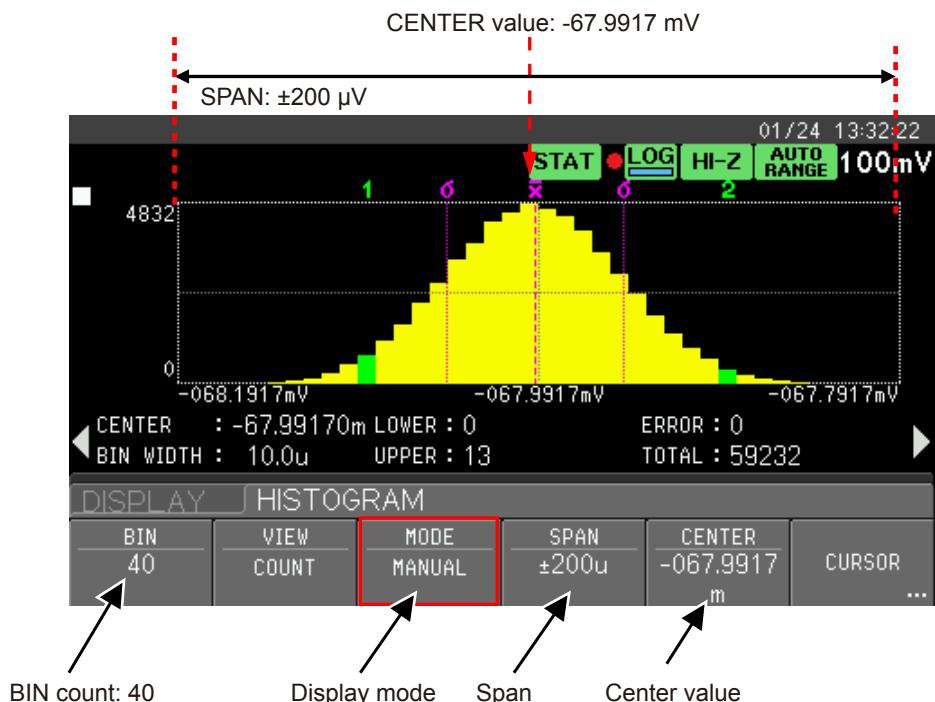
In offline mode, the largest range used to measure the log data (data within the range between the T cursors on the trend chart) is detected, and the histogram range is determined based on this range.

MANUAL mode

The histogram range is set manually.

The settings that you need to specify are the center value (CENTER) and width (SPAN) of the histogram. These are set on the CENTER and SPAN menu, respectively.

The following figure is a measurement example in MANUAL mode.



4.10.1.3 Online HISTOGRAM operation

In online mode, the histogram chart is constantly updated. Every time a measurement is made, the instrument determines which bin the measurement result belongs to, and the frequency of data occurrence of the appropriate bin is incremented. This is repeated to create the histogram chart of all the measurements.

The data of the histogram chart is continuously accumulated until it is explicitly cleared (changing of measurement conditions or data clear operation). (The operation also stops if the total number of data values reaches 2,000,000,000.)

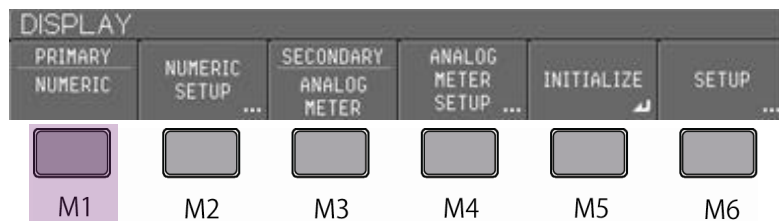
Refer to section 6.4 for instances when the data of the histogram chart is cleared.

4.10 Histogram Chart Display Function

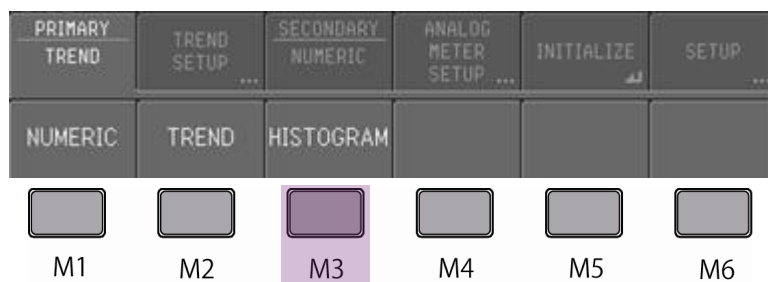
4.10.1.4 HISTOGRAM SETUP menu

This section describes how to set the histogram chart display and the settings on the HISTOGRAM SETUP menu.

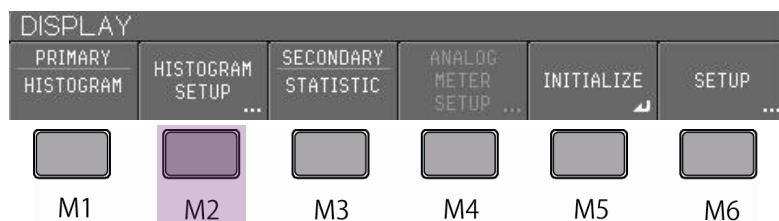
- 1 Press M1 on the DISPLAY menu below to open the PRIMARY menu in 2.



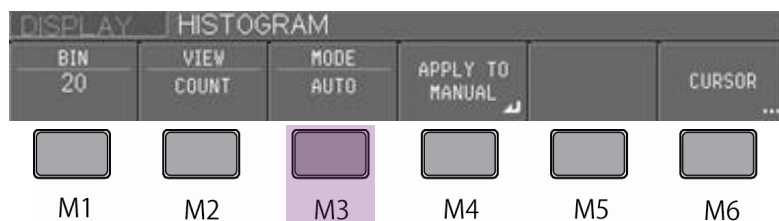
- 2 Press M3 on the following figure to select HISTOGRAM. DISPLAY menu in 3 opens.



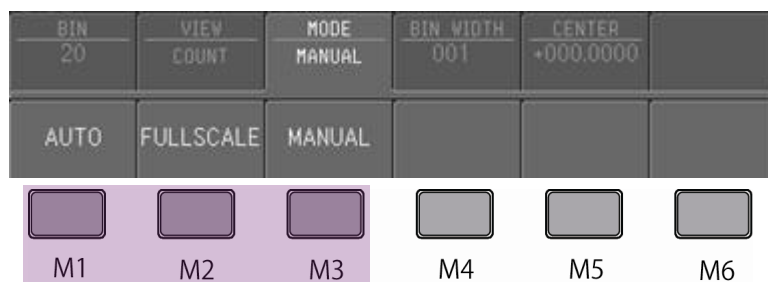
- 3 Press M2 on the following figure to select HISTOGRAM SETUP. HISTOGRAM SETUP menu in 4 opens.



- 4 Press M3 on the following figure to select MODE. MODE menu in 5 opens.



- 5 Press any of the M1 to M3s in the following figure to select the mode.



For the settings on the HISTOGRAM SETUP menu, see "HISTOGRAM SETUP menu Items and settings" on the next page. For the operation, see section 3.2.1, "Basic operation of menus."

HISTOGRAM SETUP menu Items and settings (1/2)

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
BIN		Select the BIN number using one of the following two methods.	4.10.1.2
	• DEFAULT	• Press M1 to set BIN:20.	–
	* Numeric value setting	• Turn the rotary knob to set the BIN count. Setting range: 2, 4, 5, 10, 20, 40, 50, 100, 200, 400	
VIEW		Select the vertical axis of the histogram from the following two items	4.10.1.2
	• COUNT	• Press M1 to set COUNT (frequency).	–
	• PERCENT	• Press M2 to set PERCENT (%).	
MODE		Select the method of deciding the range of the horizontal axis of the histogram from the following three modes.	4.10.1.2
	• AUTO	• The measurement data is used to automatically set the center value and span.	–
	• FULL SCALE	• The center value and span of the histogram are decided by the maximum value and minimum value in the measurement range.	
	• MANUAL	• The span and center value are set on the SPAN menu and CENTER menu below.	
APPLY TO MANUAL • When AUTO is selected in MODE above		The content of the range and the offset set in AUTO mode is copied automatically to MANUAL mode. Memo) • If APPLY TO MANUAL is executed before executing the setting in the MANUAL mode, it might become easy to operate. • Even if APPLY TO MANUAL is executed, the mode is AUTO. Switch the mode manually. Also, note that data is cleared when the mode is changed. • Because the setting resolution of SPAN is different in AUTO mode and MANUAL mode, the copied value is not appropriate. The value is rounded according to the setting resolution of MANUAL mode. • This function is invalid when there is no measurement data (immediately after changing the function or clearing data).	–
SPAN * Displayed only when MANUAL is selected in the MODE above.		Select the span from the following two methods. It is displayed only when MANUAL is selected in the MODE above.	4.10.1.2
	• DEFAULT	• Press M1 to set ± 10 for the span.	–
	* Numeric value setting	• Use the rotary knob and arrow keys to select the SPAN. Setting range: $\pm 100p$ to $\pm 500T$ (100p, 200p, 500p...500T)	
CENTER * Displayed only when MANUAL is selected in the MODE above.		Select the center value from the following two methods.	4.10.1.2
	• DEFAULT	• Press M1 to set +000.0000.	–
	• GET VAL	• The latest measurement is retrieved when the GET VAL(M2) key is pressed.	
	• +/-	• The sign (+ or -) can be set by pressing the M3 key.	
	• Selection of range of numerical value (-9 to + 9/0 to 9)	• When -9 to +9 is selected, it is possible cross over 0 from negative to positive or positive to negative by turning the rotary knob. • When 0 to 9 is selected, it is not possible to cross over 0 by turning the rotary knob.	
	* Numeric value setting	• Use the rotary knob and arrow keys to select EDGE VALUE Setting range: -999.9999 T to + 999.9999T * Suffix is added to the right of the seven digits. Minimum resolution: 0.0000001p	

Menu items and settings continue on the table of HISTOGRAM SETUP menu Items and settings (2/2) on the next page.

4.10 Histogram Chart Display Function

HISTOGRAM SETUP menu Items and settings (2/2)

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
CURSOR		H cursor is used to set movement selection and position, and σ is used to select the numeric value.	4.10.1.1
	• KNOB	Select the cursor that moves when the rotary knob is turned from the following three types. Press M1 to open the KNOB submenu. Select the cursor by pressing the corresponding. • HCURSOR1: H1 cursor moves. • HCURSOR2: H2 cursor moves. • TRACK : Both cursors move while keeping interval between them constant.	—
	• HCURSOR1	Press M2 to open the HCURSOR1 submenu. The leftmost bin is 0. • DEFAULT: Press M1 to select this. Default value is 0. * Numeric value setting: Set using the rotary knob and arrow keys. You can set an integral value within the range of 0 to BIN (set at the head of the table on the previous page).	
	• HCURSOR2	Press M3 to open the HCURSOR1 submenu. The leftmost bin is 0. • DEFAULT: Press M1 to select this. The default value is the maximum value of the bin set with BIN (set at the head of the table on the previous page). * Numeric value setting: Set using the rotary knob and arrow keys. You can set an integral value within the range of 0 to BIN (set at the head of the table on the previous page).	
	• σ	After pressing M4, turn the rotary knob to set the standard deviation (σ) displayed with the σ cursor of the histogram within the range of 1σ to 6σ . • DEFAULT: Press M1 to select this. The default value is 3 (standard deviation is 3σ). * Numeric value setting: Use the rotary knob to select from the following values. 0, 1, 2, 3, 4, 5, 6 This setting is common with the setting of standard deviation (σ) in the STATISTIC display on the secondary display. When this setting is changed, it is reflected in the STATISTIC display.	

4.10.2 Offline histogram chart display

On the offline histogram chart display, this instrument makes the histogram from the data stored in the LOG memory. The target log data in the LOG memory for the histogram is data within the range between the two T cursors on the trend chart. Therefore, the histogram with a range of your choice can be created by setting the T cursors.

Refer to section 4.9.2.5, "Relationship between offline trend chart display and histogram chart display," for the range specification using T cursors.

In online mode, when the settings of the number of bins and the mode, and the like are changed, the histogram data is cleared. But, because recalculation is possible in offline mode, it is possible to change the settings as many times as you like.

Refer to section 4.10.1.4, "HISTOGRAM SETUP menu" for details on histogram settings such as the number of bins and mode.

Thus, a detailed analysis of the measurement result is possible by specifying the range with the T cursors and changing the histogram settings on the offline histogram chart.

Section 4.10.2.1 describes how to switch from the online histogram chart display to the offline histogram chart display.

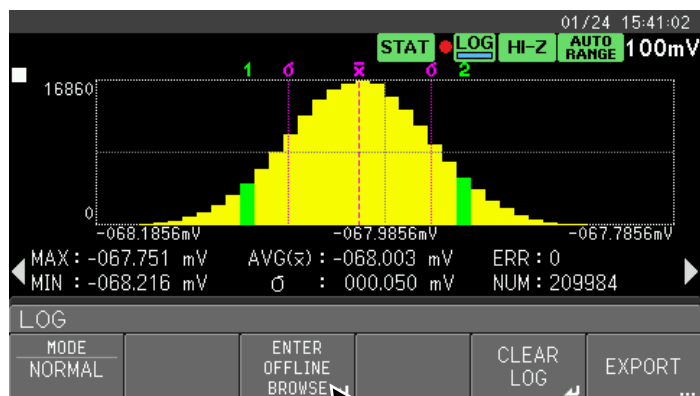
Section 4.10.2.2 describes the redisplay function of the offline histogram chart.

4.10 Histogram Chart Display Function

4.10.2.1 Switching to offline histogram chart display (offline browse function)

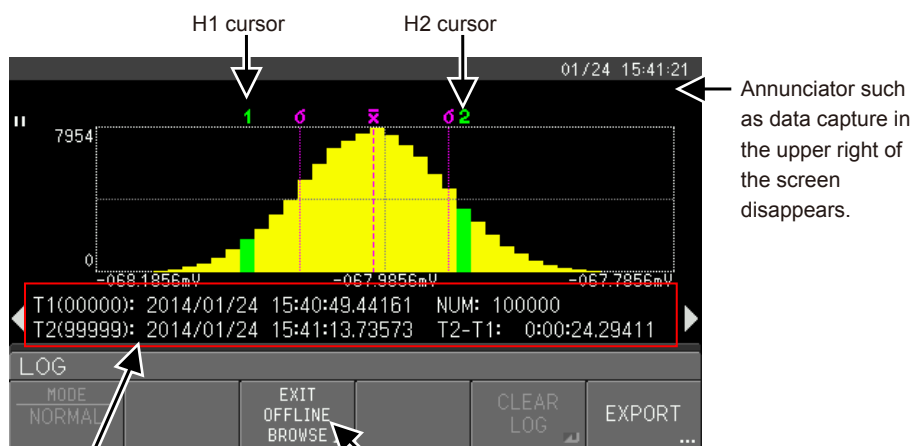
To switch from the online histogram chart display to the offline histogram chart display, press [LOG], select the LOG/ENTER OFFLINE BROWSE menu, and execute it. The following figure shows an example of switching from online to offline.

Example of online histogram chart display



Selecting ENTER OFFLINE BROWSE on the LOG menu switches to the offline browse screen below (press M3).

Example of offline histogram chart display



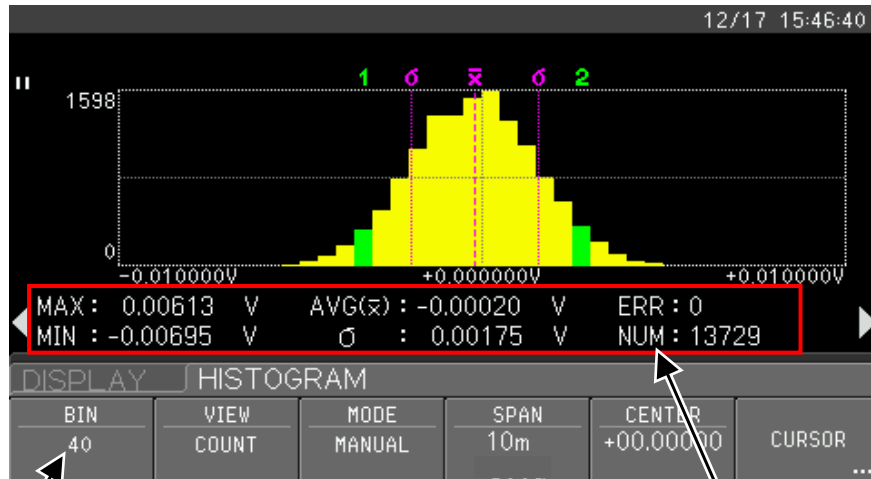
Selecting EXIT OFFLINE BROWSE on the LOG menu switches to the online browse screen above (press M3).

About the T cursor time measurement display on the secondary display
Since, for the offline trend chart display, the measurement data in the range specified by the T cursors is displayed on the histogram chart, T cursor time measurement display can be selected (see section 4.9.2.5).

4.10.2.2 Redisplay of offline histogram chart display

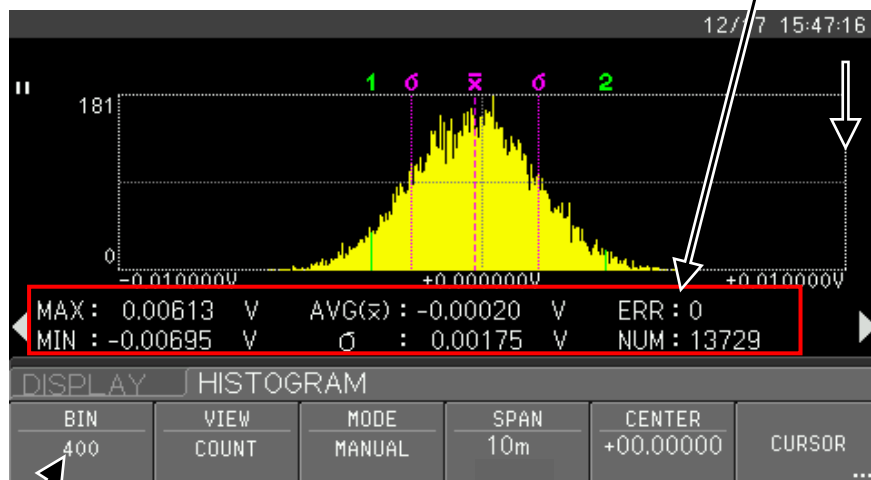
On the offline histogram chart display, you can modify the number of BINs and mode as many times as you like by changing the conditions on the HISTOGRAM menu in order to observe the waveform data in detail.

For example, if the number of BINs of the measured histogram distribution is changed, the distribution can be observed in detail as shown in the example below.



No. of BINs: 40

Statistical information does not change because the data is the same.



No. of BINs: 400

Manually changing the H1 or H2 cursor measurement, span, or center value is the same as in online mode as described in section 4.10.1.4, "HISTOGRAM SETUP menu." See "HISTOGRAM SETUP menu items and settings" of that section.

4.11 Log Function (LOG)

The log function can store up to 100,000 pieces of data. The target data is as follows:

- Measurement data • Measurement date and time
- Attribute information (measurement function, NULL calculation setting, MATH calculation setting, error type)

Modes of the log function

The log function has the following two modes, which can be selected on the LOG menu for measurement.

The outline of the logging operation to the log memory is provided below according to the mode. (Refer to < NORMAL mode > and < BULK mode > below for further details.)

- NORMAL mode
 - Always operates while measuring.
- BULK mode
 - Operates the STARTLOG key is pressed.
 - Stops when the STOP LOG key is pressed or when a stop event occurs.
 - To guarantee the sampling rate in BULK mode, operations such as displaying measurement data are not performed.

<NORMAL mode>

During measurement, data is accumulated in the LOG memory at the same time as data is displayed on the screen.

Log data is stored continuously as long as the data is not cleared.

When the number of data pieces reaches 100,000, the oldest data is deleted and new data is saved.

Refer to "Clearing of log data" on the next page for the instances when the log data is cleared.

One of indicators below is always displayed in the upper part of the screen depending on the instrument status. (The following figures are for when BACKGROUND is set to BLACK.)

-  : Indicates that log data does not exist.
-  : Indicates that less than 100,000 pieces of log data is saved.
-  : Indicates that the number of log data pieces has reached 100,000, and the oldest data is deleted, and new data is saved.

<BULK mode>

Measurement is performed without running any other functions. Logging can be performed by ensuring the sampling rate up to 30 kS/s. For details on measurement actions and setting menu, see section 4.11.2.

One of indicators below is always displayed in the upper part of the screen depending on the instrument status. (The following figures are for when BACKGROUND is set to BLACK.)

- Not displayed : Indicates that log data does not exist. This occurs just after changing to BULK mode or clearing the log data.
-  : There is no log data yet after pressing the START LOG key.
-  : Indicates that less than number of log data set on the BULK SETTING menu is stored. The screen shows the measurement display in BULK mode.
-  : Indicates that the number of log data set on the BULK SETTING menu has been reached. The oldest data is deleted, and new data is saved. The screen shows the measurement display in BULK mode.
-  : Indicates that logging has been stopped short of the number of log data set on the BULKSETTING menu.
-  : Indicates that logging has been stopped at the number of log data set on the BULKSETTING menu.

Clearing of log data

Log data is cleared when the following operations take place.

- a) Change in function
- b) Clear data operation
When the rotary knob is pressed when only the top menu of function is displayed or when INITIALIZE key is pressed on the DISPLAY menu.
- c) Turning on or off the SMOOTHING calculation
- d) Turning on or off the NULL calculation or NULL value setting
- e) Turning on or off the calculation function mode, SCALING calculation, dB calculation, or changing a parameter
- f) Execution of log clearing (LOG CLEAR)
- g) Log mode change
- h) Beginning of log in bulk mode
- i) Memory length change in bulk mode

For a list of conditions for clearing the log memory, histogram chart, and statistic calculation, refer to section 6.4.

The LOG menu includes an OFFLINE BROWSE function that displays the data currently saved in the LOG memory. It displays the content currently stored in the LOG memory with a trend chart or a histogram chart. For details on each display, see section 4.9.2 and section 4.10.2. Online display in NORMAL mode is always logged, but online measurement in BULK mode is not logged until LOG is started (LOG indicator is not displayed or only the LOG indicator without red circle is displayed). The data saved using the log function can be output to the USB memory by specifying a USB directory (folder) name and file name on the EXPORT menu.

You can also set whether to output the measurement date/time and attribute information on the menu. (See "EXPORT menu items and settings" in section 4.11.1.) For specifications of logging, see section 4.5 in the IM DM7560-02EN.

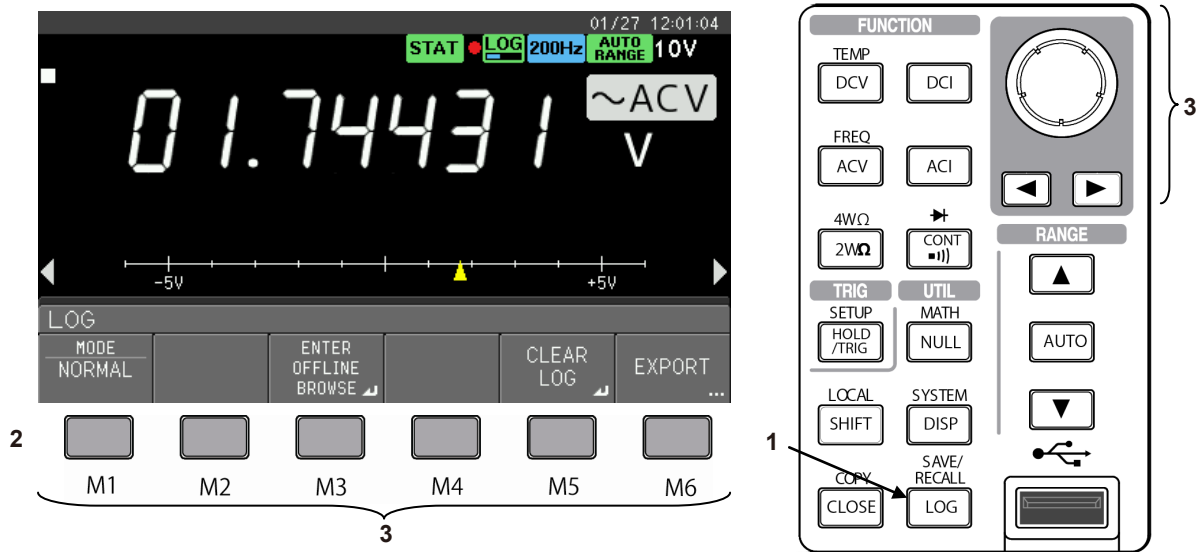
Refer to section 4.11.3, "Log data (CSV form)" for details on the output data.

4.11 Log Function (LOG)

4.11.1 Log measurement in NORMAL mode

This section describes how to set the log function and the settings on the LOG menu in NORMAL mode.

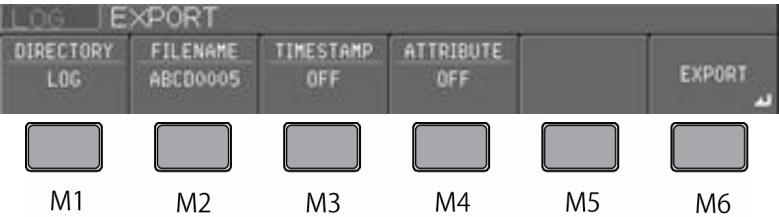
- 1 Press [LOG] to open the LOG menu.
- 2 Press M1 on the LOG menu to open the MODE menu.
Press M1 on the MODE menu to select NORMAL mode.
- 3 Set each item on the LOG menu in NORMAL mode.
Use menu keys M1 to M6 and the rotary knob under the screen (outside) for operation. For the operation, see section 3.2.1, "Basic operation of menus." For details on the settings on the LOG menu, see "LOG menu Items and settings" in NORMAL mode on the next page.



LOG menu Items and settings in NORMAL mode

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
MODE		Select from the following two modes.	—
	• NORMAL	Press M1 (default setting).	4.11
	• BULK	Press M2. For the settings in BULK mode, see section 4.11.2.	4.11 4.11.2
ENTER OFFLINE BROWSE		If M3 is pressed, the message "Do you enter offline browse?" is displayed on the menu screen. Select either of the following to set whether to change to the offline browse function.	4.9.2 4.10.2 4.11
	• OK	Press M1 to switch to the offline browse screen. If LOG memory contains data, the measurement data is displayed.	—
	• CANCEL	Press M5 to return to the initial LOG menu.	—
CLEAR LOG		Press M5 to delete the log data. If measurement is in progress, log data is saved immediately after the log is cleared.	—
EXPORT		Press M6 to store the log data to USB memory. See "Items and settings on EXPORT menu" in the table on the next page	—

EXPORT menu Items and settings



* This table continues to the next page.

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
DIRECTORY		- Set the name of the save destination directory in the USB memory. Set the name at the cursor position on the DIRECTORY creation plate using the Input/delete menu below. - The name consists of up to 8 characters and displayed on the EXPORT menu.	—
	• DEFAULT	Sets DIRECTORY in "LOG" format.	—
	• ABC	Uppercase letters can be entered at the cursor position on the DIRECTORY creation plate. M2 is used to select it and the character input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the letters, and press the knob to close DIRECTORY menu.	
	• 123	Numbers 0 to 9 can be entered at the cursor position on the DIRECTORY creation plate. M3 is used to select it and the number input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the numbers and press the knob to close DIRECTORY menu.	
	• ! @ \$	Symbols (space, symbol, etc.) can be entered at the cursor position on the DIRECTORY creation plate. M4 is used to select it and the symbol input format is displayed at the beginning on the DIRECTORY creation plate. Then, turn the rotary knob to change the symbols and press the knob to close DIRECTORY menu.	
	• BACK SPACE	Deletes the character, number, or symbol before the cursor position on the DIRECTORY creation plate. Press M5 to delete it.	
	• INPUT SPACE	Enters a space at the cursor position on the DIRECTORY creation plate. Press M6 to enter it.	

4.11 Log Function (LOG)

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
FILE NAME		- Set the file name of the log data saved on the USB memory. The name is set at the cursor position on the FILE NAME creation plate with the input menu below. - The name consists of up to 8 characters and displayed on the EXPORT menu.	—
	• DEFAULT	FILE NAME is set in "LOGDXXXX" format by pressing M1. *"XXXX": numeric value (initial value: 0000)	—
	• ABC	Uppercase letters can be entered at the cursor position on the FILE NAME creation plate. (Note) When the cursor is on the part of above-mentioned FILE NAME "XXXX," only numeric input is possible. M2 is used to select it and the character input format is displayed at the beginning on the FILE NAME creation plate. Then, turn the rotary knob to change the letters, and press the knob to close FILE NAME menu.	
	• 123	Enter a number from 0 to 9 at the cursor position on the FILE NAME creation plate. M3 is used to select it and the number input format is displayed at the beginning on the FILE NAME creation plate. Then, turn the rotary knob to change the numbers and press the knob to close FILE NAME menu.	
	• ! @ \$	Enter a symbol at the cursor position on the FILE NAME creation plate. (Note) When the cursor is on the part of above-mentioned FILE NAME "XXXX," only numeric input is possible. M4 is used to select it and the symbol input format is displayed at the beginning on the FILE NAME creation plate. Then, turn the rotary knob to change the symbols and press the knob to close FILE NAME menu.	
TIME STAMP		Set whether to save the measurement date/time in the USB memory. M3 is used.	—
	• OFF	The measurement date/time is not saved in the USB memory (default setting).	—
	• ON	The measurement date/time is saved in the USB memory.	
ATTRIBUTE		Set whether to save the attribute information (measurement function, NULL calculation setting, MATH calculation setting, and error type) in the USB memory. M4 is used.	—
	• OFF	The attribute information is not saved in the USB memory (default setting).	—
	• ON	The attribute information is saved in the USB memory.	
EXPORT		- Saves the log data in the USB memory with the folder name and file name set above. Press M6 to execute. - Refer to section 4.11.3 for the format of Log data.	4.11.3

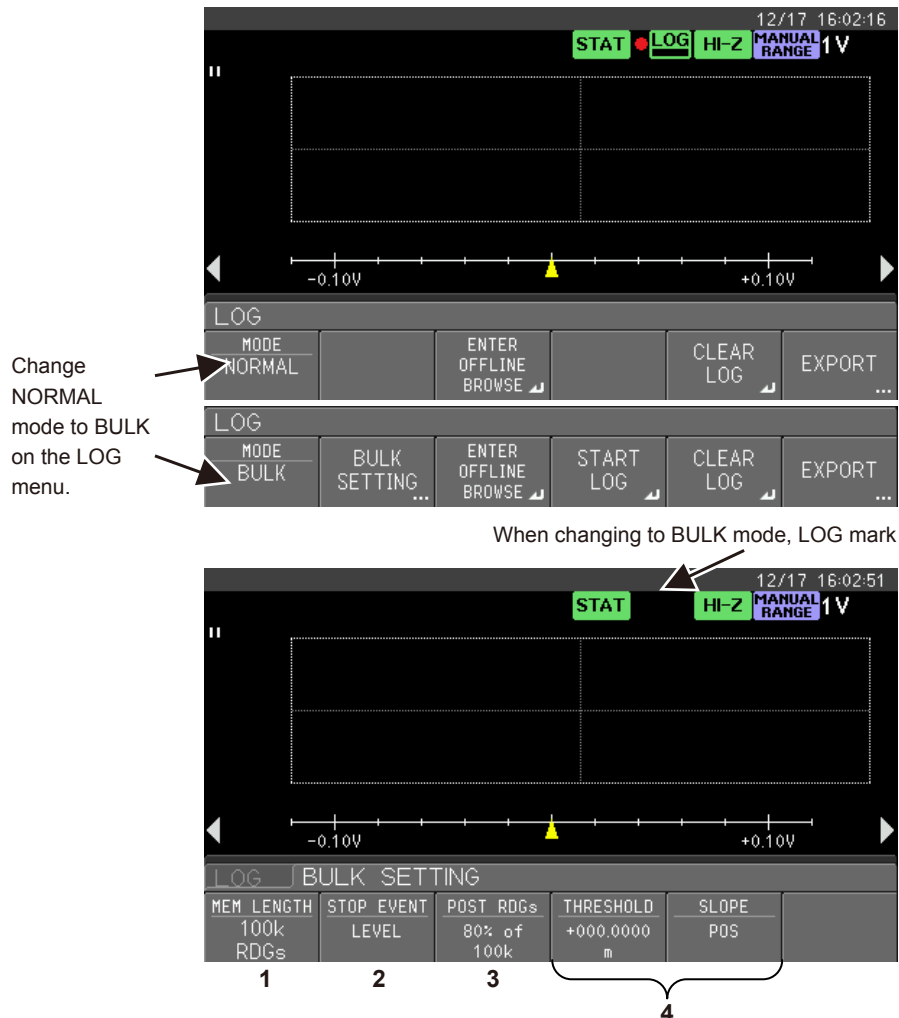
4.11.2 Log measurement in BULK mode

In BULK mode, measurement is performed by stopping all other functions. This ensures logging at sampling rates of up to 30 kS/s. Sections 4.11.2.1 and 4.11.2.2 describe the measurement action, settings, and features.

4.11.2.1 Log measurement in BULK mode

First, switch the mode to BULK on the LOG menu, and then set the acquisition conditions of BULK mode on the BULK SETTING menu. Details are explained using the following example.

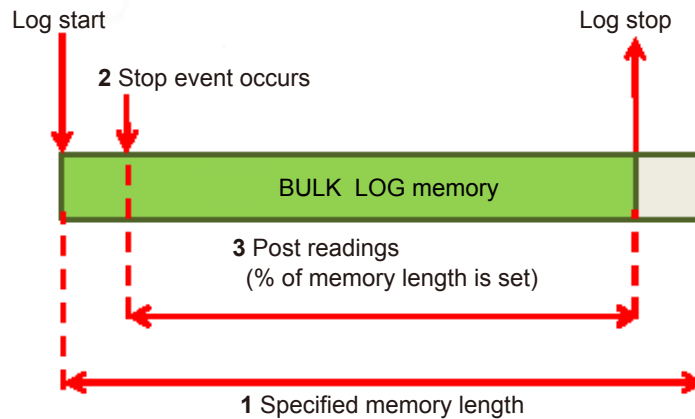
<Setting example>



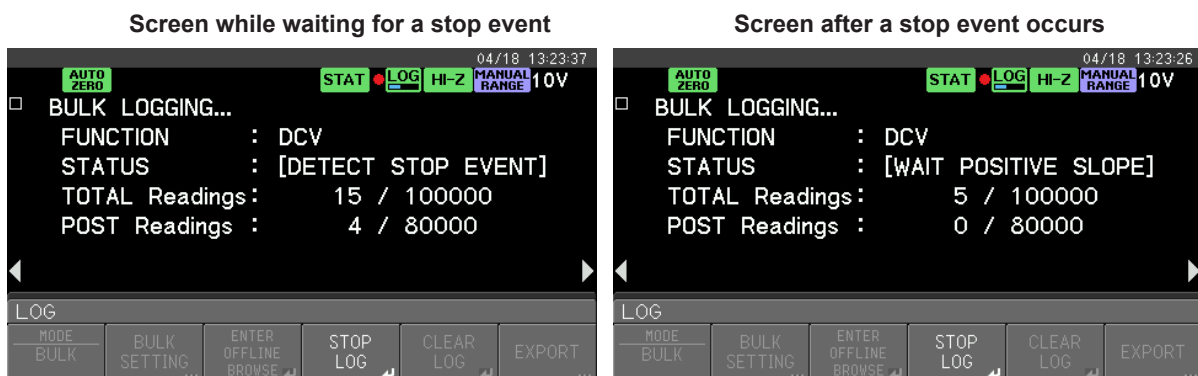
- 1 MEM LENGTH: Set the memory length to 1k, 2k, 5k, 10k, 20k, 50k, or 100k (unit: Readings).
- 2 STOP EVENT: Set the stop event to EXT TRIG, LEVEL (data value specification), or LIMIT (limit judgment result).
* EXT TRIG: Only the external trigger input is valid. The TRIG key on the front panel cannot be used to stop logging.
- 3 POST Rdgs: Specify 0 to 100% for post readings.
- 4 THRESHOLD/SLOPE/LIMIT: If STOP EVENT is set to LEVEL, set the numeric value for the threshold, and set SLOPE to POS or NEG. If STOP EVENT is set to LIMIT, select GO, NOGO, HI, or LOW.

4.11 Log Function (LOG)

<Illustration of the acquisition of bulk mode measurement and storage in the log memory>



Press START LOG to start BULK mode measurement. The screen changes to BULK mode measurement (below), and measurement starts. (However, it is not possible to begin while continuously writing to the USB memory with the VALUE TO USB function.)



The measurement stops when either of the following occurs.

- After the event specified by STOP EVENT on the BULK SETTING menu occurs and logging of data for the amount specified by POST Readings is completed.
- When the STOP LOG execute (M4) key on the LOG menu is pressed.

The screen returns to the original screen several seconds after BULK mode measurement is completed. Since data is saved in the LOG memory according to the conditions set on the BULK SETTING menu, you can use the trend chart and histogram chart display to observe the waveform and distribution status.

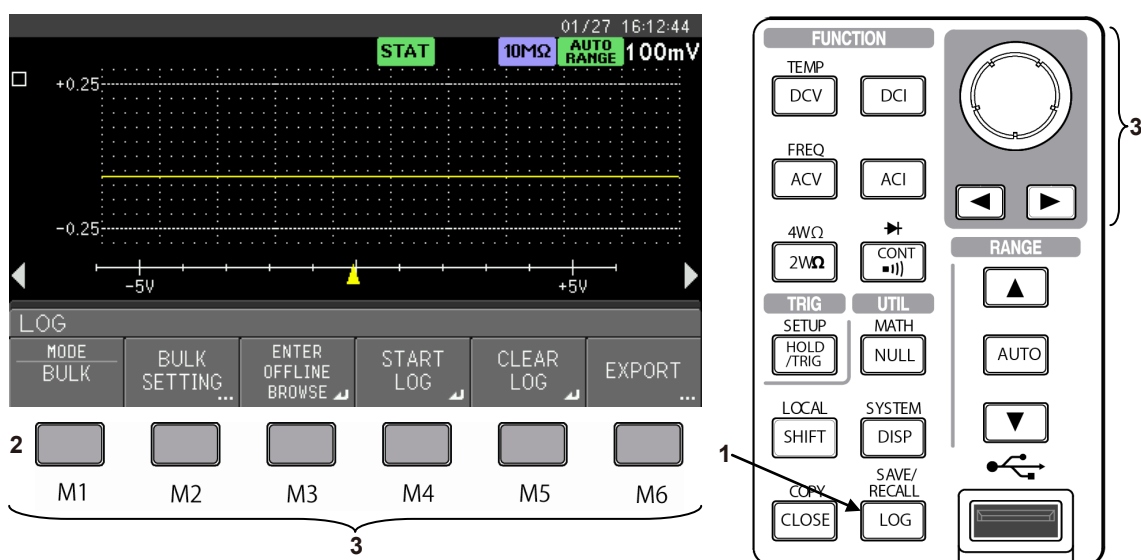
All the following functions become invalid (or their settings are fixed) while measuring in BULK mode.

- Screen display: State display of bulk log
- AUTO range: OFF (MANUAL range)
- SMOOTHING: OFF
- Trigger operation: AUTO
- Trigger delay: 0.00 ms
- Screen display of LIMIT calculation result: OFF
- Beeping based on LIMIT calculation result: OFF
- Beeping of CONT measurement: OFF
- Back panel COMPL output: OFF

4.11.2.2 Setting the LOG menu in BULK mode

This section describes how to set the log function in BULK mode and the settings on the LOG menu.

- 1 Press [LOG] to open the LOG menu.
- 2 Press M1 on the LOG menu to open the MODE menu.
Press M2 on the MODE menu to select BULK mode.
- 3 Set each item on the LOG menu in BULK mode.
Use the menu keys M1 to M6 and the rotary key under the screen (outside) for operation. For the operation, see section 3.2.1, "Basic operation of menus." For the subsequent setting of the LOG menu, see "LOG menu items and settings in BULK mode" on the next pages.



4.11 Log Function (LOG)

LOG menu items and settings in BULK mode

Menu item (1st)	Menu item (2nd)	Settings (detailed menu items)	Refer to
MODE		Select either of the following two modes.	—
	• NORMAL	Press M1 to select it. (default setting).	4.11
	• BULK	Press M2 to select it. For the BULK mode settings, see this table.	4.11 This table
BULK SETTING * Displayed only when BULK is selected in the MODE above.		Press M2 to open the BULK SETTING menu. The setting conditions for log measurement in BULK mode are specified using the following six items.	4.11.2.1
	• MEM LENGTH	Specify the memory length on the MEM LENGTH menu. • DEFAULT : Press M1 (default: 1k Readings) * Numeric value setting : Turn the rotary knob. 1k, 2k, 5k, 10k, 20k, 50k, and 100k (unit: Readings)	—
	• STOP EVENT	Specify the condition of the stop event on the STOP EVENT menu. • NONE: Continue logging until STOP LOG is pressed • EXT TRIG: This is valid only when there is an external trigger input. • LEVEL : When the waveform crosses the numeric value set with THRESHOLD below • LIMIT : When judgment result specified by LIMIT below occurs	—
	• POST Rdgs	On the POST Rdgs menu, specify the number of data values to acquire from a stop event until the log is stopped as a percentage of the data length set with MEM LENGTH. • Numeric value selection : Press M1 to M5 to specify the number. Setting range: 0, 25, 50, 75, 100 (%) * Numeric value setting: Use the rotary knob and arrow keys to specify the number. Setting range: 0 to 100% (integral number)	—
	• THRESHOLD * Displayed only when LEVEL is selected in the STOP EVENT above.	Use the THRESHOLD menu to specify the numeric value for the threshold where the stop event will be generated. • DEFAULT: Press M1 to select. default: value: +000.0000 • GET VAL: Press M2 to select. The latest measurement value is entered as a setting value. * Numeric value setting: Use the rotary knob and arrow keys to specify the value. Setting range: -999.9999T to +999.9999T	—
	• SLOPE * Displayed only when LEVEL is selected in the STOP EVENT.	Use the SLOPE menu to specify the direction in which the value specified by THRESHOLD is to be crossed: POS (rising) or NEG (falling).	—
	• LIMIT * Displayed only when LIMIT is selected in the STOP EVENT.	Use the LIMIT menu to specify any of the following four types of LIMIT judgment specified by the stop event above. • GO: Press M1. • NO-GO : Press M2. • HIGH: Press M3. • LOW : Press M4.	—
ENTER OFFLINE BROWSE		If M3 is pressed, the message "Do you enter offline browse?" is displayed on the menu screen. Select either of the following to set whether to switch to the offline browse function.	4.9.2 4.10.2 4.11
	• OK	Press M1 to switch to the offline browse screen. If the LOG memory contains data, the measurement data is displayed.	—
	• CANCEL	Press M5 to return to the initial LOG menu.	—
START LOG		Press M4 to start the log measurement in BULK mode.	4.11.2.1
STOP LOG		Press M4 during the log measurement in BULK mode to stop the log measurement and to return to the original screen.	4.11.2.1
CLEAR LOG		Press M5 to delete the log data.	4.11.2.1
EXPORT		Press M6 to open the EXPORT menu, and set the output of Log data. See "EXPORT menu items and settings" in section 4.11.1. When exporting is successful, to prevent overwriting the file, the four-digit number at the end of the file name is incremented.	4.11.1

4.11.3 Log data (CSV format)

Log data stored in the LOG memory of this instrument is set on the EXPORT menu that is explained in section 4.11.1 and is output with the EXPORT key.

Details of each item are shown in the table on the next page.

<The format of Log data >

- When TIME STAMP is set to ON and ATTRIBUTE is set to ON
Measurement data, measurement date/time (second), measurement date/time (μ s),
measurement function, NULL calculation, MATH calculation, error type (or LIMIT judgment result)
- When TIME STAMP is set to ON, ATTRIBUTE is set to OFF
Measurement data, measurement date/time (second), measurement date/time (μ s)
- When TIME STAMP is set to OFF, ATTRIBUTE is set to ON
Measurement data, measurement function, NULL calculation, MATH calculation, error type (or
LIMIT judgment result)
- When TIME STAMP is set to OFF, ATTRIBUTE is set to OFF
Measured data

4.11 Log Function (LOG)

Item		Value or setting	Output example
Measurement data		7-digit index format	+9.474861E-03
		Overload or overflow	+9.910000E+37
Measurement date/time (TIME STAMP)	Measurement date/time (second)	Year/month/day Hour: minute: second	"2013/07/01 17:38:52"
	Measurement date/time (μsecond)	Part less than 1 second	119771
Attribute information (ATTRIBUTE)	Measurement function	DCV	"DCV"
		ACV	"ACV"
		DCI	"DCI"
		ACI	"ACI"
		2WΩ	"2WOHM"
		4WΩ	"4WOHM"
		CONT	"CONT"
		DIOD	"DIOD"
		TEMP	"TEMP"
		FREQ	"FREQ"
	NULL calculation	ON	"NULL"
		OFF	Blank
	MATH calculation	SCALING	"SCALING"
		dBm	"dBm"
		dBV	"dBV"
		OFF	Blank
	Error type/LIMIT judgment result	No error, LIMIT calculation OFF	Blank
		GO	"GO"
		HIGH	"HIGH"
		LOW	"LOW"
		LIMIT calculation error	"LIMITERR"
		-overload	"-OVERLOAD"
		+overload	"+OVERLOAD"
		-overflow	"-OVERFLOW"
		+overflow	"+OVERFLOW"

The following example is log data output to the USB memory that is opened in a text editor. In this example, TIME STAMP is set to ON and ATTRIBUTE is set to ON.

<Log data example>

```
+7.335470E-03,"2014/03/28 19:19:19",319622,"DCV",,,
+7.335962E-03,"2014/03/28 19:19:19",719614,"DCV",,,
+7.319702E-03,"2014/03/28 19:19:20",119608,"DCV",,,
+7.291430E-03,"2014/03/28 19:19:20",519601,"DCV",,,
+7.299925E-03,"2014/03/28 19:19:20",919596,"DCV",,,
+7.285633E-03,"2014/03/28 19:19:21",319586,"DCV",,,
+7.310477E-03,"2014/03/28 19:19:21",719577,"DCV",,,
. . . .
. . . .
. . . .
. . . .
```

Note

- To open the log data file in Microsoft Excel, enter the following settings properly.
- Measurement data is acquired down to seven decimal places in exponential format.
 - Seconds may not be displayed in the date/time column. If this happens, change the cell format so that seconds are displayed.

4.12 Default Settings of Functions and Features

Default (factory) settings of setting items in each function and each feature are shown in Table 4.1, "Default values of settings that are saved and recalled," and Table 4.2, "Default values of settings that are not saved and recalled."

Table 4.1(a) Default values of settings that are saved and recalled

Class	Menu hierarchy	Item name	Default setting
FUNCTION	-	Function	DCV
FUNCTION/DCV	RANGE	Range	AUTO
	SAMPLE	Sampling rate	1.0 S/s
	AUTO ZERO	Auto Zero	ON
	SMOOTHING	Smoothing	OFF
	SMOOTHING/LENGTH	Smoothing count	10
	NULL	NULL calculation	OFF
	NULL/VAL	NULL value	0.000000
FUNCTION/DCI	INPUT RES.	Input impedance	AUTO
	RANGE	Range	AUTO
	SAMPLE	Sampling rate	1.0 S/s
	AUTO ZERO	Auto Zero	ON
	SMOOTHING	Smoothing	OFF
	SMOOTHING/LENGTH	Smoothing count	10
	NULL	NULL calculation	OFF
FUNCTION/ACV	NULL/VAL	NULL value	0.000000
	RANGE	Range	AUTO
	BANDWIDTH	AC filter	MID(20Hz~)
	SAMPLE	Sampling rate	2.5 S/s
	SMOOTHING	Smoothing	OFF
	SMOOTHING/LENGTH	Smoothing count	10
	NULL	NULL calculation	OFF
FUNCTION/ACI	NULL/VAL	NULL value	0.000000
	FREQ	Frequency display	OFF
	RANGE	Range	AUTO
	BANDWIDTH	AC filter	MID(20Hz~)
	SAMPLE	Sampling rate	2.5 S/s
	SMOOTHING	Smoothing	OFF
	SMOOTHING/LENGTH	Smoothing count	10
FUNCTION/2WΩ	NULL	NULL calculation	OFF
	NULL/VAL	NULL value	0.000000
	RANGE	Range	AUTO
	SAMPLE	Sampling rate	1.0 S/s
	AUTO ZERO	Auto zero	ON
	SMOOTHING	Smoothing	OFF
FUNCTION/2WΩ	SMOOTHING/LENGTH	Smoothing count	10
	NULL	NULL calculation	OFF
	NULL/VAL	NULL value	0.000000
	RANGE	Range	AUTO
	SAMPLE	Sampling rate	1.0 S/s
	AUTO ZERO	Auto zero	ON

Table 4.1(b) Default values of settings that are saved and recalled

Class	Menu hierarchy	Item name	Default setting	Remarks
FUNCTION/4WΩ	RANGE	Range	AUTO	—
	SAMPLE	Sampling rate	1.0 S/s	—
	SMOOTHING	Smoothing	OFF	—
	SMOOTHING/LENGTH	Smoothing count	10	—
	NULL	NULL calculation	OFF	—
FUNCTION/CONT	NULL/VAL	NULL value	0.000000	—
	THRESHOLD	Resistance threshold	10.0Ω	—
FUNCTION/TEMP	SAMPLE	Sampling rate	1.0 S/s	—
	AUTO ZERO	Auto zero	ON	
	SMOOTHING	Smoothing	OFF	
	SMOOTHING/LENGTH	Smoothing count	10	
	NULL/STAT	NULL calculation	OFF	
	NULL/VAL	NULL value	0.000000	
	SENSOR/TYPE	Type of sensor	TC	
	SENSOR/TC TYPE	Type of thermocouple	K	
	SENSOR/COLD JUNCTION	Cold junction temperature	0.0°C	
FUNCTION/FREQ	SENSOR/RTD TYPE	Type of resistance temperature sensor	Pt100	
	RANGE	Range	AUTO	—
	MODE	Mode	FREQ	—
	GATE TIME	Gate time	100 ms	—
	SMOOTHING/STAT	Smoothing	OFF	—
	SMOOTHING/LENGTH	Smoothing count	10	—
	NULL/STAT	NULL calculation	OFF	—
	NULL/VAL	NULL value	0.000000	—
FUNCTION/FREQ	ACV	ACV measurement value display	OFF	—
	TRIG	Trigger mode	AUTO	—
	SAMPLE COUNT	No. of samples/trigger	1	—
	DELAY	Delay time	0.0 ms	—
	INTERVAL	Interval time	0.0 ms	—
	EXT TRIGGER	External trigger	DISABLE	—
MATH	MATH	—	OFF	—
	SCALING/MODE	Scaling calculation mode	(X-A)*B/C	—
	SCALING/A	Scaling calculation constant A	0.0000	—
	SCALING/B	Scaling calculation constant B	1.0000	—
	SCALING/C	Scaling calculation constant C	1.0000	—
	SCALING/D	Scaling calculation constant D	1.0000	—
	dB/MODE	dB calculation mode	dBm	—
	dB/RE-R	dB calculation, standard resistance	600Ω	—
	dB/RE-V	dB calculation, standard voltage	1.0 uV	—
	dB/REL	dB difference calculation	OFF	—
	dB/REL/VAL	dB standard value	0.0000 dB	—

4.12 Default Settings of Functions and Features

Table 4.1(c) Default values of settings that are saved and recalled

Class	Menu hierarchy	Item name	Default setting	Remarks
MATH	LIMIT/LOW	LOW setting of LIMIT calculation	OFF	–
	LIMIT/LOW LIMIT	LOW setting value of LIMIT calculation	–999.9999T	–
	LIMIT/HIGH	HIGH setting of LIMIT calculation	OFF	–
	LIMIT/HIGH LIMIT	HIGH setting value of LIMIT calculation	+999.9999T	–
	STATISTIC	Statistics calculation	ON	–
DISPLAY	PRIMARY	Primary display	NUMERIC	–
	NUMERIC/MASKING	Mask of numeric value display	OFF	–
	NUMERIC/FONTSIZE	Font size of numeric value display	NORMAL	–
	NUMERIC/FONT	Font of numeric value display	7SEG	–
	TREND/VERTICAL/MODE	Vertical axis of trend chart	FULLSCALE	–
	TREND/VERTICAL/RANGE	Range setting of vertical axis (for MANUAL)	1.0/div	–
	TREND/VERTICAL/OFFSET	Offset setting of vertical axis (for MANUAL)	0 div	–
	TREND/CURSOR/KNOB	Type of cursor on trend chart	TCURSOR1	–
	TREND/SEARCH MODE	Search mode on trend chart	OFF	–
	TREND/EDGE VALUE Note	Level voltage of edge of search mode	0.000000(0.00000)	–
	HISTOGRAM/BIN	No. of bins on histogram chart	20	–
	HISTOGRAM/VIEW	Vertical axis setting	COUNT	–
	HISTOGRAM/MODE	Mode setting	AUTO	–
	HISTOGRAM/MANUAL SPAN	Width of span	±10	–
	HISTOGRAM/CENTER Note	Center value for MANUAL	0.0000(0.000)	–
	HISTOGRAM/CURSOR/KNOB	Type of cursor on histogram chart	HCURSOR1	–
	HISTOGRAM/CURSOR/HCURSOR1	Position of H1 cursor	0	–
	HISTOGRAM/CURSOR/HCURSOR1	Position of H2 cursor	0	–
	HISTOGRAM/CURSOR/σ STATISTIC/σ	Coefficient for standard deviation distribution	3	Sharing the setting by two menus
	SECONDARY	Secondary display	ANALOG METER	–
	ANALOG METER/MODE	Analog meter mode	FULLSCALE	–
	ANALOG METER/RANGE	Range setting of analog meter (MANUAL)	1.0/div	–
	ANALOG METER/OFFSET	Offset setting of analog meter (MANUAL)	0 div	–
	ANALOG METER/LOG MIN	Minimum value of LOG scale of analog meter (LOG)	1.0 /div	–
	ANALOG METER/LOG MAX	Maximum value of LOG scale of analog meter (LOG)	10.0 /div	–
	ARC SCALE METER/MODE	Mode of arc scale meter	FULL SCALE	–
	ARC SCALE METER/MANUAL RANGE	Range setting of arc scale meter (MANUAL)	1.0 /div	–
	ARC SCALE METER/MANUAL OFFSET	Offset setting of arc scale meter (MANUAL)	0 div	–
	ARC SCALE METER/LOG MIN	Minimum value of LOG scale of arc scale meter (LOG)	1.0 /div	–
	ARC SCALE METER/LOG MAX	Maximum value of LOG scale of arc scale meter (LOG)	10.0 /div	–
	ARC SCALE METER/TITLE/MODE	Title display form of arc scale meter	UNIT	–
	ARC SCALE METER/TITLE/TEXT	Title input form of arc scale meter	"DM7560"	–

Table 4.1(d) Default values of settings that are saved and recalled

Class	Menu hierarchy	Item name	Default setting	Remarks
LOG	MODE	Log measurement mode	NORMAL	–
	BULK/MEM LENGTH	Memory length in BULK mode	1k Readings	–
	BULK/STOP EVENT	Condition of stop event	NONE	–
	BULK/POST/Rdgs	Ratio of data to memory length	50	–
	BULK/THRESHOLD	Threshold when stop event is generated	0.000000	–
	BULK/SLOPE	Direction in which the value set with THRESHOLD is to be crossed	POSITIVE	–
	BULK/LIMIT	Content of LIMIT judgment set in stop event	GO	–
SETUP SAVE/RECALL	SETUP NAME	Setting condition name	"SETUP NAME"	–

* Settings that are saved and recalled are initialized:

- When RECALL DEFAULT on the SETUP SAVE/RECALL/RECALL menu is executed.
- Every time the instrument is started with the DEFAULT setting on SETUP SAVE/RECALL/POWER ON RECALL menu.
- When INITIALIZE on the SYSTEM/TOOLS menu is executed.

4.12 Default Settings of Functions and Features

Table 4.2 (a) Default values of settings that are not saved and recalled

Class	Menu hierarchy	Item name	Default setting	Remarks
SYSTEM	REMOTE/INTERFACE	Remote interface	USB	—
	REMOTE/COMMAND	Classification of remote command	SCPI	
	REMOTE/DELIMITER	Delimiter setting	CR+LF	
	REMOTE/GPIB/ADDRESS	Address setting	9	GP-IB/(C1)
	REMOTE/TCP/IP/DHCP	DHCP setting	OFF	LAN&RS-232 (/C2)
	REMOTE/TCP/IP/ADDRESS	Address setting	010.102.102.102	
	REMOTE/TCP/IP/SUBNET MASK	Subnet mask setting	255.255.255.0	
	REMOTE/TCP/IP/GATEWAY	Gateway setting	010.102.102.100	
	REMOTE/RS232/BIT RATE	Bit rate setting	38400bps	
	REMOTE/RS232/PARITY	Parity setting	NONE	
	REMOTE/RS232/STOP BIT	Stop bit setting	1bit	
	BEEP/KEY	Beep tone of key	ON	—
	BEEP/CAUTION	Caution tone	ON	
	BEEP/LIMIT	Beep tone for LIMIT judgment	NO-GO	
	SETUP/ANIMATION	Animation setting	ON	
	SETUP/HEADER	Header setting	DATETIME	
	SETUP/LINE FREQ	Detection setting of power supply frequency	AUTO	
	COPY/MODE	Copy output setting	SCREEN TO USB	
	COPY/SCREEN/FORMAT	File format of screen output data	PNG(COLOR)	
	COPY/SCREEN/DIRECTORY	Directory name of output data destination	"¥COPY"	
	COPY/SCREEN/FILE NAME	File name of output data	"COPY0000"	
	COPY/VALUE/ACTION	Operation of VALUE TO USBMEM	ONE TIME	
	COPY/VALUE/DIRECTORY	Directory name of text output destination	"¥TEXT"	
	COPY/VALUE/FILE NAME	File name of text output data	"TEXT0000"	
	COPY/VALUE/TIME STAMP	Date/time information of text output	ON	
	COPY/VALUE/ATTRIBUTE	Valid calculation of text output	ON	
	PANEL LOCK	Key operation on front panel	OFF	
FUNCTION/ DISPLAY	SETUP/BACK GROUND	Screen background color	BLACK	—
	SETUP/BACK LIGHT	Screen backlight brightness	HIGH	
	SETUP/LOW POWER	Power supply low power mode	OFF	
LOG	EXPORT/DIRECTORY	Directory name of logging output destination	"¥LOG"	—
	EXPORT/FILENAME	File name of logging output data	"LOGD0000"	
	EXPORT/TIMESTAMP	Date/time of logging output	ON	
	EXPORT/ATTRIBUTE	Valid calculation of logging output	ON	
SETUP SAVE/ RECALL	POWER ON RECALL/MODE	Setting condition at powering on	DEFAULT	—
	SAVE/DESTINATION	Storage of setting conditions	INTERNAL MEMORY	
	SAVE/NUMBER	Internal memory number of storage	#1	
	SAVE/DIRECTORY	Directory name of USB memory	"¥SETUP"	
	SAVE/FILE NAME	File name of saved data	"STUP0000"	
	RECALL/SOURCE	Recalling source of setting conditions		
	RECALL/NUMBER	Internal memory number of recalling source	#1	
	RECALL/DIRECTORY	Directory name of USB memory	"¥SETUP"	
	RECALL/FILE NAME	File name of recalling source data	"STUP0000"	
	RECALL/EXIT CONTROL	ON/OFF of external control	OFF	LAN&RS-232 (/C2)
	RECALL/EXIT BEGIN	Number of the first setting condition	#1	
	RECALL/EXIT END	Number of the last setting condition	#10	
	RECALL/EXIT POLARITY	Polarity of control signal	POSITIVE	

Table 4.2 (b) Default values of settings that are not saved and recalled

Class	Menu hierarchy	Item name	Default setting	Remarks
DISPLAY	TREND/HORIZONTAL/Readings/div	Horizontal resolution of waveform data on the trend chart	– (*2)	–
	TREND/HORIZONTAL/CENTER ADDR	Horizontal center address of the entire waveform on the trend chart		
	TREND/CURSOR/TCURSOR1	Address of the T1 cursor on the trend chart		
	TREND/CURSOR/TCURSOR2	Address of the T2 cursor on the trend chart		

- *1. Settings that are not saved and recalled are initialized:
 - When INITIALIZE on the SYSTEM/TOOLS menu is executed.
- *2. Set automatically whenever offline browsing starts.

5.1 Daily Cleaning

CAUTION

To prevent electric shock, be sure to remove the power cord before cleaning the instrument.

ATTENTION

Un choc électrique pouvant se produire, veiller à enlever le cordon d'alimentation avant le nettoyage.

Softly wipe the dirt off the exterior of the instrument with a soft cloth dampened with small amount of water or diluted neutral detergent.

Using solvent or detergent not to be used for cleaning may result in discoloration or unexpected failure.

Select the solvent or detergent as follows:

- Solvent and detergent to be used: Water, neutral detergent (diluted)
- Solvent and detergent not to be used: Alcohol, gasoline, acetone, lacquer, ether, thinner, and detergent including ketone

5.2 Calibration

To make accurate measurements, we recommend that the instrument be calibrated regularly.

For details on regular calibration, contact your nearest YOKOGAWA dealer.

Regular calibration is recommended once a year.

Note that the life of the data backup battery is five years in room temperature. The battery cannot be replaced by the customer.

In addition, the customer can perform calibration (calibration and adjustment) of this instrument with the SYSTEM/TOOLS/CALIBRATION menu.

The performance of each function has a standard range, but it may deviate from the range due to aging. Calibration is performed in such a case.

Section 5.3 on the IM DM7560-01EN describes calibration (adjustment) using the CALIBRATION menu.

5.3 Calibration (Adjustment) Using the CALIBRATION Menu

5.3.1 Outline

For making correct measurements, the measurement accuracy of this instrument needs to be kept at a high level. Regular inspection and calibration enable this instrument to make highly reliable measurements. This section describes the calibration (adjustment) that you can execute on the CALIBRATION menu.

After completing a calibration, it is recommended that you write down the execution date and the next calibration time on a card or sticker for management.

5.3.2 Cautions before execution

Make the following preparations, and observe the following cautions when you calibrate (adjust) this instrument.

CAUTION

- Perform calibration (adjustment) with the instrument properly installed.
- Check that the power supply voltage of this instrument is within $\pm 10\%$ of the voltage indicated on the rear panel and that the power supply frequency is 50 Hz or 60 Hz.
- Perform calibration (adjustment) in an environment where the temperature is $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is 80%RH or less.
- Warm up the instrument for at least an hour after powering on. Warm up other calibration instruments for their proper time (see the relevant instruction manual).
- Before calibrating (adjusting) this instrument, connect the calibrator, test lead, and cables.
- Never turn off the instruments or remove the test lead or cable during calibration (adjustment).

ATTENTION

- L'étalonnage (réglage) doit être effectué lorsque cet instrument est installé correctement.
- Vérifier que la tension d'alimentation de cet instrument se situe dans une plage de $\pm 10\%$ de la tension indiquée sur le panneau arrière et que la fréquence d'alimentation est de 50 Hz ou 60 Hz.
- L'étalonnage (réglage) doit être effectué à une température ambiante de $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ et une humidité relative inférieure ou égale à 80 %.
- Cet instrument doit préchauffer pendant une heure, voire plus, après sa mise sous tension. Pour le matériel d'étalonnage différent de cet instrument, l'opération de préchauffage (voir le manuel d'instruction respectif) doit être effectuée au moment voulu.
- Avant l'étalonnage (réglage) de cet instrument, raccorder le calibrateur, le câble d'essai et les câbles.
- Ne jamais mettre hors tension les instruments ni enlever le câble d'essai et le câble pendant l'étalonnage (réglage).

5.3.3 Equipment used for calibration (adjustment)

Measuring instruments

Equipment	Specifications (input/output level, range)	Required accuracy	Manufacturer and model name
DC voltage (DCV) generator	± 1100 V	11ppm	FLUKE 5700A
DC current (DCA) generator	± 0.1 A	0.02%	FLUKE 5700A
	± 10 A	0.05%	FLUKE 5700A + FLUKE 5725A or 5220A
AC voltage (ACV) generator	5 mVrms to 750 Vrms		FLUKE 5700A + FLUKE 5725A or 5205A
	15 Hz to 45 Hz	0.1%	
	45 Hz to 100 Hz	0.02%	
	100 Hz to 50 kHz	0.02%	
	50k Hz to 100 kHz	0.05%	
	100 kHz to 300 kHz	0.2%	
AC current (ACA) generator	1 A/1 kHz	0.04%	FLUKE 5700A
	10 A/1 kHz	0.05%	FLUKE 5700A + FLUKE 5725A or 5220A
Standard resistance	100 Ω	50ppm	FLUKE 5700A or FLUKE 5450A
	1.0 k Ω	50ppm	
	10 k Ω	50ppm	
	100 k Ω	50ppm	
	1.0 M Ω	50ppm	
	10 M Ω	0.05%	
	100 M Ω	0.1%	

Note

Measuring instruments above can be substituted with those with equivalent or better performances.

Cables and other items

Prepare the following cables and plugs:

- Cable with banana terminal at each end (2 sets of red and black)
- BNC cable
- BNC female ↔ double-banana plug

5.3.4 Preparation before calibration (adjustment)

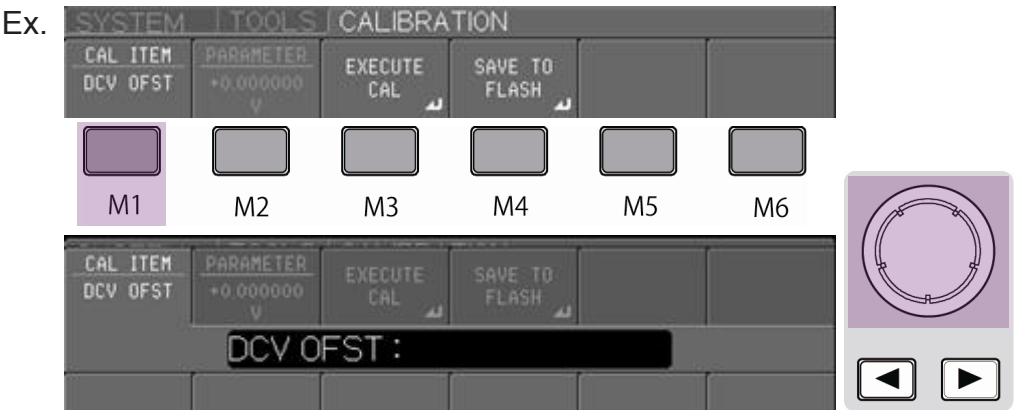
For preparation before calibration (adjustment), see sections 5.3.4.1 to 5.3.4.3.
Section 5.3.4.2 describes the basic operation on the CALIBRATION menu.

5.3.4.1 Warm up

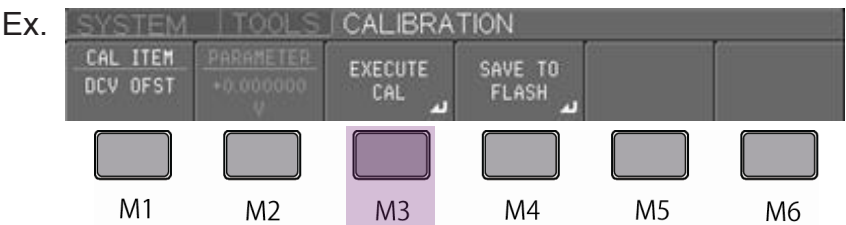
Before calibration (adjustment), warm up the instrument for at least an hour.
After warmup, if the instrument is turned off for less than 3 minutes immediately before calibration, warm up for at least 1 minute.

5.3.4.2 Common calibration (adjustment) operation

- To select the calibration (adjustment) item, press M1 on the CALIBRATION menu to select CAL ITEM, and turn the rotary knob to specify the item. Press the rotary knob to confirm the selection.
- * If the rotary knob is turned even if the CAL ITEM menu is not open, the item can be selected.



- To execute calibration (adjustment), press M3 on the CALIBRATION menu to execute EXECUTE CAL.



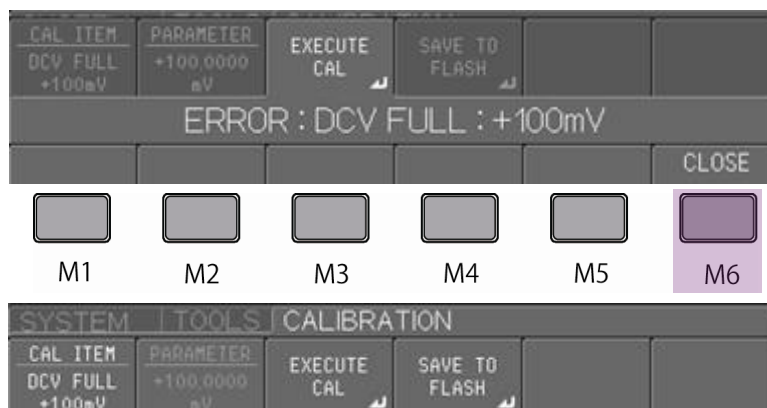
- If the calibration (adjustment) result is SUCCESS (successful), press M1 to select NEXT to automatically move to the next adjustment item.



5.3 Calibration (Adjustment) Using the CALIBRATION Menu

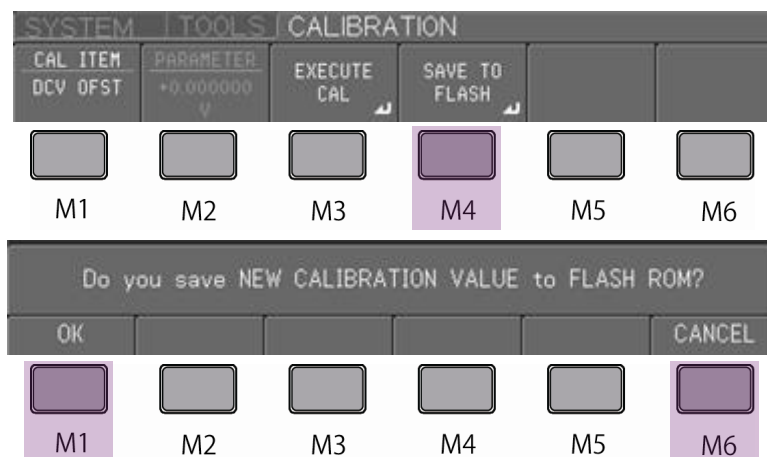
- If the calibration (adjustment) result is ERROR, press M6 to select CLOSE to automatically return to the current adjustment item.

Ex.



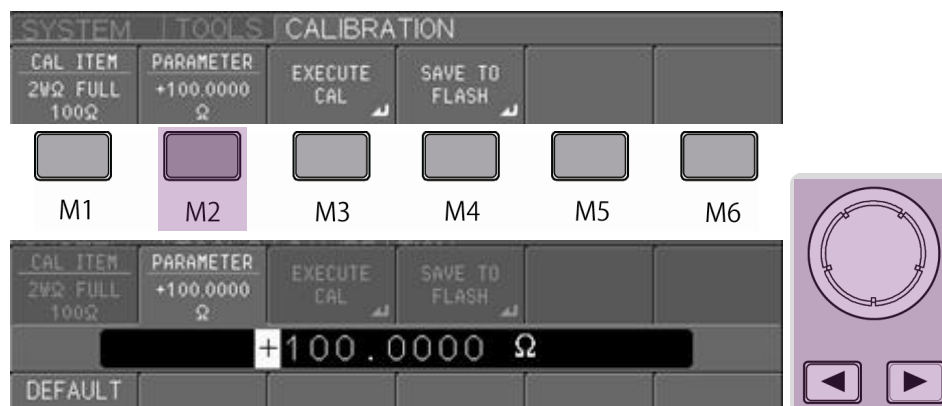
- To write the calibration (adjustment) value to the memory, press M4 on the CALIBRATION menu to select SAVE TO FLASH. If the confirmation screen appears, press M1 to write it and select [OK]. To not write, press M6 to select CANCEL.

Ex.



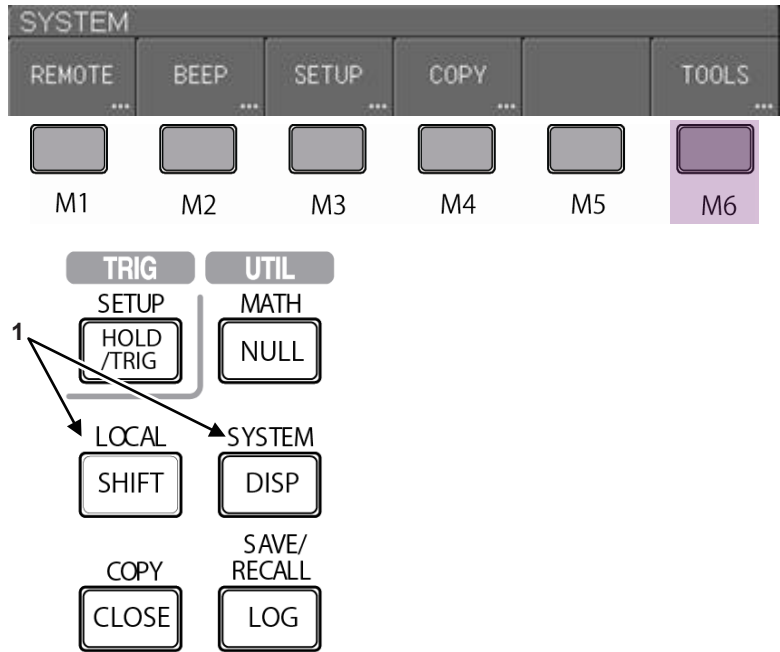
- To return from the calibration (adjustment) mode to the normal measurement mode, press [CLOSE] several times.
- To enter numeric values for the calibration (adjustment) items of resistance measurement ($2W\Omega$ or $4W\Omega$), press M2 on the CALIBRATION menu to select PARAMETER and use $\leftarrow$ and $\rightarrow$ to select the digit, and turn the rotary knob to change the numeric value. Press the rotary knob to confirm the numeric value.

Ex.

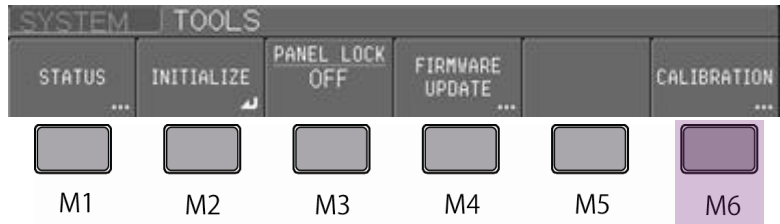


5.3.4.3 To enter CALIBRATION menu

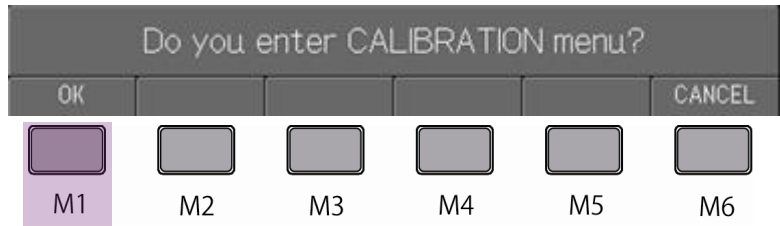
1 Press [SHIFT]→[DISP(SYSTEM)] on the following figure to open the SYSTEM menu below.



2 Press M6 in 2 to open the TOOLS menu below.



3 Press M6 in 2 to open the CALIBRATION menu below.



To exit from the CALIBRATION menu for some reason, press M6 on the figure above to return to the TOOLS menu in 2

4 To execute calibration, press M1 in 3. The menu below opens.



5.3.5 Execution of calibration (adjustment)

This section describes the calibration procedure using FLUKE 5700A+FLUKE 5725A as an example.

Sections 5.3.5.1 to 5.3.5.7 describe the execution of calibration (adjustment) of each function.

- To execute all calibration (adjustment) items, execute them in order from section 5.3.5.1 to 5.3.5.7.
- To execute a portion of the calibration (adjustment) items, execute the relevant items in sections 5.3.5.1 to 5.3.5.7.
- After the completion of calibration, write the data in the memory by referring to "To write the calibration (adjustment) value to the memory" in section 5.3.4.2."

5.3.5.1 DC voltage measurement (DCV)

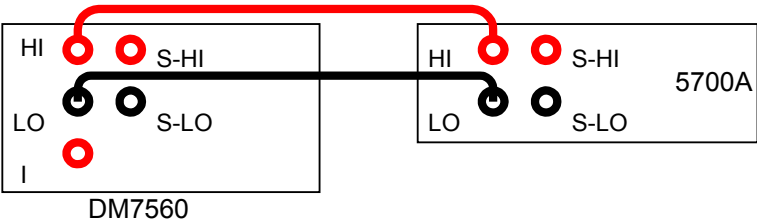
Execute the calibration of DC voltage measurement (DCV).

5.3.5.1.1 DCV offset calibration (adjustment)

Execute offset calibration (adjustment) for all ranges of the DCV circuit.

Connection method

As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · ➡ of this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
DCV OFST	0 V	

Calibration (adjustment) procedure

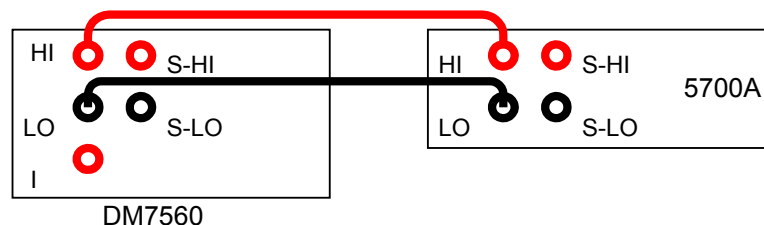
- 1 Set the output of the voltage generator (Ex. 5700A) to 0V.
- 2 Select DCV OFST on the CALIBRATION menu of this instrument, and execute EXECUTE CAL. * Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 3 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3.5.1.2 DCV gain calibration (adjustment)

Execute the calibration (adjustment) of the gain for all ranges of the DCV circuit.

Connection method

As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · $\rightarrow$ on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
DCV FULL: +100 mV	+100 mV	
DCV FULL: -100 mV	-100 mV	
DCV FULL: +1.00 V	+1.00 V	
DCV FULL: -1.00 V	-1.00 V	
DCV FULL: +10.0 V	+10.0 V	
DCV FULL: -10.0 V	-10.0 V	
DCV FULL: +100 V	+100 V	
DCV FULL: -100 V	-100 V	
DCV FULL: +1000 V	+1000 V	
DCV FULL: -1000 V	-1000 V	

Calibration (adjustment) procedure

- 1 Set the output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- 2 Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 3 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3 Calibration (Adjustment) Using the CALIBRATION Menu

5.3.5.2 AC voltage measurement (ACV)

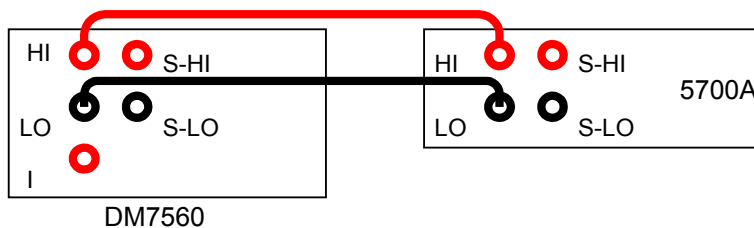
Execute the calibration (adjustment) of AC voltage measurement (ACV).

5.3.5.2.1 ACV range calibration (adjustment)

Execute the calibration (adjustment) for all ranges.

Connection method

As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · $\rightarrow$ on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
ACV 5%: 100mV	5mV 1kHz	
ACV FULL: 100mV	100mV 1kHz	
ACV 5%: 1.00V	50mV 1kHz	
ACV FULL: 1.00V	1V 1kHz	
ACV 5%: 10.0V	500mV 1kHz	
ACV FULL: 10.0V	10V 1kHz	
ACV 5%: 100V	5V 1kHz	
ACV FULL: 100V	100V 1kHz	
ACV 5%: 750V	37.5V 1kHz	
ACV FULL: 750V	750V 1kHz	

Calibration (adjustment) procedure

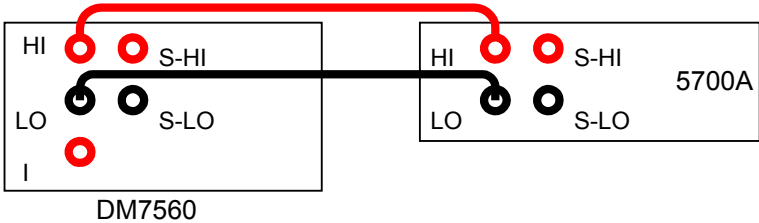
- 1 Set the frequency and output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- 2 Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 3 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3.5.2.2 Calibration (adjustment) of ACV frequency characteristics

Execute the calibration (adjustment) of the frequency characteristics.

Connection method

As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · ➤ on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
ACV 100 kHz: 100 mV	100 mV 100 kHz	
ACV 100 kHz: 1.00 V	1.00 V 100 kHz	
ACV 100 kHz: 10.0 V	10.0 V 100 kHz	
ACV 100 kHz: 100 V	100 V 100 kHz	
ACV 100 kHz: 750 V	750 V 100 kHz	

Calibration (adjustment) procedure

- 1 Set the frequency and output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- 2 Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 3 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

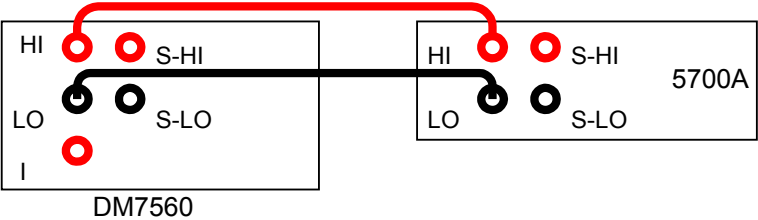
5.3 Calibration (Adjustment) Using the CALIBRATION Menu

5.3.5.3 Calibration (adjustment) of frequency measurement (FREQ)

Execute the calibration (adjustment) of frequency measurement (FREQ).

Connection method

As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · ➤ on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
FREQ 1 kHz: 10.00 V	10.00 V 1 kHz	

Calibration (adjustment) procedure

- 1 Set the frequency and output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- 2 Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 3 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3.5.4 Calibration (adjustment) of 2-wire resistance measurement (2WΩ)

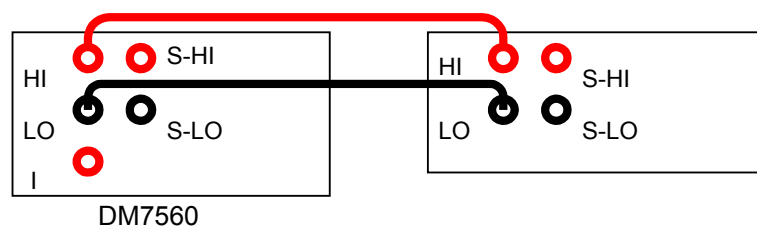
Execute the calibration (adjustment) of 2-wire resistance measurement (2WΩ).

5.3.5.4.1 Calibration (adjustment) of offset of 2WΩ

Execute the calibration (adjustment) of offset for all ranges.

Connection method

As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · $\rightarrow$ on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
2 WΩ OFST: 100 Ω	0 Ω	2 wire Comp: ON (internal resistance is canceled)
2 WΩ OFST: 1 kΩ	0 Ω	2 wire Comp: ON (internal resistance is canceled)
2 WΩ OFST: 10 kΩ	0 Ω	2 wire Comp: ON (internal resistance is canceled)
2 WΩ OFST: 100 kΩ	0 Ω	2 wire Comp: OFF
2 WΩ OFST: 1 MΩ	0 Ω	2 wire Comp: OFF
2 WΩ OFST: 10 MΩ	0 Ω	2 wire Comp: OFF

* "2 wire Comp: ON" and "2 wire Comp: OFF" in the Remarks column of the table above are the settings for the 5700A. If other calibration equipment is used, configure it so that the resistance in the instrument is canceled.

Calibration (adjustment) procedure

- 1 Set the output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- 2 Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 3 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

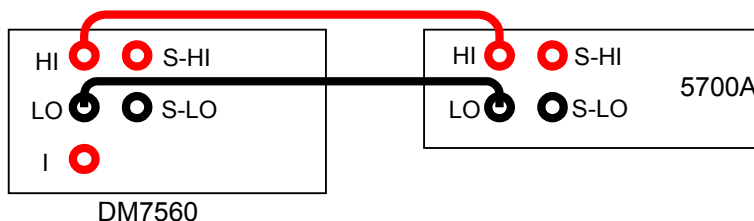
5.3 Calibration (Adjustment) Using the CALIBRATION Menu

5.3.5.4.2 Calibration (adjustment) of gain of 2W Ω

Execute the calibration (adjustment) of the gain for all ranges.

Connection method

As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · $\rightarrow$ on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
2 W Ω FULL: 100 Ω	100 Ω	2 wire Comp: ON
2 W Ω FULL: 1 k Ω	1 k Ω	2 wire Comp: ON
2 W Ω FULL: 10 k Ω	10 k Ω	2 wire Comp: ON
2 W Ω FULL: 100 k Ω	100 k Ω	2 wire Comp: OFF
2 W Ω FULL: 1 M Ω	1 M Ω	2 wire Comp: OFF
2 W Ω FULL: 10 M Ω	10 M Ω	2 wire Comp: OFF
2 W Ω : 100 M Ω	OPEN	2 wire Comp: OFF

* "2 wire Comp: ON" and "2 wire Comp: OFF" in the Remarks column of the table above are the settings for the 5700A. If other calibration equipment is used, set the range with "2 wire Comp: ON" in the Remarks column so that the resistance in the instrument is cancelled.

Calibration (adjustment) procedure

- 1 Set the output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- 2 Selection is made on the CALIBRATION/PARAMETER menu of this instrument according to the calibration (adjustment) item table above and the resistance value on the input column above is set in PARAMETER menu.
- 3 Use CALIBRATION menu of this instrument to execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 4 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3.5.5 Calibration (adjustment) of 4-wire resistance measurement (4WΩ)

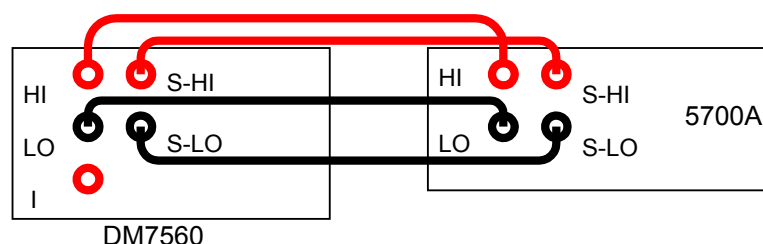
Execute the calibration (adjustment) of 4-wire resistance measurement (4WΩ).

5.3.5.5.1 Calibration (adjustment) of offset of 4WΩ

Execute the calibration (adjustment) of offset for all ranges.

Connection method

- As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · $\rightarrow$ on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).
- As shown below, connect the HI terminal and LO terminal of SENSE 4WΩ of this instrument to S-HI terminal (HI terminal of SENSE) and S-LO terminal (LO terminal of SENSE) of the voltage generator (Ex. 5700A).



Calibration (adjustment) item

CAL ITEM	Input	Remark
4 WΩ OFST: 100 Ω	0 Ω	2 wire Comp: OFF, EX SNS : ON
4 WΩ OFST: 1 kΩ	0 Ω	2 wire Comp: OFF, EX SNS : ON
4 WΩ OFST: 10 kΩ	0 Ω	2 wire Comp: OFF, EX SNS : ON
4 WΩ OFST: 100 kΩ	0 Ω	2 wire Comp: OFF, EX SNS : ON
4 WΩ OFST: 1 MΩ	0 Ω	2 wire Comp: OFF, EX SNS : ON
4 WΩ OFST: 10 MΩ	0 Ω	2 wire Comp: OFF, EX SNS : ON

* "2 wire Comp: ON," "2 wire Comp: OFF," "EX SNS: ON," and "EX SNS: OFF" in the Remarks column of the table above are the settings for the 5700A. If other calibration equipment is used, set the range with "2 wire Comp: ON, EX SNS: ON" in the Remark column so that the resistance in the instrument is canceled.

Calibration (adjustment) procedure

- Set the output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL.
 - * Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

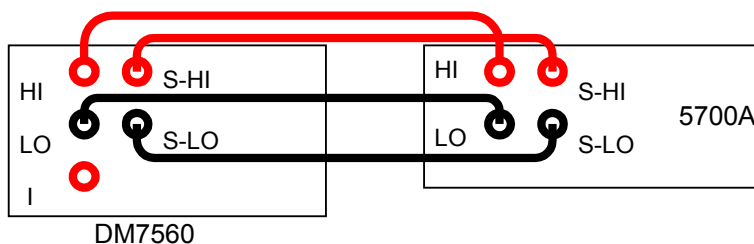
5.3 Calibration (Adjustment) Using the CALIBRATION Menu

5.3.5.5.2 Calibration (adjustment) of gain of 4WΩ

Execute the calibration (adjustment) for gain of all ranges.

Connection method

- As shown in the following figure, connect the HI terminal and LO terminal of INPUT V · Ω · → on this instrument to the HI terminal and LO terminal of the voltage generator (5700A in the following example).
- As shown below, connect the HI terminal and LO terminal of SENSE 4 WΩ of this instrument to S-HI terminal (HI terminal of SENSE) and S-LO terminal (LO terminal of SENSE) of the voltage generator (Ex. 5700A).



Calibration (adjustment) item

CAL ITEM	Input	Remark
4 WΩ FULL: 100 Ω	100 Ω	2 wire Comp: OFF, EX SNS : ON
4 WΩ FULL: 1 kΩ	1 kΩ	2 wire Comp: OFF, EX SNS : ON
4 WΩ FULL: 10 kΩ	10 kΩ	2 wire Comp: OFF, EX SNS : ON
4 WΩ FULL: 100 kΩ	100 kΩ	2 wire Comp: OFF, EX SNS : ON
4 WΩ FULL: 1 MΩ	1 MΩ	2 wire Comp: OFF, EX SNS : ON
4 WΩ FULL: 10 MΩ	10 MΩ	2 wire Comp: OFF, EX SNS : ON

- * "2 wire Comp: ON," "2 wire Comp: OFF," "EX SNS: ON," and "EX SNS: OFF" in the Remarks column of the table above are the settings for the 5700A. If other calibration equipment is used, set the range with "2 wire Comp: ON, EX SNS: ON" in the Remark column so that the resistance in the instrument is canceled.

Calibration (adjustment) procedure

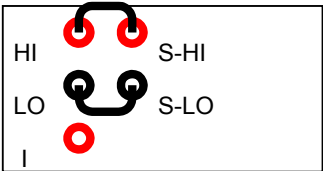
- 1 Set the output of the voltage generator (Ex. 5700A) according to the calibration (adjustment) item table above.
- 2 Selection is made on the CALIBRATION/PARAMETER menu of this instrument according to the calibration (adjustment) item table above and the resistance value on the input column above is set in PARAMETER menu.
- 3 Use CALIBRATION menu of this instrument to execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 4 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3.5.5.3 Calibration (adjustment) of 100 MΩ range of 4WΩ

Execute the calibration (adjustment) for the 100 MΩ range.

Connection method

- As shown in the following figure, connect the HI terminal and HI terminal of SENSE 4WΩ, and the LO terminal of INPUT V · Ω · $\rightarrow$ and the LO terminal of SENSE 4WΩ.



DM7560

Calibration (adjustment) item

CAL ITEM	Input	Remark
4 WΩ: 100 MΩ	None	Calibration device not used

* None is entered in the input column since no calibration equipment is used.

Calibration (adjustment) procedure

- Make the connection as shown above (without calibration equipment).
- Use CALIBRATION menu of this instrument to execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3 Calibration (Adjustment) Using the CALIBRATION Menu

5.3.5.6 DC current measurement (DCI)

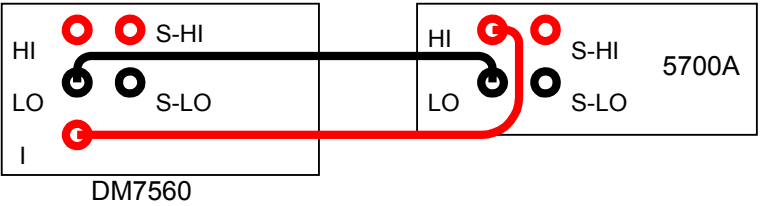
Execute the calibration (adjustment) of DC current measurement (DCI).

5.3.5.6.1 Calibration (adjustment) of DCI offset

Execute the calibration (adjustment) of offset for the DCI circuit.

Connection method

- As shown in the following figure, connect the LO terminal of INPUT I on this instrument to the LO terminal of the voltage generator.
- As shown in the following figure, connect the HI terminal of INPUT I on this instrument to the HI terminal of the voltage generator (example: 5700A).



Calibration (adjustment) item

CAL ITEM	Input	Remark
DCI OFST:	0 A	

Calibration (adjustment) procedure

- 1 Set the output of the current generator (Ex. 5700A) to 0 A.
- 2 Select DCI OFST: on the CALIBRATION menu of this instrument to execute EXECUTE CAL.
* Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- 3 Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

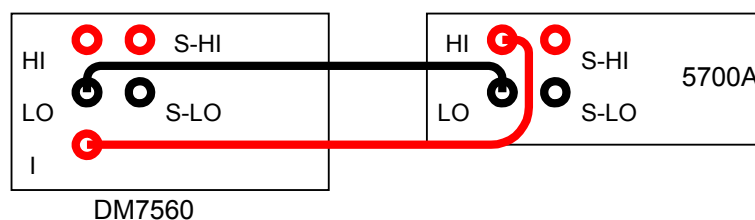
5.3.5.6.2 Calibration (adjustment) of DCI gain

Execute the calibration (adjustment) of gain for the DCI circuit.

Connection method

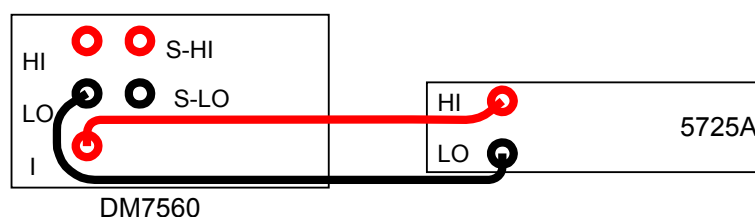
<Connection for calibration (adjustment) of 1 A or less>

- As shown in the following figure, connect the LO terminal of INPUT I on this instrument to the LO terminal of the voltage generator (example: 5700A).
- As shown in the following figure, connect the HI terminal of INPUT I on this instrument to the HI terminal of the voltage generator (example: 5700A).



<Connection for calibration (adjustment) of 3 A>

- As shown in the following figure, connect the LO terminal of INPUT I on this instrument to the LO terminal of the voltage generator (5725A in the following example).
- As shown in the following figure, connect the HI terminal of INPUT I on this instrument to the HI terminal of the voltage generator (5725A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
DCI FULL: +1.00 mA	1 mA	Connected to 5700 A
DCI FULL: -1.00 mA	-1 mA	Connected to 5700 A
DCI FULL: +10.0 mA	10 mA	Connected to 5700 A
DCI FULL: -10.0 mA	-10 mA	Connected to 5700 A
DCI FULL: +100 mA	100 mA	Connected to 5700 A
DCI FULL: -100 mA	-100 mA	Connected to 5700 A
DCI FULL: +1.00 A	1 A	Connected to 5700 A
DCI FULL: -1.00 A	-1 A	Connected to 5700 A
DCI FULL: +3.00 A	3 A	Connected to 5725 A
DCI FULL: -3.00 A	-3 A	Connected to 5725 A

Calibration (adjustment) procedure

- Set the output of the voltage generator (Ex. 5700 A or 5725A) according to the calibration (adjustment) item table above.
- Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL.
 - * Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.3 Calibration (Adjustment) Using the CALIBRATION Menu

5.3.5.7 AC current measurement (ACI)

Execute the calibration (adjustment) of AC current measurement (ACI).

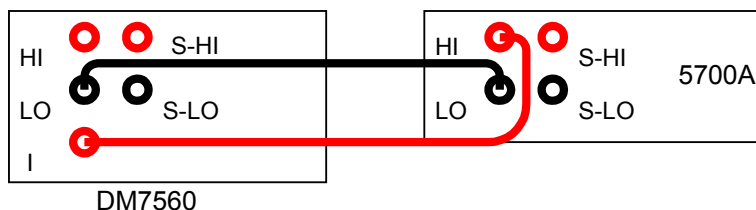
5.3.5.7.1 Calibration (adjustment) of ACI range

Execute the calibration (adjustment) of the range for the ACI circuit.

Connection method

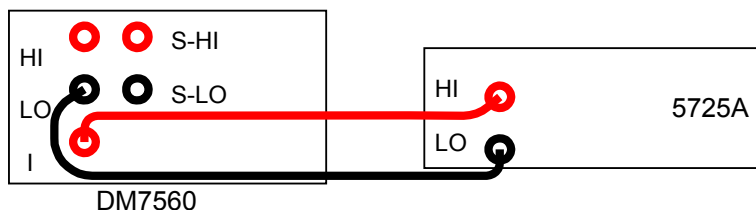
<Connection for calibration (adjustment) of 1 A or less>

- As shown in the following figure, connect the LO terminal of INPUT I on this instrument to the LO terminal of the voltage generator (5700A in the following example).
- As shown in the following figure, connect the HI terminal of INPUT I on this instrument to the HI terminal of the voltage generator (5700A in the following example).



<Connection for calibration (adjustment) of 3 A>

- As shown in the following figure, connect the LO terminal of INPUT I on this instrument to the LO terminal of the voltage generator (5725A in the following example).
- As shown in the following figure, connect the HI terminal of INPUT I on this instrument to the HI terminal of the voltage generator (5725A in the following example).



Calibration (adjustment) item

CAL ITEM	Input	Remark
ACI 5%: 1.00 A	50 mA 1 kHz	Connected to 5700A
ACI FULL: 1.00 A	1 A 1 kHz	Connected to 5700A
ACI 5%: 3.00 A	150 mA 1 kHz	Connected to 5725A
ACI FULL: 3.00 A	3.00 A 1 kHz	Connected to 5725A

Calibration (adjustment) procedure

- Set the output of the current generator (Ex. 5700A or 5725A) to the current value and frequency in the input column of calibration items above.
- Use the CALIBRATION menu of this instrument to select items according to the calibration (adjustment) item table above, and execute EXECUTE CAL. Calibration (adjustment) requires several minutes until SUCCESS or ERROR message is displayed.
- Select the NEXT menu to switch the menu, and execute the next item EXECUTE CAL or SAVE TO FLASH.

5.4 Fuse Replacement

In current measurement, the fuse may be blown because of overcurrent. If this happens, replace the fuse.



WARNING

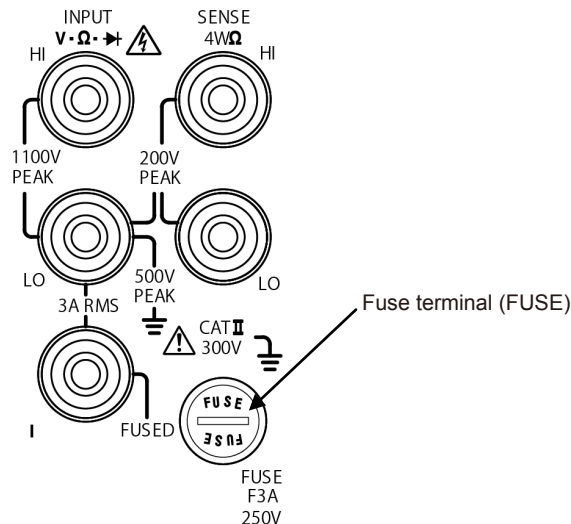
- To prevent electric shock, be sure to power off this instrument, remove the power supply cord from the outlet, and remove all cables (e.g. test lead). To prevent damage to this instrument, use the supplied or specified two fuses for replacement. If you need a fuse, contact your nearest YOKOGAWA dealer listed at the end of this manual.
- Specified fuse 3 A/250 V



AVERTISSEMENT

- Un choc électrique pouvant se produire, s'assurer de mettre cet instrument hors tension, débrancher le cordon d'alimentation de la prise et enlever tous les câbles (par exemple, câble d'essai). Compte tenu du fait que cet instrument peut se détériorer, utiliser les 2 fusibles de rechange fournis ou préconisés. En l'absence de fusible, contacter le revendeur YOKOGAWA le plus proche.
- Fusible préconisé 3 A/250 V

- 1 As shown below, press the fuse terminal (FUSE) with a flat-blade screwdriver driver (-) and rotate it counterclockwise. The fuse holder appears. Remove the fuse along with the holder.



- 2 Replace with the specified fuse.
- 3 Push the fuse holder with new fuse.
- 4 Press it with a flat-blade screwdriver, and rotate it clockwise to lock it.

6.1 Common Items of Functions

Precaution on settling (measurement after measuring high voltage (300 Vrms or more) and large current (1 A or more))

After measuring high voltage (300Vrms or more) or large current (1A or more), the temperature of input terminal and main unit will increase and may affect measurement accuracy. Before making measurements, wait for the conditions below to be satisfied when measuring current and when measuring voltage and resistance.

<When measuring current>

For current measurement, especially highly sensitive measurement, after measuring high voltage (300 Vrms or more) or large current (1 A or more), measure by referring to the following:

- Wait for the reading to stabilize (several minutes) with the terminals open.
 - * After waiting several minutes with the terminals open, fluctuation of the displayed current will stabilize.

<When measuring voltage and resistance>

For voltage and resistance measurement, especially highly sensitive measurement, after measuring high voltage (300 Vrms or more) or large current (1 A or more), measure by referring to the following:

- Wait for the reading to stabilize (several minutes) at minimum input (short).
 - * After waiting several minutes with the terminals shorted, fluctuation of the displayed voltage and resistance will stabilize.

6.2 Function-Specific Items

6.2.1 Voltage measurement (DCV, ACV)

Measurement of low level voltage (100 mV range or less)

At the highest sensitive measuring range 100 mV in voltage measurement, up to 6.5 digits can be displayed, and the resolution is 0.1 μV .

In measuring low level voltage, you must pay close attention to measurement system noise and thermoelectromotive force.

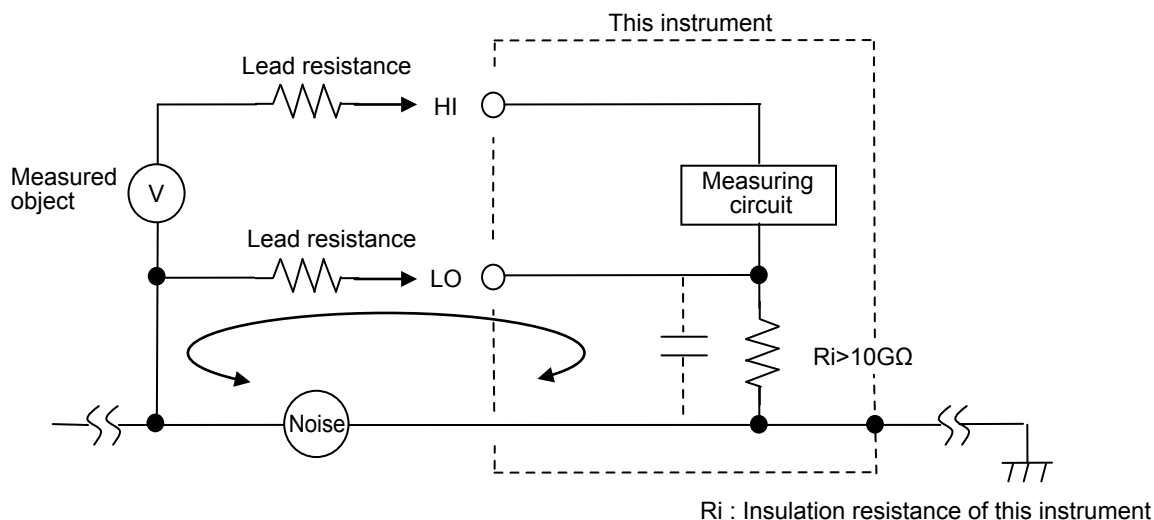
To reduce the effect of noise, the following countermeasures are effective:

- Fix the lead wires.
- Shield the lead wires.
- Make the lead wires short.
- Measure by setting the SMOOTHING function on the menu.

The material of the signal input terminal of this instrument is copper. If lead wire made of other material (e.g. ferrous) is connected, thermoelectromotive force is generated, and accurate measurement may not be achieved. Always use copper leads. Even when a copper lead wire is used, thermoelectromotive force may be generated if heat balance with input terminal cannot be obtained such as immediately after connection. Allow sufficient time to pass after connecting the input terminal before making measurements.

When voltage is measured with both the case ground of this instrument and the ground of the measured object connected to a common earth ground, a loop is formed through the ground as shown in the figure below. If noise or potential difference appears between the ground of the measured object and the case ground of this instrument in this condition, electric current flows through the measurement lead, and errors are produced in the measured voltage.

If this happens, errors can be decreased by connecting the power supply ground of this instrument to the same point as the ground of the measured object or enhancing the circuit between the measured object and the case ground of this instrument.



6.2.2 Alternating current voltage measurement (ACV) and alternating current measurement (ACI)

Voltage measurement and current measurement at low frequencies

Two types of the AC filter bandwidth (BANDWIDTH) can be selected depending on the frequency of the input signal. The time required to stabilize the measurement value can be adjusted with the BANDWIDTH setting.

If the input signal frequency is 200 Hz or more, the time for stabilization can be reduced by setting HIGH (200 Hz or more) for BANDWIDTH. However, trade-off occurs between this and measurement accuracy.

If the input signal frequency is 200 Hz or less, set LOW (20 Hz or more) for BANDWIDTH. However, the measurement value may not be stable depending on the input signal. In this case, deviation can be averaged and stable measurement can be achieved by using the SMOOTHING function on the menu. Set LENGTH (average times) as required.

In addition, for details on the measurement stable time including range switching, refer to the response time in the table of AC system (ACV, ACI) of section 4.1, "Common specifications/ Sampling rate," in IM DM7560-02EN.

6.2.3 2 terminal resistance measurement (2MΩ) and 4 terminal resistance measurement (4WΩ)

High resistance measurement

When high resistance is measured, fix the test lead. In order to reduce the effect of hum noise, SMOOTHING operation, cable shortening and shielding are also effective.

Low resistance measurement

Since low resistance measurement is affected by test lead contact resistance and thermoelectromotive force of the input terminal section, wait for the measurement display to stabilize after connection.

The test lead resistance and contact resistance between test lead and measured object resistance can also be canceled using the NULL calculation function. Please refer to section 4.6.2

6.2.4 Temperature measurement (TEMP)

For accurate temperature measurement

To measure temperature accurately, pay close attention to the following items:

- Sufficiently and thermally connect the point of temperature measurement and the measuring point of the thermocouple.
- Input terminal HI-LO must be thermally balanced at the time of temperature measurement. This balance may be unstable immediately after the thermocouple is connected. Further, during measurement, prevent wind from hitting the input terminal.
- When measuring the temperature of a liquid, measure after stirring the liquid well to eliminate unbalanced temperature distribution.
- In order to set more accurate cold junction temperature, provide a standard contact temperature compensator, and connect the thermocouple to be used to the standard contact temperature compensator. And then set the cold junction temperature so that the instrument indicates the value of the standard contact temperature compensator.

6.3 AUTO ZERO Function

The AUTO ZERO function can only be used in direct current voltage measurement (DCV), direct current measurement (DCI), 2 terminal resistance measurement ($2W\Omega$) and temperature measurement (TEMP, thermocouple or RTD($2W$)). In 4 terminal resistance measurement ($4W\Omega$) and temperature measurement (TEMP, RTD($4W$)), AUTO ZERO is always turned on.

Note: In ACV, ACI, FREQ, CONT, and DIODE, the AUTO ZERO function is not available.

Operation when AUTO ZERO is set ON

First, the internal circuit of the instrument is separated from the input signal, and the zero value inside the instrument is read.

Next, the internal circuit of the instrument is connected to the input signal, and the input signal value is read.

Lastly, the zero value is subtracted from the input signal, and this becomes the measurement result.

In this manner, minute offset voltage of the internal circuit of instrument that affects reliability can be eliminated.

This operation is performed at each measurement when AUTO ZERO is ON.

Operation when AUTO ZERO is set to OFF

When AUTO ZERO is set to OFF, the zero value is read once, and this value is subtracted from the subsequent input signal readings. The zero value is acquired again when the function, range, or sampling rate is changed.

Operation when AUTO ZERO is set to ONCE

When AUTO ZERO is set to ONCE, the zero value is acquired again immediately, and the AUTO ZERO is set to OFF thereafter. The zero value is subtracted from the input signal readings thereafter until the function, range, or sampling rate is changed or AUTO ZERO is set to ONCE again.

If integration time is set to 1PLC or less (100 S/s or more), the instrument runs as though AUTO ZERO is set to ONCE, even if AUTO ZERO is set to ON or OFF. The zero value is acquired at 1PLC (100 S/s), and it is subtracted from the input signal readings in the specified integration time.

Note) Even if AUTO ZERO is set to ON when the sampling rate is faster than 1PLC, the instrument runs as though AUTO ZERO is set to OFF.

6.4 Table of Conditions for Clearing Data

The table below shows the conditions that causes the data in the LOG memory, the trend chart, the histogram chart, and the statistic calculation to be cleared.

- Yes : Data is cleared.

- No : Data is not cleared.

Operations	LOG memory	Trend chart	Histogram chart	Statistics calculation result
Function change	Yes	Yes	Yes	Yes
Setting (ON/OFF, LENGTH) change of SMOOTHING of Function	Yes	Yes	Yes	Yes
Setting (ON/OFF, NULL VALUE) change of NULL of Function	Yes	Yes	Yes	Yes
SENSOR setting change of TEMP measurement	Yes	Yes	Yes	Yes
MODE (frequency/cycle) change in FREQ measurement	Yes	Yes	Yes	Yes
Change in MATH calculation setting (each parameter of SCALING/dB calculation)	Yes	Yes	Yes	Yes
Setting change of STATISTIC calculation (Only at the switch of OFF → ON)	No	No	Yes	Yes
Setting (MODE, number of BIN, CENTER, and SPAN) change of HISTOGRAM	No	No	Yes	Yes
Measurement range change (However, when MODE of HISTOGRAM is only FULLSCALE)	No	No	Yes	Yes
MODE (NORMAL/BULK) change in LOG measurement	Yes	Yes	Yes	Yes
MEM LENGTH (memory length) change in BULK MODE of LOG measurement	Yes	Yes	Yes	Yes
Starting of BULK MODE measurement of LOG measurement	Yes	Yes	Yes	Yes
Execution of CLEAR LOG	Yes	No	No	No
Execution of INITIALIZE on the DISPLAY menu	Yes	Yes	Yes	Yes
Execution of INITIALIZE on the SYSTEM/TOOLS menu	Yes	Yes	Yes	Yes
Setting (MODE, FREQ) change of SYSTEM/SETUP/LINE FREQ (power frequency)	Yes	Yes	Yes	Yes
Setting change of SYSTEM/SETUP/DATETIME (date and time)	Yes	Yes	Yes	Yes
Execution of CALIBRATION on the SYSTEM/TOOLS menu	Yes	Yes	Yes	Yes
Execution of SETUP RECALL (default, internal memory, and USB)	Yes	Yes	Yes	Yes
When rotary knob is pressed on the most significant hierarchical menu of each function	Yes	Yes	Yes	Yes